Dissemination and Implementation (D&I) Science Core

Guide for Getting Started in Implementation Science
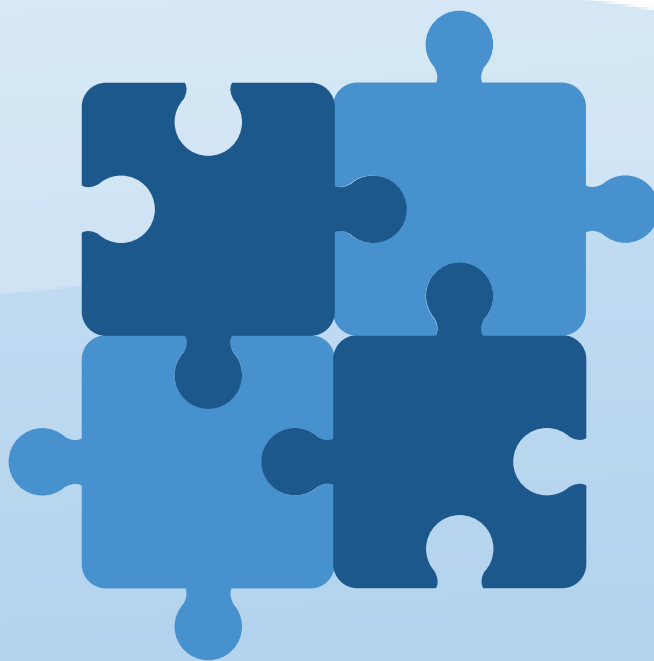
Piecing Together the Implementation Science Puzzle

Request a D&I consult via **www.tuftsctsi.org**

Table of Contents

Using this guide

This guide is meant to be a starting place for researchers new to implementation science. It provides brief overviews of key topics and describes useful articles, online resources such as videos, presentations, and self-paced courses, and materials from Clinical and Translational Science Award (CTSA) institutions. It also lists training resources for those interested in broadening their background on the topic.

Why is implementation science important?

On average, most innovations and evidence-based practices do not make it into use; for those that do, the average time it takes to go into practice is 17 years.[1] Many innovations fail to make it into practice, or are delayed, because they did not sufficiently consider the environment in which the implementation would take place. Innovations or interventions are often tested in very controlled environments that do not reflect the real world in which they'll be implemented. Implementation science attempts to help researchers consider contextual factors to better prepare innovations for use in real world settings and optimize successful adoption.

We hope this guide will help you piece together the different elements of implementation science.

Implementation Science:

Bridging the Gap

Innovation   17-year gap   Practice

The Tufts CTSI Dissemination and Implementation (D&I) Science Core is here to support Implementation Science grant proposals or to discuss how you might incorporate implementation science in other types of research studies. To receive a D&I consultation, request services on the Tufts CTSI website.

Introduction to implementation science

Implementation science is the study of methods and strategies that help with the uptake of an innovation, intervention, or other evidence-based practice with the aim of improving healthcare quality and effectiveness. Implementation science works to try and close the gap between what we know and what is done in practice. Curran[2] provides some helpful, non-scientific language to help us think about the different parts of implementation science (Figure 1).

The resources in this section focus on introducing you to implementation science and how it can be used to address improving healthcare quality at the patient, provider, organization, and policy levels.

Effectiveness research and implementation research are closely related fields that often intersect in the evaluation and application of interventions. Hybrid effectiveness-implementation studies simultaneously address questions related to both the effectiveness of an intervention and the implementation strategies used to integrate that intervention into real-world practice. These studies are valuable for researchers and practitioners interested in understanding not only whether an intervention works but also how to effectively implement it in diverse settings. Figure 2 provides a schematic to guide researchers considering hybrid implementation studies.[3]

Figure 1. **From Curran's "Implementation science made too simple: a teaching tool".[2]**

The intervention/practice/innovation is **THE THING**

Effectiveness research looks at whether **THE THING** works

Implementation research looks at how best to help people and places **DO THE THING**

Implementation strategies are the stuff we do to try and help people/places **DO THE THING**

Main implementation outcomes are **HOW MUCH** and **HOW WELL** they **DO THE THING**

