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STUDY PROTOCOL

Desirable attributes of theories, models, and frameworks for implementation strategy design in healthcare: a scoping review protocol [version 1; peer review: 1 approved, 2 approved with reservations]

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Abstract
Background: Implementation strategies can facilitate the adoption of evidence-based practices and policies. A wide range of theoretical approaches—theories, models, and frameworks—can be used to inform implementation strategy design in different ways (e.g., guiding barrier and enabler assessment to implementing evidence-based interventions). While selection criteria and attributes of theoretical approaches for use in implementation strategy design have been studied, they have never been synthesized. Furthermore, theoretical approaches have never been classified according to desirable criteria and attributes for use in implementation strategy design. This scoping review aims to a) identify the literature reporting on the selection of theoretical approaches for informing implementation strategy design in healthcare and b) understand the suggested use of these approaches in implementation strategy design.
Methods: The Joanna Briggs Institute methodological guidelines will be used to conduct this scoping review. A search of three bibliographical databases (MEDLINE, Embase, CINAHL) will be conducted for peer-reviewed discussion, methods, protocol, or review papers. Data will be managed using the Covidence software. Two review team members will independently perform screening, full text review and data extraction.

Open Peer Review

Approval Status ❓ ✔️ ❓

	1	2	3
version 1 06 Sep 2022	❓ view	✔️ view	❓ view

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Any reports and responses or comments on the article can be found at the end of the article.

Results: Results will include a list of selection criteria and attributes of theoretical approaches for use in research on implementation strategy design. Descriptive data regarding selection criteria and attributes will be synthesized graphically and in table format. Data regarding the suggested use of theoretical approaches in implementation strategy design will be presented narratively.

Conclusions: Results will be used to classify existing theoretical approaches according to the attributes and selection criteria identified in this scoping review. Envisioned next steps include an online tool that will be created to assist researchers in selecting theories, models, and frameworks for implementation strategy design.

Keywords

implementation; implementation science; review; theory; evidence-based practice; literature review; protocol; knowledge translation

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Author roles: Porat-Dahlerbruch J: Conceptualization, Methodology, Writing – Original Draft Preparation; **Fontaine G**: Conceptualization, Methodology, Visualization, Writing – Original Draft Preparation; **Bourbeau-Allard È**: Methodology, Resources, Writing – Review & Editing; **Spinewine A**: Conceptualization, Writing – Review & Editing; **Grimshaw JM**: Conceptualization, Methodology, Supervision, Writing – Review & Editing; **Ellen ME**: Conceptualization, Methodology, Software, Supervision, Writing – Review & Editing

Background

Implementation strategies are methods or techniques used to facilitate the adoption of evidence-based interventions by healthcare providers, organizations and systems.[1,2] These strategies must address the specific implementation context.[2,3] Rigorous, systematic and context-specific design of implementation strategies is critical for informing the implementation of evidence-based interventions.[4–6] Implementation strategy design is often guided by *informal* (or implicit) theory—i.e., an "understanding of the problem and its determinants gained through experience or tacit knowledge by the developers of the intervention."[4–6] While informal theory can be useful for developing strategies suited to the particular implementation context, there are downsides to using only informal theory in this context. These include lack of standardization of language/tools, failure to build on existing knowledge, and influence of personal preferences/biases.[7] To overcome these limitations and inform implementation strategy design, implementation scientists and practitioners can select from a broad range of theories, models, and frameworks (TMFs), which can be classified as *formal* theory.[8,9]

Several methodological approaches can be used to support the application of formal theory to the design of implementation strategies.[2,10] Typically, these approaches involve identifying which stakeholders need to do what differently, identifying barriers and enablers to change, articulating a pathway of change for the targeted behaviour change, and selecting implementation strategy components to overcome identified barriers and enhance enablers of change.[4,5,10,11] For example, implementation researchers often select a TMF to inform interview guide development in studies assessing barriers and enablers to healthcare professional adherence to an evidence-based clinical practice guideline.[8] Results can be used to inform stakeholders of areas necessitating intervention to enhance implementation outcomes. Table 1 presents French *et al.*,'s[11] approach for the development of a theory-informed implementation strategy.

