

Innovations in Cancer Etiology Research to Inform Cancer Prevention



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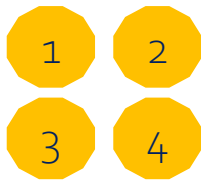
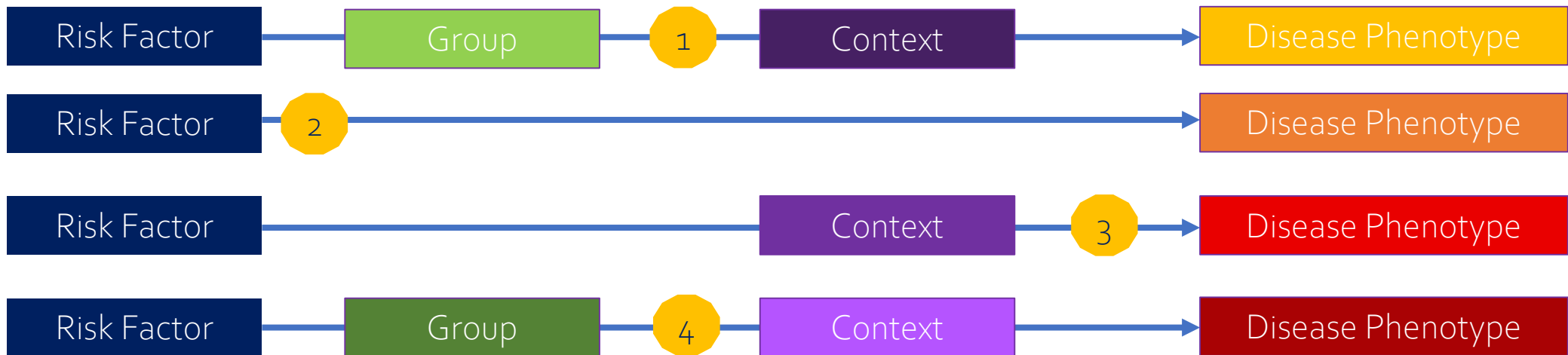
MADCaP
NETWORK



ZHU FAMILY
CENTER FOR GLOBAL
CANCER PREVENTION

The Problem:

- Cancer is etiologically complex.
- Etiologic complexity leads to etiologic and phenotypic heterogeneity.

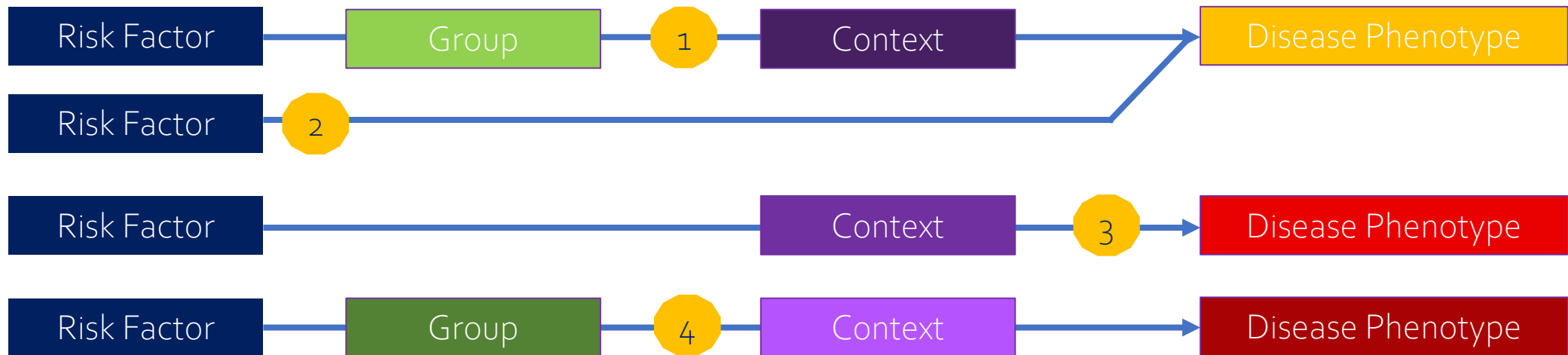


Mode and timing of interventions may vary.



