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Objectives

- To help a beginner D&I researcher to situate the field of D&I science in the continuum of research.
- To enable a beginner D&I researcher to understand key D&I science terms and use them in planning and carrying out D&I research.
- To enable users to find additional introductory D&I science resources beyond this toolkit.

Overview

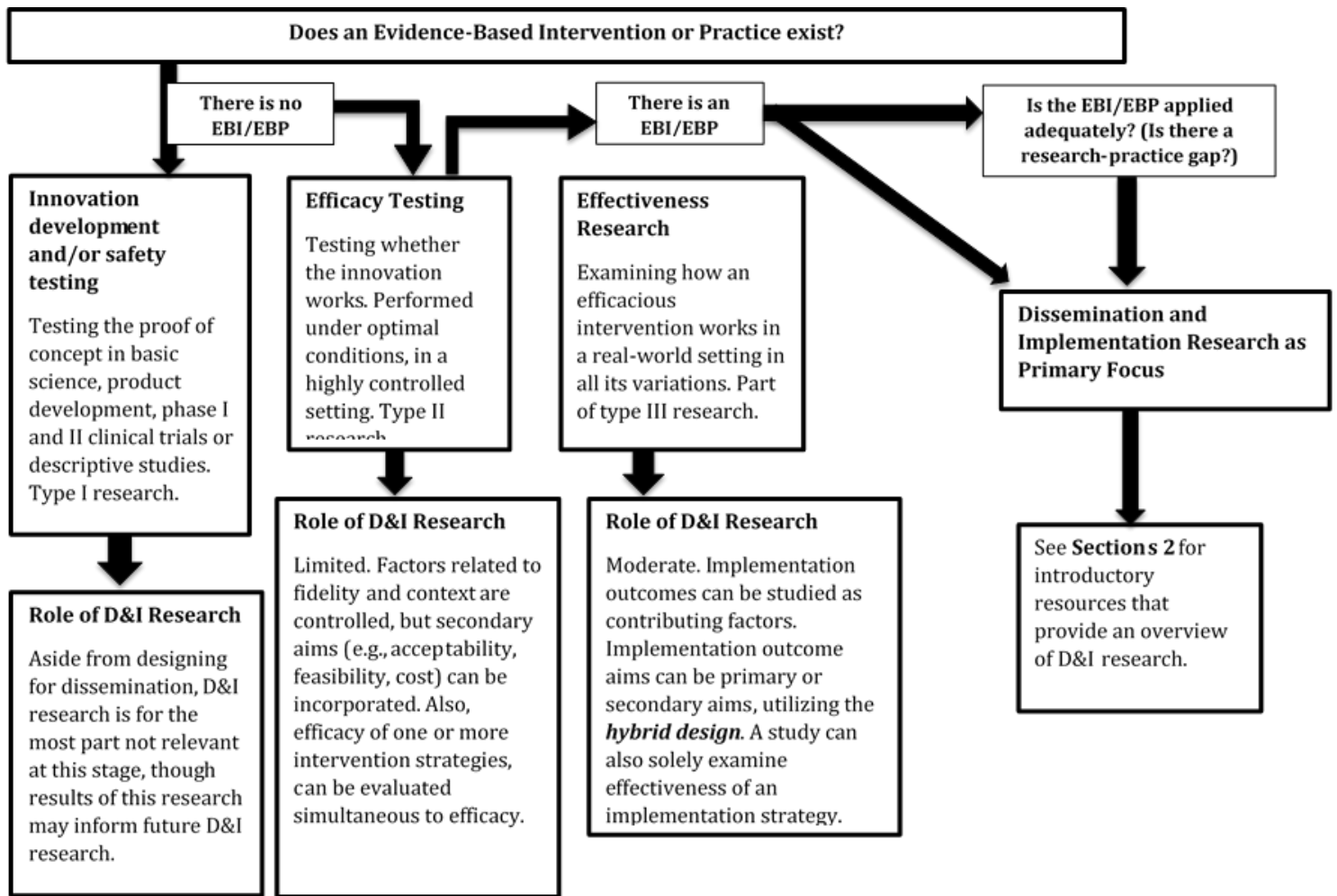
Dissemination and Implementation (D&I) science is the study of translation of research findings into practice in order to improve health outcomes in the broader community (Colditz, 2012). This toolkit is an introductory resource for D&I scientists meant to provide an overview of the field and the D&I terminology, prior to exploration of other D&I topics. Before even getting started, it is worth reviewing what we mean by D&I science. In the United States, the primary term for this type of work is dissemination and implementation, but in Canada, Australia, and many other places, this type of research is referred to as knowledge translation, or knowledge exchange. D&I research can also be placed on the continuum of T0-T4 research, which ranges from bench to bedside to public health, with D&I more focused on T3 and T4.