Figure 2. Adapted subway schematic for selection of study type.[3]
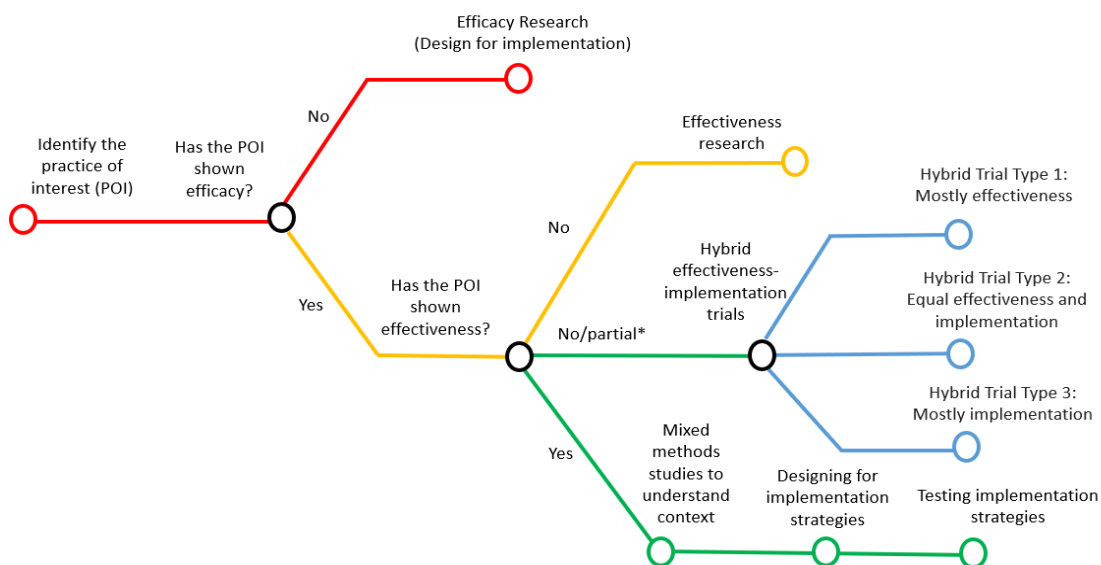
Articles

A. Curran GM. Implementation science made too simple: a teaching tool. *Implementation Science Communications*. 2020/02/25 2020;1(1):27. doi:10.1186/s43058-020-00001-z
   - Curran shares a visual teaching tool to help with the understanding of key concepts in implementation science using simple, non-scientific language.
B. Lane-Fall MB, Curran GM, Beidas RS. Scoping implementation science for the beginner: locating yourself on the "subway line" of translational research. *BMC Medical Research Methodology*. 2019/06/28 2019;19(1):133. doi:10.1186/s12874-019-0783-z
   - In this article, the authors use a "subway model" to describe and illustrate the journey of implementation science. The "subway model" is helpful for envisioning where research falls on the implementation science spectrum.
C. Bauer MS, Damschroder L, Hagedorn H, Smith J, Kilbourne AM. An introduction to implementation science for the non-specialist. *BMC Psychology*. 2015/09/16 2015;3(1):32. doi:10.1186/s40359-015-0089-9
   - Written for those new to implementation science, this article discusses how implementation science can help to move evidence-based practices (EBPS) into clinical use. It also provides background information on what is implementation science and how it can be used in different types of research.

Other resources

A. Morshed, A., Tabak, R., Taranhike, I., Baumann, A., & Proctor, E. Intro to D&I. [Internet]. St. Louis, MO: Washington University; 2018 October. Eight toolkits related to Dissemination and Implementation. Available from https://implementationresearch.wustl.edu/support-your-research/toolkits/
   - These toolkits cover a range of topics from an introduction to D&I to translating your research for impact. They offer a more in-depth introduction to different elements of implementation science such as formulating aims, identifying research outcomes, and understanding organizational constructs and measures.
B. Orientation to the Science of Dissemination and Implementation (AcademyHealth, 2022)
   - This hour-long recording from the 15th Annual Conference on the Science of Dissemination and Implementation in Health provides an orientation to D&I. The presenters include Dr. Meghan Lane-Fall, Dr. Cara C. Lewis, Dr. Byron J. Powell, and Dr. Rinad S. Beidas.

Theories, models, and frameworks

Implementation science promotes the use of theories, models, and frameworks to systematically guide, and evaluate the adoption and integration of evidence-based practices and interventions into real world settings. Choosing from the numerous models and frameworks available can be challenging. According to Nilsen[4], there are three overarching goals for using theories, models and frameworks in implementation science: 1) describing and/or guiding the process of translating research into practice, 2) understanding and/or explaining what influences implementation outcomes and 3) evaluating implementation. It's helpful to have a general understanding of some of the more frequently used models and what to consider when choosing a model or framework for your research. The resources below provide a general understanding of some of the commonly used models and why they may be used over other alternatives.