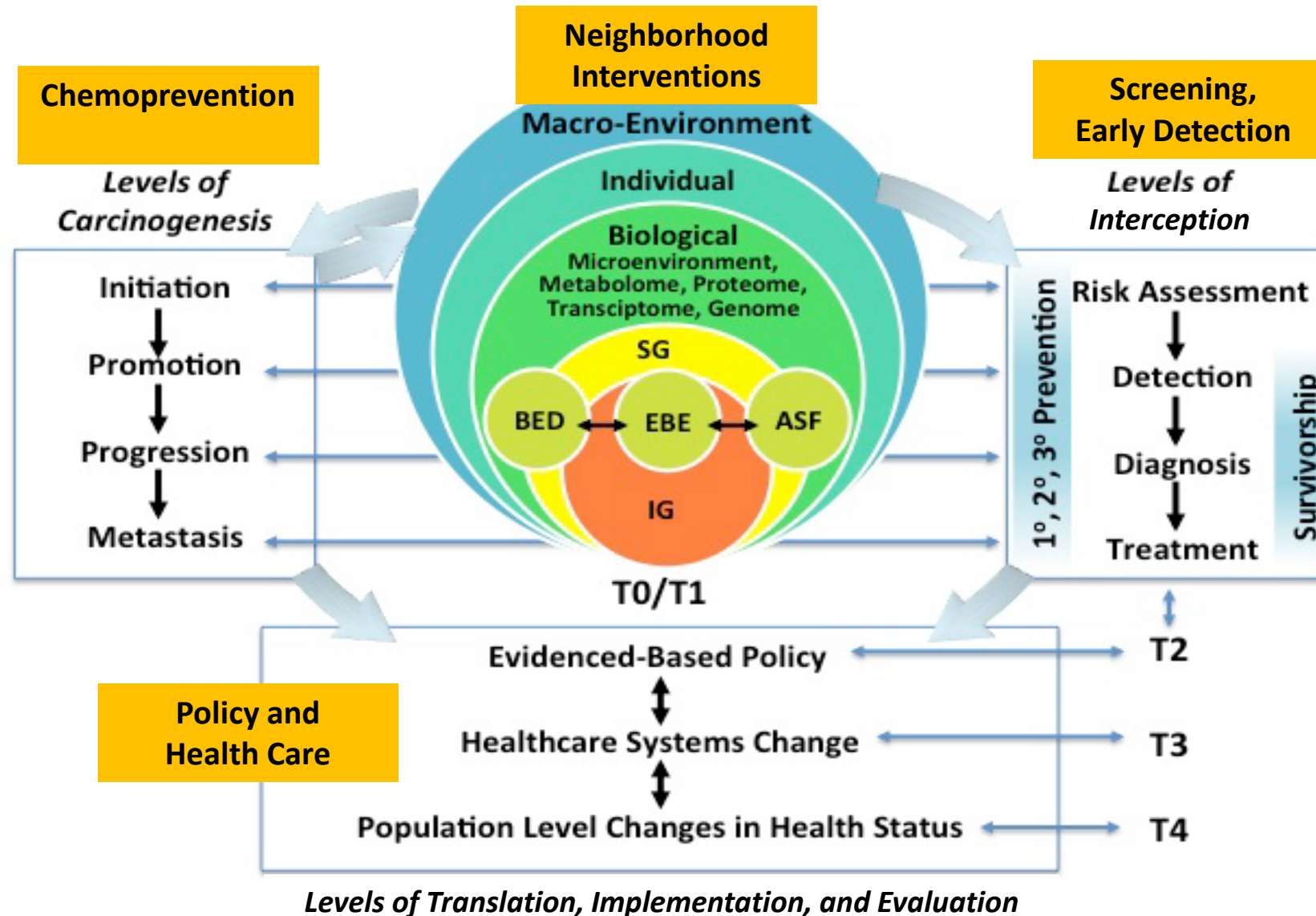
The Problem:

Different etiological pathways may lead to the same endpoint.