What's Inside?

This toolkit contains the following:

- 1) **A decision tree** to explain where D&I research fits into the continuum of health research
- 2) **A glossary** of terms used in D&I research,
- 3) **Introductory resources** that provide an overview of the field.

D&I Research Decision Tree



Designing for dissemination: Throughout all the research stages, it is important to take actions to early on in the research process to ease the process of eventually disseminating the findings (NCI, 2002).

Sources: Peters et al., 2013; Landsverk et al., 2012; Rabin & Brownson, 2012; NCI, 2002.

Note: A given research study may not fit neatly into the above boxes and could stretch across categories, as in the real world the boundaries are less rigid and research is not always uni-directional. The framework is simplified for instructional purposes.

The following glossary was developed based on: Rabin BA & Brownson RC. 2012. Developing the terminology for dissemination and implementation research in health. In Brownson RC, Colditz GA, & Proctor EK. (Eds.), [Dissemination and Implementation Research in Health: Translating Science to Practice](#). New York: Oxford University Press.

An expanded, searchable glossary can be found at: <http://www.makeresearchmatter.org/glossary.aspx>

DIRC

D&I Glossary

FOUNDATION CONCEPTS	
Evidence-Based Intervention	<p><i>Interventions with proven efficacy and effectiveness.</i></p> <ul style="list-style-type: none"> ➤ <i>Includes:</i> programs, practices, policies, and guidelines. ➤ <i>Synonyms:</i> best practices, evidence-based practices, evidence-based processes, empirically supported treatments.
Innovation	<p>An idea, practice, or object that is perceived as new by an individual or any other unit of adoption.</p> <ul style="list-style-type: none"> ➤ <i>Synonyms:</i> evidence-based intervention.
Diffusion	<p>The passive, untargeted, unplanned, and uncontrolled spread of new interventions.</p>
Dissemination	<p>An active attempt to spreading evidence-based interventions to a targeted audience through a chosen channel and planned strategies.</p> <ul style="list-style-type: none"> ➤ <u>Dissemination strategy:</u> the description of mechanisms and approaches used to communicate and spread information about interventions to target populations.
Implementation	<p>Process of putting to use or integrating evidence-based interventions within a setting.</p> <ul style="list-style-type: none"> ➤ <u>Implementation strategy:</u> the systematic processes, activities, and resources used to integrate interventions into usual settings. ➤ <i>Synonyms:</i> core implementation components, implementation drivers & list staff selection, preservice & in-service training, ongoing consultation & coaching, staff & program evaluation, facilitative administrative support, systems interventions as components.
Adoption	<p>The decision of an organization or community to commit to and initiate an evidence-based intervention.</p>
Sustainability	<p>Extent to which an evidence-based intervention can deliver the intended benefits over an extended period of time after external support (primarily from donor) has been terminated.</p>
Scale-up/scaling up	<p>Deliberate efforts to increase the impact of health service innovations successfully tested in pilot or experimental projects so as to benefit more people to foster policy and program development on a lasting basis.</p>
Systems thinking	<p>The process of understanding how things influence one another within a whole based on the premise that societal problems are complex.</p> <ul style="list-style-type: none"> ➤ <i>Includes:</i> response to complex problems is only possible by intervening at multiple levels with the engagement of stakeholders and settings.
Implementation outcomes	<p>The effects of deliberate and purposive actions to implement new treatments, practices, and services.</p> <ul style="list-style-type: none"> ➔ Distinguishes intervention failure from implementation failure.
External Validity	<p>The generalizability or real-world applicability of findings from a study.</p>

- ➔ Determines whether the results and inferences from a study can be applied to the target population and settings.

