Defining Implementation Science and Understanding Implementation Science in Practice

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Overview

1. Introduction
2. Implementation Barriers & Facilitators
3. Implementation Strategies
4. Discussion

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Defining Implementation Science and Understanding Implementation Science in Practice

Introduction

Growing Body of Evidence

- Programs (e.g., cognitive behavioral therapy)
- Practices (e.g., “catch them being good”)
- Principles (e.g., prevention before treatment)
- Procedures (e.g., screening for depression)
- Products (e.g., mHealth app for exercise)
- Pills (e.g., PrEP to prevent HIV infection)
- Policies (e.g., limit prescriptions for narcotics)

Brown et al. (2017)

Growing Body of Evidence

NATIONAL CANCER INSTITUTE Research-tested Intervention Programs (RTIPs)

20 years
1993-2013
THE COCHRANE COLLABORATION®

HIV prevention that works

NREPP SAMHSA's National Registry of Evidence-based Programs and Practices

AHRQ HEALTH CARE
INNOVATIONS EXCHANGE

And yet…

Evidence-based medicine should be complemented by evidence-based implementation.

Grol & Grimshaw (1999)

Prioritization of D&I Science

NIH National Institutes of Health
Turning Discovery Into Health

AHRQ Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NCATS National Center for Advancing Translational Sciences

DORIS DUKE CHARITABLE FOUNDATION

NATIONAL ACADEMY OF MEDICINE

Robert Wood Johnson Foundation

MATHEMATICA Policy Research

Substance Abuse and Mental Health Services Administration SAMHSA

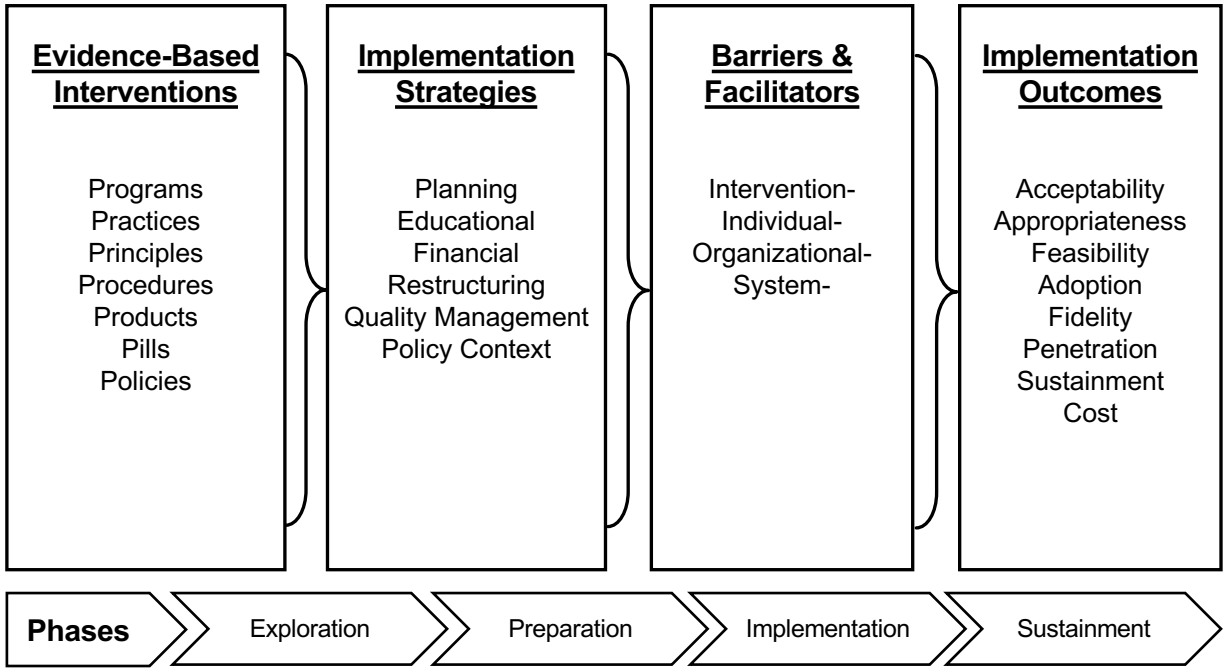
Children's Bureau

WILLIAM T. GRANT FOUNDATION
Supporting research to improve the lives of young people

“The scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice…It includes the study of influences on professional and organizational behavior.

