Implementation Science

A Critical Element of Precision Public Health

Objectives

- Define implementation science.
- Identify implementation strategies, outcomes, and frameworks.
- Describe how implementation science can be used to improve the integration of precision public health into clinical and public health settings.

Conflicts

- No relevant conflicts of interest

If you build it, (they) will come…

https://mpattyfly.medium.com/if-you-build-it-they-will-come-d9443f01fce7

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Slide adapted from David Chambers

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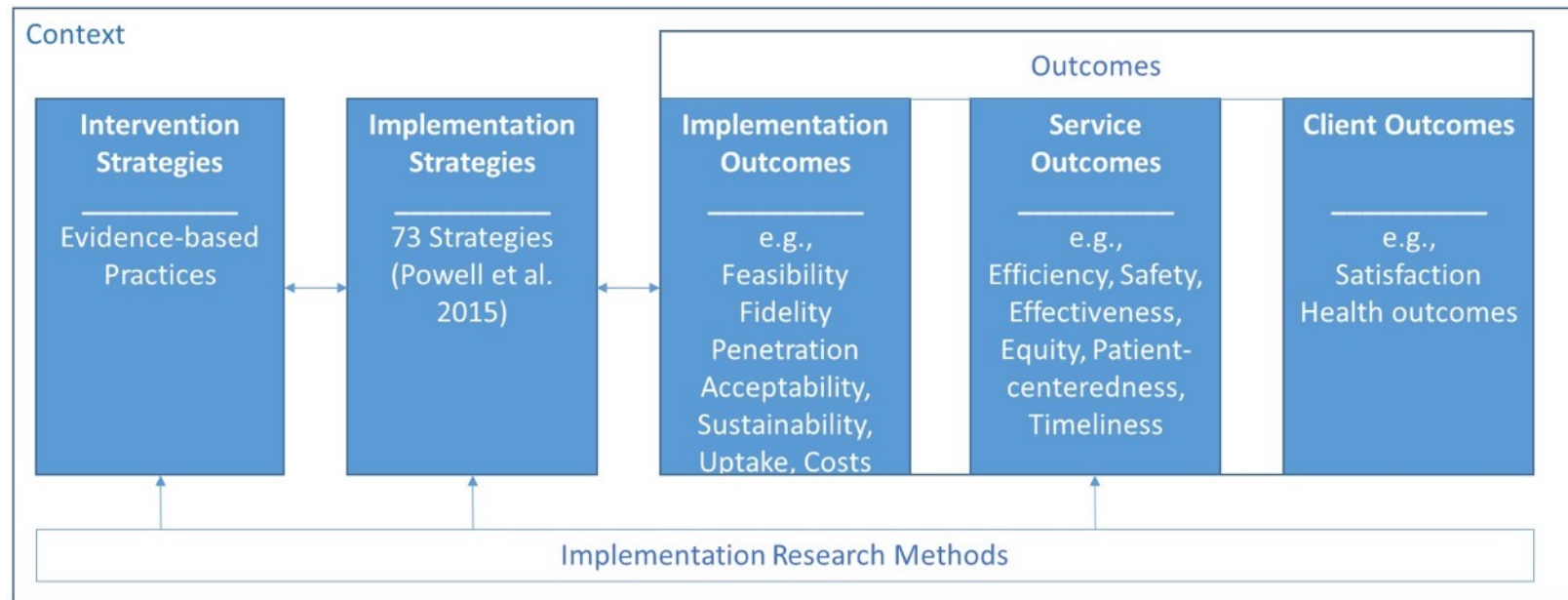081189753f88a0797.jpg

Slide adapted from David Chambers

It takes 17 years for research evidence to benefit patients

Balas and Bohen, *Yearb Med Inform,* 2000; Morris et al., *J R Soc Med,* 2011

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The study of methods to promote the adoption and integration of evidence-based practices into routine health care and public health settings to improve the impact on population health
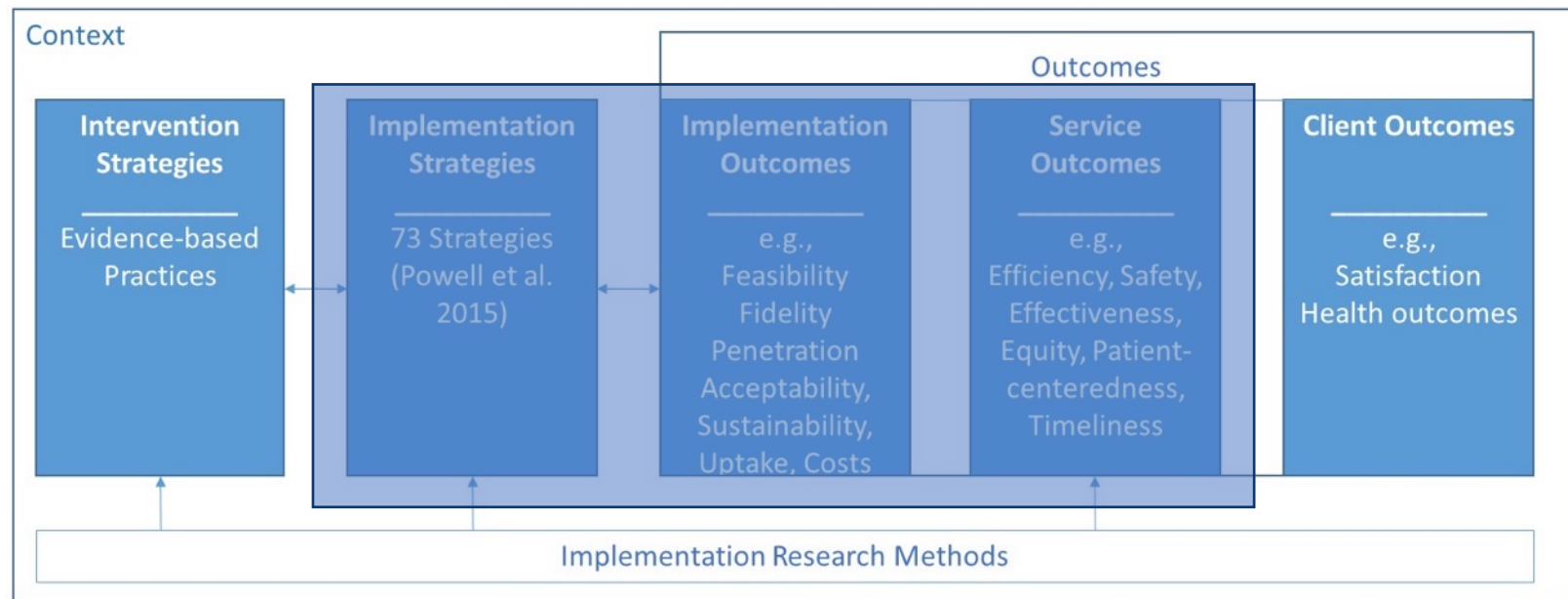

