

Accelerating the
implementation of public
health intelligence:
How implementation Science
can help

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We cannot benefit from
something we do not receive

...Or taking far too long to get there



BELLE MELLOR 2012
ADAPTED FROM AN ORIGINAL BY B. MELLOR

Morris et al, *J R Soc Med* 2011;104:510-20



Implementation science: intends to close the gap

The **scientific study of methods to promote the uptake of research findings into routine healthcare** in clinical, organisational or policy contexts

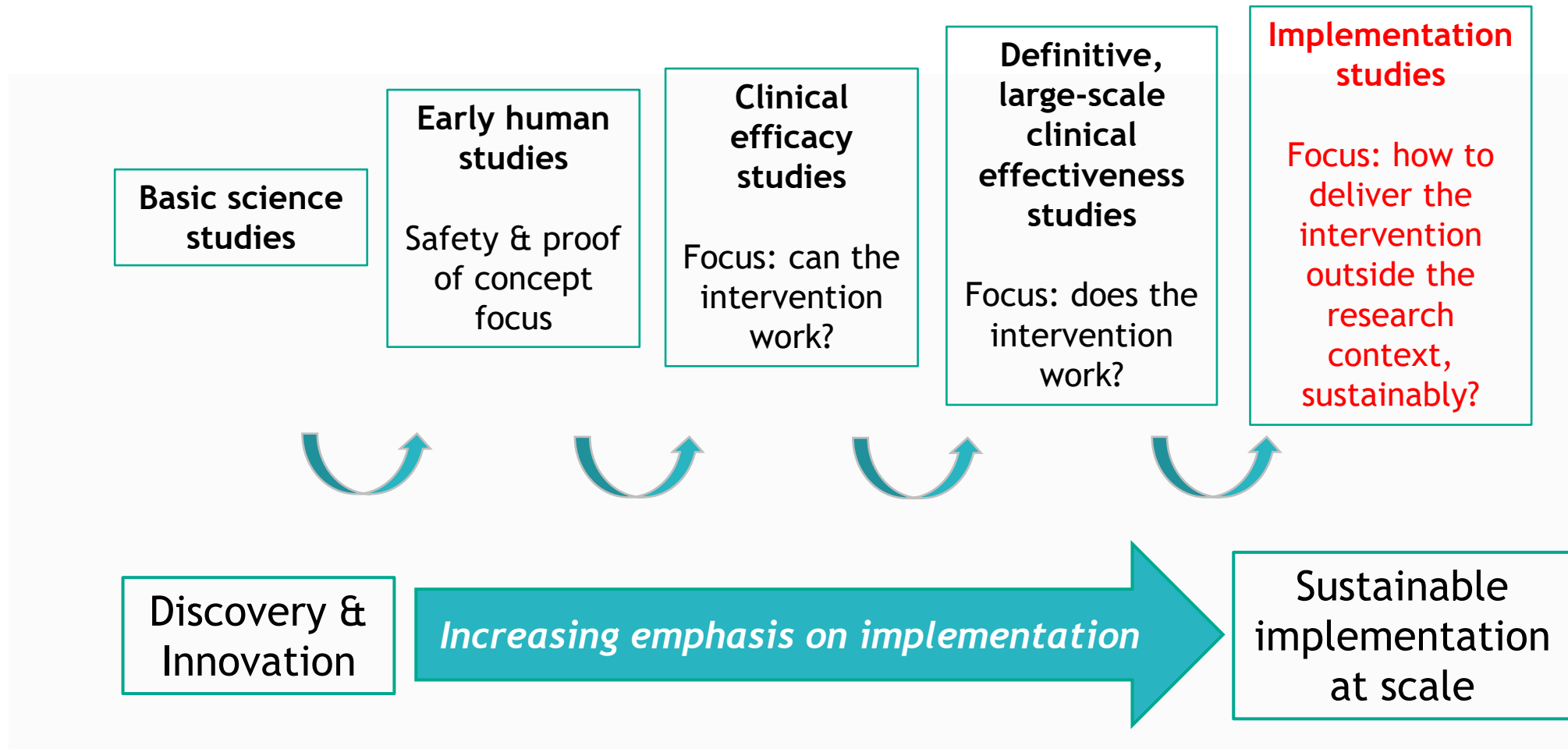
Implementation Science journal website

It supports **innovative approaches to identifying, understanding, and overcoming barriers to the adoption, adaptation, integration, scale-up and sustainability of evidence-based interventions**, tools, policies, and guidelines

National Institutes of Health (USA), 2015

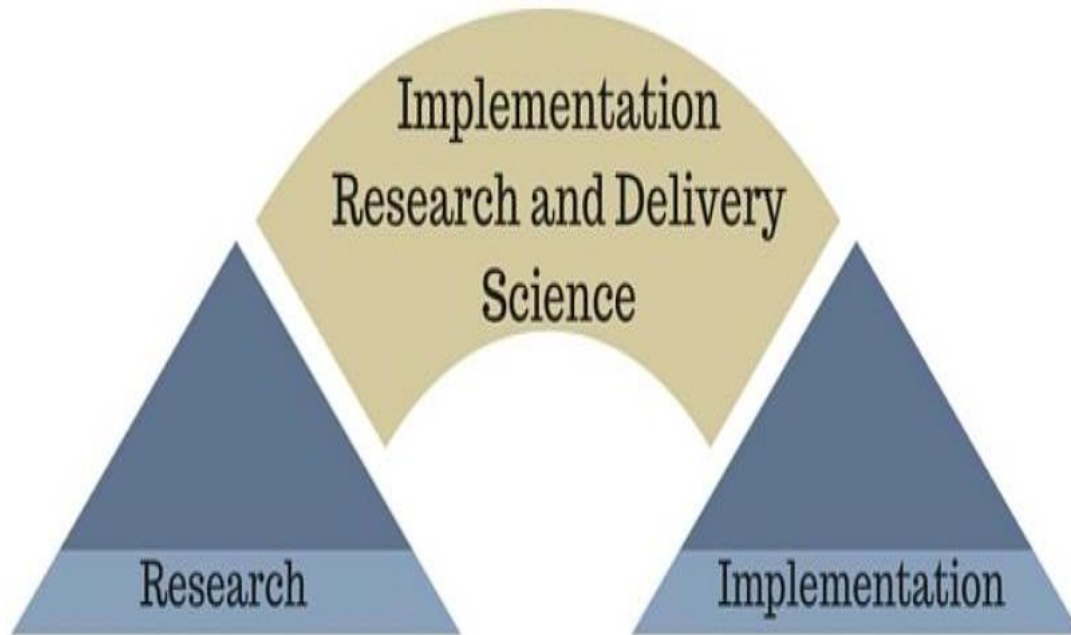
Implementation requires **Behavioural Science**: the systematic study of understanding, predicting and influencing human behaviour – including in the context of health and healthcare delivery

Implementation Research within the 'Translational Continuum'



Peters et al, *Implementation Research in Health: A Practical Guide*. WHO, 2013.

Thorncroft et al, *Psychol Med* 2011;41:2015-21.



Implementation science is the study of how research findings and evidence-based procedures are best adopted and integrated into routine practice

(Eccles & Mittman, 2006)

Implementation matters: Healthcare



Consistent failure to translate evidence into routine practice

50% of patients do not receive recommended care
30% of medical spending is on unnecessary care

Globally we spend over \$200 billion on healthcare research and 85% of those research dollars are wasted because the research is never put into practice (Chalmers and Glasziou, 2009).

How can this be avoided?



