IMPLEMENTATION OUTCOMES:
WHAT ARE THEY?
WHY ARE THEY IMPORTANT?
HOW ARE THEY MEASURED?
Conceptual Model of Implementation Research

The Core of Implementation Science

Proctor et al. (2009). Administration and Policy in Mental Health and Mental Health Services Research, 36, 24-34.
Implementation Outcomes Defined

“…the effects of deliberate and purposive actions to implement new treatments, practices, and services.”

Implementation Outcomes Have 3 Important Functions

- Serve as indicators of implementation success
- Proximal indicators of implementation process
- Key intermediate outcomes in relation to service system or clinical outcomes in treatment effectiveness and quality of care research

When an intervention fails, we must determine why:

- Was the intervention ineffective in the new setting (intervention failure)?
- Was the intervention deployed incorrectly (dissemination/implementation failure)?
Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda

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<table>
<thead>
<tr>
<th>Implementation outcome</th>
<th>Level of analysis</th>
<th>Theoretical basis</th>
<th>Other terms in literature</th>
<th>Salience by implementation stage</th>
<th>Available measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptability</td>
<td>Individual provider</td>
<td>Rogers: “complexity” and to a certain extent “relative advantage”</td>
<td>Satisfaction with various aspects of the innovation (e.g. content, complexity, comfort, delivery, and credibility)</td>
<td>Early for adoption Ongoing for penetration Late for sustainability</td>
<td>Survey Qualitative or semi-structured interviews Administrative data Refused/blank</td>
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<td></td>
<td>Individual consumer</td>
<td>Rogers: “trialability” (particularly for early adopters)</td>
<td>Uptake; utilization; initial implementation; intention to try</td>
<td>Early to mid</td>
<td>Administrative data Observation</td>
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<tr>
<td>Adoption</td>
<td>Individual provider</td>
<td>RE-AIM: “adoption” Rogers: “trialability”</td>
<td></td>
<td>Late for sustainability</td>
<td>Qualitative or semi-structured interviews</td>
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<td></td>
<td>Organization or setting</td>
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<td></td>
<td></td>
<td>Observation</td>
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<tr>
<td>Appropriateness</td>
<td>Individual provider</td>
<td>Rogers: “compatibility”</td>
<td>Perceived fit; relevance; compatibility; suitability; usefulness; practicability</td>
<td>Early (prior to adoption)</td>
<td>Survey Qualitative or semi-structured interviews</td>
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<td></td>
<td>Individual consumer</td>
<td>Rogers: “compatibility”</td>
<td></td>
<td></td>
<td>Survey</td>
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<td></td>
<td>Organization or setting</td>
<td>Rogers: “compatibility” and “trialability”</td>
<td>Actual fit or utility; suitability for everyday use; practicability</td>
<td>Early (during adoption)</td>
<td>Focus groups Survey Administrative data</td>
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<td>Feasibility</td>
<td>Individual providers</td>
<td>RE-AIM: part of “implementation”</td>
<td>Delivered as intended; adherence; integrity; quality of program delivery</td>
<td>Early to mid</td>
<td>Observation Checklists Self-report</td>
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<td>Organization or setting</td>
<td></td>
<td></td>
<td></td>
<td>Administrative data</td>
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<tr>
<td>Fidelity</td>
<td>Individual provider</td>
<td></td>
<td></td>
<td>Early for adoption and feasibility</td>
<td>Case audit Checklists</td>
</tr>
<tr>
<td>Implementation Cost</td>
<td>Provider or providing institution</td>
<td>TCU Program Change Model: “costs” and “resources”</td>
<td>Marginal cost; cost-effectiveness; cost-benefit</td>
<td>Early for adoption and feasibility Mid for penetration Late for sustainability</td>
<td>Case audit Checklists Case audit Semi-structured interviews Questionnaires Checklists</td>
</tr>
<tr>
<td>Penetration</td>
<td>Organization or setting</td>
<td>RE-AIM: necessary for “reach” “Level of institutionalization? Spread? Service access?”</td>
<td></td>
<td>Mid to late</td>
<td></td>
</tr>
<tr>
<td>Sustainability</td>
<td>Administrators</td>
<td>RE-AIM: “maintenance” Rogers: “confirmation”</td>
<td>Maintenance; continuation; durability; incorporation; integration; institutionalization; sustained use; routinization;</td>
<td>Late</td>
<td>Checklists</td>
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Implementation Outcomes

- **Acceptability**
  - Perception that a given innovation (or intervention) is agreeable, palatable, or satisfactory

- **Adoption**
  - Intention, initial decision or action to employ an innovation (or intervention)

- **Appropriateness**
  - Perceived fit of an innovation for a practice setting, provider or consumer

