Implementation Science

SYSTEMATIC REVIEW

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Advancing the selection of implementation science theories, models, and frameworks: a scoping review and the development of the SELECT-IT meta-framework

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Abstract

Background Theories, models, and frameworks (TMFs) are central to implementation practice and research. Selecting one or more TMF(s) for a project remains challenging due to numerous options and limited guidance. This study aimed to (1) identify and categorize the reported purposes and attributes of TMFs, as well as the practical considerations of TMF users, and (2) synthesize these findings into a meta-framework that supports implementation practitioners and researchers in selecting TMFs.

Methods A scoping review was conducted using Joanna Briggs Institute guidelines. Medline, Embase, and CINAHL were searched to identify articles on the selection of TMFs. Articles were selected and data extracted using Covidence. Inductive thematic analysis was used to refine and categorize purposes, attributes and practical considerations. The meta-framework was developed by mapping these categories onto a sequential process, pilot-testing through case studies, and iteratively refining it based on team feedback.

Results Of 9,276 records, 43 articles (2005–2024) were included. Most articles reported TMF purposes (41 articles), followed by attributes (30) and practical considerations (13). Seven distinct purposes were identified: (1) enhancing conceptual clarity, (2) anticipating change and guiding inquiry, (3) guiding the implementation process, (4) guiding identification of determinants, (5) guiding design and adaptation of strategies, (6) guiding evaluation and causal explanation, and (7) guiding interpretation and dissemination. Additionally, 24 TMF attributes were grouped into five domains: clarity and structure, scientific strength and evidence, applicability and usability, equity and sociocultural responsiveness, and system and partner integration. Ten practical considerations were grouped into three domains: team expertise and readiness, resource availability, and project fit. These findings informed the development of the **S**ystematic **E**valuation and Se**lect**ion of **I**mplementation Science **T**heories, Models and Frameworks (SELECT-IT) meta-framework, comprising four steps: (1) determine the purpose(s) of using TMF(s); (2) identify potential TMFs; (3) evaluate short-listed TMFs against attributes; and (4) assess practical considerations of using TMF(s) within the project context. A worked example and two user-friendly worksheets illustrate its utility.

Conclusions This study advances understanding of the selection of implementation science TMFs by distinguishing inherent TMF attributes from practical considerations. The SELECT-IT meta-framework offers a structured,

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context-sensitive approach for selecting appropriate TMFs. Future research should evaluate its validity and utility across diverse contexts.

Keywords Implementation research, Implementation practice, Quality improvement, Theory, Model, Framework, Theoretical approaches, Evidence-based practice, Knowledge translation

Contributions to the literature

- This study identifies and categorizes seven overarching purposes, 24 attributes, and 10 practical considerations for selecting implementation science TMFs, addressing gaps in clarity and guidance.
- It emphasizes underexplored attributes such as equity, trust, and cultural safety, aligning the selection of TMFs with contemporary needs in implementation practice and research.
- A four-step meta-framework, SELECT-IT, is proposed to support systematic, context-sensitive TMF selection, incorporating purposes, attributes and practical considerations.
- A worked example and two user-friendly worksheets are introduced, making the framework accessible for diverse healthcare settings and implementation challenges.

Background

In implementation practice and research, theories, models, and frameworks (TMFs) are essential to guide activities aiming to support the adoption, penetration and sustainability of evidence-based interventions, practices, programs, and policies in healthcare [1, 2]. While informal (or implicit) theories based on experience and tacit knowledge can provide valuable insights into addressing specific implementation contexts [3, 4], they also present challenges, such as a lack of standardization, the potential to overlook existing evidence, and susceptibility to personal biases [5–7]. To overcome these limitations, TMFs offer a structured and evidence-informed approach, facilitating key activities such as identifying key stakeholders, assessing barriers and enablers, developing implementation strategies, and evaluating implementation [1, 8–11]. Implementation science TMFs draw upon various disciplines, including anthropology, behavioral economics, organizational theory, psychology, and sociology [12]. Implementation practitioners and scientists using TMFs can enhance their implementation efforts by clarifying contextual factors, and leveraging the TMFs' adaptability to meet diverse project requirements, supporting the design and evaluation of robust implementation strategies [13–16].

Recent reviews have highlighted the proliferation of implementation science TMFs, with Strifler and colleagues [17] identifying 159 TMFs and Wang and colleagues [18] identifying 143 TMFs. These TMFs serve different purposes, operate at various levels (e.g., individual, organization, system), and include constructs ranging from broad to operational [17, 18]. The strength and extent of supporting evidence for TMFs vary widely; some theories benefit from decades of empirical research and validation, while more recent implementation theories and frameworks may not yet have the same level of empirical support [19, 20]. Finally, there is considerable variability in the extent to which TMFs have been operationalised and practical tools developed. This has led to challenges in selecting appropriate TMFs, exacerbated by the lack of clarity in distinguishing the purposes of TMFs from their attributes and context-specific practical considerations [1, 21–23].

Despite the development of numerous TMFs, the stated purposes of implementation science TMFs have often been narrowly defined, with the predominant framework developed by Nilsen separating these in three: describing and/or guiding the process of translating research into practice; understanding and/or explaining what influences implementation outcomes; and evaluating implementation [1]. Moreover, previous studies have tended to conflate the attributes (characteristics) of TMFs with context-, project- or team-specific factors—i.e., practical considerations such as the fit of the TMF with a given implementation problem or project, or its acceptability to the study team—which can lead to a lack of clarity as to how TMFs should be selected for specific purposes [21, 23–25]. Addressing these gaps is essential to provide more tailored guidance to practitioners and researchers to select and apply TMFs, ensuring that they align with the specific goals and contexts of their implementation efforts.

In this study, we aimed to conduct a more detailed examination of the purposes and attributes of TMFs, and of the context-specific practical considerations of users influencing the selection of TMFs in implementation practice and research. We also aimed to offer clearer guidance for practitioners and researchers seeking to select the most appropriate TMF(s) for their implementation challenge.

Objectives

The objectives of this study were to:

1. Identify and categorize the purposes and attributes of TMFs, and the practical considerations of users of TMFs reported in the literature.
2. Synthesize these findings to develop a meta-framework that supports implementation practitioners and researchers in selecting appropriate TMFs.

Methods

Review design

A scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology, following a registered protocol [26, 27]. Scoping reviews are useful to guide the exploration, identification, mapping, and discussion of characteristics of concepts across a wide range of evidence sources [26]. The review was conducted in nine steps. We first defined the objectives and questions (1) and developed the eligibility criteria (2). Next, we specified the approach to evidence searching, selection, data extraction, and presentation (3). The subsequent steps involved searching for (4), selecting (5), extracting (6), and analysing (7) the evidence. We then created the tables and figures to present the results (8), and concluded by summarizing the findings, drawing conclusions, and identifying implications (9) [26]. The study is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) guidelines (see Supplementary material 1) [28].

Eligibility criteria

Concept

We included articles that addressed the selection or use of TMFs in implementation practice or research, specifically those focusing on TMF purposes, attributes, selection criteria, or practical considerations of users. For this review, we defined 'purposes' as the primary goals or functions TMFs fulfill within implementation science (e.g., guiding implementation processes, identifying determinants such as barriers or facilitators, and supporting evaluation). We defined 'attributes' as distinctive characteristics or features of TMFs that help define how they operate, explain phenomena, or support implementation efforts (e.g., clarity of constructs, measurability, and empirical testability). 'Practical considerations' were defined as project- or team-specific factors influencing the selection of TMFs in real-world settings (e.g., acceptability of the TMF to stakeholders, availability of required resources, and fit of the TMF with the project context).

Specifically, we included articles that reported on or categorized multiple TMF purposes/attributes, or practical considerations influencing TMF use, and provided detailed discussions of these elements. We also included primary research articles examining processes involved in selecting TMFs for implementation research or practice. We excluded articles discussing a single TMF or solely demonstrating the application of one or more TMFs for guiding implementation activities, conducting contextual assessments, or designing and evaluating specific implementation strategies without discussing selection or broader considerations. Two reviewers independently screened each article against these inclusion and exclusion criteria, resolving any disagreements through discussion until consensus was achieved.

Context

We included articles addressing the selection or use of TMFs across all healthcare contexts, encompassing diverse settings such as primary, secondary, and tertiary care, public health, community health, mental health services, and allied health practices. No restrictions were placed regarding the type of healthcare intervention or specific patient populations. This broad inclusion aimed to capture comprehensive insights into TMF selection, thereby enhancing generalizability and relevance to various healthcare implementation scenarios.

Types of sources

We included review, discussion, methods, and opinion articles as well as editorials focusing on desirable attributes and/or selection criteria of TMFs for implementation practice and research. We also considered for inclusion primary studies and study protocols researching the process of selecting TMFs in implementation practice and research. We excluded conference abstracts and non-peer-reviewed sources (e.g., dissertations and theses). We decided to not search the grey literature after a preliminary search indicated that it did not substantially add to the academic literature. Specifically, we conducted a preliminary search of grey literature sources (i.e., OpenGrey, Google Scholar) using search terms identical to those used in our primary electronic database search. This search yielded a limited number of records, many of which were either conference abstracts, dissertations, or duplicate studies that lacked the detailed discussion on TMF purposes, attributes, or practical considerations required for our review. These sources did not provide substantive additional information beyond what was available in the peer-reviewed literature. We included articles published in English or French. We selected a 20-year window for searches (from January 1,

2002 onward to 2022) to capture the period of significant evolution in implementation science.

Information sources and search strategy

The search strategy was first created for MEDLINE in collaboration with an experienced medical librarian (EBA), and then adapted for CINAHL and Embase (see Supplementary material 2). We adapted elements from the search strategies of three recent reviews in the field of implementation science [8, 20, 29]. Electronic searches were conducted on October 21, 2022. Hand-searching of databases (i.e., CINAHL, Embase and MEDLINE) and relevant journals (i.e., *Implementation Science*, *Implementation Science Communications*, *BMC Health Services Research*, *Implementation Research and Practice*, and *Health Research Policy and Systems*) was conducted up to August 31, 2024 to identify additional records. We screened the reference list of included articles and performed a citation search of two core papers [22, 30] to identify additional articles that might have been missed by our primary electronic searches due to search terms or indexing limitations.

Article selection

All identified citations were collated and uploaded into the Covidence systematic review software and duplicates removed automatically, and then manually. Following a pilot test, titles and abstracts were screened by two independent review authors (GF with JPD or EBA). The full text of selected articles was then assessed against the eligibility criteria by two independent review authors (GF, JPD). Disagreements were resolved through discussion and consensus.

Data extraction

Data extraction was conducted in Microsoft Excel by four review authors (GF, MM, JPD, KC) using a data extraction tool developed specifically for this review, including details about the concept, context, study methods, and key findings relevant to the review objectives. This included descriptive data (year of publication, first author, country of origin, article type, study aim [if applicable]), methodological data (study design [if applicable], population and sample size [if applicable], study setting, data collection and analysis methods [if applicable]), and reported results according to study outcomes (if applicable). For each article, we extracted relevant text fragments—either verbatim or minimally paraphrased—that described authors' rationales and findings regarding the purposes of TMFs, the attributes of TMFs, the selection criteria/processes of TMFs, and practical considerations of users.

Data analysis and presentation

Data analysis was conducted in Microsoft Excel by two review authors (GF, MM). Drawing from critical interpretive synthesis methodologies [31–34], we employed an inductive and iterative approach to synthesize, refine and categorize the purposes, attributes, and practical considerations of TMFs. A two-step thematic coding procedure was used. First, one researcher (MM) performed an inductive thematic coding of relevant text segments in included articles to label purposes, attributes and practical considerations. Next, a second researcher (GF) independently reviewed and adjusted the codes, examining how each corresponded to the original text fragment, how frequently each was mentioned, the emphasis placed on it, and its perceived importance to TMF selection. An iterative process was conducted to group these purposes, attributes and practical considerations based on their underlying conceptual similarities. Any discrepancies were resolved through consensus discussions between the two researchers and, when needed, with the broader research team. Supplementary material 3 presents illustrative excerpts coded, the labels assigned for each purpose, attribute and practical consideration identified and supporting references.