Implementation matters: Mental health

Research has produced many interventions and approaches that work to address mental health and AOD problems, yet many in the community do not receive these interventions

An illustration from youth mental health:

- >500 evidence-based interventions have been identified, yet low intensity, clinician-preferred interventions without research support remain a common treatment approach
- This “know-do gap” is a key driver of sub-optimal outcomes in youth psychiatry and psychology





Implementation matters: Juvenile Justice

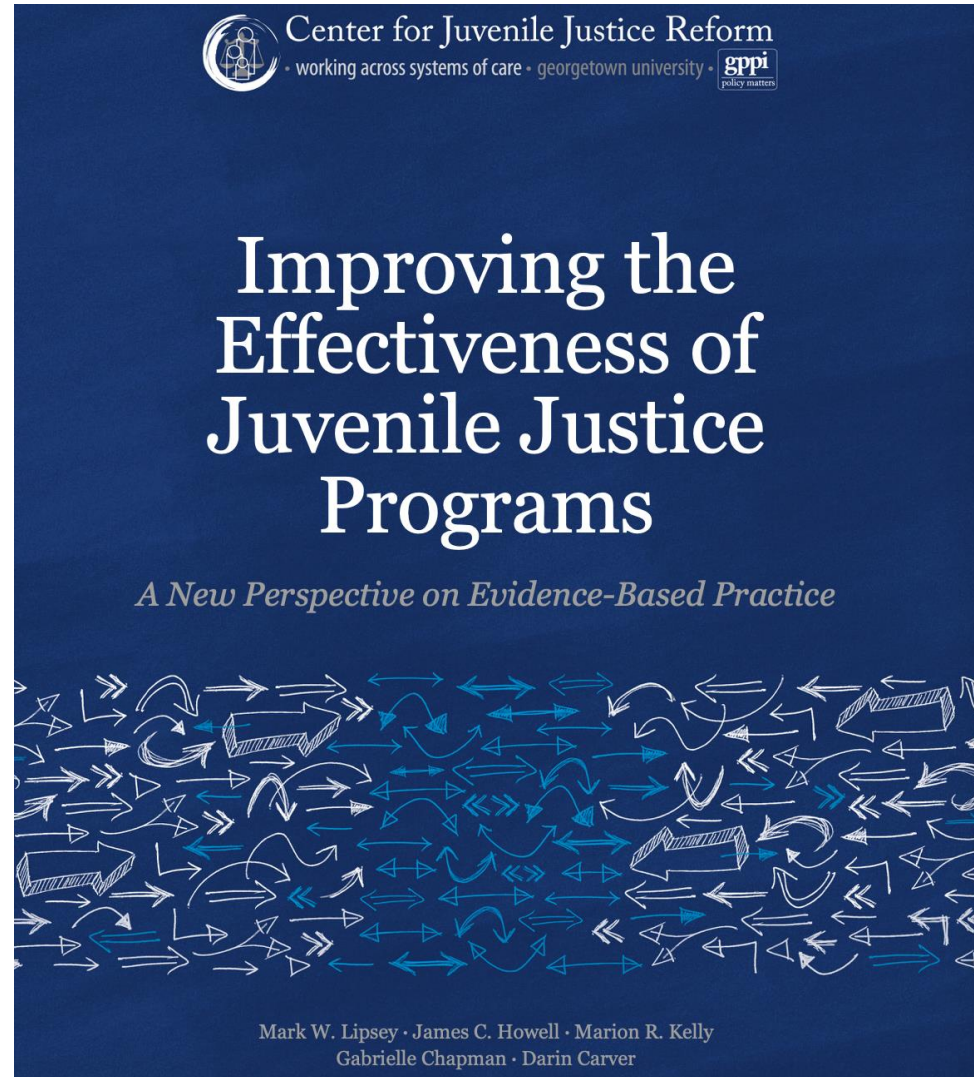
Criminal and juvenile justice systems are increasingly training staff in evidence-based practices and programs (EBPs) to enhance public safety (Lipsey, 2010)

Despite the promise of EBPs, their success is varied, limited by a lack of organizational capacity to effectively implement and sustain them.

An evidence-based approach is needed not only on the selection of the EBP, but also on successful implementation with both short- and long-term sustainability plans.

Implementation science examines how EBPs can be best implemented and how implementation affects immediate and future outcomes.

”... in some analyses, the quality with which the intervention is implemented has been as strongly related to recidivism effects as the type of program, so much so that a well-implemented intervention of an inherently less efficacious type can outperform a more efficacious one that is poorly implemented. ...” Lipsey 2009





Implementation is the bridge between goals and outcomes, but mis-implementation is common

Finding better ways to achieve system and service improvement goals is a key priority for governments, and policy and practice translation and implementation is the bridge between goals and outcomes.

- However, mis-implementation is common
 - Some studies identify at least **30%** rates of mis-implementation
- Change is challenging:
 - absent or mismatched skills and competencies in the implementation workforce
 - inadequate planning
 - lack of essential implementation and outcome data
 - stakeholder turnover or management challenges

Three waves of implementation research in mental health

First wave

- **Focus:** developing and establishing standards for identifying ‘evidence-based’ practices, and testing these
- **Results:** that high intensity, structured, less eclectic approaches that were supported by research were most effective
- **Recommendations:** outcomes can be improved by increasing clinician adoption of implementation of ‘evidence-based’ practices

Second wave

- **Focus:** testing different ways to train clinicians in ‘evidence-based’ practices, based on the assumption that the problem was a lack of knowledge and skill
- **Results:** training builds skills and knowledge but is not sufficient in and of itself to generate real practice change
- **Recommendations:** need to turn attention to contextual factors that influence whether ‘evidence-based’ practices are implemented

Third wave

- **Focus:** identifying factors at all levels (individual, organisational, system) that influence implementation
- **Results:** understanding of what contextual factors are important for driving implementation success, but new questions about relationships between these factors and about what strategies work for effecting change
- **Recommendation:** a ‘fourth wave’ that begins to put the pieces back together by developing and testing new models that are designed specifically to explain implementation



Debate | [Open Access](#) | [Published: 19 March 2021](#)

Implementation science should give higher priority to health equity

[Ross C. Brownson](#) , [Shiriki K. Kumanyika](#), [Matthew W. Kreuter](#) & [Debra Haire-Joshu](#)

[Implementation Science](#) **16**, Article number: 28 (2021) | [Cite this article](#)

20k Accesses | **128** Citations | **97** Altmetric | [Metrics](#)



Why does implementation fail?



