

Implementation Science Measurement

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Overview

- The state of Implementation Science measurement
- Measurement of implementation outcomes
- Measurement issues
- Resources

The Problem with New Fields

Lost in knowledge translation: Time for a map?

Ian D. Graham PhD^{1,*}, Jo Logan RN, PhD²
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, Wenda Caswell RN, MEd⁶ and Nicole
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Issue



Journal of Continuing
Education in the Health
Professions

Volume 26, Issue 1, pages
13–24, Winter 2006



American Journal of Preventive Medicine

Volume 43, Issue 3, September 2012, Pages 337–350



Review and special article

Bridging Research and Practice: Models for Dissemination and
Implementation Research

Rachel G. Tabak, PhD^a · · , Elaine C. Khoong, BS^a, David A. Chambers, DPhil^c, Ross C. Brownson,
PhD^{a,b}

Why Measurement Matters

- “Science is measurement” (Siegal, 1964)



INTRODUCTION TO SELF-REPORT MEASURES

- What are self-report measures?
 - A type of method commonly used in social science where individuals express their attitudes, feelings, beliefs or knowledge about a subject or situation.
- Why consider self-reports?
 - Emphasize individuals' opinions and subjective experiences of their engagement with technologies.
- Self-report methods may be discrete, dimensional, and free response. (Lopatovska & Arapakis, 2011)

Reliability?

Validity?

...but is measurement necessarily scientific?

State of Implementation Science Measurement

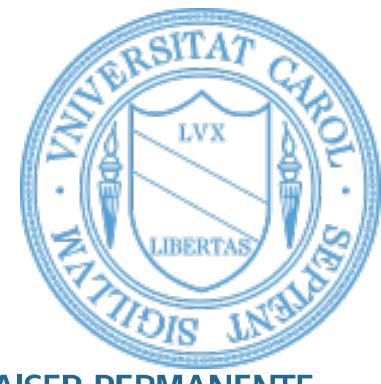
- At least 7 systematic reviews of implementation science measures
(Lewis, Proctor, & Brownson, in press)
 - 3 focused only on a single construct
 - 1 on five key organization-level constructs
 - 2 on constructs depicted in a D&I model

State of Implementation Science Measurement

- Only 2 studies evaluated measures' content validity (Lewis, Proctor, & Brownson, in press)
 - 56% and 58.14% of measures had established content validity evidence
 - Nearly half had not ensured that the items represented all facets of a known construct.
 - More common was that these studies reported broadly on psychometric strength of the measures
 - E.g., “yes” or “no” with respect to reliability or validity

Instrument Review Project

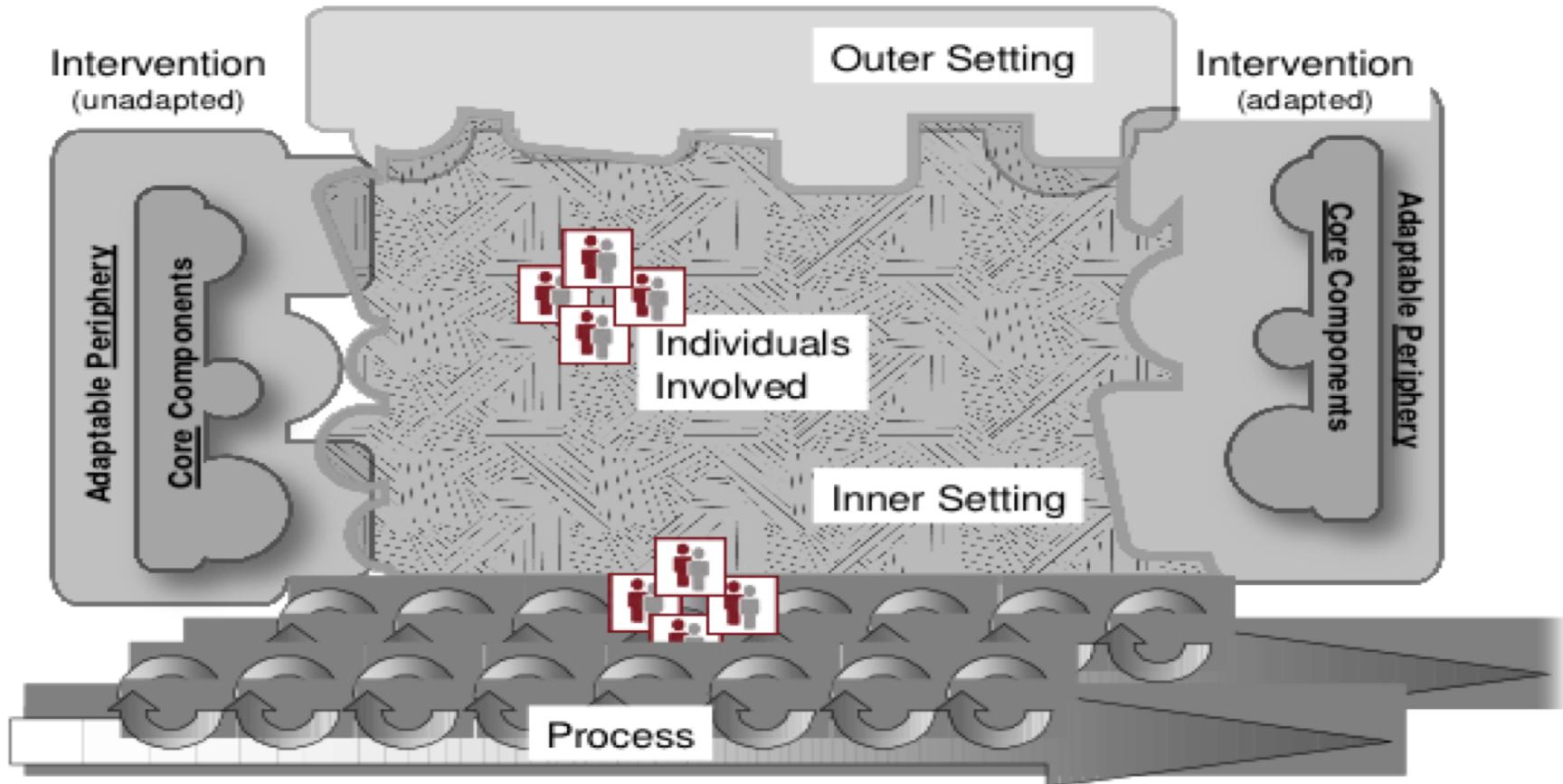
Aim: To conduct an enhanced systematic review
of instruments (Lewis, Stanick, et al., 2015)