TYPES OF EVIDENCE

Type 1

Defines the cause of a specific outcome.

- Conclusion: “something needs to be done.”
- Includes: magnitude, severity of outcome, actionability of cause.

Type 2

The relative impact of a specific intervention to address a specific outcome.

- Conclusion: “specifically this should be done.”
- Includes: effectiveness and/or cost effectiveness of a strategy.

Type 3

The type of information needed for the adaptation and implementation of evidence based interventions

- Conclusion: “how something should be done”
- Includes: how and under which circumstances, how interventions were received

INFLUENTIAL FACTORS

Designing

A set of processes that are considered and activities that are undertaken throughout the planning, development, and evaluation of an intervention to increase its dissemination and implementation potential.

Audience segmentation

The process of distinguishing between different subgroups of users and creating targeted marketing and distribution strategies for each subgroup.

Fidelity

The degree to which an intervention is implemented as it is prescribed in the original protocol.

Measurements:

- ➔ Adherence to the program protocol.
- ➔ Dose or amount of program delivered.
- ➔ Quality of program delivery.
- ➔ Participant reaction and acceptance.

Focus: the function and process of the intervention than on the individual components.

Reinvention/Adaptation	<p>The degree to which an evidence-based intervention is changed or modified by a user during adoption and implementation to suit the needs of the setting or to improve the fit to local conditions.</p> <ul style="list-style-type: none"> ➤ A.k.a Type 3 evidence.
Core elements/components	<p>The active ingredients of the intervention that are essential to achieving the desired outcomes of the intervention.</p> <ul style="list-style-type: none"> ➤ Indicates the drivers of the implementation process that are indispensable for the successful implementation of an intervention.
Extent	<p>Moderating factors that alter the causal effect of an independent variable on a dependent variable.</p> <p><u>Attributes:</u></p> <ul style="list-style-type: none"> ➤ Relative advantage ➤ Compatibility ➤ Observability ➤ Trialability ➤ Complexity
CONTEXTUAL FACTORS	
Organizational Culture	<p>The organizational norms and expectations regarding how people behave and how things are done in an organization.</p> <p><u>Includes:</u></p> <ul style="list-style-type: none"> ➤ Implicit norms ➤ Values ➤ Shared behavioral expectations ➤ Assumptions that guide the behaviors of members of a work unit.
Organizational Climate	<p>The employees' perceptions of and reaction to the characteristics of the work environment.</p>
Organizational readiness for change	<p>The extent to which organizational members are psychologically and behaviorally prepared to implement a new intervention.</p> <p><u>Attributes:</u></p> <ul style="list-style-type: none"> ➤ Change valence ➤ Change efficacy ➤ Discrepancy ➤ Principal support
INTERVENTION CHARACTERISTICS	
Acceptability	<p>Describes whether the potential implementers perceive an intervention as agreeable, palatable, or satisfactory.</p>
Appropriateness	<p>The perceived fit and relevance of the intervention for a given context and/or its perceived relevance and ability to address a particular issue.</p>

Feasibility	The actual fit, suitability, or practicability of an intervention in a specific setting.
Implementation Cost	The cost impact of an implementation efforts and depends on the costs of the particular intervention, strategy used, and characteristics of the setting(s) where the intervention is being implemented.
TYPES OF RESEARCH	
Efficacy	Evaluates the initial impact of an intervention when it is delivered under optimal or lab conditions. <ul style="list-style-type: none"> ➤ <u>Focus:</u> internal validity or on establishing a causal relationship between exposure to an intervention and an outcome.
Effectiveness	Determines the impact of an intervention with demonstrated efficacy when it is delivered under 'real-world' conditions. <ul style="list-style-type: none"> ➤ <u>Focus:</u> use of methodological designs suited for large and/or less controlled research environments to obtain increased external validity.
Population health intervention	The use of scientific methods to produce knowledge on interventions operating either within or outside the health sector with potential to impact health at the population level. <ul style="list-style-type: none"> ➤ <u>Focus:</u> <ol style="list-style-type: none"> (1) Programs, policies, resource distribution processes. (2) Multiple systems, multiple strategies (3) Evaluation research + community-based intervention research → traditional intervention research (4) Controlled and uncontrolled intervention designs → practice-relevant knowledge for real-world decision making.
Comparative effectiveness	The conduct and synthesis of research comparing the benefits and harms of different interventions and strategies to: <ul style="list-style-type: none"> ➔ Prevent ➔ Diagnose ➔ Treat ➔ Monitor Health conditions in the real-world settings. <ul style="list-style-type: none"> ➤ <u>Focus:</u> Improving health outcomes by developing evidence-based information to decision makers.
SUGGESTED PHASES OF TRANSLATIONAL RESEARCH	
T1	Uses discoveries generated through laboratory and/or preclinical research to develop and test treatment and prevention approaches. <u>Translation</u> of basic research into potential clinical application → theoretical knowledge about a possible intervention. Moving science from “the bench” to the patient’s “bedside”
T2	Focus: Enhancement of widespread use of efficacious interventions by the target audience.