Proctor et al., *Adm Policy Ment Health,* 2009
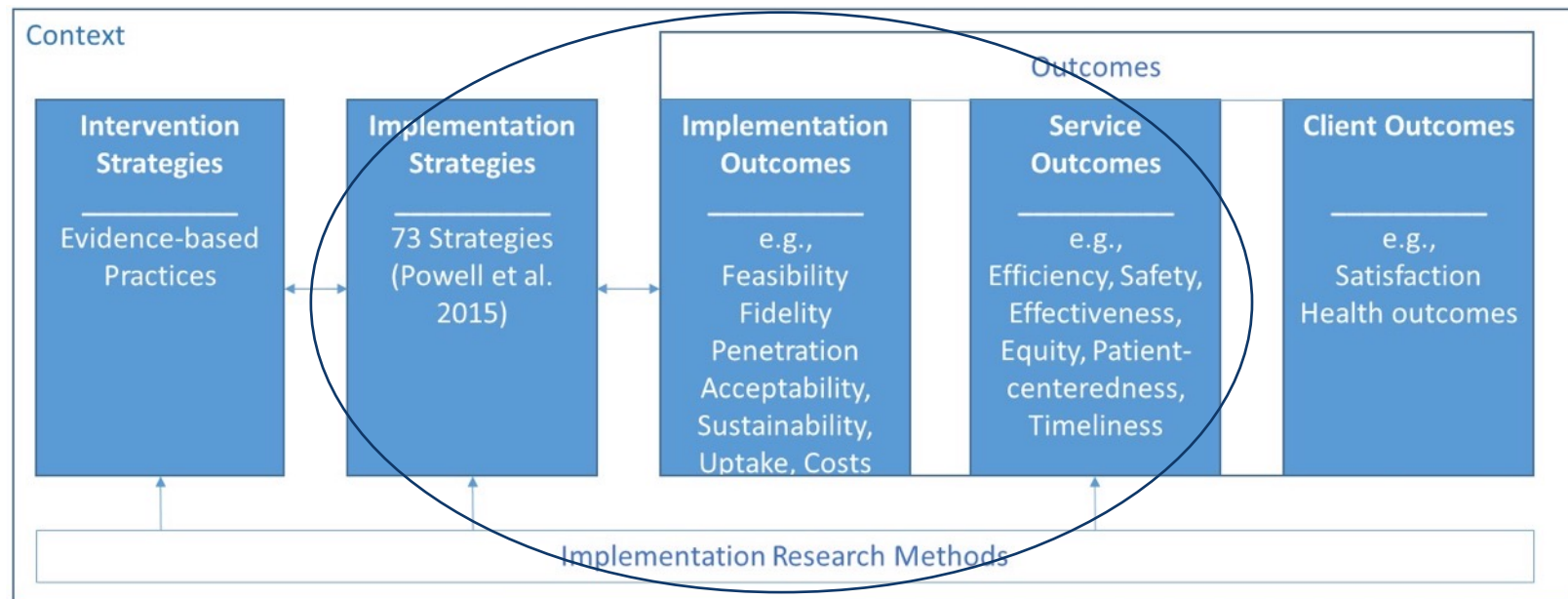
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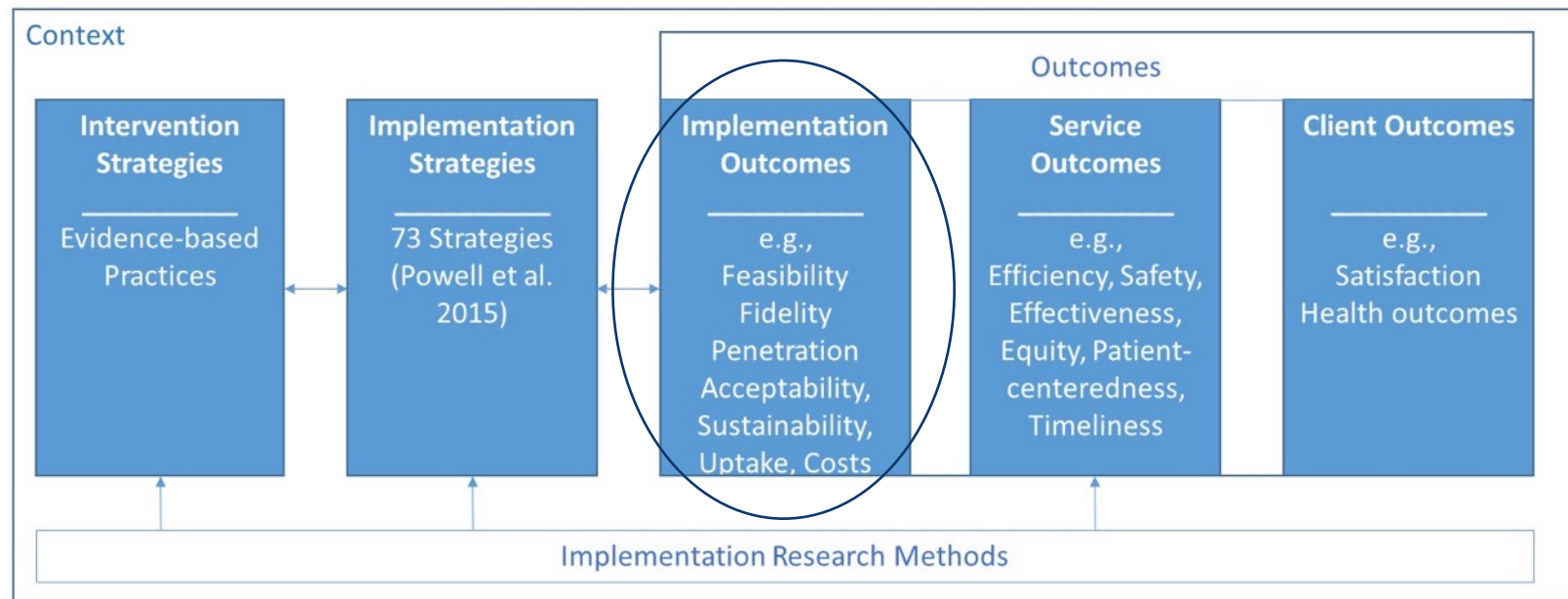Proctor et al., *Adm Policy Ment Health,* 2009

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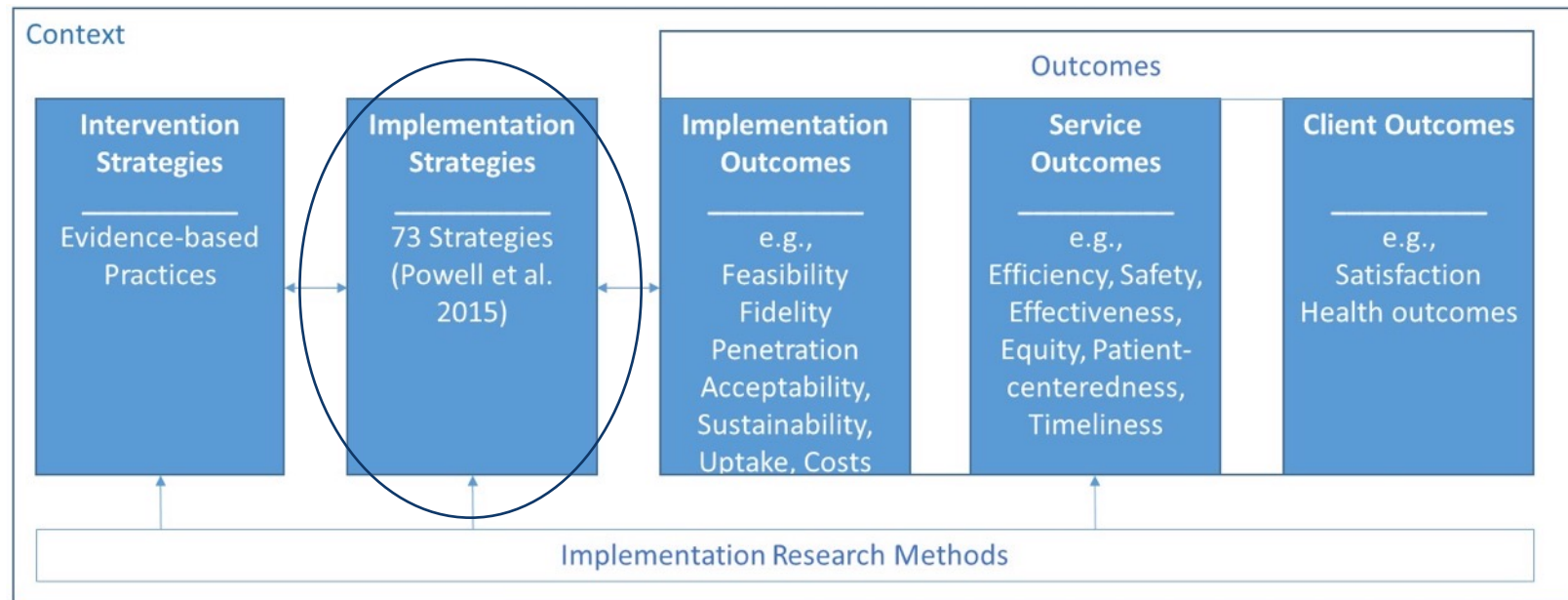
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Example Strategies

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Conduct local needs assessment; Assess for readiness and identify barriers	Distribute educational materials; Conduct ongoing training	Alter incentives; Penalize	Revise professional roles; Change physical structure and equipment	Audit and feedback; Remind clinicians	Create or change credentialing and/or licensure standards; Change liability laws