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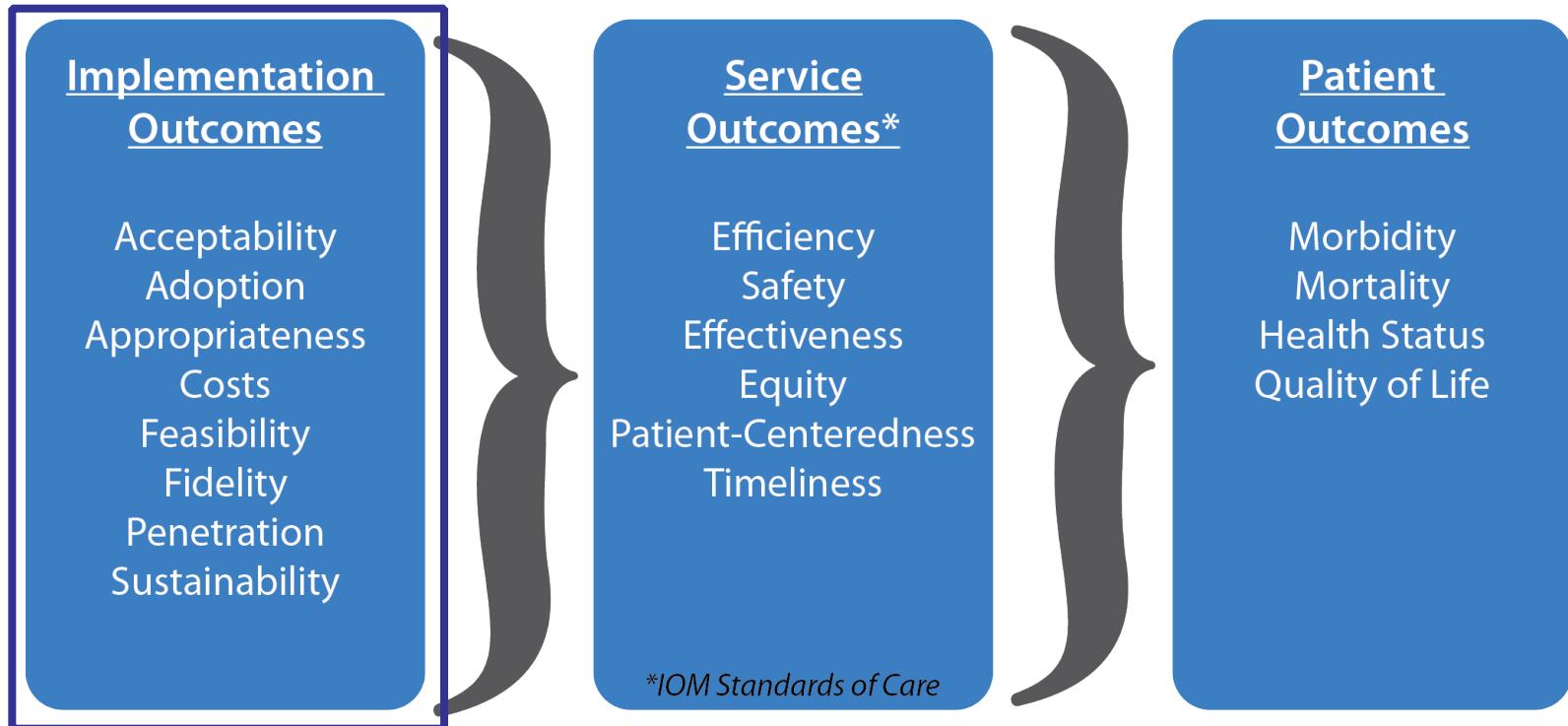
Consolidated Framework for Implementation Research (CFIR)

(Damschroder et al., 2009)



Implementation Outcomes Framework

Adapted from (Proctor et al., 2011)



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List of Constructs for Instrument Identification

CFIR Domains	Construct	Outcomes	Construct
Characteristics of Individuals	Knowledge & Beliefs about Intervention Individual Stage of Change Individual Identification with Organization Other Personal Attributes Self-Efficacy	Implementation Outcomes	Acceptability Adoption Appropriateness Feasibility Penetration
Inner Setting	Culture Implementation Climate Networks and Communications Readiness for Implementation Structural Characteristics	Client Outcomes	Sustainability Cost Fidelity Satisfaction
Intervention Characteristics	Adaptability Complexity Cost Design Quality and Packaging Evidence Strength and Quality Intervention Source Relative Advantage Trialability	<p>47 Total</p> <p>Consolidated Framework for Implementation Research</p> <pre> graph LR A[Intervention Unadapted] --> B[Outer Setting] B --> C[Inner Setting] C --> D[Characteristics of Individuals] D --> E[Process] E --> F[Implementation Outcomes] B --> G[Intervention Adapted] G --> H[Adaptable Periphery Core Components] H --> I[Adaptable Periphery Core Components] </pre>	
Outer Setting	Cosmopolitanism External Policy and Incentives Patient Needs and Resources Peer Pressure		
Process	Engaging Executing Planning Reflecting and Evaluating		

