Webinar outline

Dissemination and implementation (D&I) background
- Spectrum of research
- Core components of D&I research
- Differentiate efficacy/effectiveness vs. D&I

Models/frameworks
- Terminology
- Review paper and website, methodology and results
- Considerations for choosing a model

Study designs
- Contributors to design choice
- Types of study designs

Resources available

D&I, also known as…

Knowledge exchange

Knowledge transfer

Knowledge translation

Implementation science

Research utilization

Scale up

D&I research

Dissemination research is the scientific study of targeted distribution of information and intervention materials to a specific public health or clinical practice audience. The intent is to understand how best to spread and sustain knowledge and the associated evidence-based interventions.

Implementation research is the scientific study of the use of strategies to adopt and integrate evidence-based health interventions into clinical and community settings in order to improve patient outcomes and benefit population health.

US NIH PAR-18-007 https://grants.nih.gov/grants/guide/pa-files/PAR-18-007.html
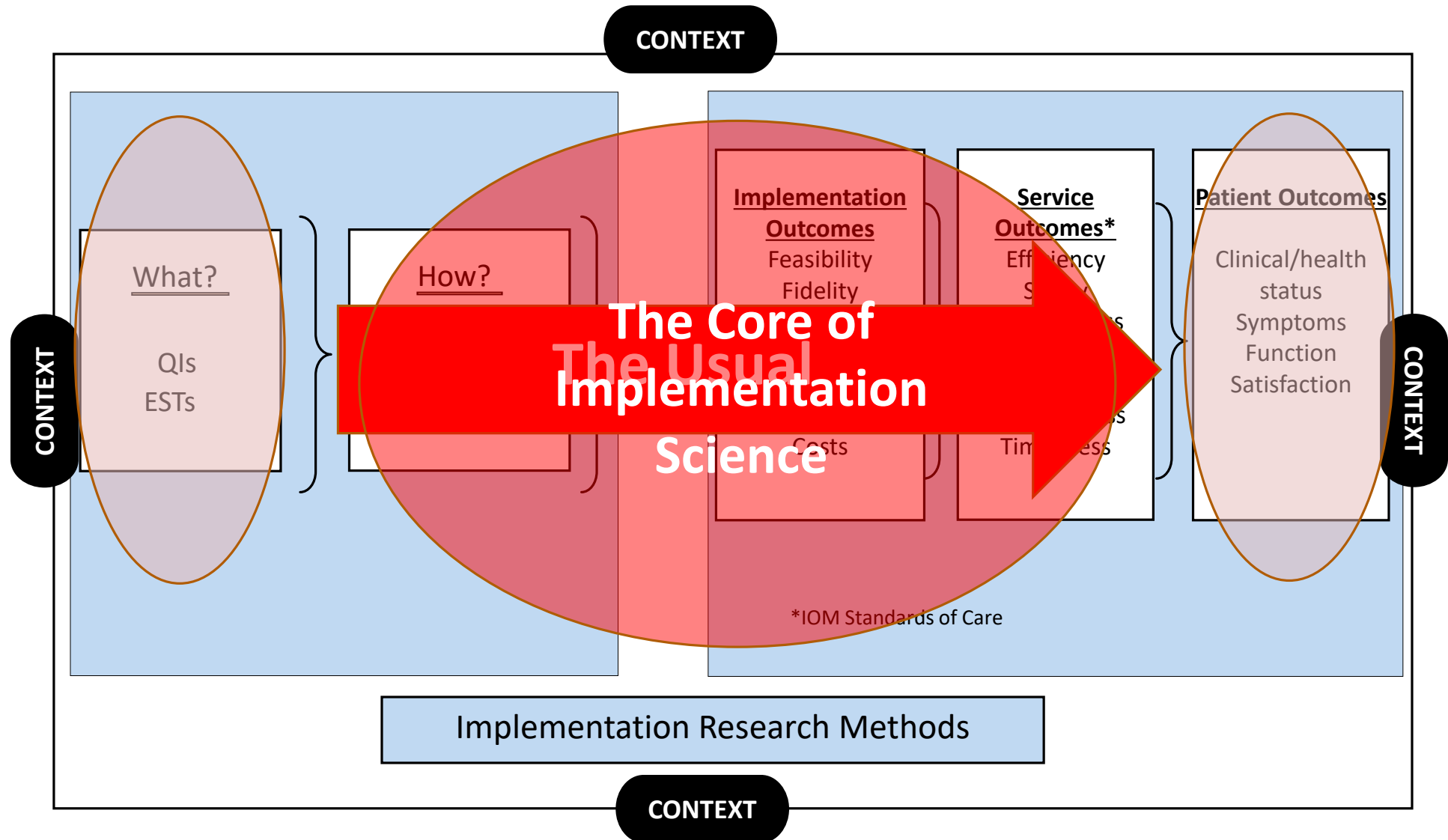
Translating research to practice
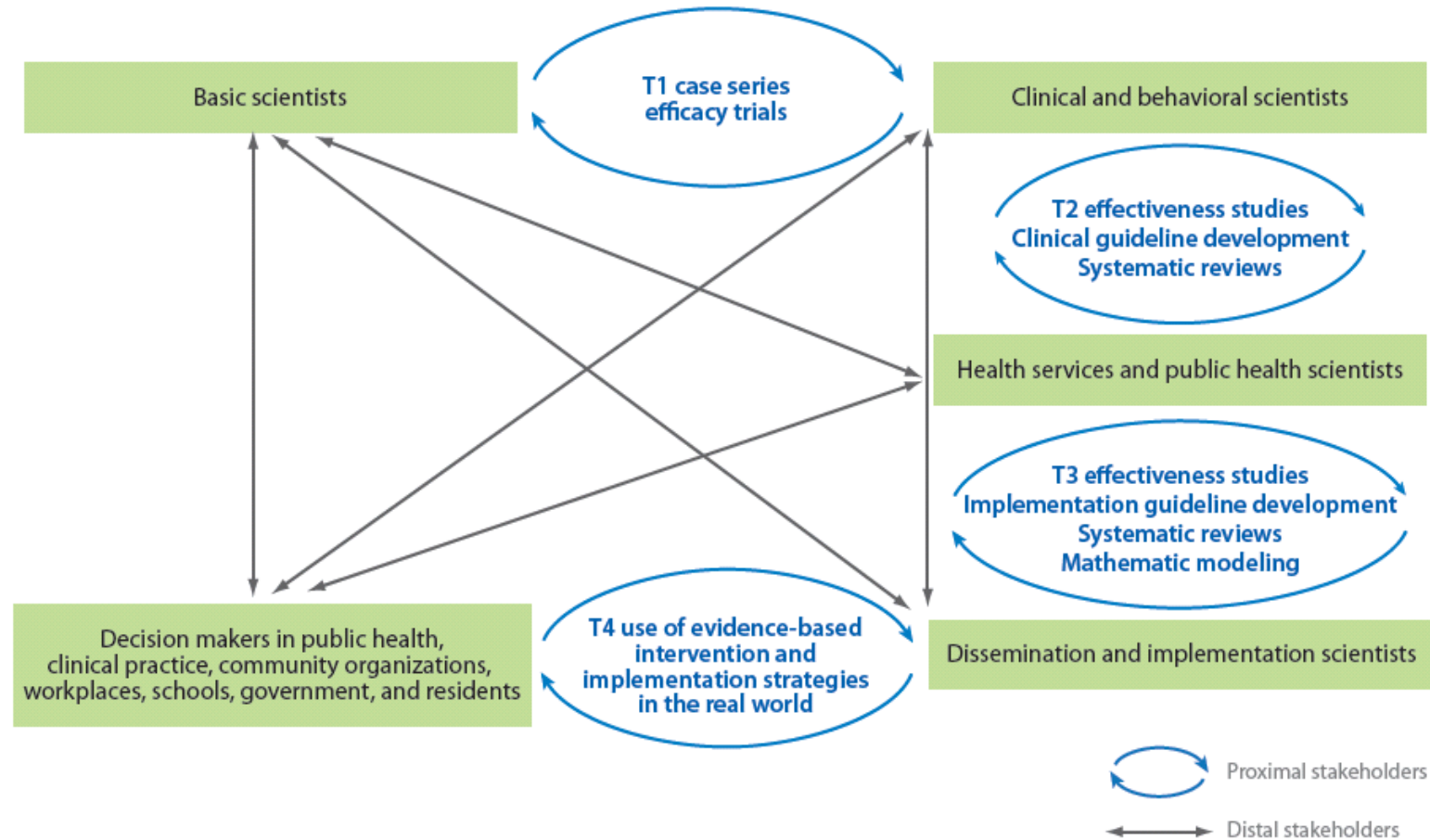
"Know-Do" Gap

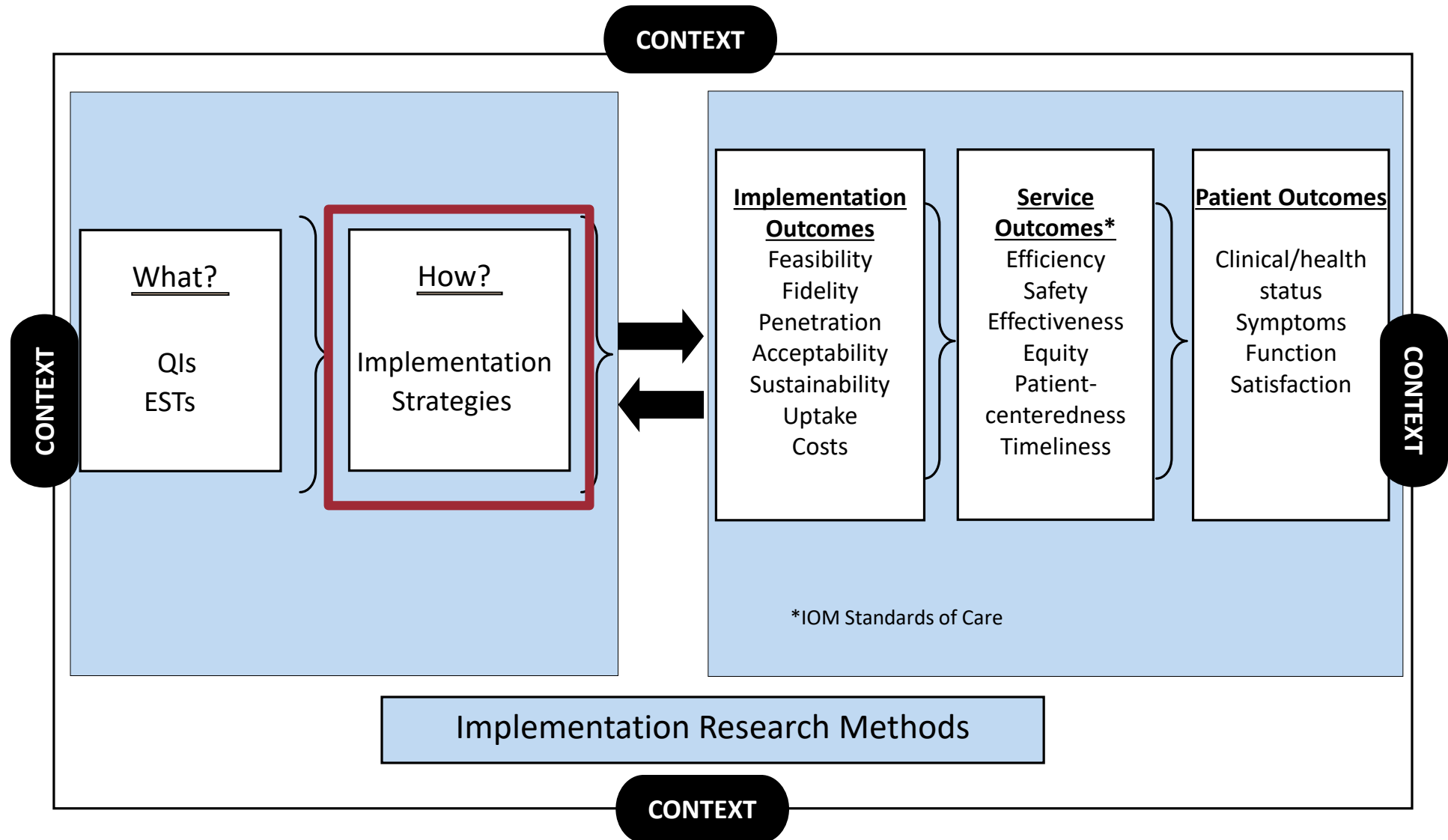Consistent evidence of failure to translate research findings into clinical practice

