Dissemination and Implementation (D&I) Science: Context, Health Equity, Adaptations and Their Implications and Opportunities for C3I

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VA Eastern Colorado QUERI and Geriatric Research Centers, and Adaptation, Fidelity and Tailoring Interest Group
Dissemination and Implementation Science Program of Adult and Child Consortium for Outcomes Research and Delivery Science
ACKNOWLEDGMENTS

- David Chambers, Ross Brownson, Gila Neta, Borsika Rabin
- University of Colorado SOM - ACCORDS D&I Science Program
- RE-AIM Colleagues

FINANCIAL DISCLOSURE
National Institutes of Health (NIH), Agency for Healthcare Research and Quality (AHRQ), and Robert Wood Johnson Foundation (RWJF) funding on various projects

COMPETENCE DISCLOSURE
Knowledge of tobacco use and cessation literature 15-20 years out of date
LEARNING AND COLLABORATION OBJECTIVES

1) Discuss key and emerging areas in D&I science, with relevance to tobacco cessation
2) Discuss how to evaluate implementation and dissemination in smoking
3) Describe scale-up and scale-out and ways to ‘Design for dissemination’
4) Describe new NCI Implementation Science Cancer Centers (ISC3), related Consortium and opportunities for collaboration
5) Sufficient time for Q and A
A BIG TENT OF TERMS (AND OVALS)*

* The terms according to D.A.C.

Adapted from Mitchell S, Chambers, D. https://doi.org/10.1200/JOP. 2017.024729;
### Key Characteristics of D&I Science

<table>
<thead>
<tr>
<th>Point #</th>
<th>Characteristic</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systems Perspective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Context is critical</td>
<td>Research should focus on and describe context</td>
</tr>
<tr>
<td>2</td>
<td>Multilevel complexity</td>
<td>Most problems and interventions are multilevel and complex</td>
</tr>
<tr>
<td>3</td>
<td>Focus on systems characteristics</td>
<td>More emphasis needed on interrelationships among system elements and systems rules</td>
</tr>
<tr>
<td><strong>Robust, Practical Goals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Representativeness and reach</td>
<td>Focus on reaching broader segments of population and those most in need</td>
</tr>
<tr>
<td>5</td>
<td>Generalizability</td>
<td>Study generalization (or lack of such) across settings, subgroups, staff, and conditions</td>
</tr>
<tr>
<td>6</td>
<td>Pragmatic and practical</td>
<td>Producing answers to specific questions relevant to stakeholders</td>
</tr>
<tr>
<td>7</td>
<td>Scalability and sustainability</td>
<td>From outset, greater focus on scale-up potential and likelihood of sustainability</td>
</tr>
<tr>
<td>Point #</td>
<td>Characteristic</td>
<td>Implication</td>
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<td>---------</td>
<td>----------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Research Methods to Enhance Relevance</td>
<td></td>
</tr>
<tr>
<td><strong>8</strong></td>
<td><strong>Rigorous</strong></td>
<td>Identify and address plausible threats to validity in context of questions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greater focus on replication.</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td><strong>Rapid</strong></td>
<td>Approaches that produce faster answers</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td><strong>Adaptive</strong></td>
<td>Best solutions usually evolve over time, as a result of informed hypotheses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and mini-tests with feedback</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Integration of methods; triangulation</td>
<td>For greater understanding, integrated Quantitative and Qualitative methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>are often required</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td><strong>Relevance</strong></td>
<td>Relevance to stakeholders should be top priority</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>Multiplicity</td>
<td>Encourage and support diverse approaches with the above characteristics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(all models are wrong)</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td><strong>Respect for diverse approaches; humility</strong></td>
<td>Different perspectives, goals, methods and approaches are needed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continuing the same existing approaches will produce the same unsatisfactory results.</td>
</tr>
</tbody>
</table>
TOO OFTEN, WE HAVE ASSUMED, “IF YOU BUILD IT…”
AN EVIDENCE-BASED SMOKING CESSATION INTERVENTION (OR PREVENTION, OR DEPRESSION TX) STORY

Even if 100% effective...is only so good as how and whether:

– it is adopted widely and in low resource settings
– Practitioners/delivery staff choose to deliver it
– trained staff deliver it well
– eligible populations, including those at highest risk receive it
– it can be sustained

If we assume 50% threshold for each step…
(even with perfect access/adherence/dosage/maintenance)

Impact: \[0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 = 3\% \text{ overall benefit}\]