> **A note on the term "stakeholder"**
>
> The term stakeholder is widely used in health research, but there is an ongoing discussion on its use and historical context. The Centers for Disease Control (CDC) notes that the word can have violent connotations for some groups and can group all parties under one name, which can fail to acknowledge the differences in power and resources between groups. While this word is still commonly used in healthcare-related research, including implementation science, the CDC has suggested a list of alternative words for the term stakeholder. [5]
>
> In this guide, we use the CDC-suggested term "contributor" to acknowledge the differing perspectives that contribute to research.

As you think through what theory or model will work for your research, remember to engage your key contributors (stakeholders) to ensure you are capturing the perspectives of the end-user. You will also want to engage other contributors who may have influence in the setting where you intend to implement the innovation. Ensuring there is appropriate organizational readiness is a precursor to any implementation science project.[6]

Articles

A. Nilsen P. Making Sense of Implementation Theories, Models, and Frameworks. In: Albers B, Shlonsky A, Mildon R, eds. *Implementation Science 30*. Springer International Publishing; 2020:53-79.
   - This chapter focuses on defining the categories of theories, models and frameworks used in implementation science. It describes a range of theoretical approaches and their different aims in implementation science.
B. Weiner BJ. A theory of organizational readiness for change. *Implementation Science*. 2009/10/19 2009;4(1):67. doi:10.1186/1748-5908-4-67
   - This article defines organizational readiness and develops a theory for organizational readiness's determinants and outcomes.
C. Tabak RG, Khoong EC, Chambers DA, Brownson RC. Bridging research and practice: models for dissemination and implementation research. *American journal of preventive medicine*. 2012;43(3):337-350.
   - This article organizes and inventories theories and frameworks (referred to as models in the text) used in dissemination and implementation (D&I) research and provides guidance on how to select a theory or framework.
D. Pinto RM, Park S, Miles R, Ong PN. Community engagement in dissemination and implementation models: A narrative review. *Implementation Research and Practice*. 2021;2:2633489520985305. doi:10.1177/2633489520985305

- The review article identifies community-specific constructs that can help researchers to collaborate and engage with community partners in dissemination and implementation science research.

E. Peters DH, Tran NT, Adam T. [Implementation research in health: a practical guide.](#) Alliance for Health Policy and Systems Research, World Health Organization; 2013.
- In this guide by the Alliance for Health Policy and Systems Research, authors introduce both what implementation research is and why stakeholder engagement is important in conducting implementation research.

Other resources

A. [Pick a Theory, Model, or Framework](#) (University of Washington, The UW Implementation Science Resource Hub)
- In addition to an introduction to theories, models, and frameworks, this website offers a selection of articles based on the type of theory, model, or framework you are interested in using (example: process models, determinant frameworks, classic models, etc.).

B. [Theories and Frameworks in Implementation Science](#) (Video)
- This series of short videos by Dr. Rachel Shelton provides information on theories and frameworks in implementation science.

C. [Applying Implementation Science Frameworks to Your Research](#) (Online module)
- This short course, presented by Sara Folta, PhD, and Denise H. Daudelin, RN, MPH, provides an overview of two common implementation frameworks used in grant proposals, RE-AIM (the Reach, Effectiveness, Adoption, Implementation, and Maintenance Framework) and CFIR (the Consolidated Framework for Implementation Research), and how the CFIR framework, combined with ERIC (Expert Recommendations for Implementing Change) strategies, can be used in planning for protocol implementation or problem solving. You will learn what these frameworks are, when to use them, and how to best integrate them into a grant proposal or ongoing study.

D. [Resources for Stakeholder and Community Engagement](#) (Consortium for Cancer Implementation)
- In this guide, there are a variety of resources includes readings, trainings, guidance, and tools to help researchers and community stakeholders with community engaged implementation science.

Implementation science questions, strategies, and mechanisms

A key ingredient in any implementation science proposal, is your research question. We have identified a few resources in this section that will help you to frame your implementation science question. This question will help you to identify your strategies and mechanisms.

In implementation science, implementation strategies are used to promote the adoption of an innovation, intervention, or best practice. These strategies focus on the "how"; how is the innovation, intervention, or best practice (the "what") going to be put into practice and used. Implementation mechanisms are the processes through which strategies work, essentially answering the "why" question.[7] The following resources offer a starting place for learning about implementation science strategies and mechanisms.

