Implementation Research from Basics to Advanced:
Terminology, Frameworks, & Theories to Guide the Process

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Yale CMIPS
Center for Methods in Implementation & Prevention Science

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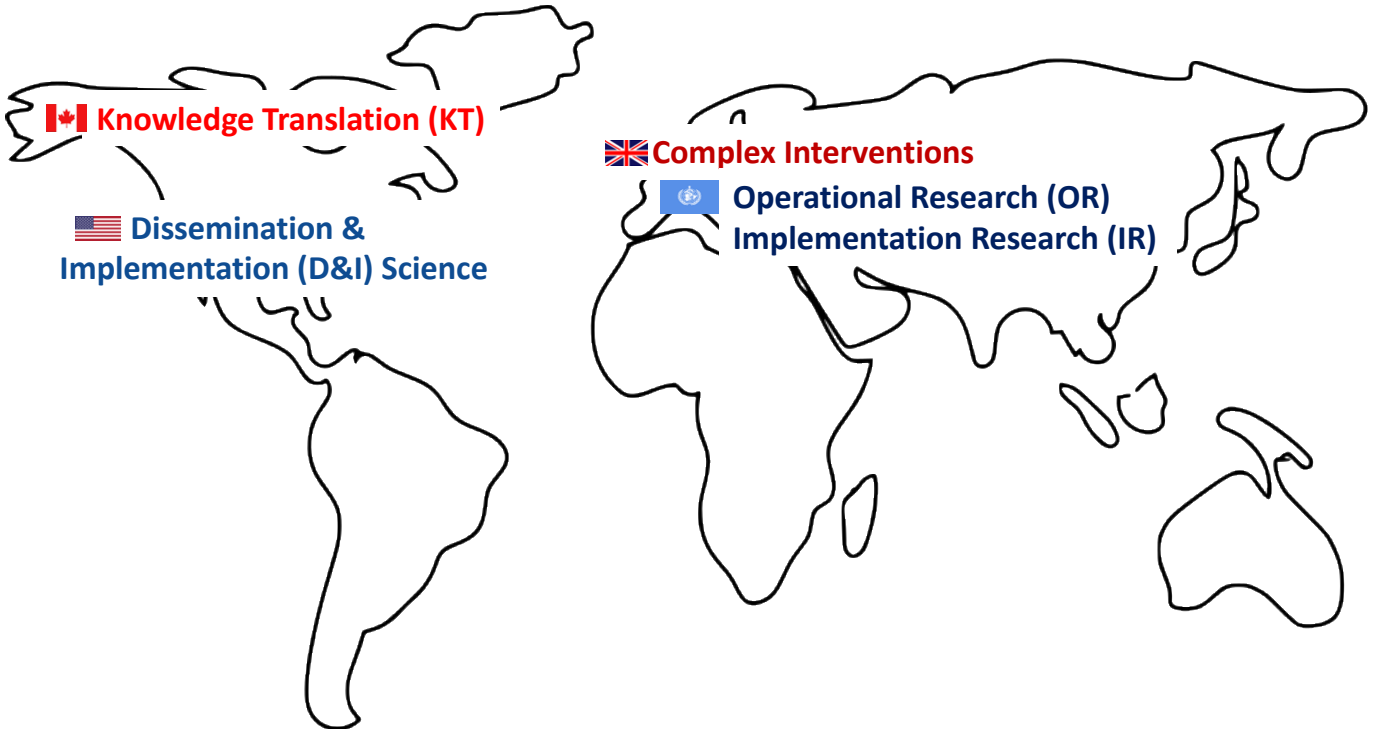
cira
Center for Interdisciplinary Research on AIDS

A definition of Implementation Science (IS)

Implementation science is
the scientific study of methods to promote
the systematic uptake of research findings & evidence-based practices into routine practice
to improve the quality & effectiveness of health services.

M. Eccles & B. Mittman. Implement Sci. 2006

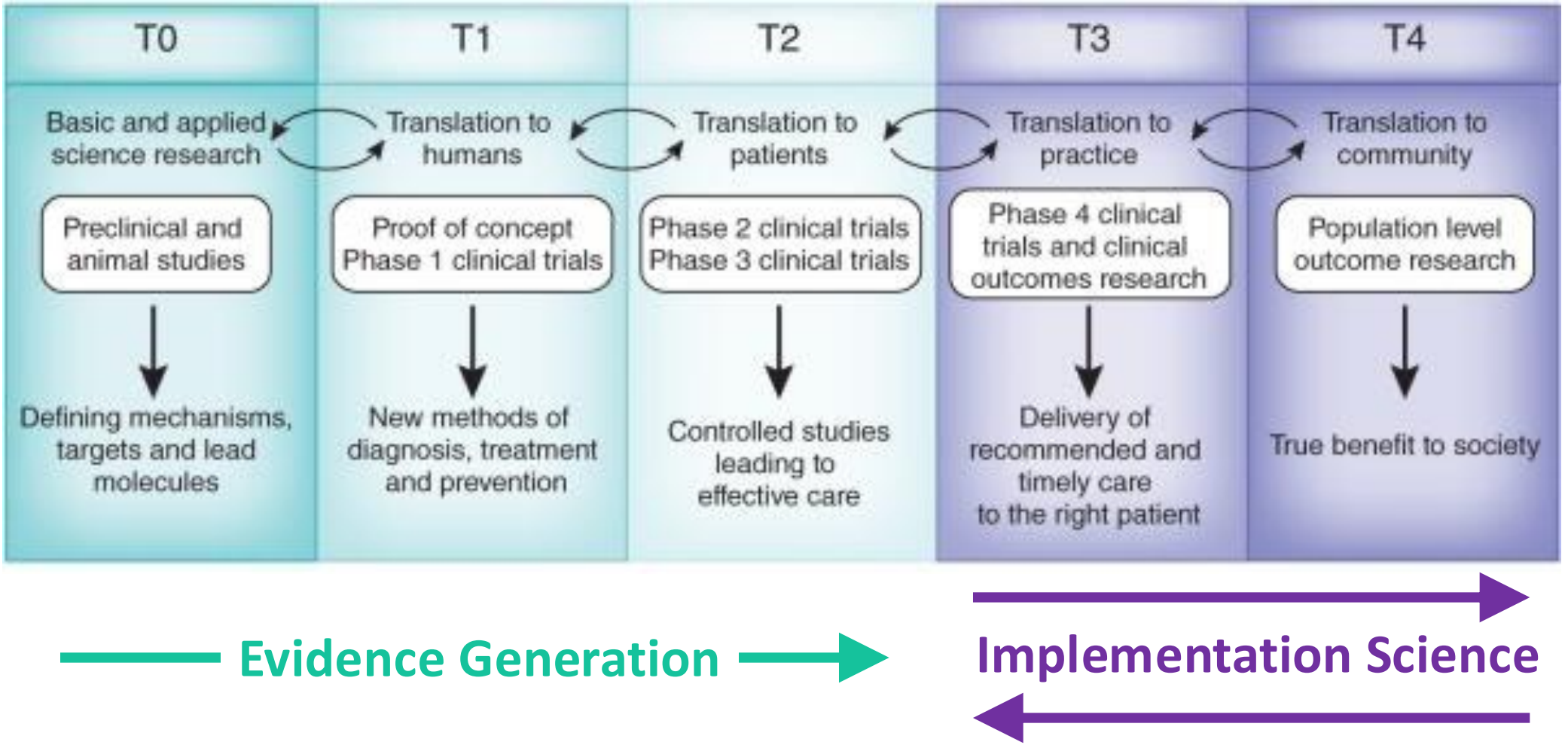
Terminology varies around the world…



Knowledge Translation	Dissemination Science	Implementation Science
Research	Dissemination Research	Implementation Research
Practice	Dissemination Practice	Implementation Practice

….but the need to bridge research & practice is a constant theme.

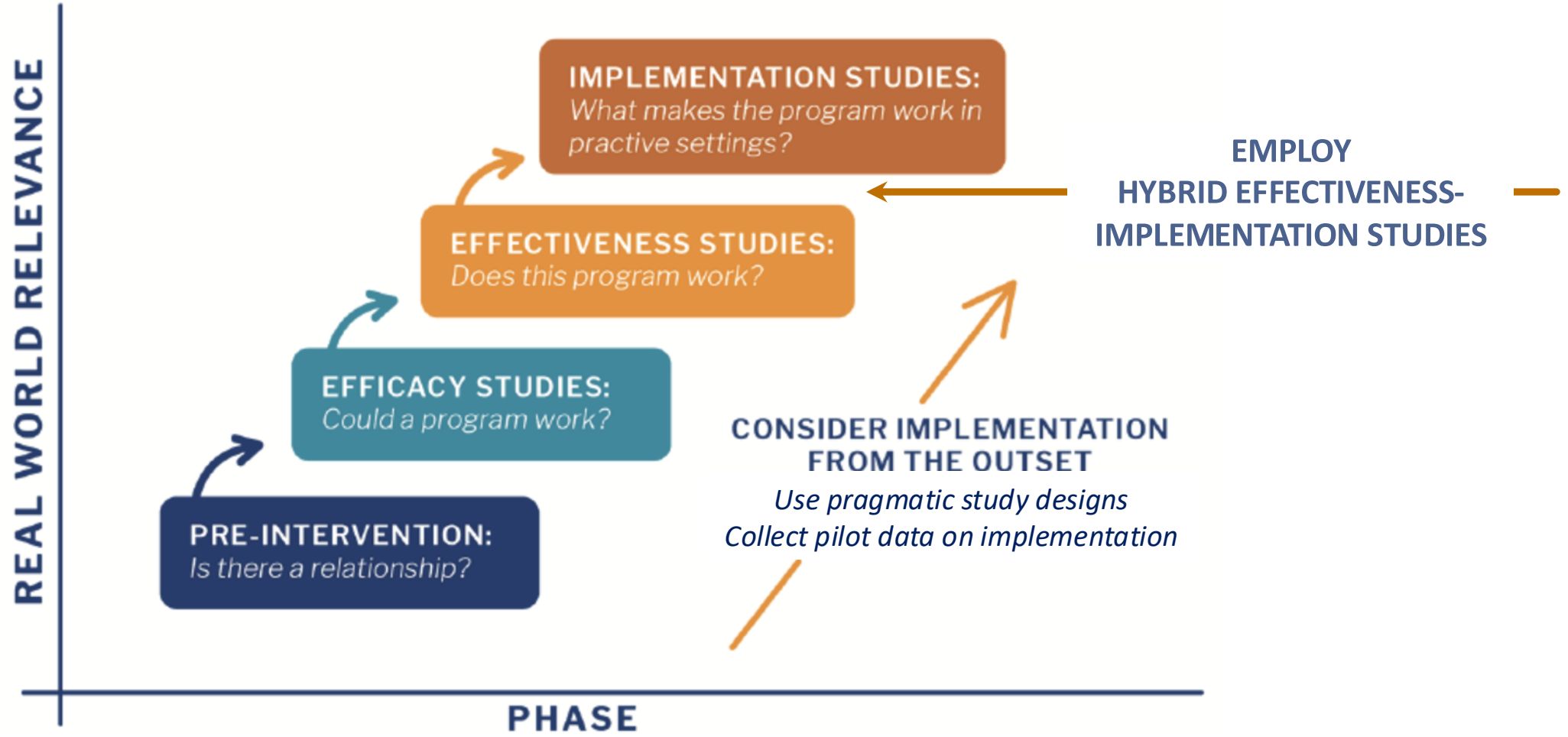
IS is a translational & iterative process