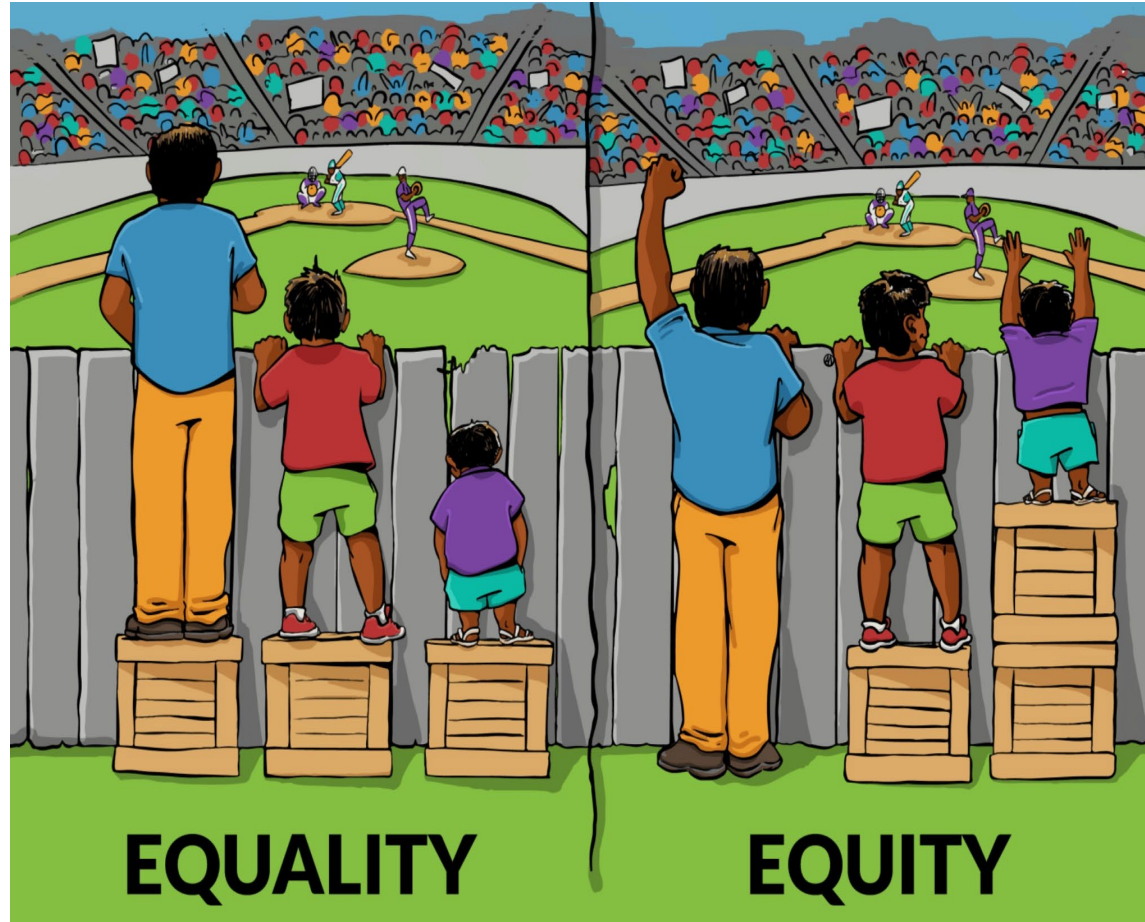


The Problem:

Complex, multifactorial traits may require level-specific interventions.



The Problem: Equally applied interventions only work if everyone is the same.