Barriers/Facilitators & Implementation Strategies

Eccles & Mittman (2006)



Aarons et al. (2011); Brown et al. (2017); Powell et al. (2012); Proctor et al. (2009 & 2011)

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Defining Implementation Science and Understanding Implementation Science in Practice

Implementation Barriers and Facilitators

Assessing Barriers/Facilitators

Methods

- Literature search
- Informal consultation
- Surveys
- Interviews, focus groups, ethnographic methods
- Mixed methods approaches
- Participatory methods

Helpful Resources

- Conceptual frameworks (e.g., **CFIR, TDF, TICD Checklist**, etc.)
- Specific measures – e.g., ILS (Aarons), OSC (Glisson et al., 2008), etc.

“A total of **601 plausible determinants** were identified (an additional 609 determinants were deemed unlikely to influence strategy development).

…the process for selecting the most important determinants to address require developing and testing in future work.

Krause et al. (2014)

Priorities Moving Forward

- Identifying and developing psychometrically and pragmatically strong measures (*see SIRC Measures Repository for Helpful Resource*)
- Moving from lists of constructs to causal theory
- Developing methods for prioritizing barriers and facilitators to be addressed
- Identifying and addressing barriers throughout implementation process

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Defining Implementation Science and Understanding Implementation Science in Practice

Implementation Strategies

Methods or techniques used to enhance the adoption, implementation, sustainment, and scale-up of a program or practice.

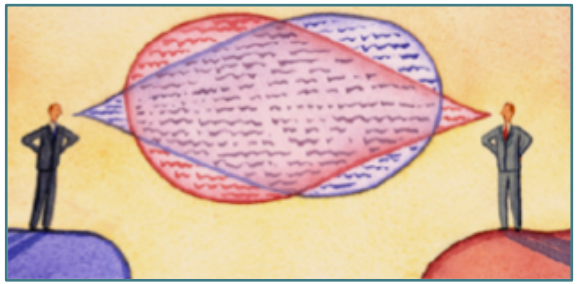
Proctor, Powell, & McMillen (2013); Powell, Garcia, & Fernandez (In Press)

Types of Strategies

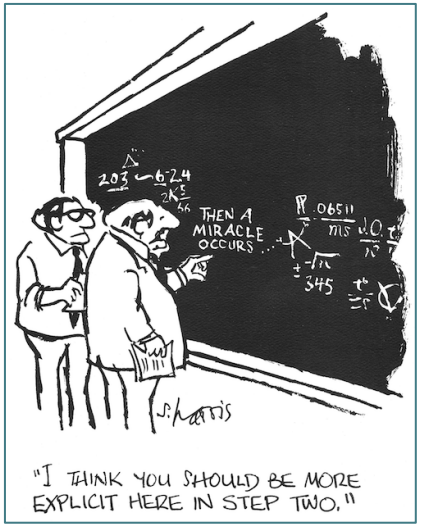
- **Discrete** – Single action or process (e.g., reminders, audit and feedback, supervision)
- **Multifaceted** – Combination of multiple discrete strategies (e.g., training + consultation), some of which have been protocolized and branded (e.g., Glisson's ARC, Aarons' LOCI)

Powell et al. (2012, 2015)

Literature Reveals Problems



"Tower of Babel"



Poor Reporting

Limited "Menu"

McKibbon et al. (2010); Michie et al. (2009); Powell et al. (2012); Proctor et al. (2013)

Initial Strategies Compilation

Plan strategies	• Assess readiness • Identify champions
Educate strategies	• Educational meetings • Shadow clinicians
Finance strategies	• Alter incentives • Place on formulary
Restructure strategies	• Change systems • Revise roles
Quality mgmt. strategies	• Audit and feedback • Clinical supervision
Policy context strategies	• Change requirements • Change liability laws

Powell et al. (2012)