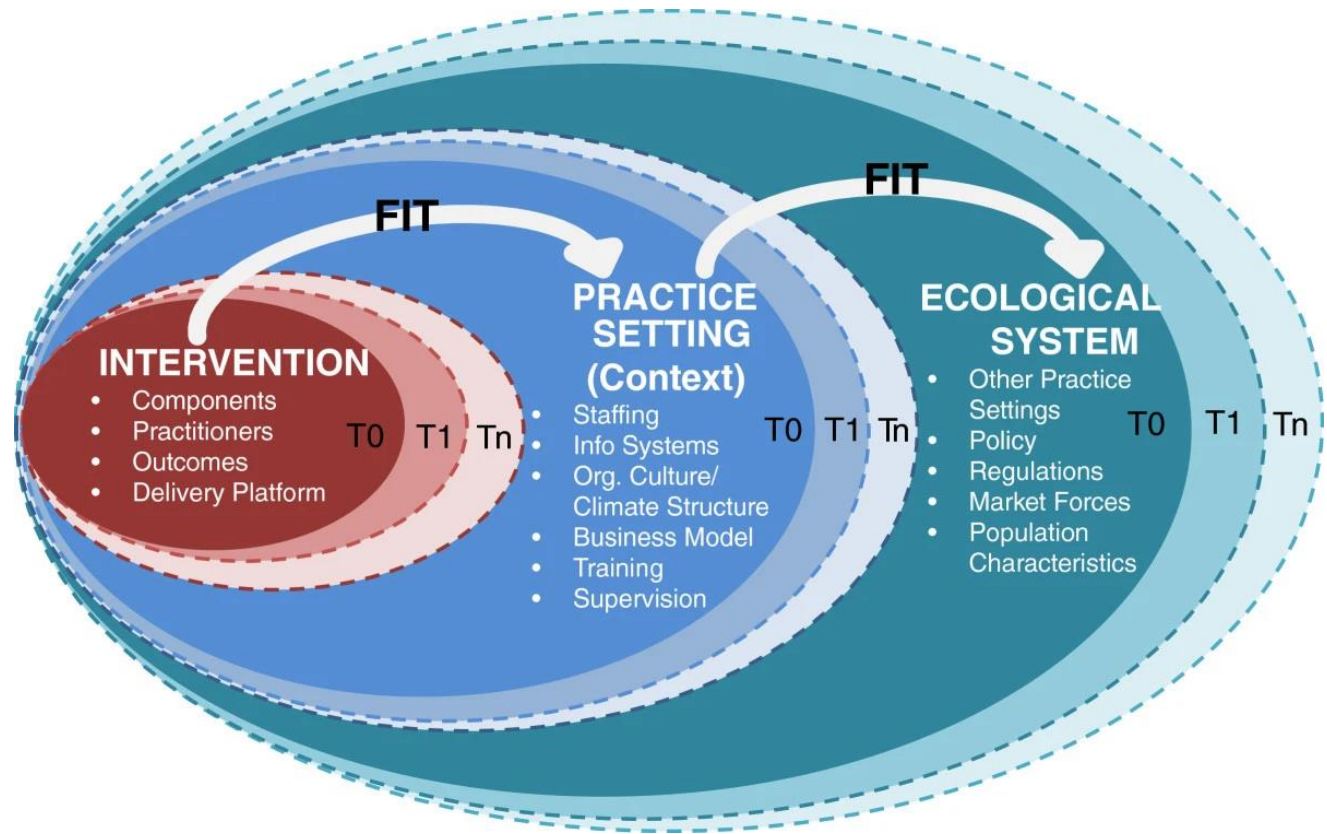
Lack of clarity in the aim or the innovation

- What are you trying to achieve?
- What changes do you want to make that will result in improvement?
- What is the evidence to support changes to practice or service?

Lack of understanding of the context

Evidence uptake depends on contexts and systems to work.

The goal is to maximize the fit between the innovation, the practice setting, and the broader system.



The Dynamic Sustainability Framework:
Chambers, Glasgow, Stange (2013). Different points in time represented by T0, T1, Tn.

Not including stakeholders in the planning

- People with an interest in the outcomes of your project
- Have something to benefit or lose from the work
- Are involved or will be affected by the project

Poor planning – “Pay now or pay later”

- Implementation plans should be well designed, very clear and guided by a theory of change

Implementation Strategies

Strategy clusters (Waltz *et al.*, 2015)

- Engage consumers
- Use evaluative & iterative strategies
- Change infrastructure
- Develop stakeholder relationships
- Utilise financial strategies
- Support clinicians
- Provide interactive assistance
- Train and educate stakeholders

'Methods or techniques used to enhance the adoption, implementation, and sustainability of a clinical program or practice.'

(Proctor, Powell & McMillen, 2013, p. 2)

Implementation frameworks



Implementation frameworks share common themes

Implementation occurs in complex, multilevel systems.

Addressing multiple levels simultaneously has been found to result in improved implementation success. Levels most often include:

1. The intervention or practice being implemented
2. Service recipients (e.g., students)
3. Professionals/practitioners (e.g., teachers, clinicians)
4. The immediate organization or “inner context” in which implementation occurs (e.g., school buildings or districts)
5. The broader “outer context” (e.g., policy context, interorganizational linkages)

Implementation unfolds over time or through stages/ phases. These phases may include pre-implementation (e.g., when systems are contemplating or exploring a change effort) and continue into a maintenance or sustainment phase.

There is a bidirectional relationship between settings and EBPs. Both are likely to require some degree of adaptation for implementation to be successful.

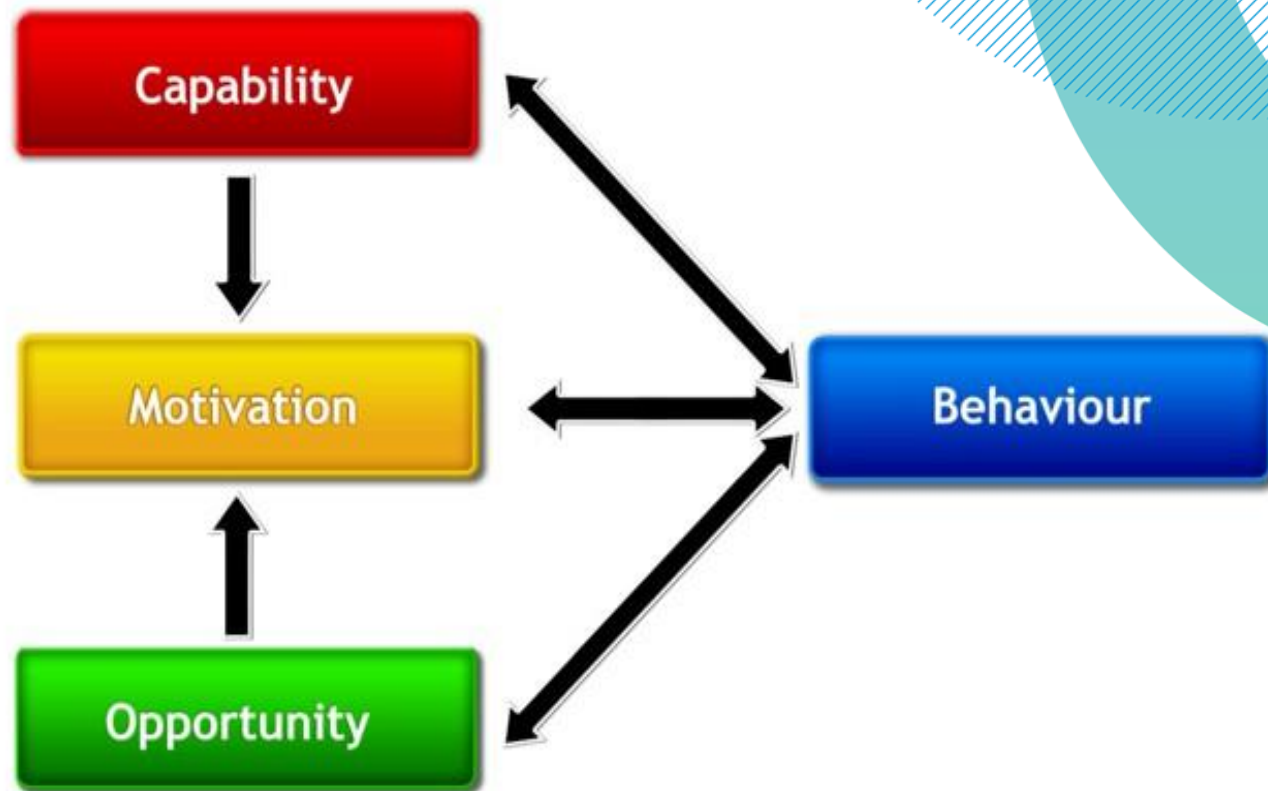
1. For EBPs, any adaptation should focus on components that are not considered critical to its effectiveness. Core EBP elements should not be adapted.
2. For settings, adaptation may focus on changing aspects such as organizational policies, leadership, or infrastructure.