The entire research team including three senior implementation scientists (ME, NT, JMG) reviewed the purposes, attributes and practical considerations, including their groupings, and revisions were made until all team members agreed. Findings were synthesized graphically, in tabular format, and narratively. We used OpenAI's ChatGPT 4o (https://chat.openai.com/chat) to enhance the coherence and readability of specific sections of the manuscript, as well as for proofreading purposes.

To develop the four-step guiding framework for selecting TMFs, we mapped the identified, categorized purposes, attributes, and practical considerations onto a sequential, step-by-step process. We aimed for each step to guide users through critical questions and decision points to select the most appropriate TMF for their specific implementation challenge. The framework was applied to a series of case studies/implementation challenges by the study team (one of which is presented in this paper) representing diverse healthcare settings and implementation challenges. Based on the feedback from the study team and pilot testing, we made necessary adjustments to enhance the framework's applicability and user-friendliness. This included refining the language, reordering steps for logical flow, and adding explanatory notes where needed. Final revisions were reviewed by the entire research team to ensure alignment with the original objectives and to confirm that the framework accurately reflected the synthesized data.

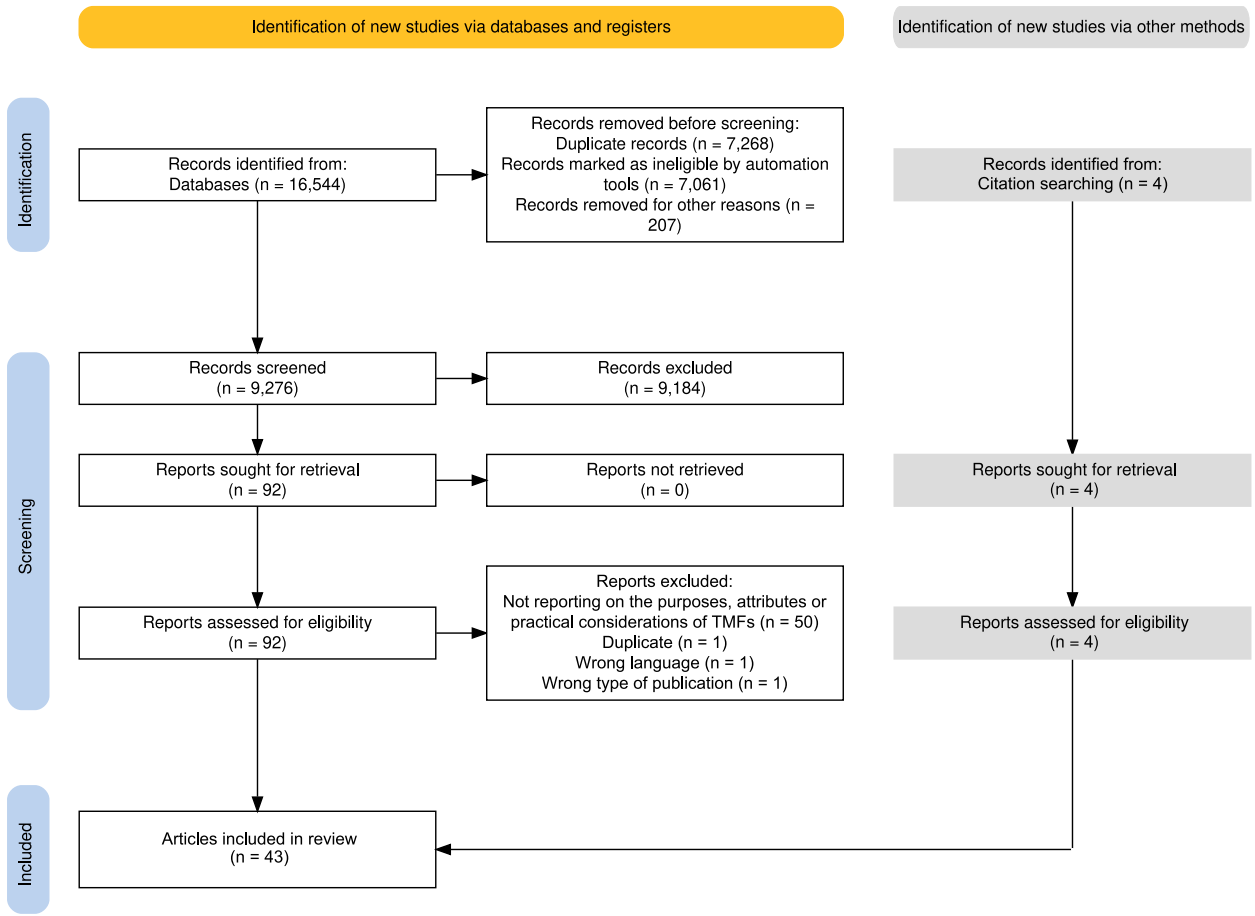

Fig. 1 PRISMA flow diagram

Results

Search results and article selection

Electronic database searches were conducted on October 21, 2022, yielding 16,544 records. After removing duplicates, 9,276 unique records remained. During the initial screening phase, 9,184 records were excluded based on title and abstract reviews. Out of the 92 reports sought for full-text retrieval and assessed for eligibility, 53 were excluded: 50 did not report on purposes, attributes or practical considerations, one was a duplicate, one for being in the wrong language and one for the wrong type of publication. This process resulted in 39 eligible articles. An additional four articles were identified through citation searching, bringing the total to 43 articles that were included in the final review. The study selection process is visually summarized in the PRISMA flow diagram in Fig. 1. The PRISMA-ScR checklist is presented in Supplementary material 1.

Characteristics of included articles

The characteristics of included articles are presented in Table 1. The included articles originated from the United States (N= 10) [6, 13, 19, 24, 25, 35–39], Canada (N= 10) [21, 30, 40–47], the United Kingdom (N= 8) [22, 48–54], Australia (N= 7) [2, 23, 55–59], New Zealand (N= 2) [60, 61], Sweden (N= 2) [1, 62], and one each from China [18], Ireland [63], Norway [64], and Poland [65]. Articles included systematic reviews (N= 7), scoping reviews and other knowledge syntheses (N= 18), primary research articles (N= 6), and discussion papers or editorials (N= 12). Systematic reviews generally focused on exploring the breadth and depth of TMFs applied in various contexts, or the attributes of TMFs (sample sizes ranging from 12 to 100 studies). Scoping reviews and other knowledge syntheses had a similar focus (sample sizes ranging from 6 to 143 studies). Primary research articles included two multi-method studies, two qualitative studies, an observational study, and an expert consensus study (sample sizes ranging from 22 to 223 participants). Most primary research articles focused on developing

Table 1 Characteristics of included articles (*N* = 43)

First author, year, country	Title	Design, sample size	Reporting areas		
			Reports on purpose of TMFs	Reports on attributes of TMFs	Reports on practical considerations
Systematic reviews (n = 7)					
Birken (2017a) [13] United States	Combined use of the Consolidated Framework for Implementation Research (CFIR) and the Theoretical Domains Framework (TDF): a systematic review	Systematic review *N* = 12 studies	Yes	No	Yes
Flottorp (2013) [64] Norway	A checklist for identifying determinants of practice: a systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice	Systematic review *N* = 12 studies	Yes	Yes	No
Lobczowska (2022) [65] Poland	Frameworks for implementation of policies promoting healthy nutrition and physically active lifestyle: systematic review	Systematic review *N* = 38 studies	Yes	Yes	Yes
McKillop (2017) [60] New Zealand	Understanding the attributes of implementation frameworks to guide the implementation of a model of community-based integrated health care for older adults with complex chronic conditions: a metanarrative review	Systematic review and metanarrative synthesis *N* = 35 studies	Yes	Yes	Yes
Mitchell (2010) [35] United States	A thematic analysis of theoretical models for translational science in nursing: mapping the field	Systematic review *N* = 47 studies	Yes	No	Yes
Moullin (2015) [55] Australia	A systematic review of implementation frameworks of innovations in healthcare and resulting generic implementation framework	Systematic review *N* = 49 studies	Yes	No	Yes
Noyes (2016) [48] United Kingdom	Current use was established and Cochrane guidance on selection of social theories for systematic reviews of complex interventions was developed	Systematic review *N* = 100 theories	Yes	Yes	Yes
Scoping reviews and other knowledge syntheses (n = 18)					
Davison (2015) [40] Canada	Critical examination of knowledge to action models and implications for promoting health equity	Scoping review *N* = 48 studies	Yes	Yes	No
Gustafson (2023) [61] New Zealand	A scoping review of equity-focused implementation theories, models and frameworks in healthcare and their application in addressing ethnicity-related health inequities	Scoping review *N* = 26 studies	Yes	Yes	No
Liang (2017) [41] Canada	Use of theory to plan or evaluate guideline implementation among physicians: a scoping review	Scoping review *N* = 42 studies	Yes	No	No
Minogue (2021) [63] Ireland	The usability and applicability of knowledge translation theories, models, and frameworks for research in the context of a national health service	Scoping review *N* = 6 studies	No	Yes	Yes
Nilsen (2019) [62] Sweden	Context matters in implementation science: a scoping review of determinant frameworks that describe contextual determinants for implementation outcomes	Scoping review *N* = 17 studies	Yes	No	No

Table 1 (continued)

First author, year, country	Title	Design, sample size	Reporting areas		
			Reports on purpose of TMFs	Reports on attributes of TMFs	Reports on practical considerations
Redman-MacLaren (2021) [56] Australia	Respect is central: a critical review of implementation frameworks for Continuous quality improvement in aboriginal and Torres Strait Islander primary health care services	Scoping review *N* = 31 studies	Yes	Yes	No
Smith (2024) [36] United States	The use of implementation science theories, models, and frameworks in implementation research for medicinal products: A scoping review	Scoping review *N* = 9 studies	Yes	Yes	No
Wang (2023) [18] China	A scoping review of implementation science theories, models, and frameworks — an appraisal of purpose, characteristics, usability, applicability, and testability	Scoping review *N* = 143 studies	Yes	Yes	No
Reed (2018) [49] United Kingdom	Translating evidence in complex systems: a comparative review of implementation and improvement frameworks	Comparative review *N* = 10 frameworks	Yes	Yes	No
Graham (2007) [30] Canada	Some theoretical underpinnings of knowledge translation	Narrative review *N* = 78 articles	Yes	Yes	No
Harris (2017) [57] Australia	Practice change in chronic conditions care: an appraisal of theories	Narrative review *N* = 9 TMFs	Yes	Yes	No
Manojlovich (2015) [37] United States	Hiding in plain sight: communication theory in implementation science	Narrative review *N* = 27 TMFs	No	Yes	No
McIsaac (2018) [42] Canada	The application of implementation science theories for population health: A critical interpretive synthesis	Narrative review *N* = 10 studies	Yes	Yes	No
Milat (2017) [58] Australia	Narrative review of frameworks for translating research evidence into policy and practice	Narrative review *N* = 98 studies	Yes	No	No
Nilsen (2015) [1] Sweden	Making sense of implementation theories, models and frameworks	Narrative review *N* = 13 documents	Yes	Yes	No
Sarkies (2021) [59] Australia	Understanding implementation science from the standpoint of health organisation and management: an interdisciplinary exploration of selected theories, models and frameworks	Narrative review *N* = 31 studies	Yes	No	No
Tabak (2021) [19] United States	Bridging research and practice: models for dissemination and implementation research	Narrative review *N* = 61 TMFs	Yes	No	No
Villalobos-Dintrans (2019) [38] United States	A synthesis of implementation science frameworks and application to global health gaps	Narrative review *N* = 52 studies	Yes	No	No
Primary research articles (n = 6)					
Birken (2018) [25] United States	T-CaST: an implementation theory comparison and selection tool	Multi-method study *N* = 37 participants	Yes	Yes	Yes
Birken (2017b) [24] United States	Criteria for selecting implementation science theories and frameworks: results from an international survey	Observational study *N* = 223 participants	Yes	Yes	Yes

Table 1 (continued)