Damschroder et al., 2009;
Proctor et al., 2009

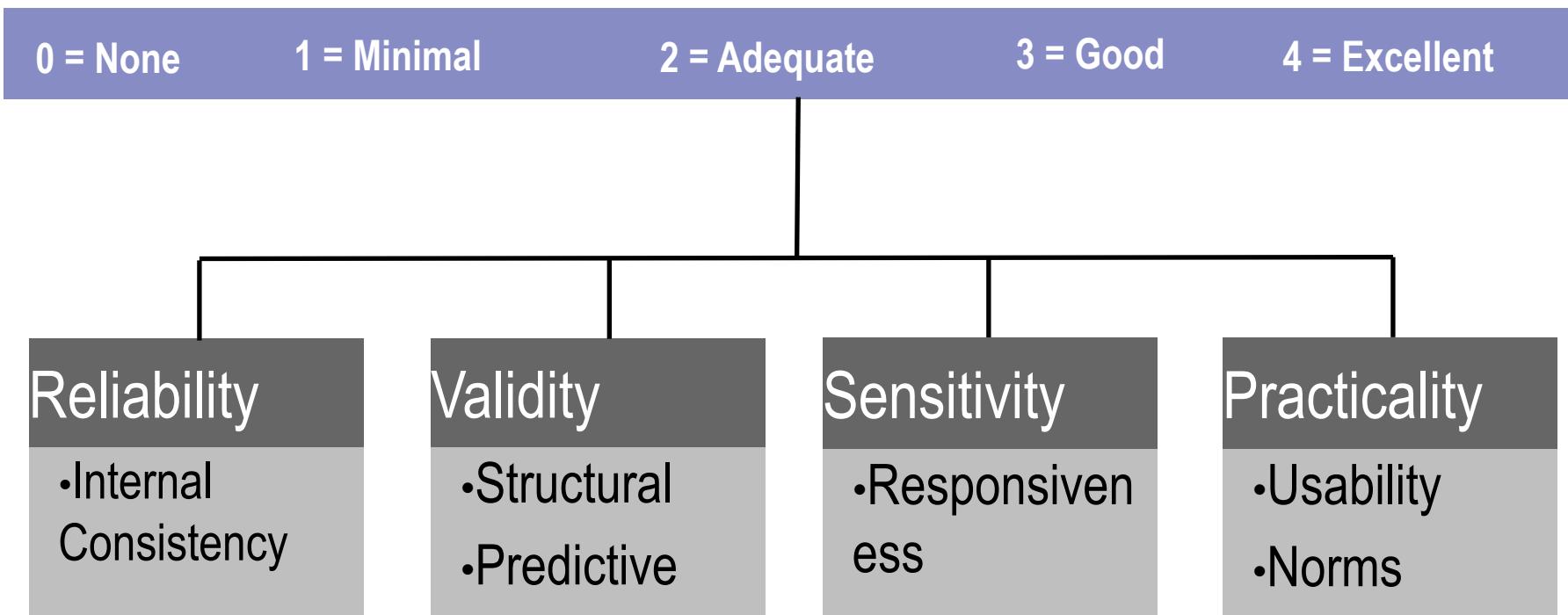
Measurement Theory

Allen & Yen, 2001

- Aims to describe, categorize, and evaluate the quality of measures
- Improve usefulness, accuracy, and meaningfulness of measurement
- Propose methods for developing new, higher quality measures
- Classical Test Theory: Reliability & Validity – fundamental attributes of measures necessary for confidence in meaning of findings

Evidence Based Assessment Criteria (EBA)

- Total possible score is 24



Systematic Review & Synthesis Process

1

Systematic Literature Review

2

Construct Specific Reviews

3

Instrument Specific Reviews

4

Compile Packets & Extract EBA-relevant info

5

Rate Each Instrument Twice Using EBA criteria



450 Instruments



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Enhanced Systematic Review: Findings

(Lewis, Fischer, et al., 2015)

Enhanced Systematic Review: Findings

(Lewis, Fischer, et al., 2015)