Powell et al., *Imp Sci,* 2015
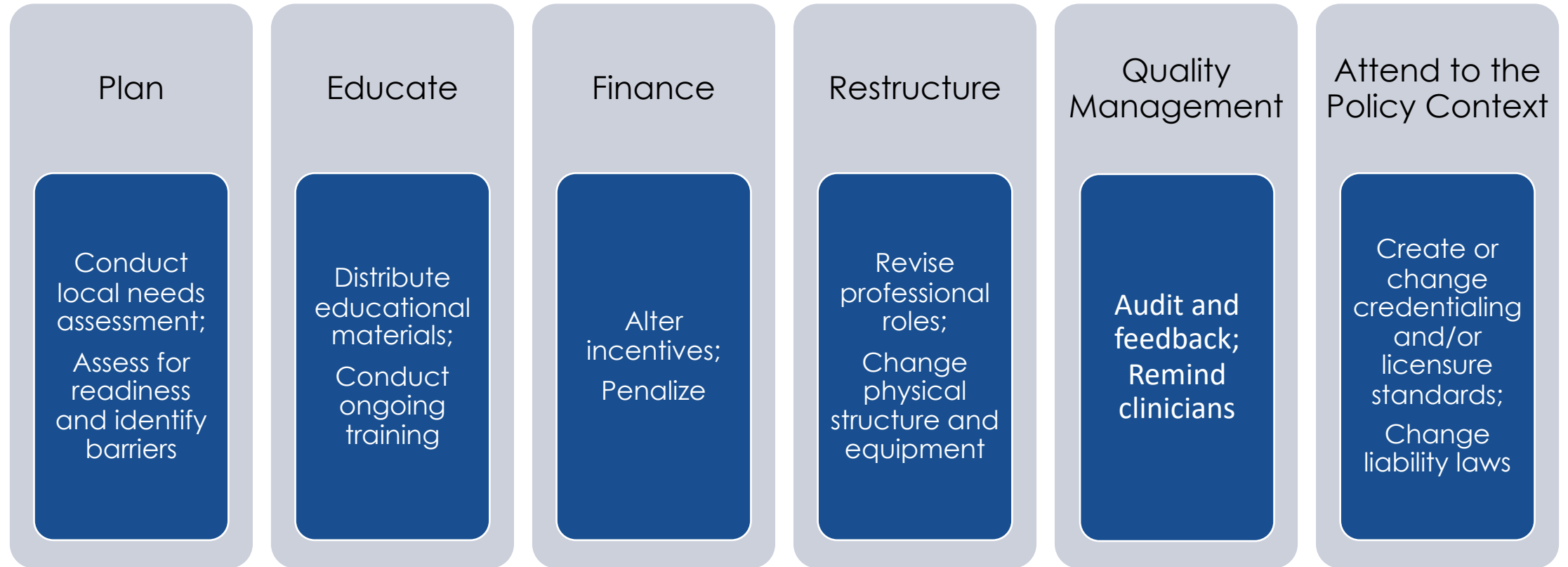
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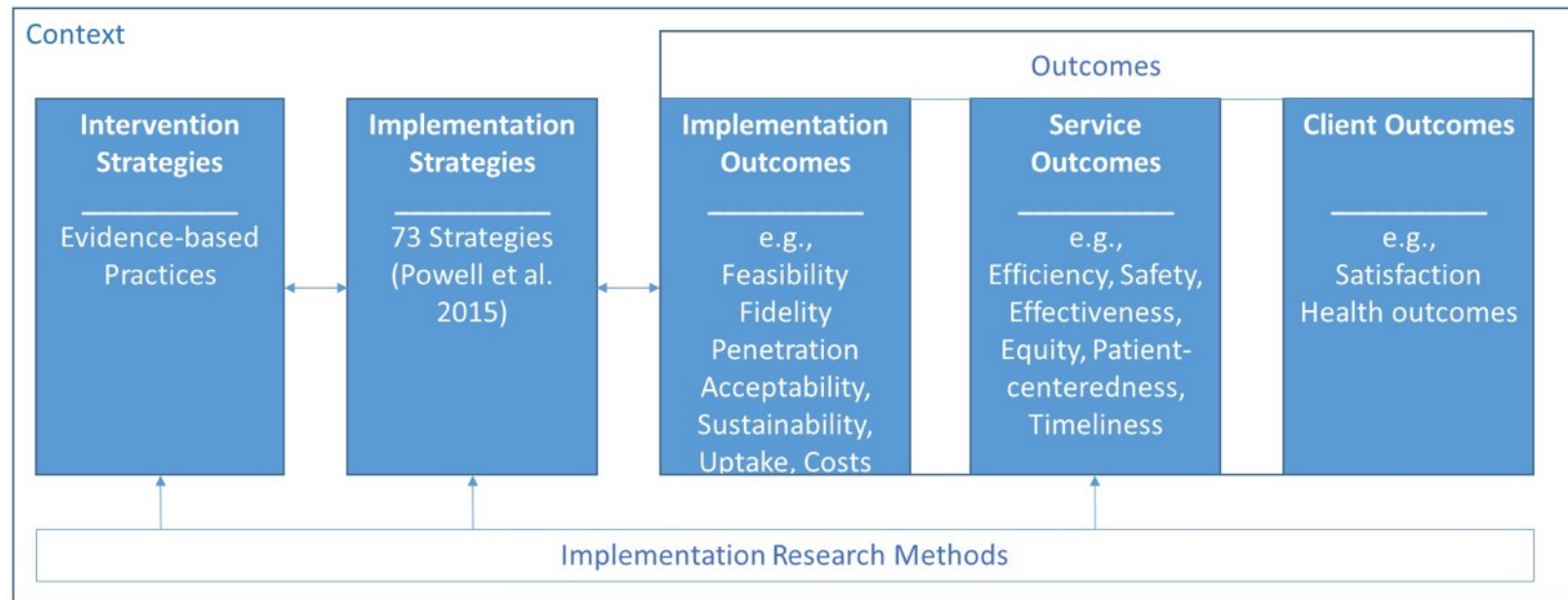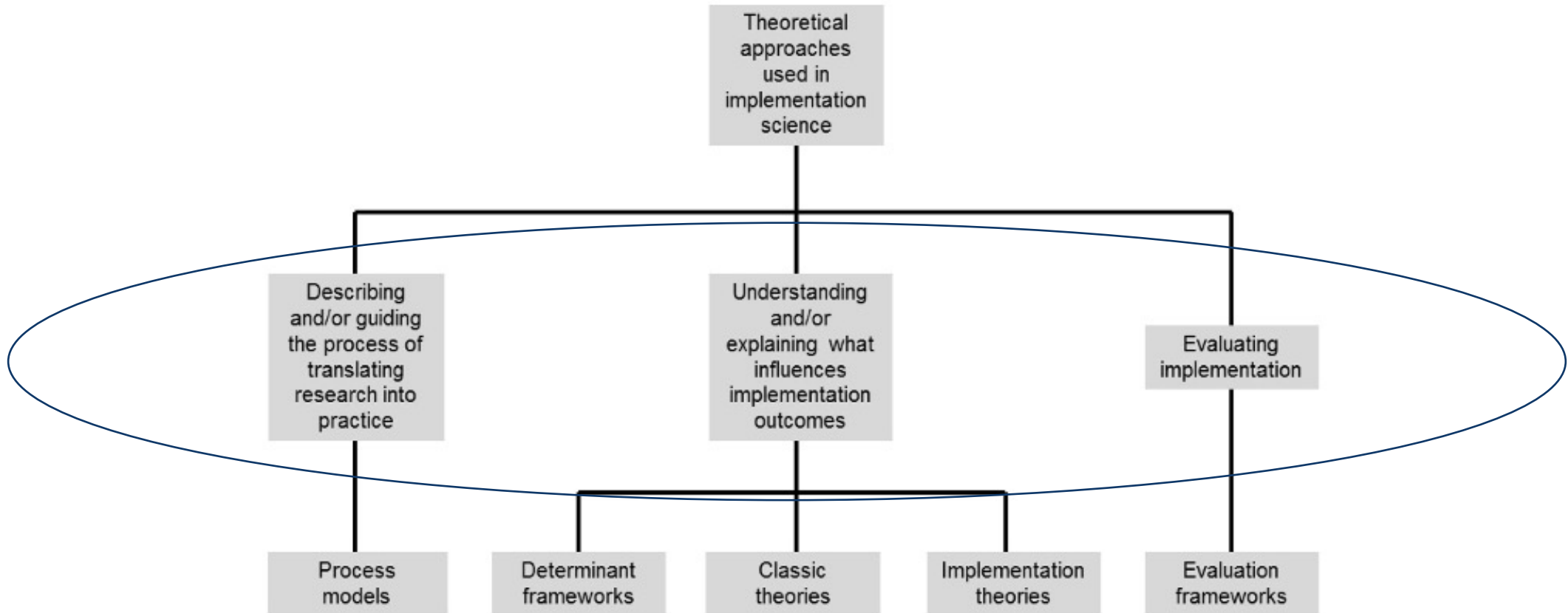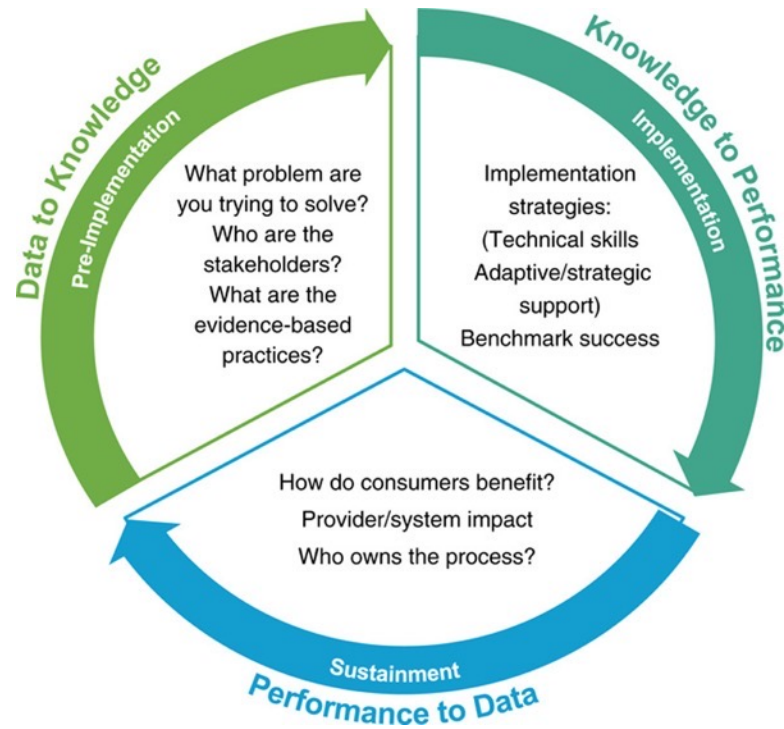Proctor et al., *Adm Policy Ment Health,* 2009

IS Frameworks, Theories, Models

Implementation Roadmap

Kilbourne et al., *Med Care,* 2019

D&I in Precision Public Health

Research priority	Description	% votes $n = 28$
Equity and access	Increase the diversity of participants included in precision public health research so that everyone has access to it	19
Evaluation	Standardize evaluation of precision public health interventions and research (e.g. clinical utility, cost-effectiveness, and patient-reported outcomes)	21
Research capacity	Advance training, mentorship and opportunities for researchers at all levels (particularly early career) in precision public health	8
Infrastructure	Identify data sources, leverage existing databases and improvements in how to store, access and link data from multiple sources	9
Implementation research	Support delivery and long-term sustainability of precision public health research initiatives and interventions	15
Workforce preparation	Prepare health professionals to deliver precision public health interventions, including appropriate training and education	8
Stakeholder engagement	Involve stakeholders (e.g., communities, payers etc.) at all stages of precision public health research	10
Public education	Increase public understanding of precision public health, genetic and genomic risk communication	5
Collaboration	Advance transdisciplinary and cross-industry partnerships in tackling precision public health challenges	4
Ethical considerations	Advance understanding about key ethical considerations in precision public health	1

Roberts et al. *Front Genet,* 2022

An Example of IS in Precision Public Health: Population Genetic Screening

Population Genetic Screening

- CDC "Tier 1" genes
  - Hereditary breast and ovarian cancer
  - Lynch syndrome (colon/uterine/ovarian)
  - Familial hypercholesterolemia

National Academy of Science, Engineering & Medicine

DISCUSSION PAPER

A Proposed Approach for Implementing Genomics-Based Screening Programs for Healthy Adults