In Cara Lewis's 2020 talk on Implementation Mechanisms, she provides the following examples of how determinants, implementation strategies, mechanisms, and implementation outcomes fit together. [8]

Table 1. Relationship of key implementation science concepts.

Determinant	Implementation Strategy	Mechanism	Implementation Outcome
Provider knowledge deficit	Education (provision of information)	Awareness building, knowledge acquisition	Feasibility, acceptability, appropriateness, adoption
Provider view evidenced-based practice (EBP) unfavorably	Audit and feedback provision of descriptive social norms indicating peer use of the EBP	Social pressure, norms	Adoption
Provider habit (forgets to use EBP)	Audit and feedback provision of descriptive social norms indicating peer use of the EBP	Self-reflection, awareness	Penetration
Unclear integration of EBP; EBP perceived to be out of scope	Opinion leader targeted training	Clarifying workflow, exerting social influence	Adoption, cost, provider penetration
Unstandardized clinical care options	Guidelines	Clarifying priorities	Fidelity

Another emerging topic for implementation scientists is de-implementation. De-implementation seeks to remove practices that are harmful or ineffective in practice and that may be of low value.[9] Often a de-implementation study will use similar methods and frameworks as an implementation study, but focuses on the removal of practices.

Articles

A. Kirchner JE, Smith JL, Powell BJ, Waltz TJ, Proctor EK. Getting a clinical innovation into practice: an introduction to implementation strategies. *Psychiatry research*. 2020;283:112467.

- This article focuses on implementation strategies: what they are, how they are defined and applied, how they can be documented over the course of a study, and how you can test for their effectiveness.

B. Walsh-Bailey C, Tsai E, Tabak RG, et al. A scoping review of de-implementation frameworks and models. *Implementation Science*. 2021/11/24 2021;16(1):100. doi:10.1186/s13012-021-01173-5
   - This review article identifies frameworks and models that can be used in the study of de-implementation.

C. Powell BJ, Waltz TJ, Chinman MJ, et al. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*. 2015/02/12 2015;10(1):21. doi:10.1186/s13012-015-0209-1
   - This article is an update on the Expert Recommendations for Implementing Change (ERIC) study. The ERIC strategies are a compilation of 73 implementation strategy terms and definitions.

D. Lewis CC, Klasnja P, Powell BJ, et al. From Classification to Causality: Advancing Understanding of Mechanisms of Change in Implementation Science. Perspective. *Frontiers in Public Health*. 2018-May-07 2018;6doi:10.3389/fpubh.2018.00136
   - This article describes a four-step approach to developing causal pathway models for implementation strategies.

E. MEASURE Evaluation Implementation Research Technical Working Group. Fundamentals of Implementation Research. U.S. Agency for International Development (USAID); 2012 (rev. 2015).
   - This resource offers an introduction to implementation science, including implementation science questions. It offers guidance on how to identify and formulate implementation science questions.

Other resources

A. Frame Your Question: What is an implementation science question? (University of Washington)
   - This webpage has general questions grouped by categories that may be of interest, such as: scaling up, sustainability, replication, program integration, equitability, and real-world effectiveness.

B. Implementation Strategies (Prajakta Adsul, University of New Mexico Cancer Center)
   - This module provides an overview of implementation strategies as well as additional readings and self-reflection questions to help guide your learning.

C. Implementation Mechanisms: The Next Frontier (Cara C. Lewis, Kaiser Permanente, Washington Health Research Institute)
   - This hour-long talk describes the current state of implementation mechanisms evaluation, an approach to articulating implementation mechanisms through causal pathway diagrams, and early learnings from an attempt to develop an implementation mechanisms research agenda.

D. CFIR-ERIC Implementation Strategy Matching Tool
   - This online tool helps you "match" strategies to barriers that were identified using the CFIR.

Using the Implementation Research Logic Model

The Implementation Research Logic Model (IRLM) is a tool that can be used to outline relationships between foundational elements of an implementation science study.[10] The IRLM typically outlines the determinants, strategies, mechanisms, and outcomes. It can be used in planning as well as evaluating implementation studies. If you are applying for a PCORI implementation grant, consider using the IRLM. This section of the toolkit focuses on resources specific to what the IRLM is and how the IRLM can be used in implementation science research.