First author, year, country	Title	Design, sample size	Reporting areas		
			Reports on purpose of TMFs	Reports on attributes of TMFs	Reports on practical considerations
Greenhalgh (2017) [50] United Kingdom	Beyond adoption: a new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies	Multi-method study *N* = 165 participants	Yes	Yes	No
Esmail (2021) [44] Canada	Characteristics of knowledge translation theories, models and frameworks for health technology reassessment: expert perspectives through a qualitative exploration	Qualitative study *N* = 22 participants	Yes	Yes	No
Presseau (2022) [45] Canada	Selecting implementation models, theories, and frameworks in which to integrate intersectional approaches	Expert consensus study *N* = 21 participants	Yes	Yes	Yes
Strifler (2020) [21] Canada	Identifying and selecting implementation theories, models and frameworks: a qualitative study to inform the development of a decision support tool	Qualitative study *N* = 24 participants	Yes	Yes	Yes
Discussion papers and editorials (n = 12)					
Brehaut (2012) [43] Canada	Building theories of knowledge translation interventions: Use the entire menu of constructs	Discussion paper	Yes	No	No
Davidoff (2015) [6] United States	Demystifying theory and its use in improvement	Discussion paper	Yes	Yes	No
Eccles (2005) [22] United Kingdom	Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings	Discussion paper	Yes	Yes	No
Gawlinski (2008) [39] United States	Selecting a model for evidence-based practice changes: a practical approach	Discussion paper	Yes	Yes	No
Hudon (2015) [46] Canada	The contribution of conceptual frameworks to knowledge translation interventions in physical therapy	Discussion paper	Yes	Yes	No
Kothari (2017) [47] Canada	Using complexity to simplify knowledge translation: comment on "Using complexity and network concepts to information healthcare knowledge translation"	Discussion paper	Yes	Yes	No
Lynch (2018) [23] Australia	"There is nothing so practical as a good theory": a pragmatic guide for selecting theoretical approaches for implementation projects	Discussion paper	Yes	No	Yes
Michie (2005) [51] United Kingdom	Making psychological theory useful for implementing evidence based practice: a consensus approach	Discussion paper	Yes	No	No
Moullin (2020) [2] Australia	Ten recommendations for using implementation frameworks in research and practice	Discussion paper	Yes	Yes	Yes
Rycroft-Malone(2007) [52] United Kingdom	Theory and knowledge translation: setting some coordinates	Discussion paper	Yes	Yes	No
Kislov (2019) [54] United Kingdom	Harnessing the power of theorising in implementation science	Editorial	Yes	No	No

Table 1 (continued)

First author, year, country	Title	Design, sample size	Reporting areas		
			Reports on purpose of TMFs	Reports on attributes of TMFs	Reports on practical considerations
Rycroft-Malone (2010) [53] United Kingdom	Using theory and frameworks to facilitate the implementation of evidence into practice	Editorial	Yes	Yes	No

Table 2 Purposes of TMFs in implementation practice and research

Purposes	Articles mentioning purpose
1. Enhancing conceptual clarity	
Clearly define and distinguish concepts, terms, constructs, or ideas	[2, 18, 24, 46, 48, 55, 61]
2. Anticipating change and guiding inquiry	
Help predict provider behaviour, outcomes and intended/unintended consequences of change	[21, 22, 30, 36, 41, 47, 52]
Inform the development of study questions and hypotheses	[2, 13, 25]
3. Guiding the implementation process	
Structure and guide the implementation process	[1, 2, 13, 18, 21, 23, 24, 30, 35, 36, 39–41, 44, 46, 49, 54, 56, 58–61, 65]
Guide the identification and engagement of key stakeholders	[23, 49, 57]
4. Guiding the identification of determinants	
Identify implementation determinants (i.e., barriers, facilitators)	[1, 6, 13, 21, 22, 24, 25, 30, 35, 36, 38, 41, 42, 45, 46, 49–51, 60–62, 65]
5. Guiding the design and adaptation of strategies	
Guide the selection, design and refinement of implementation strategies	[1, 6, 13, 18, 19, 22–24, 36, 38, 41, 43, 45, 46, 51–56, 64]
Guide the contextual adaptation of implementation strategies	[2, 6, 30, 41, 44, 45, 61, 65]
6. Guiding evaluation and causal explanation	
Guide the development of the evaluation strategy and data collection	[1, 2, 6, 13, 18, 22–24, 36, 43, 45, 49, 52–54, 56, 58, 61, 64, 65]
Explain why or how an intervention works or not (i.e., causal mechanisms)	[1, 6, 18, 23, 30, 36, 41, 51–54, 60]
Specify the relationships between constructs to be tested	[2, 13, 18, 24, 25, 36, 52]
Inform data analysis	[2, 18, 24, 36, 54, 57]
7. Guiding interpretation and dissemination	
Guide the interpretation and dissemination of implementation project findings	[2, 6, 13, 19, 22, 24, 25, 30, 35, 46, 52, 54, 63]

or assessing specific tools or criteria for selecting and using TMFs. Discussion papers and editorials contributed conceptually by exploring the application and utility of TMFs. Of the 43 included articles, 41 reported on the purposes of TMFs, 30 addressed the attributes of TMFs, and 13 discussed practical considerations in selecting a TMF for implementation research and practice.

Purposes of TMFs in implementation practice and research

A total of 13 specific purposes for using TMFs in implementation practice and research were identified, as detailed in Table 2. These were grouped into seven overarching purposes based on thematic similarities: (1) enhancing conceptual clarity; (2) anticipating change and guiding inquiry; (3) guiding the implementation process; (4) guiding the identification of determinants; (5) guiding the design and adaptation of strategies; (6) guiding evaluation and causal explanation; and (7) guiding interpretation and dissemination.

Purpose 1: enhancing conceptual clarity

A central and foundational purpose of TMFs involved clearly defining and distinguishing theoretical concepts, terms, constructs, or ideas used in research or practice [18]. These TMFs primarily aim to provide a solid foundation for consistent understanding, measurement, communication, and application of research findings, and helps stakeholders align their understanding. While a

range of TMFs can enhance conceptual clarity [18], some TMFs such as the Conceptual Framework for Implementation Fidelity [66] and the Conceptual Framework of Implementability [67] explicitly prioritize this as their primary focus.

Purpose 2: anticipating change and guiding inquiry

Some TMFs were considered useful in anticipating outcomes and the broader consequences of change, thereby guiding study questions and hypotheses. For instance, Moullin and colleagues highlight how classic theories (e.g., Theory of Planned Behavior [68]) and implementation theories (e.g., Normalization Process Theory [69]) can "inform the development of practice-related or research questions and hypotheses" [2]. These theories are also valued for their ability to anticipate provider behavior and implementation outcomes, with authors noting how they can help think about "how various forces in an environment will react in specified change situations" [30]. Moreover, complex systems and network theories (e.g., Complexity Theory [70], Actor-Network Theory [71]) within TMFs can help researchers and practitioners consider the intended and unintended consequences of change [47].

Purpose 3: guiding the implementation process

TMFs were deemed essential for structuring and organizing efforts to ensure effective implementation. For instance, process models such as the Knowledge-to-Action (KTA) Model [72] and the Exploration, Preparation, Implementation and Sustainment (EPIS) Framework [73] can "systematize and/or improve the implementation process by providing practical guidelines or steps to be followed." [60] Additionally, TMFs that focus on partner engagement like the Implementation-STakeholder Engagement Model (I-STEM) [74], can promote "creating partnerships with system actors, recognizing their role as fundamental in understanding the local system, aligning with local motives, and building capacity to effect change from within the system" [49]. Reed highlights the importance of using TMFs to develop clear mechanisms that facilitate discussions, ensuring that system actors' perspectives, drivers, and incentives are well understood [49]. Moreover, process models address critical considerations for the spread, scalability, and long-term sustainability of interventions [23].

Purpose 4: guiding the identification of determinants

Identifying barriers and facilitators was considered a central purpose of TMFs to "help clarify the factors that influence the implementation and sustainability of evidence-based practices in healthcare" [42]. A wide range of different TMFs were identified for this purpose, including the Consolidated Framework for Implementation Research (CFIR) [75], the Theoretical Domains Framework (TDF) [76], the Health Equity Implementation Framework (HEIF) [77], and the Integrated Practical, Robust Implementation and Sustainability Model and Social Ecological Model (PRISM-SEM) Framework [78].

Purpose 5: guiding the design and adaptation of strategies

Many articles also underscored the role of TMFs in guiding the selection, design, and refinement (or tailoring) of implementation strategy components, with Kislov and colleagues noting that they "alert researchers to the range of components, at multiple levels of social reality, that should be accounted for in intervention design" [54]. Key examples of these frameworks guiding strategy design include the Behaviour Change Wheel [79] (linked to the Behaviour Change Technique Ontology & Taxonomy), the Expert Recommendations for Implementing Change (ERIC) Taxonomy [80], and Implementation Mapping/Intervention Mapping [81]. TMFs can also guide the adaptation of evidence-based interventions, programs, and policies and implementation strategies. For example, as discussed by Gustafson and colleagues, the Collaborative Intervention Planning Framework applies principles such as Community-Based Participatory Research to guide context-appropriate adaptation of interventions and implementation plans, aiming to reduce disparities across different contexts [61].

Purpose 6: guiding evaluation and causal explanation

Multiple articles highlighted the role of TMFs in guiding the evaluation strategy. Evaluation frameworks such as the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) [82] and Proctor's Taxonomy of Implementation Outcomes [83] are highlighted for defining "how to assess implementation processes or specify which implementation outcomes should be measured" [65]. TMFs guide the selection of constructs to be measured and clarify the relationships between constructs that should be tested.

Additionally, authors note that "engaging with diverse styles of theorizing has the potential to uncover complex and processual forms of causality, where constructs interact in bidirectional, cumulative, or emergent ways, and to cut across multiple levels of analysis" [54]. Authors mentioned how the UK MRC Framework for Process Evaluations [84] and Realist Evaluation [85] can help explain why or how an intervention works or does not work by understanding the "black box" of implementation [53], uncovering "generative mechanisms of social phenomena" [54], and "detailing the 'cogs and wheels' of the causal processes through which implementation outcomes are brought about" [54]. Strifler and colleagues

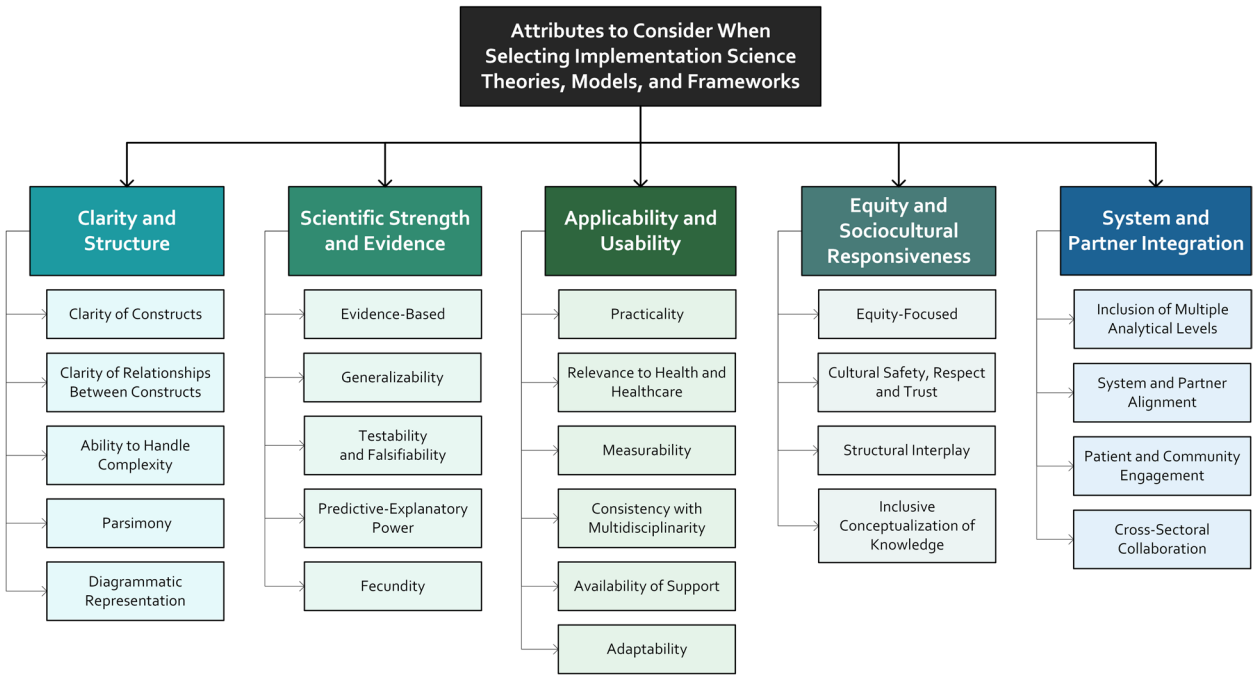

Fig. 2 Diagram presenting the 24 attributes, across five domains, to consider when selecting implementation science TMFs

discussed how some TMFs can "explain implementation success by offering an underlying mechanism or theory of change" [21]. An example of such TMF is the Implementation Research Logic Model (IRLM) [86]. TMFs can also play a key role in informing data analysis, including "structuring the analysis of retrospectively collected qualitative data" [57].

