

The Intersection of Policy and Systems Science Modeling in Examining Social Determinants of Physical Activity and Obesity

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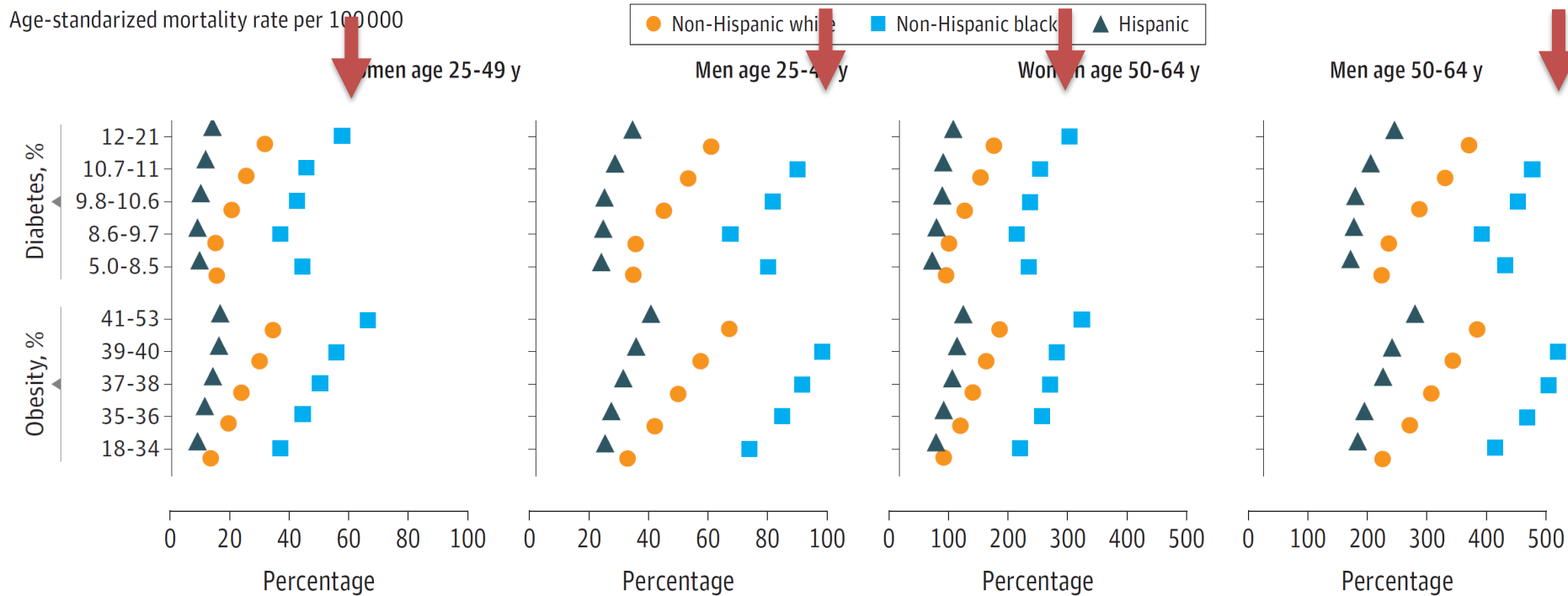
June 30, 2020



