

Methods: Mind the Gap  
Webinar Series

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# Developing and Validating Metrics and Measures for Stakeholder Engagement in Research

Presented by:

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*If you want to go fast, go alone.*

*If you want to go far, go together.*

-African Proverb

# Community Engagement Working Definition

- “....the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people.
- It is a powerful vehicle for bringing about environmental and behavioral changes that will improve the health of the community and its members.
- It often involves partnerships and coalitions that help mobilize resources and influence systems, change relationships among partners, and serve as catalysts for changing policies, programs, and practices.”

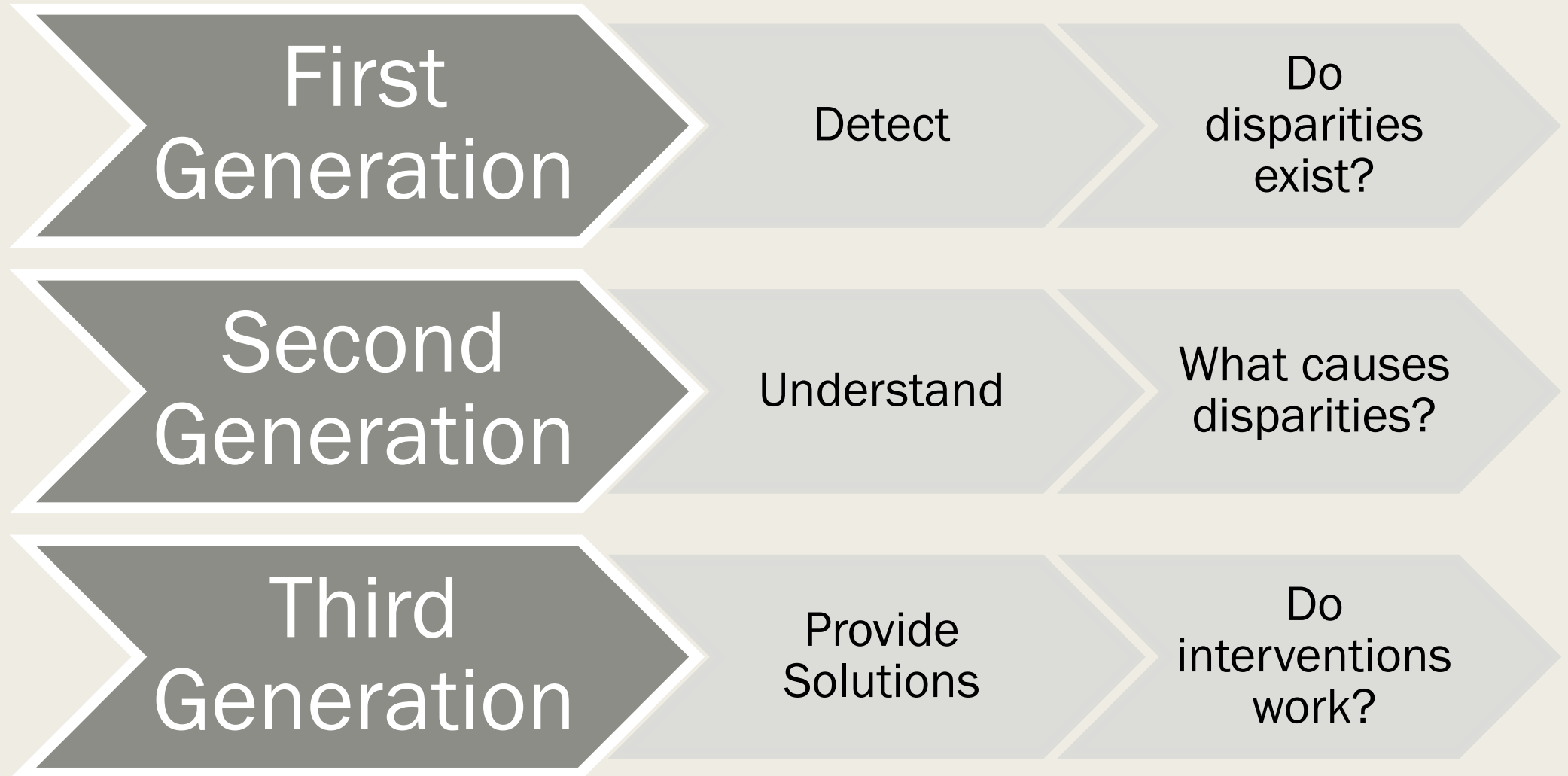
# Why Do Stakeholder Engaged Research?

- Ensure research is patient/community centered
  - *Non-academic stakeholders provide unique perspectives on needs*
- Increase relevance to non-academic stakeholders
  - *patients, communities, policy makers*
- Supports sustainability of interventions post-funding
- Builds capacity and trust among all stakeholders
- Leverage existing resources within the community
- Reciprocal relationship between researchers and non-academic stakeholders
- Evidence-based approach for addressing health disparities

# Building Partnership Capacity

- There is a need to develop infrastructure for equitable and sustainable community-academic partnerships
- Barriers to equitable partnerships include unequal knowledge gap between partners, lack of trust due to imbalance of power and resources
- Increasing research literacy among community partners can enhance the infrastructure for community engaged research

# Generations of Health Disparities Research



# MEASURING PARTNER ENGAGEMENT

# Why Measure Partner Engagement?

- The extent to which stakeholders in research partnerships *feel engaged* has not received sufficient attention.
- It is important to understand:
  - *How engagement level in a partnership is developing.*
  - *To what extent engagement level is a predictor of outcomes in the larger study.*

# Elements of Our Approach

- Systematic review
- Initial development of new measure
- Refinement and validation of new measure
- Develop a shorter (condensed) version of the measure
- Implementation study

## REVIEW

# Systematic Review of Quantitative Measures of Stakeholder Engagement

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## INTRODUCTION

Stakeholder engagement in research has received increasing attention in recent years.<sup>1,2</sup> The term “stakeholder engagement” refers to the process of meaningful involvement of those who are engaged in making decisions about programs.<sup>3</sup> Engaging members of the target population is often key to improving the relevance of the issues studied, the procedures used for study, and the interpretation of outcomes of research studies, health promotion activities, and disease prevention initiatives.<sup>4–6</sup> The utility of stakeholder engagement has been well established in the literature,<sup>7–9</sup> but there are few examples of measurement and evaluation of the degree to which stakeholders are engaged in these activities and the impact of engagement on positive outcomes. These types of evaluations have been limited in scope, and largely focused on qualitative approaches.<sup>10–14</sup> Qualitative methods cannot be easily compared across programs or institutions.<sup>15</sup>

drafting or revision of the article, and (3) approval of the final version.

## Search methods

We searched the peer-reviewed literature using two electronic bibliographic databases: PubMed (web-based) and the Web of Science (web-based). These database searches for all years until 2013 were conducted between July and September 2014. The 2014 search was conducted in January 2016.

## Phase I: Searching the literature

With assistance from a reference librarian, we generated a master list of search terms to use with both databases. The following Medical Subject Headings (MeSH) terms were selected: *stakeholder engagement*, *community engagement*, *community engaged research*. These terms were then

# Systematic Review to Identify Measures

- Started by thinking that such measures existed and that they had properties that were understood
- Found that lots of people had measured something
- But really did not know what they had measured
- Field was “not very strong methodologically”

# Existing Measures Came in Two Camps

- One, in which investigators simply counted the attendance in various events and activities, and assumed engagement
- Two, in which investigators measured some construct that was possibly related to engagement
- Neither way has been validated or corroborated
- Mostly not examined in relation to outcomes or progress in project
- Not tracked over time

## Counting Method

- Number of people who attended a board meeting
- Counts of attendees at community meeting
- Frequency of attendance at process reports

## Construct Measurement Method

- Degree to which participants felt they were part of a positive community
- Degree to which participants felt comfortable sharing their thoughts and opinions
- Level of confidence regarding their neighbors' willingness to participate in neighborhood problem solving process

## EVALUATING COMMUNITY ENGAGEMENT IN RESEARCH: QUANTITATIVE MEASURE DEVELOPMENT

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*Although the importance of community engagement in research has been previously established, there are few evidence-based approaches for measuring the level of community engagement in research projects. A quantitative community engagement measure was developed, aligned with 11 engagement principles (EPs) previously established in the literature. The measure has 96 Likert response items; 3–5 quality items and 3–5 quantity items measure each EP. Cronbach's alpha is used to examine the internal consistency of items that measure a single EP. Every EP item group had a Cronbach's alpha > .85, which indicates strong internal consistency for*

# Community Engagement Measure

New community engagement measure based on 11 engagement principles previously developed in the literature.