Purpose 7: guiding interpretation and dissemination

Authors have also discussed how TMFs play an essential role in guiding the interpretation and dissemination of implementation project findings [19, 63]. Specifically, some TMFs offer structured approaches for effectively communicating research outcomes, ensuring that findings are clearly interpretable and readily understood by target audiences. Articles also emphasized how using TMFs can improve the interpretability of study findings, and increase the generalizability of study findings [6, 40, 46]. Tabak and colleagues identified a range of TMFs with components that can support dissemination of implementation project findings [19].

Attributes of implementation science TMFs

As presented in Fig. 2, a total of 24 attributes of implementation science TMFs were identified across included articles. These were iteratively refined and grouped in five domains: (i) clarity and structure (five attributes); (ii) scientific strength and evidence (five attributes); (iii) applicability and usability (six attributes), (iv) equity and sociocultural responsiveness (four attributes), and (v) system and partner integration (four attributes). Table 3 presents each attribute along with its definition, guiding questions and supporting articles.

Domain 1: clarity and structure

This domain comprises five attributes that emphasize conceptual coherence, organized presentation, and accessibility of TMFs. Clarity of constructs is considered critical to avoid overlap and ensure that each construct is easily understood [6, 18, 21, 22, 25, 39, 48, 52, 53, 63, 64]. Authors stressed the importance of clearly articulating relationships between constructs, including whether these relationships are linear, cyclical, or otherwise [1, 6, 18, 24, 25, 30, 39, 48, 52, 64, 65]. This is considered necessary for the 'logical consistency,' 'plausibility' and 'face validity' of TMFs [24]. Authors also highlighted that TMFs should be robust enough to handle complexity and unpredictability, acknowledging that small events can generate large, emergent outcomes in self-adapting subsystems [37, 44, 47, 49, 63, 65]. Parsimony [6, 24, 30, 39, 64], meaning striking the right balance between simplicity and comprehensiveness, and the inclusion of a diagrammatic representation of the TMF were viewed as

Table 3 The 24 attributes, across five domains, to consider when selecting implementation science TMFs along with definitions and guiding questions

Domain/Attribute	Definition	Guiding questions	Articles mentioning attribute
Clarity and structure			
Clarity of constructs	Constructs are clearly defined, non-overlapping, and understandable to avoid confusion and enhance usability	• Are the TMF's constructs clearly described and easily understandable? • Are the constructs distinct from each other, with minimal overlap or redundancy? • Do the definitions align with established theory and evidence?	[6, 18, 21, 22, 25, 39, 48, 52, 53, 63, 64]
Clarity of relationships between constructs[a]	Relationships among constructs are described (e.g., linear, cyclical), with logical consistency and plausibility	• Are the relationships among constructs clearly specified as causal, correlational, or iterative? • Do these relationships reflect current empirical evidence or well-established conceptual logic? • Do potential mediators or moderators appear in the TMF?	[1, 6, 18, 24, 25, 30, 39, 48, 52, 64, 65]
Ability to handle complexity	Can accommodate unpredictable, nonlinear dynamics in real-world implementation settings	• Does the TMF address flexibility to manage complexity and unpredictability, supporting a cyclical process of solution testing and refinement? • Can it adapt to emergent phenomena or context-specific variables that evolve over time?	[37, 44, 47, 49, 63, 65]
Parsimony	Balances simplicity with comprehensiveness, avoiding unnecessary complexity	• Does the TMF balance comprehensive coverage of necessary constructs with simplicity and focus?	[6, 24, 30, 39, 64]
Diagrammatic representation	A visual depiction is included to enhance understanding of key constructs and their relationships	• Does the TMF provide a clear, well-labeled diagram to illustrate how constructs interrelate?	[18, 24, 25, 39]
Scientific strength and evidence			
Evidence-based	Grounded in empirical research and/or theoretical work with demonstrated application	• Is there empirical support for the propositions of the TMF, including its tested effects on implementation outcomes, and evidence of successful use in understanding implementation phenomena? • Is there theoretical or mechanistic evidence demonstrating its influence on behavior change and positive impact on implementation?	[6, 18, 21, 24, 25, 37, 44, 46, 48, 52, 53, 63]
Generalizability[b]	Has been applied successfully across diverse settings, populations, or interventions	• Has the TMF been evaluated for its generalizability across different behaviors, populations, and contexts?	[6, 18, 24, 25, 30, 39, 52, 56, 57, 63]
Testability and falsifiability[c]	Includes assumptions, propositions, or hypotheses that can be empirically tested and potentially refuted	• Is the TMF articulated clearly enough to allow empirical testing of its constructs or propositions? • Does it specify conditions under which its predictions or assumptions might be proven false?	[6, 18, 24, 25, 37, 48, 52, 63]
Predictive-explanatory power[c]	Can explain observed phenomena and predict implementation outcomes, particularly behavior change	• Has the TMF demonstrated effectiveness in predicting behavior change? • Has it been used to explain a set of observations and describe causal mechanisms underlying successful or unsuccessful implementation?	[1, 6, 18, 22, 24, 25, 47]
Fecundity	Supports the generation of new hypotheses, extensions, or theoretical advancements	• Does the TMF encourage the development of new research questions or expansions of existing theory? • Are there examples in which the TMF has inspired theoretical refinements or follow-on studies?	[24, 25, 48, 53]

Table 3 (continued)

Domain/Attribute	Definition	Guiding questions	Articles mentioning attribute
Applicability and usability			
Practicality	Supported by usable tools, resources, or methods that facilitate its real-world application	• Is the TMF practical and user-friendly in terms of tools, methods, and resources (e.g., checklists, websites) to support its operationalization?	[18, 21, 24, 25, 39, 40, 42, 44, 52, 53, 63, 64]
Relevance to health or healthcare	Designed to address healthcare-specific issues, such as patient outcomes, clinical guidelines, or public health	• Does the TMF address healthcare priorities, such as patient-centered outcomes, service delivery models, or public health objectives? • Does it consider healthcare-specific resources, organizational contexts, and workforce readiness?	[24, 39, 49, 57, 63, 64]
Measurability[d]	Includes constructs or domains that can be operationalized and assessed using validated methods	• Is there an explicit or validated methodology for measuring the TMF's constructs? • Are standardized instruments, scales, or data collection methods described or referenced for these constructs?	[6, 21, 57]
Consistency with multidisciplinarity	Informed by or applicable to multiple disciplines, supporting diverse perspectives	• Does the TMF explicitly address or integrate insights from various disciplines (e.g., psychology, sociology, organizational science)? • Is it flexible enough to accommodate multidisciplinary teams in designing or evaluating implementation efforts?	[40, 57]
Availability of support	Users have access to developer assistance to apply the TMF effectively	• Are the originators or recognized experts of the TMF readily contactable for guidance?	[48]
Adaptability[e]	Can be modified to suit different contexts, populations, or combined with other TMFs	• Can the TMF be tailored or merged with other frameworks without compromising its core integrity? • Does it include guidance on making context-specific adaptations (e.g., cultural, organizational)?	[21]
Equity and sociocultural responsiveness			
Equity-focused	Addresses inequalities and intersecting social determinants of health, and how these influence implementation processes and outcomes	• Does the TMF explicitly identify, measure, or respond to equity issues (e.g., justice, disparities in access or uptake)? • Does it articulate strategies for mitigating those inequalities within implementation processes?	[40, 45, 50, 56, 61, 65]
Cultural safety, respect and trust	Integrates principles of cultural safety, particularly when working with historically marginalized populations	• Does the TMF foster trust, mutual respect and cultural security through two-way learning and relationship-building? • Is there an emphasis on ensuring that implementation efforts are responsive to local values, norms, and traditions?	[36, 49, 56, 61, 63]
Structural interplay	Acknowledges the network of organizational, institutional, and sociopolitical elements, as well as power structures and historical/contemporary forms of oppression, that influence implementation processes and outcomes	• Does the TMF consider how structural or systemic barriers and contextual constraints beyond individual control shape or constrain implementation processes and outcomes? • Are there provisions for adapting implementation efforts to address these wider structural and systemic influences?	[22, 47, 56, 61]
Inclusive conceptualization of knowledge	Values diverse forms of knowledge, including community-based and experiential knowledge	• Does the TMF include or encourage the integration of non-academic or lay knowledge (e.g., lived experiences, indigenous practices)? • Does it propose methods for engaging communities and stakeholders as co-creators or co-owners of knowledge and solutions?	[40]

Table 3 (continued)

Domain/Attribute	Definition	Guiding questions	Articles mentioning attribute
System and partner integration			
Inclusion of multiple analytical levels[f]	Addresses micro-, meso-, and macro-level factors influencing implementation	• Does the TMF structure contextual assessment, implementation, or evaluation across micro (e.g., individual), meso (e.g., organizational), and macro (e.g., policy/societal) levels?	[2, 36, 42, 44, 56, 57, 61, 65]
System and partner alignment[g]	Encourages alignment with system priorities and partner goals to foster sustainable implementation	• Does the TMF account for organizational readiness, existing policies, or stakeholder goals? • How does it guide the process of securing buy-in and alignment among key actors to ensure sustainability?	[2, 40, 42, 49, 50, 56]
Patient and community engagement	Positions patients and communities as key actors in implementation processes	• Does the TMF explicitly include patients or community members in the planning and decision-making process? • Does it advocate methods or structures (e.g., advisory committees) to ensure patient/community input is integrated and valued at each implementation stage?	[40, 44, 56, 60]
Cross-sectoral collaboration	Supports integration of perspectives and resources across sectors (e.g., health, education, social services)	• Does the TMF encourage collaboration or data-sharing among various sectors (e.g., governmental, nonprofit, clinical, community)? • Are there guidelines or constructs for coordinating multisector involvement to address complex, multifactorial problems?	[40, 47]

[a] Might not be applicable to process models, determinant frameworks and evaluation frameworks (relationships between constructs may be implicit or nonexistent)

[b] Some theories might be specific to a specific health context and not meant to be generalizable

[c] Might not be applicable to process models who focus on applied processes, determinant frameworks and evaluation frameworks

[d] Might not be applicable to process models

[e] Limited applicability to theories, who are generally fixed in structure

[f] Might be partially applicable to some theories who have a single level focus

[g] Might be partially applicable to theories or evaluation frameworks

important to for enhancing understanding and communication of the constructs and structure [18, 24, 25, 39].

Domain 2: scientific strength and evidence

This domain comprises five attributes that emphasize scientific rigor and theoretical robustness to strengthen the credibility and generative potential of TMFs. Many articles highlighted the need for a strong evidence base [6, 18, 21, 24, 25, 37, 44, 46, 48, 52, 53, 63], referring to "empirical support for the propositions," [6] engagement with relevant theoretical work [37], and demonstrated application in empirical studies that contribute to theory-building [24]. Generalizability was equally emphasized, requiring evidence that the TMF can be successfully applied across different clinical settings, populations, and interventions [6, 18, 24, 25, 30, 39, 52, 56, 57, 63]. For classic and implementation theories, the ability to propose explicit hypotheses, assumptions, or propositions that can be tested and potentially falsified was commonly discussed [6, 18, 24, 25, 37, 48, 52, 63]. Theories were expected to offer predictive and explanatory power, helping clarify mechanisms underlying implementation processes [1, 6, 18, 22, 24, 25, 47]. In this vein, theories should "explain/account for a set of observations statistically or logically" [6] and demonstrate "effectiveness in predicting and explaining behavior change" [22]. Lastly, some highlighted the need for fecundity: a TMF's potential to stimulate new hypotheses and foster further theoretical development [24, 25, 48, 53].

