

The Implementation Research Logic Model (IRLM)

A Method for Planning, Executing, Reporting, and Synthesizing Implementation Projects

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Center for Prevention
Implementation Methodology
FOR DRUG ABUSE AND HIV



Shirley Ryan
Abilitylab

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The Implementation Research Logic Model:
a method for planning, executing,
reporting, and synthesizing implementation
projects

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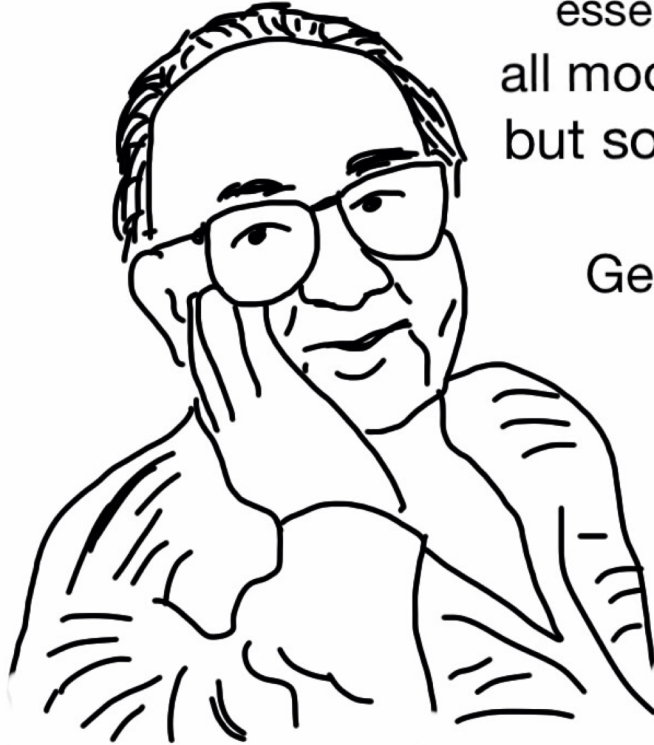
NCI: NU IMPACT Center (UM1CA233035, Cella PI)

NCATS: NUCATS (UL1 TR001422, Lloyd-Jones PI), Loan Repayment Grant (Smith)

Do We Really Need Another Model?

essentially,
all models are wrong,
but some are useful

George E. P. Box



Yes, We Need Another Model

- Logic models often required by funders (EHE supplements!)
- Integrating the necessary conceptual elements of implementation research, which often involves multiple models, frameworks, and theories, is an ongoing challenge
- Transparency, Rigor, Openness, Specification, & Reproducibility
 - Rigor—the strict application of the scientific method to ensure robust and unbiased experimental design, methodology, analysis, interpretation and reporting of results
 - Improving the specification of phenomena in implementation research is necessary to inform our understanding of how implementation strategies work, for whom, under what determinant conditions, and on what implementation and clinical outcomes (Smith, Li, & Rafferty, 2020)
 - Testable way of explaining phenomena by specifying relations among variables, thus enabling prediction of outcomes (Glanz & Bishop, 2010)

Logic Models (in general)

- A graphic depiction that presents the shared relationships among various elements of a program or study
- Develop agreement among diverse stakeholders of the “what” and the “how”
- Improve planning by highlighting theoretical and practical gaps
- Support the development of meaningful process indicators for tracking
- Reproduce successful studies / identify failures of unsuccessful studies

Petersen, Taylor, & Peikes, 2013

Development of the IR Logic Model

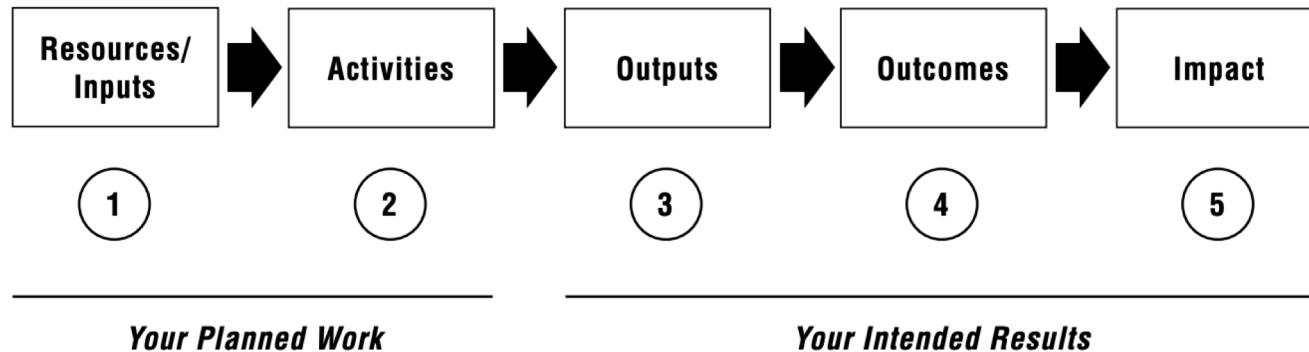
Uses and Elements

Case Applications

- Used in the study of implementing a new model of patient care in a new physical space Implementation strategies
- Used in the first 6 months of three already-funded implementation research projects to plan for and describe the prospective implementation research aspects of the trials
- Applied in the later stages of a nearly completed implementation research project
- Used in a two-day training hosted by ISC³i — EHE planning project grantees (post-training survey results will be presented)

Structure of the IRLM

- Began with the common “pipeline” logic model format used by AHRQ, CDC, NIH, PCORI, and others
 - Familiar to funders, investigators, readers, and reviewers
 - Adapted to integrate existing implementation science frameworks as its core elements with an eye toward facilitating causal modeling



W.K. Kellogg Foundation Evaluation Handbook (1998)

Theory and Elements of the IRLM

- Generalized theory of the IRLM :
 - (1) implementation strategies selected for a given EBP are related to the implementation determinants (context-specific barriers and facilitators)
 - (2) strategies work through specific mechanisms of action to change the context or the behaviors of those within the context
 - (3) implementation outcomes are the proximal impacts of the strategy and its mechanisms, which then relate to the clinical outcomes of the EBP
- IRLM: Aid in the specification of the relationship between foundational elements of an IR study

Determinant(s) → Implementation Strategy → Mechanism of Action → Outcomes

Definitions of IRLM Elements

- **Determinants**

- Factors that might prevent or enable improvements (barriers & facilitators); may act as moderators or 'effect modifiers,' or as mediators; indicating that they are links in a chain of causal mechanisms (CFIR, Damschroder et al. 2009)

- **Implementation Strategies**

- Supports, changes to, and interventions on the system to increase adoption of EBPs into usual care (Powell et al. 2012; Powell et al. 2015)