Behavioral & Implementation Science – Core Frameworks and Strategies

Achieving and sustaining behaviour change

The COM-B Model

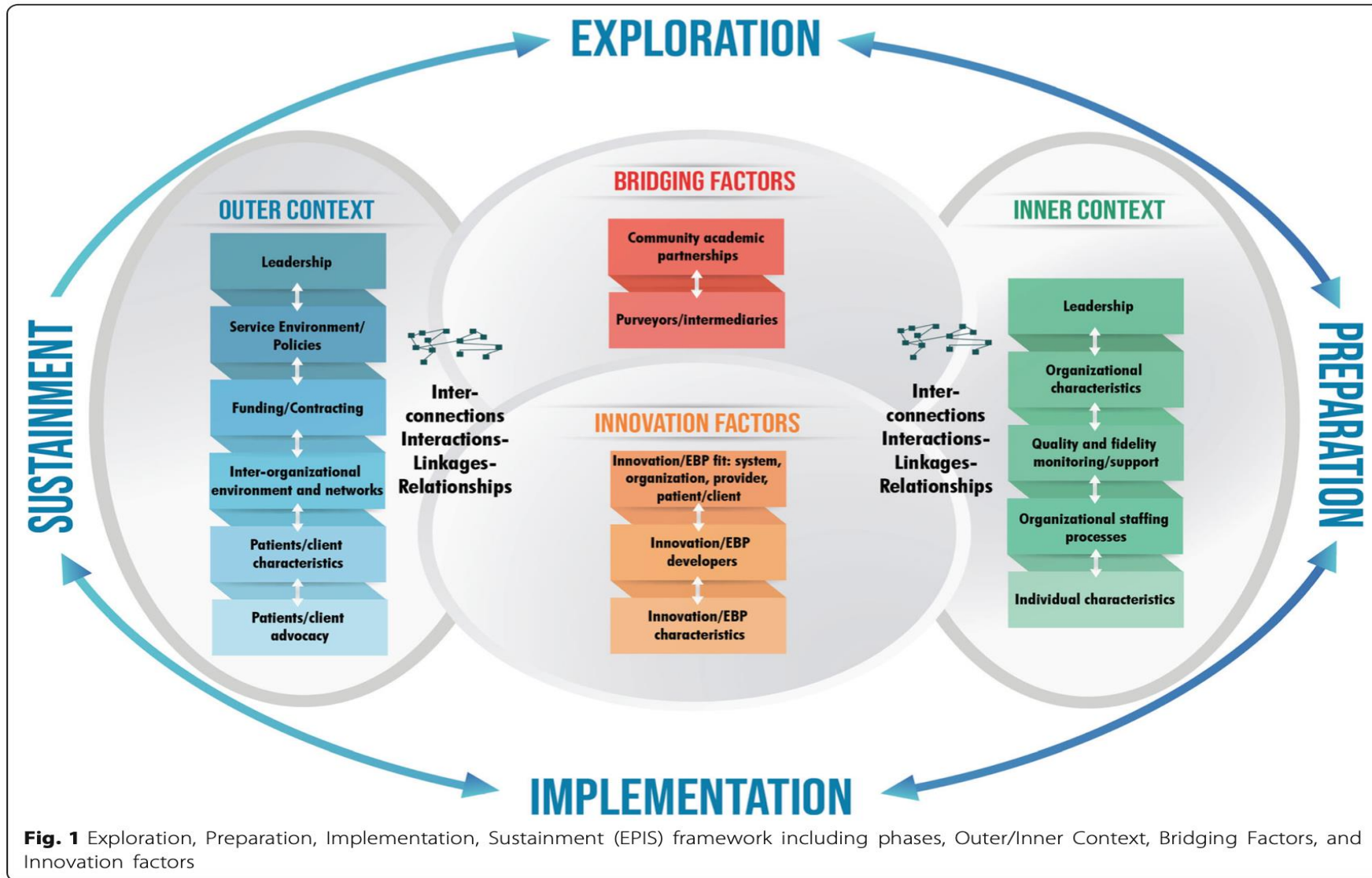
Individual:
Skills and resources
(money, time, information, support)



Interaction of individual and environmental factors :
preferences/values,
perceptions of risk/reward and decision process

Michie *et al.* (2010)

Environmental: Physical,
financial and social enablers



Aarons GA, Hurlburt M, Horwitz SM. Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Adm Policy Ment Hlth.* 2011;38:4–23.



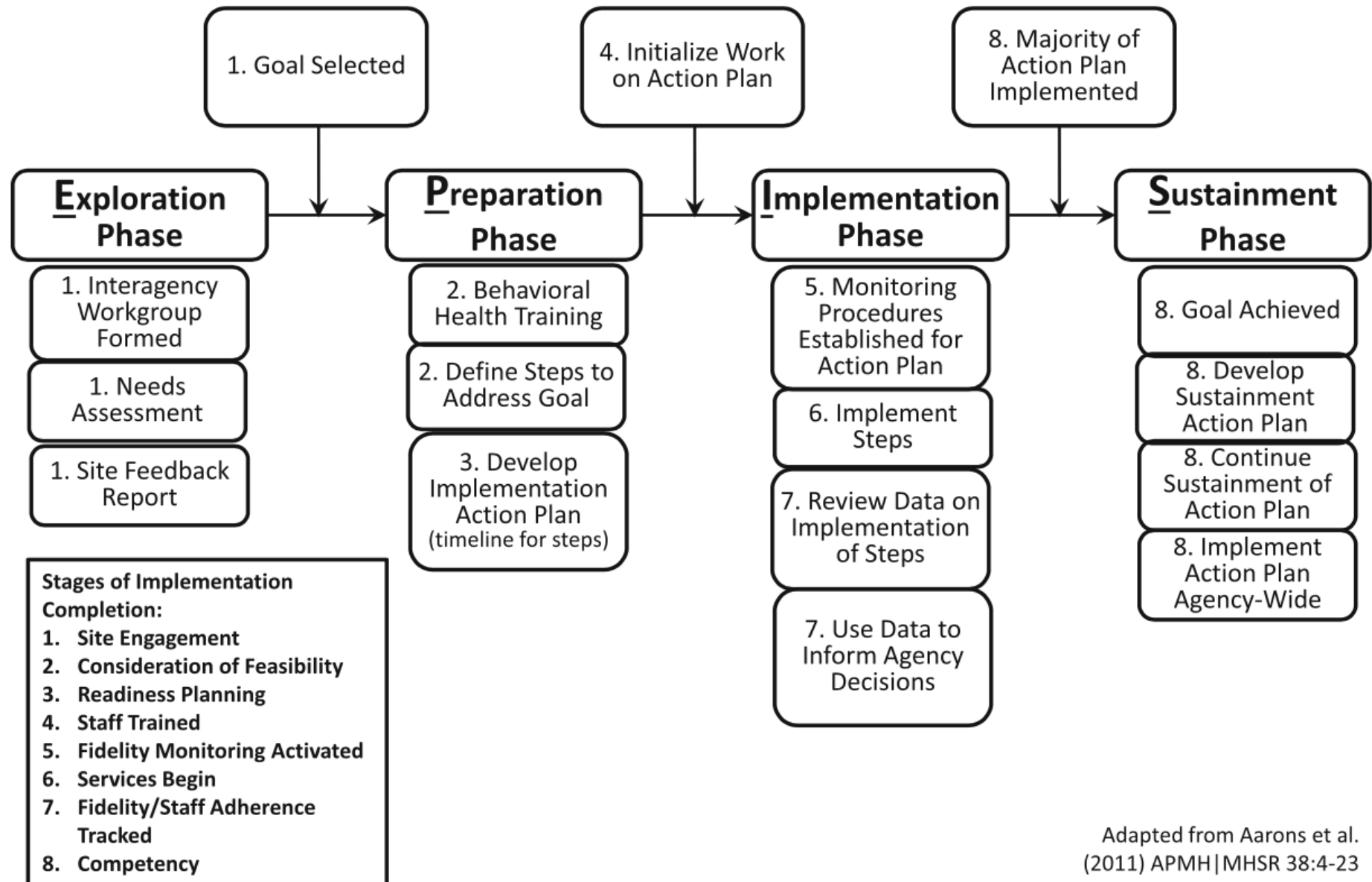
STUDY PROTOCOL

Open Access



A model for rigorously applying the Exploration, Preparation, Implementation, Sustainment (EPIS) framework in the design and measurement of a large scale collaborative multi-site study