Disclosures

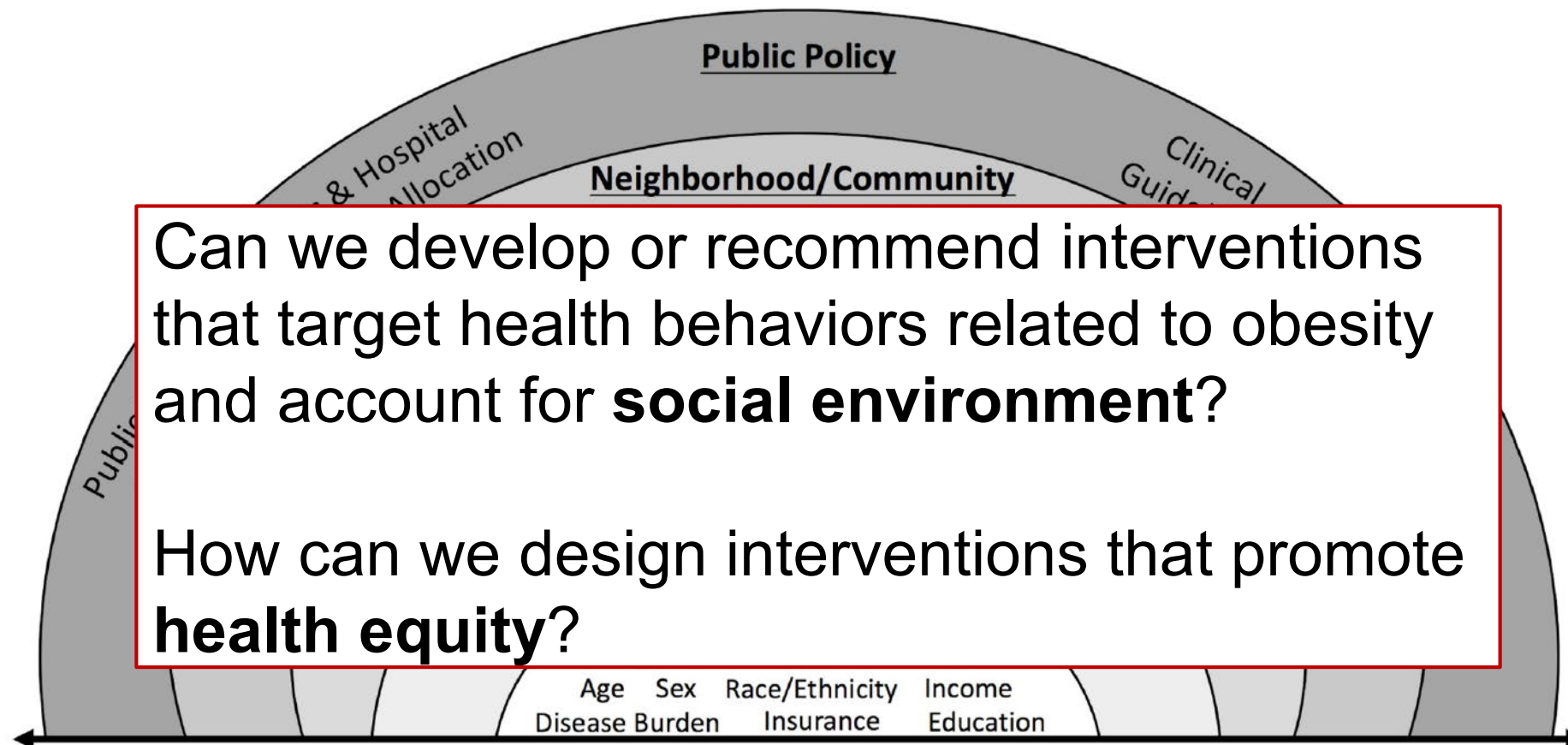
- Relevant Financial Disclosures
 - None
- Non-FDA Approved Uses
 - None
- The views expressed in this presentation are my own and do not necessarily represent the views of the NHLBI; the NIMHD; the National Institutes of Health; or the U.S. Department of Health and Human Services.

Obesity and Diabetes Associated with Premature CVD Mortality Across Racial/Ethnic Groups in U.S.