However, the sheer number of TMFs relevant to implementation strategies is staggering and they are not one-size-fits-all; several complexities must be considered.[9,12] TMFs have different purposes, operate at different levels (e.g., individual, organization, community, system), contain constructs ranging from broad to operational, and the relationships between their constructs can vary (e.g., linear, cyclical, feedback) or be absent.[13,14] TMFs vary in the extent to which there are methods for operationalizing them; some TMFs are associated with a wide range of resources that can be useful to guide implementation strategy design. Finally, the supporting evidence varies; some theories emerged from decades of research in psychology, while this is not the case for more recent TMFs.[13,14] To help clarify TMF distinctions, Nilsen[8] proposed a taxonomy identifying five categories of TMFs: process models, determinant frameworks, classic theories, implementation theories, and evaluation frameworks (see Table 2). Three types of TMFs are particularly useful for informing implementation strategy design. Determinant frameworks consolidate several theories and describe multilevel factors that are theoretically and/or empirically linked to implementation outcomes. Classic theories and implementation theories describe precise mechanisms of behaviour and behaviour change that can be targeted by implementation strategy components. These theories often describe how change in the behaviour of those involved in an implementation process (e.g., healthcare professionals, patients) is anticipated to occur.[4,8]

While there is a wide range of TMFs available to inform implementation strategy design, researchers have little guidance on the desirable attributes of TMFs for this purpose. Furthermore, there is little information on how to select TMFs for use in their specific context. Several papers have reported broad taxonomies intended to elucidate and identify attributes on which to select TMFs for use in implementation research, but none, to our knowledge, specifically focus on implementation strategy design. Tabak *et al.*,[13] sought to classify, organize and synthesize models aiming to support dissemination

Table 1. Suggested steps for the development of a theory informed implementation strategy. Adapted from French *et al.*[11] and Wolfenden *et al.*[4]

Steps	Description
1	Identify who (e.g., individuals or professional groups) needs to do what differently, when and in what context, for implementation to be improved.
2	Using informal and formal theory and frameworks, identify barriers and enablers that need to be resolved, and articulate a pathway of change for the targeted behaviour change to occur. A variety of research methods should be used to support the development of the change pathway (programme theory).
3	Select implementation strategy components (behaviour change techniques, modes of delivery) that might be effective, locally relevant, acceptable, and feasible to overcome identified barriers and enhance enablers to change. Selection of strategies should be based on matrices recommended by determinant frameworks, empirical evidence, and engagement with end users.
4	Decide how implementation can be robustly and feasibly measured, including factors on the hypothesised causal pathway (mediators) and appropriate implementation outcomes.

Table 2. Five categories of theories, models and frameworks used in implementation science. Adapted from Nilsen[8] and Wolfenden *et al.*[4]

Theory, model or framework type	Description
Process models (e.g., Knowledge-to-Action Cycle)	• Models that specify steps (stages, phases) in the process of translating research into practice, including the implementation and use of research.
Determinant frameworks	• Frameworks often developed through the consolidation of constructs from a range of theories and aiming to understand and explain factors that could influence implementation. • They typically do not describe mechanisms for change.
Classic theories	• Theories originating from disciplines such as psychology that help understand or explain individual, group, or organizational behaviour. • They describe precise mechanisms of behaviour change.
Implementation theories	• Theories developed (or adapted classic theories) specifically to understand, explain, and inform implementation. • They describe precise mechanisms of change for one or more aspect of implementation.
Evaluation frameworks	• Frameworks that specify aspects of implementation that could be evaluated to determine implementation success.

and implementation and offered guidance on how to select a model to inform study design and execution. Davis *et al.*,[15] developed a list of criteria to appraise the quality of theories of behaviour and behaviour change. Birken *et al.*,[16,17] identified the criteria used by implementation scientists to select TMFs and developed a tool to help scientists and practitioners select appropriate TMFs to guide their implementation initiatives. Similar work was undertaken by Lynch *et al.*,[18] who developed a pragmatic guide for TMF selection. More recently, Strifler *et al.*,[12] conducted a qualitative study that aimed to explore barriers and facilitators to identifying and selecting TMFs.

Despite the breadth of work, current papers discussing TMF selection do not differentiate criteria as a function of how implementation scientists and practitioners intend to use them.[16,17] As discussed by Nilsen,[8,19] there are different overarching aims of the use of TMFs in implementation science, but the selection criteria have not yet been differentiated by function of their intended use (Figure 1). Criteria currently available remain the same whether implementation scientists and practitioners intend to use TMFs for guiding the process of translating research into practice, understanding what influences implementation outcomes (to guide implementation strategy design), or evaluating implementation.