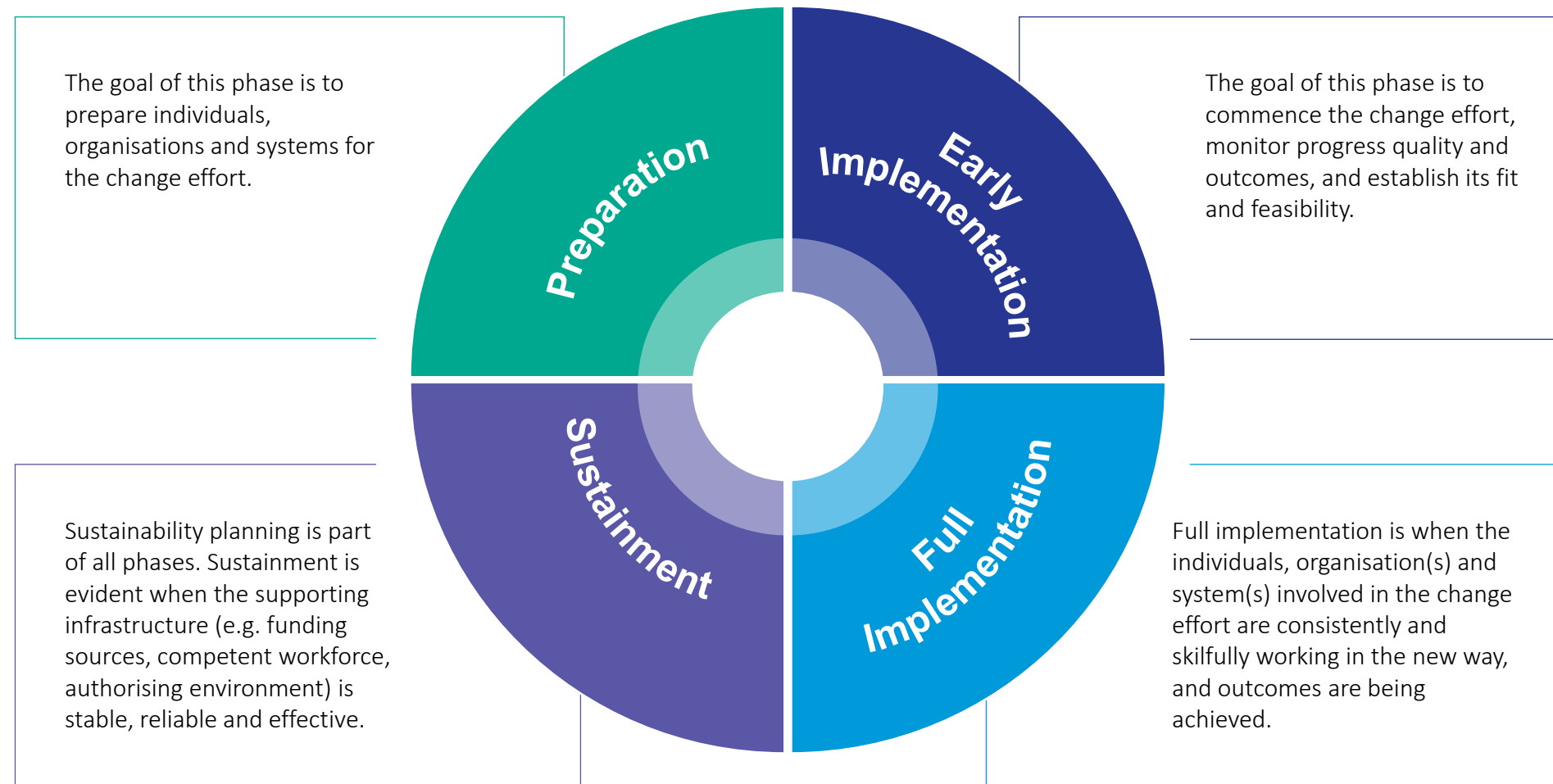
Jennifer E. Becan^{1*}, John P. Bartkowski², Danica K. Knight¹, Tisha R. A. Wiley³, Ralph DiClemente⁴, Lori Ducharme⁵, Wayne N. Welsh⁶, Diana Bowser⁷, Kathryn McCollister⁸, Matthew Hiller⁶, Anne C. Spaulding⁴, Patrick M. Flynn¹, Andrea Swartzendruber⁹, Megan F. Dickson¹⁰, Jacqueline Horan Fisher¹¹ and Gregory A. Aarons¹²



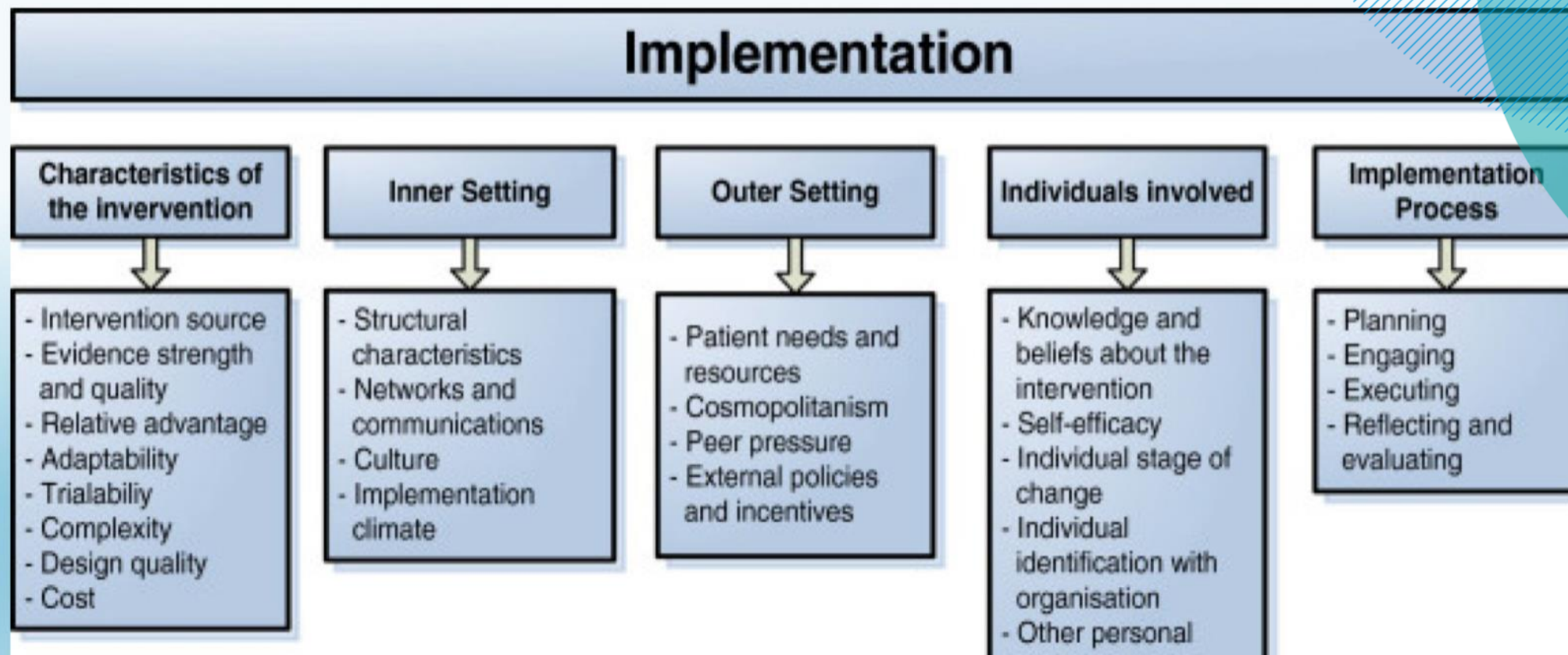
Adapted from Aarons et al. (2011) APMH | MHSR 38:4-23