- **Mechanisms of Action**

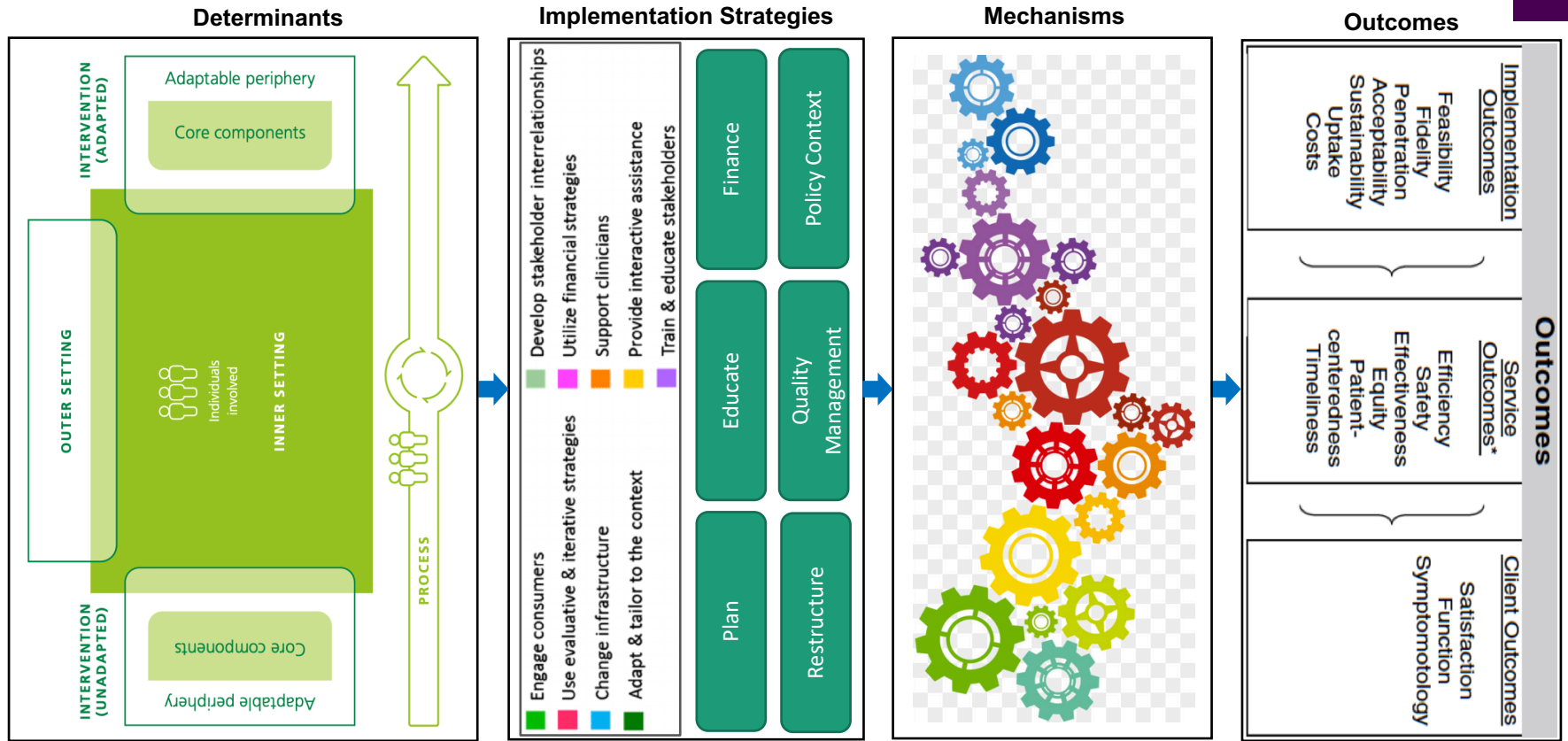
- Processes or events through which an implementation strategy operates to affect desired implementation outcomes (Lewis et al. 2018)

- **Outcomes**

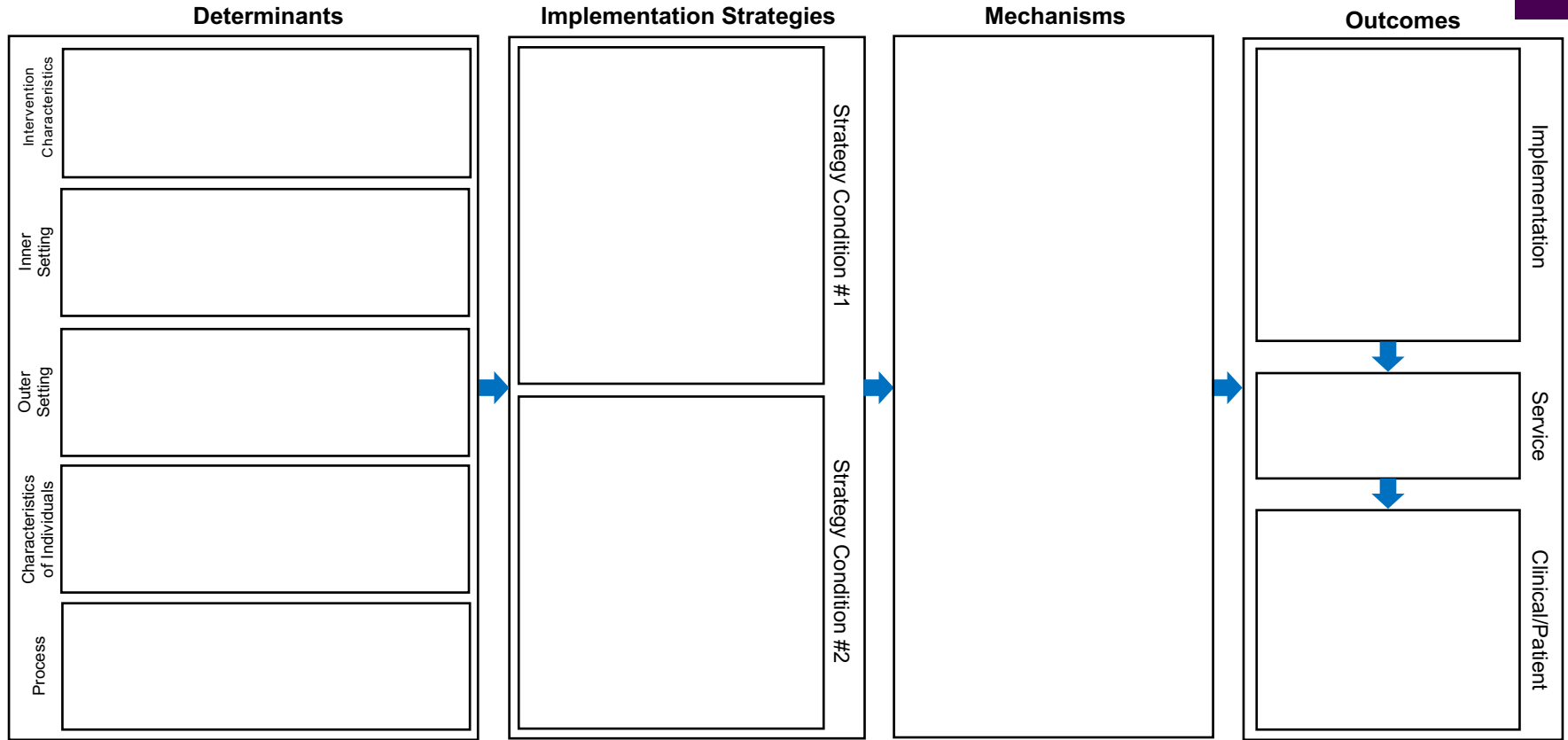
- **Implementation:** the effects of deliberate and purposive actions to implement new treatments, practices, and services (Proctor et al. 2011)
- **Clinical:** the direct effects on participants of the EBP (e.g., symptoms, infection)