Updated Compilation

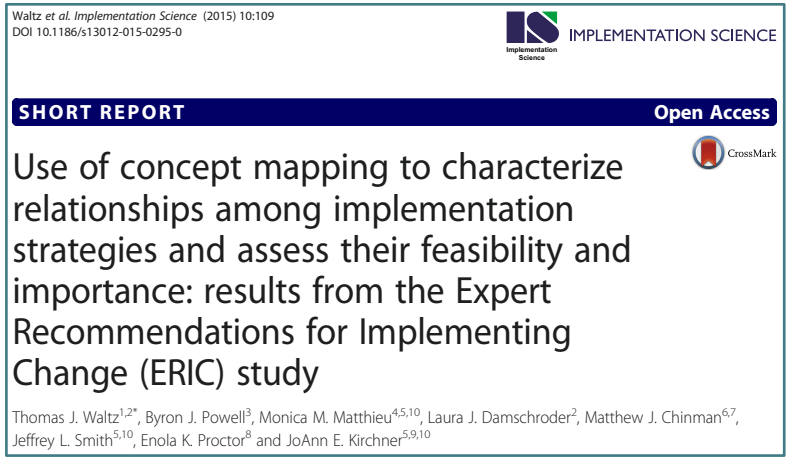
Powell *et al. Implementation Science* (2015) 10:21
DOI 10.1186/s13012-015-0209-1

IMPLEMENTATION SCIENCE

RESEARCH **Open Access**

A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project

Byron J Powell[1*], Thomas J Waltz[2], Matthew J Chinman[3,4], Laura J Damschroder[5], Jeffrey L Smith[6], Monica M Matthieu[6,7], Enola K Proctor[8] and JoAnn E Kirchner[6,9]



Waltz *et al. Implementation Science* (2015) 10:109
DOI 10.1186/s13012-015-0295-0

IMPLEMENTATION SCIENCE

SHORT REPORT **Open Access**

Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: results from the Expert Recommendations for Implementing Change (ERIC) study

Thomas J. Waltz[1,2*], Byron J. Powell[3], Monica M. Matthieu[4,5,10], Laura J. Damschroder[2], Matthew J. Chinman[6,7], Jeffrey L. Smith[5,10], Enola K. Proctor[8] and JoAnn E. Kirchner[5,9,10]

*See Additional File 6 of Powell et al. (2015) for most comprehensive version of the compilation

Utility of Compilation

- Identifying “building blocks” of multi-level, multi-faceted strategies for research *and* practice
- Promoting a common language and improving reporting
- Tracking strategy use and assessing fidelity
- Highlighting under-researched strategies

Visibility and Application

NIH National Institutes of Health
Turning Discovery Into Health

Substance Abuse and Mental Health Services Administration
SAMHSA

The National Academies of
SCIENCES
ENGINEERING
MEDICINE

U.S. Department of Veterans Affairs

pcori®

Helpful Extensions

- Adapted for school mental health settings (Cook et al., Under Review; Lyon et al., Under Review)
- Planned adaptation for child maltreatment prevention programs in LMICs (Martin et al., In Process)
- Technical assistance and uses of research evidence in child welfare (Metz, Boaz, & Powell, In Process)

Complementary Resources

ann. behav. med. (2013) 46:81–95
DOI 10.1007/s12160-013-9486-6

ORIGINAL ARTICLE

The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions

Susan Michie, DPhil, CPsychol · Michelle Richardson, PhD · Marie Johnston, PhD, CPsychol · Charles Abraham, DPhil, CPsychol · Jill Francis, PhD, CPsychol · Wendy Hardeman, PhD · Martin P. Eccles, MD · James Cane, PhD · Caroline E. Wood, PhD

HEALTH PSYCHOLOGY REVIEW, 2016
VOL. 10, NO. 3, 297–312
http://dx.doi.org/10.1080/17437199.2015.1077155

Routledge
Taylor & Francis Group

OPEN ACCESS

A taxonomy of behaviour change methods: an Intervention Mapping approach

Gerjo Kok[a], Nell H. Gottlieb[b], Gjalt-Jorn Y. Peters[a,c], Patricia Dolan Mullen[b], Guy S. Parcel[b], Robert A.C. Ruiter[a], María E. Fernández[b], Christine Markham[b] and L. Kay Bartholomew[b]

[a]School of Psychology & Neuroscience, Maastricht University, Maastricht, MD, The Netherlands; [b]School of Public Health, University of Texas, Houston, TX, USA; [c]School of Psychology, Open University, Heerlen, DL, The Netherlands

McHugh, Presseau, Luecking, & Powell (In Prep)

Evidence for Strategies

- Some strategies have systematic reviews assessing their effectiveness (e.g., audit and feedback, opinion leaders, facilitation), whereas others are unlikely to be tested as stand-alone strategies (e.g., obtain formal commitments, shadowing clinicians)
- Increasingly, focus is not on whether or not they work, but how does it work? Why? Where? For whom? How can we enhance effectiveness?