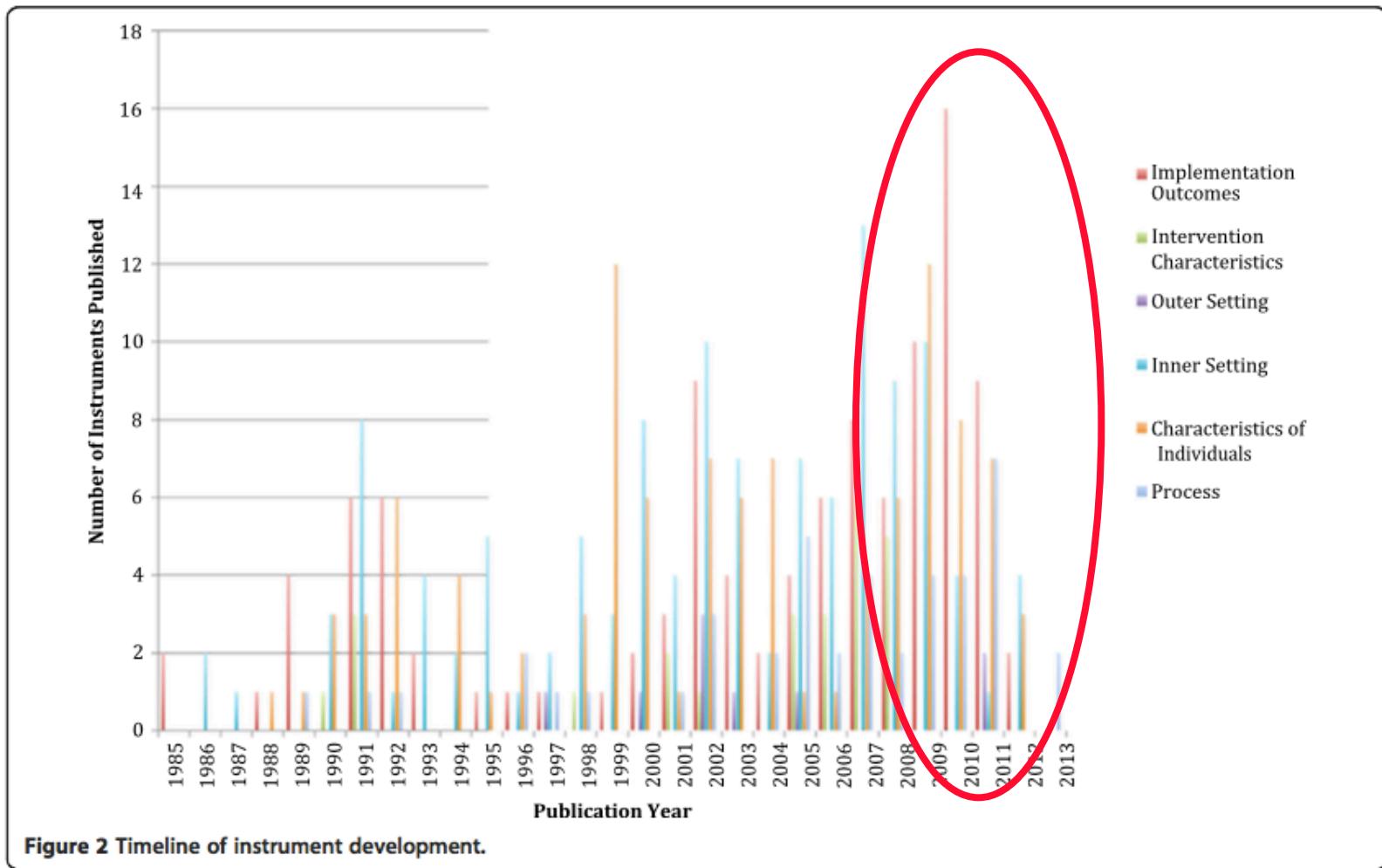


Figure 2 Timeline of instrument development.

Enhanced Systematic Review: Findings

(Lewis, Fischer, et al., 2015)

“Gold standard” measure development:

- (1)construct is defined,
- (2)initial items are generated by a group of experts,
- (3)pilot test of items with representative sample,
- (4)validity and reliability tests conducted based on pilot testing,
- (5)instrument is refined based on pilot results,
- (6)refined instrument is administered to the targeted sample,
- (7)validity and re- liability tests are performed,
- (8)psychometric properties are reported

Mean = 3; Mode = 1

71.13% defined their construct

Implementation Outcomes Findings

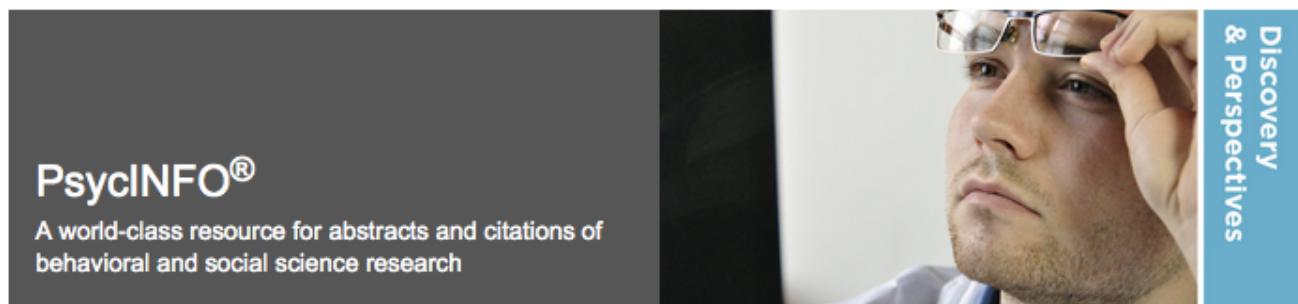
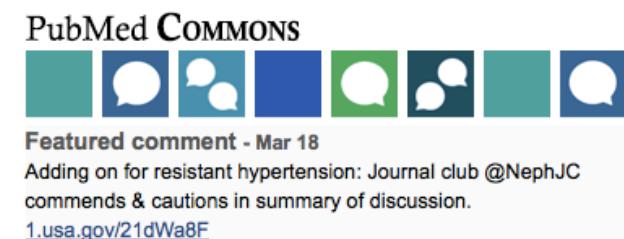
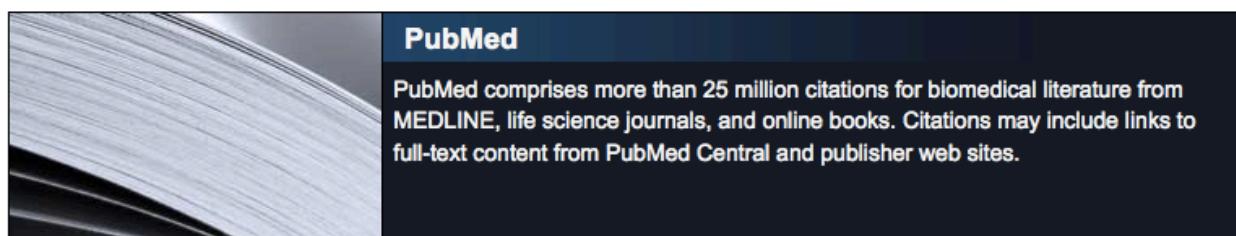
(Lewis, Fischer, et al., 2015)

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Implementation Outcomes Findings