## ■ 11 Engagement Principles

- 1) Focus on local relevance and determinants of health
- 2) Acknowledge the community
- 3) Disseminate findings and knowledge gained to all partners
- 4) Seek and use the input of community partners
- 5) Involve a cyclical and iterative process in pursuit of objectives
- 6) Foster co-learning, capacity building, and co-benefit for all partners
- 7) Build on strengths and resources within the community
- 8) Facilitate collaborative, equitable partnerships
- 9) Integrate and achieve a balance of all partners
- 10) Involve all partners in the dissemination process
- 11) Plan for a long-term process and commitment

# Items measured on two scales

- 3-5 items to assess each engagement principle
- Likert response options
- Quantity (how much)
  - *Never, rarely, sometimes, often, always*
- Quality (how well)
  - *Poor, fair, good, very good, excellent*



# The science of stakeholder engagement in research: classification, implementation, and evaluation

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## Abstract

In this commentary, we discuss the science of stakeholder engagement in research. We propose a classification system with definitions to determine where projects lie on the stakeholder engagement continuum. We discuss the key elements of implementation and evaluation of stakeholder engagement in research posing key questions to consider when doing this work. We commend and critique the work of Hamilton et al. in their multilevel stakeholder engagement in a VA implementation trial of evidence-based quality improvement in women's health primary care. We also discuss the need for more work in this area to enhance the science of stakeholder engagement in research.

## Keywords

Stakeholder-engaged research, Evaluation, Implementation science, Community engagement

With the uptake of implementation and translational

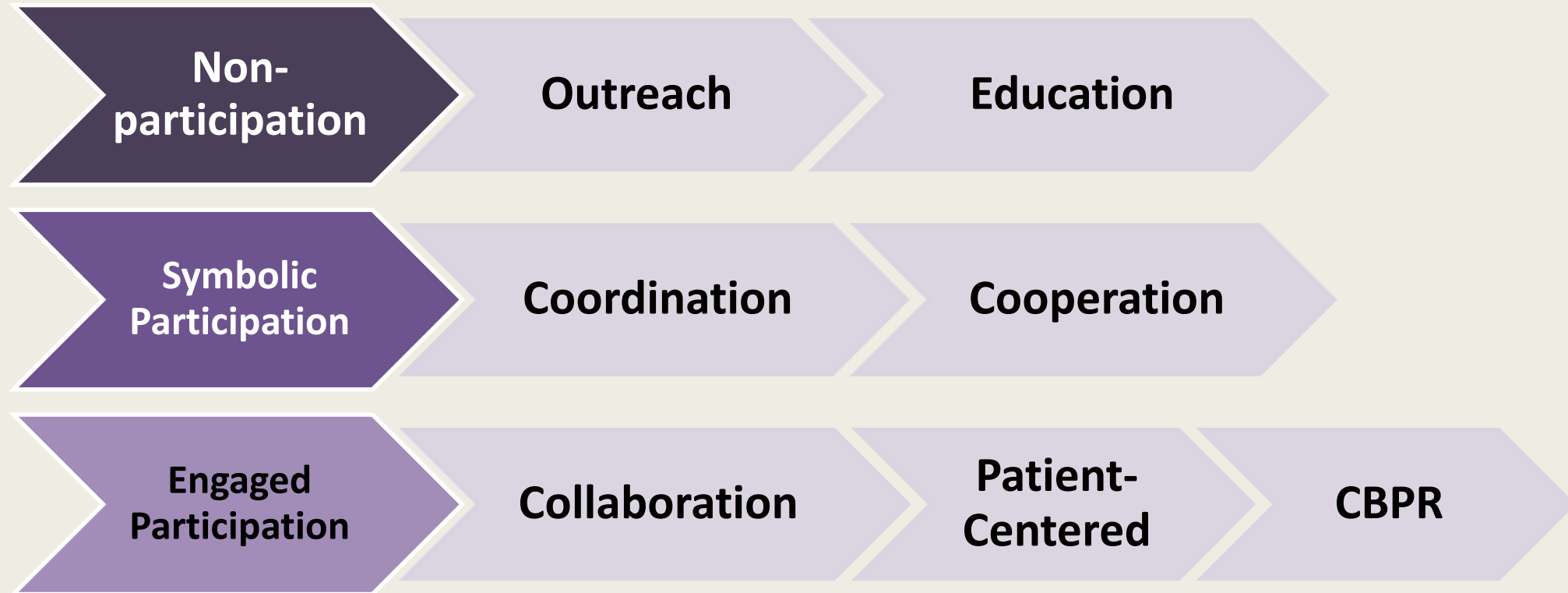
## Implications

**Research:** Future research should evaluate stakeholder engagement in research to determine the association between the level (quality and quantity) of engagement and research outcomes.

**Practice:** Practitioners interested in engaging multilevel stakeholders in service evaluation and quality improvement should consider where the project lies on the stakeholder engagement continuum and create processes for shared decision-making that respect diverse perspectives and interests.

**Policy:** Meaningful stakeholder engagement with shared decision-making is a key component to evidence-based quality improvement initiatives.

# Categories and Classifications of Stakeholder Engagement



Source: Goodman, M. S., & Sanders Thompson, V. L. (2017). The science of stakeholder engagement in research: Classification, implementation, and evaluation. *Translational Behavioral Medicine*, 7(3), 486–491. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5645283/>

# PCORI Specific Aims (Goodman, Thompson et al. 2017)

- I. Examine the construct validity of each engagement principle on both scales (quality/quantity) and use a standardized Delphi process for expert validation, advocacy group/patient/family feedback and prioritization of domains.
- II. Examine the psychometric properties (reliability and sensitivity to change), correlative validity with the trust in medical researchers scale, and determine appropriate categorization cut-off for community engagement scores.
- III. Develop a shorter (condensed) version of the community engagement measure and revise the comprehensive community engagement measure.
- IV. Evaluate uptake and implementation of community engagement measure in PCOR/CER trials