Strategy Review	Number of Trials	Effect Sizes
Printed Educational Materials	14 Randomized Trials 31 ITS	Median absolute improvement 2.0% (range 0% to 11%)
Educational Meetings	81 Randomized Trials	Median absolute improvement 6% (IQR 1.8% to 15.3%)
Educational Outreach	69 Randomized Trials	Median absolute improvement in prescribing behaviors 4.8% (IQR 3% to 6.6%), other behaviors 6% (IQR 3.6% to 16%)
Local Opinion Leaders	18 Randomized Trials	Median absolute improvement 12% (6% to 14.5%)
Audit and Feedback	140 Randomized Trials	Median absolute improvement 4.3% (IQR .5 to 16%)
Computerized Reminders	28 Randomized Trials	Median absolute improvement 4.2% (IQR .8 to 18.8%)
Tailored Interventions	26 Randomized Trials	Meta-Regression using 15 trials. Pooled odds ratio of 1.56 (95% CI, 1.27 to 1.93, $p < .001$)

Examples of Cochrane EPOC reviews updated from Grimshaw et al. (2012)

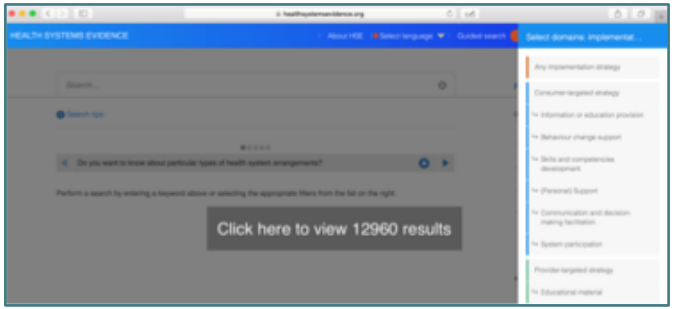
Multi-faceted Strategies

- Mixed evidence regarding the effectiveness of multifaceted strategies. Two plausible explanations:
  - Lack of a priori rationale for selection of components (could be “kitchen sink” approach)
  - Some multifaceted strategies may focus on only one type of barrier; some single component strategies may address multiple barriers

Grimshaw et al. (2012); Lau et al. (2015); Squires et al. (2014); Wensing et al. (2017)

Resources to Assess Evidence

- Cochrane EPOC (epoc.cochrane.org)
- Campbell Collaboration (campbellcollaboration.org)
- Health Systems Evidence (healthsystemsevidence.org)

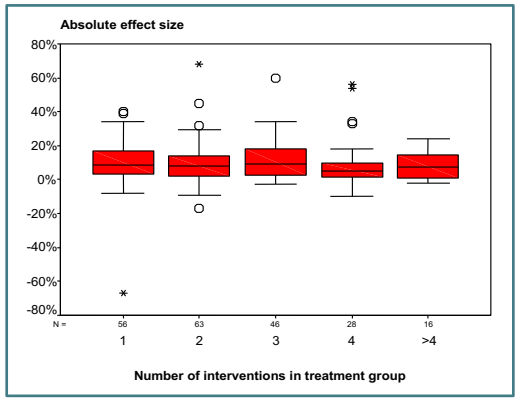


Now what?

How do we design and tailor strategies?

Far Too Often We…

"Kitchen Sink" Approach



Most frequently used model of change: **ISLAGIATT**

-Martin Eccles

"It seemed like a good idea at the time!"