We posit that classifications of attributes for TMF selection must be more distinctive and focus on their intended use. In the context of implementation strategy design, some criteria for TMF selection might be more relevant than others.
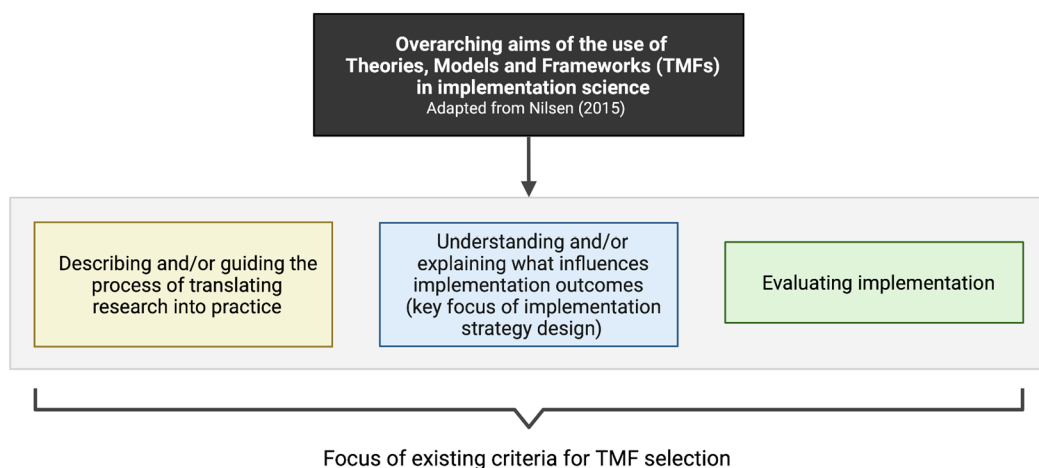

Figure 1. Focus of existing criteria for TMF selection; the criteria are not differentiated in function of the study purpose. The blue box corresponds to the use of TMFs for implementation strategy design.

Applicability—i.e., whether a particular method (e.g., interviews, surveys, focus groups) can be used with the TMF—is often critical. Furthermore, the extent to which the TMF provides an explanation of how included constructs influence implementation and/or one another is essential.[16,17] Thus, the lack of clear criteria renders TMF selection, and therefore implementation strategy design, perplexing, particularly for neophyte implementation scientists.[16,17] As implementation strategy design is a key focus of implementation research, we believe it is critical to clarify specifically the selection criteria of TMFs in this context. Therefore, it is of high interest to synthesize the literature reporting on the selection of TMFs for informing implementation strategy design.

Objective

This scoping review aims to identify literature reporting on the selection of TMFs for informing implementation strategy design in healthcare and understand the suggested use of TMFs in implementation strategy design. We found no similar review after a preliminary search in MEDLINE (Ovid) and the Cochrane Database of Systematic Reviews on 15th March 2022. The main review question is the following:

1. What are the desirable attributes/selection criteria of TMFs for implementation strategy design in healthcare?

In addition, we will explore the purposes and uses of TMFs for informing each step of implementation strategy design, and the suggested research methods (e.g., qualitative interviews) for use in this context.t

Methods

Scoping reviews are particularly useful to explore, identify, map and discuss characteristics of concepts across a wide range of evidence sources.[20] The proposed scoping review will be conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews (which expands on the work of Arksey and O'Malley[21] and Levac *et al.*[22]). It emphasizes appropriateness, feasibility, and meaningfulness of the literature and includes nine sequential steps. First, defining the scoping review objective(s) and question(s). Second, developing and aligning the inclusion criteria with the objective(s) and question(s). Third, specifying the approach to evidence searching, selection, data extraction, and presentation. The next four steps involve searching for, selecting, extracting and analysing the evidence. The eighth is the presentation of the results, while the ninth and last step is summarizing the evidence, making conclusions and noting implications of the findings.[20]