Blumberg et al. *Nature Medicine* 2012

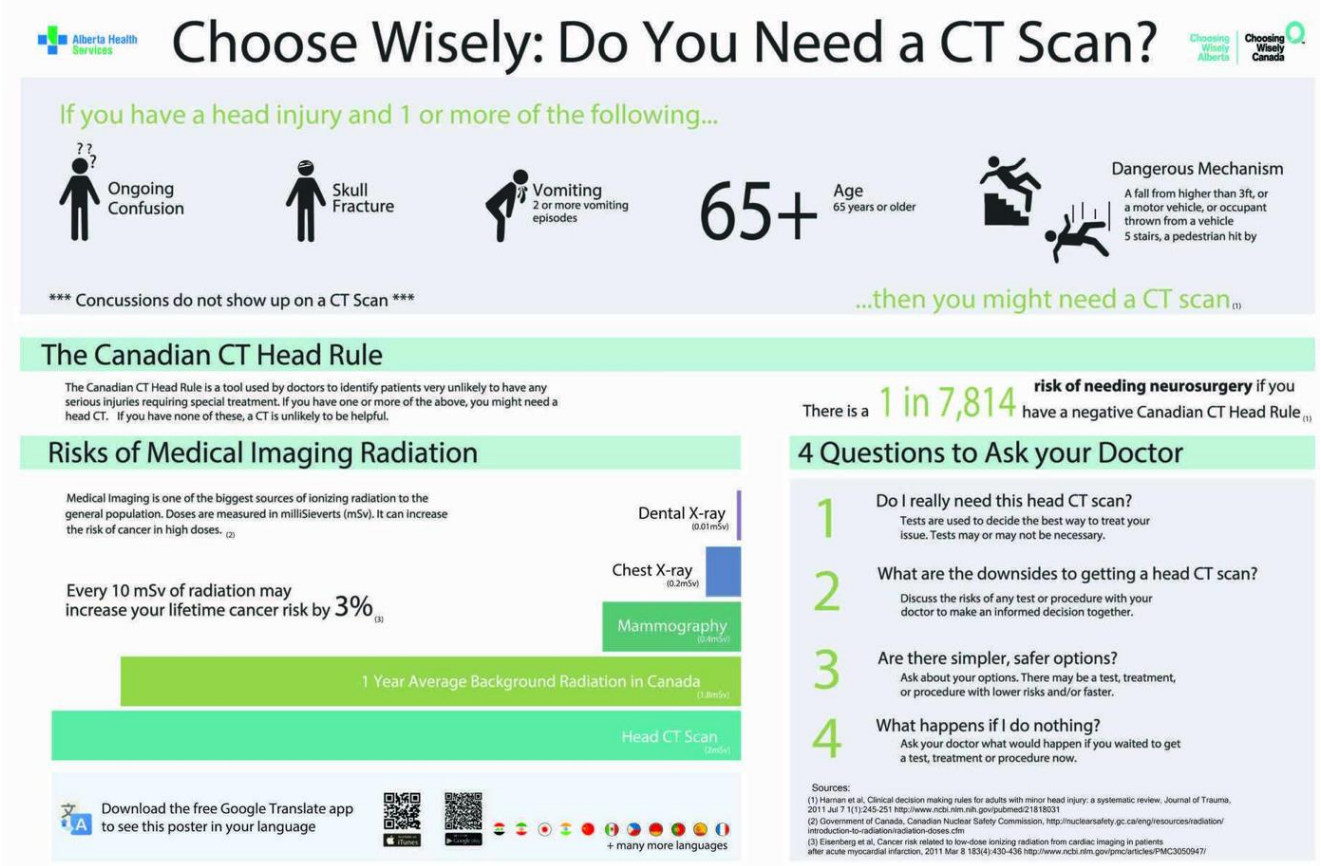
"It's never too early to think about implementation"

~~"Isn't it too early to think about implementation?"~~



It's also concerned with de-implementation & sustainability

~~"Implementation science is only about implementation"~~



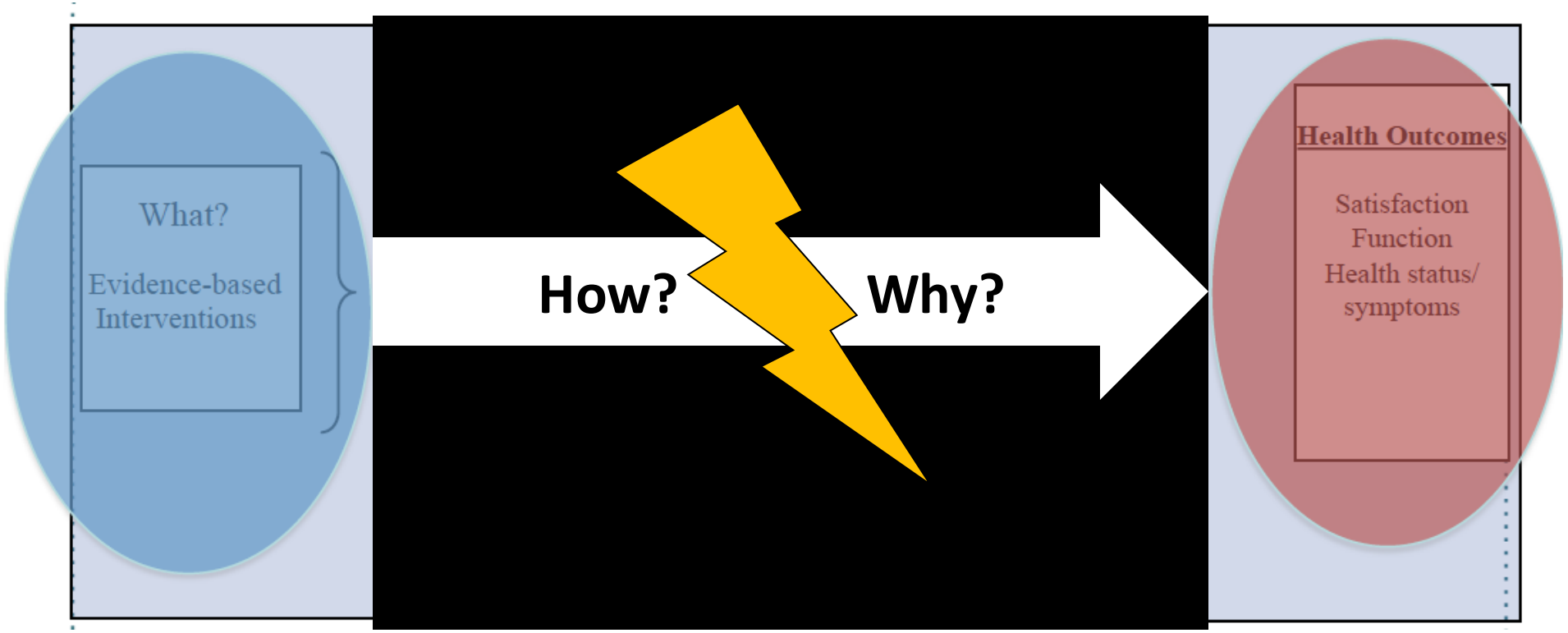
The Center for Implementation

Figure adapted by The Center for Implementation
Original source: https://sustaintool.org/

Interventions, Strategies, or Outcomes?

- The intervention/practice/innovation is **THE THING**
- Implementation strategies are the stuff we do to try to help people/places **DO THE THING**
- Main implementation outcomes are **HOW WELL** they **DO THE THING**

Something is missing in most effectiveness research

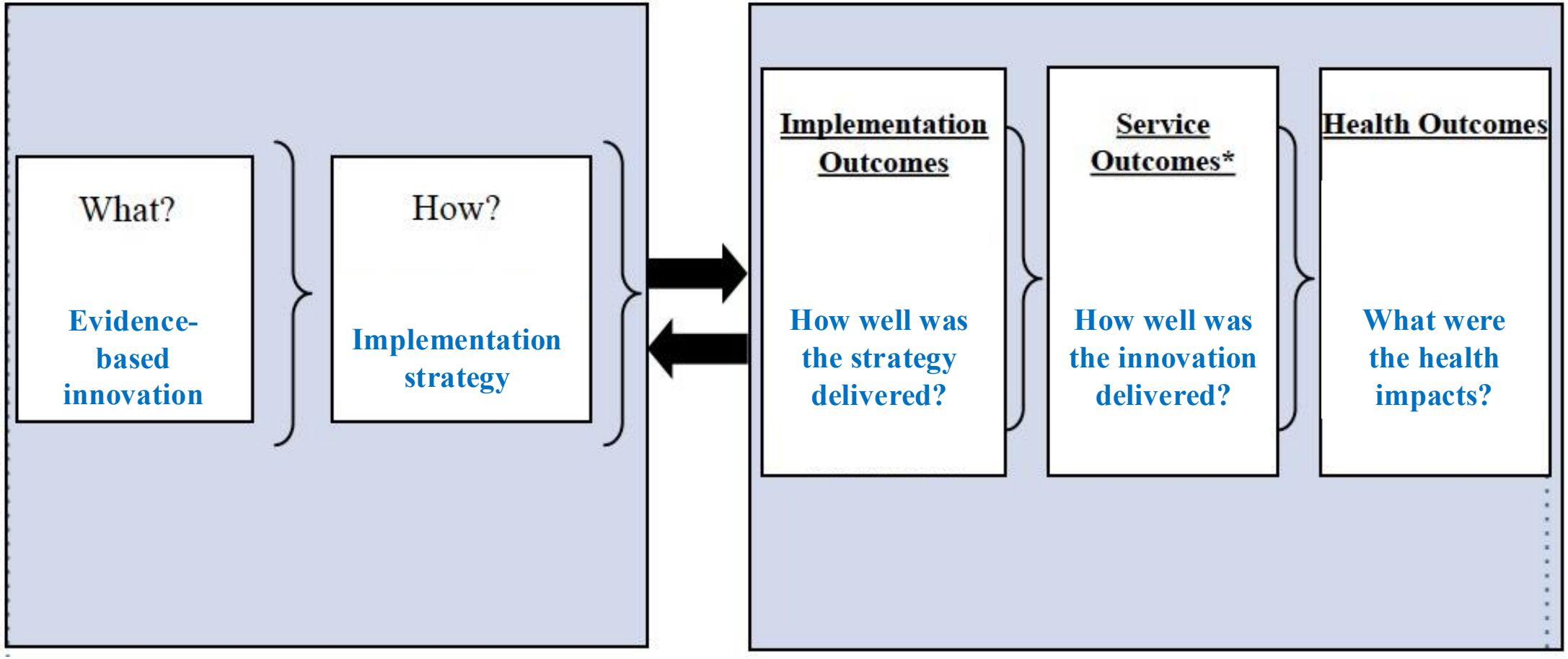


If the intervention does work, we won't know how.

If the intervention doesn't work, we won't know why.

Slide adapted from Beidas, Lewis, Lane-Fall, Powell, D&I Conference, 2019

Implementation outcomes are a defining feature of IS



Proctor et al Adm Policy Ment Health 2011

A roadmap for today's talk

Implementation Science: Revisiting What it Is and What it is Not

What are theories, models, and frameworks & why do we need them?