IRLM Formats

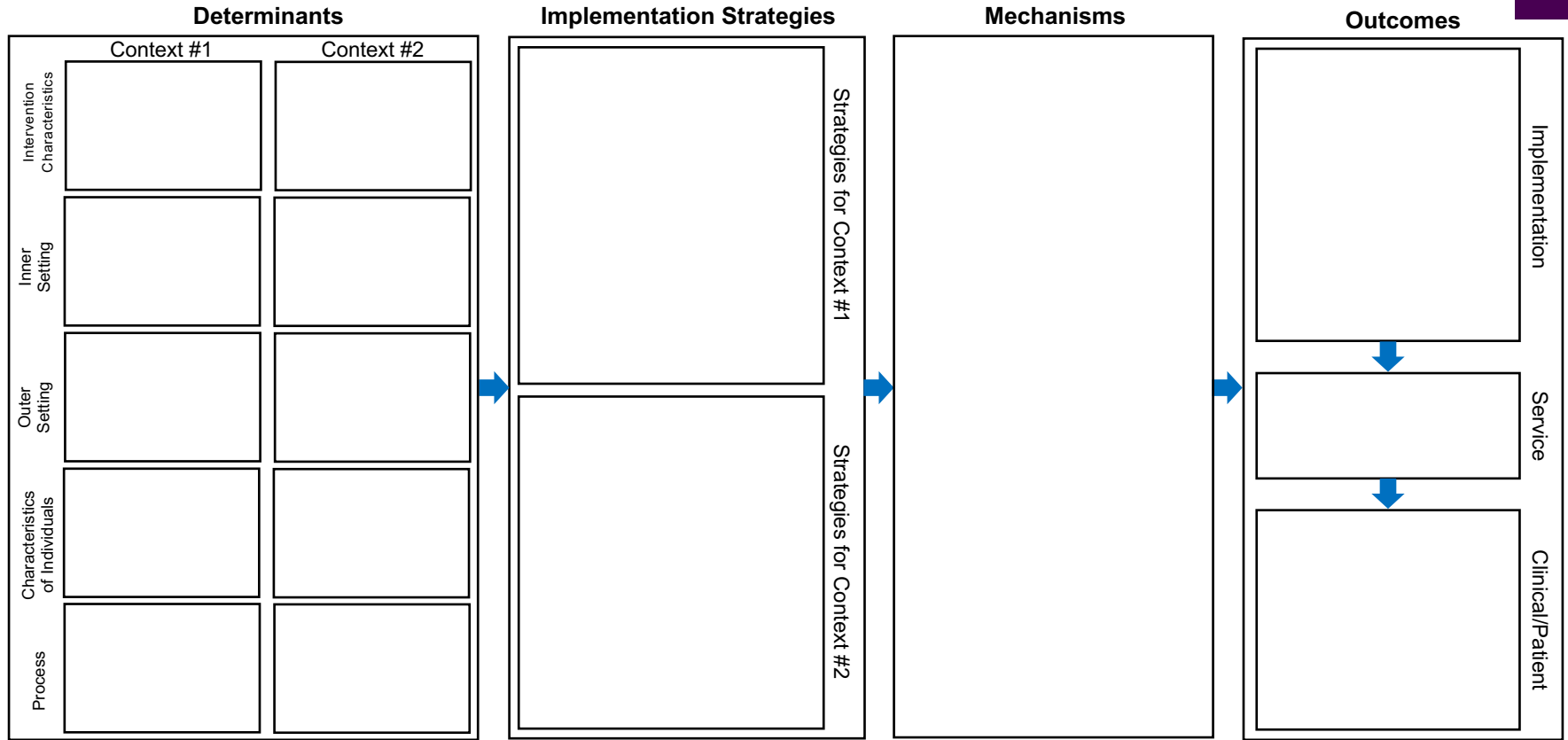
The Implementation Research Logic Model (IRLM)