# Phase I: Delphi Process

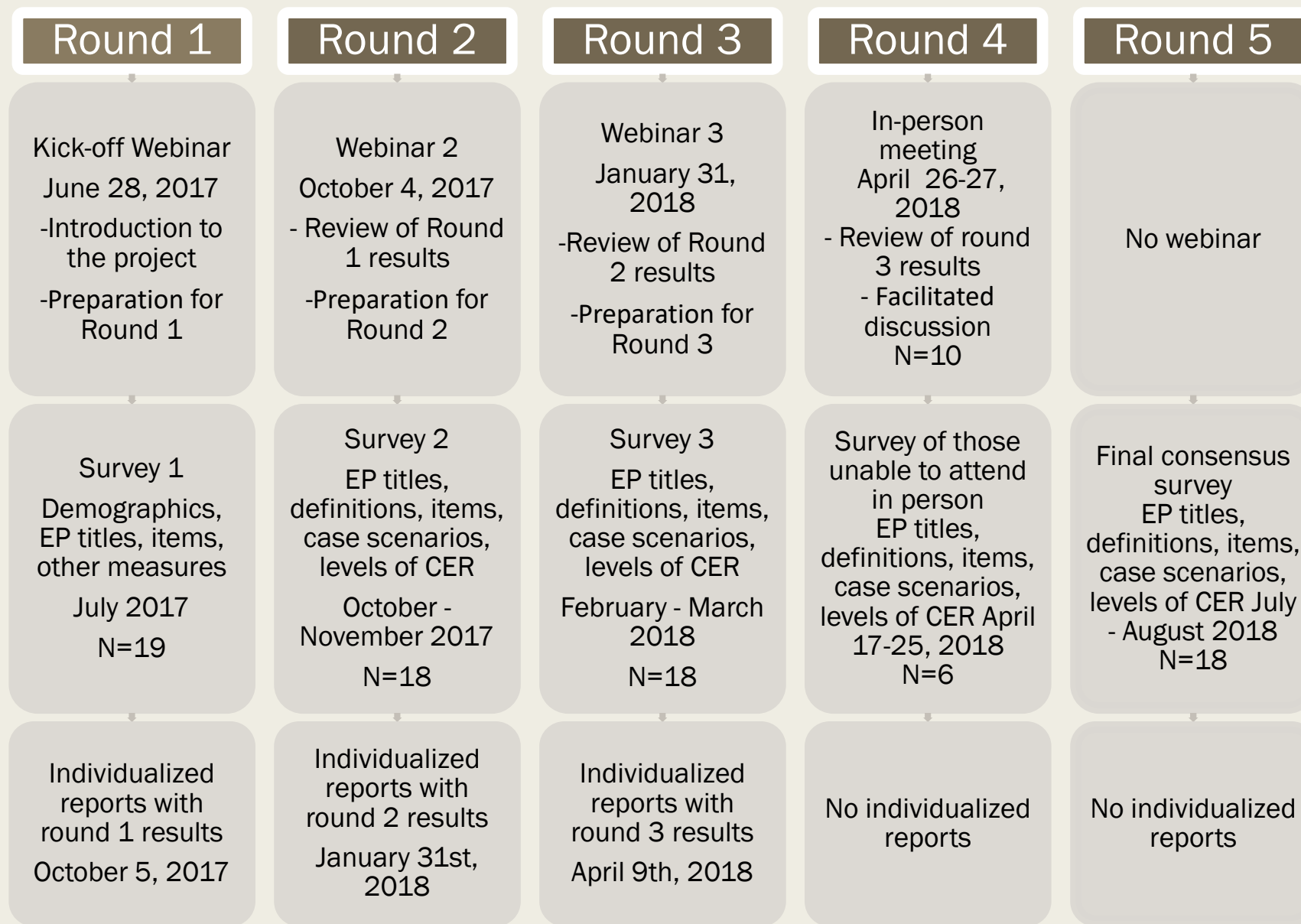
# What is the Delphi Technique?

- The Delphi technique is a method for collecting and organizing informed opinions from a group of experts using an iterative process
  - *often used in survey instrument development*
- This approach is most appropriate to ensure that feedback is obtained from all stakeholders
  - *with all experts being treated equal and everyone's voices being heard*
- Delphi Technique afforded a stakeholder engaged measure development and validation (construct validity) process
- Web-based surveys used in rounds 1-3, 5; round 4 an in person meeting with polling software
- The responses to surveys were analyzed by the investigator team and returned to the Delphi panelist for further consideration and response

# More about the Delphi Process

- Subsequent rounds include items where consensus was not previously reached accompanied with anonymous feedback from previous iterations.
- Panelists are encouraged to reconsider their previous responses, and if appropriate, to change their previous response in light of replies and comments from other panelists.
- The eventual outcome of the Delphi process is to obtain consensus with  $\geq 80\%$  agreement among experts.
- Consensus was not forced; items for which consensus could not be reached were discussed at the in-person meeting.
- On day 2 of the in-person meeting, live voting reached over 80% agreement on all items.

# Five Round Delphi Process




Source: Goodman, M, Ackermann, N, Bowen, D, Thompson, V (2019). Reaching Consensus on Principles of Stakeholder Engagement in Research. *Progress in Community Health Partnerships: Research, Education and Action* [In press].

# Delphi Panelist



## RESEARCH ARTICLE

# Content validation of a quantitative stakeholder engagement measure

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## Funding information

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## Abstract

**Aim:** Using a stakeholder-engaged approach, this study conducted content validation and item reduction of a quantitative measure of research engagement.

**Methods:** A five-round modified Delphi process was used to reach consensus on items. Rounds 1–3 and 5 were conducted using web-based surveys. Round 4 consisted of a 2-day, in-person meeting. Delphi panelists received individualized reports outlining individual and aggregate group responses after rounds 1–3.

**Results:** Over the five-round process, items were added, dropped, modified, and moved from one engagement principle to another. The number of items was reduced from 48 to 32, with three to five items corresponding to eight engagement principles.

**Conclusions:** Research that develops standardized, reliable, and accurate measures to assess stakeholder engagement is essential to understanding the impact of engagement on

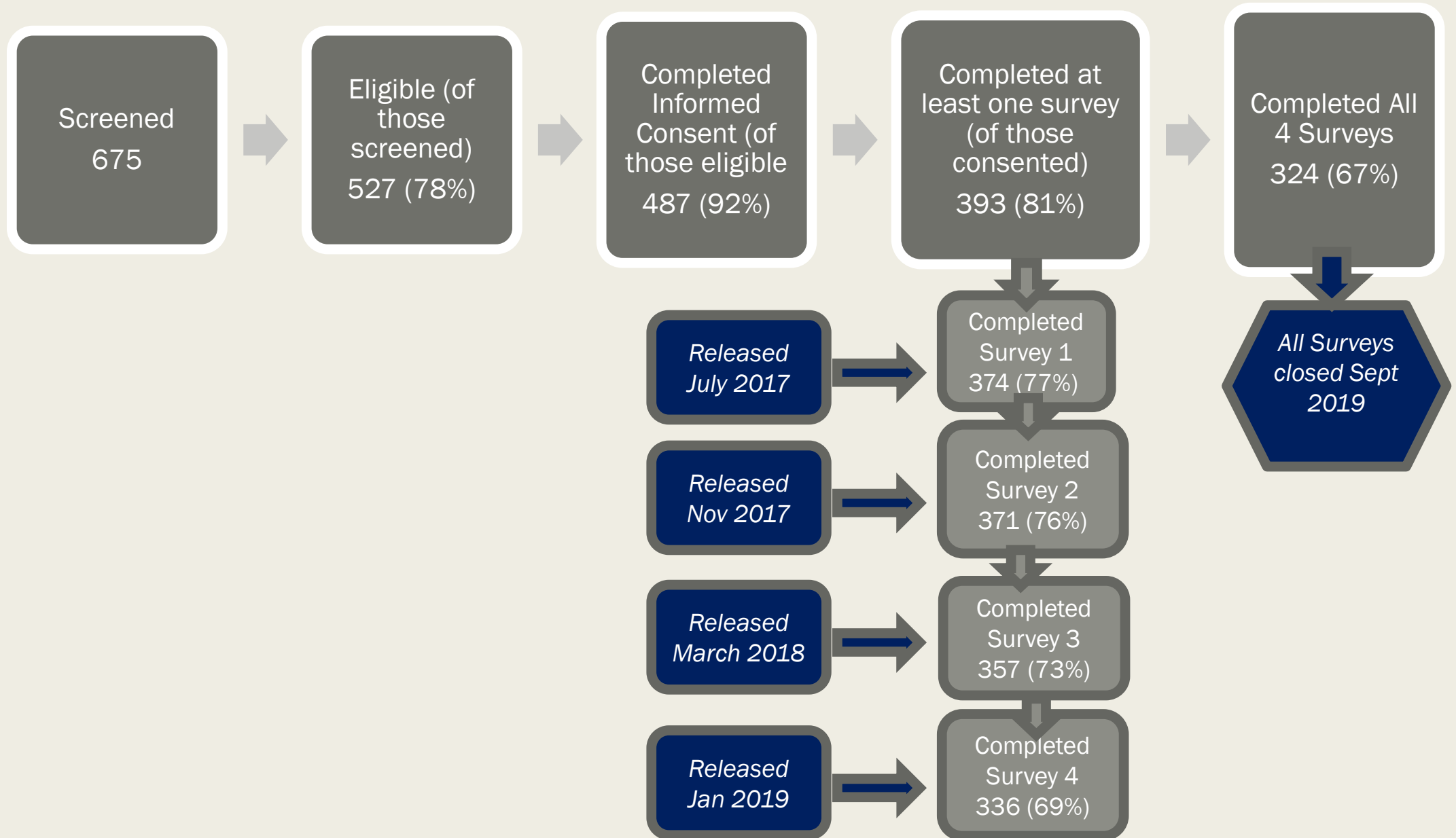
# Research Engagement Survey Tool (REST)