Eligibility criteria

The eligibility criteria are presented in Table 3 and described in more detail below. We will include literature reporting on a) the desirable attributes or selection criteria of TMFs for informing implementation strategy design and/or on b) the use of TMFs in implementation strategy design (concept) within any healthcare setting (context) (Figure 2). We define 'implementation strategy design' as all steps described in Table 1, including a) the identification of which stakeholders need to do what differently, b) the identification of the barriers and enablers that need to be resolved, c) the selection of implementation strategy components and the identification of the hypothesized casual pathway (mediators), and c) the selection of appropriate implementation outcomes.[11] We anticipate that the primary types of records will be method-ological papers and expert opinion papers. In addition, systematic reviews that meet the inclusion criteria will also be considered, depending on the research question. Primary studies will be included only if they research the use of TMFs in implementation strategy design; studies aiming to design and evaluate implementation strategies will be excluded. Furthermore, we will consider other types of records if these meet the eligibility criteria regarding the concept and context of interest. After a preliminary search in the grey literature, we concluded that it does not provide a substantial addition to the academic literature. Thus, we decided to not search the grey literature for low relevance and feasibility reasons.

Literature search
Information sources

The bibliographical databases to be searched include MEDLINE (Ovid), CINAHL (EBSCO), and Embase (Ovid). Additionally, we will hand-search relevant journals to identify additional records. Examples of journals may include: *Implementation Science*, *Implementation Science Communications*, *BMC Health Services Research*, *Implementation Research and Practice*, and *Health Research Policy and Systems.* We will screen the reference list of included records to identify additional records. Finally, we will identify a limited number of 'core papers' (e.g., 10) and perform a citation search.

Search strategy

The search strategy will aim to locate published papers in peer-reviewed journals. An initial limited search of MEDLINE and CINAHL was undertaken in April 2022 to identify articles on the topic. The text words contained in the titles and

Table 3. Eligibility criteria.

Criterion	Inclusion criteria	Exclusion criteria
Concept	• We will include papers reporting on the desirable attributes and/or selection criteria of theories, models and frameworks (TMFs) for implementation research • We will include studies researching/investigating the use of TMFs in implementation strategy design (i.e., papers that go beyond a superficial level and provide enough detail to answer the review question)	• We will exclude papers that do not discuss implementation TMFs, their selection criteria/attributes or their use in implementation strategy design • We will exclude studies aiming to design and evaluate specific implementation strategies
Context	• We will include papers reporting on the review concept in any healthcare setting/context	• We will exclude papers unrelated to healthcare settings (e.g., work settings, school settings)
Language	• We will include papers published in English and French	• We will exclude papers published in any other language
Time period	• We will include papers published from 1st January 2002 and onward	• We will exclude papers published on or before 31st December 2001
Types of sources	• We will include review, discussion, methods, and opinion papers as well as editorials focusing on desirable attributes and/or selection criteria of theories, models and frameworks (TMFs) for implementation research • We will also consider primary studies and study protocols researching/investigating the use of TMFs in implementation strategy design for inclusion	• We will exclude conference abstracts and non-peer reviewed sources (e.g., blogs) • We will exclude randomized controlled trials
Geographic	• We will include papers originating from all countries	• None

abstracts of relevant articles, and the index terms used to describe the articles, were used to develop and refine a full search strategy for MEDLINE (see Figure 1). We also adapted elements from the search strategies of three recent reviews in the field of implementation science, Colquhoun *et al.*,[10] Walsh-Bailey *et al.*,[14] and Esmail *et al.*,[9] to fit our objectives. The full search strategy, including all identified keywords and index terms, will be adapted for CINAHL and Embase. The reference list of all included sources of evidence will be screened for additional papers. We will include papers published in English and French only. We will limit the search to 2002–2022 as implementation research has developed drastically over the last two decades. Limiting our search will ensure that information is relevant for use today.

Source of evidence selection

Following the search, all identified citations will be collated and duplicates removed. Following a pilot test, titles and abstracts will be screened by two independent reviewers for assessment against the inclusion criteria for the review. The full text of selected citations will be assessed in detail against the inclusion criteria by two independent reviewers. Reasons for exclusion of sources of evidence during the full text review that do not meet the inclusion criteria will be recorded and reported in the scoping review. Any disagreements that arise between the reviewers at each stage of the selection process will be resolved through discussion, or with an additional reviewer. The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram.[23]

Data extraction

Data will be extracted from included records by two independent reviewers using a data extraction tool developed specifically for this review (see Table 4). The data extracted will include specific details about the concept, context, study methods and key findings relevant to the review question. Using the extraction tool, we will extract the following data from included records:

1. *Descriptive data*: year of publication, first author's academic discipline, country of origin, article type (e.g., study, editorial, review, opinion paper) and aim.