Goal: Equity In Outcome Not Equality of Intervention

The Problem: Population Transferability and Need for Data Diversity

Example of Prostate Cancer Polygenic Risk Scores

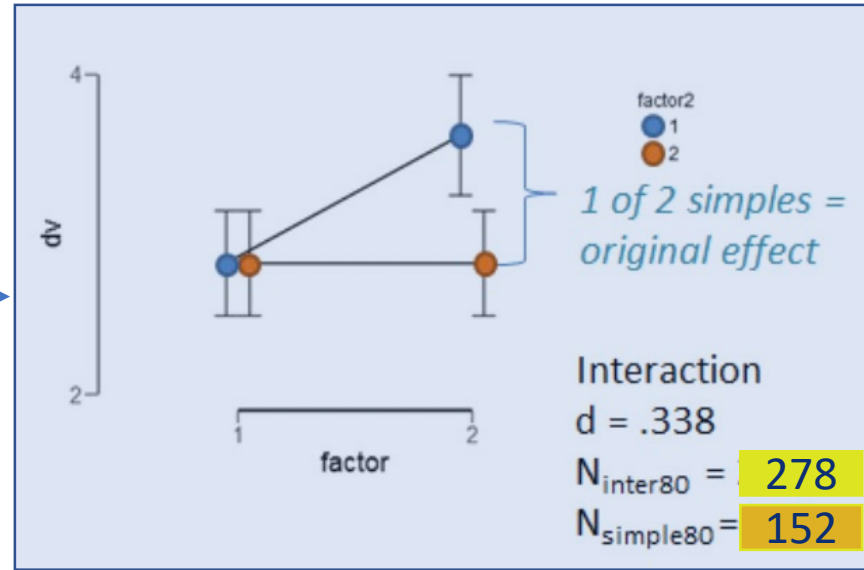
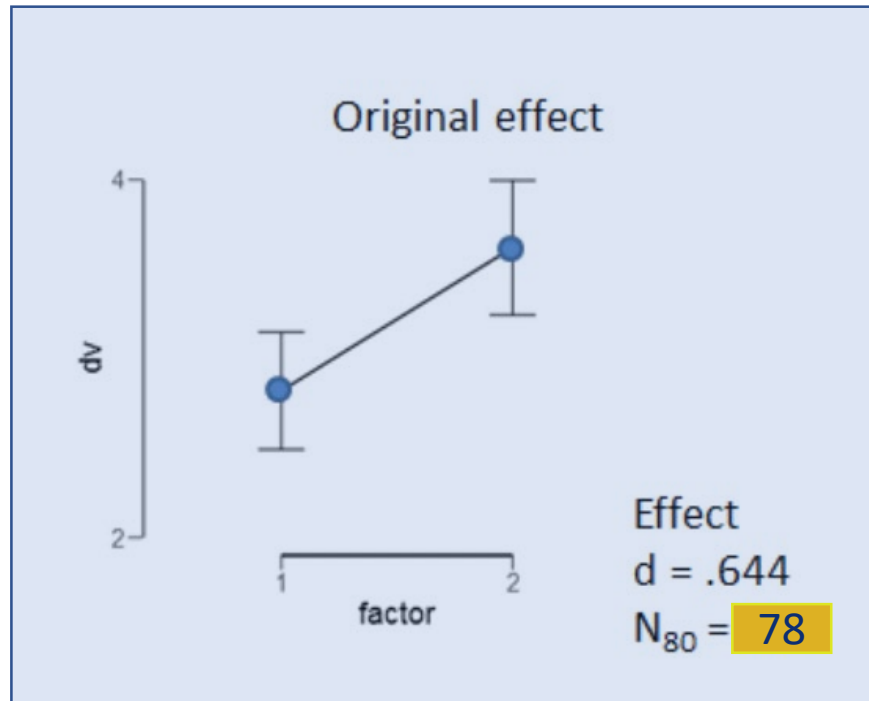
PRS source	PRS ancestry	AUC _{UKBB} (95% CI)	AUC _{MADCaP} (95% CI)	OR _{UKBB} (95% CI)	OR _{MADCaP} (95% CI)
Schumacher	European	0.675 (0.662 – 0.689)	0.538 (0.516 – 0.56)	9.83 (9.60 – 10.06)	1.36 (1.01 – 1.70)
Conti	Multi-ancestry	0.703 (0.694 – 0.713)	0.579 (0.558 – 0.601)	20.05 (19.75 – 20.35)	3.18 (2.83 – 3.53)

- *Early consideration of how and in whom interventions will be applied.*
- *Ensure data diversity in developing interventions.*
- *Does not imply group (e.g., race)-specific interventions will be created.*

Conti	Asian	0.652 (0.652 – 0.672)	0.511 (0.511 – 0.555)	8.61 (8.61 – 0.05)	1.59 (1.59 – 2.28)
Conti	Hispanic	0.678 (0.668 – 0.688)	0.527 (0.505 – 0.549)	10.68 (10.45 – 10.92)	1.97 (1.62 – 2.32)
PHS46	European	0.612 (0.598 – 0.627)	0.502 (0.48 – 0.524)	4.09 (3.90 – 4.27)	1.01 (0.66 – 1.34)
PHS46AA	European + African	0.608 (0.594 – 0.622)	0.547 (0.525 – 0.569)	4.58 (4.38 – 4.77)	2.19 (1.85 – 2.54)
		Poorer Classification		Bias>Null	