How to choose a theory, model, or framework?

Theory, model, or framework?

- *A tool that describes and simplifies a phenomenon*

Model

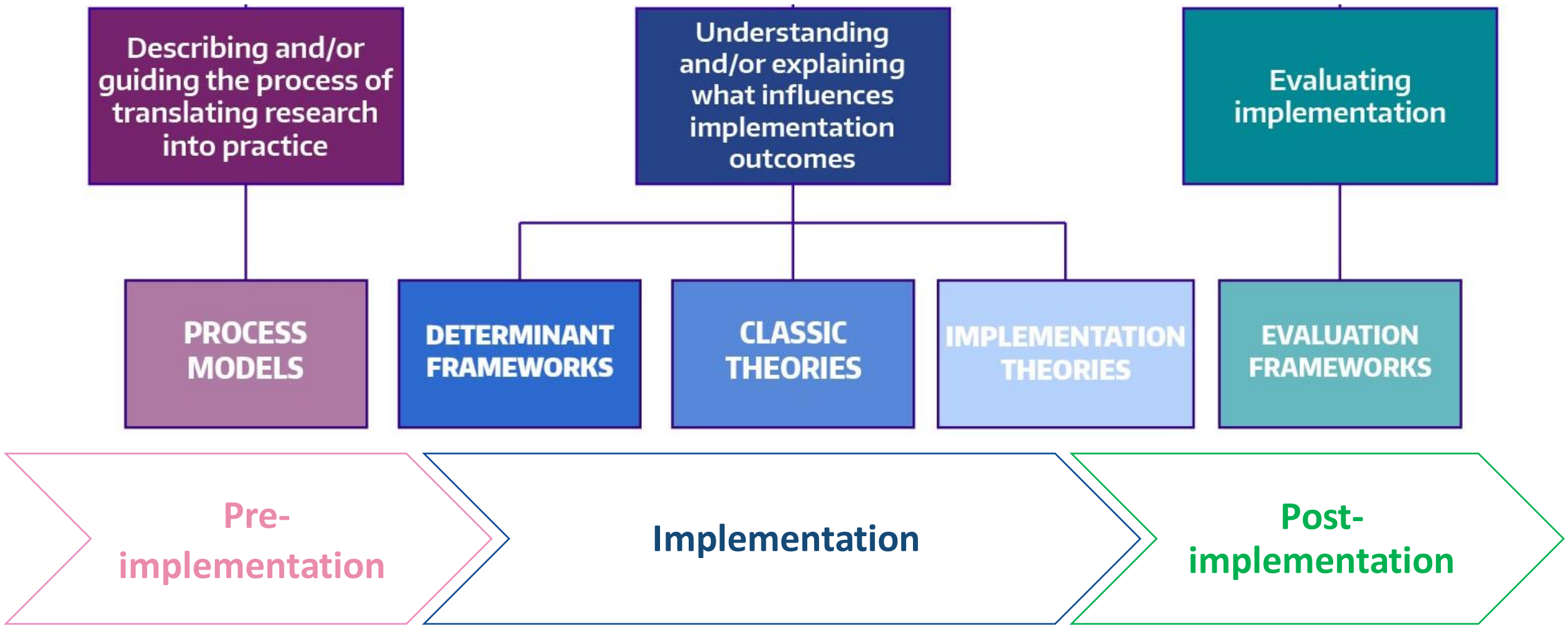
- *A set of principles or statements that explain & predict a phenomenon*

Theory

- *A structure for identifying factors that influence implementation*

Framework

Theoretical approaches used in IS: Function & Phases



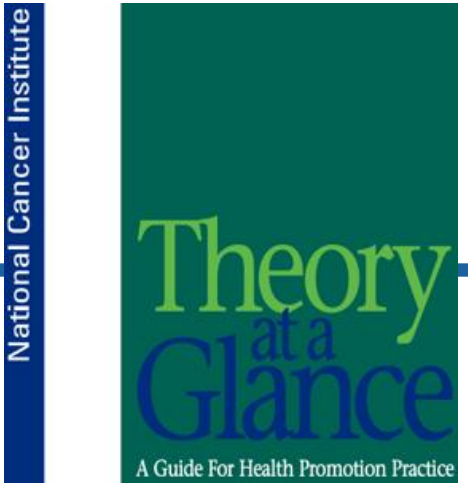
Nilsen Implementation Science 2015

Why not just use common sense instead of theory?

Common Sense	**vs.**	**Theory**
Practical		Conceptual
Implicit/Intuition-driven		Explicit/Hypothesis-driven
Inscrutable		Testable
Context-Specific		Generalizable

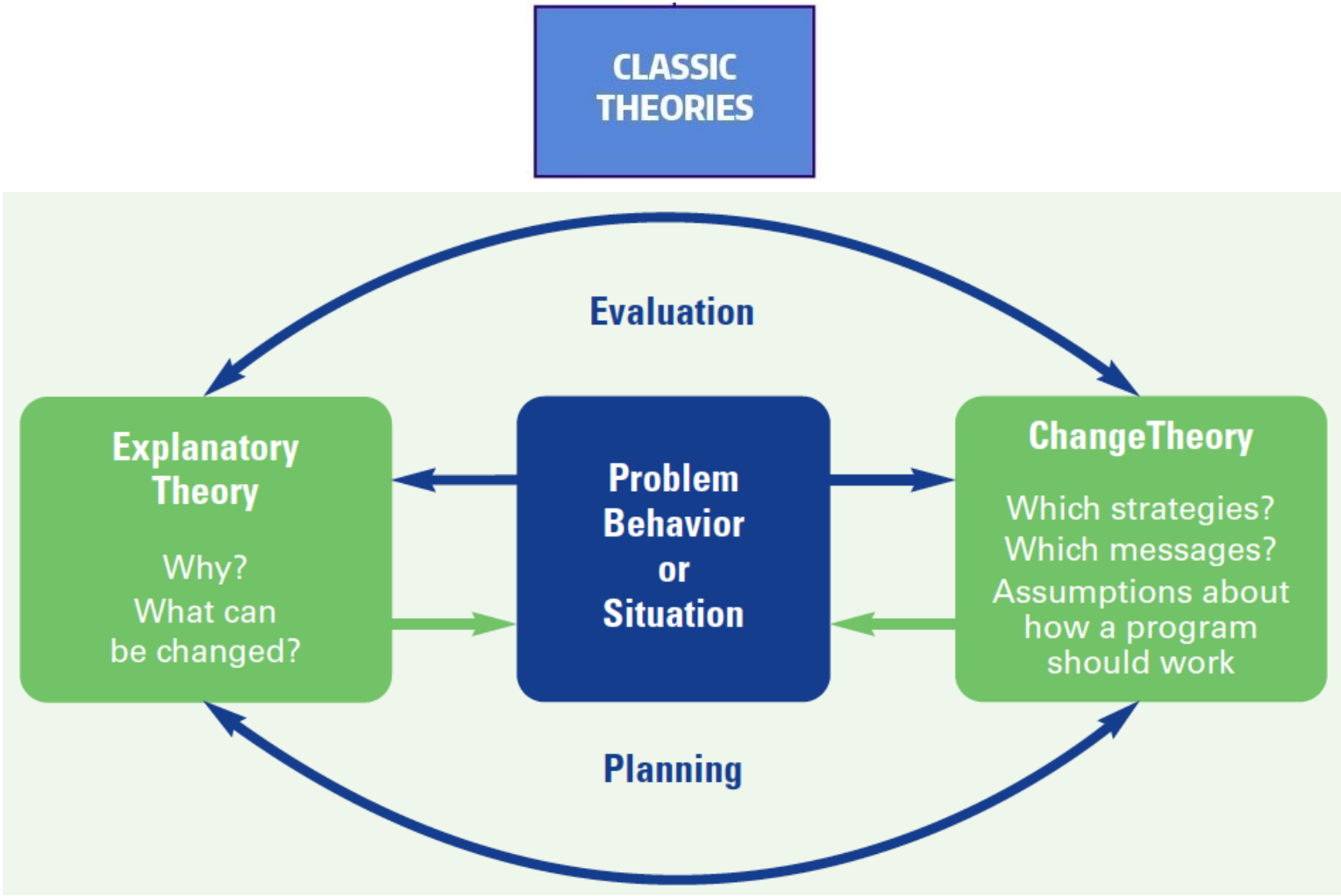
Nilsen P. Implementation Science 2015

What is Theory?



- A systematic way to understand events or situations.
- Concepts, definitions, & propositions to explain or predict events or situations by illustrating (and ideally testing) relationships between variables.
- Theories must apply to a broad variety of situations.
- Abstract by nature, not confined to a specific content area.