(Lewis, Fischer, et al., 2015)

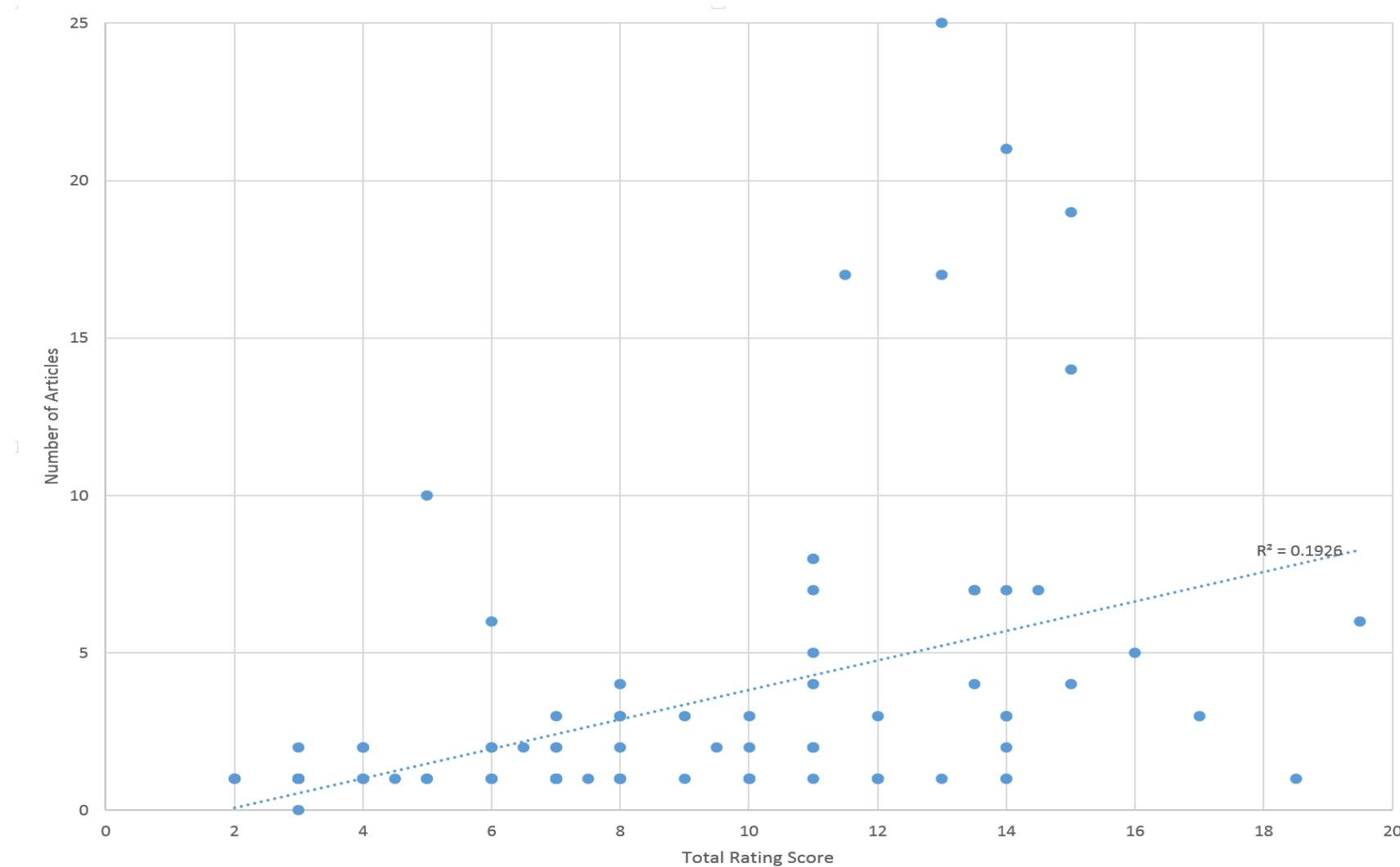
Table 3 Summary statistics of all instrument ratings, including scores of "0"

Construct name	Rating criteria											
	Internal consistency		Structural validity		Predictive validity		Norms		Responsiveness		Usability	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Acceptability	2.66	1.77	0.90	1.57	0.51	1.14	2.88	1.32	0.08	0.57	3.30	0.51
Adoption	1.47	1.90	0.92	1.42	0.79	1.37	1.95	2.01	0.00	0.00	2.84	0.60
Appropriateness	1.00	1.73	0.29	0.49	0.14	0.19	1.29	1.70	0.57	1.51	3.00	0.58
Cost	0.00	0.00	0.00	0.00	0.00	0.00	2.63	1.92	0.00	0.00	2.63	1.77
Feasibility	0.38	1.06	0.50	1.41	0.00	0.00	1.25	1.39	0.00	0.00	3.38	0.52
Penetration	1.00	2.00	1.00	2.00	0.75	1.50	3.25	0.96	0.38	0.75	3.75	0.50
Sustainability	1.25	1.75	0.88	1.46	0.13	0.35	1.00	1.85	0.13	0.35	3.00	0.53