- 30-40% patients do not get treatments of proven effectiveness

- 20–25% patients get care that is not needed or potentially harmful

Suggests that implementation of research findings is fundamental challenge for healthcare systems to optimize care, outcomes and costs

Conceptual Model of Implementation Research

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

Conceptual Model of Implementation Research

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

Implementation strategies

- Use evaluative and iterative strategies

- Provide interactive assistance

- Adapt and tailor to context

- Develop stakeholder interrelationships

- Train and educate stakeholders

- Support clinicians

- Engage consumers

- Utilize financial strategies

- Change infrastructure

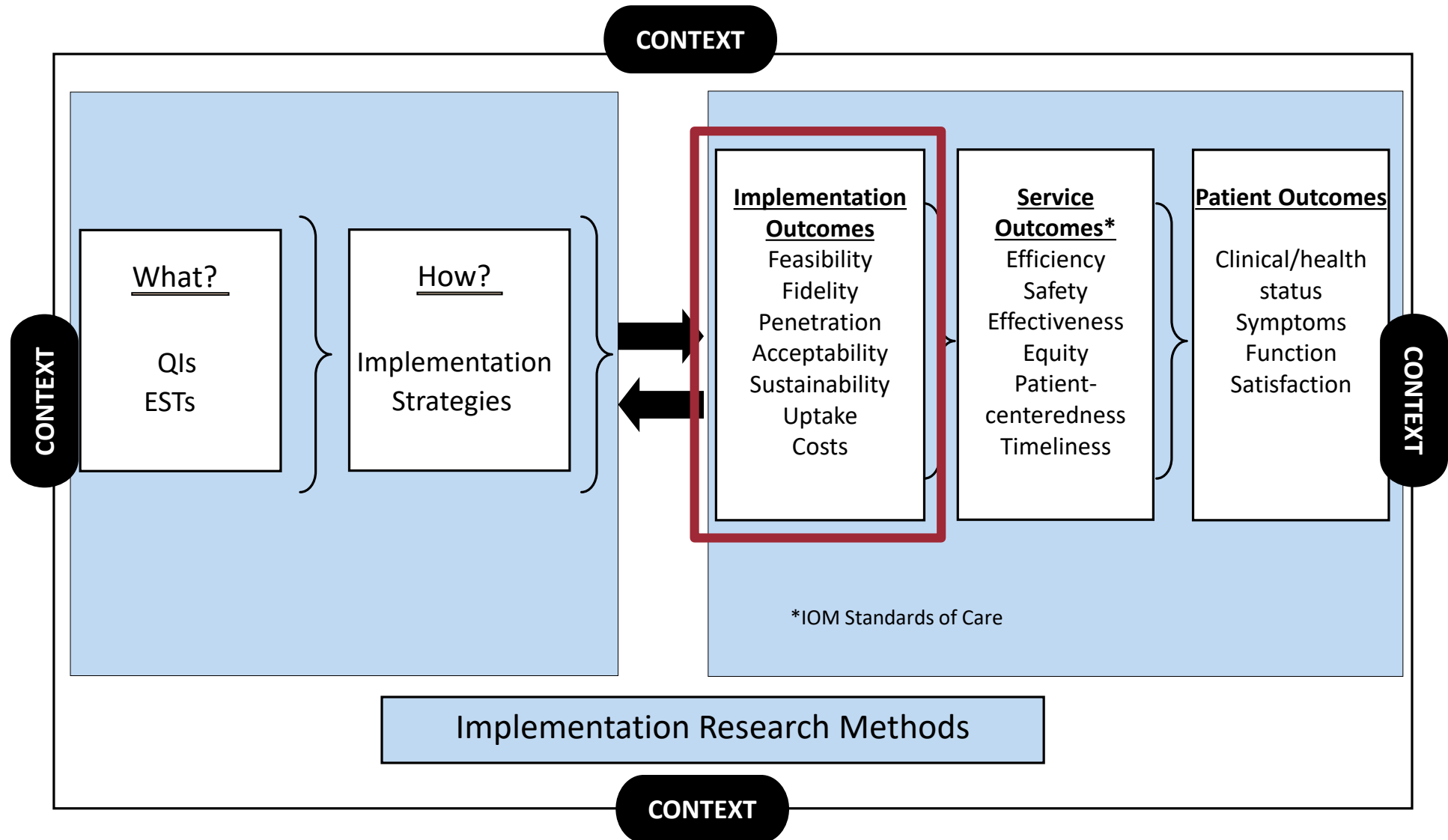Powell et al. Implementation Science (2015) 10:21
DOI 10.1186/s13012-015-0209-1

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]

Conceptual Model of Implementation Research

*IOM Standards of Care

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

Implementation outcomes

- Acceptability

- Adoption

- Appropriateness

- Feasibility

- Fidelity

- Implementation Cost

- Penetration

- Sustainability
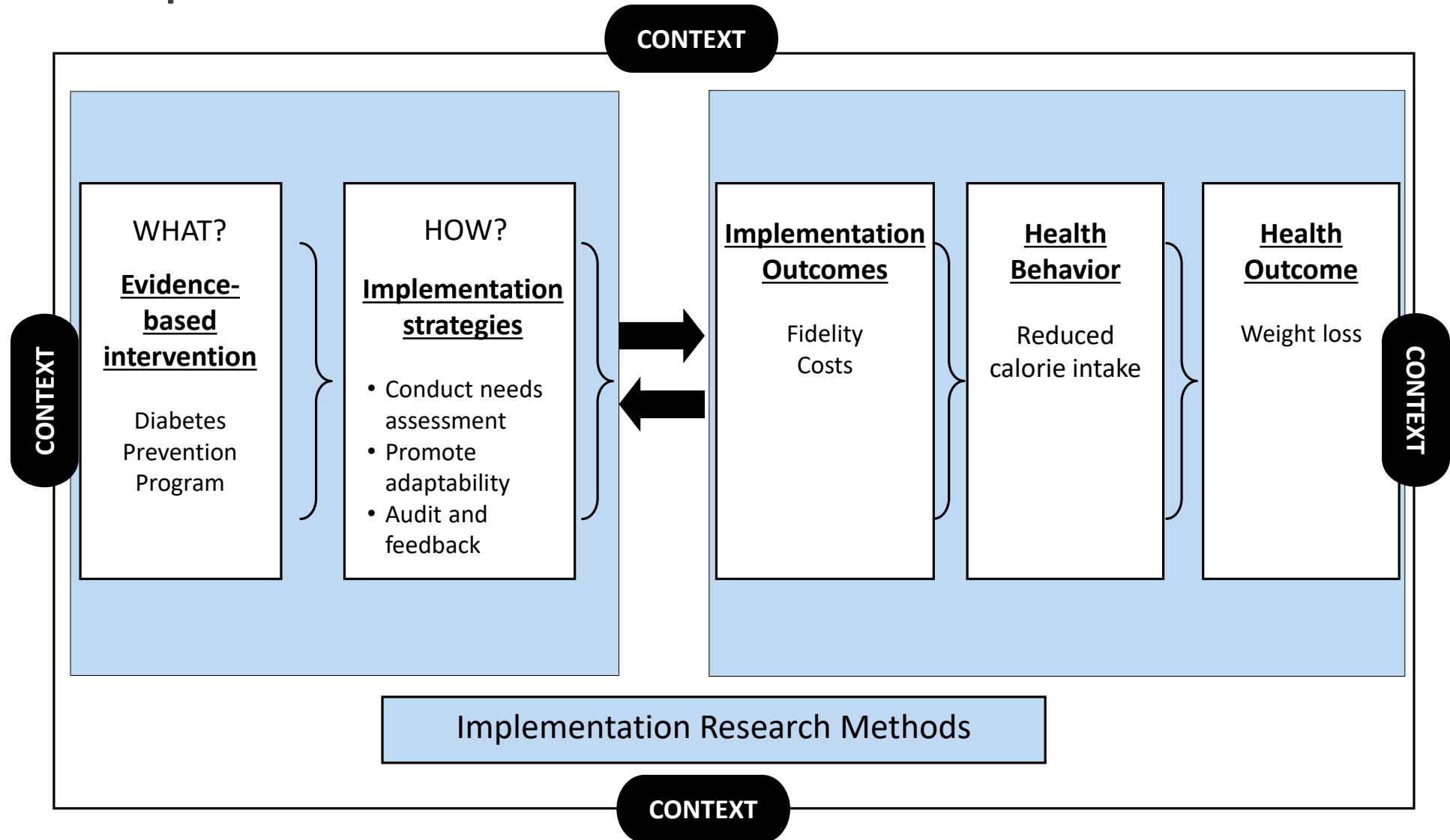
Example from Public Health