Domain 3: applicability and usability

This domain comprises six attributes focusing on the applicability and usability of TMFs across diverse healthcare contexts. Practicality was widely discussed, referring to the availability of user-friendly tools, methods, and resources (e.g., websites, checklists) that support the application of the TMF [18, 21, 24, 25, 39, 40, 42, 44, 52, 53, 63, 64]. The availability of support to apply the TMF was also discussed, which may include direct assistance from TMF developers [48]. Measurability was prominent, particularly the presence of validated methods for assessing TMF constructs [6, 21, 57]. In addition, the TMF's relevance to healthcare was frequently underscored, particularly regarding how well it addresses patient outcomes, healthcare system dynamics, clinical practice guidelines, or public health interventions [24, 39, 49, 57, 63, 64]. Some articles also advocated for consistency with multidisciplinarity, suggesting that incorporating expertise from various fields can broaden the TMF's applicability [40, 57]. Finally, adaptability emerged as a need, ensuring the TMF can be tailored to different populations and contexts or integrated with other frameworks [21].

Domain 4: equity and sociocultural responsiveness

This domain comprises four attributes that ensure TMFs are equity-focused and culturally responsive. Recent literature stresses the necessity for an explicit focus on equity in TMFs [40, 45, 50, 56, 61, 65], as "to date, it appears that [TMFs] have largely omitted any consideration for how intersecting social identities and social structures could be impeding or supporting the success of a given implementation intervention" [42], or "how they should be considered when developing an implementation intervention." [56] For example, some authors argue that TMFs should account for social determinants of health and address inequalities in healthcare access, uptake, and outcomes—especially for vulnerable groups [56]. Equally important is the emphasis on building trust, showing respect, and ensuring cultural security as central principles for guiding implementation projects and fostering mutual learning, particularly when engaging with Indigenous communities [36, 49, 56, 61, 63]. Furthermore, incorporating factors beyond individual control, such as organizational policies, structural inequalities, and systemic barriers, is crucial to understanding the full context of implementation [22, 47, 56, 61]. Finally, adopting an inclusive conceptualization of knowledge is critical, recognizing and valuing diverse forms of expertise, including insights from communities [40].

Domain 5: system and partner integration

This final domain encompasses four attributes that promote comprehensive system and partner integration within TMFs. Several articles emphasize that including multiple analytical levels is essential—especially for determinant frameworks focused on policy implementation [2, 36, 42, 44, 56, 57, 61, 65]. Equally, aligning with key health system actors and partners is critical to secure stakeholder buy-in, align with system priorities, and foster collaboration for sustainable change [2, 40, 42, 49, 50, 56]. Many articles also stress that patient and community engagement should be central to all implementation processes [40, 44, 56, 60]. Finally, promoting cross-sectoral collaboration and communication is seen as vital because it integrates diverse perspectives, resources, and expertise across different sectors [40, 47].

Practical considerations for the selection of TMFs

Thirteen articles provided information on practical considerations for the selection of TMFs. Table 4 outlines the 10 practical considerations identified across included articles for selecting a TMF in implementation practice and research, organized into three domains. Each practical consideration is accompanied by guiding questions to help assess the suitability of a TMF for specific contexts. The first domain, *team expertise and readiness*, includes

Table 4 The 10 practical considerations, across three domains, to consider when selecting implementation science TMFs along with guiding questions

Domain/Practical consideration	Guiding questions	Articles mentioning practical consideration
Team expertise and readiness		
Team knowledge and skills	• Does the team have the necessary knowledge of existing implementation theories, models, and frameworks to effectively apply the TMF? • Have team members received adequate training to apply the TMF in this specific context? • Do they have experience using similar frameworks in past projects?	[13, 21, 23–25, 35, 48, 60, 63]
Alignment with disciplinary backgrounds	• How well do the team's disciplinary backgrounds align with the origins and focus of the TMF? • Do the disciplines represented in the team (e.g., clinical, public health, social sciences) have complementary expertise to fully utilize the TMF's constructs?	[24, 25, 48, 55, 63]
Acceptability	• Do all team members find the TMF suitable and acceptable for the project? • Has the TMF been endorsed or recommended by credible authorities, such as leading scholars, funding agencies, or professional organizations, enhancing its acceptability to the team?	[21, 24, 25, 45, 63]
Resource availability		
Resource availability	• Are there sufficient resources (e.g., funding, personnel, tools, time) available for implementing the TMF effectively? • Does the team have access to necessary software, data collection tools, and expertise? • Is there adequate time allocated for training and applying the TMF throughout the study?	[23, 48]
Project fit		
Fit with project context and scope	• How well does the TMF align with the specific context and clinical setting of the project (e.g., hospital, community-based setting, rural area)? • Is the TMF suitable for the analytical scope and level at which the project is being conducted (e.g., individual, organizational, system-wide)?	[2, 21, 25, 48, 60, 63]
Fit with available data	• Is the data quality and type suitable for the TMF?	[23, 48]
Fit with project purpose and timing	• Does the TMF align with the primary goals and objectives of the project? • How well does the TMF help to answer the research questions or hypotheses? • At what stages of the project process should the TMF be applied?	[21, 23, 35, 48, 63]
Fit with target population(s)	• Is the TMF appropriate for the specific population being studied (e.g., age group, cultural background, socioeconomic status)?	[21, 25, 65]
Fit with target behavior(s)/intervention(s)	• Does the TMF appropriately address the behavior(s) targeted by the implementation strategy(ies) (e.g., adherence to guidelines, patient engagement)? • Is the TMF suitable for the type of intervention being implemented (e.g., clinical, educational, policy change)?	[2, 21, 60, 65]
Fit with desired outcomes	• Can the TMF be effectively used to measure and address the desired outcomes of the study (e.g., health outcomes, process improvements)?	[25]

considerations such as the team's knowledge of TMFs, as well as skills and experience in applying TMFs. It assesses whether the team is adequately trained to apply the TMF and whether their disciplinary backgrounds align with the TMF's focus and origins. Acceptability of the TMF to the study team is also considered, as it reflects how well the framework aligns with the team's preferences, experiences, and perceptions. Factors influencing acceptability may include the TMF's frequency of use, popularity, and perceived impact within the research community [24, 25]. Additionally, its endorsement or recommendation by credible authorities, such as prominent scholars, reviewers, funding agencies, or professional organizations, can further enhance its acceptability among the team [24, 25].

The second domain, *resource availability*, evaluates whether sufficient resources, such as funding, personnel, tools, and time, are available to implement the TMF effectively. It also assesses access to necessary software, data collection tools, and training resources.

The *project fit*domain examines how well the TMF aligns with the project's specific context and scope, including the clinical setting, data quality, and the

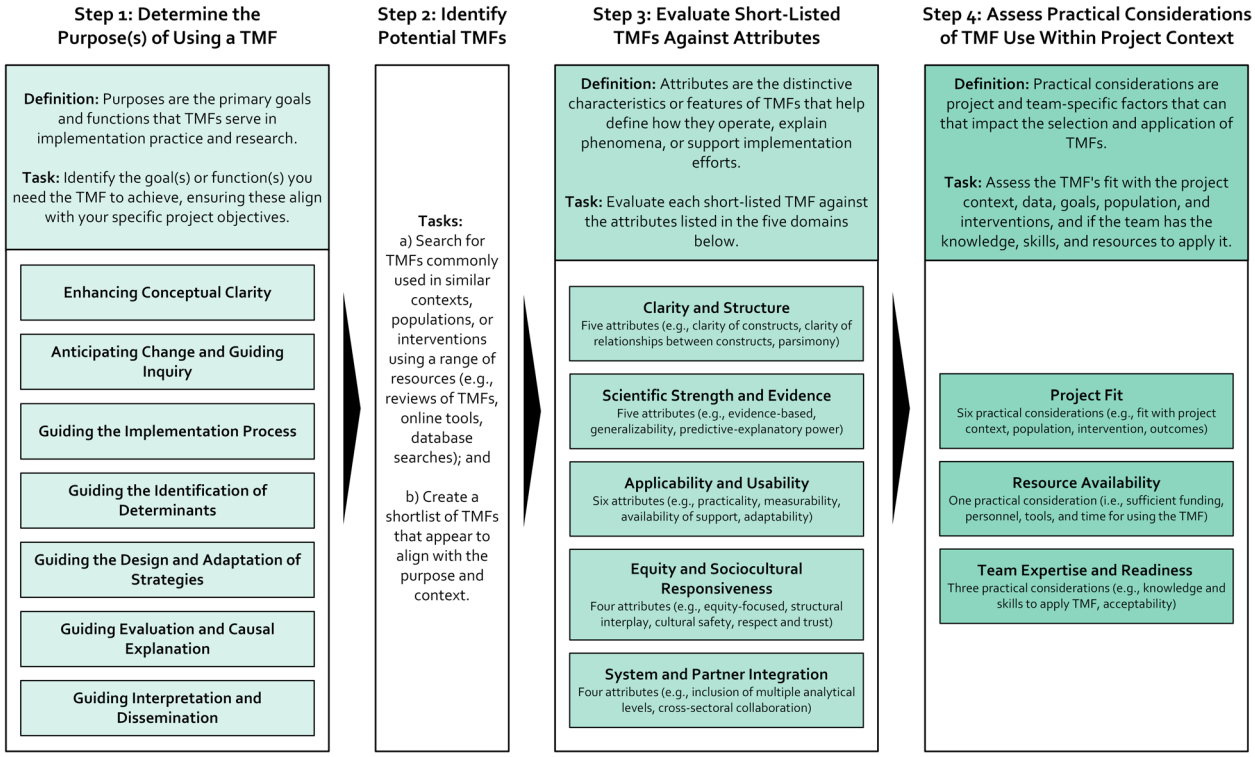

Fig. 3 SELECT-IT, a four-step meta-framework to guide the selection of implementation science TMFs

project's goals and objectives. It also considers the TMF's suitability for the target population, behaviors, and interventions, as well as its ability to address the desired outcomes of the project. Indeed, a project should be "informed by theoretical constructs that are appropriate to the people, context, practice and scope of what is being implemented" [60].

SELECT-IT: a four-step meta-framework to guide the selection of TMFs

The four-step **S**ystematic **E**valuation and S**elect**ion of **I**mplementation Science **T**heories, Models and Frameworks (SELECT-IT) meta-framework is illustrated in Fig. 3. These steps are: (1) determine the purpose(s) of using TMF(s); (2) identify potential TMFs; (3) evaluate the short-listed TMFs against attributes; and (4) assess the practical considerations of using each TMF within the project context. In the following sections, we offer detailed, step-by-step instructions for applying the SELECT-IT meta-framework to guide the selection of TMFs effectively.

Two complementary worksheets for applying SELECT-IT in choosing an implementation science TMF are presented in Supplementary material 4. Worksheet A offers a high-level approach (Steps 1–4) that helps users identify their project's main goals (i.e., the purpose of using a TMF) and conduct a domain-level assessment of the attributes of each shortlisted TMF. This rapid evaluation allows teams to quickly see which TMFs are most promising. For projects requiring more in-depth analysis, worksheet B provides a detailed scoring table in which each candidate TMF is systematically rated across 24 attributes, allowing for a nuanced side-by-side comparison. Users can opt for either the high-level or detailed assessment—or both—depending on their available resources, time constraints, and the complexity of their implementation challenge.

Step 1: determine the purpose(s) of using a TMF

Once the core implementation challenge has been clearly defined, the first step is to identify the primary goals and functions a TMF should fulfill within the project or practice context. Drawing on the array of purposes outlined in Table 2, practitioners and researchers can determine whether a TMF is needed for planning (e.g., enhancing conceptual clarity, anticipating change, formulating research questions), guiding the implementation process, identifying determinants, designing strategies, evaluating outcomes, or disseminating findings. There is no strict "correct" order to these purposes. Practitioners and researchers may start with whichever purpose aligns best with immediate objectives (e.g., clarifying

concepts or evaluation outcomes). In most projects, multiple purposes (and hence multiple TMFs) may be used concurrently. For example, one framework might be used for identifying implementation barriers and another for guiding stakeholder engagement or strategy. In determining which of these purposes (or combinations thereof) best addresses the project's needs, it is possible to narrow down TMFs with evidence or guidance specific to those aims.