Michael F. Murray, MD, FACMG, FACP, Yale University; James P. Evans, MD, PhD, University of North Carolina at Chapel Hill; Misha Angrist, PhD, Duke University; Kee Chan, PhD, University of Illinois at Chicago; Wendy R. Uhlmann, MS, CGC, University of Michigan; Debra Lochner Doyle, MS, LCGC, Washington State Department of Health; Stephanie M. Fullerton, DPhil, University of Washington; Theodore G. Ganiats, MD, University of California at San Diego; Jill Hagenkord, MD, Color Genomics; Sara Imhof, PhD, North Carolina Biotechnology Center; Sun Hee Rim, PhD, MPH, Centers for Disease Control and Prevention; Leonard Ortmann, PhD, Centers for Disease Control and Prevention; Nazneen Aziz, PhD, Kaiser Permanente; W. David Dotson, PhD, Centers for Disease Control and Prevention; Ellen Matloff, MS, MyGene Counsel; Kristen Young, Northwestern University; Kimberly Kaphingst, ScD, University of Utah; Angela Bradbury, MD, University of Pennsylvania; Joan Scott, MS, CGC, Health Resources and Services Administration; Catharine Wang, PhD, Boston University; Ann Zauber, PhD, Memorial Sloan Kettering Cancer Center; Marissa Levine, MD, MPH, University of South Florida; Bruce Korf, MD, PhD, University of Alabama at Birmingham; Debra G. Leonard, MD, PhD, University of Vermont; Catherine Wicklund, MS, Northwestern University; George Isham, MD, HealthPartners; and Muin J. Khoury, MD, PhD, Centers for Disease Control and Prevention

December 3, 2018

Disclaimer: This paper is a product of a working group of the Genomics and Population Health Action Collaborative, an ad hoc activity of the Roundtable on Genomics and Precision Health of the National Academies of Sciences, Engineering, and Medicine. The paper should not be viewed as a consensus statement of the Action Collaborative or Roundtable. The paper and the conclusions it draws are the individual opinions of the listed authors.

Perspectives | Expert Voices in Health & Health Care

NATIONAL ACADEMY OF MEDICINE

CDC

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

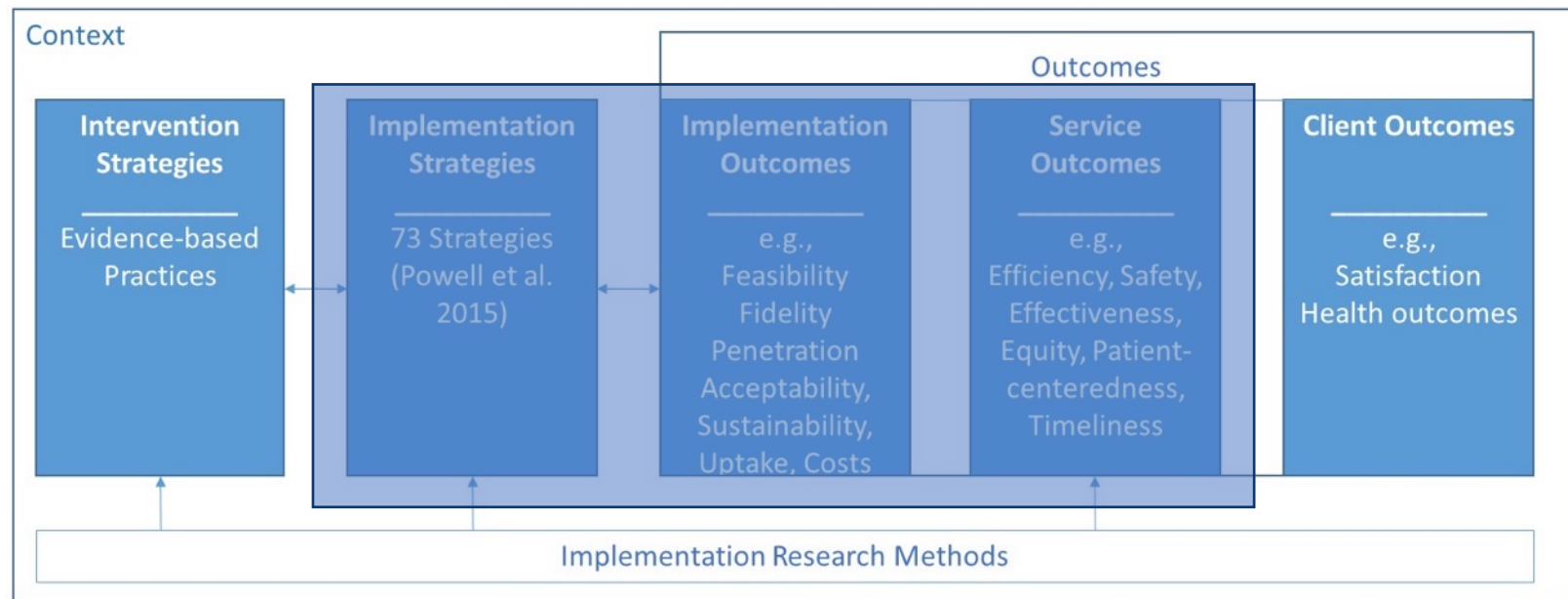# Population Genetic Screening Programs are Growing

Foss et al. *J Pers Med*, 2022
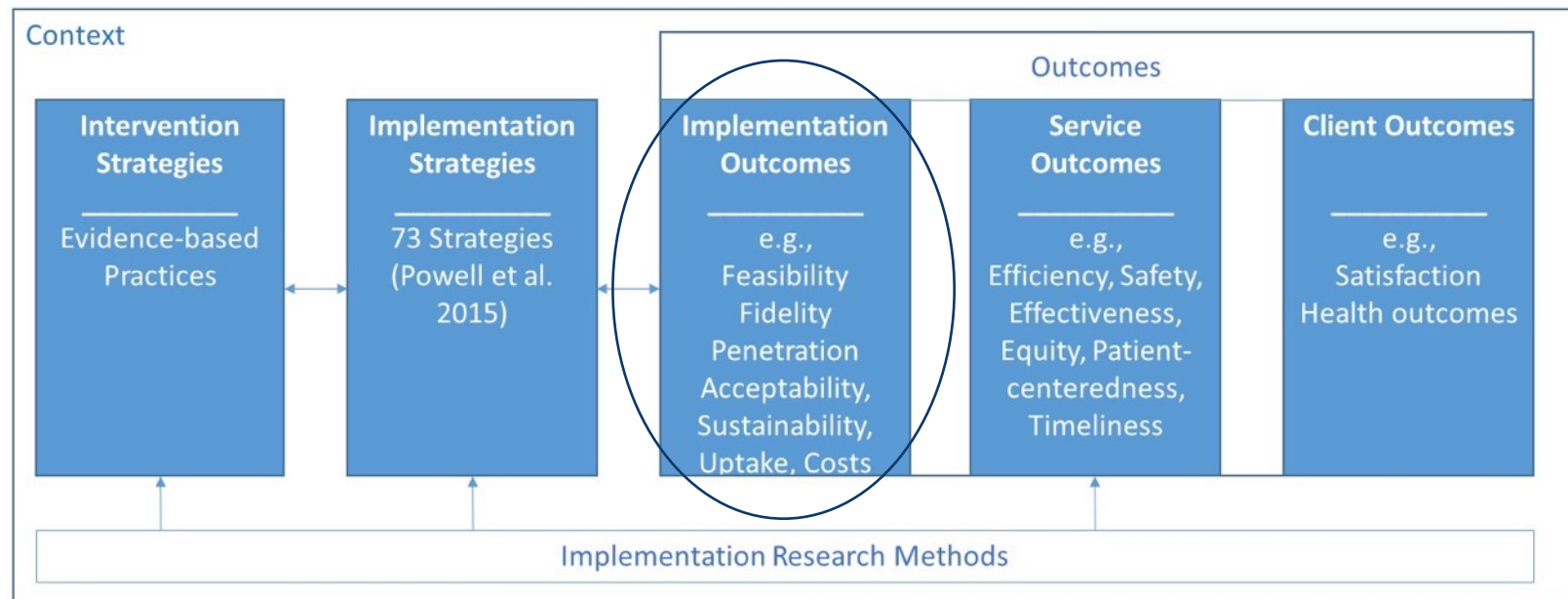
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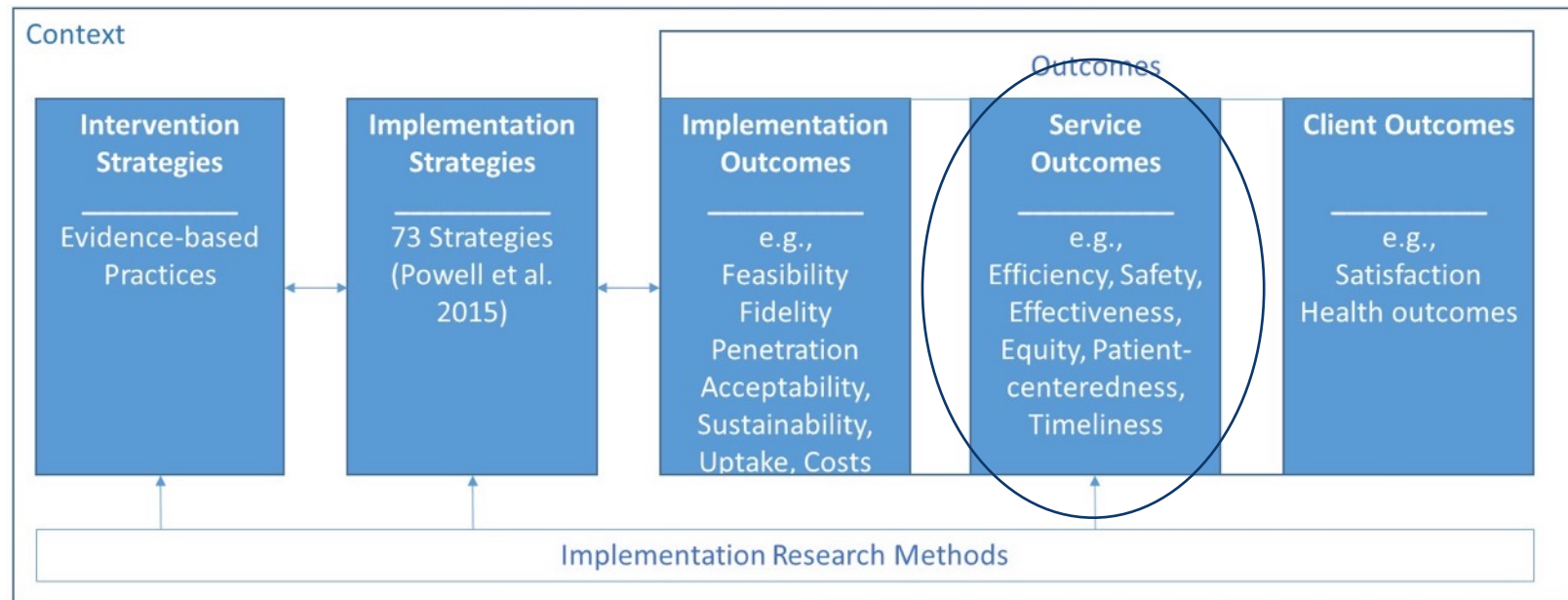Proctor et al., *Adm Policy Ment Health,* 2009