## ■ 8 Engagement Principles

- 1) Focus on community perspectives and determinants of health
- 2) Partner input is vital
- 3) Partnership sustainability to meet goals and objectives
- 4) Foster co-learning, capacity building, and co-benefit for all partners
- 5) Build on strengths and resources within the community or patient population
- 6) Facilitate collaborative, equitable partnerships
- 7) Involve all partners in the dissemination process
- 8) Build and maintain trust in the partnership

# **Phase II: Community Engaged Research Participant Surveys**

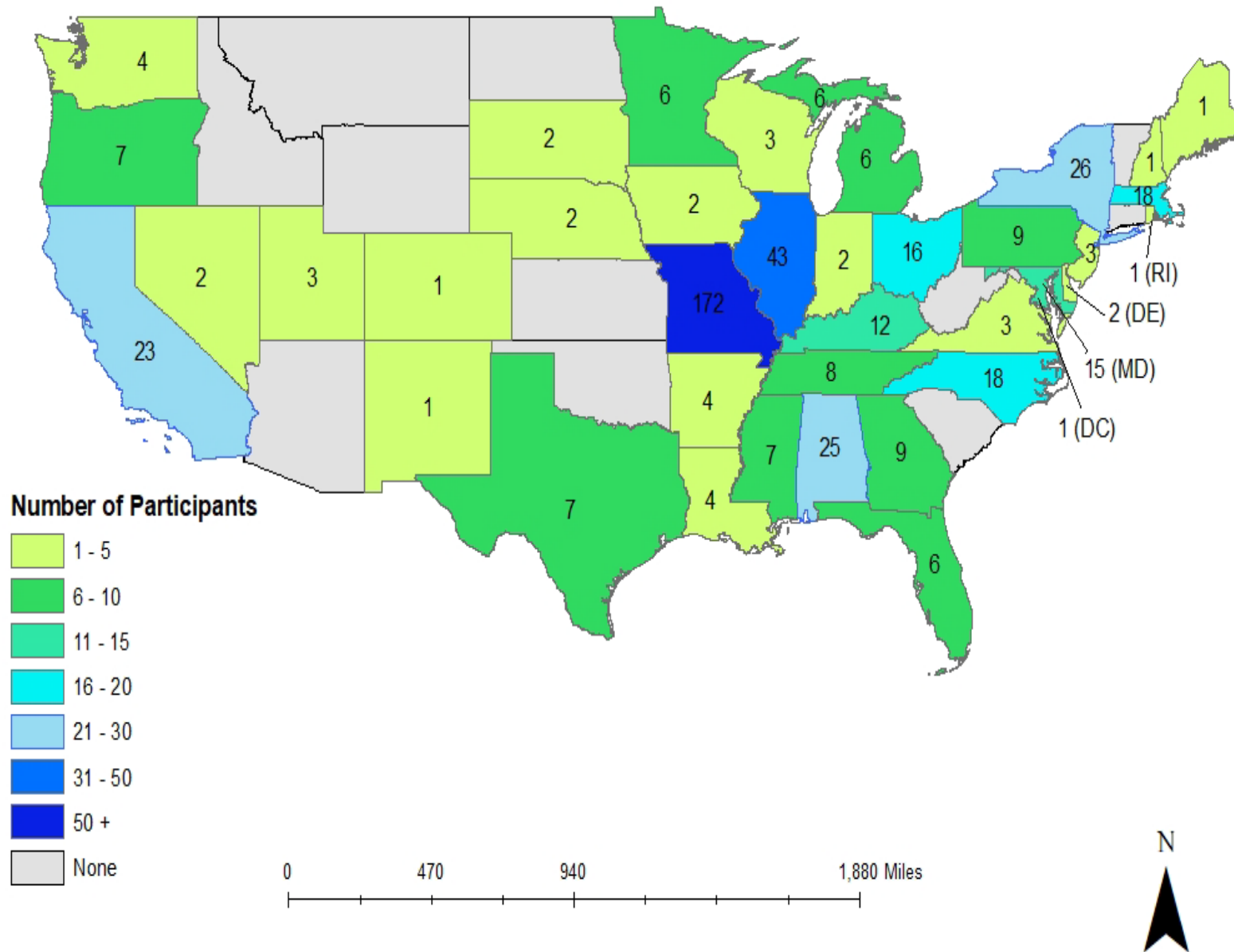
# Participant Surveys



# Cognitive Response Testing (n=16)

- Completed October 2018, between participant surveys 3 & 4
- Purpose
  - *To ensure readability & understandability of the measure*
- Preliminary results
  - *Literacy & interpretation concerns on certain words (ex: dissemination, governance, intellectual property, capacity)*
  - *Confusion on question stem*
  - *Complex questions*
  - *Add unsure [not applicable] option to responses*
- Measure was modified based on cognitive response testing results

# Participants who Enrolled (N=487)



- One participant from Virgin Islands, one from Puerto Rico, & one from Alaska not displayed on map
- 12 states have 0 participants
  - AZ, CT, HI, ID, KS, MT, ND, OK, SC, VT, WV, WI

# Participant Survey - Universities

- 177 universities are represented among the research participants who have completed the survey
- Universities listed have 15 or more participants reporting.

University	Number of Participants
Washington University in St. Louis (WUSTL)	165
New York University (NYU)	28
University of Alabama	21
Northwestern University	21
Mayo Clinic	19
Saint Louis University	17
University of Washington (UW)	17

Demographic Characteristics		N (%)
Race	Non-Hispanic/Latino(a) Black	201 (41.3%)
	Non-Hispanic/Latino(a) White	206 (42.3%)
	Hispanic	31 (6.4%)
	Asian	21 (4.3%)
	Other/ Multiracial/ Unknown	28 (5.8%)
Gender	Male	92 (19.2%)
	Female	386 (80.4%)
	Other/Unknown	9 (1.8%)
Education	Less than HS	5 (1.0%)
	HS degree or GED	17 (3.5%)
	Some college or Associate degree	98 (20.4%)
	College Degree	133 (27.7%)
	Graduate Degree	227 (47.3%)
		Mean (SD)
Age		41.6 (14.4)

# Internal Consistency of EPs

- Examined using Cronbach's Alpha

- *A statistic calculated from the pairwise correlations between items*
- *Measures whether several items that propose to measure the same general construct produce consistent responses*
- *Measured on a 0 to 1 scale*

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Values above 0.7 are considered acceptable in many fields

# Internal Consistency

Engagement Principle	N Items	Quality		Quantity	
		N	Alpha	N	Alpha
EP1	4	301	0.88	306	0.82
EP2	4	306	0.88	311	0.85
EP3	5	291	0.92	298	0.90
EP4	4	313	0.91	324	0.87
EP5	3	309	0.88	319	0.83
EP6	4	292	0.90	296	0.87
EP7	3	283	0.83	296	0.79
EP8	5	301	0.92	304	0.91

- Alpha increases to 0.84 (quality scale) and 0.81 (quantity scale) if item EP7.3 removed
  - Ep7.3: All partners have the opportunity to be coauthors when the work is published.*
- Results show strong internal consistency

# Correlative Validity

- Measure correlations
  - Spearman's correlation coefficient and p-values comparing to other measures of engagement

Interpreting the Correlation Coefficient	
Absolute Value of Correlation Coefficient	Interpretation
0.90 to 1.00	Very high correlation
0.70 to 0.90	High correlation
0.50 to 0.70	Moderate correlation
0.30 to 0.50	Low correlation
0.00 to 0.30	Negligible correlation
Source: Mukaka MM. Statistics corner: a guide to appropriate use of correlation coefficient in medical research. Malawi Med J. 2012;24(3):69-71. doi:10.1016/j.cmpb.2016.01.020.	