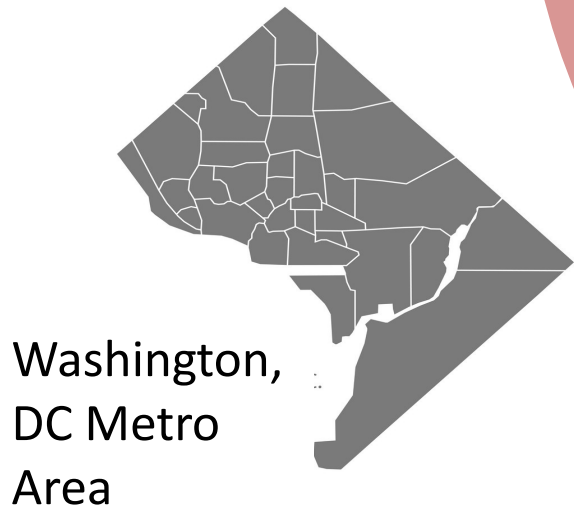
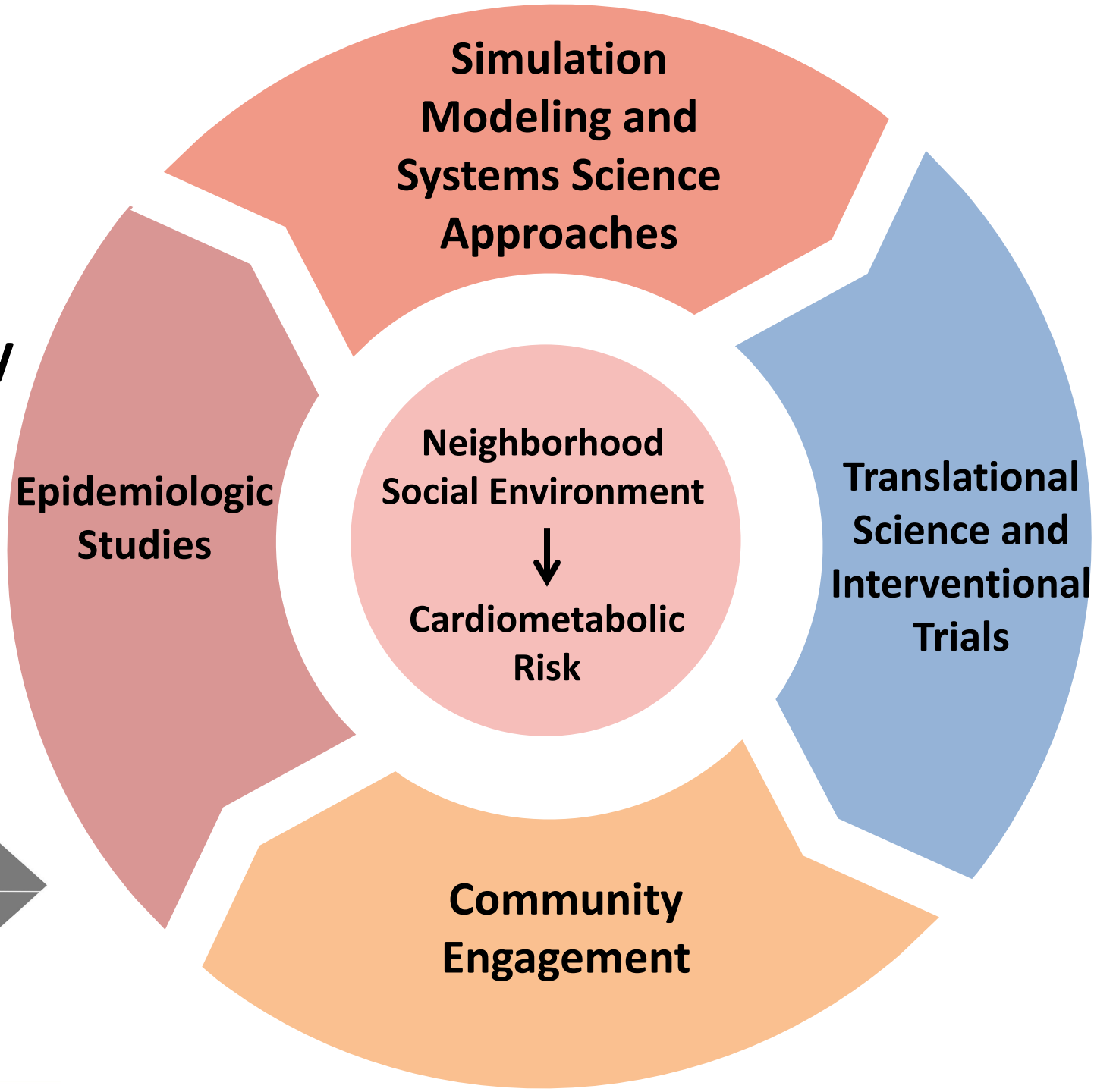
How do we address these CV disparities for at-risk, non-Hispanic Black populations?