From efficacy to implementation
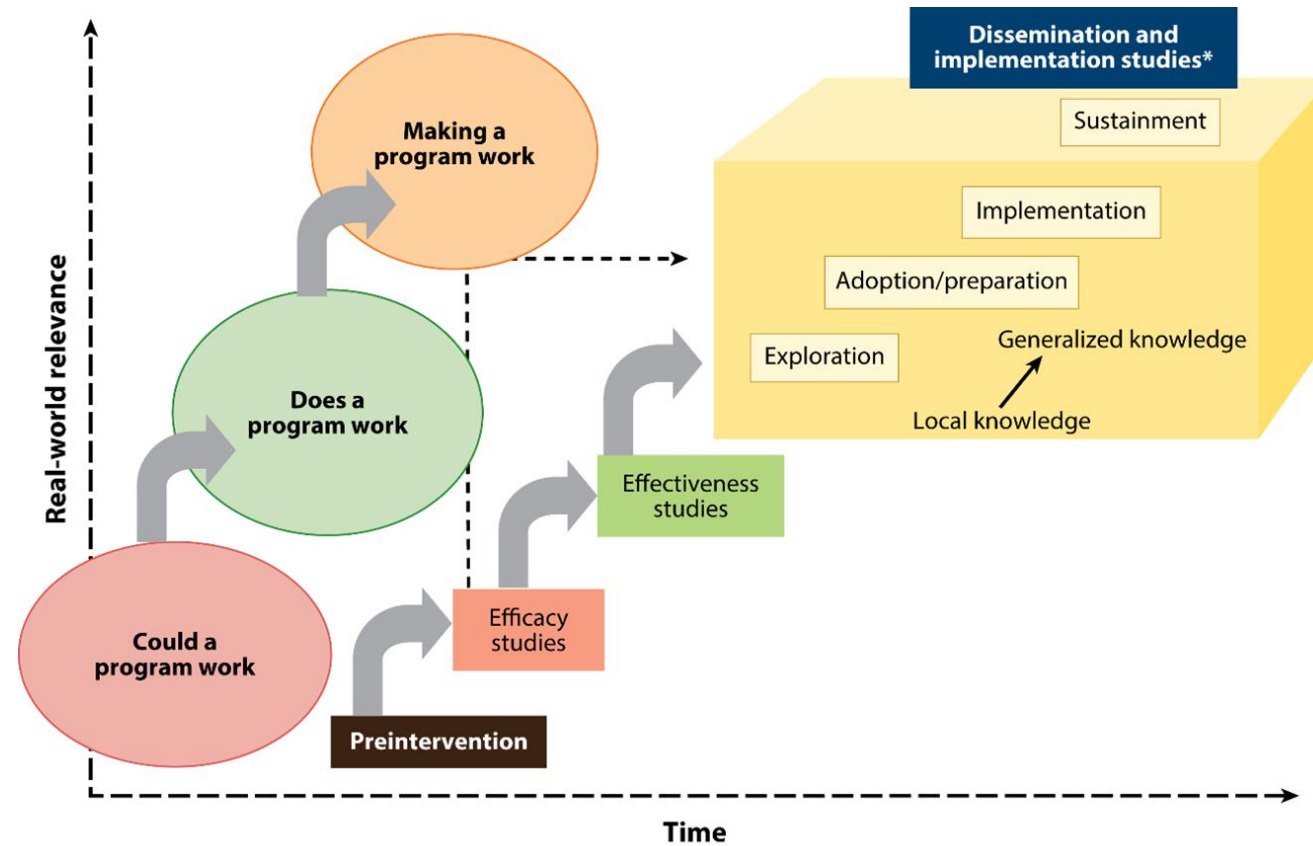
Internal vs. external validity

Threats to internal validity
Ambiguous temporality
Selection
History
Maturation
Regression to the mean
Attrition
Testing
Instrumentation

Threats to external validity, causal relationships do not hold across:
People
Treatment variations
Outcomes
Settings

Theories, frameworks, and models in D&I research

Terminology

Theory: a set of interrelated concepts, definitions, and propositions that present a systematic view of events or situations by specifying relations among variables, in order to explain and predict events or situations.[1]

Conceptual Framework: A type of intermediate theory that attempts to connect to all aspects of inquiry; can act like maps that give coherence to empirical inquiry. [2]

Model: A description of analogy used to help visualize something that cannot be directly observed. [3]

1. Glanz K et al.. Theory, Research, and Practice in Health Behavior. In: Glanz K, Rimer BK, Viswanath K, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. 5th ed: Jossey-Bass; 2015:23. (pg 26)
2. Wikipedia. Conceptual Framework. 2013; http://en.wikipedia.org/wiki/Conceptual_framework.
3. In Merriam-Webster online. Model & Theory. 2013; Retrieved from http://www.merriam-webster.coms.

Review Methods

Snowball sampling: published literature and available presentations
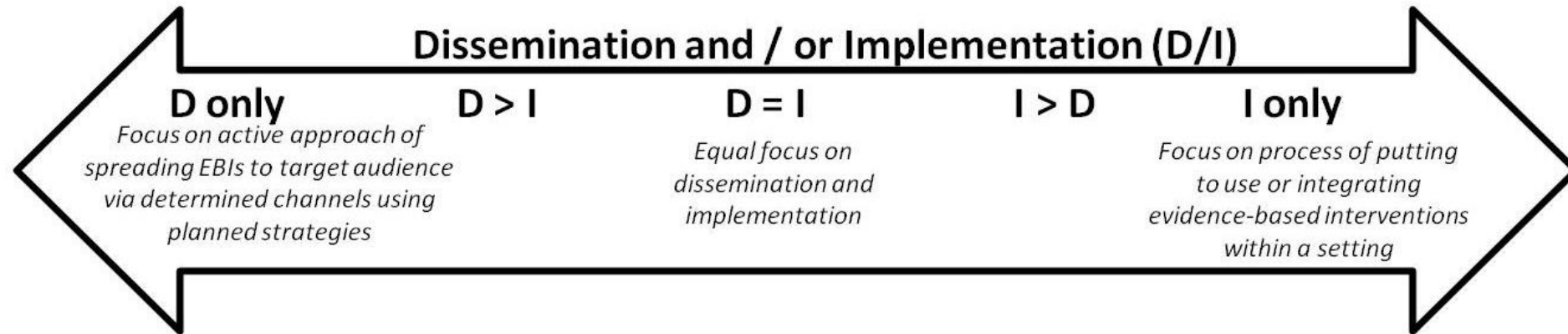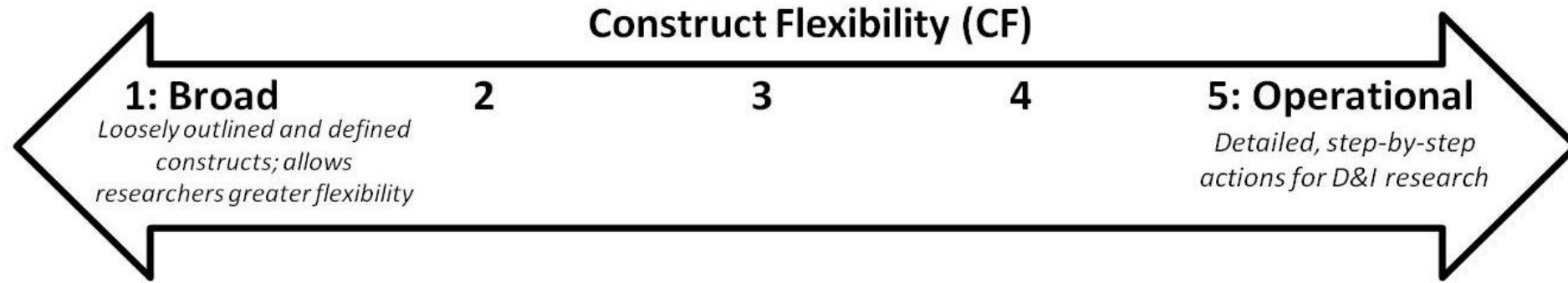
Selection criteria – D+I <u>research</u>
- Exclude: Individual behavior change theories, practitioner/clinician focused, end of grant knowledge translation
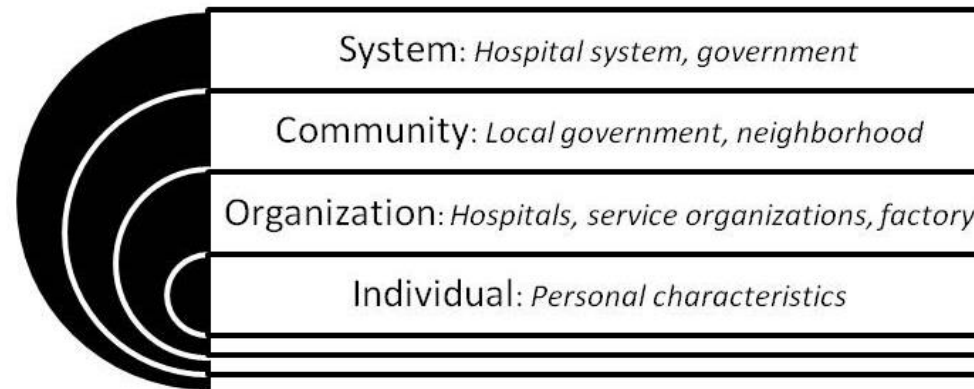- Setting: local level vs. national dissemination plans
- Publication in English

Categorizing models

Contacting authors

Model Categories

Construct Flexibility (CF)

1: Broad — *Loosely outlined and defined constructs; allows researchers greater flexibility*   **2**   **3**   **4**   **5: Operational** — *Detailed, step-by-step actions for D&I research*

Dissemination and / or Implementation (D/I)

D only — *Focus on active approach of spreading EBIs to target audience via determined channels using planned strategies*   **D > I**   **D = I** — *Equal focus on dissemination and implementation*   **I > D**   **I only** — *Focus on process of putting to use or integrating evidence-based interventions within a setting*

Socio-ecological Framework (SEF)

System: *Hospital system, government*

Community: *Local government, neighborhood*

Organization: *Hospitals, service organizations, factory*

Individual: *Personal characteristics*

Results

Identified109 models

Exclusions
◦ 26 focus on practitioners
◦ 12 not applicable to local level dissemination
◦ 8 end of grant knowledge translation
◦ 2 duplicates

Included 61 models

GLASBERGEN

"Look at the bright side...we're still on the cutting edge of *yesterday's* technology!"

Model	Dissemination and/or Implementation	Construct flexibility: broad to operational	Socioecologic Level					References
			System	Community	Organization	Individual	Policy	
Diffusion of Innovation	D-only	1		x	x	x		21
RAND Model of Persuasive Communication and Diffusion of Medical Innovation	D-only	1		x	x	x		22
Effective Dissemination Strategies	D-only	2		x	x	x		23
Model for Locally Based Research Transfer Development	D-only	2		x	x			24
Streams of Policy Process	D-only	2	x	x	x		x	25, 26
A Conceptual Model of Knowledge Utilization	D-only	3	x	x			x	27
Conceptual Framework for Research Knowledge Transfer and Utilization	D-only	3			x			28
Conceptualizing Dissemination Research and Activity: Canadian Heart Health Initiative	D-only	3		x	x			29, 30
Policy Framework for Increasing Diffusion of Evidence-Based Physical Activity Interventions	D-only	3	x	x	x		x	31
Blueprint for Dissemination	D-only	4		x	x			32
Framework for Knowledge Translation	D-only	5		x	x	x		33
A Framework for Analyzing Adoption of Complex Health Innovations	D > I	2	x	x	x	x		34, 35
A Framework for Spread	D > I	2		x	x			36, 37
Collaborative Model for Knowledge Translation Between Research and Practice Settings	D > I	2			x	x		38
Coordinated Implementation Model	D > I	2			x	x		39
Model for Improving the Dissemination of Nursing Research	D > I	2		x	x	x		40
Framework for the Dissemination & Utilization of Research for Health-Care Policy & Practice	D > I	3		x	x	x		41, 42
Framework of Dissemination in Health Services Intervention Research	D > I	3	x	x	x			43
Linking Systems Framework	D > I	3		x	x	x		44

Results – Cross-Tabulation

Number of Models in Each Category When the "Construct Flexibility" and "Dissemination vs. Implementation" Variables are Cross-tabulated						
	Dissemination vs. Implementation					
Construct Flexibility	D only	D > I	D = I	I > D	I only	Total
Broad = 1	2	-	2	-	-	4
2	3	5	6	1	-	15
3	4	5	6	2	8	25
4	1	4	2	2	2	11
Operational = 5	1	2	1	-	2	6
Total	11	16	17	5	12	61