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Allen et al., *AJPH*, 2023; Roberts et al *Front* Genet, 2022; Proctor et al., *Adm Policy Ment Health,* 2009
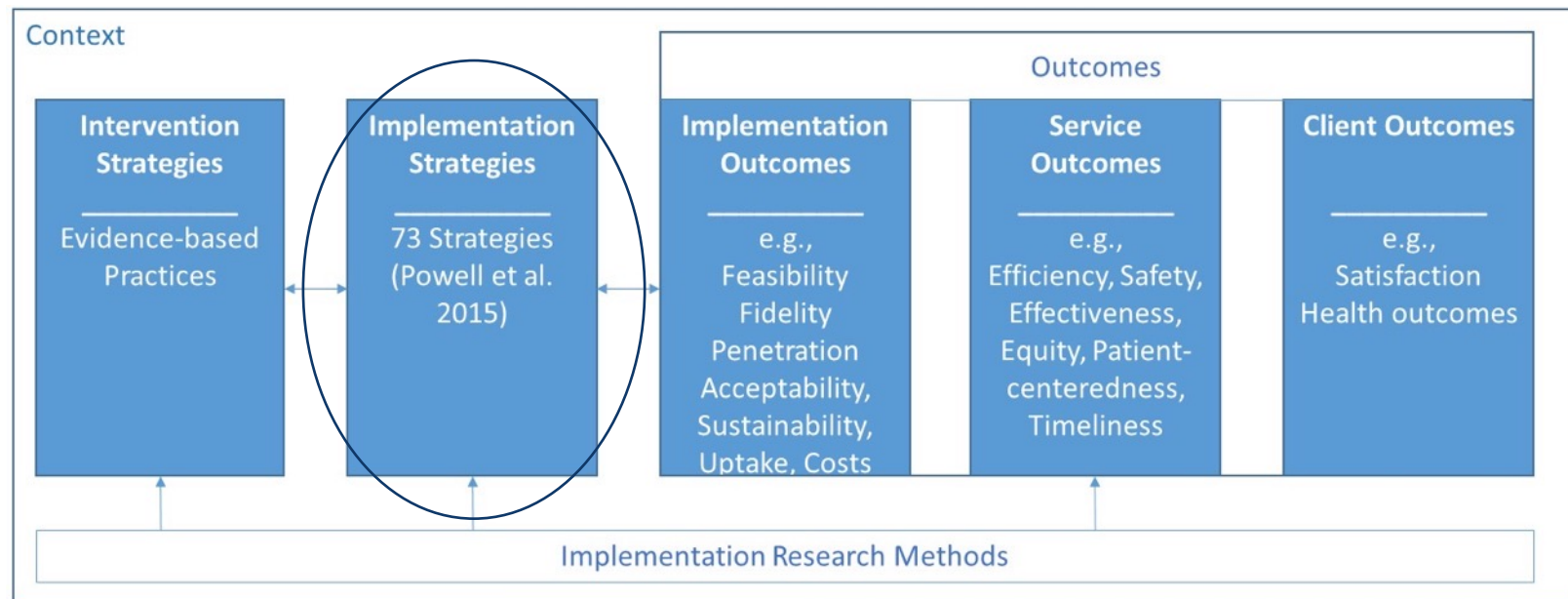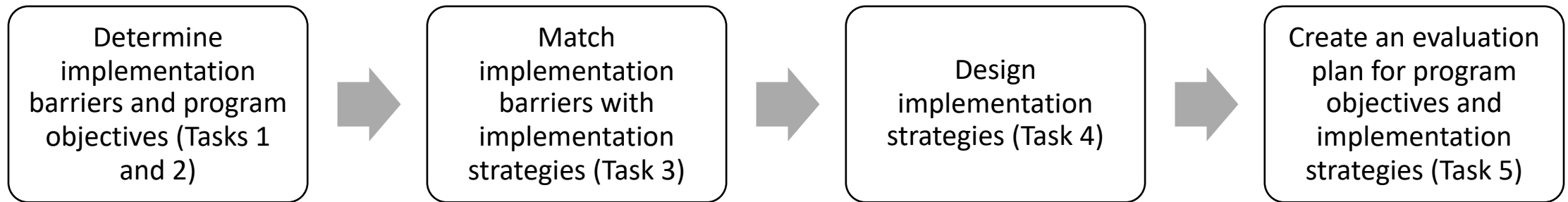
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Proctor et al., *Adm Policy Ment Health,* 2009

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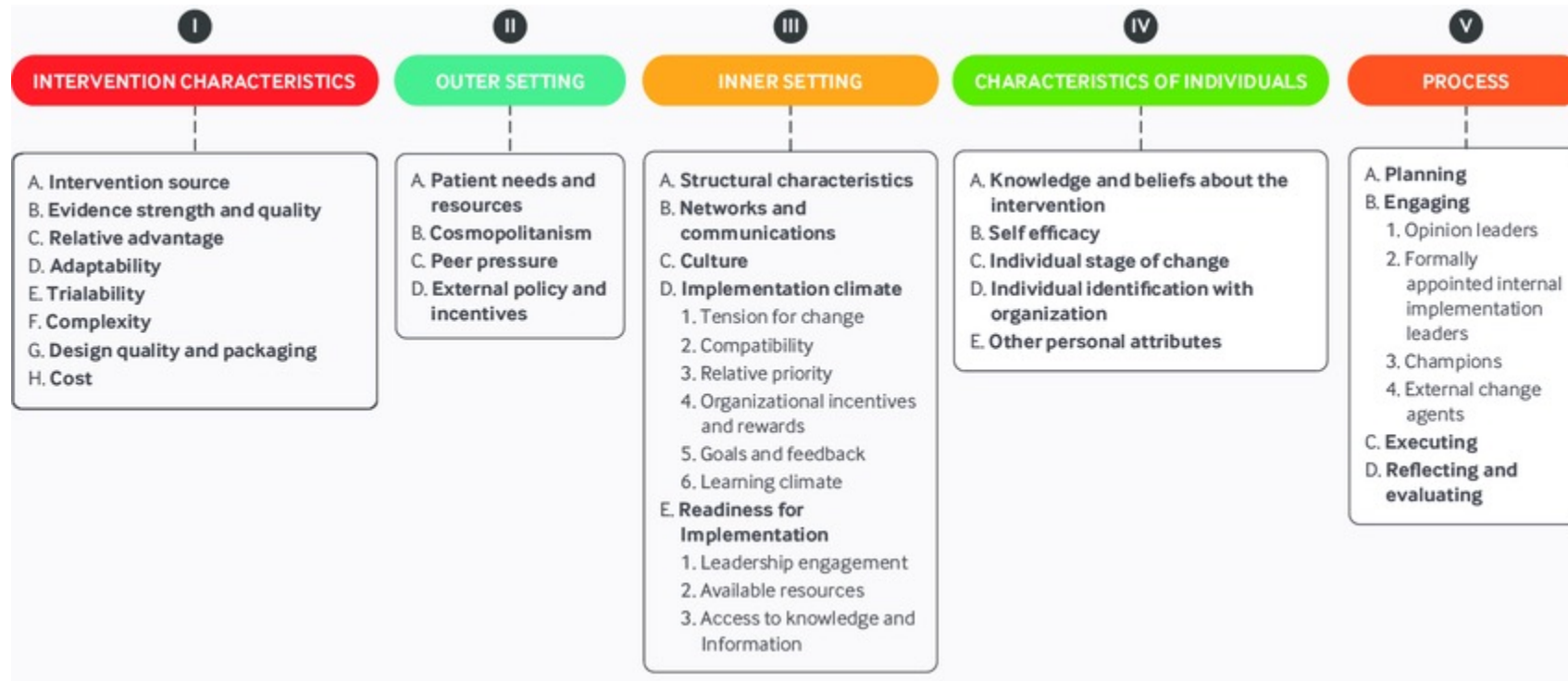
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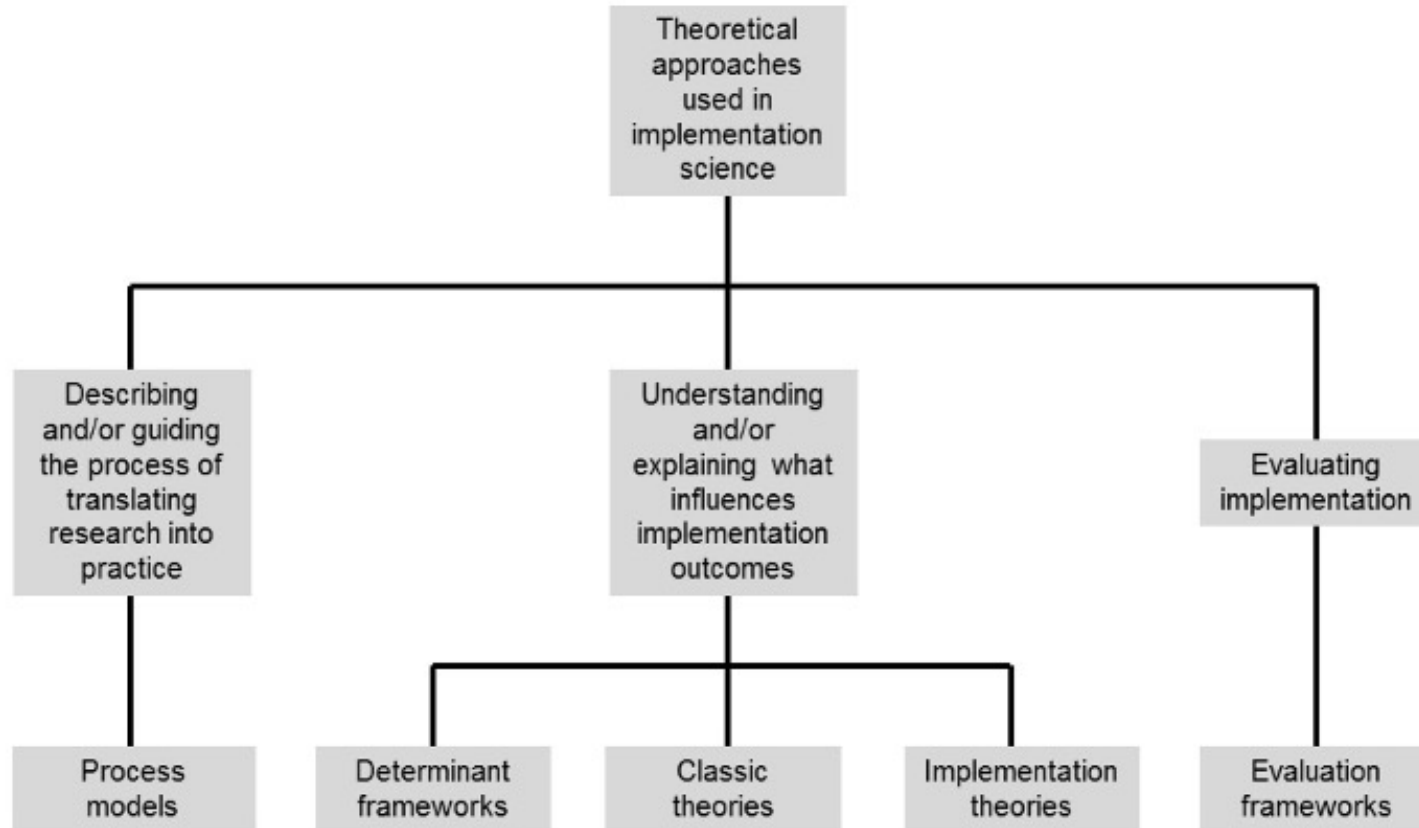
Nilsen et al. *Imp Sci* 2015