Figure 4. Implementation Research Logic Model (IRLM) Standard Form. [10]
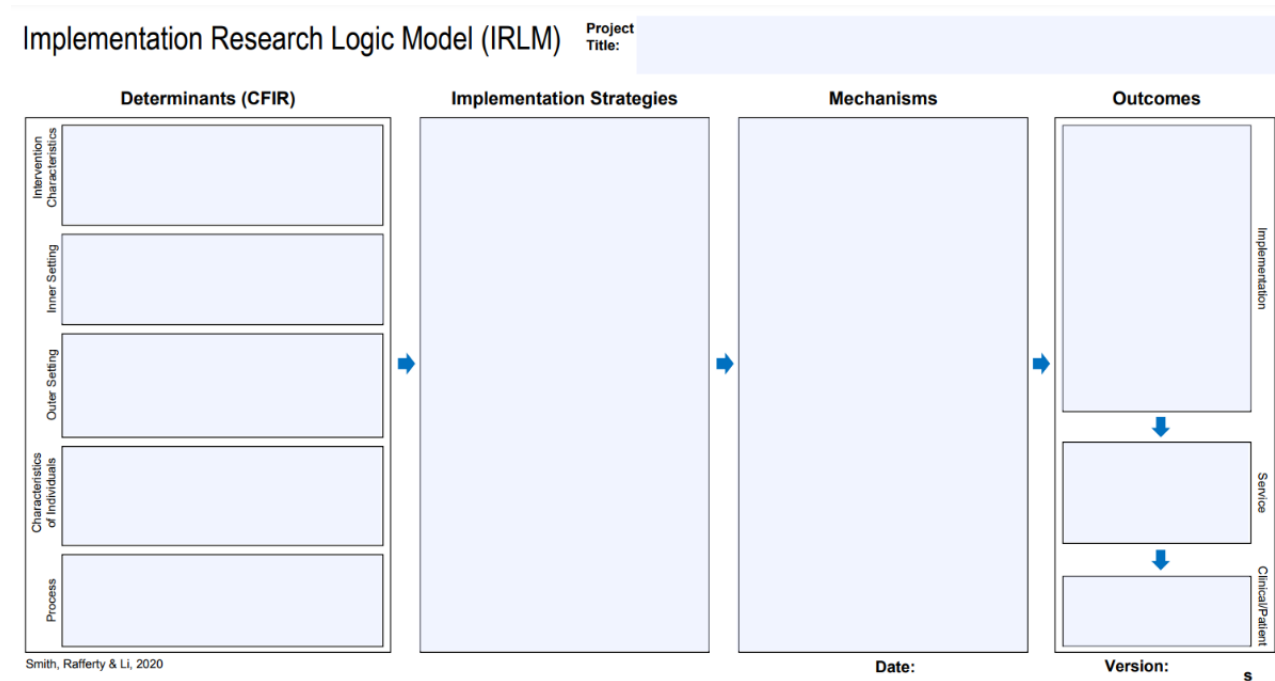
Articles

A.   Smith JD, Li DH, Rafferty MR. The Implementation Research Logic Model: a method for planning, executing, reporting, and synthesizing implementation projects. *Implementation Science*. 2020/09/25 2020;15(1):84. doi:10.1186/s13012-020-01041-8
   - The Implementation Research Logic Model (IRLM) helps to illustrate the processes used in the implementation of an EBP. This article describes the design of the IRLM and how it can be used. The IRLM template can be found in the "supplementary information" of this article.

Other resources

A.   Rigorous Implementation Research: The Implementation Research Logic Model and Key Design Considerations (J.D. Smith, University of Utah)
   - This slide deck from Dr. J.D. Smith provides more information on the IRLM, including examples and additional references.
B.   Implementation Research Designs and Methods: Testing Implementation Strategies (J.D. Smith, University of Utah)
   - These slides describe different types of designs for implementation studies and the fundamentals of the Implementation Research Logic Model (IRLM).

C. [Implementation Research Logic Model](#) (The HIV Implementation Science Coordination Initiative)
- This website provides templates and guides to using the IRLM.

Implementation outcomes and measures

Proctor defines implementation outcomes as "the effects of deliberate and purposive actions to implement new treatments, practices, and services."[11] Implementation outcomes have three important functions: 1) they are indicators of the implementation success; 2) they are proximal indicators of implementation processes; 3) they are key intermediate outcomes in relation to service system or clinical outcomes in treatment effectiveness and quality of care research.[11] There is currently work underway to evaluate several proposed implementation measures. Many measures are developed as single-use measures that are never repeated again in other studies. Efforts are underway to address this issue so that there can be future comparisons across studies.[12]

The resources in this section focus on introducing you to implementation outcomes, how they are used in implementation science research, and how they can be measured.