CF	Dissemination vs Implementation				
	D only	D > I	D = I	I > D	I only
Broad = 1	1-Diffusion of Innovation 2-RAND Model of Persuasive Communication and Diffusion of Medical Innovation	-	1-Health Promotion Technology Transfer Process 2-Real-World Dissemination	-	-
2	1-Effective Dissemination Strategies 2-Model for Locally Based Research Transfer Development 3-Streams of Policy Process	1-A Framework for Spread 2-Collaborative Model for Knowledge Translation Between Research and Practice Settings 3-Coordinated Implementation Model 4-Framework For Analyzing Adoption of Complex Health Innovations 5-Model for Improving the Dissemination of Nursing Research	1-A Framework for the Transfer of Patient Safety Research into Practice 2-Interactive Systems Framework 3-Interacting Elements of Integrating Science, Policy, and Practice 4-Push-Pull Capacity Model 5-Research Development Dissemination & Utilization Framework 6-Utilization-Focused Surveillance Framework	1-FAB Model	-
3	1-A Conceptual Model of Knowledge Utilization 2-Conceptual Framework for Research Knowledge Transfer and Utilization 3-Conceptualizing Dissemination Research and Activity: Canadian Heart Health Initiative 4-Policy Framework for Increasing Diffusion of Evidence-based Physical Activity Interventions	1-Framework for the Dissemination and Utilization of Research for Health-Care Policy and Practice 2-Framework of Dissemination in Health Services Intervention Research 3-Linking Systems Framework 4-Marketing and Distribution System for Public Health 5-OPTIONS Model	1-"4E" Framework for Knowledge Dissemination and Utilization 2-CRARUM 3-Davis' Pathman-PROCEED Model 4-Dissemination of Evidence-based Interventions to Prevent Obesity 5-Knowledge Translation Model of TUMS 6-Multi-level Conceptual Framework of Organizational Innovation Adoption	1-Pathways to Evidence Informed Policy 2-Six-Step Framework For International Physical Activity Dissemination	1-Active Implementation Framework 2-An Organizational Theory of Innovation Implementation 3-Conceptual Model of Implementation Research 4-Implementation Effectiveness Model 5-Normalization Process Theory 6-PARIHS 7-Pronovost's 4E's Process Theory 8-Sticky Knowledge
4	1-Blueprint for Dissemination	1-Conceptual Model for the Diffusion of Innovations in Service Organizations 2-HPRC Framework 3-Knowledge Exchange Framework 4-Research Knowledge Infrastructure	1-OMRU 2-RE-AIM	1-CDC DHAP's Research-to-Practice Framework 2-PRISM	1-CFIR 2-REP Plus
Operational = 5	1-Framework for Knowledge Translation	1-A Convergent Diffusion and Social Marketing Approach for Dissemination 2-Framework for Dissemination of Evidence-Based Policy	1-Precede-Proceed	-	1-ARC Model 2-Conceptual Model of Evidence-Based Practice Implementation in Public Service Sectors

*CF = Construct Flexibility

Model	D vs I	CF	SEF				Policy	Field of Origin	Studies Using Model	#of Times Model Cited	Citation
			Syste	Com	Org	Indv					
Diffusion of Innovation	D only	1		x	x	x		Agriculture	[1-8]	39364†	[9]
RAND Model of Persuasive Communication and Diffusion of Medical Innovation	D only	1		x	x	x		Medical Information: Technology Assessment	[10]	56	[11]
Effective Dissemination Strategies	D only	2		x	x	x		Nursing Research	--	24	[12]
Model for Locally Based Research Transfer Development	D only	2		x	x			Local Health and Social Service Delivery Agency	--	50	[13]
Streams of Policy Process	D only	2	x	x	x		x	Political Science	[14-16]	8091‡	[17, 18]
A Conceptual Model of Knowledge Utilization	D only	3	x	x			x	Knowledge Utilization in Public Policy	--	52	[19]
Conceptual Framework for Research Knowledge Transfer and Utilization	D only	3			x			Workplace Health and Safety	[20]	32	[21]
Conceptualizing Dissemination Research and Activity: Canadian Heart Health Initiative	D only	3		x	x			Public Health Systems	--	31	[22, 23]
Policy Framework for Increasing Diffusion of Evidence-based Physical Activity Interventions	D only	3	x	x	x		x	Public Health: Health Behavior - Physical Activity	--	54	[24]
Blueprint for Dissemination	D only	4		x	x			Quality of Health Care	--	6	[25]
Framework for Knowledge Translation	D only	5		x	x	x		Knowledge Translation	--	113	[26]
A Framework For Analysing Adoption of Complex Health Innovations	D > I	2	x	x	x	x		Health Systems	[27-32]	34§	[33, 34]
A Framework for Spread	D > I	2		x	x			Veteran Affairs Health Care Access	[35]	32	[36, 37]
Collaborative Model for Knowledge Translation Between Research and Practice Settings	D > I	2			x	x		Clinical Healthcare Settings	--	30	[38]
Coordinated Implementation Model	D > I	2			x	x		Health Care: Obstetric Care	--	111	[39]
Model for Improving the Dissemination of Nursing Research	D > I	2		x	x	x		Nursing Research	--	49	[40]
Framework for the Dissemination & Utilization of Research for Health-Care Policy & Practice	D > I	3		x	x	x		Health Policy and Clinical-Decision Making	[41-44]	125	[45, 46]
Framework of Dissemination in Health Services Intervention Research	D > I	3	x	x	x			Health Services	--	44	[47]
Linking Systems Framework	D > I	3		x	x	x		Public Health: Health Promotion	--	29	[48]
Marketing and Distribution System for Public Health	D > I	3	x	x	x	x		Public Health	--	--	[49]
OPTIONS Model	D > I	3		x	x	x		Mental Health: Substance Abuse	[50, 51]	57	[52]
A Conceptual Model for the Diffusion of Innovations in Service Organizations	D > I	4		x	x			Health Services	[53, 54]	1190	[55]
Health Promotion Research Center Framework	D > I	4	x	x	x		x	Public Health: Health Promotion	--	--	[56]
Knowledge Exchange Framework	D > I	4	x	x	x	x		Knowledge Transfer	[57]	27	[58-60]
Research Knowledge Infrastructure	D > I	4		x	x	x	x	Knowledge Transfer in Health and Economic/Social Research Organizations	[61]	111, 437¶	[62-65]

Appendix A

Categorization of dissemination and implementation models for use in research studies

| Model | D and/or I | Construct flexibility | Socio-ecological level | | | | | Field of origin | Studies that use the model (Reference #) | Number of times model has been cited[a] | Citations (Reference #) |
			System	Community	Organization	Individual	Policy				
Diffusion of Innovation	D-only	1		x	x	x		Agriculture	1–8	39,364[b]	9
RAND Model of Persuasive Communication and Diffusion of Medical Innovation	D-only	1		x	x	x		Medical information: technology assessment	10	56	11
Effective Dissemination Strategies	D-only	2		x	x	x		Nursing research	—	24	12
Model for Locally Based Research Transfer								Local health and social			

NIH Public Access
Author Manuscript

Am J Prev Med. Author manuscript; available

Published in final edited form as:
Am J Prev Med. 2012 September ; 43(3): 337–350

Bridging Research and Practice
Models for Dissemination and Implementation

Rachel G. Tabak, PhD, Elaine C. Khoong, BS
Brownson, PhD
Prevention Research Center in St. Louis, Brow
Public Health Sciences and Alvin J. Siteman C
Washi
(Cham

Abst

Wilson et al. *Implementation Science* 2010, **5**:91
http://www.implementationscience.com/content/5/1/91

IMPLEMENTATION SCIENCE

SYSTEMATIC REVIEW   **Open Access**

Disseminating research findings: what should
researchers do? A systematic scoping review of
conceptual frameworks

Paul M Wilson[1]*, Mark Petticrew[2], Mike W Calnan[3], Irwin Nazareth[4]

NIH Public Access

in PMC 2011 November 1.

16/j.outlook.2010.07.001.

etical Models for Translational
he Field

heryl A. Fisher, RN-BC, EdD[1], Clare E. Hastings,
[1], and Gwenyth R. Wallen, RN, PhD[1]
Bethesda, MD

Wealth of existing models for D&I:
- 61 with research focus (Tabak et al., 2012)
- additional 25+ with practitioner/clinician focus (Mitchell at al.,
2010)
- 33 frameworks from a UK perspective (Wilson et al. 2010)

Searchable website

http://dissemination-implementation.org/index.aspx

Selecting a model

Adapted from:
Chambers DA. Guiding theory for dissemination and implementation research: A reflection on models used in research and practice. In: Beidas RS, Kendall PC, eds. *Dissemination and implementation of evidence-based practices in child and adolescent mental health*: Oxford University Press; 2016:3.

Tabak RG, et al. The conceptual basis for dissemination and implementation research: lessons from existing models and frameworks. In Brownson RC, Colditz GA, Proctor EK (eds). *Dissemination and implementation research in health: translating science to practice*. 2nd edition. New York: Oxford University Press; 2017.

What is the research question I'm seeking to answer?

Reviewing D&I literature to identify and utilize essential concepts and established definitions

Articulating a research question and aims

Determine what evidence is needed

What is the purpose of the model in the context of the study?

Nilsen proposed five categories within three aims:

Process models 'describe and/or guide the process of translating research into practice'.

Determinant frameworks help explain/understand influences on implementation outcomes.

Classical theories and **Implementation theories** explain/understand implementation efforts.