# Correlative Validity

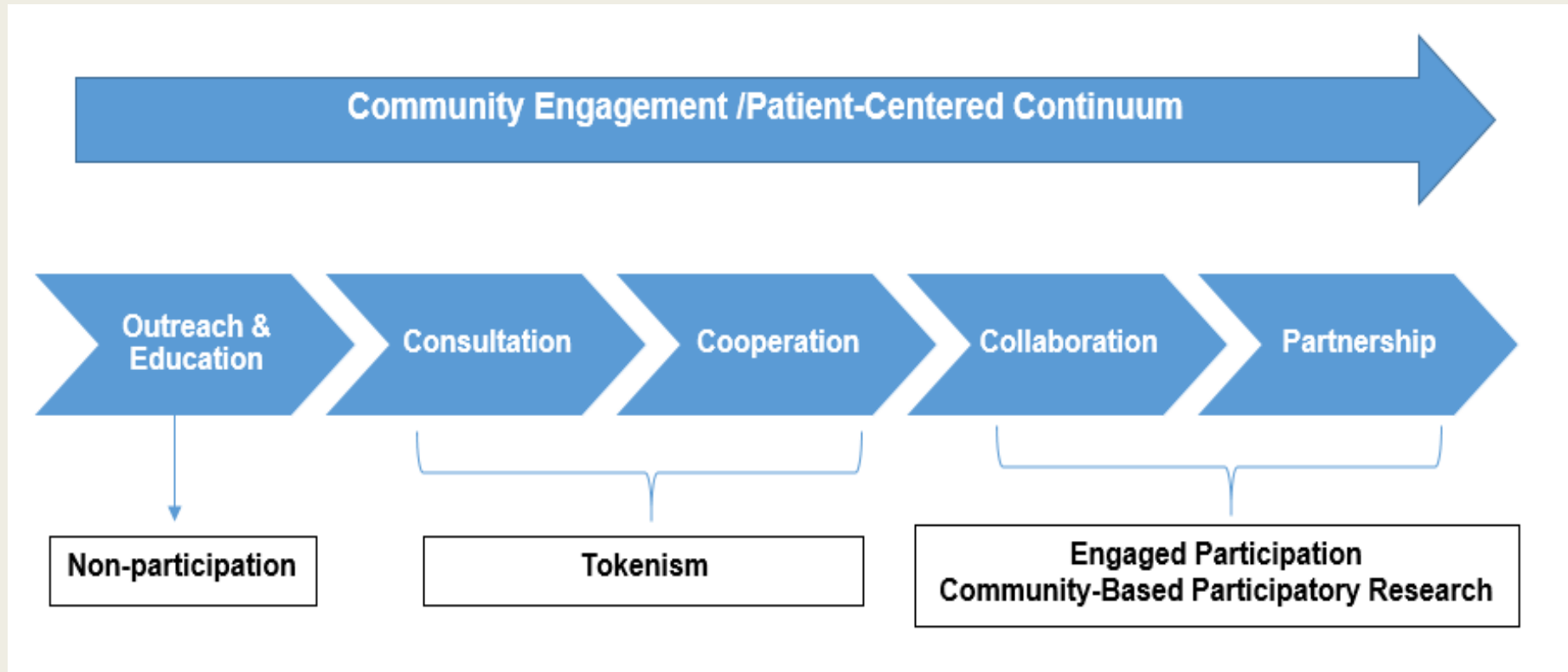
Other Measures	Our Measure – Quality			Our Measure – Quantity		
	N	Spearman's R	P-Value	N	Spearman's R	P-Value
Medical Mistrust	322	0.11 (negligible)	0.05	325	0.12 (negligible)	0.03
Trust in Medical Researchers	322	0.18 (negligible)	<0.001	324	0.21 (negligible)	<0.001
Community Engagement in Research Index (CERI)	320	0.19 (negligible)	0.001	323	0.25 (negligible)	<0.001
Partnership Assessment in community-based Research (PAIR) Measure	322	0.34 (low)	<0.001	325	0.44 (low)	<0.001
Coalition Self-Assessment Survey – Trust*	323	0.40 (low)	<0.001	328	0.42 (low)	<0.001

\*Correlation with EP8 (trust)

# Correlative Validity

Other Measures	Our Measure – Quality			Our Measure – Quantity		
	N	Spearman's R	P-Value	N	Spearman's R	P-Value
Kagan Measure	319	0.50 (moderate)	<0.001	322	0.56 (moderate)	<0.001
Partnership Self-Assessment Tool (PSAT) – Synergy	325	0.61 (moderate)	<0.001	328	0.62 (moderate)	<0.001
PSAT - Satisfaction	324	0.61 (moderate)	<0.001	327	0.65 (moderate)	<0.001
Wilder Collaboration	325	0.54 (moderate)	<0.001	328	0.54 (moderate)	<0.001

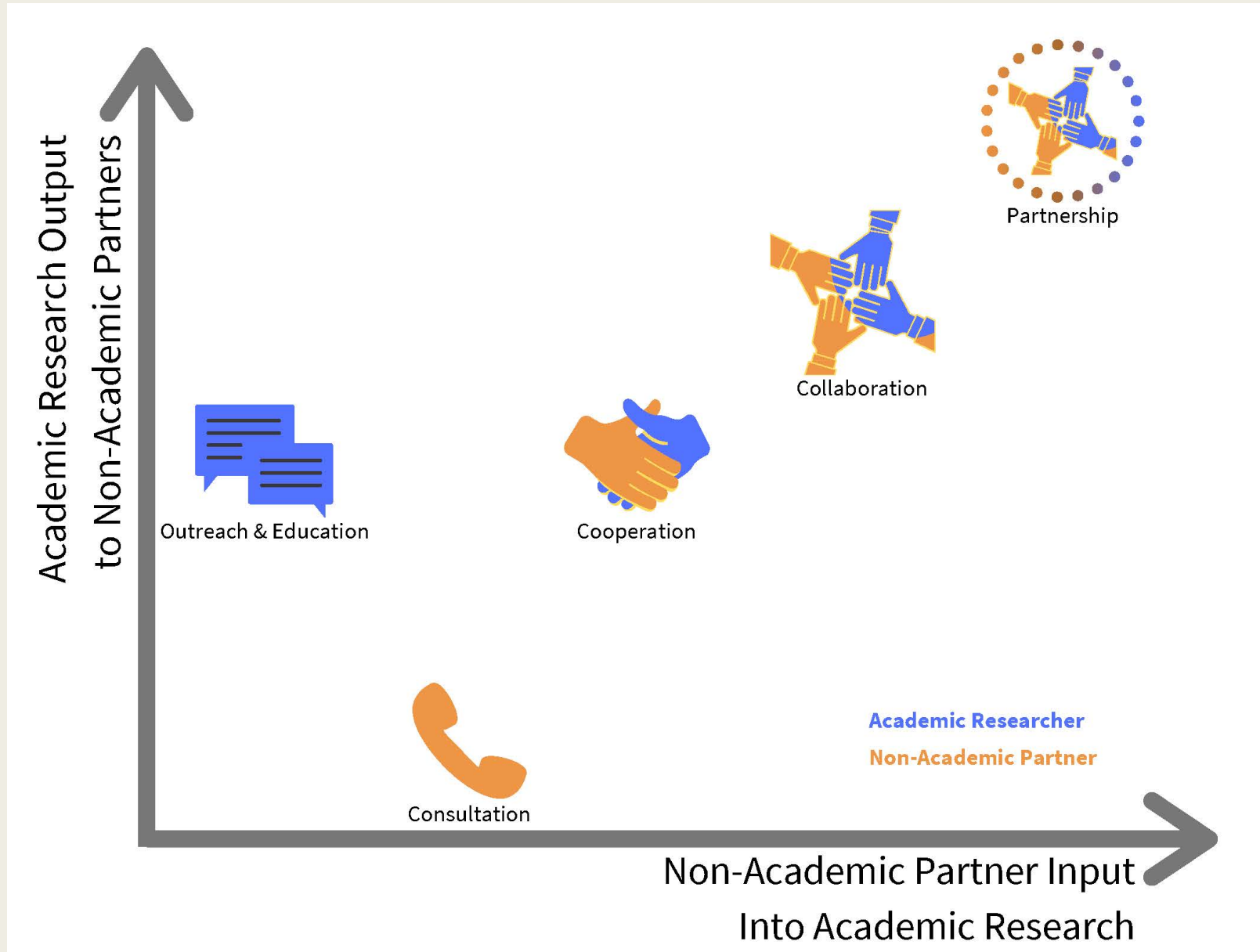
# Categories and Classifications of Stakeholder Engagement - Revised