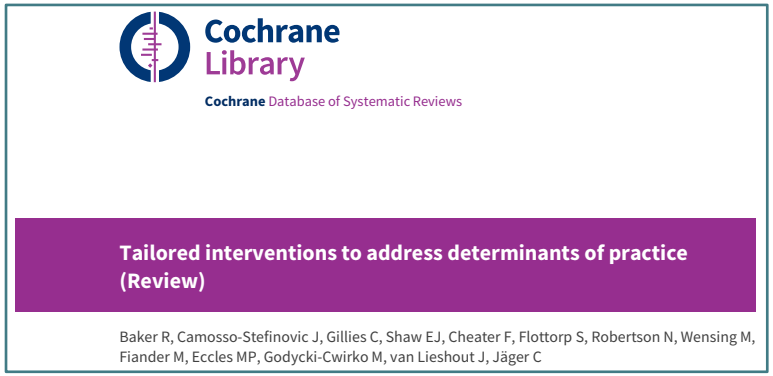
Grimshaw et al. (2004); Henggeler et al. (2002); Squires et al. (2014)

Implementation as Usual

- Decision making not driven by evidence, theory, or implementation “best practices”
- Strategies not used with frequency, intensity, and fidelity required
- Wider range of strategies needed
- Organizational context poorly addressed

Powell et al. (2013); Powell (2014); Powell & Proctor (2016)

Tailored Strategies in Literature



15 cluster RCTs, OR = 1.56 (95% CI = 1.27 to 1.93, *p* < *.001)*

"…results suggest a mismatch between identified barriers and the quality improvement interventions selected for use."

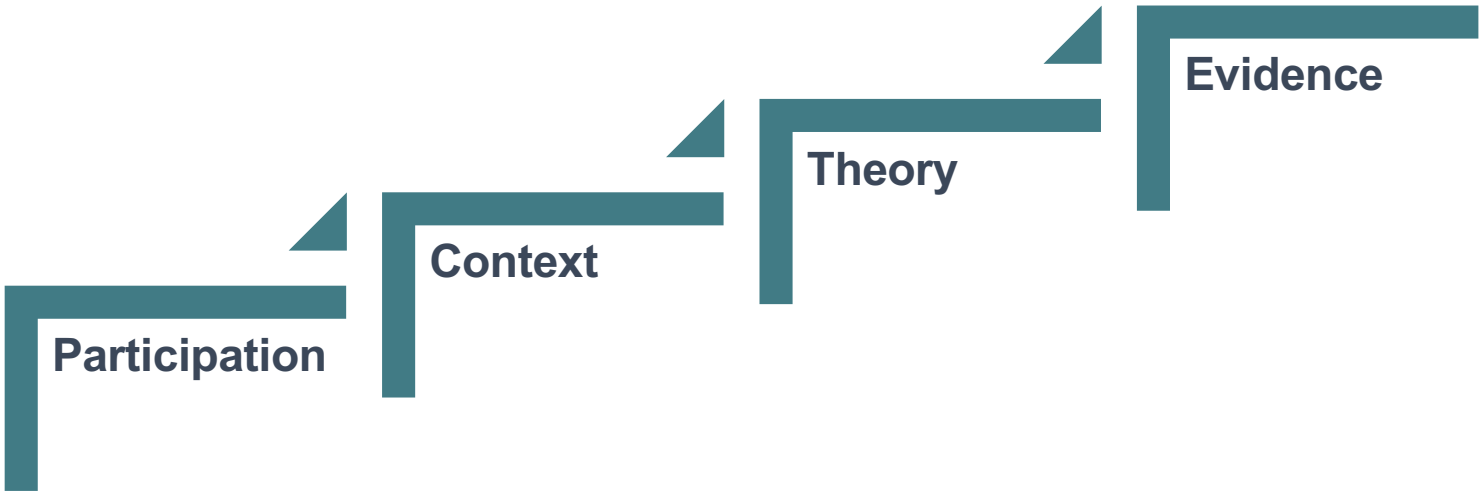
Baker et al. (2015); Bosch et al. (2007)

Enhance Methods for Designing and Tailoring

- Need better methods for IDing and prioritizing barriers
- Need “systematic and rigorous methods…to enhance the linkage between identified barriers and strategies”

Baker et al. (2015); Bosch et al. (2007); Colquhoun et al. (2017); Grol et al. (2013); Powell et al. (2017)

The Ideal



Colquhoun et al. (2017); Powell et al. (2017)

Barrier-Strategy Linkages

Identified barrier	Relevant implementation strategies
Lack of knowledge	Interactive education sessions
Perception/reality mismatch	Audit and feedback
Lack of motivation	Incentives/sanctions
Beliefs/attitudes	Peer influence/opinion leaders
Systems of care	Process redesign