Evaluation frameworks specify aspects to evaluate to determine success.
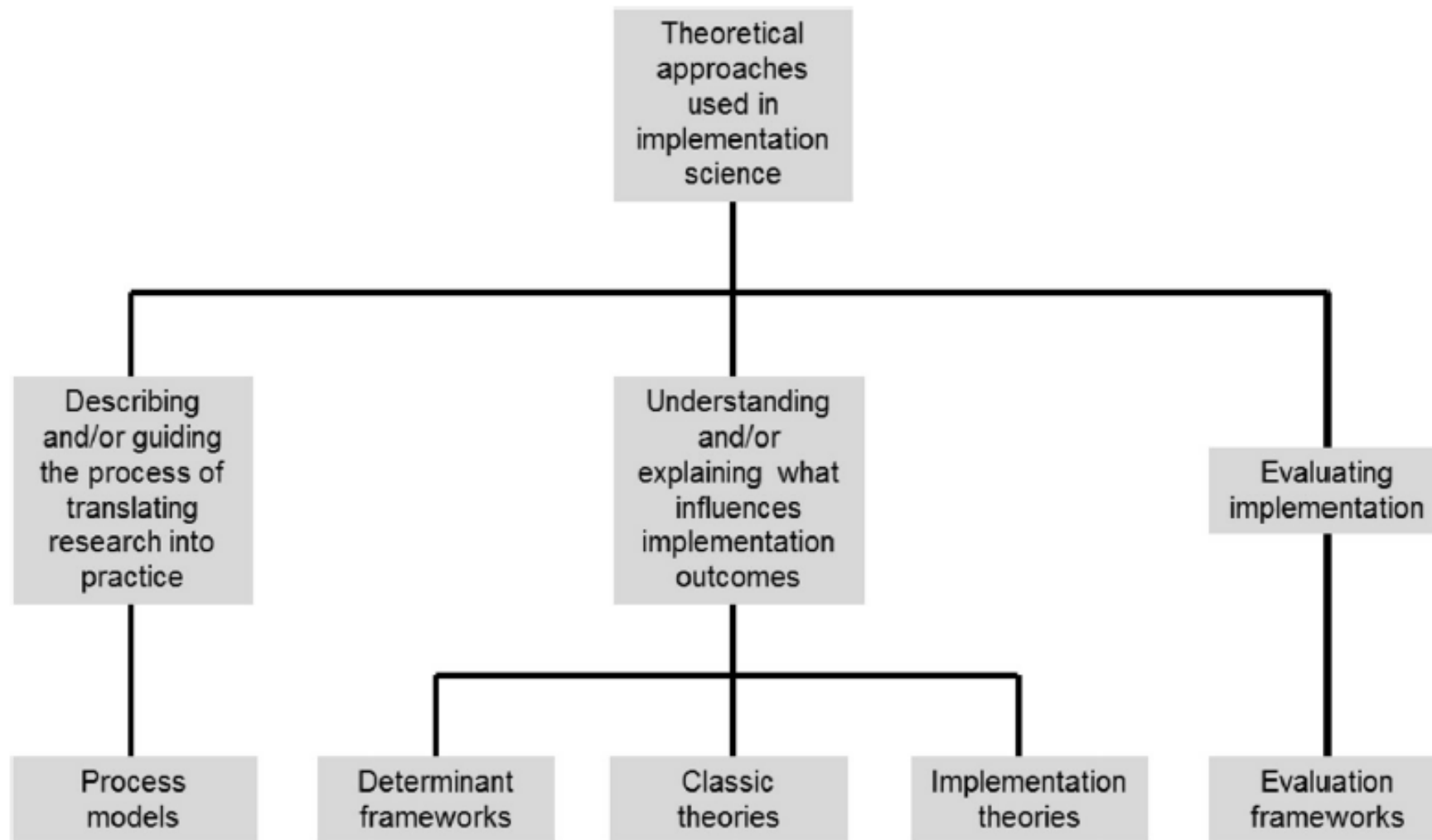
Figure 1 Three aims of the use of theoretical approaches in implementation science and the five categories of theories, models and frameworks.

What socioecological level of change am I seeking to explain?

Individual, organizational, community, system

Policy: "big P" policy and "small P" policy

Dissemination & Implementation Models
in Health Research & Practice

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This interactive website was designed to help researchers and practitioners to select the D&I Model that best fits their research question or practice problem, adapt the model to the study or practice context, fully integrate the model into the research or practice process, and find existing measurement instruments for the model constructs. The term 'Models' is used to refer to both theories and frameworks that enhance dissemination and implementation of evidence-based interventions more likely.

Select
Search, view, and select D&I Models

Adapt
Read strategies for adapting D&I Models to research or practice context

Integrate
Read strategies for incorporating D&I Models into the full spectrum of your project

Measure constructs
Find a list of constructs and links to measurement tools associated with the D&I Models

in Health Research & Practice

Glossary   Contact Us

Google™ Custom Se

Home   Resources   Submit Models   About Us

View All D&I Models
Search D&I Models

Search D&I Models
You can search for D&I Models by entering a keyword OR by selecting from the categories below.

Enter keyword for model search: Submit Keyword Search

----------------------- OR -----------------------

Dissemination & Implementation Models can be searched using individually set criteria.

Select
Adapt
Integrate
Measure constructs

User Name

Password

Login   Register

D And/Or I ⓘ
- ○ Dissemination Only
- ○ Implementation Only
- ◉ Any

Socio-Ecological Levels ⓘ
- ☐ Individual   ☐ Organization
- ☐ Community   ☐ System
- ☐ Policy   ☑ All

Constructs ⓘ
- ☐ Acceptability/feasibility
- ☐ Awareness   ☐ Barriers and facilitators
- ☐ Communication   ☐ Communication channels   ☐ Complexity
- ☐ Context   ☐ Context - Inner setting
- ☐ Development of an intervention

Searchable website

http://dissemination-implementation.org/index.aspx

Questions to Consider

What is the scope of the study?

What characteristics of context are relevant to the research questions?

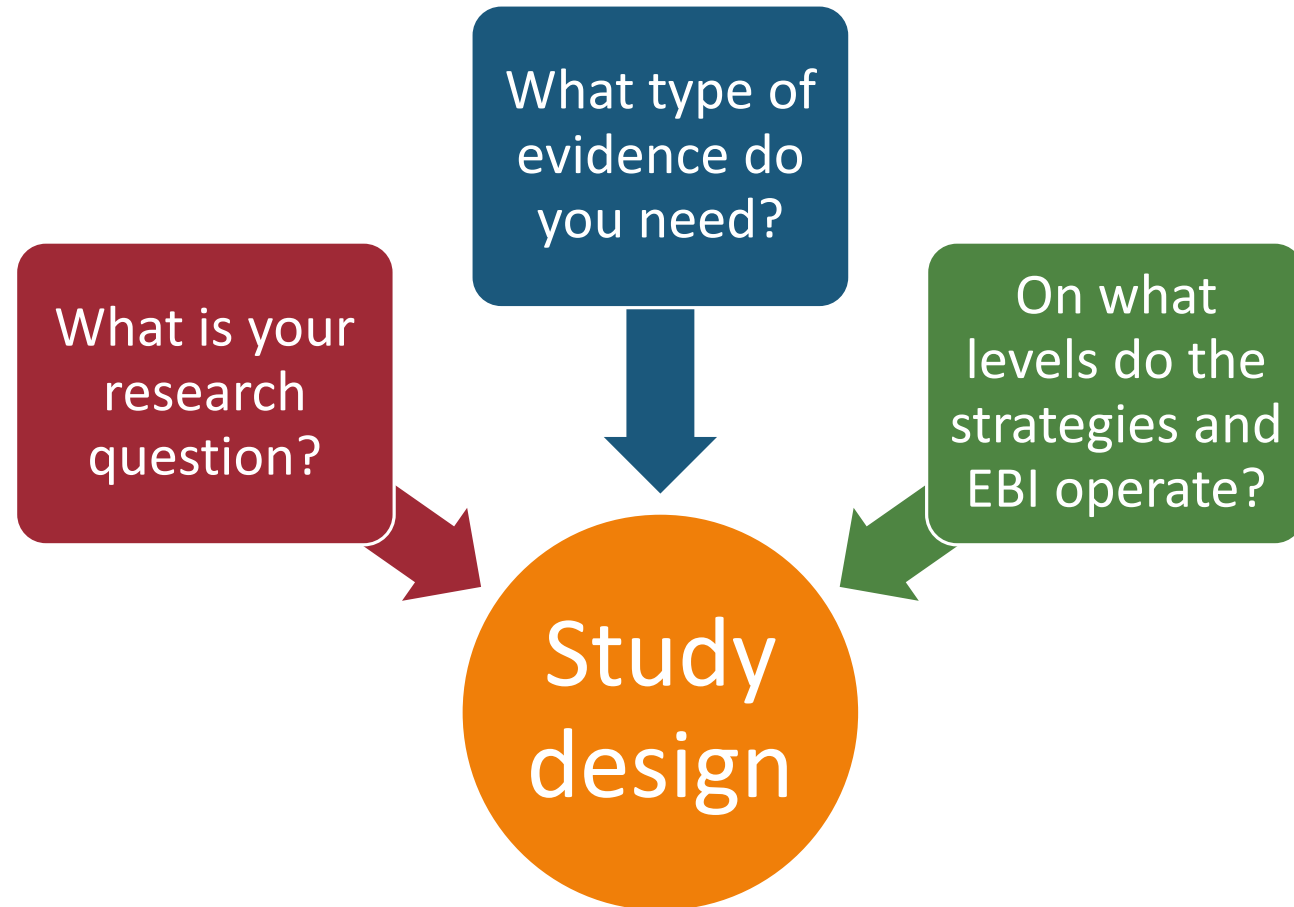What is the timeframe?

Are measures available?

Does the study need to be related to a single model?
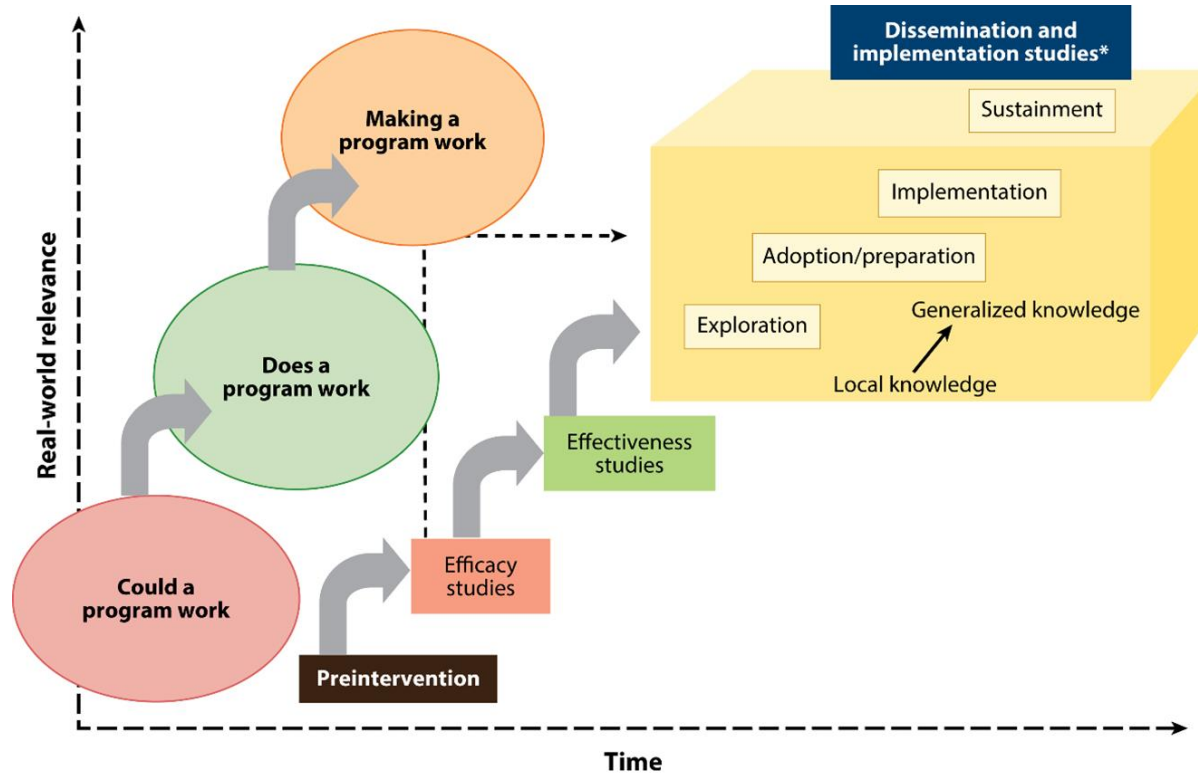
How strict does the use of the model need to be?