Two general types of theories



Examples

- Explanatory Theory

Understanding why an employee smokes

e.g., Health Belief Model

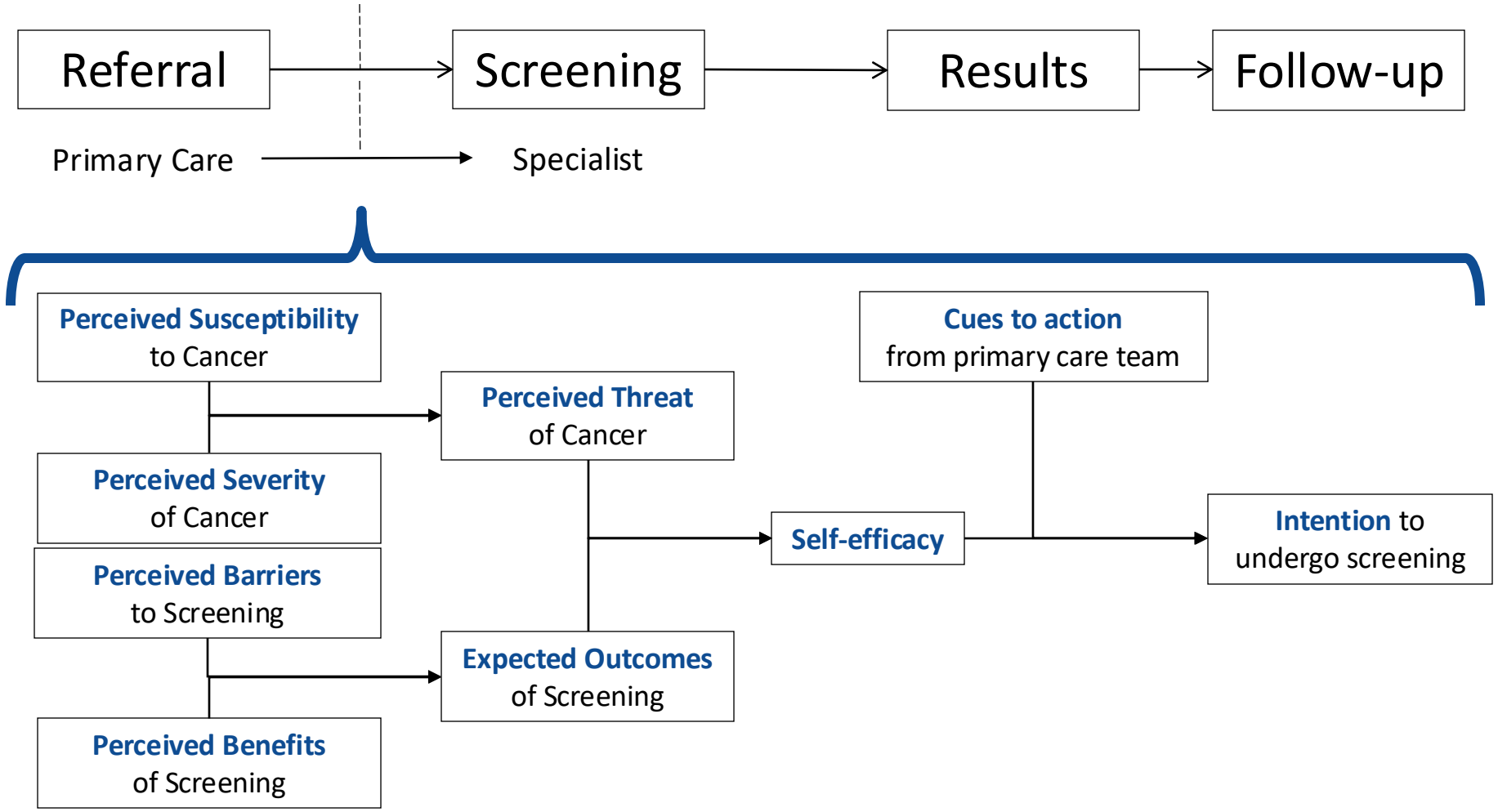
- Change Theory

Understanding how to get an employee to quit smoking

e.g., Transtheoretical Model

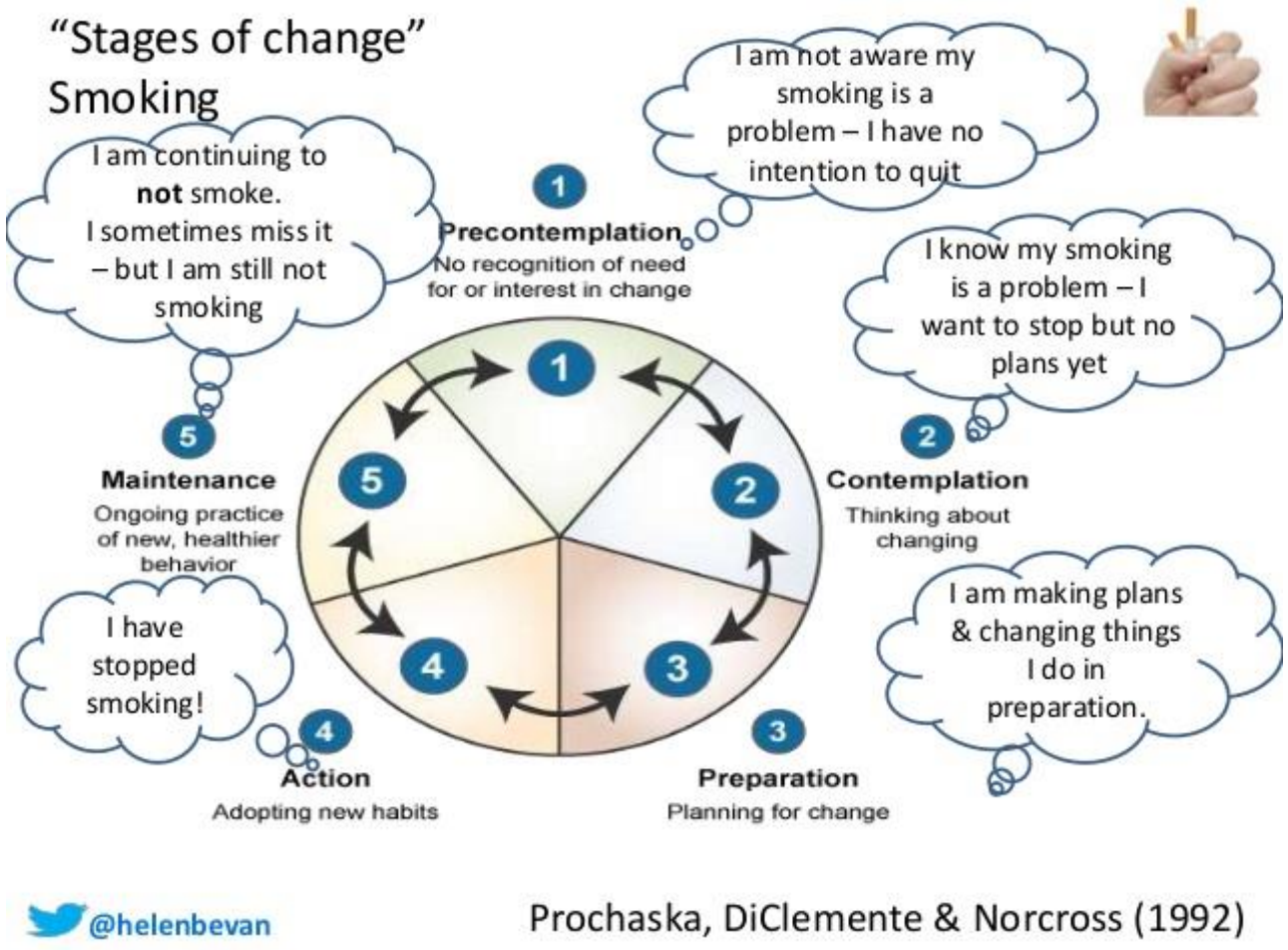
Health Belief Model, explanatory theory for cancer screening

Premise:
Behavior is influenced by expected outcomes.



Stages of Change (Transtheoretical) Model, a theory of change

Premise:
Behavior change is a process, not an event.

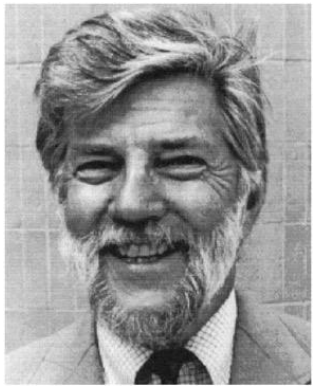


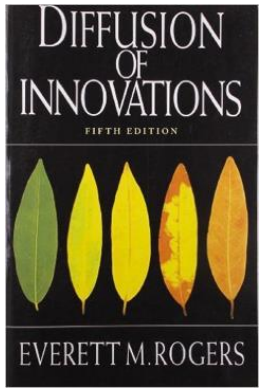
Frameworks

- Understand which *contextual* factors influence implementation & why

- Understand *fidelity/adaptation* & other implementation measures & how

Implementation Science Frameworks: Origins



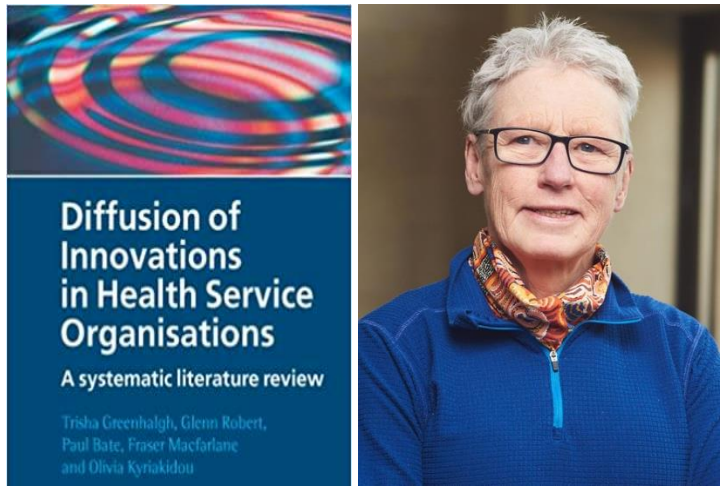


Attribute	Key Question
Relative advantage	Is the innovation better than what it will replace?
Compatibility	Does the innovation fit with the intended audience?
Complexity	Is the innovation easy to use?
Trialability	Can the innovation be tried before making a decision to adopt?
Observability	Are the results of the innovation observable and easily measurable?

Characteristics of innovations

Characteristics of innovators

From Diffusion to Implementation



Diffusion — **"Watch It Happen"**

Dissemination — **"Help It Happen"**

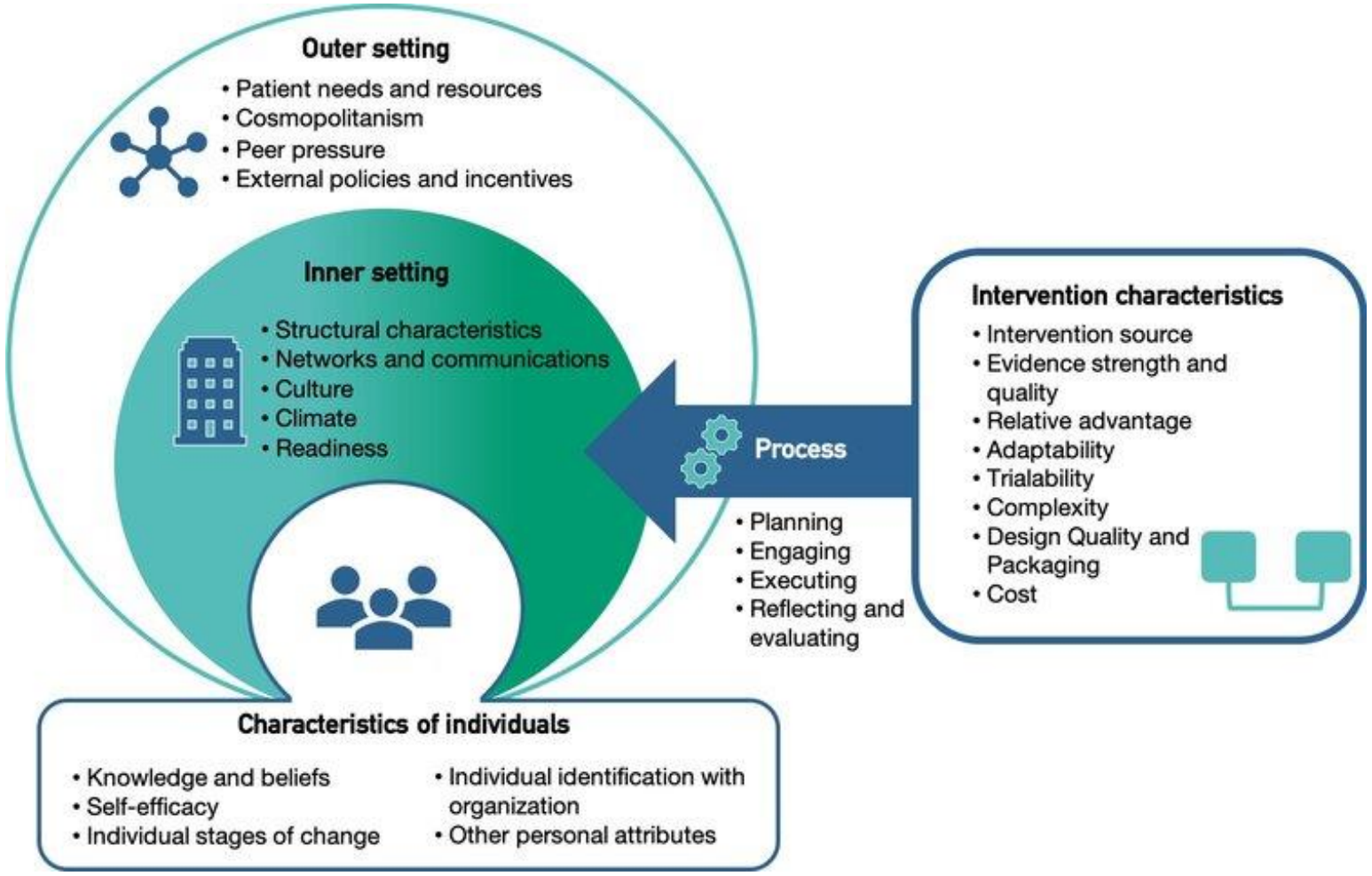
Implement-ation — **"Make It Happen"**

Evidence → Practice

Greenhalgh et al. *Diffusion of Innovations in Health Service Organizations,* 2005.