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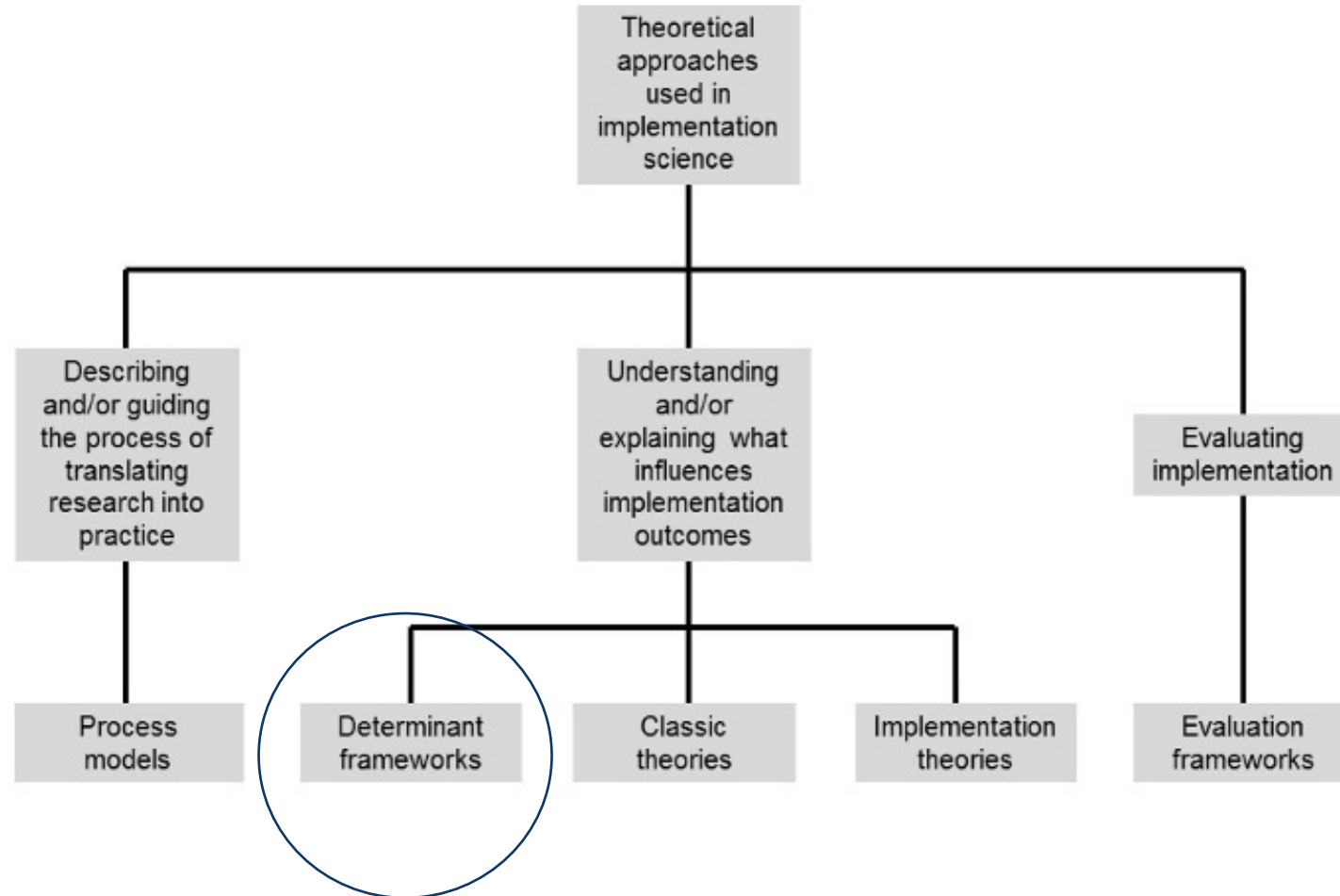
Nilsen et al. *Imp Sci* 2015

Consolidated Framework for Implementation Research

Shen, et al. *Front* Genet, 2022; Nolan et al., *BMJ Clinical Research*, 2017

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Fernandez et al., *Front Public Health,* 2019

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Roberts et al., *Front Genet,* 2022; Fernandez et al., *Front Public Health,* 2019