Does the model need to be adapted?

Study Designs for D&I Research

Considerations for study design choice

D&I research questions
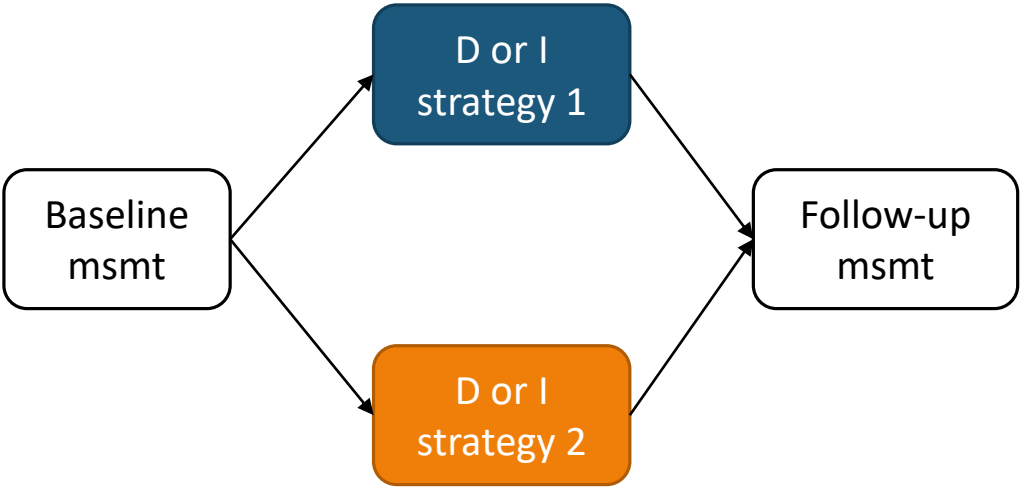

What D or I strategy is most relevant to the population and the EBI?

What factors impact the decision to disseminate or implement?

Does D or I of the EBI work with the chosen strategies?

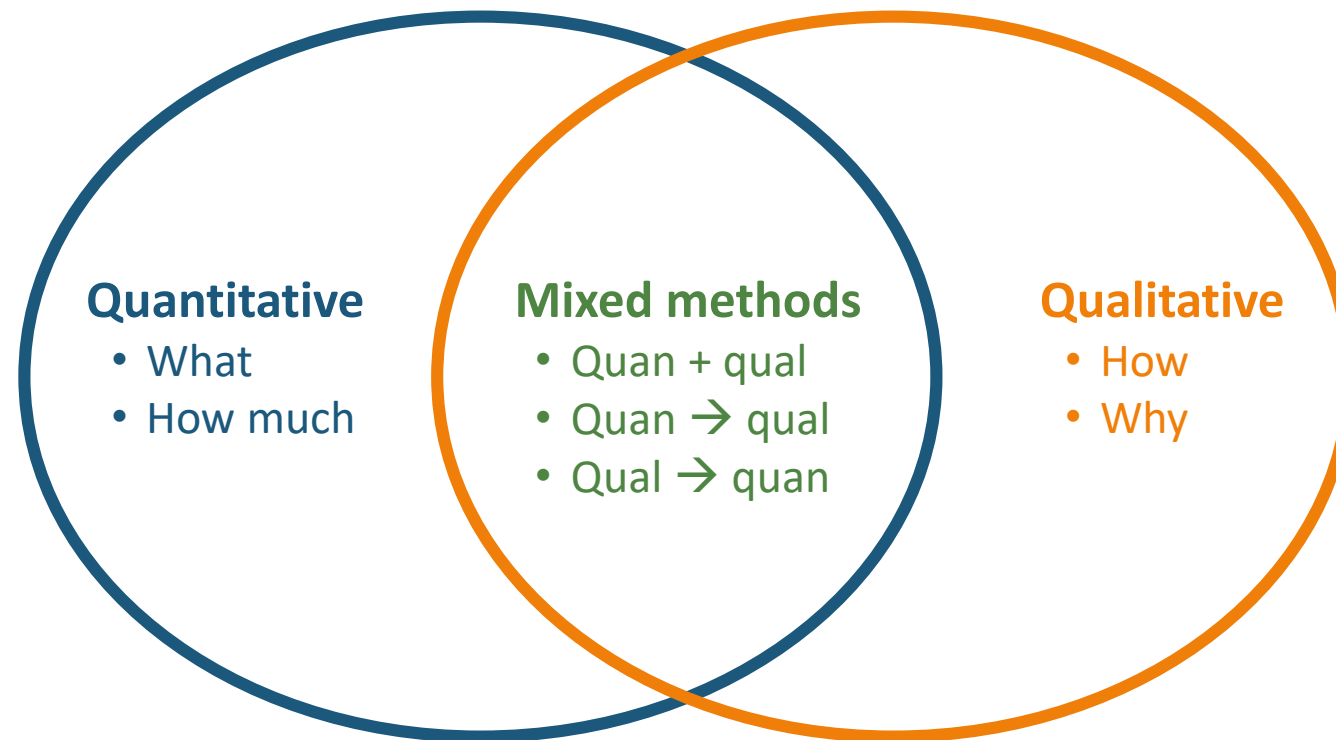What strategies are needed to maintain or extend use of the EBI?

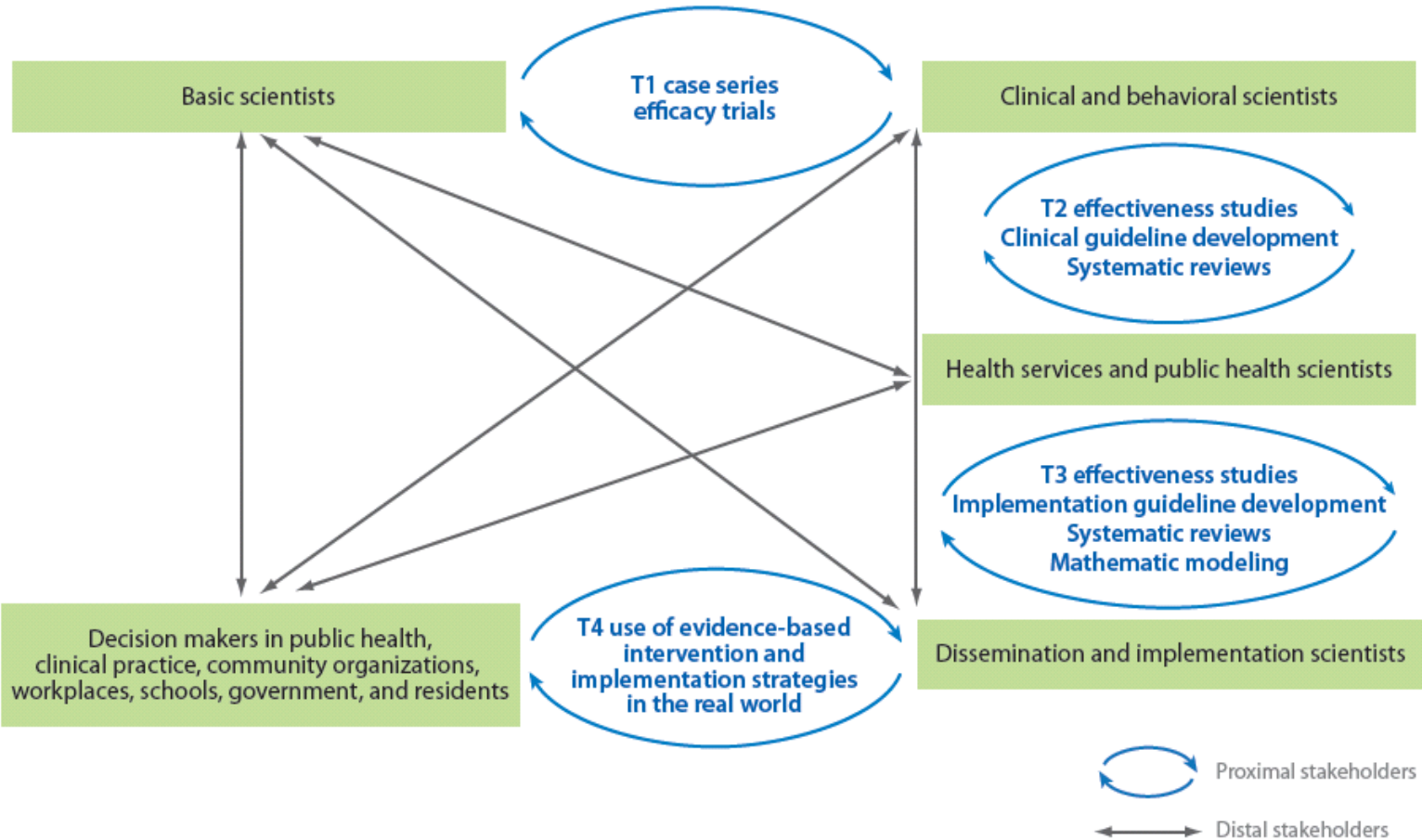Brown et al 2017. An Overview of Research and Evaluation Designs for Dissemination and Implementation. *Annual Review of Public Health*.

Comparisons

BY GROUP
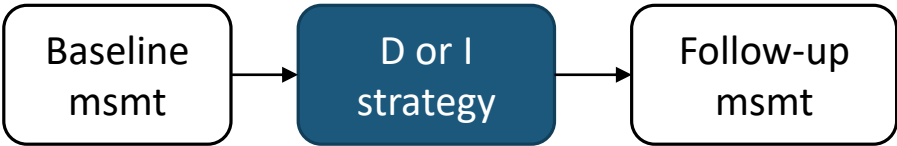
BY TIME

Engage stakeholders

Levels of D&I strategies and EBIs

D&I is inherently multi-level!