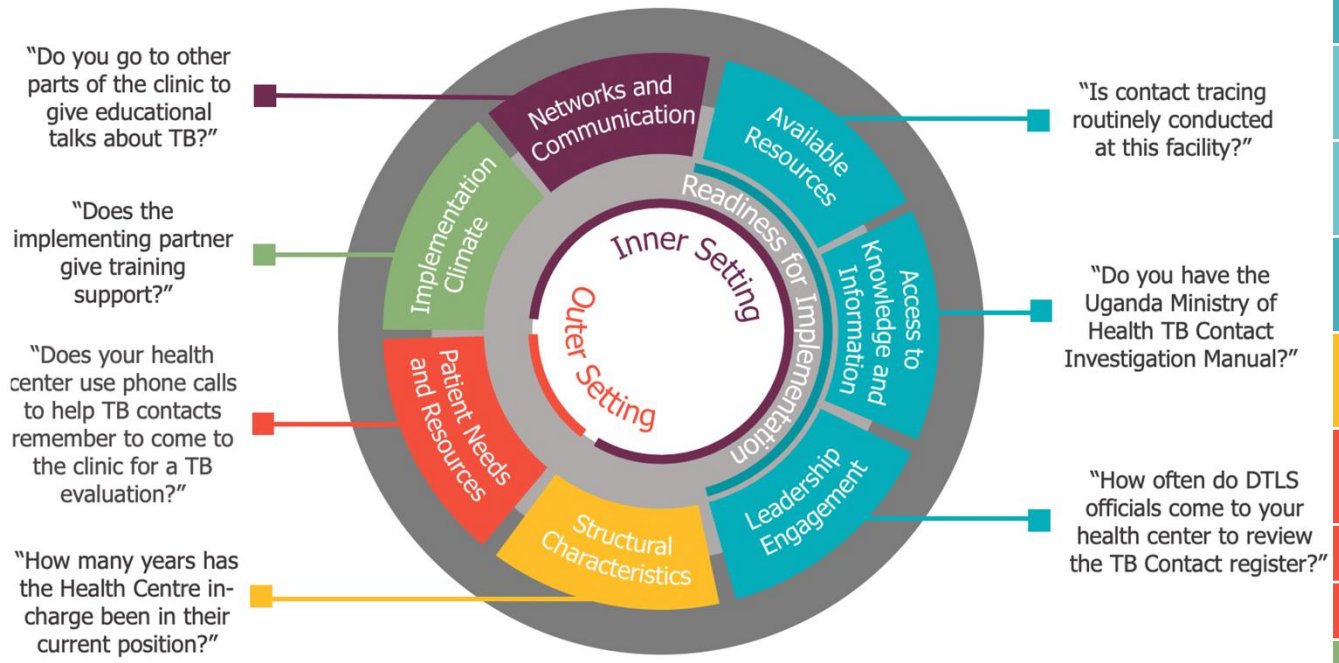
Consolidated Framework for Implementation Research (CFIR)

Premise:
Characteristics of individuals, structures, processes, and interventions influence implementation



Damschroder Implement Sci 2008, 2022

Example: Parallel, convergent mixed-methods study of implementation readiness to deliver TB contact investigation



CFIR Construct	Health Facility Attributes	% (n=28)
Available Resources	Conducting contact tracing outside home	38% (10/26)
	Trained staff on national TB CI guidelines	50% (14/28)
	Regular supervisory visits for contact investigation from District TB Officer	71% (20/28)
Leadership Engagement	On-site access & adherence to guidelines	25% (7/28)
Structural Characteristics	New clinic leadership in past 3 years	46% (13/28)
Patient Needs & Resources	Give education & counseling to TB patients	71% (20/28)
	Same-day TB testing and result allocation	64% (18/28)
	Provide social support for contacts	82% (23/28)
Implementation Climate	Receive training support from implementing partners	96% (27/28)
Networks & Communication	TB educational outreach	100% (28/28)

Johnson, Turimumahoro et al AJRCCM Supplement 2021

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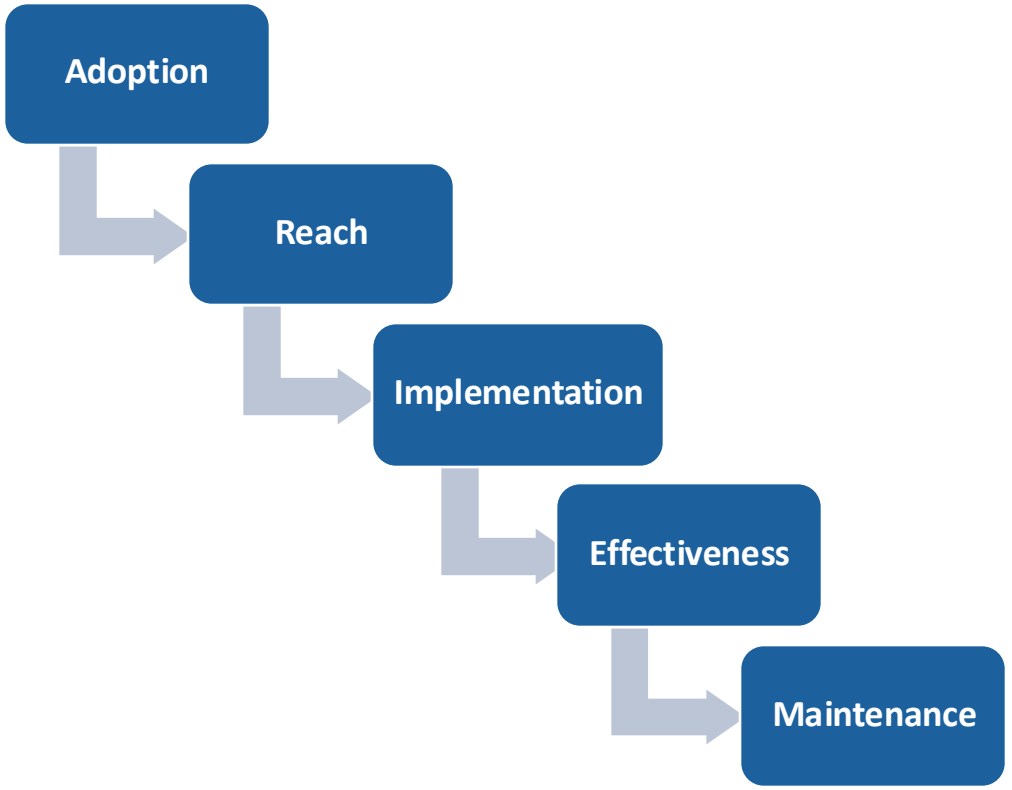
Evaluation Frameworks

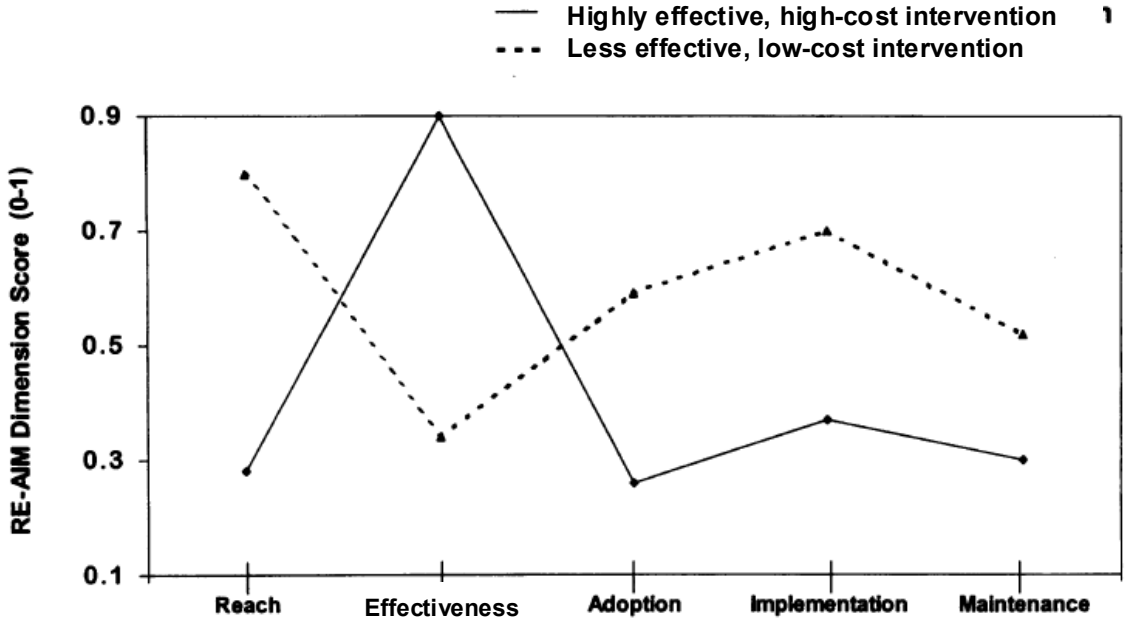
Premise: Implementation measures & process outcomes



Glasgow RE et al. Frontiers in Public Health. 2019.
Glasgow RE, Vogt TM, Boles SM. Am J Public Health 1999.