Database: "Ovid MEDLINE(R) ALL <1946 to July 25 2022>"		
1	implementation.kf.	11894
2	(implementation adj2 (scien* or research* or process* or practice or project* or theor* or framework* or model* or strateg* or design* or guideline* or barrier* or enabler* or facilitator* or intervention*)).ti,ab.	43551
3	*Implementation Science/	599
4	*Health Plan Implementation/mt [Methods]	511
5	(Knowledge adj2 (translat* or implement* or application or uptake or utili#ation)).ti,kf.	2860
6	(Evidence adj2 (translat* or implement* or application or action or uptake or utili#ation)).ti,kf.	2613
7	(research adj2 (translat* or implement* or application or action or uptake or utili#ation)).ti,kf.	11902
8	(intervention* adj2 (mapping or design* or develop* or "behavio?r change")).ti,kf.	3221
9	(theor* or model or models or framework* or concept*).ti,kf.	978646
10	*Models, Theoretical/ or *Models, Organizational/	70725
11	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	67484
12	9 or 10	1019501
13	11 and 12	8027
14	(exp Animals/ or exp Models, Animal/) not Humans/	5041246
15	((animal or animals or cattle* or canine* or dog or dogs or feline or hamster* or lamb or lambs or mice or monkey* or mouse or murine or pig or pigs or piglet* or porcine or primate* or rabbit* or rats or rat or rodent* or sheep or ovine or veterinar* or cats or cow or bovine or phytolog* or botan* or plant) not (human* or patient*)).ti,kf,jw.	2879370
16	14 or 15	5749514
17	13 not 16	7438
18	("control?ed clinical trial" or "randomi?ed control?ed trial" or "randomi?ed clinical trial" or "pilot study" or "feasibility study" or "interrupted time series" or "cohort study" or "case-control study" or "experimental study").ti.	324831
19	(Randomized Controlled Trial/ or Controlled Clinical Trial/ or Pilot Projects/ or Feasibility Studies/ or Interrupted Time Series Analysis/ or Cohort Studies/ or Case-Control Studies/) not (Randomized Controlled Trials as Topic/ or Pragmatic Clinical Trials as Topic/ or Non-Randomized Controlled Trials as Topic/)	1442972
20	18 or 19	1566705
21	17 not 20	6920
22	21 not congress/	6914
23	limit 22 to yr="2002 - 2022"	6573
24	limit 23 to (english or french)	6470

Figure 2. Search strategy.

2. *Methodological data*: study design (if applicable), population and sample size (if applicable), study setting, data collection and analysis methods (if applicable).

3. Data on TMFs:

   a. Authors' rationale regarding the purpose of TMFs:

      • Generally, in implementation research and practice

      • Specifically for informing implementation strategy design

Table 4. Data extraction tool.

General information	
1. **Study ID** *(surname of first author and year first full report of study was published e.g. Smith 2001)*	
2. **Report IDs of other reports of this study** *(e.g. duplicate publications, follow-up studies)*	
3. **General notes**	
4. **Date form completed** *(dd/mm/yyyy)*	
5. **Name/ID of person extracting data**	
6. **Report title** *(title of paper/abstract/report that data are extracted from)*	
7. **Report ID** *(if there are multiple reports of this study)*	
8. **Reference details**	
9. **Report author contact details**	
10. **Publication type** *(e.g. full report, abstract, letter)*	
11. **Publication aim**	
12. **First author's academic discipline**	
13. **First author's country of origin**	
Study characteristics *(if applicable)*	
14. **Design**	
15. **Population and sample characteristics**	
16. **Setting**	
17. **Types of intervention**	
18. **Types of outcome measures**	
19. **Data collection methods**	
20. **Data analysis methods**	
Data on the desirable attributes, selection criteria and use of theories, models and frameworks (TMFs)	
21. **Rationale regarding the <u>purpose of TMFs generally</u>, in implementation research and practice;**	
22. **Rationale regarding the <u>purpose of TMFs specifically for informing implementation strategy design;</u>**	
23. **Rationale regarding the <u>selection process of TMFs</u>;**	
24. **<u>Desirable attributes/selection criteria of TMFs generally</u>, in implementation research and practice;**	
25. **<u>Desirable attributes/selection criteria of TMFs</u> for informing the first step of implementation strategy design: 1) identifying who needs to do what, differently;**	
26. **<u>Desirable attributes/selection criteria of TMFs</u> for informing the second step of implementation strategy design: 2) identifying barriers and enablers and articulate a pathway of change;**	