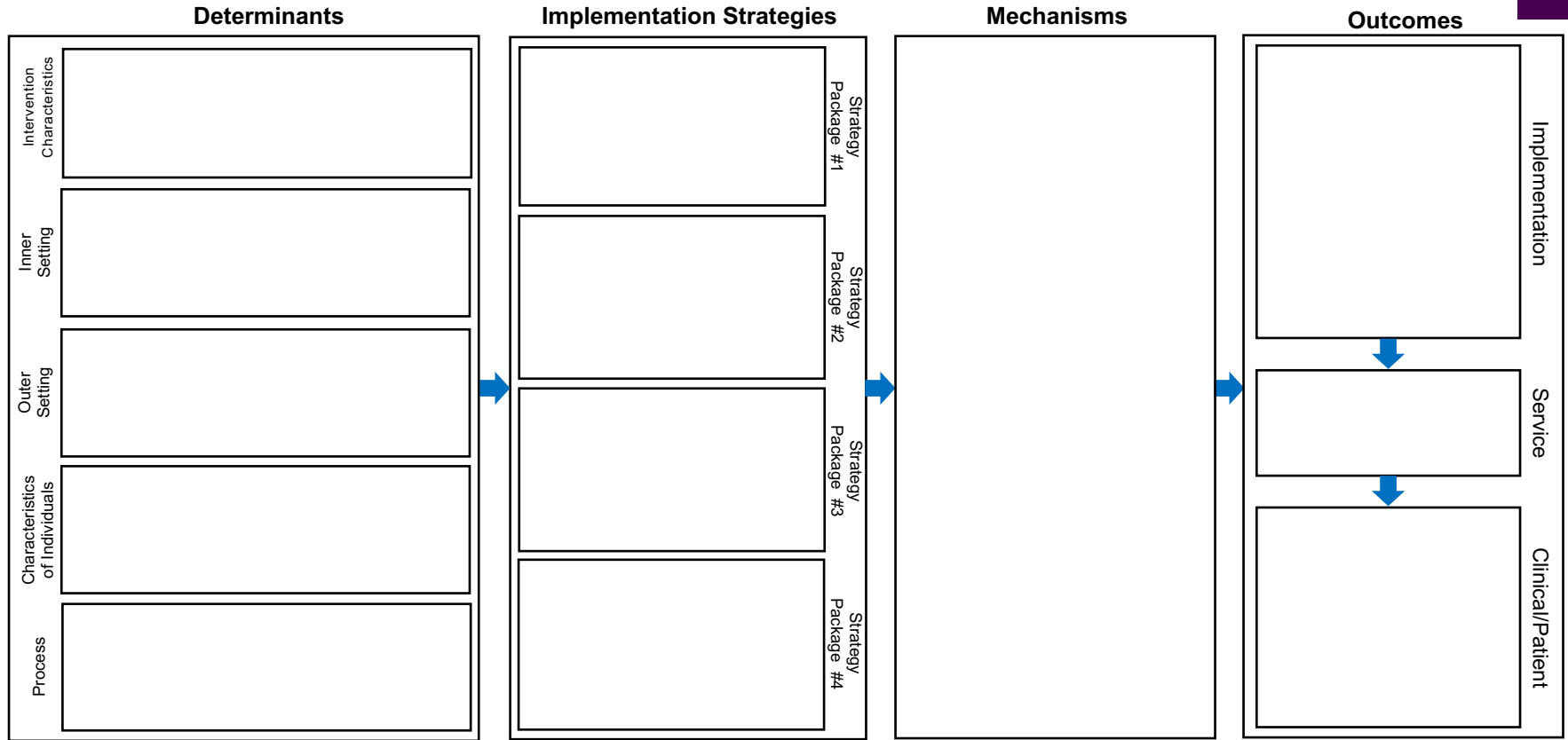
IRLM for Comparative Implementation



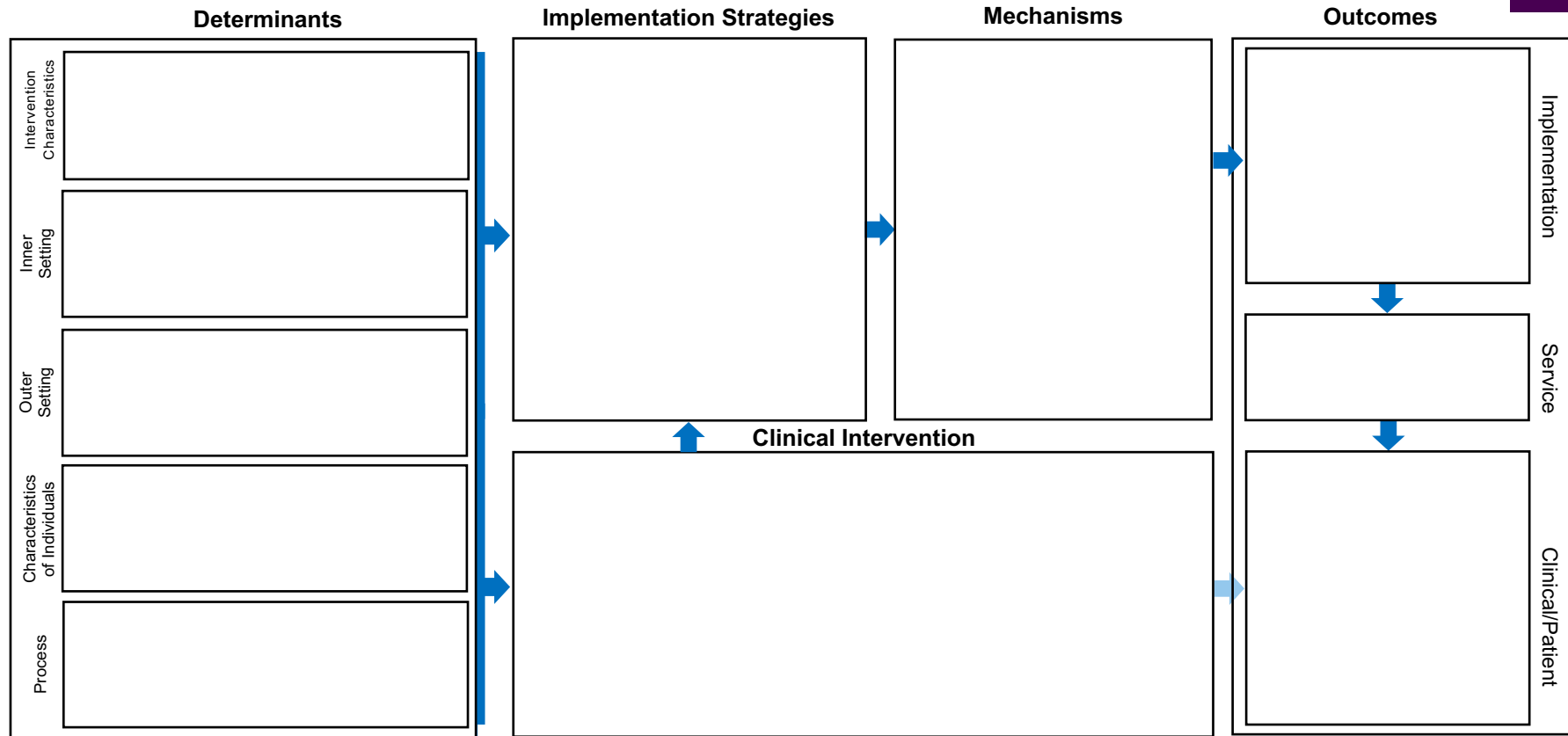
IRLM for Multi-Context Implementation of Single Intervention



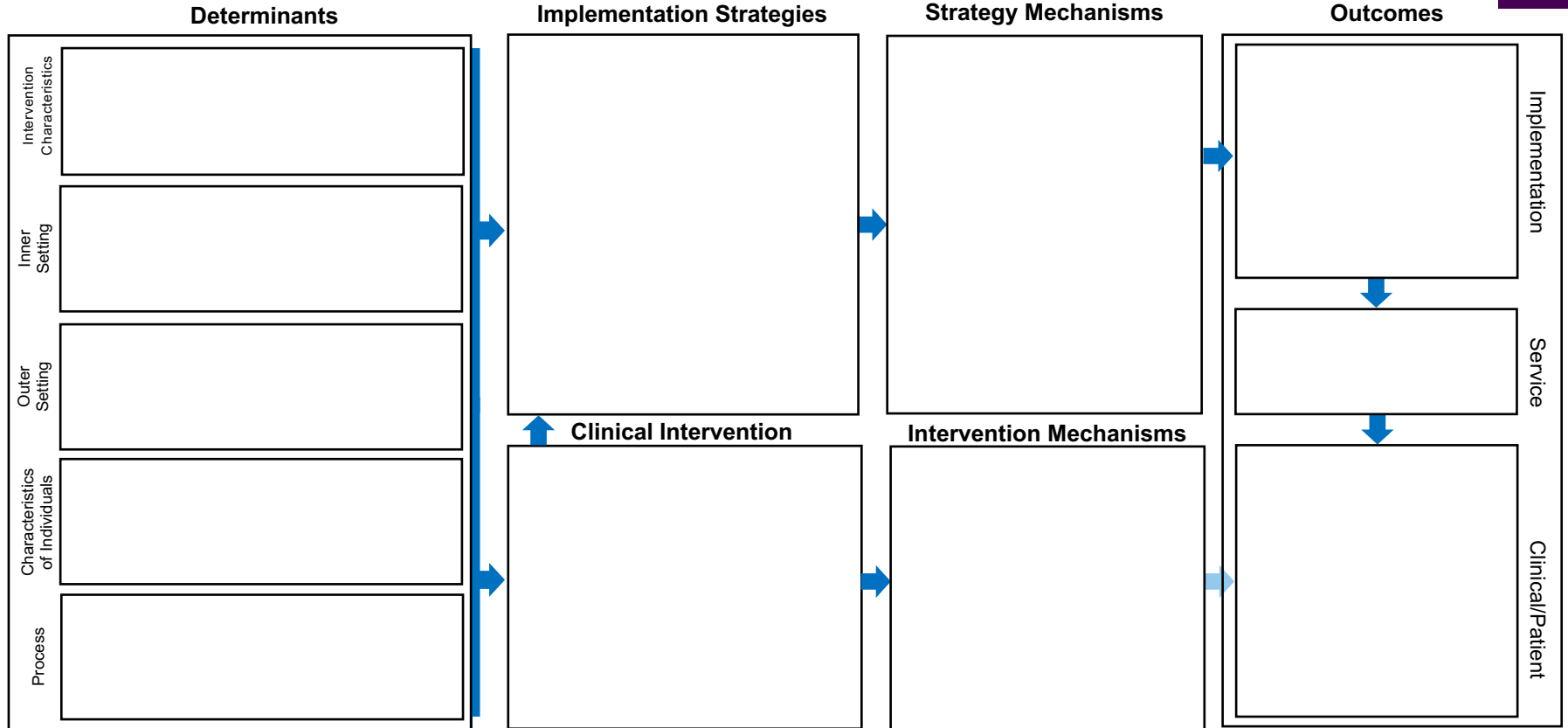
IRLM for Implementation Optimization Trial (4 clusters; 1 setting)