Articles

A. Proctor E, Silmere H, Raghavan R, et al. Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda. *Administration and Policy in Mental Health and Mental Health Services Research*. 2011/03/01 2011;38(2):65-76. doi:10.1007/s10488-010-0319-7
   - This paper addresses eight distinct implementation outcomes—acceptability, adoption, appropriateness, feasibility, fidelity, implementation cost, penetration, and sustainability—and provides their definitions.
B. Nilsen P, Bernhardsson S. Context matters in implementation science: a scoping review of determinant frameworks that describe contextual determinants for implementation outcomes. *BMC Health Services Research*. 2019/03/25 2019;19(1):189. doi:10.1186/s12913-019-4015-3
   - This review addresses how determinant frameworks were developed in implementation science, what terminology is used in implementation science for contextual determinants, and how context is conceptualized.
C. Damschroder LJ, Reardon CM, Opra Widerquist MA, Lowery J. Conceptualizing outcomes for use with the Consolidated Framework for Implementation Research (CFIR): the CFIR Outcomes Addendum. *Implementation Science*. 2022/01/22 2022;17(1):7. doi:10.1186/s13012-021-01181-5
   - The Consolidated Framework for Implementation Research (CFIR), first published in 2009, is one of the most used frameworks to help assess contextual determinants of implementation. This article addresses gaps in the CFIR that have been identified.

Other resources

A. Implementation outcomes: What are they? Why are they important? How are they measured? (The University of Texas Health)
   - This presentation by the University of Texas Health offers an introduction to the basics of implementation outcomes. It covers the functions of implementation outcomes, their role in research studies, and how to measure these outcomes.

Selecting a study design

When it comes to selecting a study design for an implementation science project, there are multiple options. Study designs for implementation science include randomized controlled trials, quasi-experimental designs, intervention optimization, and mixed methods. It is important to understand what different study designs can offer your research as well as when and how they can be used. This section provides a selection of articles and resources related to choosing a study design for implementation science studies.

In addition to thinking about a study design, your study may need to consider adapting an existing intervention to fit into a different context. Adaptation and modification are key areas in implementation science that may improve acceptability and feasibility of the targeted intervention.[13]

Articles

A. Brown CH, Curran G, Palinkas LA, et al. An Overview of Research and Evaluation Designs for Dissemination and Implementation. *Annual Review of Public Health*. 2017;38(1):1-22. doi:10.1146/annurev-publhealth-031816-044215
   - This article discusses randomized and nonrandomized designs for translational research, building on efficacy and effectiveness trials to look at how EBPs are implemented. It also describes other designs, including hybrid designs that combine effectiveness and implementation research, quality improvement designs for local knowledge, and designs that use simulation modeling.
B. Mazzucca S, Tabak RG, Pilar M, et al. Variation in Research Designs Used to Test the Effectiveness of Dissemination and Implementation Strategies: A Review. Review. *Frontiers in Public Health*. 2018-February-19 2018;6doi:10.3389/fpubh.2018.00032
   - This article reviews D&I study designs and methodologies and offers a guide for choosing a research design.
C. Curran GM, Bauer M, Mittman B, Pyne JM, Stetler C. Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance public health impact. *Med Care*. Mar 2012;50(3):217-26. doi:10.1097/MLR.0b013e3182408812
   - This article describes what "hybrid effectiveness-implementation" designs are and how they can be used in implementation science.
D. Wiltsey Stirman S, Baumann AA, Miller CJ. The FRAME: an expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implementation Science*. 2019/06/06 2019;14(1):58. doi:10.1186/s13012-019-0898-y
   - This article provides an update on the FRAME (framework for reporting adaptions and modification to evidence-based interventions). This framework is designed to help characterize modifications to interventions.

Other resources

A. Select Study Designs (University of Washington, The UW Implementation Science Resource Hub)
   - The UW Implementation Science Resource Hub website provides information on study designs for implementation science and how to appropriately select a study design to meet the needs of your research.
B. Implementation Science Study Designs Overview (National Cancer Institute)
   - These slides provide a brief overview on implementation science study designs and address the concept of "equitable implementation" when discussing health equity.