Table 4. *Continued*

27.	**Desirable attributes/selection criteria of TMFs for informing the third step of implementation strategy design: 3) selecting implementation strategy components**	
28.	**Desirable attributes/selection criteria of TMFs for informing the fourth step of implementation strategy design: 4) deciding how change in implementation will be measured;**	
29.	**Rationale regarding how TMFs should be used for implementation strategy design:**	
	a. Suggested use of TMFs to select recipients for the intervention and define the target behaviour? *If yes, paste relevant paper section.*	
	b. Suggested use of TMF for selecting the theoretical constructs that the study intervention is hypothesized to change? *If yes, paste relevant paper section.*	
	c. Suggested use of a single or a combination of TMFs? *If yes, paste relevant paper section.*	
	d. Suggested use of TMFs to select/develop intervention techniques? *If yes, paste relevant paper section.*	
	e. Suggested use of TMFs to tailor intervention techniques? *If yes, paste relevant paper section.*	
	f. Suggested use of TMFs to link intervention techniques to theory-relevant constructs or predictors, and vice-versa? *If yes, paste relevant paper section.*	
	g. Suggested use of TMFs to specify which theory-relevant constructs/predictors will be measured? *If yes, paste relevant paper section.*	
30.	**Which research methods (e.g., intervention mapping) should be used?**	
Study results (if applicable)		
31.	**Main results**	
Other information		
32.	**Key conclusions of study authors**	
33.	**References to other relevant studies**	

Notes on using a data extraction form: 1) Be consistent in the order and style you use to describe the information for each included study; 2) Record any missing information as unclear or not described, to make it clear that the information was not found in the study report(s), not that you forgot to extract it; and 3) Include any instructions and decision rules on the data collection form, or in an accompanying document. It is important to practice using the form and give training to any other authors using the form.

b. Authors' rationale regarding the desirable attributes, selection criteria and selection process of TMFs:

- Generally, in implementation research and practice

- Specifically for informing each of the four main steps of implementation strategy design: 1) identifying who needs to do what, differently; 2) identifying barriers and enablers and articulate a pathway of change; 3) selecting implementation strategy components; and 4) deciding how change in implementation will be measured.

c. Authors' rationale regarding how TMFs should be used for implementation strategy design, according to the different types of theory use specified in the Theory Coding Scheme.[24]

    d.   The research methods (e.g., intervention mapping) that should be used to incorporate theory in implementation strategy design

   4. *Results data:* reported results according to study outcomes (if applicable).

Two independent reviewers will pilot the form by extracting data from five publications and the tool will be revised iteratively. Modifications will be detailed in the scoping review. Any disagreements that arise between the reviewers will be resolved through discussion, or with an additional reviewer on our research team. If appropriate, authors of papers will be contacted to request missing or additional data, where required.

Data analysis and presentation
An inductive approach will be used to categorize the desirable attributes and selection criteria of TMFs by two researchers independently. This process will be iterative as each researcher will continue categorization until distinct groups are created. After categorizing, the two researchers will compare groupings. Discrepancies in the categories will be resolved in group discussions among the research team. The final categories will be summarized into attribute themes. The entire research team will review final attribute themes, and revisions will be made until all team members agree. Findings will be presented as a list of attributes on which to base TMF selection for guiding implementation strategy design. Descriptive data regarding the purpose, different types of TMF use and research methods in implementation strategy design will be synthesised graphically and in table format. Data will also be presented narratively.

Future direction
Results of this scoping review can be used to develop a taxonomy based on attributes and criteria specific to TMF selection for implementation strategy design, a key focus of implementation research and practice. Using the results of this scoping review, we plan to classify existing TMFs according to the attributes identified. This will result in additional publications. We also plan on creating an accessible, online tool with which researchers can identify TMFs for use in implementation strategy design. Specifically, the tool will allow researchers to select their intended use for a TMF in implementation strategy design and provide TMFs that match the identified desired traits.

Data availability
No data are associated with this article.