Bhattacharyya (2012); Palda (2007)

Potential Methods

Methods to Improve the Selection and Tailoring of Implementation Strategies

Byron J. Powell, PhD
Rinad S. Beidas, PhD
Cara C. Lewis, PhD
Gregory A. Aarons, PhD
J. Curtis McMillen, PhD
Enola K. Proctor, PhD
David S. Mandell, ScD

Colquhoun *et al. Implementation Science* (2017) 12:30
DOI 10.1186/s13012-017-0560-5

Implementation Science

SYSTEMATIC REVIEW Open Access

CrossMark

Methods for designing interventions to change healthcare professionals' behaviour: a systematic review

Heather L. Colquhoun[1*], Janet E. Squires[2,3], Niina Kolehmainen[4], Cynthia Fraser[5] and Jeremy M. Grimshaw[2,6]

Colquhoun et al. (2017); Powell et al. (2017)

Identified 15 papers w/replicable methods

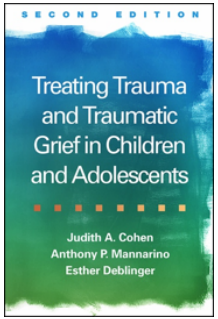
There appear to be four steps common to intervention design: barrier identification, linking barriers to intervention component selection, use of theory, and user engagement.

Limited methods target change in organizations or systems

Colquhoun et al. (2017)

COAST-IS Pilot Study

A PARTNER IN NCTSN The National Child Traumatic Stress Network



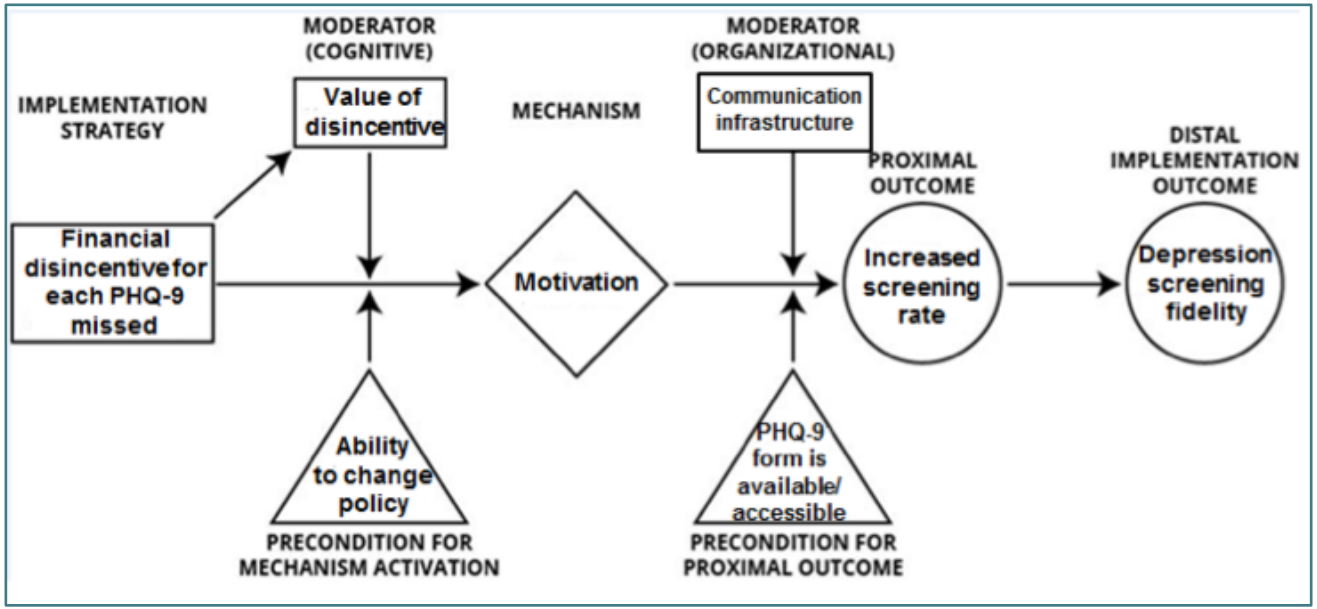
☐	1 K01 MH113806 01	IMPROVING THE IMPLEMENTATION AND SUSTAINMENT OF EBPS IN MENTAL HEALTH: DEVELOPING AND PILOTING THE COLLABORATIVE ORGANIZATIONAL APPROACH TO SELECTING AND TAILORING IMPLEMENTATION STRATEGIES (COAST-IS)	POWELL, BYRON JAMES	UNIV OF NORTH CAROLINA CHAPEL HILL	2017	NIMH	NIMH