Recall: Total Possible Score per EBA Criterion = 4
Mode Score = 0

Implementation Outcomes Findings

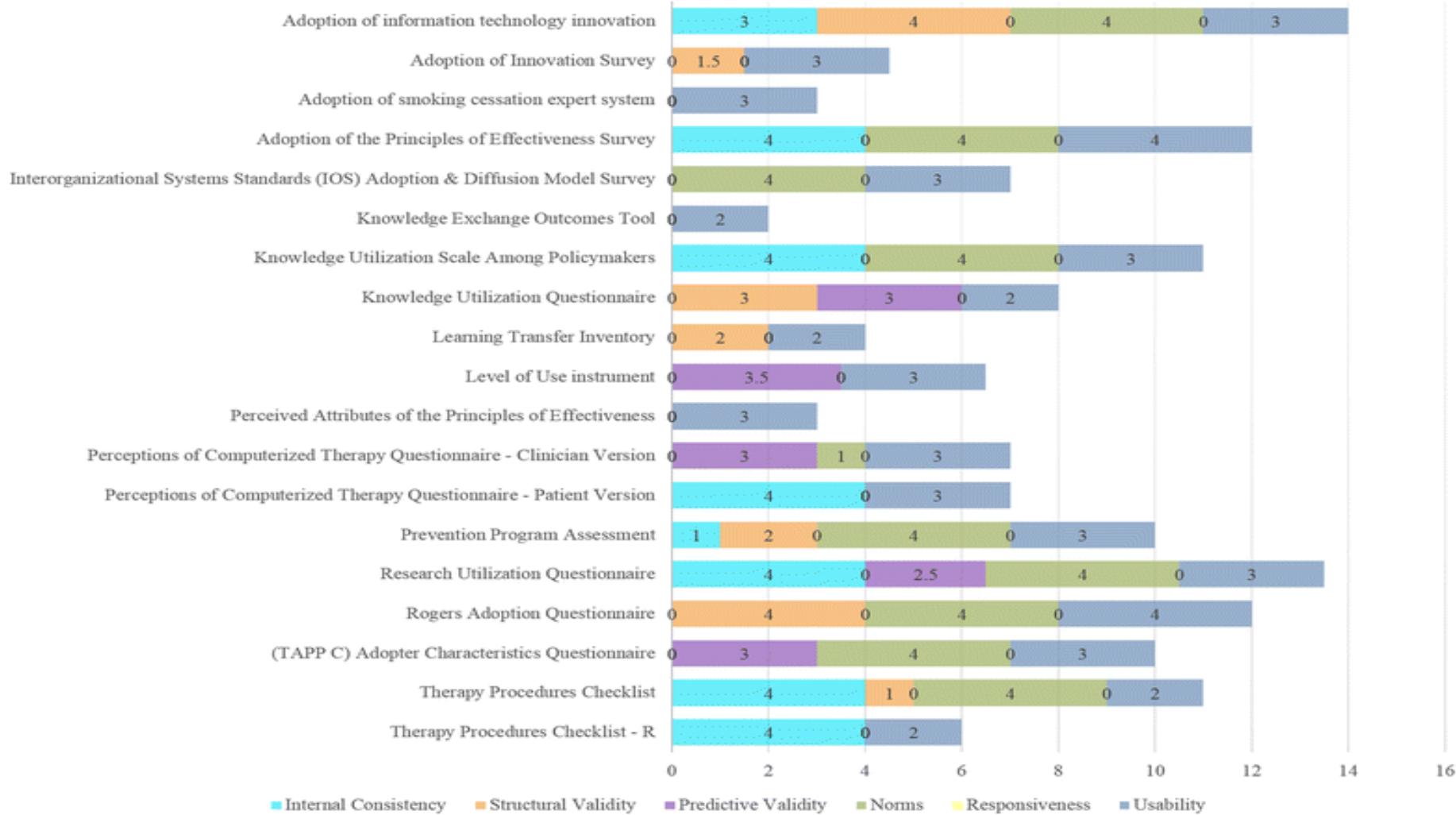
(Lewis, Fischer, et al., 2015)



Head-to-Head EBA Ratings

(Society for Implementation Research Collaboration, no date)

EVIDENCE-BASED ASSESSMENT RATING PROFILE FOR ADOPTION



Instrumentation Issues Revealed

(Gerring, 2001; Martinez, Lewis, & Weiner, 2014)

- Non-use of theories and frameworks
- Homonymy, synonymy, and instability
- Minimal psychometric testing, reporting, and strength
- Frequent use of home-grown, use-once measures
- Over-reliance on self-report, common methods
- Lack of attention to pragmatic relevance
- Redundant development across teams

Dissemination and Implementation Outcome	Level of Analysis	Theoretical Basis	Other terms in the Literature	Salience by D & I Phase Informed by the EPIS Model ²⁶	Latent Variable Y/N	Example Method of Measurement
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Measurement Resource

Rabin et al. *Implementation Science* 2012, 7:119
<http://www.implementationscience.com/content/7/1/119>



IMPLEMENTATION SCIENCE

METHODOLOGY

Open Access

Advancing the application, quality and harmonization of implementation science measures

Borsika A Rabin^{1*}, Peyton Purcell², Sana Naveed², Richard P Moser², Michelle D Henton¹, Enola K Proctor³, Ross C Brownson^{4,5} and Russell E Glasgow²

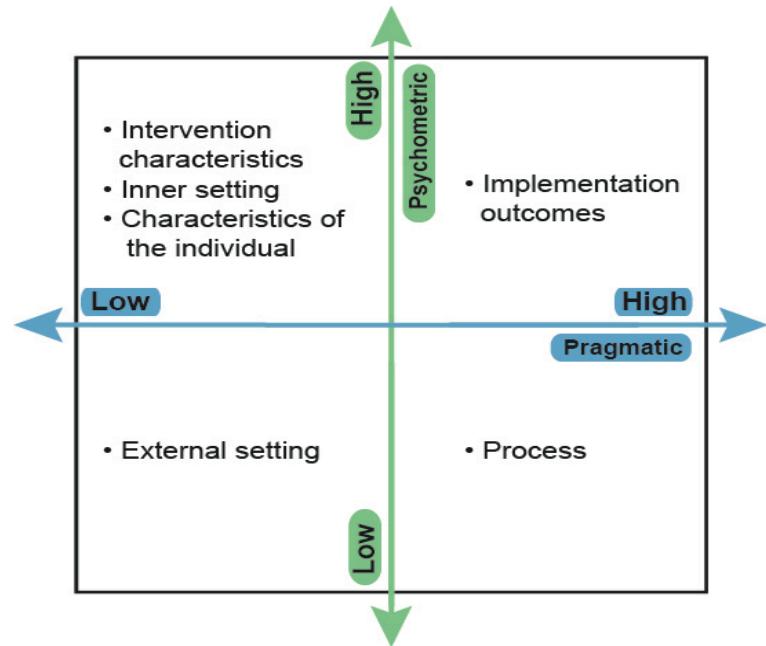
<https://www.gem-beta.org/public/home.aspx>