# Project Classifications – Survey 4

Community Engagement in Research Level	Quality		Quantity	
	N	Mean (SD)	N	Mean (SD)
Outreach & Education	131	3.6 (1.0)	132	3.9 (0.8)
Consultation	41	3.3 (0.9)	41	3.7 (0.8)
Cooperation	59	3.7 (0.8)	61	3.8 (0.6)
Collaboration	60	3.9 (0.8)	61	4.0 (0.6)
Partnership	41	4.1 (0.9)	41	4.3 (0.8)

# Categories of Partner Engagement in Research



# Condensed Measure

- To reduce partner burden, working on a condensed version of the measure
- Preliminary results show promise for a 9 item version of the measure
  - *Condensed versions highly correlated with full version*
  - *Overall and EP specific means similar between versions of measure*

## Condensed Measures & Full Measures Comparison – Quality (full sample)

Variable	N	# of Items	Cronbach's alpha	Mean	SD	Median	Min	Max	Spearman Correlation with Full Version
<b>Condensed Version 1</b>	332	9	0.94	3.72	0.92	3.86	1	5	0.97 (p<0.001)
<b>Condensed Version 2</b>	332	9	0.94	3.72	0.92	3.86	1	5	0.97 (p<0.001)
<b>Full Version</b>	332	32	0.98	3.69	0.89	3.84	1	5	--

## Condensed Measures & Full Measures Comparison of EP Means – Quality (full sample)

Comparison	Condensed V1 Mean (SD)	Condensed V2 Mean (SD)	Full Mean (SD)
EP1	3.7 (1.1)	3.8 (1.1)	3.7 (0.9)
EP2	3.6 (1.1)	3.6 (1.1)	3.7 (1.0)
EP3	3.6 (1.2)	3.6 (1.2)	3.6 (1.0)
EP4	3.8 (1.1)	3.8 (1.1)	3.7 (1.0)
EP5	3.7 (1.1)	3.7 (1.1)	3.8 (1.0)
EP6	3.7 (1.0)	3.7 (1.0)	3.6 (1.0)
EP8	3.8 (1.1)	3.8 (1.1)	3.8 (1.0)

## Condensed Measures & Full Measures Comparison – Quantity (full sample)

Variable	N	# of Items	Cronbach's alpha	Mean	SD	Median	Min	Max	Spearman Correlation with Full Version
<b>Condensed Version 1</b>	336	9	0.92	3.96	0.77	4.07	1.43	5.0	0.97 (p<0.001)
<b>Condensed Version 2</b>	336	9	0.92	3.98	0.77	4.07	1.33	5.0	0.97 (p<0.001)
<b>Full Version</b>	336	32	0.97	3.92	0.74	4.04	1.51	5.0	---

## Condensed Measures & Full Measures Comparison of EP Means – Quantity (full sample)

Comparison	Condensed V1 Mean (SD)	Condensed V2 Mean (SD)	Full Mean (SD)
EP1	4.0 (0.8)	4.1 (0.9)	4.0 (0.8)
EP2	3.9 (1.0)	3.9 (1.0)	4.0 (0.8)
EP3	3.8 (1.0)	3.8 (1.0)	3.9 (0.8)
EP4	3.8 (1.1)	3.8 (1.1)	3.7 (0.9)
EP5	4.1 (0.9)	4.1 (0.9)	4.0 (0.8)
EP6	4.0 (1.0)	4.0 (1.0)	4.0 (0.9)
EP8	4.0 (0.9)	4.0 (0.9)	3.9 (0.9)

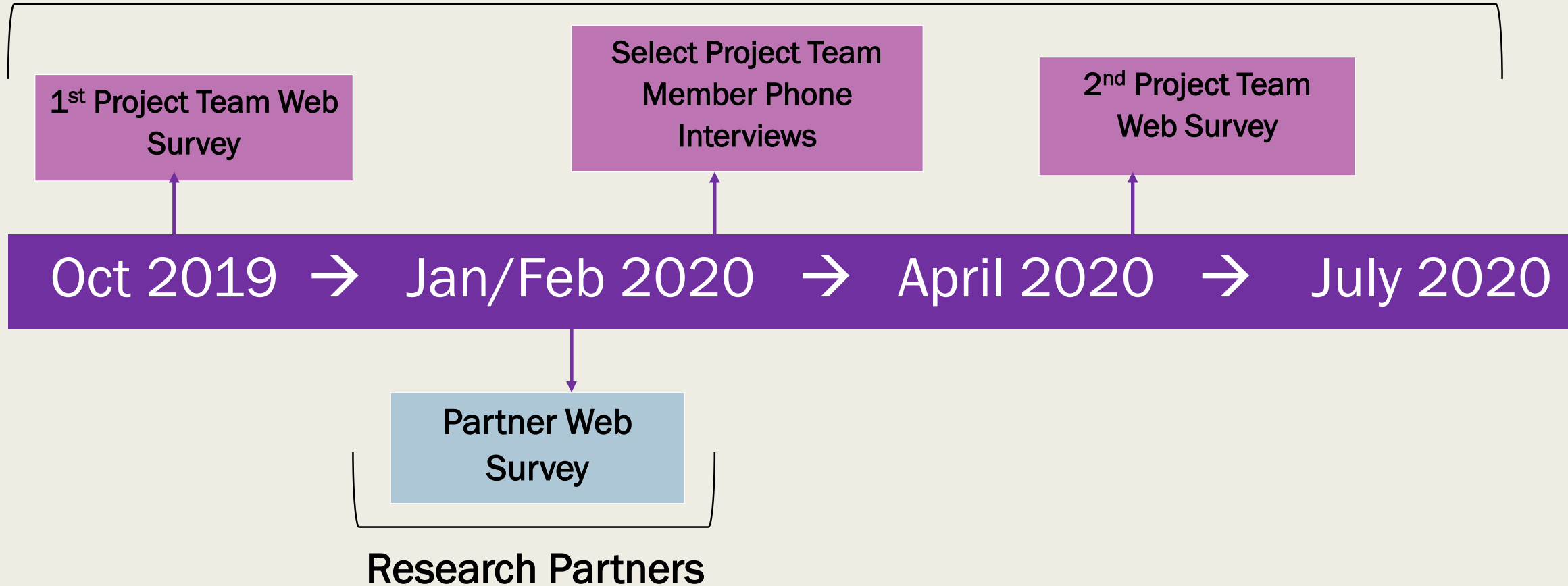
# **Phase III: Implementation Study**

# Implementation Phase

- To evaluate the stakeholder engagement measure in practice we are examining the implementation and performance in PCOR/CER studies
- Examine uptake among research teams, barriers and facilitating factors for use of the research engagement survey tool in practice, and best practices for implementation
- Using the Consolidated Framework for Implementation Research (CFIR) which is comprised of five domains
  - *Intervention characteristics, outer setting, inner setting, characteristics of the individuals involved and the process of implementation*
- This information will be used to refine tool administration guidelines, procedures for implementation of the tool in practice, and how the tool will be packaged and disseminated to research teams.

# Implementation Study Timeline

## Research Teams



# Implementation Phase

- PCOR/CER trials project team members
  - *Baseline project team web survey launched Sept. 24, 2019*
    - 79 completed baseline surveys
    - 29 teams agreed to implement measure
  - *20 teams (with 25 projects) currently implementing the measure*
- Stakeholder/partner survey for project teams that agree to implement measure
  - *Launched February 12, 2020*
  - *72 completed stakeholder surveys*
- Next Steps:
  - *Phone interviews with project team members*
  - *Follow-up project team web-survey*

# MEASURING RESEARCH LITERACY

# Research Literacy definition

- Having the ability to understand and to critically appraise scientific research including basic knowledge of research methodology, study design, and research terminology
- Distinct from health literacy
- Health literacy defined as the ability of individuals to obtain, process, and understand basic health information and services needed to make informed health decisions

Sources: Komaie G, Ekenga CC, Thompson VLS, Goodman MS. Increasing Community Research Capacity to Address Health Disparities: A Qualitative Program Evaluation of the Community Research Fellows Training Program. *J Empir Res Hum Res Ethics*. 2017;12(1):55-66.