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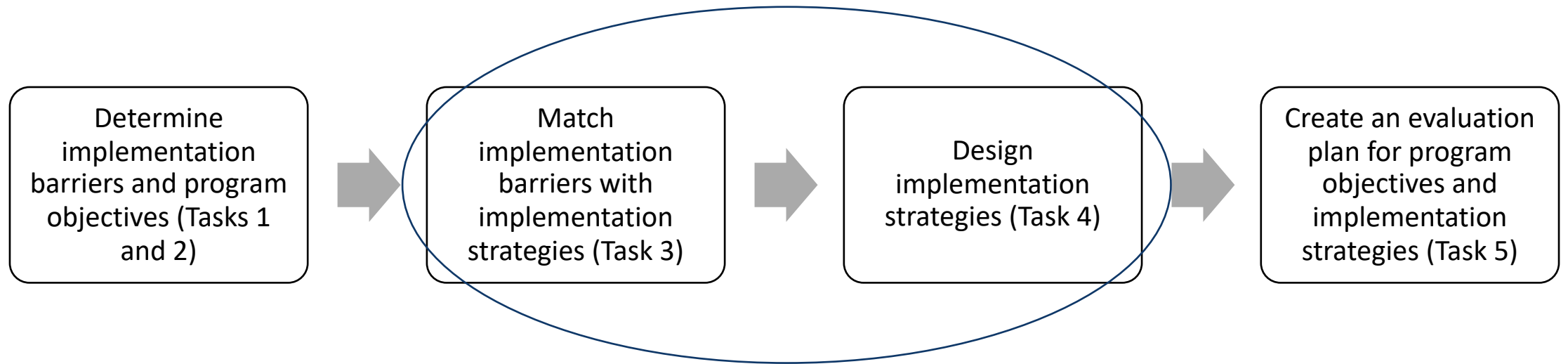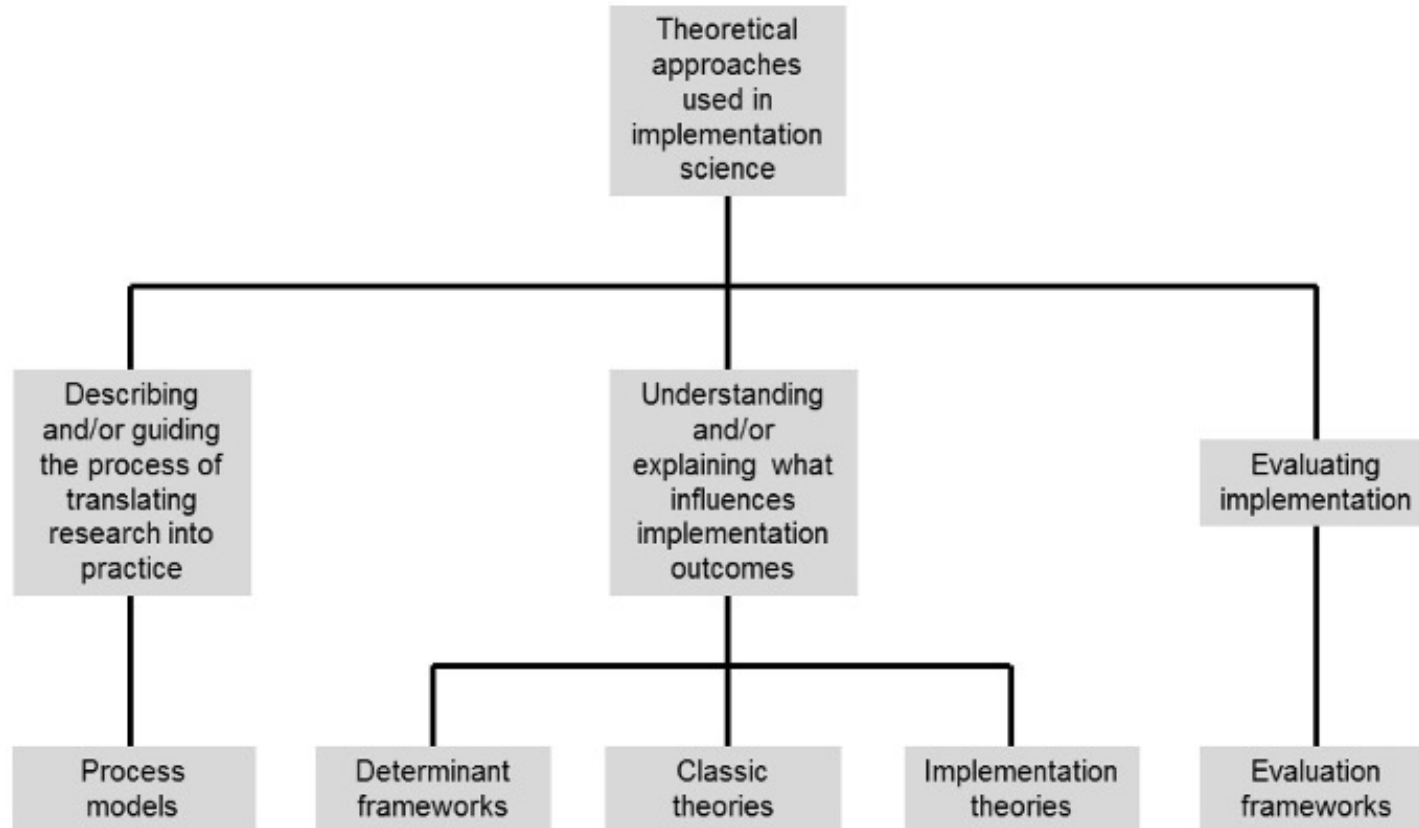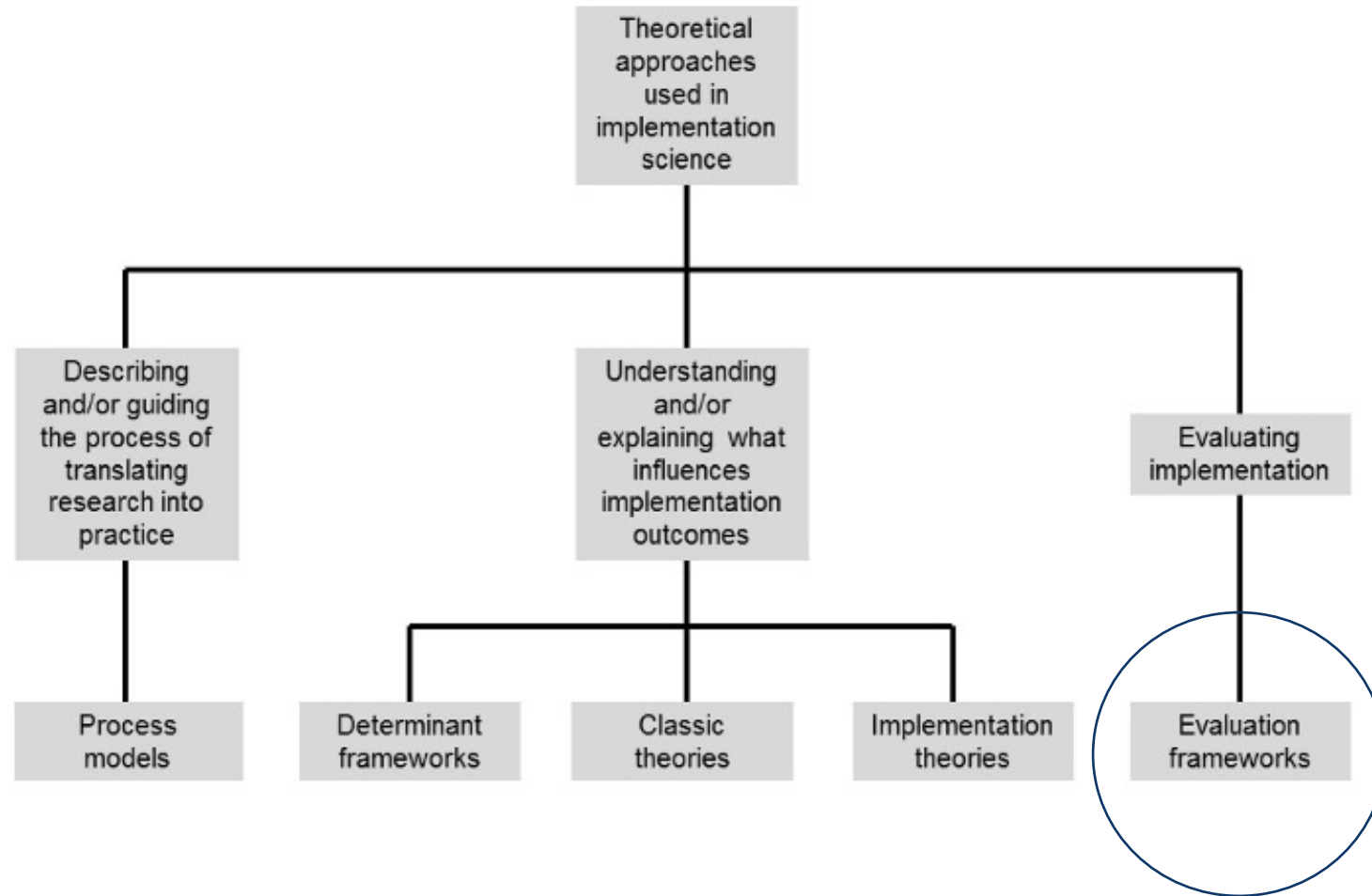

Nilsen et al. *Imp Sci* 2015

IS Frameworks, Theories, Models

Nilsen et al. *Imp Sci* 2015

# Reach, Effectiveness, Adoption, Implementation, Maintenance

Reach
What percent of eligible patients took part in the intervention? How representative were they?

Effectiveness
Did the intervention improve health outcomes such as quality of life?

Maintenance
To what extent were different intervention components institutionalized? What were the long-term effects of the intervention?

RE-AIM

Implementation
What the intervention implemented as it was intended to be?

Adoption
What percent of providers adopted the new intervention? How representative were they?