Advancing Implementation Science through Measure Development and Evaluation

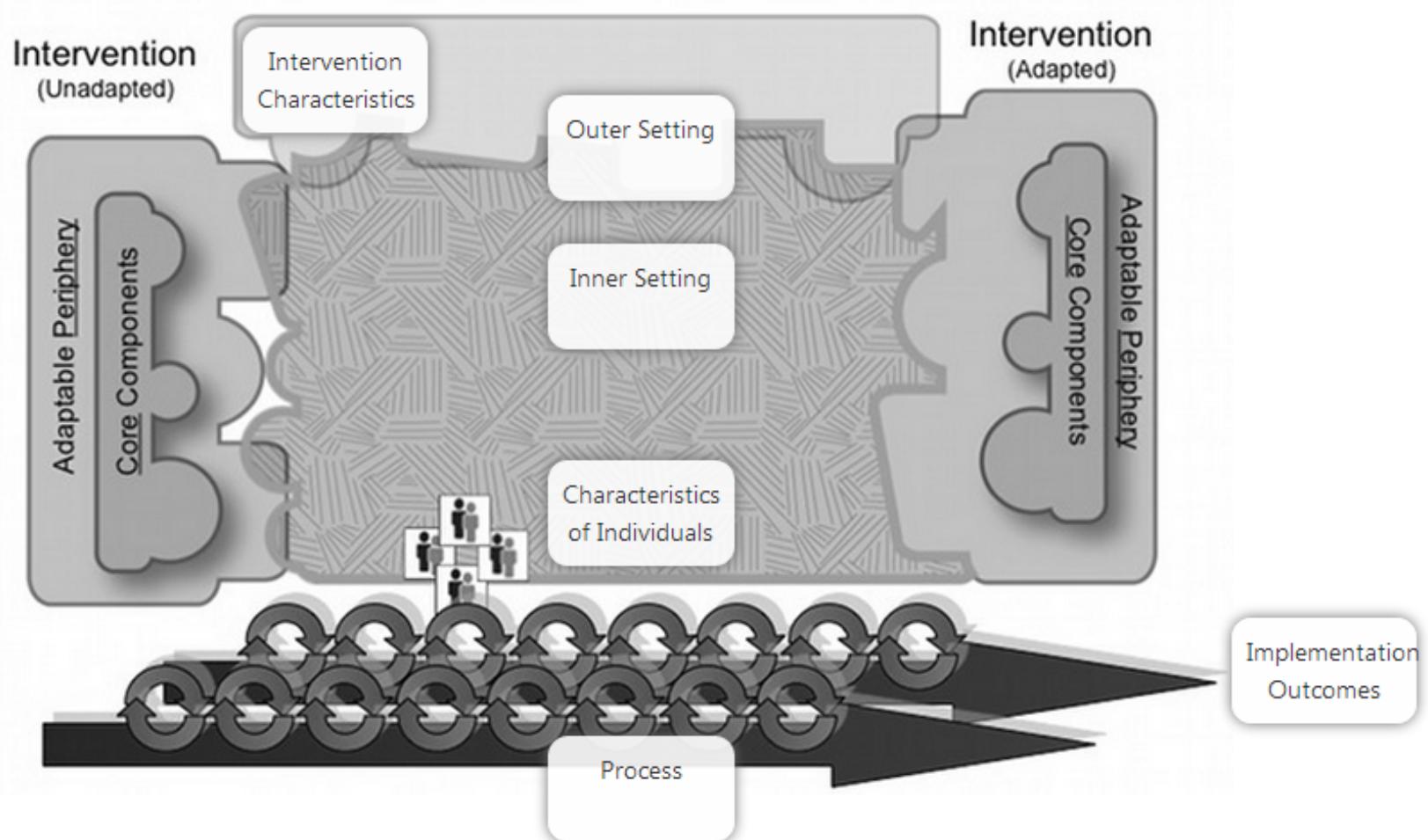
(Lewis, Fischer, et al., 2015)

■ R01: Aims

1. Establish a stakeholder-driven operationalization of pragmatic measures and develop reliable, valid rating criteria for assessing the construct.
2. Identify CFIR- and IOF- linked measures that are both psychometrically strong and pragmatic.