	<p><i>Efficacy studies</i> and results in efficacy knowledge about interventions that work under optimal conditions.</p> <p>➤ <i>Includes:</i> effectiveness research, diffusion research, dissemination research, implementation research.</p> <p><i>Synonyms:</i> “bedside to practice” translation.</p>
T3	<i>Effectiveness, dissemination, and implementation</i> research → applied knowledge about interventions that work in real-world settings.
T4	<i>Outcomes assessment</i> at the population level → public health knowledge at the population level.

T1-T4 Framework, adapted from Washington University Institute of Clinical and Translational Sciences [framework](#) to describe the stages of translation of scientific findings into population level changes.

Translating laboratory finding into potential clinical solutions in humans	Testing initial hypotheses in early-stage and multi-center human trials	Translating clinical trial findings into everyday clinical practice	Implementing and testing new clinical solutions at the population level
T1 To Humans	T2 To Patients	T3 To Practice	T4 To Population

STUDY DESIGNS¹

Mixed-methods	Collection and analysis of multiple, both quantitative and qualitative data in a single study.
Pragmatic/Practical clinical trial (PCT)	<p>Clinical trials that are concerned with producing answers to questions faced by decision makers.</p> <p><i>Attributes:</i></p> <ul style="list-style-type: none"> ➤ Select clinically relevant alternative interventions to compare ➤ Include a diverse population of study participants ➤ Recruit participants from heterogeneous practice settings ➤ Collect data on a broad range of health outcomes.
Natural Experiment	Naturally occurring circumstances in which subsets of the population have different levels of exposure to a supposed causal factor.
Plausibility	Documents impact and rule out alternative explanations when RCT approach is not feasible or acceptable.

¹ For in-depth guidance on D&I designs, see the DIRC Designs Toolkit.