IRLM with Clinical Intervention



IRLM with Clinical Intervention and Intervention Mechanisms



Using the IRLM

Guiding Principles

Principle 1: Strive for Comprehensiveness

- Determinants

- Include all relevant determinants and not simply limit reporting to those that are hypothesized to be related to the strategies and outcomes
- Valence should be noted
 - Simply adding plus (+) or minus (–) signs for facilitators and barriers, respectively
 - Using a coding system, such as that developed by Damschroder et al. 2013, to indicate the relative strength of the determinant
 - 2 (strong negative impact)
 - 1 (weak negative impact)
 - 0 (neutral or mixed influence)
 - 1 (weak positive impact)
 - 2 (strong positive impact)
- Try not to use study-specific adjectives or change the name of the determinant (e.g., greater relative priority, addresses patient needs, good climate for implementation)

Principle 1: Strive for Comprehensiveness

- Implementation strategies
 - First, list all strategies in the system
 - Second, strategies should be labeled to indicate whether they were:
 - (a) in place in the system prior to the study;
 - (b) initiated prospectively for the purposes of the study (particularly for experimental study designs);
 - (c) removed as a result of being ineffective or onerous; or
 - (d) introduced during the study to address an emergent barrier or supplement other strategies because of low initial impact
 - Relevant for IRLM used during planning, as an ongoing tracking system (article in process), for retrospective application to a completed study, and in the final reporting of a study

Principle 1: Strive for Comprehensiveness

- Outcomes
 - List all measured outcomes.

Principle 2: Indicate Key Conceptual Relationships

- Indicate the relationships between elements in a manner aligning with the specific theory of change for the study
 - Provide some form of notation to indicate these conceptual relationships using superscripts (preferred), color-coding, arrows (limited), or a combination of the three
 - Such notations in the IRLM facilitate reference in text to the study hypotheses, tests of effects, causal chain modeling, and other forms of elaboration
 - When presenting the IRLM using presentation programs (e.g., PowerPoint, Keynote, Prezi), colors and arrows can be helpful, and animations can make these connections dynamic and sequential without adding to visual complexity

Principle 3: Specify Critical Study Design Elements

- *Primary Outcomes*
 - Indicate the primary outcome(s) at each relevant level of the study design (i.e., clinician, clinic, organization, county, state, nation)
 - The levels should align with the specific aims and the level(s) targeted by the implementation strategy/ies
 - Suggestion: Include downstream health services and clinical outcomes even if they are not measured, as these are important for understanding the logic of the study and the ultimate health-related targets

Principle 3: Specify Critical Study Design Elements

- *For quasi/experimental designs*
 - Clearly label the independent variable(s) (i.e., the strategies that are introduced or manipulated or that otherwise differentiate study conditions)
 - important for internal validity and for differentiating conditions in multi-arm studies
- *For comparative implementation trials*
 - Indicate the determinants, strategies, mechanisms, and (potentially) the outcomes that differentiate the conditions
 - Might need to use an IRLM for each arm when the strategies either occur across two delivery systems or are simply were very different, by design
- *For implementation optimization designs*
 - Specify the different combinations, packages, or conditions being tested

Principle 3: Specify Critical Study Design Elements

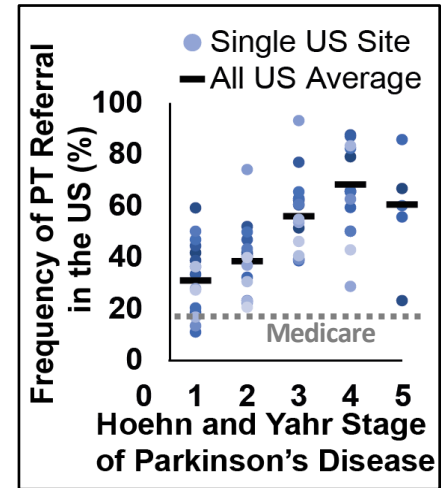
- *Additional specification options*
 - Users of the IRLM can specify any number of additional elements that may be important to their study
 - Notate those elements of the IRLM that have been or will be measured versus those that were based on the researcher's prior studies or inferred from findings reported in the literature
 - Indicate when implementation strategies differ by level or unit within the study (in large multisite studies, strategies might not be uniform across all units, particularly those strategies that already exist within the systems)
 - Be creative 😊

PSMG IRLM Example

Sustaining Proactive Physical Therapy (PT)
for People with Early Parkinson's Disease (PwEPD)

Implementing an Evidence-Based Clinical Intervention

- Sustaining regular exercise is associated with a slower decline in mobility and quality of life in people with Parkinson's.
- How do we get people with Parkinson's to exercise?
 - Physical therapy (PT) is a sustainable existing intervention that isn't reliant on grant funding.
 - Clinical Practice Guidelines support PT soon after diagnosis for exercise advice.
 - But people with Parkinson's don't regularly go to PT, especially not early after diagnosis.



Project Context and Timeline

> [Phys Ther. 2019 Dec 16;99\(12\):1644-1655. doi: 10.1093/ptj/pzz129.](#)

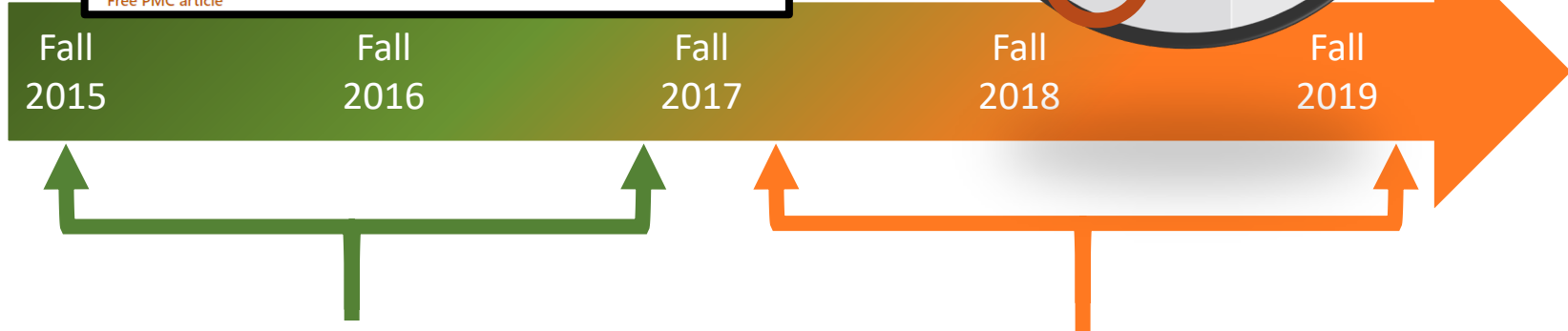
Using Implementation Frameworks to Provide Proactive Physical Therapy for People With Parkinson Disease: Case Report

Miriam R Rafferty¹, Jillian MacDonald², Alexandria Byskosh³, Laura Sloan⁴, Santiago Toledo⁵, Christina Marciniak⁶, Tanya Simuni⁷

Affiliations + expand

PMID: 31508801 PMCID: PMC7372734 DOI: 10.1093/ptj/pzz129

[Free PMC article](#)