Specify Mechanisms

- Focus on establishing mechanisms of change
- Identify mediators, moderators, and pre-conditions
- Increase use of causal theory and model proposed causal pathways

Lewis et al. (2017); National Institutes of Health (2016); Weiner et al. (2012); Williams et al. (2016)

Specifying Causal Pathways



Lewis et al. (2018)

Improve Description, Tracking, and Reporting

- Poor description, tracking, and reporting:
  - Limits replication in science and practice
  - Precludes answers to how and why strategies work
- Numerous reporting guidelines exist
- Need pragmatic approaches for tracking strategies

Albrecht et al. (2013); Boyd et al. (2018); Bunger et al. (2017); Hoffman et al. (2014); Proctor et al. (2013)

Poor Reporting Limits Evidence

Understanding the Components of Quality Improvement Collaboratives: A Systematic Literature Review

ERUM NADEEM,[1] S. SERENE OLIN,[1]
LAURA CAMPBELL HILL,[2]
KIMBERLY EATON HOAGWOOD,[1]
and SARAH McCUE HORWITZ[1]

[1]*New York University;* [2]*Columbia University*

"Reporting on specific components of the collaborative was imprecise across articles, rendering it impossible to identify active QIC ingredients linked to improved care."

Name it, Define it, Specify it!

Domain	Strategy: clinical supervision	Strategy: clinician implementation team
Actor(s)	Clinician who is expert in the clinical innovation and recommended by the treatment developer.	A team of clinicians who are implementing the clinical innovation.
Action(s)	Provides clinical supervision via phone to answer questions, review case implementation, make suggestions, and provide encouragement.	Reflect on the implementation effort, share lessons learned, support learning, and propose changes to be implemented in small cycles of change.
Target(s) of the action	Clinicians newly trained in the innovation.	Clinicians newly trained in the innovation.
	Knowledge about the innovation, skills to use the innovation, optimism that the innovation will be effective, and improved ability to access details about how to use the innovation without prompts.	Knowledge about how to use the innovation in this context, intentions to use the innovation, social influences.
Temporality	Clinical supervision should begin within one week following the end of didactic training.	First meeting should be within two weeks of initial training.
Dose	Once per week for 15 minutes for 12 weeks, plus follow-up booster sessions at 20 and 36 weeks.	Once monthly for one hour for the first six months.
Implementation outcome(s) affected	Uptake of the innovation, penetration among eligible clients/patients, fidelity to the protocol of the clinical innovation.	Uptake of the innovation, penetration among eligible clients/patients, fidelity to the protocol of the clinical innovation, sustainability of the innovation.
Justification	Research that suggests that post-training coaching is more important than quality or type of training received [70].	Cooperative learning theory [71].

Proctor, Powell, & McMillen (2013)

Applied Example

TF-CBT Learning Collaborative (11 component strategies*)

- Expert change package
  - Commitment
  - Learning sessions
  - PDSA cycles
  - Conference calls
  - Web support
- Quality improvement technique training
- Metrics reporting
- Coaching calls
- Onsite visits
- Rostering

**Each specified according to Proctor et al. (2013) standards*

Bunger et al. (2014)

Table 1 Specification of the TF-CBT learning collaboratives (LCs)

Goal	Expand regional capacity to meet the mental health service needs of youth who have experienced trauma by scaling up TF-CBT among behavioral health agencies funded by the county
Description	The LCs focused on providing clinical training and consultation for clinicians, supervisors, and senior leaders from participating agencies. The LCs also provided training on quality improvement techniques for senior leaders
Actors	-Faculty experts from a local university-based treatment center designed and conducted the LCs, and trained and supported clinicians from other agencies to implement TF-CBT
	-Agency Implementation Teams (comprised of senior leaders, supervisors, and clinicians) were tasked with implementing TF-CBT