Fig. 4 JJ-TRIALS conceptual framework of EPIS stages and transition points

This phased implementation framework serves as a practical tool for planning, undertaking and evaluating change efforts and provides a shared language for stakeholders



Barriers and facilitators to implementation of evidence in practice and policy: Consolidated Implementation Research Framework (Damschroder et al 2009)





Implementation phases have associated implementation strategies suitable for the requirements of each phase

Implementation strategies are techniques or approaches used to enhance adoption, implementation and sustainability of reform.

The 'how to' building blocks of the implementation process.

>70 strategies identified by implementation scientists.

Can address different targets, for example:

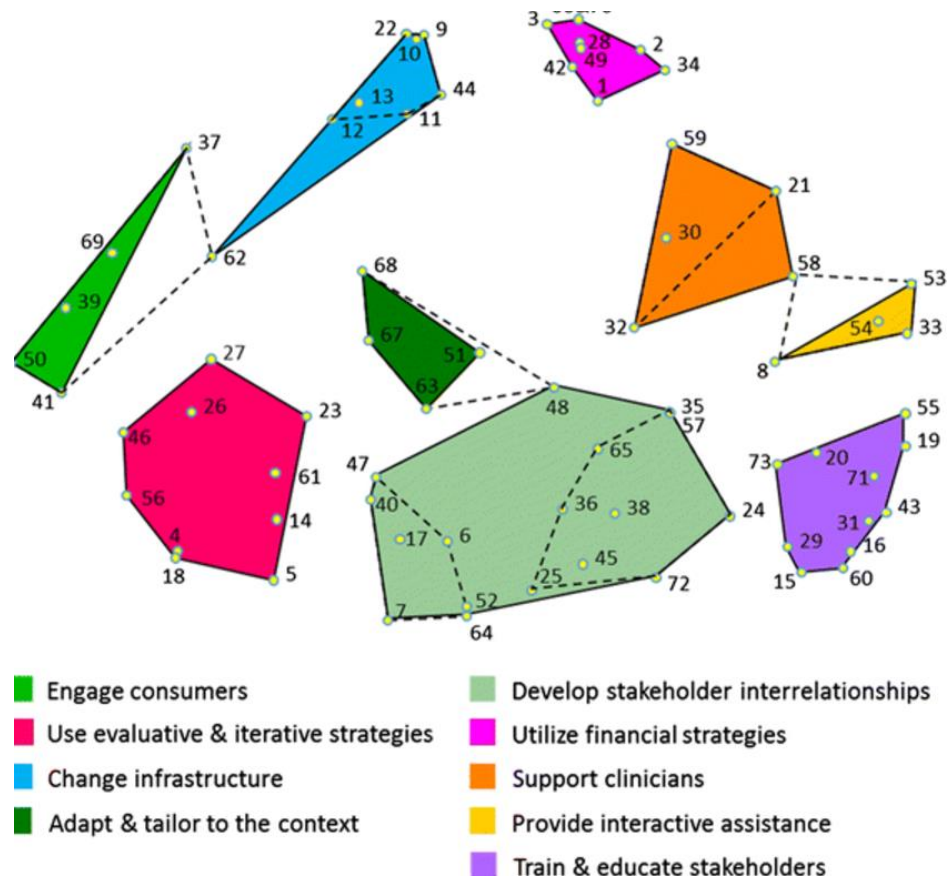
- Individual attitudes, beliefs and behaviours
- Organisational processes and structures
- Organisational culture and climate
- System readiness

Sources: Powell et al. (2015); Waltz et al. (2019)

Implementation strategies and measurement

Implementation strategies: state of the art

- Evidence review & expert consensus
- 73 strategies grouped into 9 thematic categories
- These are the interventions we are interested in



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

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Abstract

Background: Poor terminological consistency for core concepts in implementation science has been widely noted as an obstacle to effective meta-analyses. This inconsistency is also a barrier for those seeking guidance from the research literature when developing and planning implementation initiatives. The Expert Recommendations for Implementing Change (ERIC) study aims to address one area of terminological inconsistency: discrete implementation strategies involving one process or action used to support a practice change. The present report is on the second stage of the ERIC project that focuses on providing initial validation of the compilation of 73 implementation strategies that were identified in the first phase.

Findings: Purposive sampling was used to recruit a panel of experts in implementation science and clinical practice (N = 35). These key stakeholders used concept mapping sorting and rating activities to place the 73 implementation strategies into similar groups and to rate each strategy's relative importance and feasibility. Multidimensional scaling analysis provided a quantitative representation of the relationships among the strategies, all but one of which were found to be conceptually distinct from the others. Hierarchical cluster analysis supported organizing the 73 strategies into 9 categories. The ratings data reflect those strategies identified as the most important and feasible.

Conclusions: This study provides initial validation of the implementation strategies within the ERIC compilation as being conceptually distinct. The categorization and strategy ratings of importance and feasibility may facilitate the search for, and selection of, strategies that are best suited for implementation efforts in a particular setting.

Keywords: Concept mapping, Implementation research, Implementation strategies, Mental health, US Department of Veterans Affairs

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How many strategies are needed to optimize uptake of a treatment?

Methods

- 73-item survey sent to all Veterans Affairs sites treating Hep C to assess whether or not a site used each one of the strategies
- Assessed associations between treatment starts and number of implementation strategies used


Results

- Between 1 and 59 strategies used (average: **25 ± 14**)
- Number of treatment starts correlated with total number of strategies used (**r=0.43**, p<0.001)

Rogal et al. *Implementation Science* (2017) 12:50
DOI 10.1186/s13012-017-0588-6

Implementation Science

RESEARCH Open Access

 CrossMark

The association between implementation strategy use and the uptake of hepatitis C treatment in a national sample

Shari S. Rogal^{1,2,3*}, Vera Yakovchenko⁴, Thomas J. Waltz^{5,6}, Byron J. Powell⁷, JoAnn E. Kirchner⁸, Enola K. Proctor⁹, Rachel Gonzalez¹⁰, Angela Park¹¹, David Ross¹², Timothy R. Morgan¹⁰, Maggie Chartier¹² and Matthew J. Chinman¹³

Abstract

Background: Hepatitis C virus (HCV) is a common and highly morbid illness. New medications that have much higher cure rates have become the new evidence-based practice in the field. Understanding the implementation of these new medications nationally provides an opportunity to advance the understanding of the role of implementation strategies in clinical outcomes on a large scale. The Expert Recommendations for Implementing Change (ERIC) study defined discrete implementation strategies and clustered these strategies into groups. The present evaluation assessed the use of these strategies and clusters in the context of HCV treatment across the US Department of Veterans Affairs (VA), Veterans Health Administration, the largest provider of HCV care nationally.