Four Levels of Change for Assessing Performance Improvement

	Assumptions about Change
Larger System/Environment	Reimbursement, legal, and regulatory policies are key
Organization	Structure and strategy are key
Group/Team	Cooperation, coordination, & shared knowledge are key
Individual	Knowledge, skill, and expertise are key
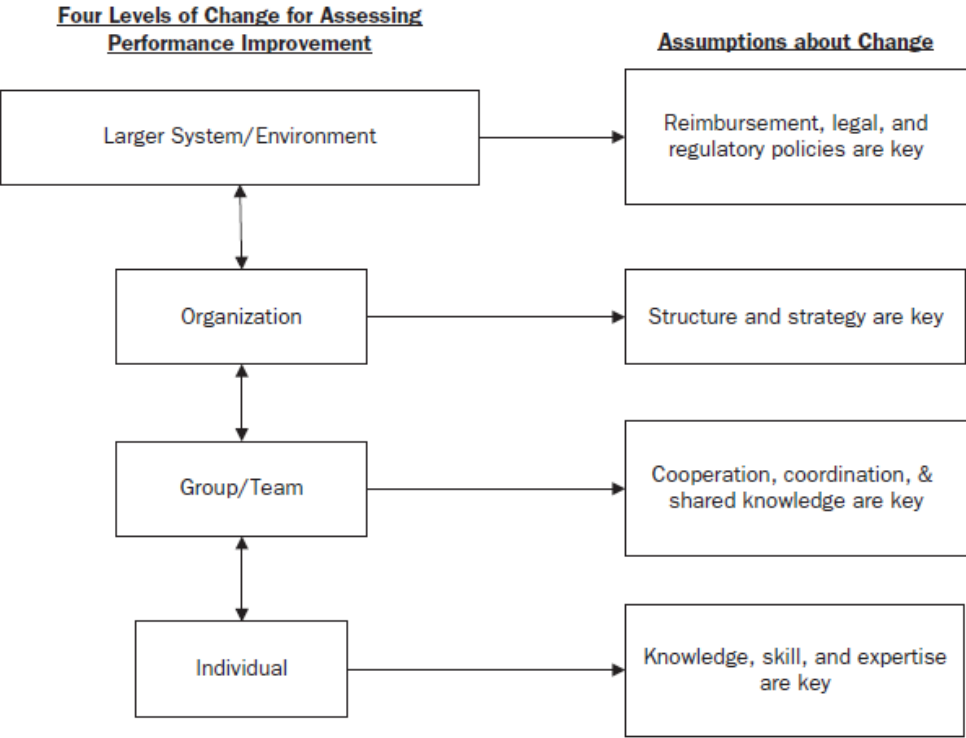
Consistency of design components

Study Design Consistency Pattern	Assignment to study arms	D or I strategy	Measurement
Multi-level consistency	●	●▲	●▲■
Single-level consistency	●	●▲	●■
Partial consistency	●	▲	●■
No consistency	▲	●	■

● Organization = hospital
▲ Provider = doctor
■ Client = patient

Keep the levels of assignment, strategy, and measurement consistent!

Mazzucca et al 2018. Variation in Research Designs Used to Test the Effectiveness of Dissemination and Implementation Strategies: A Review. *Frontiers in Public Health*.

Types of study designs

Categories of D&I research designs

1. Within-site
   - Evaluate implementation successes or failures by examining changes inside an organization, community, or system
   - Evaluate changes over time within one or more sites exposed to the same D&I strategy

2. Between-site
   - Compare processes and output among sites that have different exposures

3. Within- and between-site

4. Hybrid designs

Within-site: Interrupted time series

Multiple data collection points with a dissemination or implementation effort in between

O_1 O_2 O_3 O_4 X O_5 O_6 O_7 O_8

O = observation (data collection time point), numbered by subscript

X = EBI dissemination or implementation

Example
◦ EBI = healthy school lunch standards
◦ Dissemination strategy = policy mandate
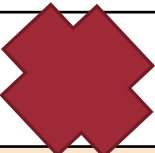◦ Implementation outcomes = compliance with policy (adoption)

Policy mandate enacted
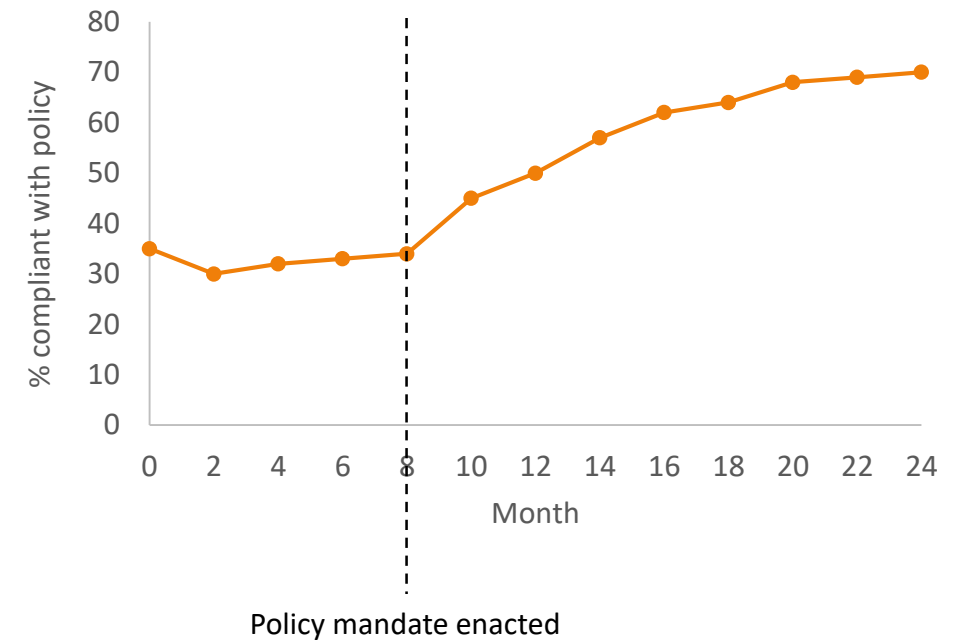
Between-site: Factorial designs

Investigates combination of ≥2 ISs at a time (factors)

- Each experimental factor has ≥2 levels
- Provides estimates of each factor by itself and of their interactions
- 2×2 factorial design assigns units randomly to 1 of 4 conditions

Example:
- EBI = walking program for senior community centers
- IS 1 = tailored implementation
- IS 2 = ongoing consultation
- Implementation outcomes = appropriateness of, fidelity to EBI

Tailored implementation

	No	Yes
No		2
Yes	3	4

Ongoing consultation

Incomplete (fractional) factorial designs: ≥ 1 arms are excluded

Between-site: SMART designs

Sequential multiple assignment randomized implementation design (SMART)

Special case of the factorial experiment

Multistage randomization (adaptive)
- Site-level implementation process can be modified if unsuccessful
- Can optimize allocation of available resources and change its approach if a strategy is failing

Example:
- EBI = physical activity curriculum in early care and education centers
- IS 1 = audit and feedback
- IS 2 = technical assistance
- Implementation outcomes = fidelity to, adoption of EBI
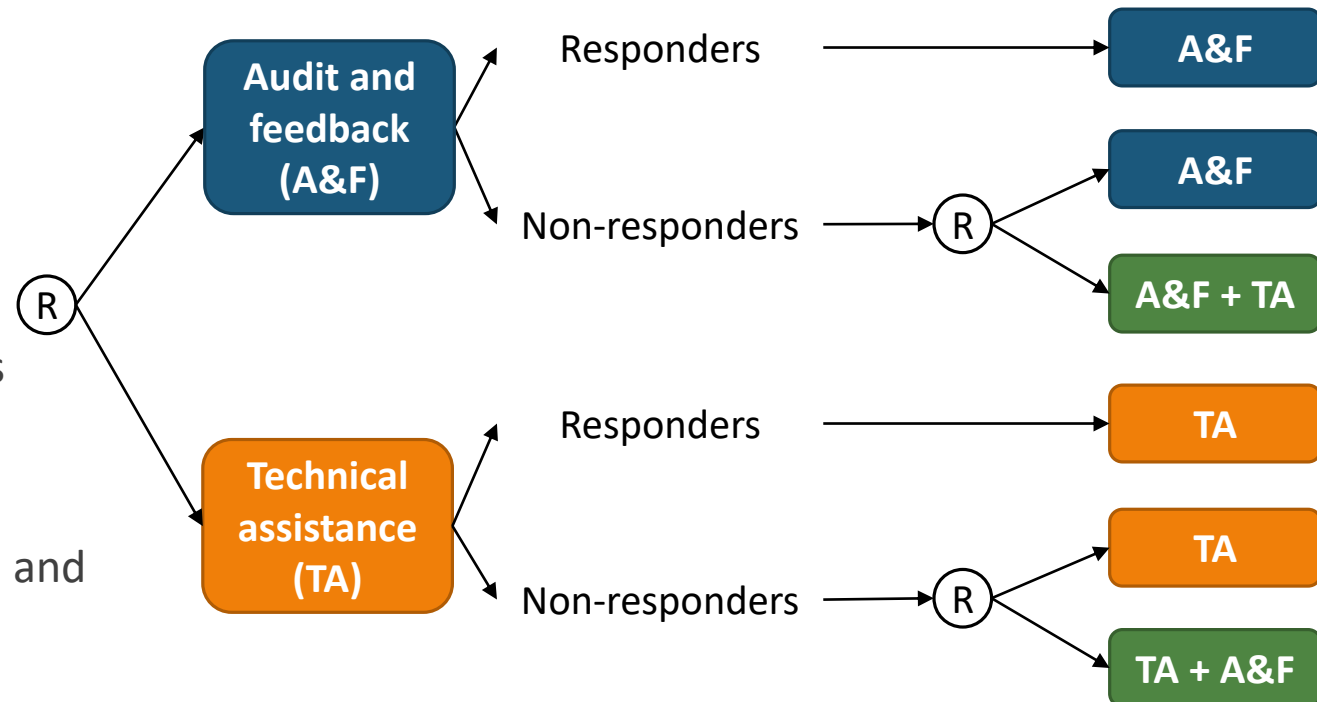
Within- and Between-sites: Stepped wedge

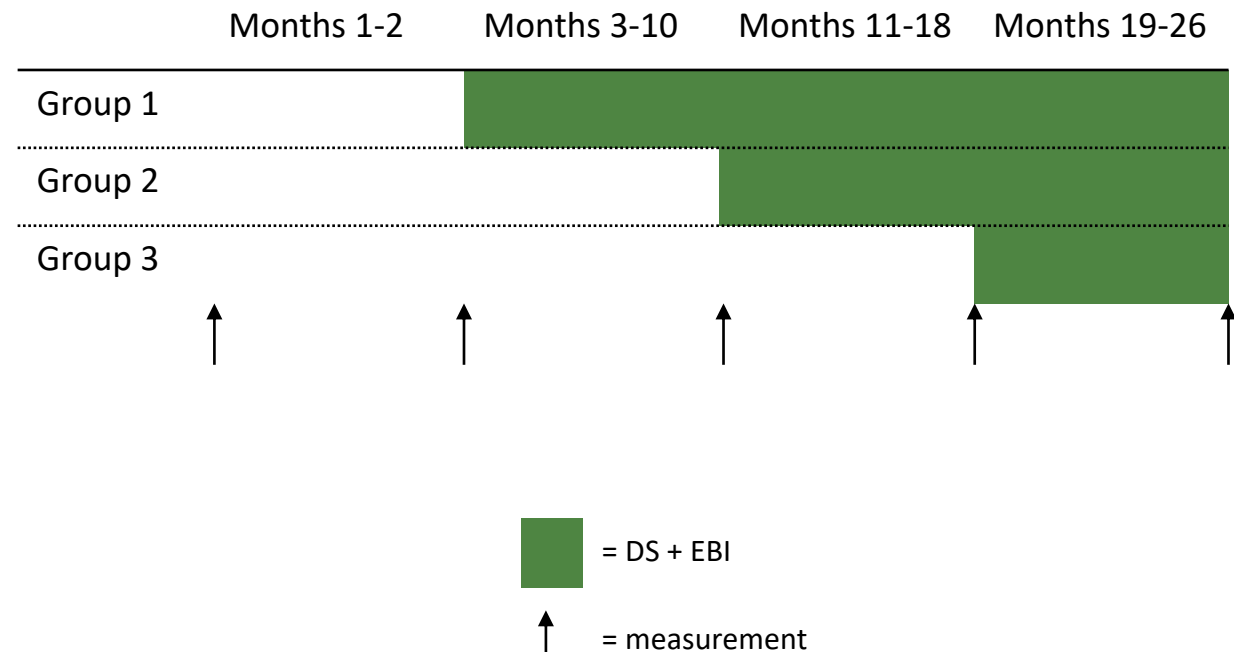Stepped wedge is one type of rollout design