C. [An Overview of Hybrid Effectiveness Implementation Designs](#) (Geoffrey M. Curran, University of Arkansas)
   - These slides cover the concept of "hybrid designs" in implementation science and provide examples of the different types of hybrid designs.
D. [Adaptation & Fidelity of Interventions in Implementation Science](#) (National Cancer Institute)
   - This talk is presented by Dr. Ana Baumann (Washington University in St. Louis) and Dr. Shannon Wiltsey Stirman (Stanford University) discuss adaption and fidelity in implementation science. Their talk includes a discussion on the tension between adaption and fidelity, how to address this tension, and how to conceptualize the relationship between the two.
E. [Balancing Fidelity and Adaption: A guide for evidence-based program implementation](#) (Washington State University)
   - This worksheet introduces the debate between fidelity and adaption and presents best practices to help balance adaption and fidelity to meet the needs of the community in which the innovation is being implemented.

Writing implementation science grant proposals

Writing implementation science grant proposals includes considerations and additional elements that are specific to implementation science. Proctor's article on ten ingredients for writing implementation science grant proposals has become foundational in the field.[14] The article addresses some of the challenges in writing implementation science grant proposals and suggests ten elements that should be included. In this section, we provide resources for developing implementation science aims and grant proposals and a link to sample applications from the National Cancer Institute.

Table 2. Key proposal ingredients checklist. From Proctor, Powell, Naumann, Hamilton, and Santen's "Ten key ingredients for implementation research proposals." [14]

Proposal ingredient	Key question	Review criteria	Check (yes/no)
1. The care gap or quality gap	The proposal has clear evidence that a gap in quality exists?	Significance Impact	
2. The evidence-based treatment to be implemented	Is the evidence for the program, treatment, or set of services to be implemented demonstrated?	Significance Innovation	
3. Conceptual model and theoretical justification	The proposal delineates a clear conceptual framework/theory/model that informs the design and variables being tested?	Approach Innovation	
4. Stakeholder priorities, engagement in change	Is there a clear engagement process of the stakeholders in place?	Significance Impact Approach Environment	
5. Setting's readiness to adopt new services/treatments/programs	Is there clear information that reflects the setting's readiness, capacity, or appetite for change, specifically around adoption of the proposed evidence-based treatment?	Impact Approach Environment	
6. Implementation strategy/process	Are the strategies to implement the intervention clearly defined, and justified conceptually?	Significance Impact Innovation	
7. Team experience with the setting, treatment, implementation process	Does the proposal detail the team's experience with the study setting, the treatment whose implementation is being studied, and implementation processes?	Approach Investigator team	
8. Feasibility of proposed research design and methods	Does the methods section contain as much detail as possible, as well as lay out possible choice junctures and contingencies, should methods not work as planned?	Approach Investigator team	
9. Measurement and analysis section	Does the proposal clarify the key constructs to be measured, corresponding to the overarching conceptual model or theory? Is a measurement plan clear for each construct? Does the analysis section demonstrate how relationships between constructs will be tested?	Approach Investigator team	
10. Policy/funding environment; leverage or support for sustaining change	Does the proposal address how the implementation initiative aligns with policy trends?	Impact Significance	

Articles

A. Proctor EK, Powell BJ, Baumann AA, Hamilton AM, Santens RL. Writing implementation research grant proposals: ten key ingredients. *Implementation Science*. 2012/10/12 2012;7(1):96. doi:10.1186/1748-5908-7-96

- This article addresses the challenges faced when submitting an implementation science grant application and summarizes ten ingredients that are important in implementation research grants.

Other resources

A. D&I Aims Toolkit (Washington University in St. Louis)
- This toolkit introduces scientists to the formulation of D&I research aims and provides guidance on how to effectively write such aims.

B. Implementation Science Grant Writing Resource (University of Washington)
- The UW Implementation Science Resource Hub website provides information on the specific elements required in an implementation science grant proposal that are not common in other types of grants. This webpage includes a section on key considerations for writing implementation science grants, webinars on grant development and funding, and implementation science funding announcements.

C. 10 Key Ingredients for D&I Research Proposals (Video)
- This short video by the University of Colorado Anschutz Medical Campus provides a minute and a half introduction to what should be included in a D&I research proposal.

D. Tufts CTSI D&I Interest Group Meeting with Dr. Rachel Gold: Writing implementation science grant proposals (Recording)
- In this September 2023 talk, Dr. Rachel Gold discussed the ten key ingredients for writing implementation science grant proposals and shared examples from her own work.

E. Sample Grant Applications (The National Cancer Institute (NCI))
- On the National Cancer Institute (NCI) webpage, there are examples of several dissemination and implementation grant applications that their investigators and their organizations have agreed to share online.