• Summarized in Tabak, et al., proliferation of models: 61 reviewed then, now more than 159*! (*many similarities*)
  • 87% used in only 5 or fewer of 596 studies
  • **Context** is critical
  • Focus on external validity
  • Begin with **stakeholders**—take their perspective(s)
  • Find balance between fidelity to EB program and **adaptation** to local setting
  • Unlikely you need to create a new model

This interactive webtool is designed to help researchers and practitioners (1) develop a logic model or diagram for their research or practice question; (2) select the dissemination and implementation (D&I) Model(s) that best fit(s) their research question or practice problem; (3) combine multiple D&I Models; (4) adapt the D&I model(s) to the study or practice context; (5) use the D&I Model(s) throughout the research or practice process - not just on the aims page; and (5) find existing measures to assess the key constructs of the D&I Model(s) selected.

A few key tips to help you navigate the site:

- In this webtool, the term “Models” is used to refer to both theories and frameworks that enhance dissemination and implementation of evidence-based interventions.
- We STRONGLY recommend that you begin with either the TUTORIAL or the PLAN section.
“D&I theories are kind of like toothbrushes: Everybody has one and no one wants to use somebody else’s”

Cara Lewis via Anne Sales via ????
Health Equity....need your feedback on most relevant Smoking Cessation equity issues

• Considering context
• Planning programs for dissemination
• Adaptations – cultural and local
• Representativeness and transparent reporting
• Impact of social determinants of health
• Your feedback and opportunities for D&I research
## RE-AIM—HEALTH EQUITY IMPLICATIONS

<table>
<thead>
<tr>
<th>RE-AIM Issue</th>
<th>Disparity</th>
<th>Overall Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reach</td>
<td>30%</td>
<td>70% benefit</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>0 (equal)</td>
<td>70% benefit</td>
</tr>
<tr>
<td>Adoption</td>
<td>30%</td>
<td>49% benefit</td>
</tr>
<tr>
<td>Implementation</td>
<td>30%</td>
<td>34% benefit</td>
</tr>
<tr>
<td>Maintenance</td>
<td>30%</td>
<td>24% benefit</td>
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</tbody>
</table>
Context: Issues from a D&I Perspective

- **People exist in the context of culture and places in which they work, live, study and play** *(Take home point #1)*
- Context is *multi-level and dynamic*
- Adapting for context
- Challenges of studying and understanding context:
  - So many factors…which are most important for which issues, for which settings, for which populations?
  - Need for brief, validated and pragmatic measures
Crosscutting issues
- Proportion who benefit
- Representativeness of who benefits
- Reasons: how and why they benefit
- Adaptations made
- Costs incurred

FIT among:
- Intervention
- Implementation strategy
- Context
- You can’t have it all-interactions

Changing Outer Context
PRISM External Environment (e.g., policy, guidelines, incentives)

Changing Internal Context
PRISM factors of
- Organizational & Patient Characteristics
- Organizational & Patient Perspectives (values)
- Implementation & Sustainability Infrastructure

Impact Strategies
- Evidence-based intervention (components)
- Implementation strategies

Maintenance
Reach
Effectiveness
Adoption

Implementation
Evaluating complex interventions: Confronting and guiding (vs. ignoring and suppressing) heterogeneity and adaptation

October 9, 2018
Brian S. Mittman, PhD
Department of Research and Evaluation, Kaiser Permanente Southern California
Quality Enhancement Research Initiative (QUERI), U.S. Department of Veterans Affairs
Clinical and Translational Science Institute, University of California at Los Angeles
PCORI METHODOLOGY GUIDELINE SCI-3:
SPECIFY HOW ADAPTATIONS TO THE FORM OF THE INTERVENTION AND COMPARATOR WILL BE ALLOWED AND RECORDED

• Researchers should specify:
  • **allowable adaptations** in form and/or function
  • a description of how planned and unplanned adaptations will be managed, measured and reported over time

• Any **planned adaptations** should:
  • have a clear rationale
  • ideally be supported by theory, evidence or experience
  • maintain fidelity to the core functions of the intervention

• Upon study conclusion, researchers should provide guidance on:
  • **allowable adaptations**, or
  • unproductive adaptations
<table>
<thead>
<tr>
<th>Focus of Adaptation</th>
<th>Planning</th>
<th>During</th>
<th>Dissemination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
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<td></td>
<td></td>
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<tr>
<td>Implementation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Strategy</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Setting</td>
<td></td>
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</table>
External Validity/Pragmatic Criteria, Often Ignored

- Participant representativeness
- Setting and staff representativeness
- Multi-level context
- Adaptation/change in intervention and implementation strategies
- What outcomes and over what time period
- Reasons for participation and drop out
### TYPES OF OUTCOMES IN IMPLEMENTATION RESEARCH (PROCTOR, ET AL., 2011)