Methods: A 73-item survey was developed and sent to all VA sites treating HCV via electronic survey, to assess whether or not a site used each ERIC-defined implementation strategy related to employing the new HCV medication in 2014. VA national data regarding the number of Veterans starting on the new HCV medications at each site were collected. The associations between treatment starts and number and type of implementation strategies were assessed.

Results: A total of 80 (62%) sites responded. Respondents endorsed an average of 25 ± 14 strategies. The number of treatment starts was positively correlated with the total number of strategies endorsed (r = 0.43, p < 0.001). Quartile of treatment starts was significantly associated with the number of strategies endorsed (p < 0.01), with the top quartile endorsing a median of 33 strategies, compared to 15 strategies in the lowest quartile. There were significant differences in the types of strategies endorsed by sites in the highest and lowest quartiles of treatment starts. Four of the 10 top strategies for sites in the top quartile had significant correlations with treatment starts compared to only 1 of the 10 top strategies in the bottom quartile sites. Overall, only 3 of the top 15 most frequently used strategies were associated with treatment.

Conclusions: These results suggest that sites that used a greater number of implementation strategies were able to deliver more evidence-based treatment in HCV. The current assessment also demonstrates the feasibility of electronic self-reporting to evaluate ERIC strategies on a large scale. These results provide initial evidence for the clinical relevance of the ERIC strategies in a real-world implementation setting on a large scale. This is an initial step in identifying which strategies are associated with the uptake of evidence-based practices in nationwide healthcare systems.

Keywords: Interferon-free medications, Importance, Feasibility

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Common implementation strategies targeting professional behaviour change

Meta-analyses	Number of studies/individuals	Effect sizes
Printed educational materials (35)	14 RCTs and 31 ITS	Median absolute improvement of 2.0% (range 0% to 11%)
Educational meetings (31)	81 RCTs (involving more than 11,000 health professionals)	Median absolute improvement in care of 6.0% (interquartile range 1.8% to 15.3%)
Educational outreach (36)	69 RCTs (involving more than 15,000 health professionals)	Median absolute improvements in: -Prescribing behaviors [17 comparisons] of 4.8% (interquartile range 3.0–6.5%) -Other behaviors (e.g., providing screening tests; 17 comparisons) of 6.0% (interquartile range 3.6–16.0%)
Local opinion leaders (33)	18 RCTs (involving more than 296 hospitals and 318 primary care physicians)	Median absolute improvement of care of 12% across studies (interquartile range 6.0–14.5%)
Audit and feedback (9)	140 RCTs	Median absolute improvement of 4.3% (interquartile range 0.5–16%)
Computerized reminders (8)	28 RCTs	Median absolute improvement of care 4.2% (interquartile range 0.8–18.8%)
Tailored implementation strategies (37)	32 RCTs	Meta-regression using 15 randomized trials. Pooled odds ratio of 1.56 (95% CI, 1.27–1.93, $p < 0.001$)

Table updated from Grimshaw et al. (34), and draws upon Cochrane Reviews from the Effective Practice and Organization of Care (EPOC) group (38).

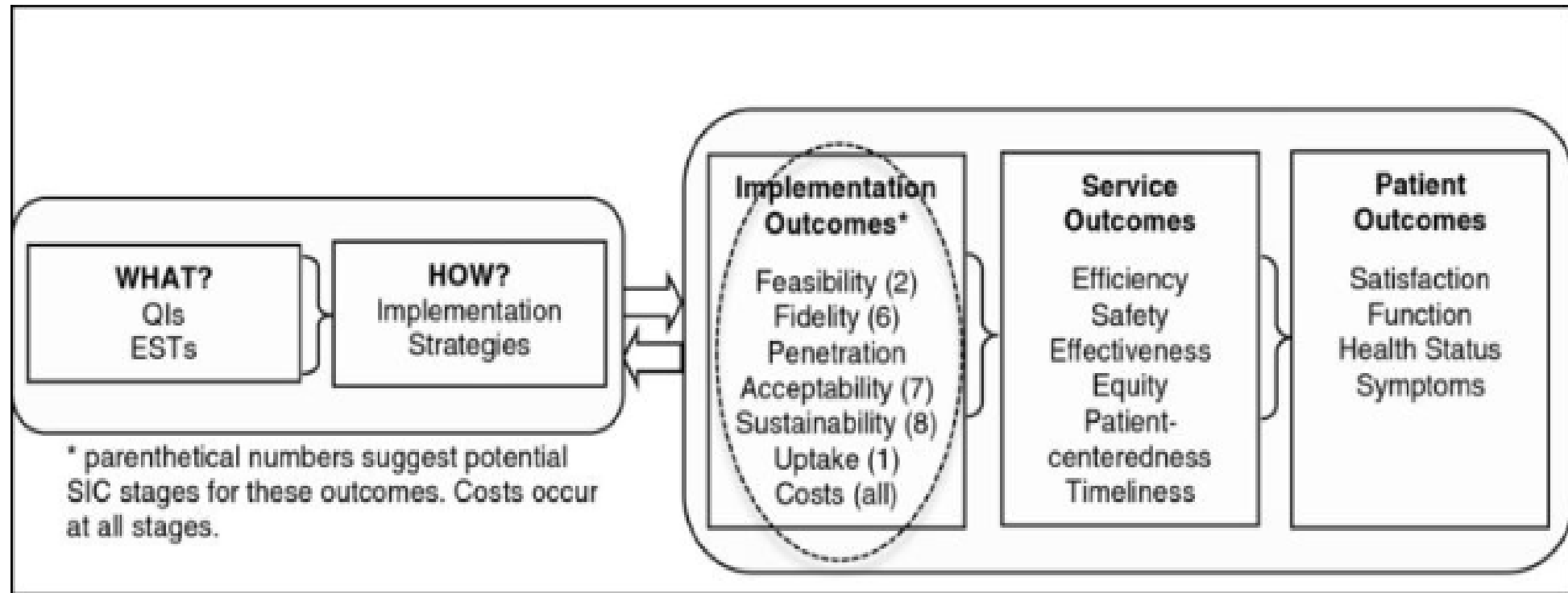


Figure 1

Conceptual model for implementation research (adapted from Proctor et al.[3]) Circled area shows target of proposal.