Disseminating innovations

Dissemination plays a role in ensuring uptake in evidence-based practices. Many of the resources included in this guide touch on dissemination as well as implementation. You can also check out Tufts CTSI D&I Core's Dissemination Planning Template to help you get started with planning the dissemination of your next innovation or intervention.

Dissemination resources

A. Ross-Hellauer T, Tennant JP, Banelytė V, et al. Ten simple rules for innovative dissemination of research. *PLoS Comput Biol*. Apr 2020;16(4):e1007704. doi:10.1371/journal.pcbi.1007704
   - This article outlines 10 steps researchers can take to disseminate their work to help ensure that their work engages their target audience and therefore increases its' impact.
B. Eagleman DM. Why Public Dissemination of Science Matters: A Manifesto. *The Journal of Neuroscience*. 2013;33(30):12147-12149. doi:10.1523/jneurosci.2556-13.2013
   - This short article offers six reasons why researchers should take time to disseminate this work to the public.
C. Tufts CTSI D&I Core Dissemination Planning Worksheet
   - Planning for dissemination is essential in all stages of research. By answering the questions posed in the worksheet, you will have all 10 essential elements of dissemination in your plan. You can access the Dissemination Planning Worksheet on the Tufts CTSI D&I Core page under "D&I Resources."

Training resources

If you are looking for more opportunities to develop your implementation skills, additional training and education might be the next step in your journey. Please find some additional training opportunities listed below, including online and in-person training.

Online training opportunities

Training Institute for Dissemination and Implementation Research in Cancer (TIDIRC) Open Access
- The eight modules included in this free online course make up the TIDIRC Open Access course. These modules can be viewed together as a whole or individually by section and include videos, readings, and self-reflection questions. Accessible anytime.

Introduction to Implementation Research: Designing & Evaluating Interventions
- This online course outlines qualitative, quantitative, and mixed research methods that address the facilitators and barriers to the translation of evidence into practice in healthcare. It is designed to be an introduction to the theory and methods of implementation research. General timeline: Apply by early summer, participate in course in late summer/early fall.

Washington University in St. Louis: Implementation Science Video Library
- A collection of short videos on key theories, models, and frameworks in the field of dissemination and implementation science. Accessible anytime.

In-person training opportunities

The Penn Implementation Science Certificate Program at the Perelman School of Medicine at the University of Pennsylvania
- This program is designed for those in mind who are interested in developing their competencies in implementation science to be used in future research, such as seeking NIH K award or equivalent funding. The certificate is intended for people who are implementation practitioners, including improvement scientists. This is a credit-based course that takes place over the academic year. General timeline: Courses take place over the academic calendar year.

The University of Pennsylvania Implementation Science Institute
- The Implementation Science Institute aims to provide participants with the skills to design and execute implementation science research. Students will be introduced to the foundations of implementation science as well as an overview of advanced topics including implementation strategies and sustainability. The course includes tips for grant writing, skill development and time will be spent writing specific aims for Implementation Science grants. This is a 4-day course. General timeline: Course takes place over the summer.

Implementation Science in Global Health Summer Institute at the University of Washington
- The Implementation Science in Global Health Summer Institute is a one-week course that provides participants with an in-depth look into implementation science. The Institute covers interdisciplinary framework of methods for improving implementation and scaling-up health programs as well as examples from global health leaders. General timeline: Course takes place in late summer.

References

1.   Balas EA, Boren SA. Managing Clinical Knowledge for Health Care Improvement. *Yearb Med Inform*. 2000;(1):65-70.

2.   Curran GM. Implementation science made too simple: a teaching tool. *Implementation Science Communications*. 2020/02/25 2020;1(1):27. doi:10.1186/s43058-020-00001-z

3.   Lane-Fall MB, Curran GM, Beidas RS. Scoping implementation science for the beginner: locating yourself on the "subway line" of translational research. *BMC Medical Research Methodology*. 2019/06/28 2019;19(1):133. doi:10.1186/s12874-019-0783-z

4.   Nilsen P. Making Sense of Implementation Theories, Models, and Frameworks. In: Albers B, Shlonsky A, Mildon R, eds. *Implementation Science 30*. Springer International Publishing; 2020:53-79.

5.   Centers for Disease Control and Prevention. Preferred Terms for Select Population Groups & Communities. Updated November 3, 2022. Accessed November 17, 2023. https://www.cdc.gov/healthcommunication/Preferred_Terms.html

6.   Weiner BJ. A theory of organizational readiness for change. *Implementation Science*. 2009/10/19 2009;4(1):67. doi:10.1186/1748-5908-4-67

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