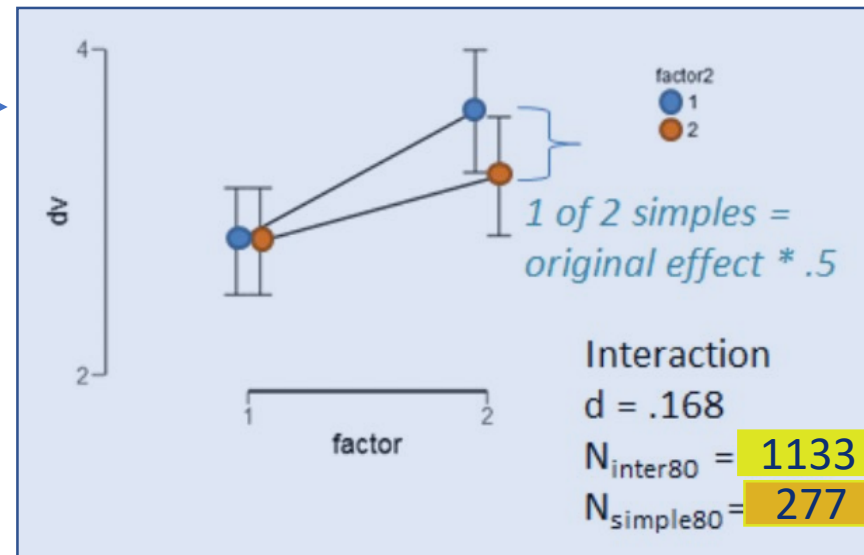


The Problem: Are we missing associations because they are group-specific? (e.g., Are there interactions?)