Step 2: identification and shortlisting of candidate TMFs

The second step involves scanning the literature to identify and shortlist potential TMFs that align with the selected purposes. Comprehensive reviews of implementation science TMFs constitute an essential starting point for this step. Specifically, two key reviews provide thorough inventories and classifications: (i) the scoping review by Wang et al. [18] identified 143 unique TMFs which were classified according to their purpose and type; and (ii) the scoping review by Strifler et al. [17] which similarly identified and categorized 159 TMFs. Additional considerations at this stage include searching databases for recent empirical examples of TMFs being successfully applied within similar contexts or populations and consulting supplementary sources (e.g., Nilsen's categorization of frameworks [1], the Dissemination & Implementation Models website [87], the Find TMF website [88]) to validate completeness and currency of the shortlist.

Step 3: evaluation of short-listed TMFs against attributes

After identifying a shortlist of candidate TMFs, the next step is to systematically evaluate each one according to five overarching domains: (i) clarity and structure, (ii) scientific strength and evidence, (iii) applicability and usability, (iv) equity and sociocultural responsiveness, and (v) system and partner Integration (see Fig. 2 and Table 3). This process can be conducted at two levels.

Initially, a high-level assessment may suffice, particularly for smaller or less complex projects (see worksheet A in Supplementary material 4). In this approach, appraisers examine each TMF's overall clarity of constructs and relationships, the empirical and theoretical support substantiating it, its user-friendliness and practicality, its explicit consideration of equity and cultural nuances, and its ability to integrate with system-level or partner structures. Focusing on these domain-level characteristics, teams can quickly identify the most promising TMFs and determine whether they align with core implementation needs.

If greater precision is required, especially in complex or high-stakes projects, teams can proceed with a detailed attribute-by-attribute assessment. In this expanded evaluation, each TMF is to be rated on up to 24 specific attributes (e.g., clarity of constructs, evidence-based, equity-focused) by one or more appraiser(s) using guiding questions to capture nuanced differences. We recommend a 1–3 scale (1 = not addressed/poorly addressed, 2 = partially addressed, 3 = well addressed, plus "N/A" if not applicable) and adding notes or examples to clarify the reasoning. When two appraisers evaluate a TMF independently, they can compare scores, discuss discrepancies, and reach consensus with the broader team if needed. Worksheet B in Supplementary material 4 is designed for this purpose, offering a transparent framework for comparing TMFs side by side based on a consistent rating scale and accompanying notes.

Finally, we recommend synthesizing the insights obtained from both levels of assessment into worksheet A or in a brief comparative report, clearly highlighting strengths, limitations, and suitability of each TMF. This practical, structured approach ensures transparent, rigorous selection and a solid justification for their final TMF selection.

Step 4: assessing practical considerations of the TMF within the project context

Once one or more promising TMFs have been identified based on their alignment with project goals and attributes, it is important to ensure they are also feasible to apply in the project context. This step helps verify whether the team has the necessary resources, skills, and readiness to use the chosen TMF effectively, guided by the items in Table 4:

i. *Project fit:* Confirm whether the TMF's scope, constructs, and recommended processes align with the intended population, setting, and intervention goals. Consider whether substantial adaptations are required and, if so, whether the TMF permits them.
ii. *Available resources:* Evaluate the time, budget, staff capacity, and infrastructure required to apply the TMF. Identify any potential shortfalls and plan for how these may be addressed (e.g., seeking additional funding, establishing external partnerships).
iii. *Team expertise and readiness:* Determine whether team members (or external collaborators) have sufficient expertise to apply the TMF (e.g., familiarity with key concepts, methods, and measurement approaches). If gaps are identified, assess the availability of training or technical assistance from the TMF developers or other experienced users.

These considerations should influence the final choice of TMF(s). At this stage, it is helpful to bring together the core team, including both researchers and relevant stakeholders (e.g., organizational partners, community members), to discuss the remaining options. Drawing on the findings from the earlier steps and the team's practical considerations, a consensus-based discussion can help surface any lingering uncertainties and ensure all perspectives are heard. The discussion should converge on a single TMF or combination of TMFs that best fits the project's objectives, context, and constraints. The group can then jointly confirm which TMF(s) is most appropriate. Although formal voting or consensus methods (e.g., a Nominal Group Technique) can be employed, for many projects a more informal process, such as a structured team meeting that leads to agreement, can suffice.

Table 5 presents a high-level worked example of SELECT-IT applied to an implementation challenge (i.e., improving hand hygiene compliance in a pediatric hospital among healthcare providers). As previously noted, worksheet B (Supplementary material 4) can be used for more detailed TMF assessments if required.

Discussion

The findings from this study provide critical insights into the selection of TMFs in implementation practice and research. Through a comprehensive analysis of the literature, we identified and synthesized the various purposes TMFs serve, the attributes that help define and assess them, and the practical considerations for their selection based on the context of implementation projects. Our review provides clarity on the wide range of purposes that TMFs serve in implementation science, underscoring the necessity of selecting TMFs that align closely with the specific goals of an implementation project. The attributes of TMFs that emerged from our analysis reflect the tension between theoretical strength and practical utility. Our findings also clarify the different contextual factors that should be considered alongside the purposes of TMFs and their attributes. The four-step meta-framework developed for selecting TMFs, SELECT-IT, provides a systematic approach to identify appropriate TMFs, evaluate their attributes, and assess their practical fit within the specific implementation context.

Our work builds on previous research that has explored the identification, comparison, and selection of implementation science TMFs [21, 24, 25, 44]. Birken and colleagues conducted a study involving 223 implementation scientists and practitioners to establish criteria for selecting implementation science TMFs [24]. This research led to the development of the Theory Comparison and Selection Tool (T-CaST), a tool which assesses TMFs based on their usability, testability, applicability, and familiarity [25]. Our approach diverges from Birken's by differentiating between the attributes of TMFs—such as clarity of constructs—and the context-dependent practical considerations, like their fit within specific implementation environments. While the T-CaST tool conflated these two types of factors into overarching selection criteria, our framework aims to provide a more nuanced understanding by addressing them separately, offering clearer guidance for the selection and application of TMFs based on both their intrinsic qualities and their practical relevance to specific contexts.

The seven main purposes of TMFs identified in our review, and featured in SELECT-IT, build on earlier work by Nilsen [1] and Wang and colleagues [18]. Specifically, "Guiding the implementation process" corresponds to Nilsen's "Describing and/or guiding the process of translating research into practice" and process models that structure how change is enacted. "Guiding the identification of determinants" relates to Nilsen's "Understanding and/or explaining what influences implementation outcomes" and determinant frameworks identifying barriers and facilitators. However, in our categorization, causal explanation appears under "Guiding evaluation and causal explanation," while Nilsen places causal explanation within its second purpose. We opted for this distinction because we view the process of evaluating outcomes and elucidating why or how an intervention works as intertwined activities. Wang and colleagues [18] have identified similarly purposes including enhancing conceptual clarity, guiding implementation planning, identifying barriers and facilitators, guiding design or selection of implementation strategies, framing evaluation, informing data collection and analysis, and specifying the process or relationships between constructs. These overlap with our purposes and highlight a shared foundation across different perspectives, reinforcing the central role of these purposes in guiding implementation practice and research.

Our findings reflect the growing emphasis on health equity and sociocultural responsiveness in implementation science, which features prominently in the SELECT-IT meta-framework in the third step in the evaluation of the attributes of TMFs [89–93]. This focus on equity aligns with broader movements in healthcare towards addressing social determinants of health and ensuring that implementation efforts do not exacerbate existing inequities [94]. To achieve this, our work emphasizes the need to consider attributes that have been neglected in previous studies focusing on TMF selection, particularly equity and sociocultural responsiveness, as well as the extent of system and partner integration [24, 25]. This underscores the importance of selecting TMFs that are not only relevant to the

Table 5 Worked example of using the SELECT-IT meta-framework to orient the selection of implementation science TMFs

Implementation Challenge	Step 1 – Determine the Purpose of Using TMF	Step 2 – Identify Potential TMFs	Step 3 – Evaluate the Attributes of TMFs	Step 4 – Assess Practical Considerations
Improving Hand Hygiene Compliance in a Pediatric Hospital	Guide the identification of barriers and facilitators to hand hygiene compliance among healthcare providers	A. Consolidated Framework for Implementation Research (CFIR): widely used in examining barriers and facilitators in healthcare at organizational and system levels B. Theoretical Domains Framework (TDF): widely used for examining barriers to behavior change at individual and team levels	• Clarity and Structure: CFIR provides clear domains and a significant number of constructs for assessing implementation barriers and facilitators at the health system and organizational levels. TDF offers a strong focus on behavior change with a more limited number of clear, behavior-specific domains (ideal for analyzing provider barriers) but lacks comprehensive system-level guidance • Scientific Strength and Evidence: CFIR has extensive empirical evidence across diverse settings. TDF has demonstrated strong applicability in behavior change studies but less so in broader organizational contexts. Both CFIR and TDF have been applied successfully to study the determinants of hand hygiene compliance in this population (TDF more often than CFIR) • Applicability and Usability: CFIR offers a range of robust tools and web-based resources guidance for system-level implementation, while TDF is more user-friendly for behavior-specific interventions. The TDF is also linked to a range of tools to guide implementation strategy design (e.g., Behaviour Change Wheel). Both are adaptable but require appropriate expertise. The frameworks have often been used in combination • Equity and Sociocultural Responsiveness: CFIR has a limited focus on equity but adaptable to incorporate sociocultural considerations. Some researchers have already used the CFIR with complementary theoretical lens for a stronger focus on equity. TDF primarily targets behavior with limited consideration of systemic or cultural factors. However, the TDF has been applied with an intersectionality lens to account for social identity and structural factors • System and Partner Integration: CFIR addresses micro, meso, and macro-level assessments and policies effectively. It also emphasizes the consideration of the characteristics and roles of a range individuals involved in the implementation process. TDF focuses on the determinants of individual/group behaviors, with limited direct linkage to broader health system integration	• Team Expertise and Readiness: The research team is already familiar with the TDF, but not the CFIR. CFIR would require familiarity with a wide range of constructs like "inner/outer settings," while TDF would demand a deeper understanding of behavior-specific theories for some interviewers and coders. Extensive training would be needed for applying the CFIR • Available Resources: Given limited timelines and resources, the research team prioritizes frameworks with accessible training resources, user-friendly tools, and proven applicability to digital health contexts. TDF aligns closely with available resources and timeframe constraints, while CFIR, although comprehensive, would require more upfront investment • Project Fit: Both CFIR and TDF are suitable for addressing different aspects of hand hygiene compliance. CFIR excels in identifying organizational and system-level factors such as hospital policies, leadership engagement, and environmental constraints. TDF focuses on individual and team-level barriers, making it highly effective for designing and implementing behavior-specific interventions like training or feedback mechanisms. Combining elements of both (e.g., CFIR for organizational context and TDF for individual behaviors) could offer complementary insights but may stretch available resources. Given the project scope and objectives, prioritizing TDF may provide the most direct and immediate actionable insights

immediate project context but also capable of engaging with and influencing the broader system. TMFs that explicitly address issues of equity, trust, and cultural security are increasingly recognized as essential, particularly in projects involving marginalized or vulnerable populations and Indigenous communities [56, 61]. These new domains of attributes build on those identified in previous studies focusing on the factors influencing the selection of TMFs [21, 24, 25, 44]. Future research should continue to explore and delineate how TMFs can be developed or adapted to better promote health equity.

The findings from this review have several implications for both practice and research in implementation science. Different tools have been developed to guide the selection of implementation science TMFs, such as *Dissemination & Implementation Models* [95], *Find TMF* [88], Moullin's worksheet [2], and the T-CaST [25]. To our knowledge, these tools do not cover the extent of factors (in terms of TMF purposes, attributes, and practical considerations) identified in the current review, focusing primarily on attributes. Taking into account the practical considerations in the use of TMFs is critical to ensure that the chosen theoretical approach can be applied in the context of the study.

Strengths and limitations

One of the key strengths of this study is its broad scope, covering a wide range of literature and systematically categorizing the purposes and attributes of implementation science TMFs, and practical considerations of TMF users. We used both scoping review methodology and inductive thematic analysis to ensure a thorough and nuanced exploration of the literature and allow for both breadth and depth in the analysis. The study also has limitations. First, we included only peer-reviewed published research in English and French. Second, the synthesis of diverse study designs and theoretical perspectives presents challenges in maintaining consistency across analyses. A known limitation of inductive analysis methods are their reproducibility, meaning that different research teams using the same set of articles might arrive at different synthesis results and interpretations. To address these limitations, we involved two independent reviewers in the data extraction and coding processes, utilized an iterative process where initial coding was reviewed and refined through consensus discussions among team members, and incorporated feedback from three senior implementation scientists throughout the process. We have also included an additional file that provides, for each category identified during our analysis, the assigned label, an illustrative text excerpt, and the corresponding article reference. Finally, we focused exclusively on healthcare contexts, potentially limiting the generalizability of our findings and guiding framework to other sectors where implementation science is emerging as an area of practice and research.