RE-AIM Evaluation Framework: Effectiveness+

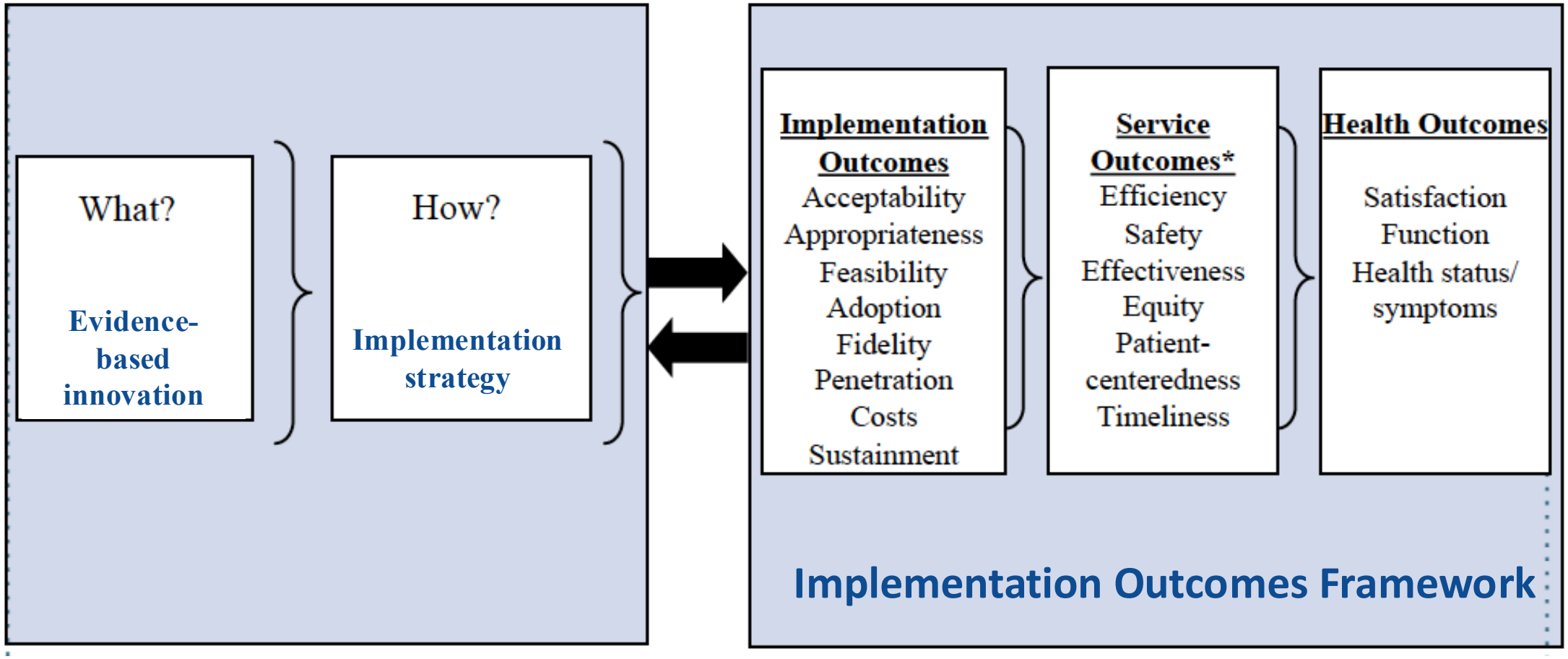
Dissemination Step	Concept	% Impacted
50% of clinics use	Adoption	50
50% of clinicians prescribe	Adoption	25
50% of patients accept medication	Reach	12.5
50% follow regimen correctly	Implementation	6.2
50% of those taking correctly benefit	Effectiveness	3.2
50% continue to benefit after 6 mo	Maintenance	1.6



How well was the intervention delivered and for how long?
Why did implementation succeed or fail?

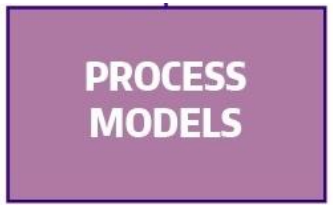
Glasgow R et al Implementation Science 2013
Glasgow et al. Am J Public Health 1999

One final evaluation framework



Proctor et al Adm Policy Ment Health 2011

Models



EPIS Framework (a kind of process model)

Premise: Implementation is a process where each stage poses unique questions

Exploration	• **What are the gaps** between current care & best practice?
Preparation	• **Which strategies** might facilitate implementation?
Implementation	• Were the practice & strategies **successful & delivered as intended?**
Sustainment	• How can the practices & strategies be **sustained over time?**

Aarons GA et al, Adm Policy Ment Health, 2011
https://episframework.com/what-is-epis

A logic model required by a funder

Inputs

Xpert testing platform
Xpert MTB/RIF assays
Sputum isolation tent
Stakeholders / Experts
- Emergency Medicine
- HIV/AIDS
- Pulmonary
- Microbiology
- Infection Control
- TB Control Director
- Industrial Hygienist
- Induction Nurses
- Finance / Accounting
- SFGH Informatics
- SFDPH Informatics
- EM Informatics
- IM Chief Residents
- FM Chief Residents
- Hospitalists Director
- DOM QI Team
- Cepheid Suppliers

Activities

Ordered supplies
Ordered equipment
Met with funders
Set up specimen flow
Set up isolation flow
Set up discharge flow
Performed ED FGD
Educated/Trained
- EM MDs
- ED Charge RNs
- Sputum induction

IM/FM/Hospitalists
Nursing Admin Forum
Hospital Admin Forum
Sought Dean approval
Received costs/billings
Accessed databases

Outputs

Cepheid MTA
Program Protocol
Xpert testing SOP
Data collection SOP
ED SOP
Sputum instructions
New test algorithm
Sputum tent guide
Xpert info sheet
SFDPH Xpert website
Xpert Pagerbox link
Xpert Consult Service
ED EHR orderset
Inpatient EHR orderset

Outcomes

Short-term

% referred for Xpert
% referred for AFB

Intermediate term

Time to 1st test order
Time to isolation
Time to collection
Time to result
Time to d/c isolation

Long term

Establish Xpert as a regular SFGH service

Impact

Reduced stays

ED LOS
Isolation LOS
Hospital LOS

Reduced costs

- ED use
- Isolation room use
- Admissions
- Admissions from jail

Improved health

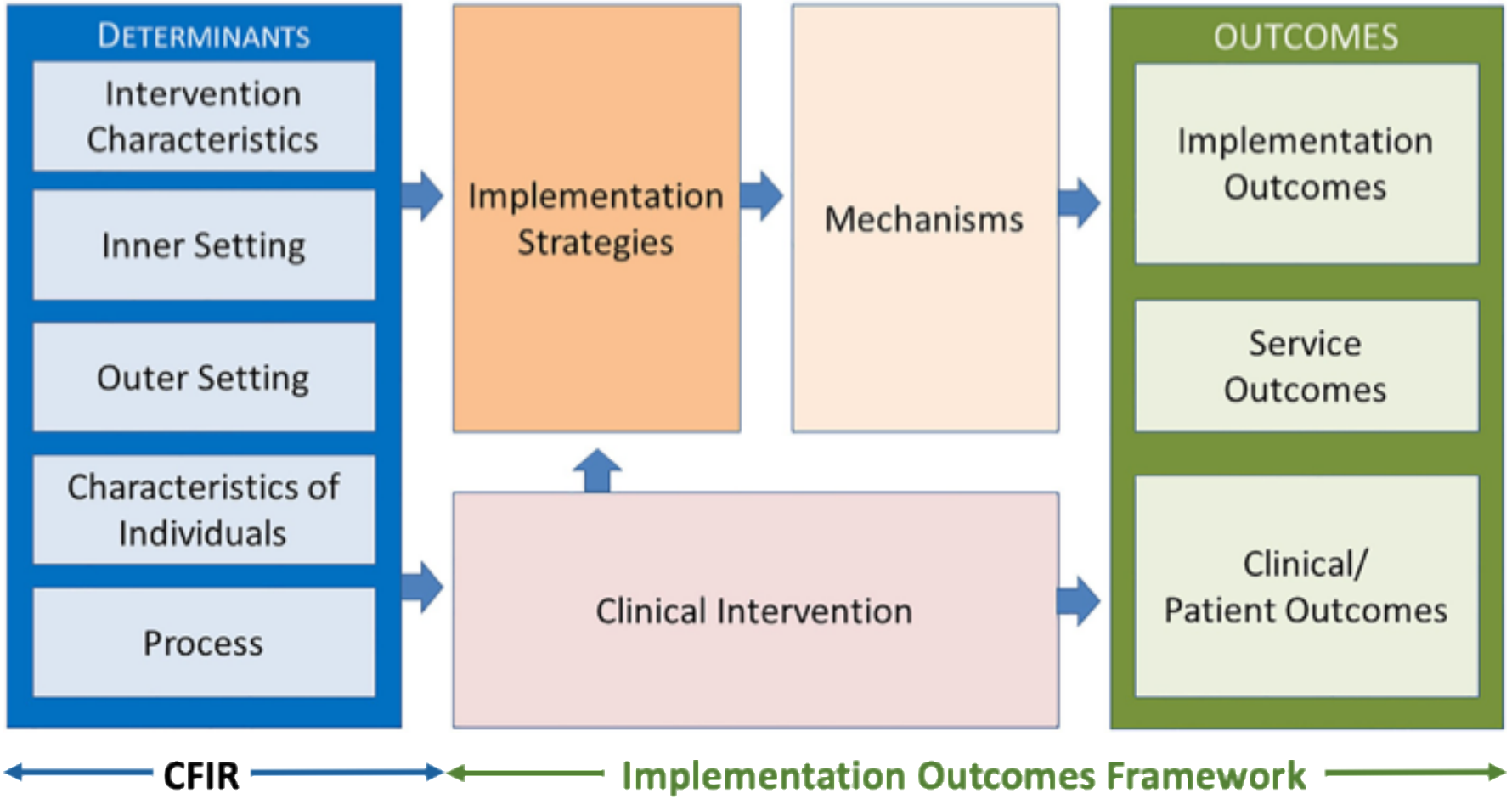
Earlier TB diagnoses
Better health

Improved well-being

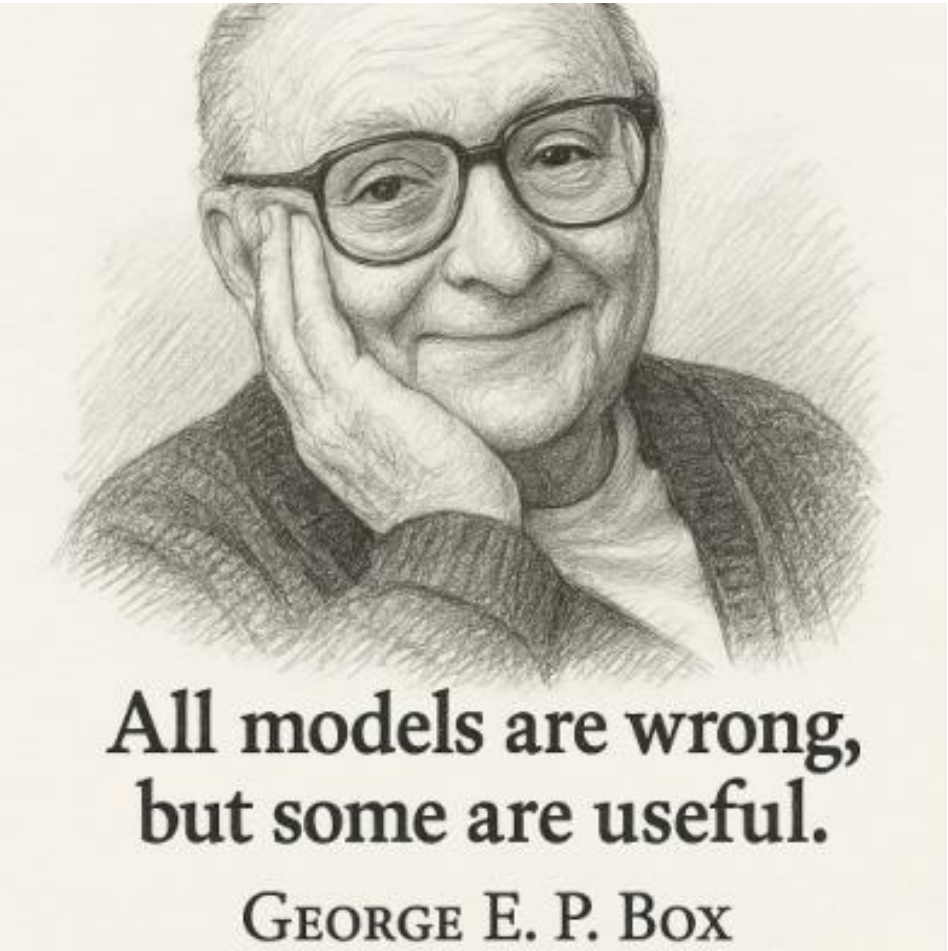
Health care workers

Chaisson LH et al *JAMA Intern Med* 2018

Implementation Research Logic Model



Callaghan-Koru J et al Clin Perinatol 2023
Adapted from Smith JD et al Implement Sci. 2020



"Experience without theory is blind, but theory without experience is mere intellectual play."