Knockout
interaction

4x increase in
sample size

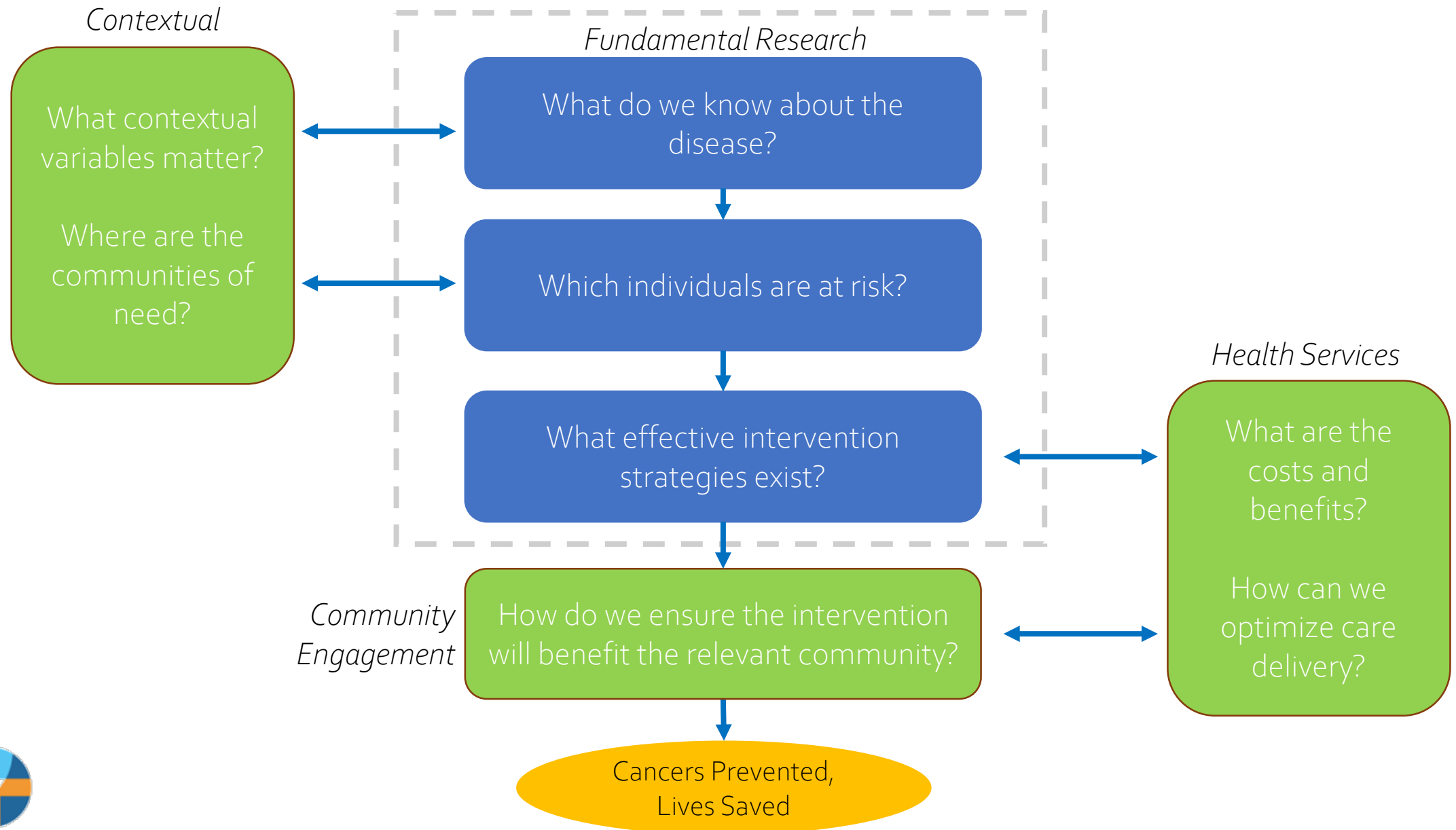


50% attenuation
interaction

15x increase in
sample size



Multisector framework for interventions based on risk and context



Possible Solutions

- Do not focus on group-specific effects and interactions.
 - Develop universal interventions built from data diversity and an understanding of disparities.
- Conduct large, expensive, long-term studies.
 - May always required (e.g., FDA approval).
- Innovate with novel technology and methods.



Innovative Solutions: Are novel tools and technologies the answer? Maybe, but they can create or exacerbate disparities.



- *Early consideration of how and in whom interventions will be applied.*
- *Ensure data diversity in developing interventions.*
- *Does not imply group (e.g., race)-specific interventions will be created.*

Disparities in Screening Mammography Services by Race/Ethnicity and Health Insurance

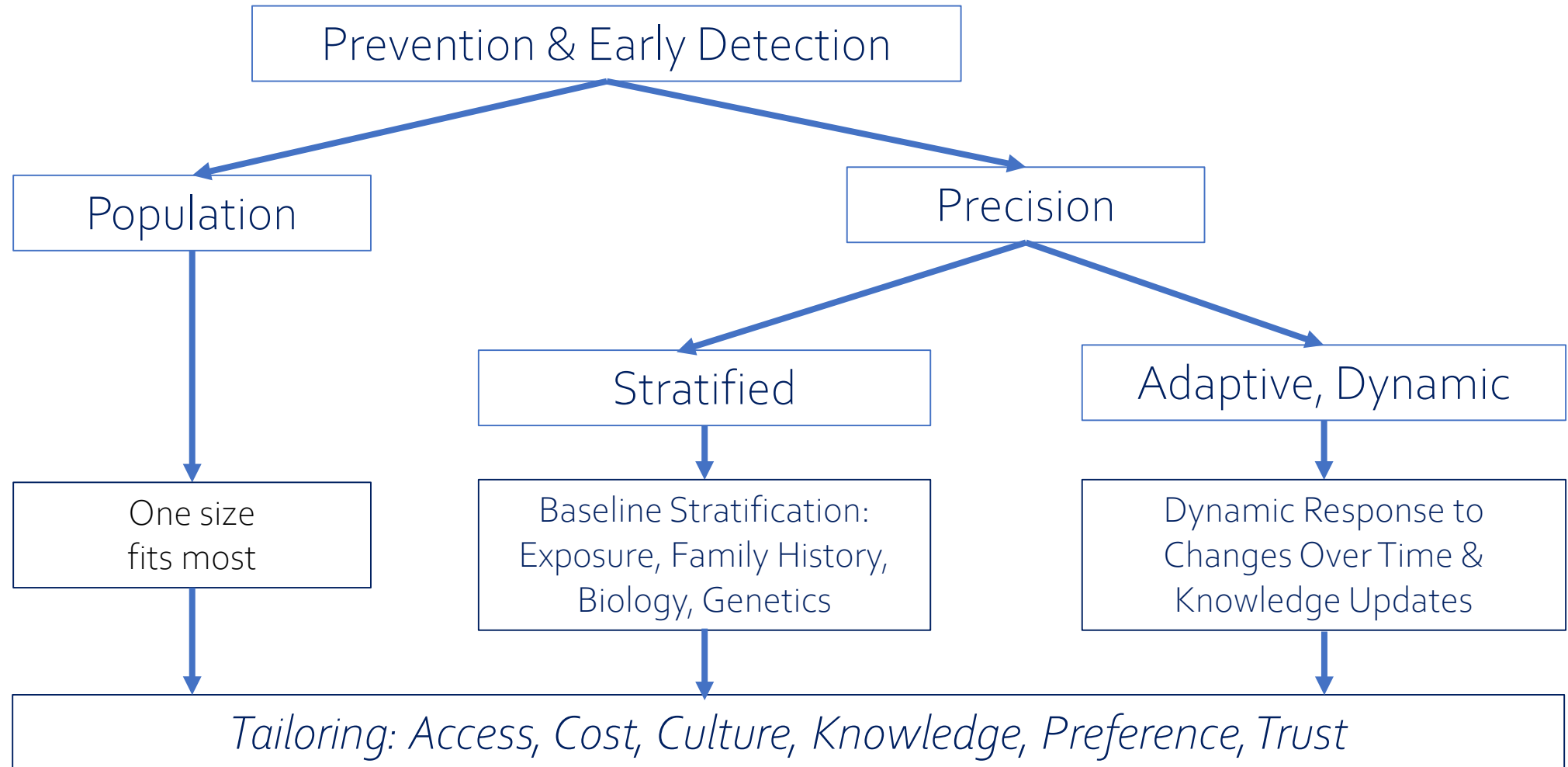
Garth H. Rauscher, Ph.D.,¹ Kristi L. Allgood, M.P.H.,² Steve Whitman, Ph.D.,² and Emily Conant, M.D.³