<table>
<thead>
<tr>
<th>Implementation Outcomes</th>
<th>Service Outcomes</th>
<th>Client Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptability</td>
<td>Efficiency</td>
<td>Satisfaction</td>
</tr>
<tr>
<td>Adoption</td>
<td>Effectiveness</td>
<td>Function</td>
</tr>
<tr>
<td>Appropriateness</td>
<td>Equity</td>
<td>Symptoms</td>
</tr>
<tr>
<td>Costs</td>
<td>Patient-centeredness</td>
<td>(Smoking Cessation)</td>
</tr>
<tr>
<td>Feasibility</td>
<td>Timeliness</td>
<td>(Quality of Life)</td>
</tr>
<tr>
<td>Penetration</td>
<td></td>
<td>(Long term reductions morbidity and mortality)</td>
</tr>
<tr>
<td>Sustainability</td>
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Logic Model of Implementation Sequence

Starting Conditions

- Problem

Inputs

- Evidence Based Intervention or Policy
- Implementation Strategies

Proximal Outcomes

- Determinants/Mediators
- Implementation Outcomes

Distal Outcomes

- Sustainable System Infrastructure & Behaviors
- Long-term Outcomes

Dynamic Context

FIT & Adaptations
EVALUATION AND REPORTING IN D&I RESEARCH

• Context and Representativeness (Expanded CONSORT)*

• Implementation- including fidelity, adaptation, and variability

• Costs- stakeholder perspective, replication costs, feasibility

• Standards for Reporting Implementation Studies (StaRI)**


**Pinnock H, et al. StaRI reporting standards. BMJ 2017;356:i6795 http://dx.doi.org/10.1136/bmj.i6795
...As you scale up decision-making from practice to program to policy, does evidence exist to guide implementation?
Dissemination generally does not occur spontaneously and naturally; Passive approaches to dissemination (diffusion) are usually ineffective; Single-source prevention messages are generally less effective than comprehensive, multi-level approaches; Stakeholder involvement in the research or evaluation process is likely to enhance dissemination; Theory and frameworks for dissemination are beneficial; and The process of dissemination needs to be tailored to various audiences.

DESIGNING FOR DISSEMINATION (D4D): START EARLY!!

- Think about dissemination at the beginning and throughout the project
  - Structures
    - In grant applications, are D4D principles enunciated?
    - Do you have a conceptual model for dissemination?
  - Processes
    - How to engage stakeholders early and often
  - Products
    - How to frame messages, develop brief summaries
  - Systems changes
    - How to shift and fit funder, academic priorities, and incentives

REPLICATION (AND GENERALIZABILITY)

Important to report conditions under which the program was delivered

- To what extent is the program replicable:
  - In similar settings?
  - In different settings?

Bottom Line and **ULTIMATE USE QUESTION**

“What program/policy components are most effective for producing what outcomes for which populations/ recipients when implemented by what type of persons using what implementation strategies under what conditions, with how many resources and how/why do these results come about?”
Implementation Science Centers in Cancer Control (ISC³)

The Implementation Science Centers in Cancer Control (ISC³) Program supports the rapid development, testing, and refinement of innovative approaches to implement a range of evidence-based cancer control interventions. Centers all feature "implementation laboratories" involving clinical and community sites that will engage in implementation research across the cancer control continuum to advance methods in studying implementation and develop and validate reliable measures of key implementation science constructs. These Centers collectively provide leadership for an Implementation Science consortium across this and other Cancer Moonshot℠ initiatives.

The Cancer Moonshot℠ was designed to accelerate efforts to prevent, diagnose, and treat cancer and achieve 10 years of progress in 5 years.

BLUE RIBBON PANEL RECOMMENDATION C: Expand use of proven cancer prevention and early detection strategies
Reduce cancer risk and cancer health disparities through approaches in development, testing and broad adoption of proven prevention strategies.

NCI LEADS: CYNTHIA VINSON, APRIL OH
HTTPS://CANCERCONTROL.CANCER.GOV/IS/INITIATIVES/ISC3.HTML
CANCER CENTER CESSATION INITIATIVE (2017-20)

- **NCI Lead:** Stephanie Land

- **Goal:** Administrative supplements to develop tobacco cessation treatment capacity and infrastructure for cancer patients that should lead to the implementation and dissemination of a sustainable tobacco cessation treatment program within the cancer center.