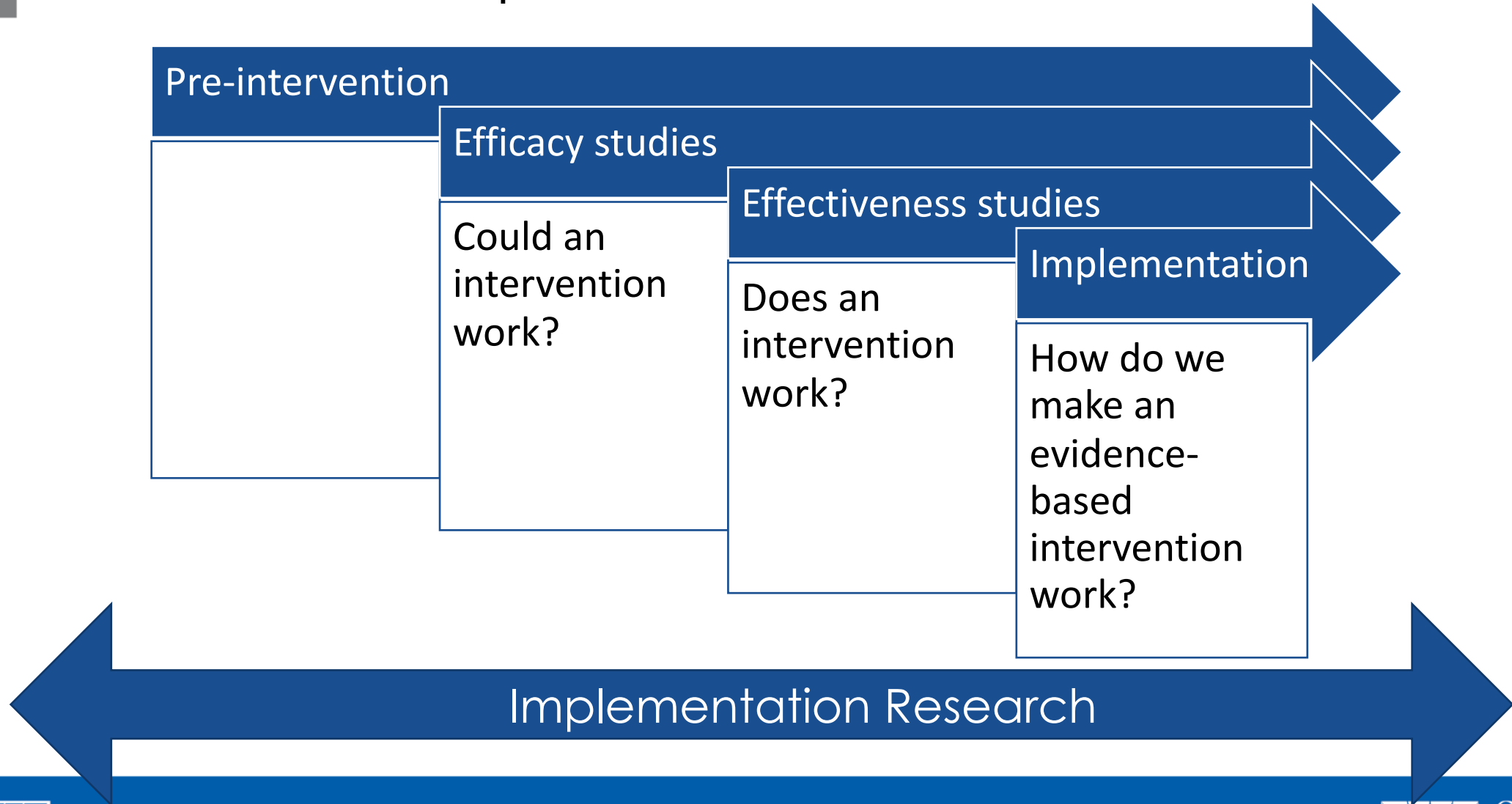Ory et al. 2014; Glasgow et al. *Am J Public Health,* 1999www.re-aim.org

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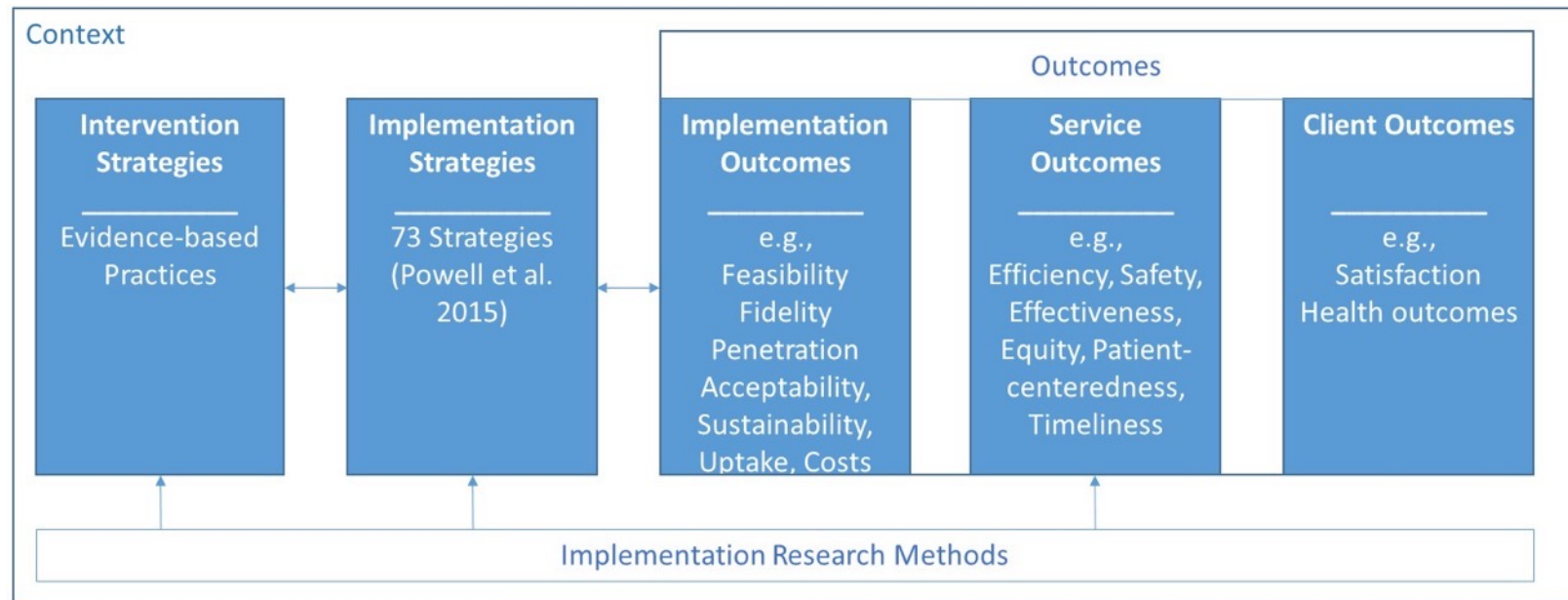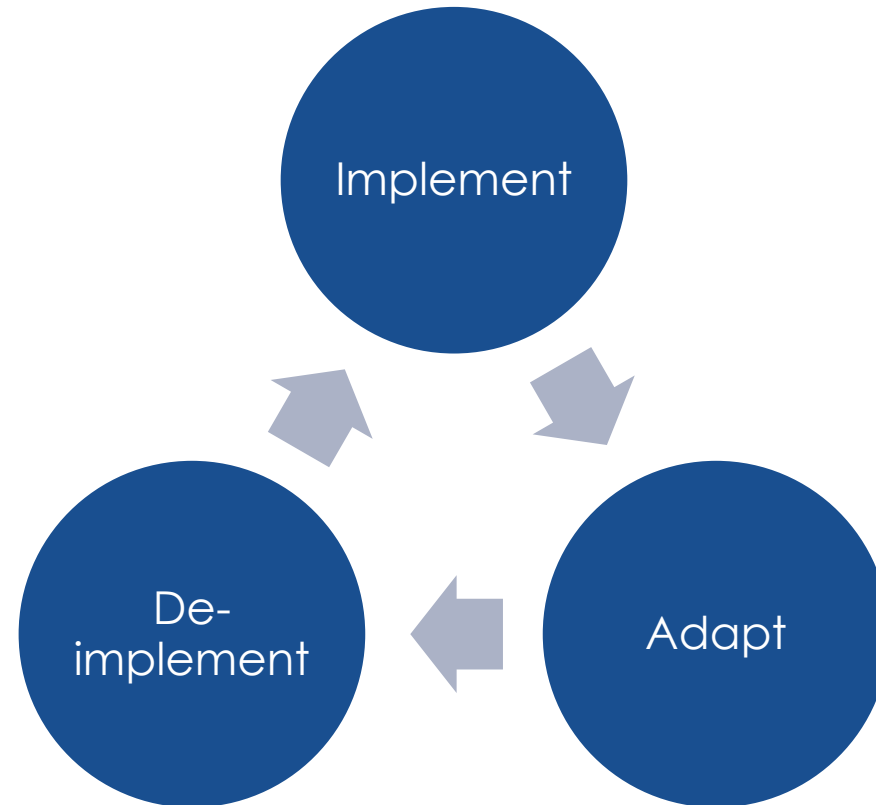

Proctor et al., *Adm Policy Ment Health,* 2009

Translational Pipeline

Implementation Practice and Research: An Iterative Process

In Summary

- Implementation science is a field of research that can improve the integration of precision public health into practice to improve public health
- Tools from the field such as implementation strategies, outcomes, and frameworks can support precision public health
- Implementation science can be used to improve the integration of precision public health interventions, such as population genetic screening, into clinical and public health settings.

Thank you

- megan.roberts@unc.edu

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- Julianne O'Daniel
- Gail Henderson
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- NIH/NCI R13 CA261073

Precision Public Health Network

Back-up slides

IS vs QI: Two sides of one coin

Implementation Science

- Convene multidisciplinary research team, engage key stakeholders
- Diagnose gap (barriers/facilitators assessment)
- Apply theory and empirical evidence to design implementation strategy
- Evaluate via RCT (or other strong design)

- Document results at end of grant
- Inform empirical evidence base, theory

Quality Improvement

- Convene multidisciplinary, representative stakeholder team
- Diagnose gap (root cause analysis)

- Propose solution (expert, literature)

- PDSA: "treat, measure, refine, repeat" via rapid cycle implementation and evaluation
- Conclude upon success
- Share (e.g., IHI forum), scale/spread

Slide adapted from Devon K Check

Outcomes by Implementation Stage

Implementation Outcome	Level of Analysis	Salience by Implementation Stage
Appropriateness	Consumer, Provider, Organization/Setting	Early (Pre-Adoption)
Feasibility	Providers, Organization/Setting	Early (Adoption)
Adoption	Provider, Organization/Setting	Early-mid
Fidelity	Provider	Early-mid
Penetration	Organization/Setting	Mid-Late
Sustainability	Decision-makers, Organization/Setting	Late
Acceptability	Consumer, Provider	Early (Adoption), Ongoing (Implementation), Late (Sustainability)
Cost	Provider, Providing Organization/Setting	Early (Adoption), Ongoing (Implementation), Late (Sustainability)

Proctor et al., *Adm Policy Ment Health,* 2011