References

1.   Proctor EK, Powell BJ, McMillen JC: **Implementation strategies: recommendations for specifying and reporting.** *Implement. Sci.* 2013; **8**(1): 139.
PubMed Abstract | **Publisher Full Text**

2.   Powell BJ, Beidas RS, Lewis CC, *et al.*: **Methods to improve the selection and tailoring of implementation strategies.** *J. Behav. Health Serv. Res.* 2017; **44**: 177–194.
PubMed Abstract | **Publisher Full Text**

3.   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**(1): 1–14.

4.   Wolfenden L, Foy R, Presseau J, *et al.*: **Designing and undertaking randomised implementation trials: guide for researchers.** *BMJ.* 2021; **372**.
PubMed Abstract | **Publisher Full Text**

5.   Davidoff F, Dixon-Woods M, Leviton L, *et al.*: **Demystifying theory and its use in improvement.** *BMJ Qual. Saf.* 2015; **24**: 228–238.
PubMed Abstract | **Publisher Full Text**

6.   Eccles M: **The Improved Clinical Effectiveness through Behavioural Research Group (ICEBeRG). Designing theoretically-informed implementation interventions.** *Implement. Sci.* 2006; **1**.
PubMed Abstract | **Publisher Full Text**

7.   Eccles M, Grimshaw J, Walker A, *et al.*: **Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings.** *J. Clin. Epidemiol.* 2005; **58**(2): 107–112.
PubMed Abstract | **Publisher Full Text**

8.   Nilsen P: **Making sense of implementation theories, models and frameworks.** *Implement. Sci.* 2015; **10**(53): 13–53.
PubMed Abstract | **Publisher Full Text**

9.   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): 11–14.
PubMed Abstract | **Publisher Full Text**

10. Colquhoun HL, Squires JE, Kolehmainen N, *et al.*: **Methods for designing interventions to change healthcare professionals' behaviour: a systematic review.** *Implement. Sci.* 2017; **12**(30): 30.
PubMed Abstract | **Publisher Full Text**

11. French SD, Green SE, O'Connor DA, *et al.*: **Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework.** *Implement. Sci.* 2012; **7**(1): 38.
PubMed Abstract | **Publisher Full Text**

12. Strifler L, Barnsley JM, Hillmer M, *et al.*: **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): 12–91.
PubMed Abstract | **Publisher Full Text**

13. Tabak RG, Khoong EC, Chambers DA, *et al.*: **Bridging research and practice: models for dissemination and implementation research.** *Am. J. Prev. Med.* 2012; **43**(3): 337–350.
PubMed Abstract | **Publisher Full Text**

14. Walsh-Bailey C, Tsai E, Tabak RG, *et al.*: **A scoping review of de-implementation frameworks and models.** *Implement. Sci.* 2021; **16**(1): 100–118.
PubMed Abstract | **Publisher Full Text**

15. Davis R, Campbell R, Hildon Z, *et al*.: **Theories of behaviour and behaviour change across the social and behavioural sciences: A scoping review.** *Health Psychol. Rev.* 2015; **9**(3): 323–344.
PubMed Abstract | **Publisher Full Text**

16. 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): 124–129.
PubMed Abstract | **Publisher Full Text**

17. Birken SA, Rohweder CL, Powell BJ, *et al*.: **T-CaST: an implementation theory comparison and selection tool.** *Implement. Sci.* 2018; **13**(1): 110–143.
PubMed Abstract | **Publisher Full Text**

18. Lynch EA, Mudge A, Knowles S, *et al*.: **"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): 811–857.
PubMed Abstract | **Publisher Full Text**

19. Nilsen P, Birken SA: *Handbook on Implementation Science.* Edward Elgar Publishing; 2020.

20. Peters MDJ, Godfrey C, McInerney P, *et al*.: **Chapter 11: Scoping reviews (2020 version).** Aromataris E, Munn Z, editors. *Joanna Briggs Institute (JBI) manual for evidence synthesis.* JBI; 2020.