- **Natural laboratory** for understanding implementation of tobacco cessation within cancer center care delivery

- Capturing data on **Implementation strategies** to integrate cessation services

- **Coordinating Center:** University of Wisconsin Madison (Lead: Michael Fiore)
ISC³ FUNDED SITES

University of Washington

Oregon Health & Science University

University of Colorado, Denver

Harvard School of Public Health

Wake Forest University Health Sciences

Washington University in St. Louis
<table>
<thead>
<tr>
<th>Center</th>
<th>PI/MPI</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Implementation Science Center for Cancer Control Equity</td>
<td>Karen Emmons</td>
<td>Harvard T.H. Chan School of Public Health</td>
</tr>
<tr>
<td>Building Research in Implementation and Dissemination to close Gaps and achieve Equity in Cancer Control (BRIDGE-C2) Center</td>
<td>Jennifer DeVoe</td>
<td>Oregon Health &amp; Science University</td>
</tr>
<tr>
<td>Colorado ISC³</td>
<td>Russell E. Glasgow</td>
<td>University of Colorado School of Medicine</td>
</tr>
<tr>
<td>Optimizing Implementation in Cancer Control: OPTICC</td>
<td>Bryan J. Weiner</td>
<td>University of Washington</td>
</tr>
<tr>
<td>iDAPT: Implementation and Informatics - Developing Adaptable Processes and Technologies for Cancer Control</td>
<td>Kristie Long Foley</td>
<td>Wake Forest School of Medicine</td>
</tr>
<tr>
<td>Washington University Implementation Science Center for Cancer Control (WU-ISCCC)</td>
<td>Ross C. Brownson</td>
<td>Washington University in St. Louis</td>
</tr>
</tbody>
</table>
• Implementation Science **Consortium in Cancer** (ISCC; July 10-12, 2019)
  • 107 in-person attendees (72 institutions)
  • 136 online attendees (102 institutions)
• **Goals** identified by participants:
  • Advance implementation science (IS); build capacity; collaboration; articulate and create a vision for IS across Moonshot Initiatives and beyond
• **Future meetings** hosted by Implementation Science Centers:
  • **Wake Forest (Sept 22-23 2020)**; **Colorado (June 2021)**; **Seattle (2022)**

[https://cancercontrol.cancer.gov/IS/initiatives/iscc.html](https://cancercontrol.cancer.gov/IS/initiatives/iscc.html)
CONSORTIUM WORKING GROUPS

- 20 projects generated across 7 working groups
- Working groups:
  - Implementation laboratories
  - Rapid cycle designs
  - Economics & costs
  - Technology
  - Equity
  - Policy
  - Precision medicine
Dissemination and Implementation Science is about:

- Multi-level, contextual issues, and external validity
- Relevant, pragmatic models, research methods and measures
- Real world implementation and adaptation (T3 and T4)
- Designing for dissemination, sustainability and equity

*(Normal science (T1–T2) is necessary but not sufficient)*
IF AN INTERVENTION WORKS

AND NOBODY CAN USE IT.....

DOES IT STILL MAKE AN IMPACT?
AREAS RIPE FOR EXPLORATION

- **Sustainability** of programs in a changing context
- **Scaling up** practices across different health plans, systems, networks and nations: partnerships
- **De-Implementation**: discontinuing wasteful and harmful practices
- **Adaptation/evolution** of programs over time
- **Adaptive designs** (implementation as an iterative, step-wise approach)
- Integration of D&I and quality improvement

THE 5 RS TO ENHANCE PRAGMATISM, D&I SCIENCE AND LIKELIHOOD OF TRANSLATION

Research that is:

• Relevant
• Rapid and recursive
• Redefines rigor
• Reports resources required
• Replicable
PREMIS-2

PRAGMATIC EXPLANATORY CONTINUUM INDICATOR SUMMARY: A TOOL TO DESIGN PRAGMATIC TRIALS

1 = Very explanatory, 5 = Very pragmatic; Loudon et al., 2015.
REP was developed by the Centers for Disease Control to rapidly translate HIV prevention programs into community-based settings.

Enhanced REP includes additional facilitation based on the PARiHS framework: developing relationships and promoting provider self-efficacy.
IMPLEMENTATION STRATEGIES

- What barriers are you trying to overcome?
- What resources are you able to leverage?
- Who are your stakeholders?

Powell, et al., 2015.
CONVERGENCE OF PRECISION HEALTH, DIS & LEARNING HEALTH CARE SYSTEMS AND COMMUNITIES

Chambers DA, Feero WG, Khoury MJ. Conversion of implementation science, precision medicine, and the learning health care system. *JAMA.* 2016, 315: 1941-1942