Specification of LC components

	Actions	Target	Temporality	Dose	Outcome	Justification[a]
Preparatory work						
Prepare change package	Faculty experts prepare resources on TF-CBT, and implementation strategies	Agency implementation team members' knowledge	Before learning sessions	Once	Adoption, fidelity, penetration, and sustainment of TF-CBT	*Theoretical* Knowledge (CFIR & TDF); planning (CFIR) *Empirical* Farmer et al. (2011)
Commitment	Implementation team members describe their commitment to, and resources allocated for implementing TF-CBT	Agency implementation team members' awareness of their readiness to implement	Before learning sessions; before TF-CBT implementation	Once	Adoption, fidelity, penetration, and sustainment of TF-CBT	*Theoretical* Leadership engagement; planning (CFIR); intentions; environmental context and resources (TDF)
Active learning						
Learning sessions	Present information about trauma and TF-CBT practice components; skill practice and behavioral rehearsal; case vignettes and problem-based learning; share experiences, expertise, and lessons learned	Agency implementation team members' knowledge, skills, and access to expertise within and outside of their home agency	3 sessions over 12 months (approx. month 1, months 3–4, month 9)	Three 2-day sessions	Adoption, fidelity, penetration, and sustainment of TF-CBT	*Theoretical* Knowledge (CFIR & TDF); self-efficacy (CFIR); skills; beliefs about capabilities (TDF) *Empirical* Herschell et al. (2010)
PDSA cycles	Use TF-CBT with test cases, identify barriers, plan strategies to remove barriers, study and refine strategy; support learning within teams; support team members	Agency implementation team members' knowledge, skills, access to clinical expertise at their home agency; Removes barriers; Promotes supportive organizational climate for TF-CBT	Three action periods in between learning sessions	12 months total	Adoption, fidelity, penetration, and sustainment of TF-CBT	*Theoretical* Planning; executing; reflecting & evaluating (CFIR); environmental context and resources (TDF) *Empirical* Taylor et al. (2014)

Bunger et al. (2014)

Tracking Strategy Use

Bunger *et al. Health Research Policy and Systems* (2017) 15:15
DOI 10.1186/s12961-017-0175-y

Health Research Policy and Systems

RESEARCH Open Access

Tracking implementation strategies: a description of a practical approach and early findings

Alicia C. Bunger[1*], Byron J. Powell[2], Hillary A. Robertson[3], Hannah MacDowell[1], Sarah A. Birken[2] and Christopher Shea[2]

Available online at www.sciencedirect.com

ScienceDirect

Behavior Therapy xx (2018) xxx–xxx

Behavior Therapy

www.elsevier.com/locate/bt

ELSEVIER

A Method for Tracking Implementation Strategies: An Exemplar Implementing Measurement-Based Care in Community Behavioral Health Clinics

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Cara C. Lewis
Indiana University, Kaiser Permanente Washington Health Research Institute, and University of Washington School of Medicine

Boyd et al. (2017); Bunger et al. (2017); Walsh-Bailey et al. (2018)

Conduct More Comparative Effectiveness Research

- Diversify the strategies tested
- Need for more comparative studies of discrete, multifaceted, and tailored strategies
- Utilize a wider range of designs and methods

Brown et al. (2017); Institute of Medicine (2009); Lau et al. (2015); Mazucca et al. (2018); Powell et al. (2014)

Increase Economic Evaluations

- In a review of 235 implementation studies, only 10% provided information about implementation costs
- Severely inhibits decision making regarding strategies
- Practical tools have been developed (e.g., COINS)
- Common framework facilitating comparability is needed

Raghavan et al. (2018); Saldana et al. (2014); Vale et al. (2007)

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Defining Implementation Science and Understanding Implementation Science in Practice

Discussion

Acknowledgments

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- NIMH K01MH113806 (Powell, PI)
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- NIMH R01MH103310 (Lewis, PI)
- NIH UL1TR001111 (Buse, PI)
- NIAID P30A1050410 (Golin, PI)

Department of Veterans Affairs

- Mental Health QUERI QLP 55-025

Expert Recommendations for Implementing Change Team

National Child Traumatic Stress Network

North Carolina Child Treatment Program

Society for Implementation Research Collaboration

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