Using Prediction Models to Reduce Persistent Racial and Ethnic Disparities in the Draft 2020 USPSTF Lung Cancer Screening Guidelines

Rebecca Landy¹, PhD,^{1,*†} Corey D. Young, MS,^{2,†} Martin Skarzynski, PhD,¹ Li C. Cheung¹, PhD,¹ Christine D. Berg, MD,¹ M. Patricia Rivera, MD,³ Hilary A. Robbins¹, PhD,⁴ Anil K. Chaturvedi, PhD,¹ Hormuzd A. Katki, PhD^{1,*}

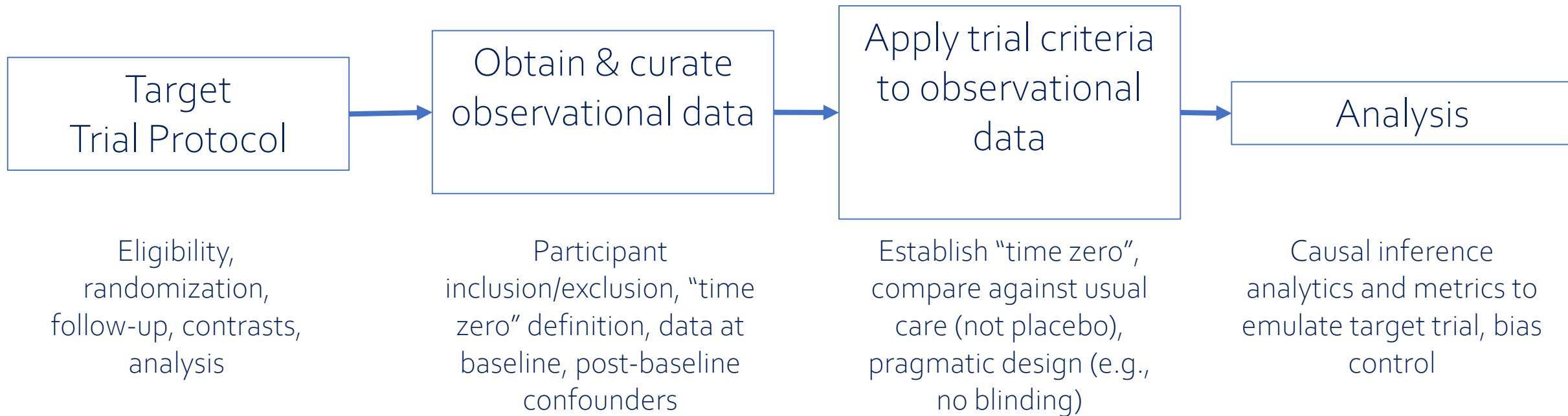


Innovative Solutions: New dimensions of prevention & early detection



Innovative Solutions: Target Trial Emulation

Goal: Analyze observational data to emulate a hypothetical pragmatic trial



Thank You!

Thanks to:

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