What is D&I Research? Useful Resources

Resource	Description
Bauer MS, Damschroder L, Hagedorn H, Smith J, Kilbourne AM. 2015. An Introduction to Implementation Science for the Non-Specialist. <i>BMC psychology</i> , 3(1), 32.	Provides an introduction to implementation science principles to new investigators in the field. The article reviews published literature in implementation science and draws on the authors' experience as researchers and grant reviewers in the field.
Peters DH, Tran NT and Adam T. 2013. Implementation Research in Health: A Practical Guide. Alliance for Health Policy and Systems Research, WHO.	Chapter 3 'What is Implementation Research' (pp. 26-32) of this report defines what implementation research is and presents it as a continuum that can be integrated within several areas of health research. Chapter 5 'What approaches and methods are appropriate for implementation research?' (pp. 44-55) connects research questions to appropriate methods in implementation science. Particularly useful for formulation of implementation research questions are 'Figure 3. The continuum of implementation research' (p. 31) and 'Table 5. Types of implementation research objectives, implementation questions, and research methods' (p. 55).
Stages of Research and Phases of Dissemination and Implementation Framework Figure 12-1 in Landsverk J, Hendricks Brown C, Chamberlain P, et al. "Design and Analysis in Dissemination and Implementation Research." in Brownson RC, Colditz GA, Proctor EK, eds. 2012. <i>Dissemination and Implementation Research in Health.</i> Oxford University Press: New York, NY.	This framework is useful for conceptualizing how D&I research fits into the overall field of health research. Landsverk et al. adapted Institute of Medicine's 'prevention research cycle' to illustrate how D&I research relates to two other stages of research, efficacy and effectiveness. The framework conceptualizes D&I research in four distinct phases that have some overlap: exploration, adoption/preparation, implementation and sustainment.
NIH PAR on Dissemination and Implementation Research in Health, http://grants.nih.gov/grants/guide/pa-files/PAR-16-238.html .	NIH's funding opportunity announcement for D&I research project proposals is useful for understanding how NIH conceptualizes D&I research, including key definitions and background for the research call.
Dissemination & Implementation Models in Health Research & Practice, website developed by Center for Research in Implementation Science and Prevention, http://www.dissemination-implementation.org/index.aspx Originally based on the following reviews: Tabak RG, Khoong EC, Chambers DA, Brownson RC. (2012) Bridging Research and Practice: Models for Dissemination and Implementation Research. <i>Am J Prev Med</i> 43(3):337-350. Mitchell SA, Fisher CA, Hastings CE, Silverman LB, Wallen GR. (2010) A Thematic Analysis of Theoretical Models for Translational Science in Nursing: Mapping the Field. <i>Nurs Outlook</i> 58(6):287-300.	This is a web-based collection of models used in D&I research. The models are searchable based on several characteristics: D and/or I, Socio-Ecological Levels, and Constructs. Some information about the constructs is also available as are links to the GEM database (see Implementation Outcomes Toolkit), where available. To find a model for a specific study: 1. Go to the website. 2. Click on the yellow "Select" box and then the blue oval "Search D&I Models." 3. Here you can select attributes of the model (i.e., D And/Or I, Socio-Ecological Levels, and Constructs) using the checkboxes. You can also search by model name, using the "Enter keyword for model search" box. Then, click "Submit Keyword Search". 4. In the search box located on the top-right portion of the Measures page titled "Search Measures," select the implementation outcome you are interest in from the drop down menu titled "Construct." 5. You will now be able to see a table of models and related characteristics for the model. The far left column has a blue 'Description' link, which takes you to a page with more detail about the model, including the constructs used, relevant citations, and if available, example studies using the model.
Training Institute for Dissemination and Implementation Research in Health (TIDRH), July 20-25, 2014, Boston, MA http://conferences.thehillgroup.com/OBSSRinstitutes/TIDIRH2014/agenda.html	The TIDRH was developed by the NIH and VA for postdoctoral level applicants aspiring to advance D&I science. Particularly helpful for conceptualizing D&I research are Ross Brownson's and Amy Kilbourne's presentations: "D&I Part I: Dissemination Science & Designing for Dissemination" and "D&I Part II: Implementation Science". These can be found here: http://conferences.thehillgroup.com/OBSSRinstitutes/TIDIRH2014/TIDIRH%20Pre-Institute%20Webinar%202014.mp4

Veterans Administration Quality Enhancement Research Initiative (QUERI)

<http://www.queri.research.va.gov/>

Veterans Administration Center for Dissemination and Education Resources (CIDER)

http://www.queri.research.va.gov/ciprs/cyber_seminars.cfm

The Veterans Administration runs several quality improvement and translation initiatives. Of particular interest to D&I researchers are the QUERI and CIDER websites. QUERI contains several resources for quality improvement developed in the process of translating evidence into practice at the VA. CIDER conducts and stores webinar materials dealing with implementation practice and research.

Woolf SH. 2008. **The meaning of translational research and why it matters.** JAMA, 299(2), 211-213.

Defines and distinguishes two types of research that are both referred to as translational research, but have different goals, settings, study design, and investigators. Describes the lower funding and support of T2 translational research than T1 translational research, and calls for increased focus on T2 translational research.

Chambers DA, Feero WG, Khoury MJ.
Convergence of Implementation Science, Precision Medicine, and the Learning Health Care System: A New Model for Biomedical Research.
JAMA. 2016 May 10;315(18):1941-2. doi:
10.1001/jama.2016.3867.

Provides a conceptual framework of how implementation science fits with the new field of precision medicine, and how both integrate with the learning healthcare system field.

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