Neighborhood Social Environment is an Important Component of Multi-Level Interventions



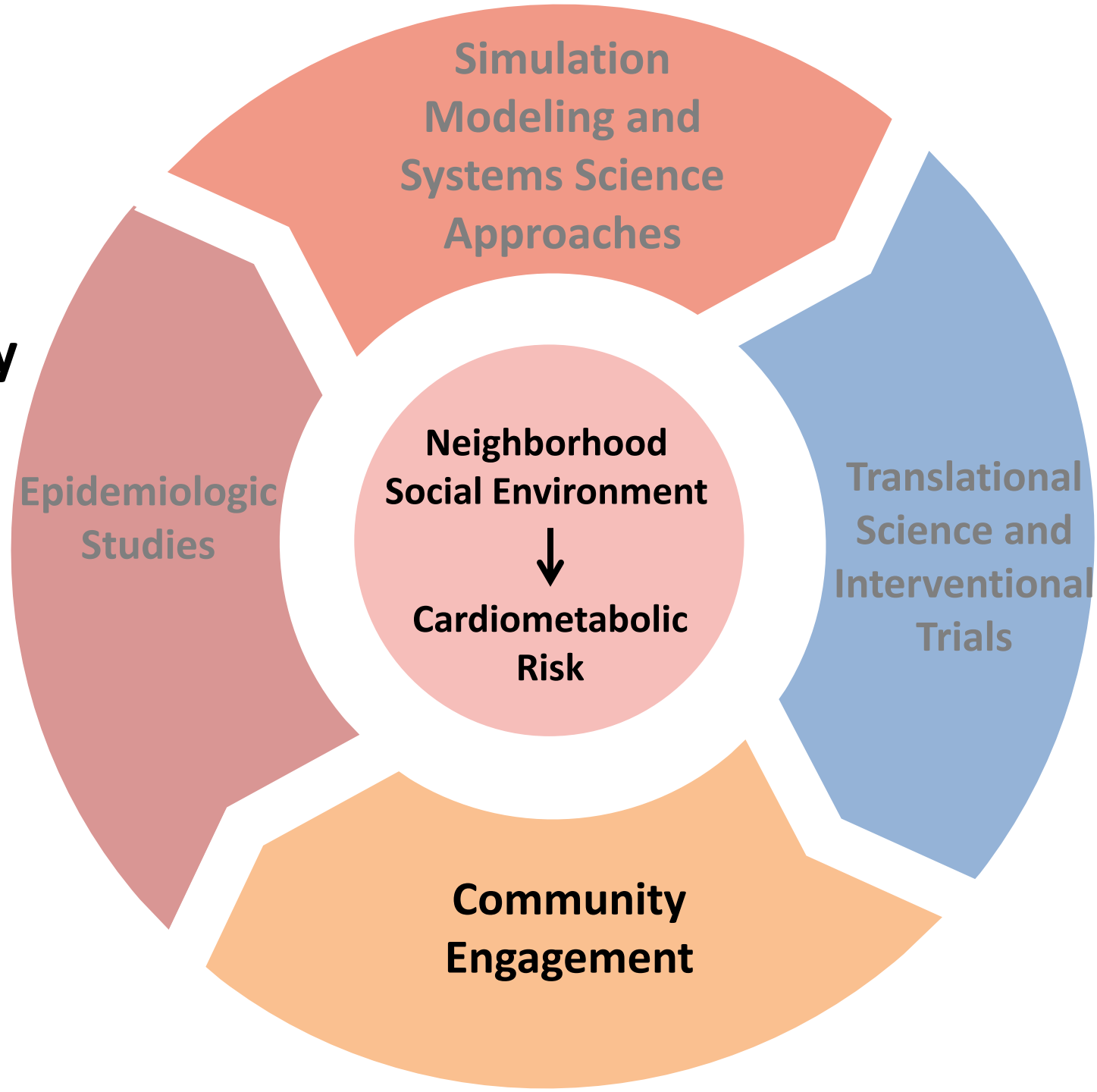
Socio-ecological Model for Health Behavior