-Immanuel Kant

Image courtesy of https://eco-razon.es/

Reflection Questions

1. How do different types of theories, models, and frameworks help put research into practice?

2. Which ones would be most useful for your work?

A roadmap for today's talk

Implementation Science: Revisiting What it is and What it is Not

What are theories, models, and frameworks & why do we need them?

How to choose a theory, model, or framework?

Seminal Systematic Review of TMF in IS

Bridging Research and Practice
Models for Dissemination and Implementation Research

Rachel G. Tabak, PhD, Elaine C. Khoong, BS, David A. Chambers, DPhil, Ross C. Brownson, PhD

61 TMF identified focused on multi-level IS

Categorized according to
1. Construct flexibility
2. Dissemination vs Implementation focus
3. Level of social-ecological model

Multiple TMFs at all levels

Needs
1. Standardized terminology
2. Comparative measures
3. Info about how to select among them

Tabak et al. Am J Prev Med 2012

How to choose?

Birken *et al. Implementation Science* (2017) 12:124
DOI 10.1186/s13012-017-0656-y

Implementation Science

SHORT REPORT Open Access

Criteria for selecting implementation science theories and frameworks: results from an international survey

Sarah A. Birken[1*], Byron J. Powell[1], Christopher M. Shea[1], Emily R. Haines[1,2], M. Alexis Kirk[1,2], Jennifer Leeman[3], Catherine Rohweder[4], Laura Damschroder[5] and Justin Presseau[6,7,8]

- Choice of models is often haphazard and driven by convenience
- Have a reason why your choice is appropriate for the problem
- Choose an approach that is familiar to you and your audience

Theory Comparison and Selection Tool (T-CaST)

Birken *et al. Implementation Science* (2018) 13:143
https://doi.org/10.1186/s13012-018-0836-4

Implementation Science

RESEARCH Open Access

T-CaST: an implementation theory comparison and selection tool

Sarah A. Birken[1*], Catherine L. Rohweder[2], Byron J. Powell[1], Christopher M. Shea[1], Jennifer Scott[3], Jennifer Leeman[4], Mary E. Grewe[3], M. Alexis Kirk[1,5], Laura Damschroder[6], William A. Aldridge II[7], Emily R. Haines[1,5], Sharon Straus[8] and Justin Presseau[9,10,11]

The T-CasT Tool

1. Score each as 0, 1, or 2

0 = Poor fit

1 = Moderate fit

2 = Good fit

2. Sum scores for each TMF

Average across team members

3. Select highest scoring

Use sub-scores to justify

T-CasT Worksheet

Usability

- ☐ TMF includes relevant constructs (e.g., self-efficacy; climate)
- ☐ Key stakeholders (e.g., researchers; clinicians; funders) are able to understand, apply, and operationalize TMF.
- ☐ TMF has a clear and useful figure depicting included constructs and relationships among them.
- ☐ TMF provides a step-by-step approach for applying it.
- ☐ TMF provides methods for promoting implementation in practice.
- ☐ TMF provides an explanation of how included constructs influence implementation and/or each other.

Testability

- ☐ TMF proposes testable hypotheses.
- ☐ TMF includes meaningful, face-valid explanations of proposed relationships.
- ☐ TMF contributes to an evidence base and/or TMF development because it has been used in empirical studies.

Applicability

- ☐ TMF focuses on a relevant implementation outcome (e.g., fidelity; acceptability).
- ☐ A particular method (e.g., interviews; surveys; focus groups; chart review) can be used with TMF.
- ☐ TMF addresses a relevant analytic level (e.g., individual; organizational; community).
- ☐ TMF has been used in a relevant population (e.g., children; adults with serious mental illness) and/or conditions (e.g., attention deficit hyperactivity disorder; cancer).
- ☐ TMF is generalizable to other disciplines (e.g., education; health services; social work), settings (e.g., schools; hospitals; community-based organizations), and/or populations (e.g., children; adults with serious mental illnes

Acceptability

- ☐ TMF is familiar to key stakeholders (e.g., researchers; scholars; clinicians; funders).
- ☐ TMF comes from a particular discipline (e.g., education; health services; social work).

Birken et al Implement Sci 2018

frontiers in Public Health

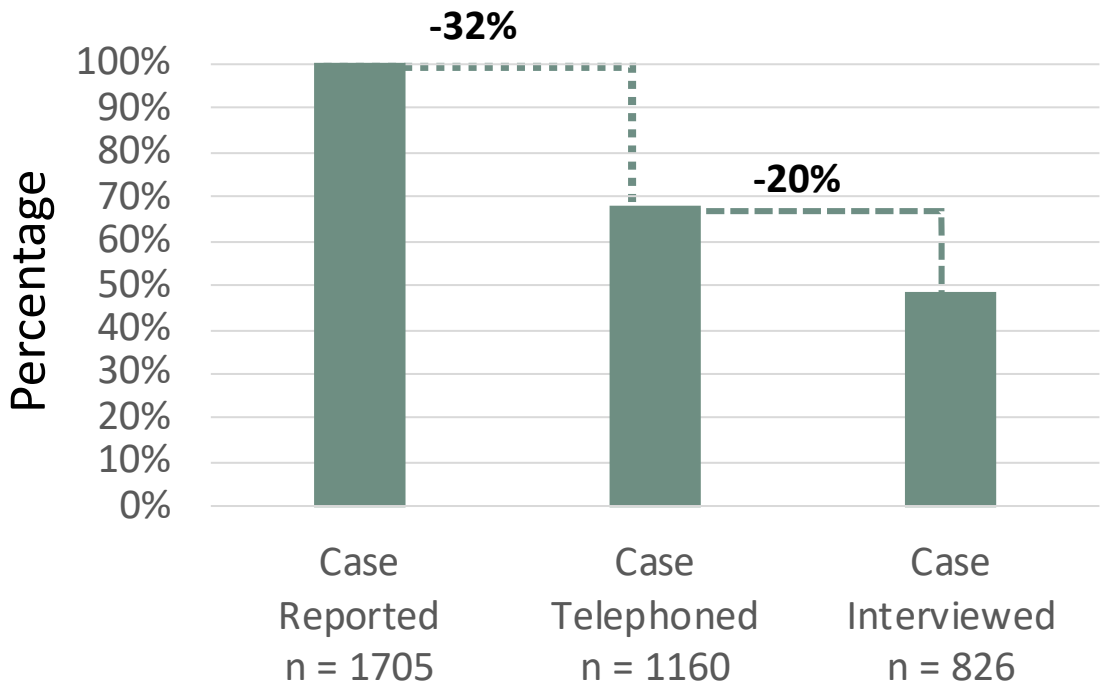
ORIGINAL RESEARCH
published: 20 August 2021
doi: 10.3389/fpubh.2021.721952

Check for updates

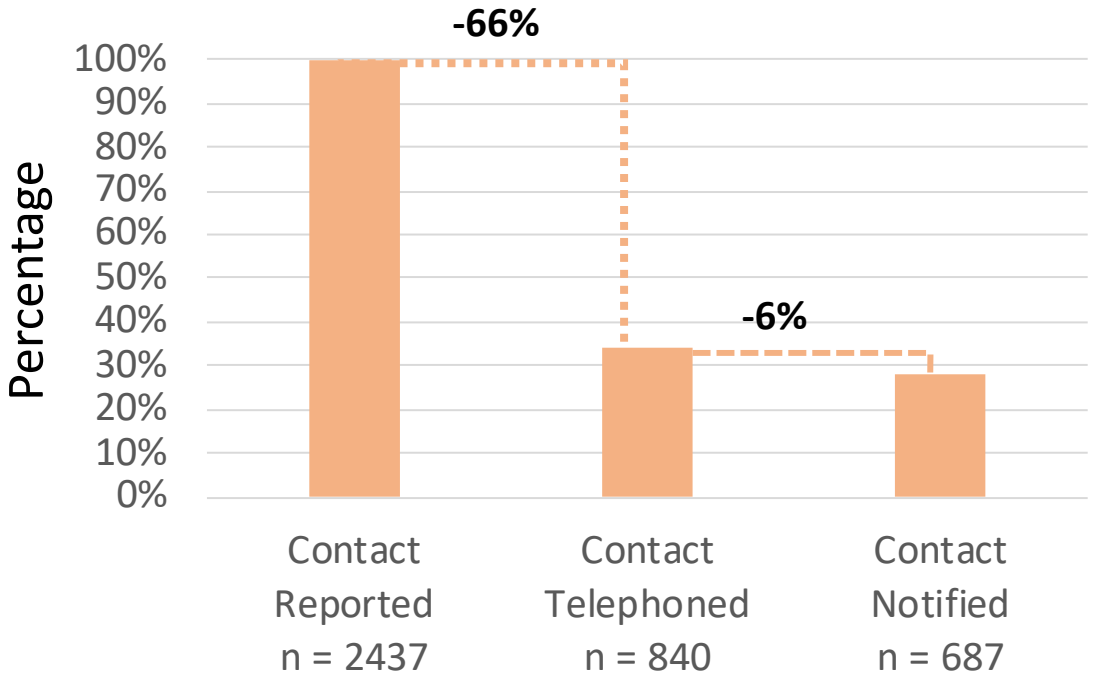
Lessons Learned From COVID-19 Contact Tracing During a Public Health Emergency: A Prospective Implementation Study

Tyler Shelby[1,2†], Christopher Schenck[2†], Brian Weeks[3†], Justin Goodwin[1,2], Rachel Hennein[1,2], Xin Zhou[4,5], Donna Spiegelman[4,5], Lauretta E. Grau[1], Linda Niccolai[1], Maritza Bond[3†] and J. Lucian Davis[1,5,6†]*