- **Feasibility**
  - Extent to which an innovation (or intervention) can be used or carried out within a setting

- **Fidelity**
  - Degree to which an innovation (or intervention) is implemented as prescribed in the original protocol

- **Costs**
  - Cost impact of an implementation effort (cost of intervention, implementation strategy, and the location of service delivery)

- **Penetration**
  - Integration of a practice within a service setting and its subsystem (number of providers who deliver/total number of providers) – “Reach”

- **Sustainability**
  - Extent to which a new treatment is maintained or becomes part of normal practice
Role of implementation outcomes in research studies
Implementation Study Design

- **Efficacy**
  - Randomized controlled trial; high internal validity; limited external validity
  - Is Cognitive Behavioral Therapy (CBT) for child anxiety efficacious in a research setting?

- **Effectiveness**
  - More diverse samples; real world settings; better external validity
  - Is CBT for child anxiety effective in a real-world clinic?

- **Implementation**
  - Focus just on the implementation process of an intervention
  - Can training and consultation as implementation strategies improve the implementation of CBT for child anxiety?

- **Hybrid Implementation-Effectiveness Study**
  - Combination of implementation and effectiveness study
  - Can training and consultation improve implementation of CBT for child anxiety?
  - Does child anxiety improve?
Stages of Research and Phases of D&I

<table>
<thead>
<tr>
<th>Design</th>
<th>Efficacy/Effectiveness</th>
<th>Implementation</th>
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</thead>
<tbody>
<tr>
<td>Manipulation</td>
<td>Clinical intervention</td>
<td>Implementation strategy/intervention</td>
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<tr>
<td>Outcome</td>
<td>Clinical outcomes (symptoms, quality of life)</td>
<td>Implementation outcomes (fidelity, adoption)</td>
</tr>
<tr>
<td>Unit of analysis</td>
<td>Patient</td>
<td>Provider, Organization</td>
</tr>
<tr>
<td>Approach to data collection</td>
<td>Typically quantitative</td>
<td>Mixed methods – inclusion of qualitative data</td>
</tr>
<tr>
<td>Summative outcomes</td>
<td>Health outcomes; process/quality measures typically considered intermediate; costs</td>
<td>Adoption/uptake of the “clinical” intervention; process measures/quality measures typically considered outcomes</td>
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Implementation outcomes: Common pitfalls

- Skipping over implementation outcomes
- Including too many implementation outcomes
- Using home-grown measures
- Failure to directly measure
- Unit of analysis inconsistency
Tips for investigators:

**Implementation outcomes should**

- Be justified in terms of a pressing service system problem (the quality gap, current levels of uptake of the EBI tested)
- Be reflected in aims
- Derive from guiding conceptual model/ framework
  - Help inform mechanisms or process of practice change
- Correspond to the phase of implementation
- Measured robustly
Measuring implementation outcomes
What we look for in a good measure

- **Reliability** – is about the consistency or repeatability of measure

- **Validity** – is about the accuracy of a measure

- **Practicality** – is about the usefulness and ease of use of a measure
Implementation Outcome Measures
Study Overview – Three Phases

Phase 1
Data Collection

Searched databases (e.g. PubMed) for existing measures

Phase 2
Data Extraction

Used the PAPERS rating system (Psychometric And Pragmatic Evidence Rating Scale) to assess quality of measures

Phase 3
Data Analysis

Compared scores across psychometric criteria for each measure

Results

Number of Measures Identified for Each Outcome

- Acceptability: 32 measures
- Adoption: 26 measures
- Appropriateness: 6 measures
- Feasibility: 18 measures
- Fidelity: 18 measures
- Penetration: 23 measures
- Sustainability: 14 measures
- Implementation Cost: 31 measures
Acceptability
Measurement Challenges

- Measures are poorly distributed (some constructs have lots of measures, some have a few)
- Many measures have unknown / questionable quality
- Measures exhibit synonymy, homonymy, and instability
  - Synonymy: different terms have the same meaning
  - Homonymy: same term can have multiple meanings
  - Instability: terms shift unpredictably over time
- Measures are not practical
- Translating self-report measures can be difficult*
Measure Repositories

- Society for Implementation Research Collaboration
  - [https://www.societyforimplementationresearchcollaboration.org/sirc-projects/sirc-instrument-project/](https://www.societyforimplementationresearchcollaboration.org/sirc-projects/sirc-instrument-project/)

- Grid-Enabled Measures developed by the National Cancer Institute
  - [https://www.gem-beta.org/Public/Home.aspx](https://www.gem-beta.org/Public/Home.aspx)

- DIRC CMHSR Measures Collection
  - [https://icts.wustl.edu/items/dissemination-and-implementation-research-core-dirc/](https://icts.wustl.edu/items/dissemination-and-implementation-research-core-dirc/)