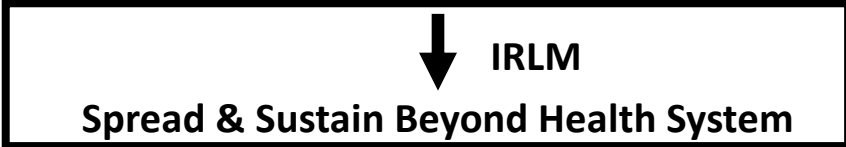


Proactive PD Program established 2016

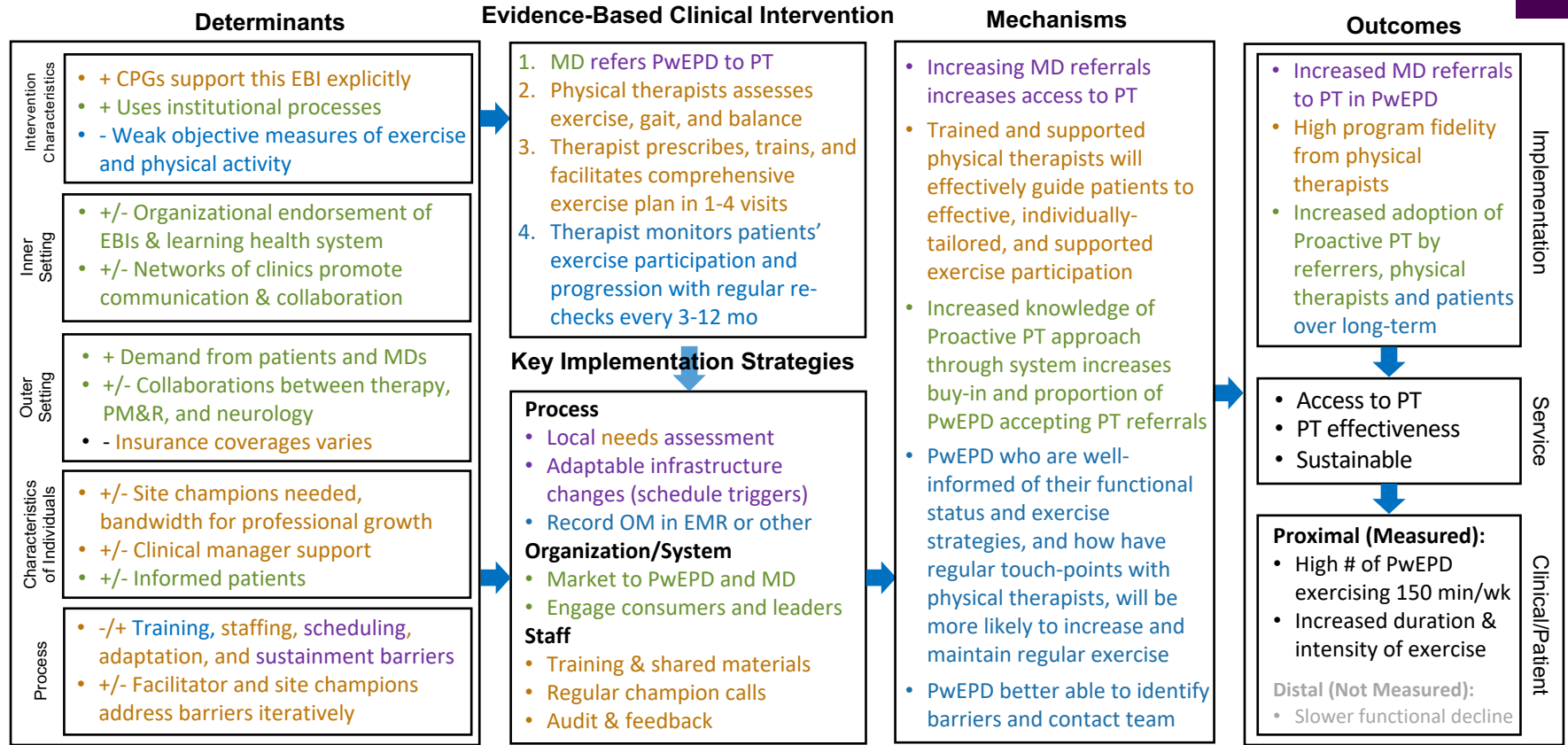
Spread in 2018

Local Implementation of Proactive PT for Early PD

Study Spread & Sustainment in Health System

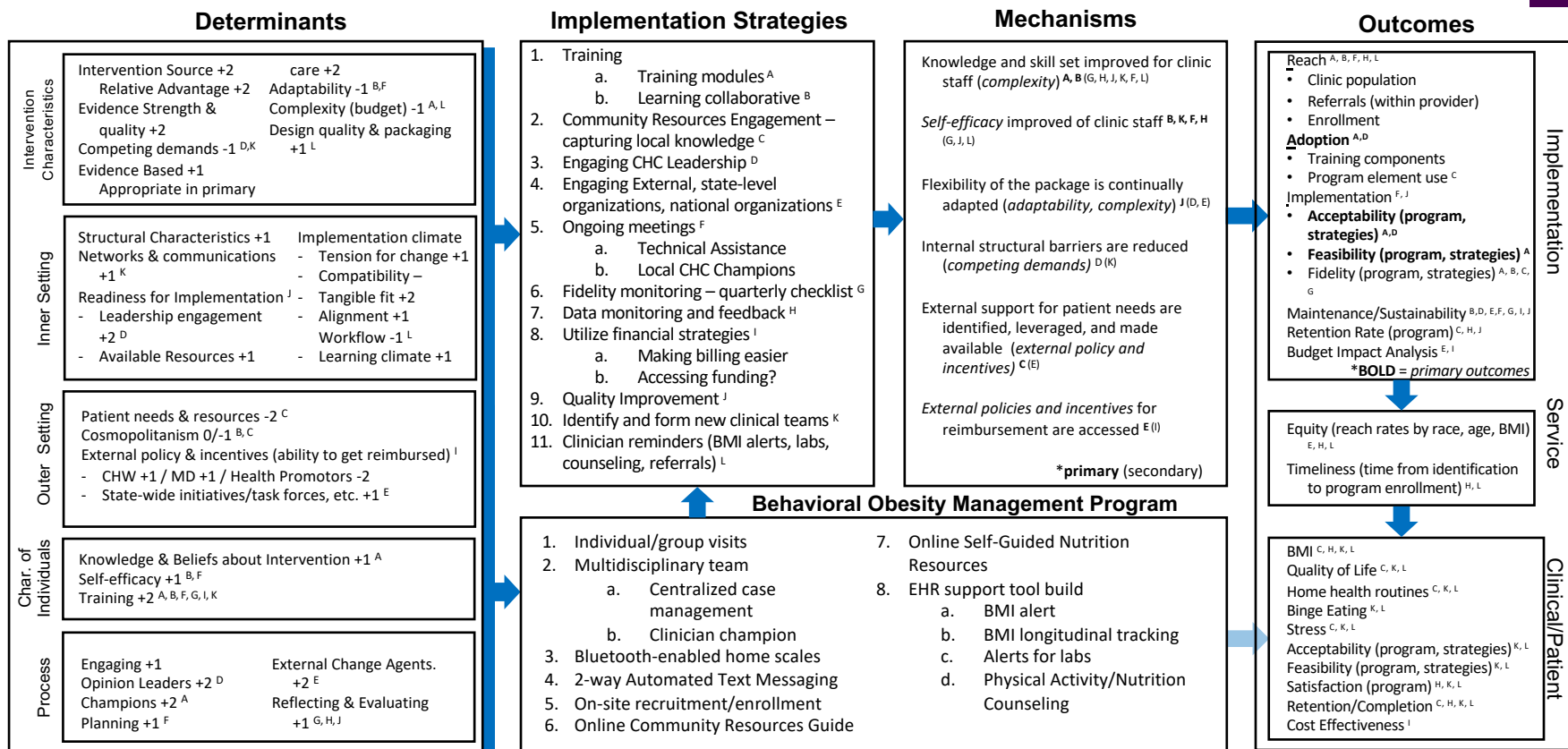


Sustaining Proactive Physical Therapy (PT) for People with Early Parkinson's Disease (PwEPD)