Nielsen-Bohlman, L., Panzer, A. M., Kindig, D. A., Nielsen-Bohlman L., P. A. M. K. D. A., & eds. (2004). *Health Literacy: A Prescription to End Confusion*. Washington, DC: National Academies Press.

# Increasing Research Literacy: The Community Research Fellows Training Program

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Bethany Johnson Javois<sup>2</sup>, and Melody S. Goodman<sup>1</sup>

## Abstract

The Community Research Fellows Training (CRFT) Program promotes the role of underserved populations in research by enhancing the capacity for community-based participatory research (CBPR). CRFT consists of 12 didactic training sessions and 3 experiential workshops intended to train community members in research methods and evidence-based public health. The training (a) promotes partnerships between community members and academic researchers, (b) enhances community knowledge of public health research, and (c) trains community members to become critical consumers of research. Fifty community members participated in training sessions taught by multidisciplinary faculty. Forty-five (90%) participants completed the program. Findings demonstrate that the training increased awareness of health disparities, research knowledge, and the capacity to use CBPR as a tool to address disparities.

## Keywords

community-based participatory research, public health training, research literacy, evidence-based public health, academic–community partnership, health disparities

# Community Research Fellows Training (CRFT) Program

- CRFT was developed to enhance community health stakeholder capacity to develop equitable partnerships with academic researchers by increasing research literacy
- Adapted from Community Alliance for Research Empowering Social Change (CARES) Fellows Training (Long Island, NY)
- Public health research methods training program based on the standard master of public health (MPH) curriculum
- CRFT has been implemented among adults in St. Louis, MO (five cohorts), Jackson, MS (2 cohorts), Hattiesburg, MS (1 cohort), and a youth version in New Jersey (1 cohort)

CARES Funding: NIH Partners in Research-(R03), Sponsored by National Institutes of Health grants 1R03HD061220 (Stony Brook) and 1R03HD061219 (Literacy Suffolk, Inc.)

CRFT-STL Funding: Program to Eliminate Cancer Disparities (National Institutes of Health, National Cancer Institute grant U54CA153460) at the Siteman Cancer Center, Barnes Jewish Hospital, and Washington University School of Medicine; Staenberg Foundation, Siteman Cancer Center and WUSM, Prevention and Control.

CRFT-MS Funding: Mississippi State Department of Health, Office of Health Equity

YRFT-NJ Funded by New York University (NYU)

# Community Research Fellows Training (CRFT)

## Program Goals for Increasing Research Literacy

1. Train community members to become good consumers of research
2. Understand how to use research as a tool in improving health outcomes in communities
3. Increase community members understanding of how to work with academic researchers
4. Increase the role of minority and medically underserved populations in the research enterprise

# CRFT Curriculum

Session	Topics
Session 1	Community Based Participatory Research
Session 2	Public Health Research & Health Disparities
Session 3	Family Health History/Introduction to Epidemiology
Session 4	Public Health Library Resources/Cultural Competency
Session 5	Health Literacy
Session 6	Evidence Based Public Health & Program Planning
Session 7	Quantitative Methods
Session 8	Research Methods & Data
Session 9	Qualitative Methods
Session 10	Research Ethics I & II
Session 11	Clinical Trials & Biobanks
Session 12	Health Policy Research/Grant Writing
Session 13	Community Health/Community Based Prevention
Session 14	Community Organizing
Session 15	Human Subjects Certification

# Increasing Community Research Capacity to Address Health Disparities: A Qualitative Program Evaluation of the Community Research Fellows Training Program

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and Melody S. Goodman<sup>1</sup>

## Abstract

The Community Research Fellows Training program is designed to enhance capacity for community-based participatory research; program participants completed a 15-week, Master of Public Health curriculum. We conducted qualitative, semistructured interviews with 81 participants from two cohorts to evaluate the learning environment and how the program improved participants' knowledge of public health research. Key areas that provided a conducive learning environment included the once-a-week schedule, faculty and participant diversity, and community-focused homework assignments. Participants discussed how the program enhanced their understanding of the research process and raised awareness of public health–related issues for application in their personal lives, professional occupations, and in their communities. These findings highlight key programmatic elements of a successful public health training program for community residents.

## Keywords

community-based participatory research, public health training, academic–community partnership, program evaluation, qualitative methods

# CRFT Evaluation Methods

- **Baseline assessment** at orientation
- **Mid-training evaluation** at training session 6 to assess participants' satisfaction
- **Follow up assessment and evaluation** after last training session
- **Pre-test, Post-test, and evaluation** administered at each training session
- **Faculty Evaluation Survey** web-based survey of faculty experience after teaching a session
- **Qualitative Interviews** with Fellows after completion of training program

# Quantitative evaluation of the community research fellows training program

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*Edited by:*

**Context:** The community research fellows training (CRFT) program is a community-based participatory research (CBPR) initiative for the St. Louis area. This 15-week program, based on a Master in Public Health curriculum, was implemented by the Division of Public Health Sciences at Washington University School of Medicine and the Siteman Cancer Center.

# Research Literacy Measure

- 10-item research literacy scale was first piloted in CRFT-STL cohort III on the web-based baseline and final assessments
  - *In-person cognitive interviews conducted after the training*
- Research literacy scale modified and revised version pilot tested in CRFT-STL cohort IV
- Revised version also added to PCORI project participant survey 1

# Research Knowledge Measure

- CRFT-STL cohort I – III: 31 open-ended questions (62 points total)
  - *Each item assessed a single topic covered in the training program*
  - *3 levels for each question:*
    - 0 indicating an incorrect answer
    - 1 indicating a partially correct answer
    - 2 indicating an essentially correct answer
- CRFT-STL cohort IV: 20 closed-ended items (20 points total)
  - *Incorrect & ‘Don’t Know’ responses = 0 points*
  - *Correct responses = 1 point*
- PCORI project: 8 of the 20 questions developed for CRFT IV were used (8 points total)

Demographic Characteristics of Research Literacy Participants								
Characteristics	All Participants (n = 347)		CRFT Cohort III (n=19)		CRFT Cohort IV (n=23)		PCORI Project (n=305)	
	n	%	n	%	n	%	n	%
Gender								
Male	67	19%	4	21%	4	17%	59	19%
Female	280	81%	15	79%	19	83%	246	81%
Race								
Black	148	43%	17	89%	13	57%	118	39%
White	153	44%	0	0%	9	39%	144	48%
Other/Multiple Races	46	13%	2	11%	1	4%	43	14%
Ethnicity								
Hispanic/ Latino	16	5%	0	0	1	4%	15	5%
Non-Hispanic/Latino	328	95%	19	100%	22	96%	287	95%
Education Level								
High school diploma or GED or less	11	3%	0	0	0	0	11	4%
Some college or associates degree	70	20%	4	21%	3	13%	63	21%
College degree	103	30%	8	42%	6	26%	89	29%
Graduate degree	163	47%	7	37%	14	61%	142	47%
Age- Mean (SD)	40	14	46.2	13	42.3	13	39.9	14

# Original Research Literacy Measure

- 5 questions created by the CRFT research team
  - *research methodology, sample size, study design, primary and secondary data , and interpretation of study findings/Statistics university*
- 1 question (genetics and disease risk) modified from Haga et al. 2013
- 4 questions from the Test of Scientific Literacy Skills
  - *diet soda and disease risk, data driven hypothesis development, interpretation of study results/Grip bar and interpreting results from a graph*

**Sources:** Haga, S. B., Rosanbalm, K. D., Boles, L., Tindall, G. M., Livingston, T. M., & O'Daniel, J. M. (2013). Promoting public awareness and engagement in genome sciences. *J Genet Couns*, 22(4), 508–516. <https://doi.org/10.1007/s10897-013-9577-3>