Social Determinants of Obesity and Cardiovascular Risk Laboratory



Urban Areas of U.S.

Social Determinants of Obesity and Cardiovascular Risk Laboratory



The Washington DC Cardiovascular Health and Obesity Collaborative (DC CHOC)

- Community advisory board that facilitates community engagement
- Multidisciplinary group of church & community leaders
- Provide input on project development and design
- First project: The Washington DC Cardiovascular Health and Needs Assessment (DC-CHNA)

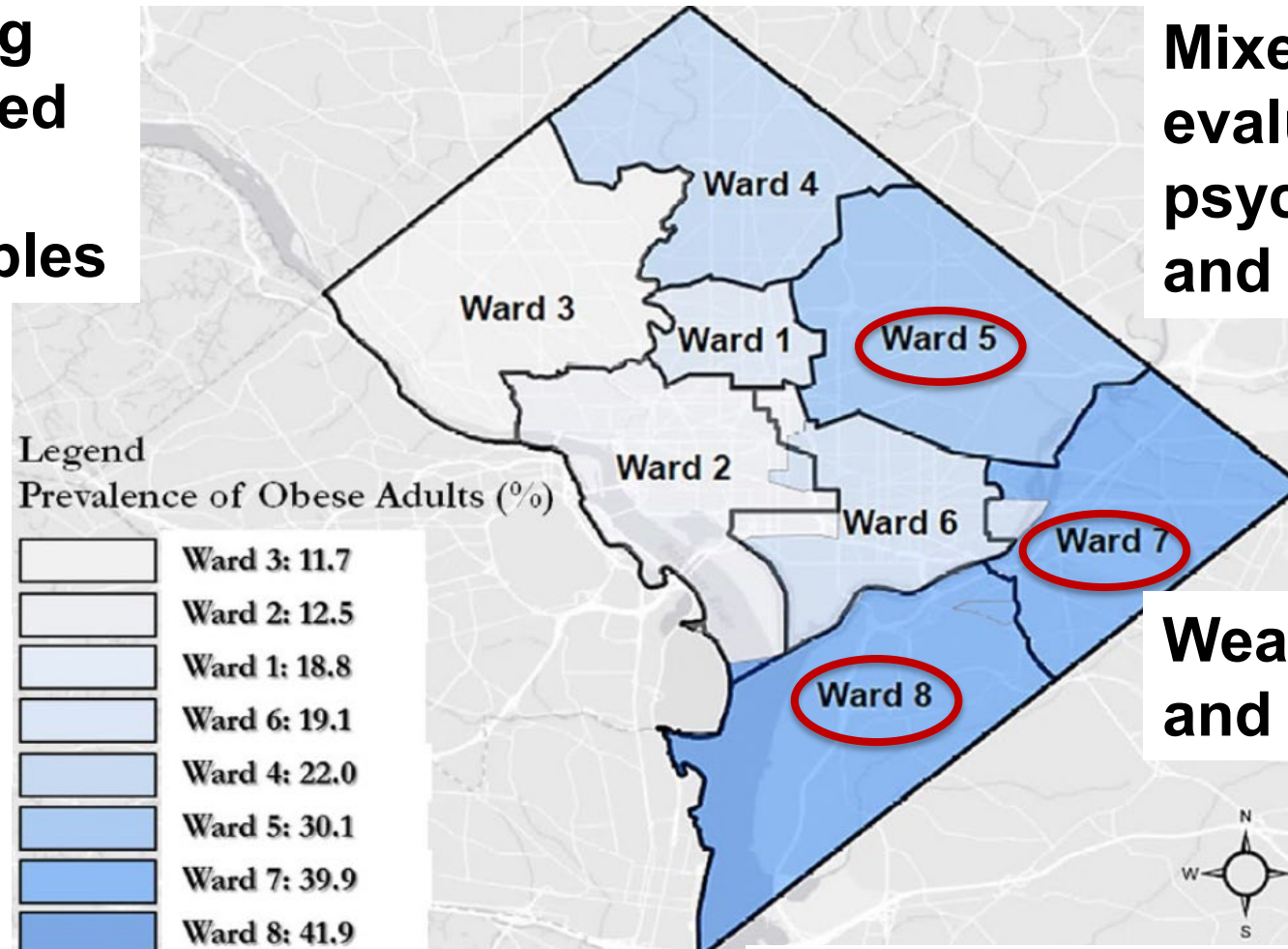


Washington, D.C. CV Health and Needs Assessment