Completed Hypothetical IRLM

Obesity Management Intervention implemented in Community Health Centers (CHCs)



Using the IRLM for Different Purposes and Stages of Research

Planning, Executing, Reporting, Synthesizing

Planning

- Often begins with the known parameter(s) of the study
 - Working from the two “bookends” of the IRLM (context and outcomes often known; strategies, mechanisms, and even the EBP often are not)
- Work with community partners and/or organization stakeholders to fill in the implementation strategies that are likely to be feasible and effective (Waltz et al. 2015)
- Posit conceptually derived mechanisms of action based on determinants, strategies, and targeted outcomes

Executing

- Majority of the parameters will be known
- However, through completing the IRLM prior to the start of studies, we found that:
 - IRLM helped to reveal important contextual factors
 - Additional implementation strategies were needed to complement the primary ones proposed
 - Mechanisms needed to be added and measured
- Completed IRLM serves as "protocol" and can form the basis for ongoing tracking of what occurs, what is altered, deviations, etc.

Reporting

- Nearly all elements of the IRLM will be known
- Means of showing what happened during the study
- Accurate reporting of the hypothesized relationships that were observed
- Facilitates communication of the findings

Synthesizing

- **Purpose:** draw conclusions for the implementation of an EBP/similar EBPs in a particular context (or across contexts) that are shared and generalizable to provide a guide for future research and implementation
- Being applied in a NCI-funded research consortium

Supporting Text and Resources

- Data re: determinants
- Measures
- Strategy specification (Proctor, Powell, & McMillen, 2013)
- “Paths” supported by theory (e.g., Lewis et al. 2018)
- Trial design description and methods
- Implementation plan/process model (e.g., EPIS)

Text	Table	Figure
✓	✓	✓
✓	✓	
✓	✓	
✓	✓	✓
✓		✓
✓	✓	✓

By utilizing superscripts, subscripts, color, and other notations within the IRLM, it is easy to refer to (a) hypothesized causal paths in theoretical overviews and analytic plan sections; (b) planned measures for determinants and outcomes; and (c) specific implementation strategies in text, tables, and figures.

Acceptability and Usability of the IRLM

Results of a Post-Training Survey of EHE Planning Project Grantees

ISC³I's *Ending the HIV Epidemic* Summit

- Coordinating and technical assistance center for grantees funded under the national *EHE* plan
- 2-day in-person training in Chicago, IL, in October 2019
- $N=132$ participants from 63 projects
 - $n=129$ pre-training survey
 - $n=66$ post-training survey 6 weeks after
 - 42 investigators, 24 implementation partners; 68.2% women
 - 44.6% indicated having completed a full draft of the IRLM for their project
- 10 items related to the IRLM plus one about the general logic of implementation research
 - Rated on a 4-point scale from 1 (*not at all*) to 4 (*very much*)

IRLM was either “moderately” or “very” helpful in:

- | | |
|--|-------------------|
| 1) Improving the rigor and reproducibility | 77.7%, $M=3.05^*$ |
| 2) Serving as a “roadmap” for the project | 74.0%, $M=3.08$ |
| 3) Clearly reporting and specifying the project plan | 67.8%, $M=2.94$ |
| 4) Understanding connections between determinants, strategies, mechanisms, and outcomes | 66.3%, $M=2.92$ |
| 5) Identifying gaps in the IR logic of their project | 64.2%, $M=2.86$ |
| 6) Deepening their knowledge of IR methods | 62.9%, $M=2.83$ |
| 7) Planning the project | 61.3%, $M=2.82$ |
| 8) Developing consensus and understanding of the project among diverse stakeholders involved | 58.8%, $M=2.75$ |
| 9) Identifying gaps in research questions/analyses | 51.3%, $M=2.54$ |

Additional Results

- 74.1% ($M=3.02$, $SD=.886$) said the worksheets provided during the summit were “*moderately*” or “*very*” helpful in completing the IRLM
- 77.6% ($M=3.18$, $SD=.827$) said their knowledge on the logic of implementation research increased “*moderately*” or “*very much*” after the two-day training
- No statistically significant difference between investigators and implementation partners
 - Approached significance: Investigators scored higher on project planning, reporting/specifying project plan, and knowledge of IR logic

EHE Year 2 RFA

plans to monitor and evaluate the ability of the activities to achieve the outcome. Most importantly, applicants must clearly indicate how the proposed activities outlined in the supplement requests are expected to lead to development of the stated goals.

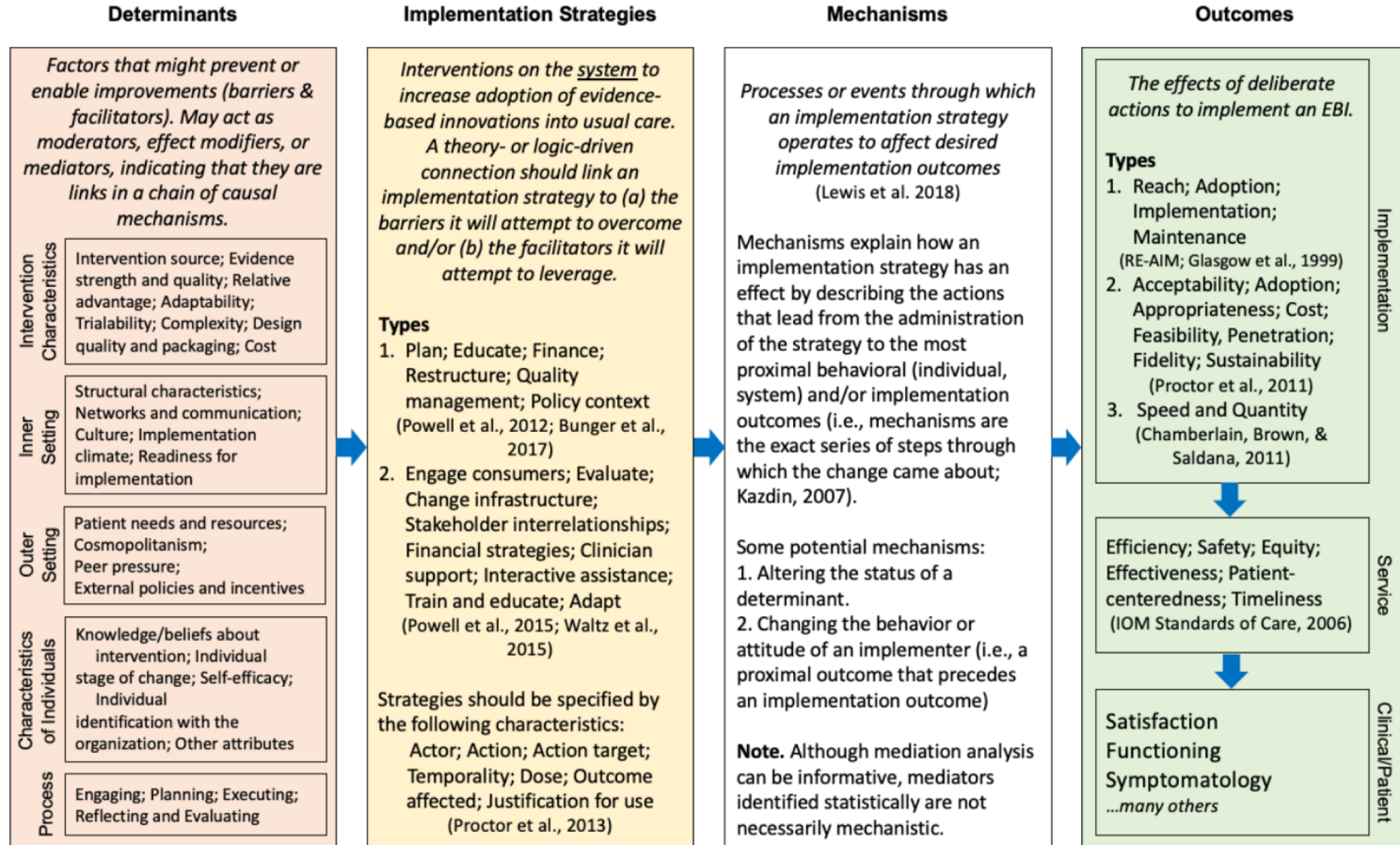
- c. Provide an **implementation logic model** and describe what aspects of the logic model are being studied and with emphasis on implementation barriers/facilitators (determinants), how implementation strategies will address these determinants, and which implementation outcomes will be measured and expected to improve. Describe the **implementation science framework or model** utilized to support the logic model and to guide the study design and evaluation methods.