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# Research Literacy Methods

- Cognitive Interview Testing of the Research Literacy Measure – CRFT III only
  - *Respondents given research literacy measure and asked to respond using a think aloud approach*
  - *Two versions of measure tested, two questions differed (sample size, reading graphs) and order of questions differed*
  - *Fellows rated confidence in correct answer (0: not at all confident to 5: very confident)*
  - *Fellows also picked 3 easiest and 3 hardest questions*
- Item response theory (IRT) analysis was performed on the final assessment (cohorts III and IV), the cognitive interview (cohort III) data, and the PCORI project data
  - *Rankings go from 1 (least difficult) to 10 (most difficult)*

# Research Literacy Methods



Item level Analysis CRFT Cohort III (N=19)				
Question	Baseline Assessment % Correct	Final Assessment % Correct	Cognitive Interview % Correct	Mean (SD) Confidence Rating
1. Research Methodology	79	79	89.5	4.18 (1.12)
2. Sample size	73.7	84.2	84.2	4.08 (1.27)
Version A (n=9)	-	-	100	4.40 (0.88)
Version B (n=10)	-	-	70	3.75 (1.50)
3. Genetics and disease risk	68.4	52.6	57.9	4.18 (0.95)
4. Study Design	79	79	73.7	4.75 (0.49)
5. Diet soda and disease risk	68.4	89.5	68.4	4.33 (0.86)
6. Data driven hypothesis development	57.9	57.9	57.9	3.89 (1.52)
7. Interpretation of study results	68.4	73.7	73.7	4.44 (0.70)
8. Interpretation of study findings	21.1	15.8	31.6	4.00 (0.94)
9. Primary and secondary data	52.6	79	89.5	4.71 (0.65)
10. Interpreting results from a graph	52.6	79	73.7	4.41 (1.12)
Version A (n=9)	-	-	66.7	4.80 (0.46)
Version B (n=10)	-	-	80	4.10 (1.50)
Mean Total (SD)	62.1 (15.8)	68.9 (18.5)	70.0 (21.3)	4.28 (0.55)
Cronbach's Alpha	0.19	0.48	0.66	-

Item level Analysis CRFT Cohort III (N=19)						
Question	Number (%) fellows picked easy	Number (%) fellows picked hard	Ranking Based on Confidence Ratings	Ranking Based on Easy/Hard Rankings	Cognitive Difficulty Ranking (IRT)	Final Assessment Difficulty Ranking (IRT)
1. Research Methodology	10 (53%)	2 (11%)	6	3	1	3
2. Sample size	13 (68%)	1 (5.3%)	8	2	3	2
Version A (n=9)	8 (89%)	0	-	-	-	-
Version B (n=10)	5 (50%)	1 (10%)	-	-	-	-
3. Genetics and disease risk	1 (5.3%)	6 (32%)	7	7	8	9
4. Study Design	8 (42%)	1 (5.3%)	2	4	4	3
5. Diet soda and disease risk	0	11 (58%)	5	9	7	1
6. Data driven hypothesis development	0	9 (47%)	10	8	8	8
7. Interpretation of study results	4 (21%)	3 (16%)	3	5	4	7
8. Interpretation of study findings	0	14 (74%)	9	10	10	10
9. Primary and secondary data	17 (89%)	0	1	1	1	3
10. Interpreting results from a graph	2 (11%)	6 (32%)	4	6	4	3
Version A (n=9)	0	1 (11%)	-	-	-	-
Version B (n=10)	2 (20%)	5 (50%)	-	-	-	-

# Original Research Literacy Measure Results

- Percentage of fellows that answered correctly from baseline to follow-up increased for 5 questions, no change for 3 questions, decreased for 2 questions
- 4 items increased from final to cognitive interview, 3 did not change, 3 decreased
- Items 1, 2, 9 were ranked as easiest most often
- Items 8, 5, 6 were ranked as hardest most often
- Fairly consistent with IRT results from cognitive interview, except item 4 was ranked in top 3 hardest as opposed to item 5

# Summary Research Literacy (RL) and Knowledge Scores (KS) - Cohort III (n=19)

RL and KS Scores	Mean	SD	Median	Min	Max	Cronbach's Alpha
RL Score Baseline	62.1	15.8	60	30	90	0.19
RL Score Follow-up	68.9	18.5	70	30	90	0.48
RL Score Difference	6.8	14.5	10	-20	30	--
<i>P-value: Difference Baseline &amp; Follow-Up*</i> 0.08						
KS Baseline	46.7	17.7	50	8.1	75.8	0.89
KS score Follow-up	78.8	15.5	83.9	43.5	96.8	0.88^
KS Score Difference	32.1	16.7	27.4	12.9	80.6	--
<i>P-value: Difference Baseline &amp; Follow-Up*</i> <0.001						
Baseline RL & KS Correlation	0.34 (p=0.16)					
Follow-up RL & KS Correlation	0.38 (p=0.11)					

\*P-value for Wilcoxon Signed Rank Test between baseline and follow up

^Knowledge items 4 and 26 were excluded from the calculation of CRFT III knowledge score follow-up due to all 2 point responses

# Revised Research Literacy Questions

- Sample size question from version A of the cognitive interviews chosen
- Interpreting results from graphs question from version B (bar chart) chosen
  - *Question also modified to change the comparison from Type A and Type B mice to white and gray mice*
- Changed names used in questions from region specific to generic names
- One of the TOSL questions removed and replaced with another
- Several TOSL questions modified by bolding/underlining key text
- One of investigator created questions revised based on confusion in interviews – removing unnecessary data, revising question stem & one response option

# Item level Analysis CRFT Cohort IV & PCORI Project

Question	CRFT IV (N=23)			PCORI Project (N=305)	
	Baseline Assessment % Correct	Final Assessment % Correct	Final Assessment Difficulty Ranking (IRT)	% Correct	Difficulty Ranking (IRT)
1. Research Methodology	91.3	95.7	2	81.3	2
2. Sample size	91.3	87	4	75.7	3
3. Genetics and disease risk	91.3	91.3	3	83	1
4. Study Design	69.8	78.3	5	66.2	7
5. Diet soda and disease risk	60.9	65.2	8	66.2	6
6. Data driven hypothesis development	43.5	47.8	9	58.4	9
7. Interpretation of study results	78.3	78.3	5	62.6	8
8. Interpretation of study findings	21.7	21.7	10	37.9	10
9. Primary and secondary data	78.3	100	1	72.1	5
10. Interpreting results from graph	82.6	73.9	7	72.5	4

# Summary Research Literacy (RL) and Knowledge Scores (KS)

RL and KS Scores	<u>Cohort IV (n=23)</u>			<u>PCORI (n=305)</u>		
	Mean	SD	Cronbach's Alpha	Mean	SD	Cronbach's Alpha
RL Score Baseline	70.9	17	0.49	67.5	22.1	0.66
RL Score Follow-up	73.9	15	0.42^	--	--	--
RL Score Difference	3	13.3	--	--	--	--
<i>P-value: Difference Baseline &amp; Follow-Up*</i>	0.3325			--		
KS Baseline	63.3	13.5	0.52	76.1	24	0.74
KS score Follow-up	78	11.1	0.62^	--	--	--
KS Score Difference	14.8	8.5	--	--	--	--
<i>P-value: Difference Baseline &amp; Follow-Up*</i>	<0.0001			--		
Baseline RL & KS Correlation	0.49 (p=0.008)			0.57 (p<0.001)		
Follow-up RL & KS Correlation	0.26 (p=0.22)			--		

\*P-value for Wilcoxon Signed Rank Test between baseline and follow up for CRFT cohort IV only

^Research literacy item 9 & Knowledge item 4 were excluded from the calculation of CRFT IV follow-up scores due all correct responses

# Research Literacy Measure Conclusions

- More work is needed on research literacy measure to increase discriminant ability from baseline to follow-up and correlative validity with the longer knowledge assessment tools
- Potential modifications to the research literacy measure include:
  - *reduction in research vocabulary*
  - *modification of response options to make clear distinctions between each option*
  - *reduction in the number of concepts covered in each item*
  - *additional modifications to reduce the reading level for the items*

# DISCLAIMER

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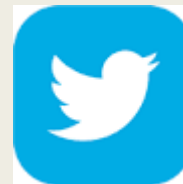
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