Reach:
Large proportions of cases & contacts could not be reached



Key Case Investigation Activities



Key Contact Notification Activities

Shelby et al *Frontiers in Public Health* 2021

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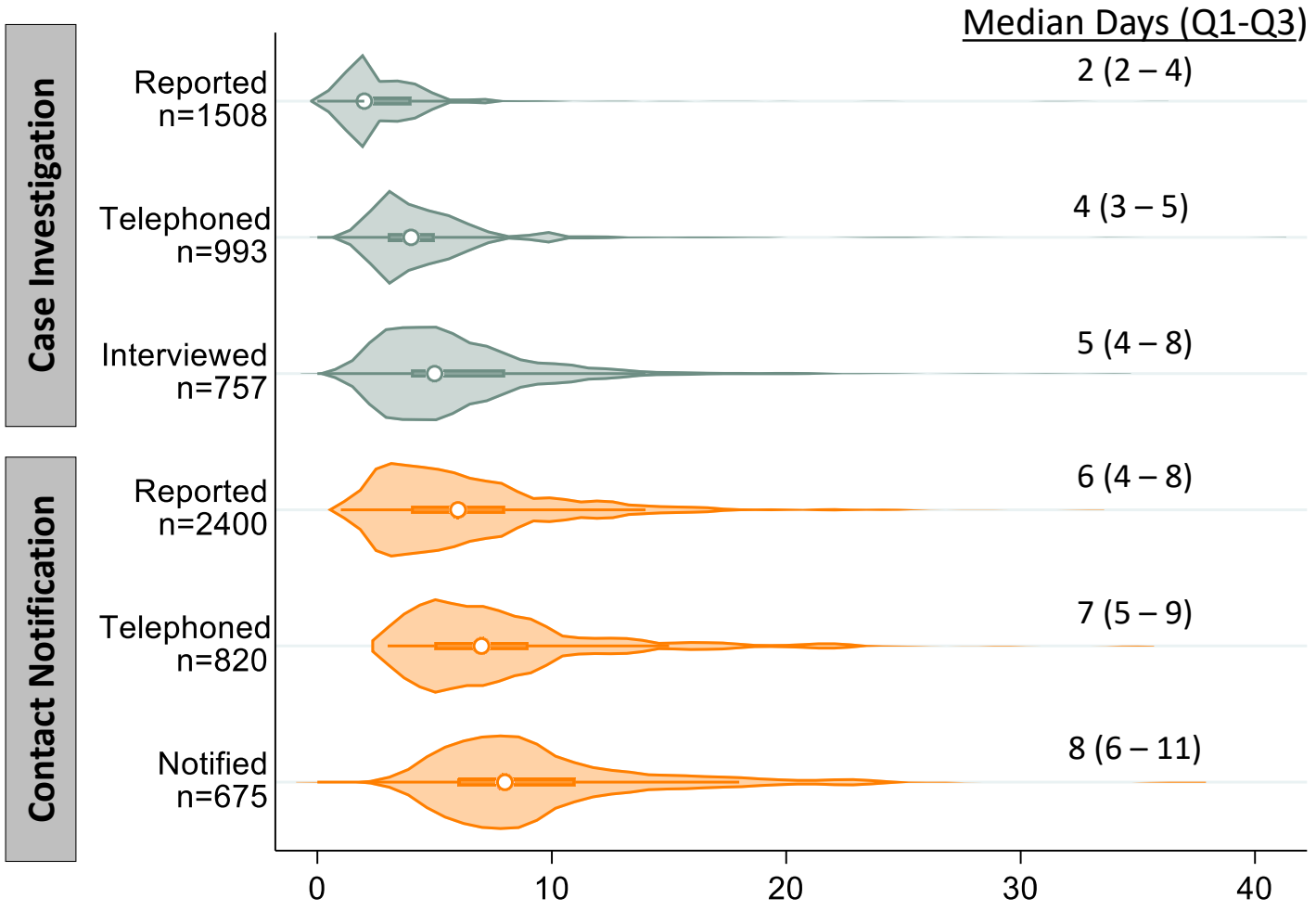
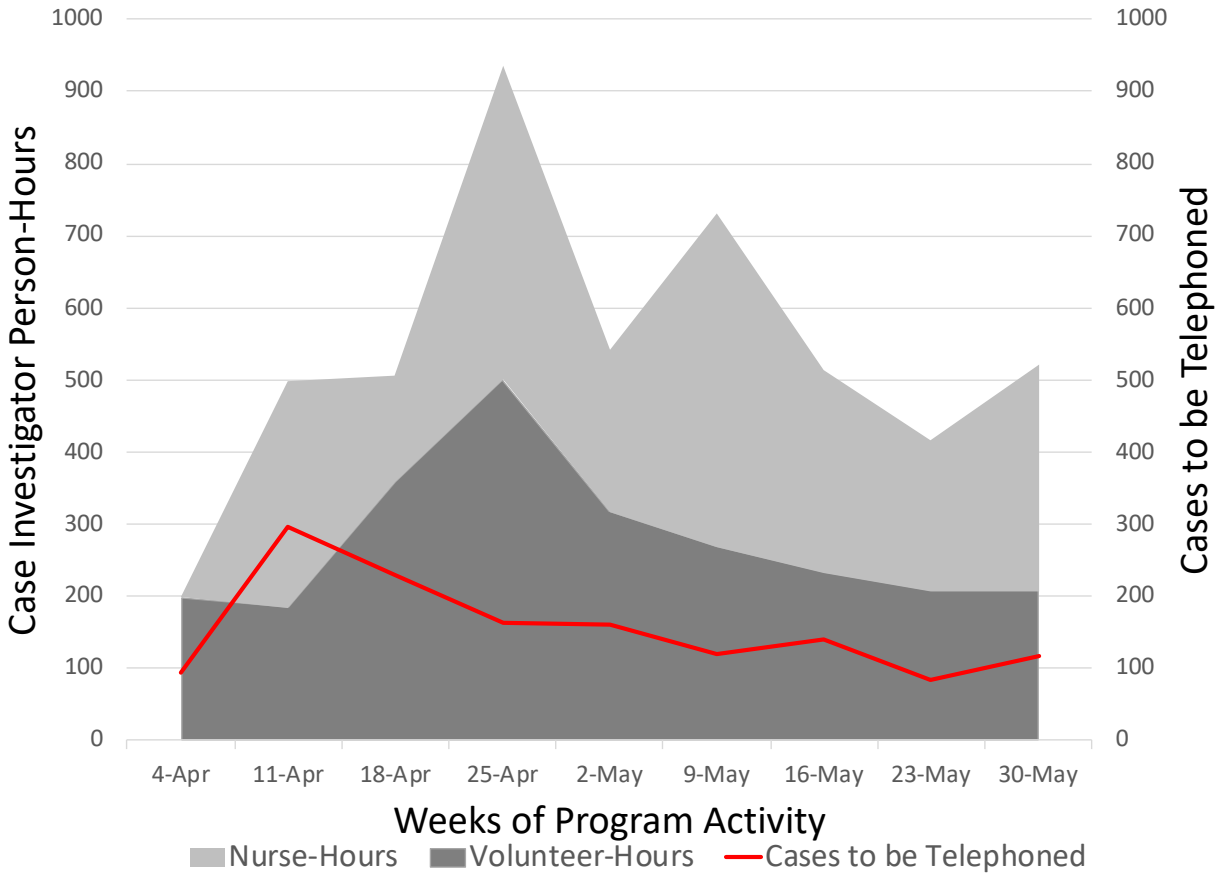
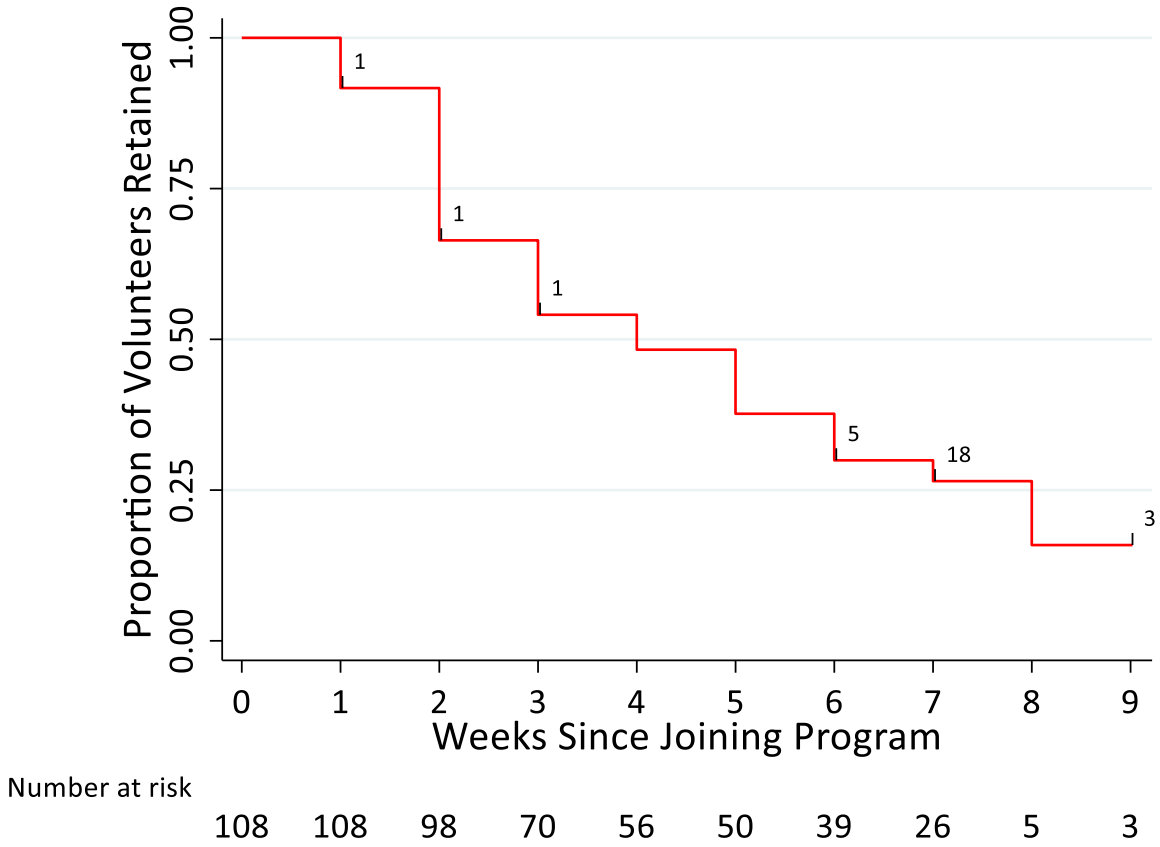
Implementation:
Delayed reach to contacts reduced prevention of transmission



Shelby et al *Frontiers in Public Health* 2021

Adoption & Maintenance:
Volunteers mostly met case demand, but retention was low





Shelby et al *Frontiers in Public Health* 2021

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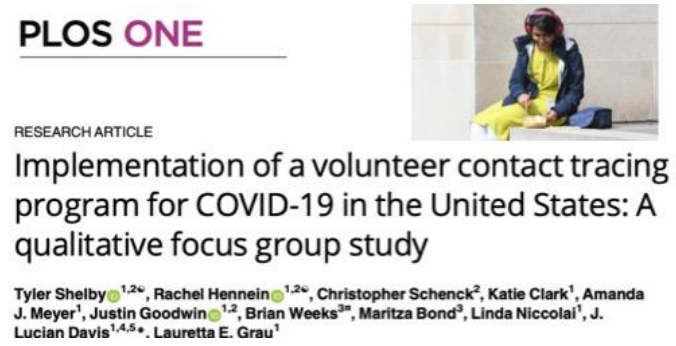
Synthesizing qualitative themes using RE-AIM



Reach	Implementation	Effectiveness	Adoption	Maintenance
Offer 2-way SMS	Personalize script	Offer food, housing, income	Continuing education	Academic credit for volunteers
Add privacy script	Standardize data collection	Automate data transfers	Offer peer support	
↑ Awareness campaigns	Coordinate with other contact tracing initiatives	Verify preferred language	Make volunteer scheduling flexible	
Combine case-contact outreach				

Shelby et al *PLoS ONE* 2022

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Questions?

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