Conclusion

This study advances our understanding of the intricate and multifaceted nature of TMFs in implementation science. The delineation of their purposes, identification of key attributes, and outline of practical considerations collectively form a comprehensive resource for practitioners and researchers seeking to select and apply TMFs effectively. The development of the four-step SELECT-IT meta-framework offers a structured approach to ensure that the selection of TMFs aligns with the specific goals and context of implementation projects. The inclusion of equity and sociocultural responsiveness, along with considerations for system and partner integration, reflects a growing recognition of their importance in contemporary implementation science. These attributes are vital for addressing health disparities and advancing inclusive implementation efforts, especially in projects involving marginalized or vulnerable populations. Future research should focus on validating and refining the SELECT-IT meta-framework across diverse contexts, including non-healthcare sectors and resource-limited settings.

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

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Authors' contributions

GF, JPD, ME and JMG developed the research questions and the scope of the study. GF, JPD, ME and JMG developed the search strategies in collaboration with EBA. GF, MM, JPD, KC, and EBA contributed to title and abstract screening, full text screening, and data extraction. GF, MM, JPD and KC conducted the analyses. ME, AS, NT, RL, EBA and JMG contributed to the organization, analysis, and interpretation of the results. GF drafted the manuscript, tables and figures, with significant contributions from MM, JPD and KC. All authors read and approved the final manuscript.

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Data availability
Data is available upon reasonable request to corresponding author.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
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Competing interests
Authors declare no conflict of interest.

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References

1. Nilsen P. Making sense of implementation theories, models and frameworks. Implement Sci. 2015;10(53):1–13. https://doi.org/10.1186/s13012-015-0242-0.
2. Moullin JC, Dickson KS, Stadnick NA, et al. Ten recommendations for using implementation frameworks in research and practice. Implement Sci Commun. 2020;1:42. https://doi.org/10.1186/s43058-020-00023-7.
3. Morrow A, Chan P, Tiernan G, et al. Bridging the Gap between Intuition and Theory: A Comparison of Different Approaches to Implementation Strategy Development for Improving Lynch Syndrome Detection. Public Health Genomics. 2024;27(1):110–23. https://doi.org/10.1159/000540612.
4. Taylor N, Healey E, Morrow A, et al. Aligning intuition and theory: enhancing the replicability of behaviour change interventions in cancer genetics. Implement Sci Commun. 2020;1:90. https://doi.org/10.1186/s43058-020-00054-0.
5. Wolfenden L, Foy R, Presseau J, et al. Designing and undertaking randomised implementation trials: guide for researchers. BMJ. 2021;372https://doi.org/10.1136/bmj.m3721
6. Davidoff F, Dixon-Woods M, Leviton L, Michie S. Demystifying theory and its use in improvement. BMJ Qual Saf. 2015;24:228–38. https://doi.org/10.1136/bmjqs-2014-003627.
7. Eccles M. The Improved Clinical Effectiveness through Behavioural Research Group (ICEBeRG). Designing theoretically-informed implementation interventions. Implementation Science. 2006;1https://doi.org/10.1186/1748-5908-1-4
8. Esmail R, Hanson HM, Holroyd-Leduc J, et al. A scoping review of full-spectrum knowledge translation theories, models, and frameworks. Implement Sci. 2020;15(1):1–14. https://doi.org/10.1186/s13012-020-0964-5.
9. Fontaine G, Vinette B, Weight C, et al. Effects of implementation strategies on nursing practice and patient outcomes: a comprehensive systematic review and meta-analysis. Implement Sci. 2024;19(1):68. https://doi.org/10.1186/s13012-024-01398-0.
10. Patey AM, Fontaine G, Francis JJ, McCleary N, Presseau J, Grimshaw JM. Healthcare professional behaviour: health impact, prevalence of evidence-based behaviours, correlates and interventions. Psychol Health. Jun2023;38(6):766–94. https://doi.org/10.1080/08870446.2022.2100887.
11. Ivers N, Yogasingam S, Lacroix M, et al. Audit and feedback: effects on professional practice. Cochrane Database Syst Rev. 2025;3(3):CD000259. https://doi.org/10.1002/14651858.CD000259.pub4.
12. Wensing M, & Grol, R. (2020). Theories on Implementation of Change in Healthcare. In M. Wensing, R. Grol, & J. Grimshaw (Eds.), Improving Patient Care: The Implementation of Change in Health Care (3rd ed., pp. 21–38). John Wiley & Sons Ltd. Theories on Implementation of Change in Healthcare. In: M. Wensing RG, & J. Grimshaw, ed. *I*mproving Patient Care: The Implementation of Change in Health Care. John Wiley & Sons Ltd; 2020:21–38. https://doi.org/10.1002/9781119488620.ch2.
13. Birken SA, Powell BJ, Presseau J, et al. Combined use of the Consolidated Framework for Implementation Research (CFIR) and the Theoretical Domains Framework (TDF): a systematic review. Implement Sci. 2017;12(1):2. https://doi.org/10.1186/s13012-016-0534-z.
14. Shin HD, Hamovitch E, Gatov E, et al. The NASSS (Non-Adoption, Abandonment, Scale-Up, Spread and Sustainability) framework use over time: A scoping review. PLOS Digit Health. Mar2025;4(3): e0000418. https://doi.org/10.1371/journal.pdig.0000418.
15. Dyson J, Cowdell F. How is the Theoretical Domains Framework applied in designing interventions to support healthcare practitioner behaviour change? A systematic review. Int J Qual Health Care. 2021;33(3). https://doi.org/10.1093/intqhc/mzab106.
16. Mosavianpour M, Sarmast HH, Kissoon N, Collet JP. Theoretical domains framework to assess barriers to change for planning health care quality interventions: a systematic literature review. J Multidiscip Healthc. 2016;9:303–10. https://doi.org/10.2147/JMDH.S107796.
17. Strifler L, Cardoso R, McGowan J, et al. Scoping review identifies significant number of knowledge translation theories, models, and frameworks with limited use. J Clin Epidemiol. Aug2018;100:92–102. https://doi.org/10.1016/j.jclinepi.2018.04.008.
18. Wang Y, Wong EL, Nilsen P, Chung VC, Tian Y, Yeoh EK. A scoping review of implementation science theories, models, and frameworks - an appraisal of purpose, characteristics, usability, applicability, and testability. Implement Sci. 2023;18(1):43. https://doi.org/10.1186/s13012-023-01296-x.
19. Tabak RG, Khoong EC, Chambers DA, Brownson RC. Bridging research and practice: models for dissemination and implementation research. Am J Prev Med. 2012;43(3):337–50. https://doi.org/10.1016/j.amepre.2012.05.024.
20. Walsh-Bailey C, Tsai E, Tabak RG, et al. A scoping review of de-implementation frameworks and models. Implement Sci. 2021;16(1):1–18. https://doi.org/10.1186/s13012-021-01173-5.
21. Strifler L, Barnsley JM, Hillmer M, Straus SE. Identifying and selecting implementation theories, models and frameworks: a qualitative study to inform the development of a decision support tool. BMC Med Inform Decis Mak. 2020;20(1):1–12. https://doi.org/10.1186/s12911-020-01128-8.
22. Eccles M, Grimshaw J, Walker A, Johnston M, Pitts N. Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. J Clin Epidemiol. 2005;58(2):107–12. https://doi.org/10.1016/j.jclinepi.2004.09.002.
23. Lynch EA, Mudge A, Knowles S, Kitson AL, Hunter SC, Harvey G. "There is nothing so practical as a good theory": a pragmatic guide for selecting theoretical approaches for implementation projects. BMC Health Serv Res. 2018;18(1):1–11. https://doi.org/10.1186/s12913-018-3671-z.
24. Birken SA, Powell BJ, Shea CM, et al. Criteria for selecting implementation science theories and frameworks: results from an international survey. Implement Sci. 2017;12(1):1–9. https://doi.org/10.1186/s13012-017-0656-y.
25. Birken SA, Rohweder CL, Powell BJ, et al. T-CaST: an implementation theory comparison and selection tool. Implement Sci. 2018;13(1):1–10. https://doi.org/10.1186/s13012-018-0836-4.
26. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Chapter 11: Scoping reviews (2020 version). In: Aromataris E, Munn Z, eds. Joanna Briggs Institute (JBI) manual for evidence synthesis. JBI; 2020.
27. Porat-Dahlerbruch J, Fontaine G, Bourbeau-Allard E, Spinewine A, Grimshaw JM, Ellen ME. Desirable attributes of theories, models, and