**Developed using
community-based
participatory
research principles**

**Mixed methods to
evaluate environmental,
psychosocial & CV risk
and intervention tools**

**Conducted in
the community**

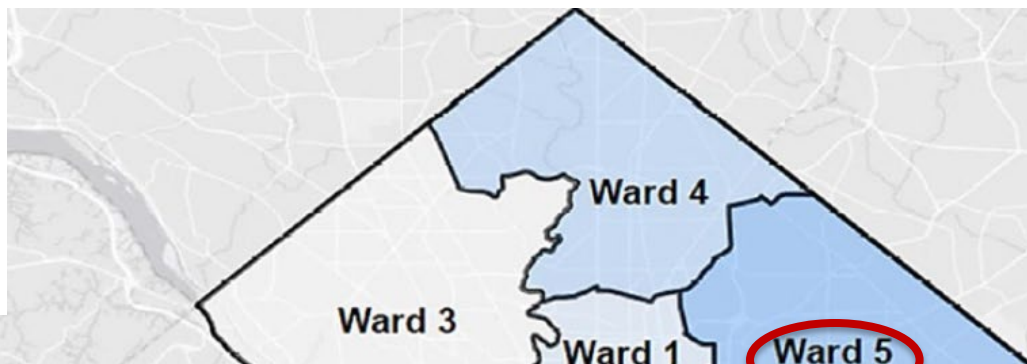


**Wearable mHealth devices
and mobile apps tested**

Aimed at developing interventions for improved CV health

Washington, D.C. CV Health and Needs Assessment

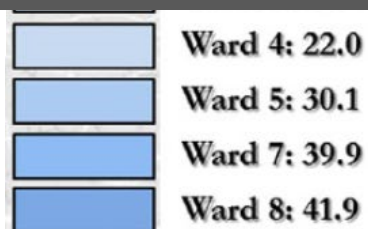
Developed using
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Mixed methods to
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and intervention tools