Consolidated Framework for Implementation Research

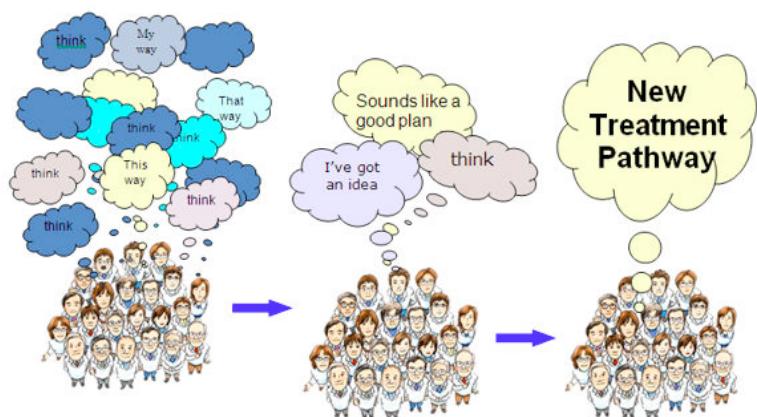
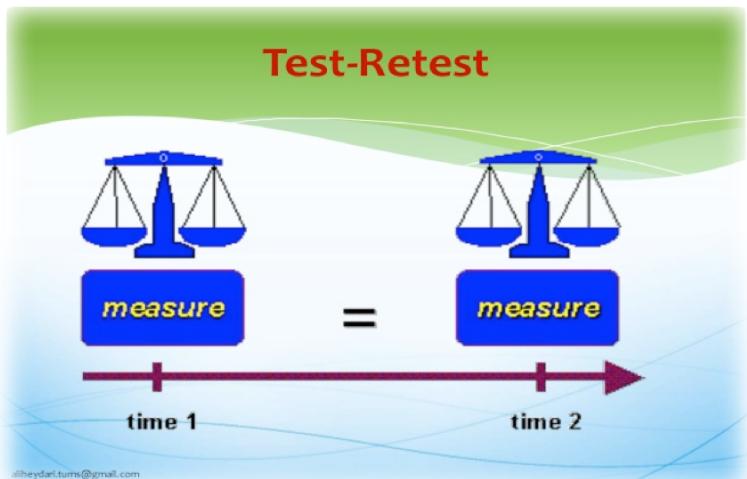
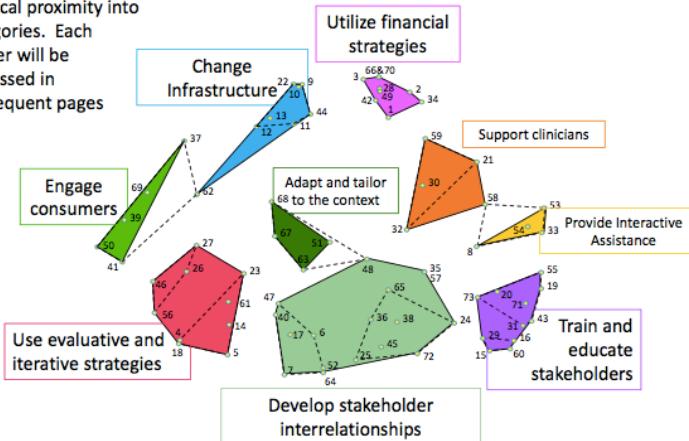


The Pragmatic Construct



Strategies were clustered together by physical proximity into categories. Each cluster will be discussed in subsequent pages

Final Solution



Pragmatic Rating Criteria

(Gerring 2001; Martinez, Lewis, Weiner, 2014)

- Subjective (Stakeholder Facing)
 - Acceptable
 - Offers Relative Advantage over Existing Methods
 - Completed with Ease
 - Appropriate
 - Fits Organizational Activities
 - Informs Clinical or Organizational Decision Making
- Objective (from the Literature)
 - Low Cost
 - Uses Accessible Language
 - Low Assessor Burden (Training + Scoring/Interpretation)
 - Brief

Advancing Implementation Science through Measure Development and Evaluation

(Lewis et al., 2015)

- Develop reliable, valid, and pragmatic measures of three critical implementation outcomes, acceptability, appropriateness, and feasibility.



Domain Delineation

- Process of defining what a concept is and what it is not.
- **Acceptability**: the quality or state of meeting one's needs, preferences, or expectations.
- **Appropriateness**: the quality or state of being fitting, suitable, or proper for a particular purpose, person, condition, occasion, or place.
- **Feasibility**: the state or degree of being easily or conveniently done.

Results

Psychometric Property		Psychometric Property	
Substantive validity	✓	Discriminant validity	TBD
Discriminant content validity	✓	Structural invariance	Coming
Scale reliability	✓		
Structural validity	✓		
Known-groups validity	✓		
Test-retest reliability	✓		
Responsiveness to change	✓		
Predictive validity	Coming	Pragmatic features:	<ul style="list-style-type: none">• Brief• Low burden?• Actionable?



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AIM, IAM, FIM

(Weiner et al., under review)

Acceptability	Appropriateness	Feasibility
[Intervention] meets my approval.	[Intervention] seems fitting.	[Intervention] seems implementable.
[Intervention] is appealing to me.	[Intervention] seems suitable.	[Intervention] seems possible.
I like this [Intervention].	[Intervention] seems applicable.	[Intervention] seems doable.
I welcome [Intervention].	[Intervention] seems like a good match.	[Intervention] seems easy to use.

Advancing Implementation Science through Measure Development and Evaluation

1. Measurement-focused research agenda
2. Repository with psychometric & pragmatic quality ratings
3. Core set of instruments across studies

Recommendations and Future Directions

SHORT REPORT

Open Access



Measurement resources for dissemination and implementation research in health

Borsika A. Rabin^{1,2*†}, Cara C. Lewis^{3†}, Wynne E. Norton⁴, Gila Neta⁴, David Chambers⁴, Jonathan N. Tobin⁵, Ross C. Brownson^{6,7} and Russell E. Glasgow²

- 17 measures resources
 - 12 static reviews
 - 5 web-based resources
 - 14 of 17 publically available
 - 10 focused on quantitative measures
 - 9 provided the actual measures
 - 6 included reliability and validity info



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Recommendations and Future Directions

- If developing anew, ensure its content validity by carefully defining the construct
- Focus measure development on underdeveloped constructs such as the outer setting
- Work to establish psychometrics of underdeveloped measures
- Look to implementation science protocol papers for measures commonly used (but don't trust your peers ☺)
- Clarify constructs for which self-reports are most appropriate
- Engage your stakeholders

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Cameo Stanick, PhD

Byron Powell, PhD



<http://www.societyforimplementationresearchcollaboration.org/>

Thank
you

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