21. Arksey H, O'Malley L: **Scoping studies: Towards a methodological framework.** *Int. J. Soc. Res. Methodol.* 2005; **8**(1): 19–32.
Publisher Full Text

22. Levac D, Colquhoun H, O'Brien KK: **Scoping studies: Advancing the methodology.** *Implement. Sci.* 2010; **5**(1): 69.
PubMed Abstract | **Publisher Full Text**

23. Tricco AC, Lillie E, Zarin W, *et al*.: **PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation.** *Ann. Intern. Med.* 2018; **169**(7): 467–473.
PubMed Abstract | **Publisher Full Text**

24. Michie S, Prestwich A: **Are interventions theory based? Development of a theory coding scheme.** *Health Psychol.* 2010; **29**(1): 1–8.
PubMed Abstract | **Publisher Full Text**

Open Peer Review

Current Peer Review Status: ？ ✓ ？

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Version 1

Reviewer Report 28 July 2023

https://doi.org/10.5256/f1000research.137056.r187545

？
Lauren Connell Bohlen

Center for Health Promotion and Health Equity, Brown University School of Public Health, Providence, RI, USA

The protocol for a scoping review to investigate the use of theories, models, and frameworks in the development of implementation strategies is well written. My one reservation with the protocol is that as worded, the research question to identify 'desirable attributes' is not clearly operationalized. The authors should specify how the data extracted, and the analysis plan will lead to the identification of a 'desirable' attribute. Additionally, it is unclear whether all of the items from the theory coding scheme will be extracted, or whether only some will be extracted and in a modified way (e.g., item 3c).

Is the rationale for, and objectives of, the study clearly described?
Partly

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Partly

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Behavioral science, Behavior change theories and frameworks, Implementation science

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have

significant reservations, as outlined above.

Reviewer Report 21 July 2023

✓ **Sanne Peters** iD

School of Health Sciences, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Melbourne, Victoria, Australia

This paper is a protocol for a scoping review that aims to 1) identify the literature reporting on the selection of theoretical approaches for informing implementation strategy design in healthcare and 2) understand the suggested use of these approaches in implementation strategy design. The rationale for this review is clearly described and the methods are transparent and appropriate for the research questions. I believe that this will be a very informative review.

I have one suggestion for the authors to consider. I think that it is a great idea to synthesize desirable attributes/selection criteria. I am wondering whether you can give recommendations regarding prioritisation of selection criteria, based on your review findings and/or authors' expertise? For example, do we need to give more "weight" to one or two selection criteria and why? Can you order the selection criteria based on importance/relevance (from most desirable to least desirable) as described in the literature? Or does the order of selection criteria depend on the local context and should researchers make their own selection of X number of criteria and decide their order? How many criteria would you suggest? I wonder if you can find that kind of information in the literature. I have used multiple selection criteria, for other purposes, in the past and I feel that some criteria are more important than others. It would be informative to give guidance on how to deal with this. This is just a suggestion and the authors are free to ignore it.

I believe that this is a very useful scoping review. I am very much looking forward to reading the review findings and wish the author team the best of luck.

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Yes

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Implementation Science, Knowledge Translation and Medical Education.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 06 July 2023

https://doi.org/10.5256/f1000research.137056.r179778

? **Thomas J. Waltz** (iD)

Department of Psychology, Eastern Michigan University, Ypsilanti, Michigan, USA

The authors describe a study protocol for a scoping review of studies focused on the selection of theories, models, and frameworks used to inform any of the four steps involved in developing a theory-informed selection of implementation strategies. The aim is to be able to characterize the desirable attributes/selection criteria of theories, models, and frameworks aiding implementation strategy design with a focus on applications to healthcare. The rationale for the scoping review is clearly described and justified. The details of the search strategy are transparently reported and the data extraction plan is consistent with the aim of the project.

My substantive comments focus on the review's inclusion/exclusion criteria.

1) In Table 3, the Context domain is over-exclusionary. Implementation of health and mental health services in school settings is a robust area of implementation research. The same is true for health and nutrition programs within childcare settings. I suggest the inclusion criteria for context be amended to read something like: We will include papers reporting on the review concept in any healthcare setting/context inclusive of schools and childcare settings where the implementation research focuses on the provision of health-related care in that setting.

The search strategy in Figure 2 suggests that this suggestion is feasible since key terms related to "school" were not explicit exclusions in the search strategy. If this friendly amendment to the inclusion/exclusion criteria is viewed as impractical, the authors should provide additional justification for why the exclusion of health-related care in school and childcare settings is necessary.

2) It is unclear whether studies on policy implementation would be included if the subject of the policy area involves healthcare. Please clarify.

Minor comment.

3) There is a typo on page 5: the last line before the Methods header has an extra "t" following the

end of the sentence.

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Yes

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Implementation science, clinical psychology, behavioral economics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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