Time that sites receive D/I strategy is assigned by the researcher

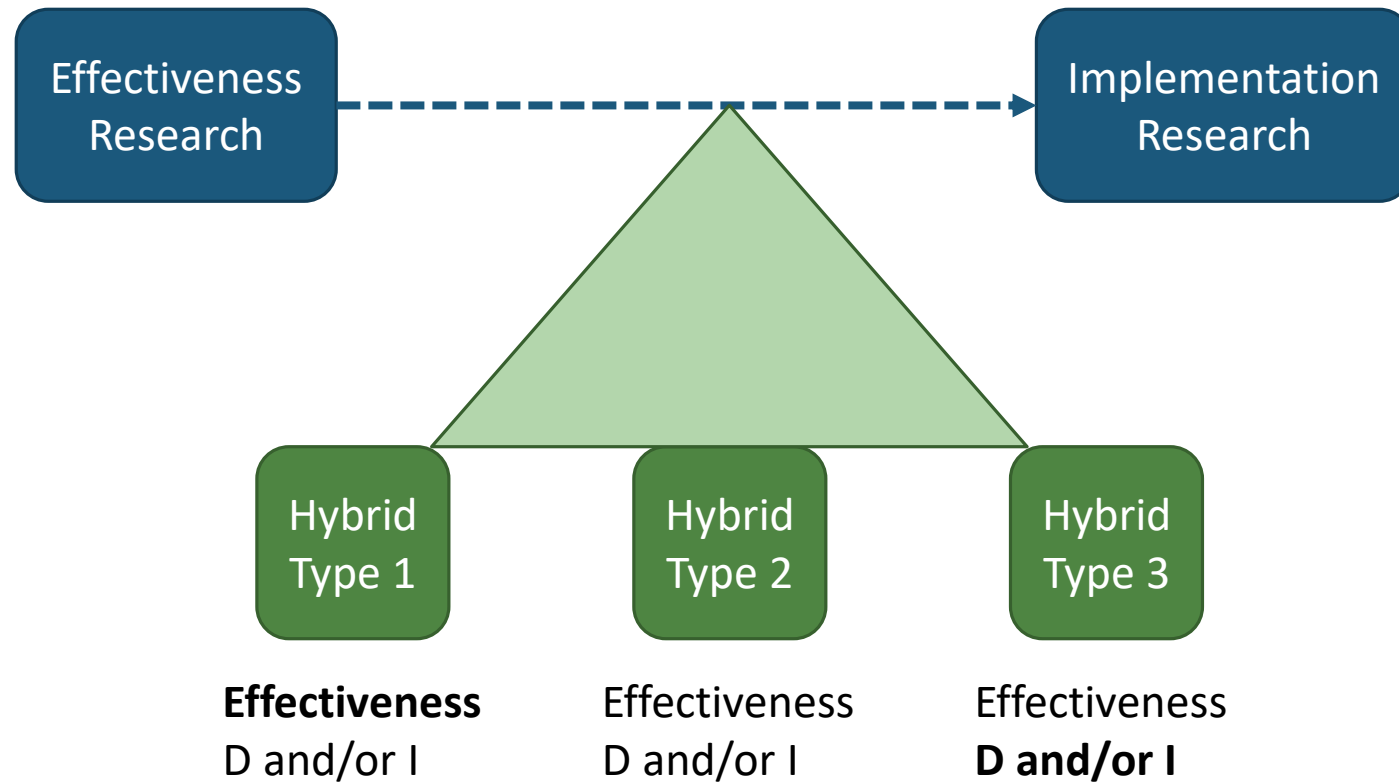All sites receive the D/I strategy and EBI at some point

Measurement as each group transitions allows within- and between-site comparisons

Example:
◦ EBI = choice of EBI for diabetes prevention or control
◦ DS = targeted workshop in evidence-based public health, technical assistance through a knowledge broker, or organizational changes to create climates supportive of evidence-based public health
◦ Implementation outcomes = adoption, use of EBIs

	Months 1-2	Months 3-10	Months 11-18	Months 19-26
Group 1				
Group 2				
Group 3				

= DS + EBI

= measurement

Parks RG et al. 2017. Enhancing evidence-based diabetes and chronic disease control among local health departments: a multi-phase dissemination study with a stepped-wedge cluster randomized trial component. *Implementation Science.*

Hybrid designs

Summary points

Many factors play into the choice of a study design

Main considerations
◦ Research question
◦ Type of evidence needed
◦ Levels of your D&I strategies and EBI

Many study designs available for D&I research that fit nuances of D&I research, individual phases of D&I research

Resources

DIRC toolkits
- Intro to D&I, Aims, Barriers & Facilitators, Implementation Outcomes, Designs, Implementation Organizational Measures, Implementation Strategies, Guidelines, Checklist for writing IR proposals
- https://sites.wustl.edu/wudandi/di-toolkits/

Penn State Methodology Center
- Support for SMART, MOST, factorial designs
- https://methodology.psu.edu/

Implementation Science Webinar Series
- National Cancer Institute (NCI) Division of Cancer Control & Population Sciences Implementation Science Team
- https://cyberseminar.cancercontrolplanet.org/implementationscience/

2014 Training Institute for Dissemination and Implementation Research in Health (TIDIRH) presentations
- http://conferences.thehillgroup.com/OBSSRinstitutes/TIDIRH2014/agenda.html
- Designs for D&I Research, Dr. David Marrero
  - http://conferences.thehillgroup.com/OBSSRinstitutes/TIDIRH2014/Presentations/July%2021/4_Marrero_DesignsforD&IResearch.pdf

Textbooks
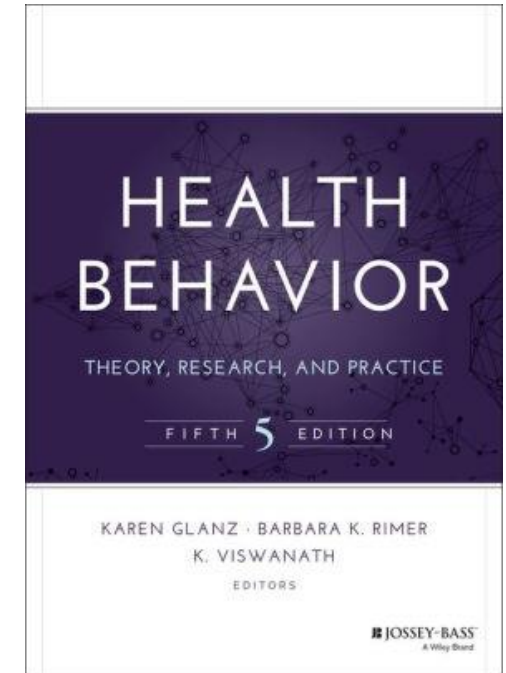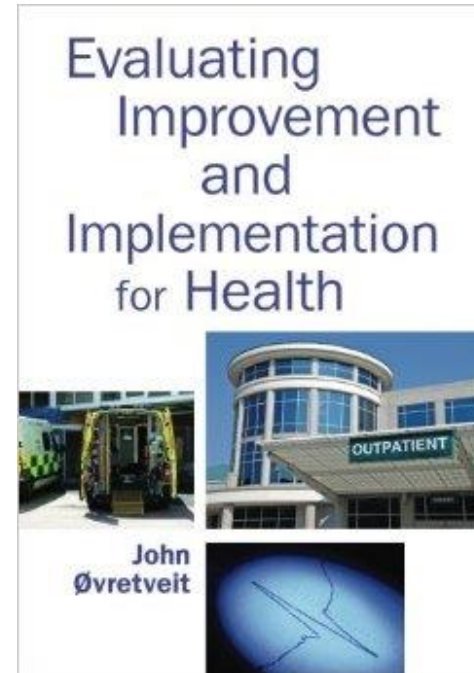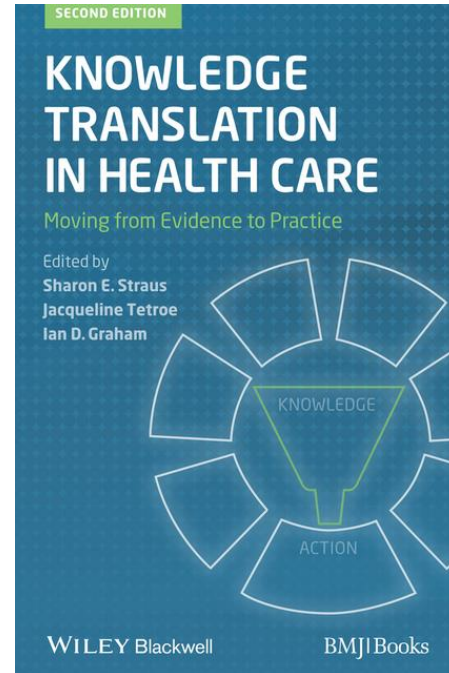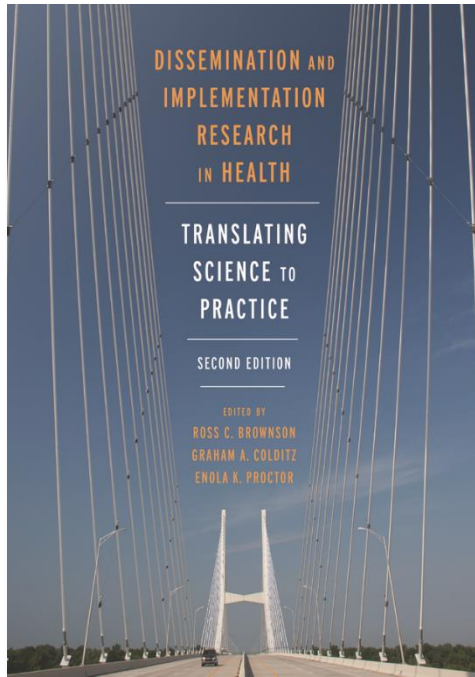
References

Brown CH, Curran G, Palinkas LA, et al. An Overview of Research and Evaluation Designs for Dissemination and Implementation. Annu Rev Public Health. Mar 20 2017;38:1-22.

Curran GM et al. Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance public health impact. *Medical Care*. 2012 Mar; 50(3): 217-26.

Landsverk J, Brown CH, Smith JD, et al. Design and Analysis in Dissemination and Implementation Research. In: Brownson RC, Colditz GA, Proctor EK, eds. Dissemination and Implementation Research in Health: Translating Science to Practice. 2nd ed. New York: Oxford University Press; 2017:201-227.

Lee H et al. A "SMART" design for building individualized treatment sequences. *Annual Reviews of Clinical Psychology.* 2012; 8:21-48.

Mazzucca S, Pilar M, Tabak R, Ramsey A, Baumann A, Kryzer E, Padek M, Powell B, Brownson R. Variation in research designs used to test the effectiveness of dissemination and implementation strategies: A review. Accepted at Frontiers in Public Health Education and Promotion.

Powell BJ et al. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science.* 2015. 10:21.

Shadish, Cook, Campbell. Experimental & Quasi-Experimental Designs for Generalized Causal Inference. Houghton Mifflin Company. 2002.

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