frameworks for implementation strategy design in healthcare: a scoping review protocol. F1000Res. 2022;11:1003. https://doi.org/10.12688/f1000research.124821.1.
28. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467–73.
29. Colquhoun HL, Squires JE, Kolehmainen N, Fraser C, Grimshaw JM. Methods for designing interventions to change healthcare professionals' behaviour: a systematic review. Implement Sci. 2017;12(30). https://doi.org/10.1186/s13012-017-0560-5.
30. Graham ID, Tetroe J, Group KTTR. Some theoretical underpinnings of knowledge translation. Acad Emerg Med. Nov2007;14(11):936–41. https://doi.org/10.1197/j.aem.2007.07.004.
31. Bullock HL, Lavis JN, Wilson MG, Mulvale G, Miatello A. Understanding the implementation of evidence-informed policies and practices from a policy perspective: a critical interpretive synthesis. Implement Sci. 2021;16(1):18. https://doi.org/10.1186/s13012-021-01082-7.
32. Dixon-Woods M, Cavers D, Agarwal S, et al. Conducting a critical interpretive synthesis of the literature on access to healthcare by vulnerable groups. BMC Med Res Methodol. 2006;6:35. https://doi.org/10.1186/1471-2288-6-35.
33. Duan Y, Iaconi A, Wang J, et al. Conceptual and relational advances of the PARIHS and i-PARIHS frameworks over the last decade: a critical interpretive synthesis. Implement Sci. 2022;17(1):78. https://doi.org/10.1186/s13012-022-01254-z.
34. Patey AM, Hurt CS, Grimshaw JM, Francis JJ. Changing behaviour 'more or less'-do theories of behaviour inform strategies for implementation and de-implementation? A critical interpretive synthesis. Implement Sci. 2018;13(1):134. https://doi.org/10.1186/s13012-018-0826-6.
35. Mitchell SA, Fisher CA, Hastings CE, Silverman LB, Wallen GR. A thematic analysis of theoretical models for translational science in nursing: mapping the field. Nurs Outlook Nov-Dec. 2010;58(6):287–300. https://doi.org/10.1016/j.outlook.2010.07.001.
36. Smith MY, Gaglio B, Anatchkova M. The use of implementation science theories, models, and frameworks in implementation research for medicinal products: A scoping review. Health Res Policy Syst. 2024;22(1):17. https://doi.org/10.1186/s12961-024-01102-0.
37. Manojlovich M, Squires JE, Davies B, Graham ID. Hiding in plain sight: communication theory in implementation science. Implement Sci. 2015;10:58. https://doi.org/10.1186/s13012-015-0244-y.
38. Villalobos Dintrans P, Bossert TJ, Sherry J, Kruk ME. A synthesis of implementation science frameworks and application to global health gaps. Glob Health Res Policy. 2019;4:25. https://doi.org/10.1186/s41256-019-0115-1.
39. Gawlinski A, Rutledge D. Selecting a model for evidence-based practice changes: a practical approach. AACN Adv Crit Care Jul-Sep. 2008;19(3):291–300. https://doi.org/10.1097/01.AACN.0000330380.41766.63.
40. Davison CM, Ndumbe-Eyoh S, Clement C. Critical examination of knowledge to action models and implications for promoting health equity. Int J Equity Health. 2015;14:49. https://doi.org/10.1186/s12939-015-0178-7.
41. Liang L, Bernhardsson S, Vernooij RW, et al. Use of theory to plan or evaluate guideline implementation among physicians: a scoping review. Implement Sci. 2017;12(1):26. https://doi.org/10.1186/s13012-017-0557-0.
42. McIsaac JL, Warner G, Lawrence L, et al. The application of implementation science theories for population health: A critical interpretive synthesis. AIMS Public Health. 2018;5(1):13–30. https://doi.org/10.3934/publichealth.2018.1.13.
43. Brehaut JC, Eva KW. Building theories of knowledge translation interventions: use the entire menu of constructs. Implement Sci. 2012;7:114. https://doi.org/10.1186/1748-5908-7-114.
44. Esmail R, Clement FM, Holroyd-Leduc J, Niven DJ, Hanson HM. Characteristics of knowledge translation theories, models and frameworks for health technology reassessment: expert perspectives through a qualitative exploration. BMC Health Serv Res. 2021;21(1):401. https://doi.org/10.1186/s12913-021-06382-8.
45. Presseau J, Kasperavicius D, Rodrigues IB, et al. Selecting implementation models, theories, and frameworks in which to integrate intersectional approaches. BMC Med Res Methodol. 2022;22(1):212. https://doi.org/10.1186/s12874-022-01682-x.
46. Hudon A, Gervais MJ, Hunt M. The contribution of conceptual frameworks to knowledge translation interventions in physical therapy. Phys Ther. Apr2015;95(4):630–9. https://doi.org/10.2522/ptj.20130483.
47. Kothari A, Sibbald SL. Using Complexity to Simplify Knowledge Translation Comment on "Using Complexity and Network Concepts to Inform Healthcare Knowledge Translation." Int J Health Policy Manag. 2018;7(6):563–5. https://doi.org/10.15171/ijhpm.2017.139.
48. Noyes J, Hendry M, Booth A, et al. Current use was established and Cochrane guidance on selection of social theories for systematic reviews of complex interventions was developed. J Clin Epidemiol. Jul2016;75:78–92. https://doi.org/10.1016/j.jclinepi.2015.12.009.
49. Reed JE, Green S, Howe C. Translating evidence in complex systems: a comparative review of implementation and improvement frameworks. Int J Qual Health Care. 2019;31(3):173–82. https://doi.org/10.1093/intqhc/mzy158.
50. Greenhalgh T, Wherton J, Papoutsi C, et al. Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies. J Med Internet Res. 2017;19(11):e367. https://doi.org/10.2196/jmir.8775.
51. Michie S, Johnston M, Abraham C, et al. Making psychological theory useful for implementing evidence based practice: a consensus approach. Qual Saf Health Care. Feb2005;14(1):26–33. https://doi.org/10.1136/qshc.2004.011155.
52. Rycroft-Malone J. Theory and knowledge translation: setting some coordinates. Nurs Res Jul-Aug. 2007;56(4 Suppl):S78-85. https://doi.org/10.1097/01.NNR.0000280631.48407.9b.
53. Rycroft-Malone J, Bucknall T. Using theory and frameworks to facilitate the implementation of evidence into practice. Worldviews Evid Based Nurs. 2010;7(2):57–8. https://doi.org/10.1111/j.1741-6787.2010.00194.x.
54. Kislov R, Pope C, Martin GP, Wilson PM. Harnessing the power of theorising in implementation science. Implement Sci. 2019;14(1):103. https://doi.org/10.1186/s13012-019-0957-4.
55. Moullin JC, Sabater-Hernandez D, Fernandez-Llimos F, Benrimoj SI. A systematic review of implementation frameworks of innovations in healthcare and resulting generic implementation framework. Health Res Policy Syst. 2015;13:16. https://doi.org/10.1186/s12961-015-0005-z.
56. Redman-MacLaren M, Turner Anmatyerre/Jaru NN, Taylor J, et al. Respect Is Central: A Critical Review of Implementation Frameworks for Continuous Quality Improvement in Aboriginal and Torres Strait Islander Primary Health Care Services. Front Public Health. 2021;9:630611. https://doi.org/10.3389/fpubh.2021.630611.
57. Harris M, Lawn SJ, Morello A, et al. Practice change in chronic conditions care: an appraisal of theories. BMC Health Serv Res. 2017;17(1):170. https://doi.org/10.1186/s12913-017-2102-x.
58. Milat AJ, Li B. Narrative review of frameworks for translating research evidence into policy and practice. Public Health Res Pract. 2017;27(1)https://doi.org/10.17061/phrp2711704.
59. Sarkies M, Robinson S, Ludwick T, et al. Understanding implementation science from the standpoint of health organisation and management: an interdisciplinary exploration of selected theories, models and frameworks. J Health Organ Manag. 2021;35(7):782–801. https://doi.org/10.1108/jhom-02-2021-0056.
60. McKillop A, Shaw J, Sheridan N, et al. Understanding the Attributes of Implementation Frameworks to Guide the Implementation of a Model of Community-based Integrated Health Care for Older Adults with Complex Chronic Conditions: A Metanarrative Review. Int J Integr Care. 2017;17(2):10. https://doi.org/10.5334/ijic.2516.
61. Gustafson P, Abdul Aziz Y, Lambert M, et al. A scoping review of equity-focused implementation theories, models and frameworks in healthcare and their application in addressing ethnicity-related health inequities. Implement Sci. 2023;18(1):51. https://doi.org/10.1186/s13012-023-01304-0.
62. Nilsen P, Bernhardsson S. Context matters in implementation science: a scoping review of determinant frameworks that describe contextual determinants for implementation outcomes. BMC Health Serv Res. 2019;19(1):189. https://doi.org/10.1186/s12913-019-4015-3.
63. Minogue V, Matvienko-Sikar K, Hayes C, Morrissey M, Gorman G, Terres A. The usability and applicability of knowledge translation theories, models, and frameworks for research in the context of a national

health service. Health Res Policy Syst. 2021;19(1):105. https://doi.org/10.1186/s12961-021-00747-5.
64. Flottorp SA, Oxman AD, Krause J, et al. A checklist for identifying determinants of practice: a systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. Implement Sci. 2013;8:35. https://doi.org/10.1186/1748-5908-8-35.
65. Lobczowska K, Banik A, Romaniuk P, et al. Frameworks for implementation of policies promoting healthy nutrition and physically active lifestyle: systematic review. Int J Behav Nutr Phys Act. 2022;19(1):16. https://doi.org/10.1186/s12966-021-01242-4.
66. Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. Implement Sci. 2007;2:40. https://doi.org/10.1186/1748-5908-2-40.
67. Klaic M, Kapp S, Hudson P, et al. Implementability of healthcare interventions: an overview of reviews and development of a conceptual framework. Implement Sci. 2022;17(1):10. https://doi.org/10.1186/s13012-021-01171-7.
68. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process. 1991;50(2):179–211. https://doi.org/10.1016/0749-5978(91)90020-t.
69. Murray E, Treweek S, Pope C, et al. Normalisation process theory: a framework for developing, evaluating and implementing complex interventions. BMC Med. 2010;8:63. https://doi.org/10.1186/1741-7015-8-63.
70. Turner JR, Baker RM. Complexity Theory: An Overview with Potential Applications for the Social Sciences. Systems. 2019;7(1). https://doi.org/10.3390/systems7010004.
71. Cresswell KM, Worth A, Sheikh A. Actor-Network Theory and its role in understanding the implementation of information technology developments in healthcare. BMC Med Inform Decis Mak. 2010;10:67. https://doi.org/10.1186/1472-6947-10-67.
72. Graham ID, Logan J, Harrison MB, et al. Lost in knowledge translation: time for a map? J Contin Educ Health Prof Winter. 2006;26(1):13–24. https://doi.org/10.1002/chp.47.
73. Aarons GA, Hurlburt M, Horwitz SM. Advancing a conceptual model of evidence-based practice implementation in public service sectors. Adm Policy Ment Health. Jan2011;38(1):4–23. https://doi.org/10.1007/s10488-010-0327-7.
74. Potthoff S, Finch T, Buhrmann L, et al. Towards an Implementation-STakeholder Engagement Model (I-STEM) for improving health and social care services. Health Expect. Oct2023;26(5):1997–2012. https://doi.org/10.1111/hex.13808.
75. Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. Implement Sci. 2022;17(1):75. https://doi.org/10.1186/s13012-022-01245-0.
76. Atkins L, Francis J, Islam R, et al. A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. Implement Sci. 2017;12(1):77. https://doi.org/10.1186/s13012-017-0605-9.
77. Woodward EN, Matthieu MM, Uchendu US, Rogal S, Kirchner JE. The health equity implementation framework: proposal and preliminary study of hepatitis C virus treatment. Implement Sci. 2019;14(1):26. https://doi.org/10.1186/s13012-019-0861-y.
78. Henderson V, Tossas-Milligan K, Martinez E, et al. Implementation of an integrated framework for a breast cancer screening and navigation program for women from underresourced communities. Cancer. 2020;126 Suppl 10:2481–2493. https://doi.org/10.1002/cncr.32843.
79. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci. 2011;6:42. https://doi.org/10.1186/1748-5908-6-42.
80. Powell BJ, Waltz TJ, Chinman MJ, et al. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. Implement Sci. 2015;10:21. https://doi.org/10.1186/s13012-015-0209-1.
81. Fernandez ME, Ten Hoor GA, van Lieshout S, et al. Implementation Mapping: Using Intervention Mapping to Develop Implementation Strategies. Front Public Health. 2019;7:158. https://doi.org/10.3389/fpubh.2019.00158.
82. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. Am J Public Health. Sep1999;89(9):1322–7. https://doi.org/10.2105/ajph.89.9.1322.
83. Proctor E, Silmere H, Raghavan R, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Health. Mar2011;38(2):65–76. https://doi.org/10.1007/s10488-010-0319-7.
84. Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: Medical Research Council guidance. BMJ. 2015;350:h1258. https://doi.org/10.1136/bmj.h1258.
85. Greenhalgh J, Manzano A. Understanding 'context' in realist evaluation and synthesis. Int J Soc Res Methodol. 2021;25(5):583–95. https://doi.org/10.1080/13645579.2021.1918484.
86. Smith JD, Li DH, Rafferty MR. The Implementation Research Logic Model: a method for planning, executing, reporting, and synthesizing implementation projects. Implement Sci. 2020;15(1):84. https://doi.org/10.1186/s13012-020-01041-8.
87. University of Colorado Denver. Dissemination & implementation models in health research and practice. https://dissemination-implementation.org/. 27 April 2025.
88. Strifler L, Fahim C, Hillmer MP, Barnsley JM, Straus SE. Development and usability testing of an online support tool to identify models and frameworks to inform implementation. BMC Med Inform Decis Mak. 2024;24(1):182. https://doi.org/10.1186/s12911-024-02580-6.
89. Adsul P, Chambers D, Brandt HM, et al. Grounding implementation science in health equity for cancer prevention and control. Implement Sci Commun. 2022;3(1):56. https://doi.org/10.1186/s43058-022-00311-4.
90. Baumann AA, Shelton RC, Kumanyika S, Haire-Joshu D. Advancing healthcare equity through dissemination and implementation science. Health Serv Res. 2023;58 Suppl 3(Suppl 3):327–344. https://doi.org/10.1111/1475-6773.14175.
91. Brownson RC, Kumanyika SK, Kreuter MW, Haire-Joshu D. Implementation science should give higher priority to health equity. Implement Sci. 2021;16(1):28. https://doi.org/10.1186/s13012-021-01097-0.
92. Fontaine G, Presseau J, Bruneau J, et al. Using an intersectionality lens to explore barriers and enablers to hepatitis C point-of-care testing: a qualitative study among people who inject drugs and service providers. Int J Equity Health. 2024;23(1):124. https://doi.org/10.1186/s12939-024-02209-0.
93. Fontaine G, Taylor N, Bruneau J, et al. The urgent need for implementation science to achieve hepatitis C elimination. Lancet Gastroenterol Hepatol. 2025;https://doi.org/10.1016/S2468-1253(25)00050-0.
94. Nundy S, Cooper LA, Mate KS. The Quintuple Aim for health care improvement: a new imperative to advance health equity. JAMA. 2022;327(6):521–2. https://doi.org/10.1001/jama.2021.25181.
95. University of Colorado Denver. Dissemination & implementation models in health research and practice. 2024. https://dissemination-implementation.org/. 27 April 2025.

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