Resources for Using the IRLM

Quick Reference Guide, Worksheets, Templates, Examples

IRLM Website

Quick Reference Guide



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Implementation Research L

IRLM — Deter
Smith, Li, & Rafferty, 2020
Determinants of implementation
Often, researchers think that
mediators, moderators, or
comes from the Consolidated

1. From the list of Consolidated Framework for Implementation Research (CFIR) project. It is important to identify the determinants that are most relevant to your project.
2. Circle any determinants that are most relevant to your project.
3. For each determinant, identify the implementation strategies that are most relevant to your project.

Determinants

Intervention Characteristics

Intervention source

Evidence strength

Relative advantage

Adaptability

Trialability

Complexity

Design quality and packaging

Cost

Outer Setting

Patient needs and resources

Cosmopolitanism

Peer pressure

External policies and incentives

Inner Setting

Structural characteristics

Networks and communication

Culture

Implementation climate

- Tension for change
- Compatibility
- Relative priority
- Incentives & rewards
- Goals and feedback
- Learning climate

Readiness for implementation

- Leadership engagement
- Available resources
- Access to knowledge

Characteristics of Intervention

Knowledge/beliefs about intervention

Individual stage of change

Self-efficacy

Individual identification with the organization

Other attributes

Process

Engaging

- Opinion leaders
- Formal internal implementation
- Champions
- External change agents

Planning

Executing

Reflecting and evaluating

Implementation Research Logic

IRLM — Implementation
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Implementation outcomes

treatments, practices, and success, (2) proximal individual service and clinical/patient

Implementation strategies

To identify implementation downstream/ distal/long-term

1. For the evidence-based outcomes you are interested in, identify the determinants that are most relevant to your project.
2. From the list of service project. Add these to your project.

Service outcome

Efficiency

Safety

Effectiveness

Equity

Patient-centeredness

Timeliness

Implementation Research Logic

IRLM — Implementation
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Implementation strategies

In implementation research

- An evidence-based intervention
- An implementation intervention

To avoid inevitable consequences

When implementing an intervention, strategies exist in the literature

1. From either taxonomy considering for your project.
 - a. For help selecting ERIC Matchmaker
 - b. A full list of implementation strategies: https://link.springer.com/10.1007/978-1-4939-9066-1_10
2. For each strategy, consider the following:
 - a. A full list of implementation strategies: https://link.springer.com/10.1007/978-1-4939-9066-1_10
 - b. A full list of implementation strategies: https://link.springer.com/10.1007/978-1-4939-9066-1_10
3. Add your discrete strategies to your PreP example project providers/staff on P

Strategy

Planning

Education

Finance

Restructure

Quality management

Policy

Acceptability

Adoption

Appropriateness

Cost

Feasibility

Fidelity

Penetration/Uptake

Sustainability

Implementation Research Logic

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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

Expert Recommendations for Implementing Change (ERIC; Powell et al., 2015; Waitz et al., 2015)

- Assess for readiness and identify barriers and facilitators
- Audit and provide feedback
- Develop and implement tools for quality monitoring
- Conduct local need assessment
- Obtain and use patients/consumers and family members

- Facilitation
- Provide local technical assistance
- Provide clinical supervision
- Centralize technical assistance

- Tailor strategies
- Promote adaptability
- Use data experts
- Use data warehousing techniques

- Identify and prepare champions
- Organize clinician implementation team meetings
- Recruit, designate, and train for leadership
- Inform local opinion leaders
- Build a coalition
- Obtain formal commitments

- Conduct ongoing training
- Provide ongoing consultation
- Develop educational materials
- Distribute educational materials
- Use train-the-trainer strategies
- Create a learning collaborative

- Facilitate relay of clinical data to providers
- Remind clinicians
- Develop resource sharing agreements
- Revise professional roles
- Create new clinical teams

- Involve patients/consumers and family members
- Intervene with patients/consumers to enhance uptake and adherence
- Prepare patients/consumers to be active participants
- Increase demand
- Use mass media

- Fund and contract for the clinical innovation
- Access new funding
- Alter incentive/allowance structures
- Make billing easier
- Alter patient/consumer fees

- Mandate change
- Change record systems
- Change physical structure and equipment
- Change service sites



IRLM Website



The image shows the header of the IRLM website. It features a light gray background with a geometric pattern of overlapping triangles. On the left, there is a logo consisting of seven colorful hexagons (green, purple, blue, red, pink, blue, and purple) arranged in a cluster. To the right of the logo, the text reads: "Center for Prevention Implementation Methodology" in a large, bold, purple serif font, followed by "FOR DRUG ABUSE AND HIV" in a smaller, gray, sans-serif font. Below this, the tagline "IMPROVING POPULATION HEALTH THROUGH IMPLEMENTATION SCIENCE" is written in a small, gray, sans-serif font. At the bottom of the header, there is a dark purple navigation bar with white text for "Home", "About", "Resources", "D&I Consultation", "PSMG", and "Contact". Below the navigation bar is a large banner with a dark background and a network of orange and yellow lines connecting various points, resembling a molecular or data network. In the center of the banner, the letters "IRLM" are displayed in a large, white, sans-serif font. Below "IRLM", the text "Implementation Research Logic Model" is written in a smaller, white, sans-serif font.

**Center for Prevention
Implementation Methodology**
FOR DRUG ABUSE AND HIV

IMPROVING POPULATION HEALTH THROUGH IMPLEMENTATION SCIENCE

Home About Resources D&I Consultation PSMG Contact

IRLM
Implementation Research Logic Model

<https://cepim.northwestern.edu/implementationresearchlogicmodel/>

Concluding Thoughts

Concluding Thoughts

- Visual depiction of implementation project
 - Usability is high for seasoned and novice implementation researchers alike
 - Could increase the rigor and transparency of complex studies that ultimately could improve reproducibility
 - Common structure to increase consistency
 - Method for more clearly specifying links and pathways to test theories
-
- Simplified format – balance depth and detail
 - May inhibit creative thinking if applied too rigidly

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