Tool name	Tool purpose	Tool references
The Evidence-Based Practice Attitude Scale (<i>EBPAS</i>)	To measure the attitudes of service providers toward adopting an EBP	Aarons (2004), Aarons, Cafri, Lugo, and Sawitzky (2010), Cook et al. (2018), Egeland, Ruud, Ogden, Lindstrøm, and Heiervang (2016), Rye, Torres, Friborg, Skre, and Aarons (2017), and van Sonsbeek et al. (2015)
The Implementation Leadership Scale (<i>ILS</i>)	To assess the presence of characteristics of leadership conducive of implementation	Aarons et al. (2014), Aarons, Ehrhart, Torres, Finn, and Roesch (2016), Finn, Torres, Ehrhart, Roesch, and Aarons (2016), Lyon et al. (2018), and Torres et al. (2018)
The Implementation Climate Scale (<i>ICS</i>)	To assess the presence of critical factors of implementation climate	Ehrhart et al. (2016), Ehrhart, Aarons, and Farahnak (2014), and Lyon et al. (2018)
The Organizational Readiness for Implementing Change (<i>ORIC</i>) Questionnaire	To measure the organizational implementation readiness within health-care settings	Ruest, Léonard, Thomas, Desrosiers, and Guay (2019), Shea, Jacobs, Esserman, Bruce, and Weiner (2014), and Storkholm, Mazzocato, Tessma, and Savage (2018)
<i>NoMad</i> : Implementation measure based on Normalization Process Theory	To assess, monitor, and measure factors that affect the implementation of complex intervention within routine practice (i.e., “normalization”)	Elf et al. (2018), Finch et al. (2013, 2018), Rapley et al. (2018), and Vis et al. (2019)
The Stages of Implementation Completion (SIC) tool	To track the time required to achieve key milestones for the implementation of an EBP	Chamberlain et al. (2011), Saldana (2014); Saldana et al. (2019), and Saldana, Chamberlain, Wang, and Brown (2011)

Albers, Shlonsky & Mildon (2020)

READINESS THINKING TOOL [®]

$$R = MC^2$$

Readiness Motivation
Innovation-Specific Capacity
General Capacity

This form can help you think about an organization's readiness to implement a new program, policy, practice or process.

1. Write down the innovation you are considering: _____
2. Reflect and consider whether the areas below are challenges or a strength for your innovation. Discuss your rationale with colleagues also involved in implementation.

Motivation	Degree to which we want the innovation to happen.	Challenge	Strength	Unsure
Relative Advantage	This innovation seems better than what we are currently doing.			
Compatibility	This innovation fits with how we do things.			
Simplicity	This innovation seems simple to use.			
Ability to Pilot	Degree to which this innovation can be tested and experimented with.			
Observability	Ability to see that this innovation is leading to outcomes.			
Priority	Importance of this innovation compared to other things we do.			
Innovation-specific Capacity	What is needed to make this particular innovation happen.			
Innovation-specific Knowledge & Skills	Sufficient abilities to do the innovation.			
Champion	A well-connected person who supports and models this innovation.			
Supportive Climate	Necessary supports, processes, and resources to enable this innovation.			
Inter-organizational Relationships	Relationships between organizations that support this innovation.			
Intra-organizational Relationships	Relationships within organization that support this innovation.			
General Capacity	Our overall functioning.			
Culture	Norms and values of how we do things here.			
Climate	The feeling of being part of this organization.			
Innovativeness	Openness to change in general.			
Resource Utilization	Ability to acquire and allocate resources including time, money, effort, and technology.			
Leadership	Effectiveness of our leaders.			
Internal Operations	Effectiveness at communication and teamwork.			
Staff Capacities	Having enough of the right people to get things done.			
Process Capacities	Ability to plan, implement, and evaluate.			



Innovations in study designs

Hybrid trials to assess the quality and effectiveness of implementation activities while simultaneously evaluating the effectiveness of an intervention

Hybrid Type 1: Testing a clinical intervention while gathering information on its delivery during an effectiveness trial and/or on its potential for implementation in a real-world situation

Hybrid Type 2: Simultaneous testing of a clinical intervention and an implementation intervention/strategy

Hybrid Type 3: Testing an implementation intervention/strategy while observing/gathering information on the clinical intervention and related outcomes

(Curran et al 2012)

Table 2 Types of Studies to Address Blockages in the Implementation Process

Implementation Process Gap	Types of Studies
Limited external validity of efficacy/effectiveness studies	<ul style="list-style-type: none">• Design clinical interventions ready for implementation earlier in the research pipeline, emphasizing tools, products, and strategies that mitigate variations in uptake across consumer, provider, and or organizational contexts
Quality gaps across systems due to variations in organizational capacity (e.g., resources, leadership)	<ul style="list-style-type: none">• Assess variations and customize implementation strategies based on organizational context• Data infrastructure development to routinely capture or assess implementation fidelity, patient-level processes/outcomes of care, and value/return-on-investment measures• Further refinement of implementation strategies involving organizational and/or provider behavior change• Development of provider/practice networks to conduct implementation studies or evaluation of national programs
Frontline provider competing demands (e.g., multiple clinical reminders)	<ul style="list-style-type: none">• Refinement of implementation strategies using cross-disciplinary methods that address provider behavior/organizational change (e.g., business, economics, policy, operations research. etc.)• Positive deviation or adaptation studies especially to improve implementation at lower-resourced, later-adopter sites
Misalignment with national or regional priorities	<ul style="list-style-type: none">• National policy/practice roll-outs• Randomized evaluations of national programs or policies



Implementation science in action

- Implementation occurs in phases and stages
- Requires an assessment of needs prior to the selection of an innovation to implement
- Depends on the readiness of individuals and organizations
- Necessitates considering how an innovation may need to be adapted
- Implies to build capacities among all stakeholders involved – internal as well as external
- Entails developing an infrastructure to support the implementation – e.g., in the form of proper planning, team building, or system alignment
- Demands continuous monitoring of and support to practice, which should be embedded within continuous feedback mechanisms

Albers, Shlonsky & Mildon (2020)

Bauer et al. *BMC Psychology* (2015) 3:32
DOI 10.1186/s40359-015-0089-9

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Psychology

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An introduction to implementation science for the non-specialist



Mark S. Bauer^{1,7*}, Laura Damschroder², Hildi Hagedorn³, Jeffrey Smith⁴ and Amy M. Kilbourne^{5,6}

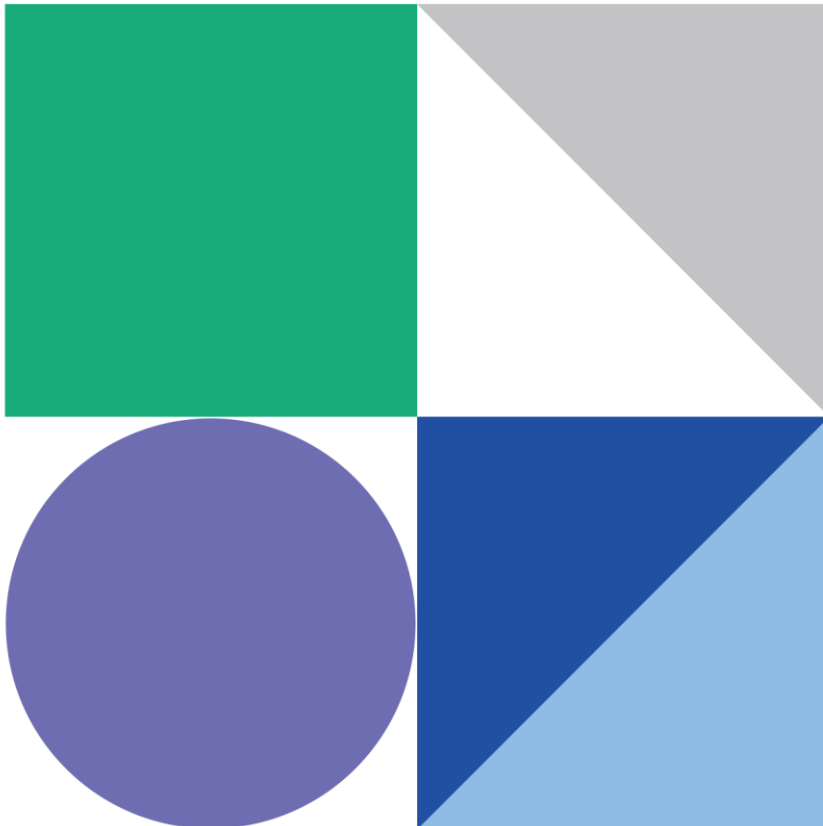




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Behavioural and Implementation Science Interventions
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