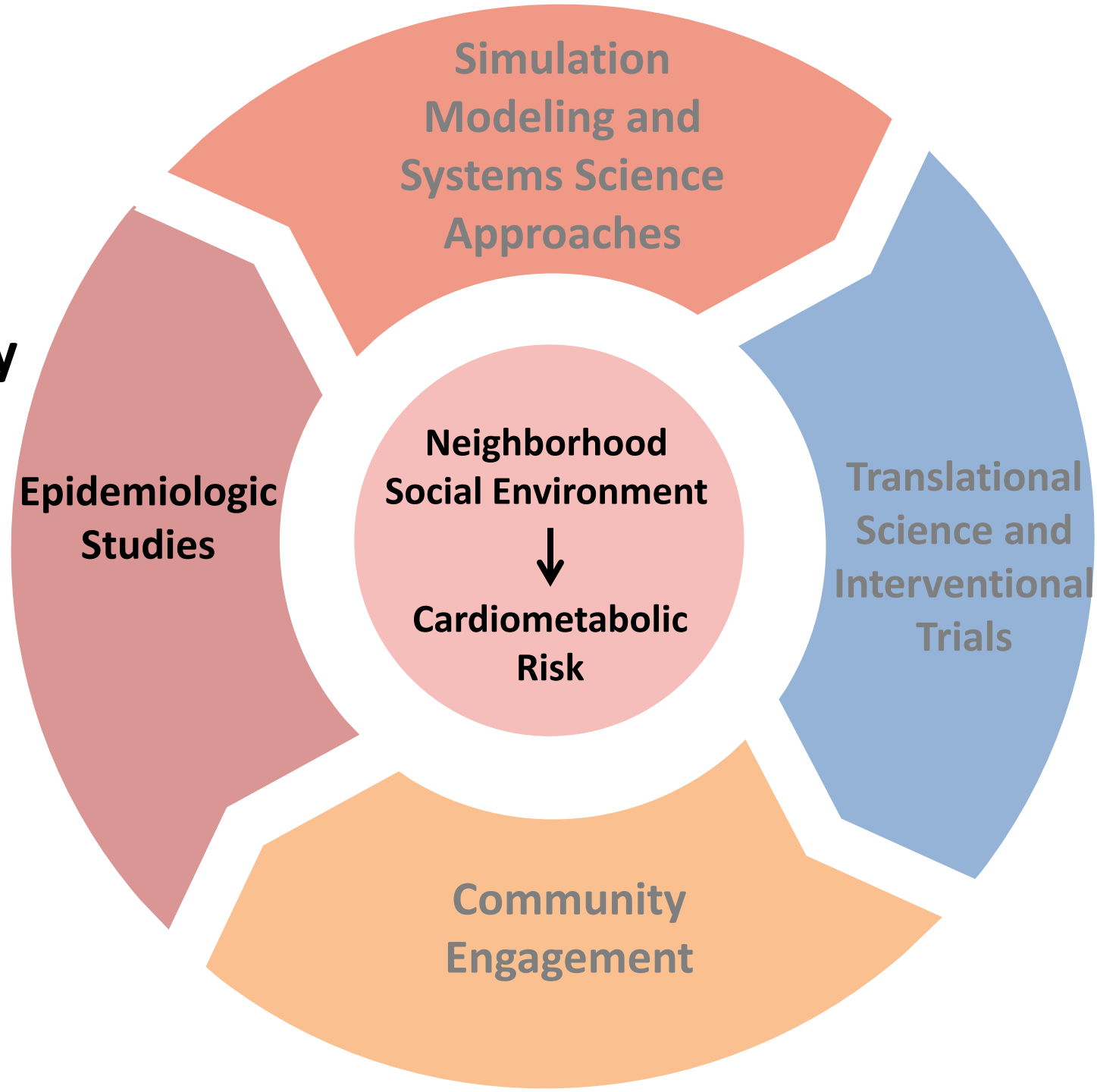
**Feasible to Use mHealth Apps and Wearables for
Community-based Physical Activity Intervention**

Crime and Limited Safety as Barriers to Physical Activity



Fowler L et al. *JMIR mHealth and uHealth* 2018
Yingling L et al. *Translational Behavioral Medicine* 2017
Thomas S et al. *Journal of Racial Ethnic Health Disparities* 2016

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Crime, Safety and Cardiometabolic Risk Change: Multiethnic Study of Atherosclerosis (MESA)



Neighborhood environment

Social Environment

- Police-reported Crime
- Safety
 - Neighborhood-level
 - Individual-level

Lifestyle Mediators

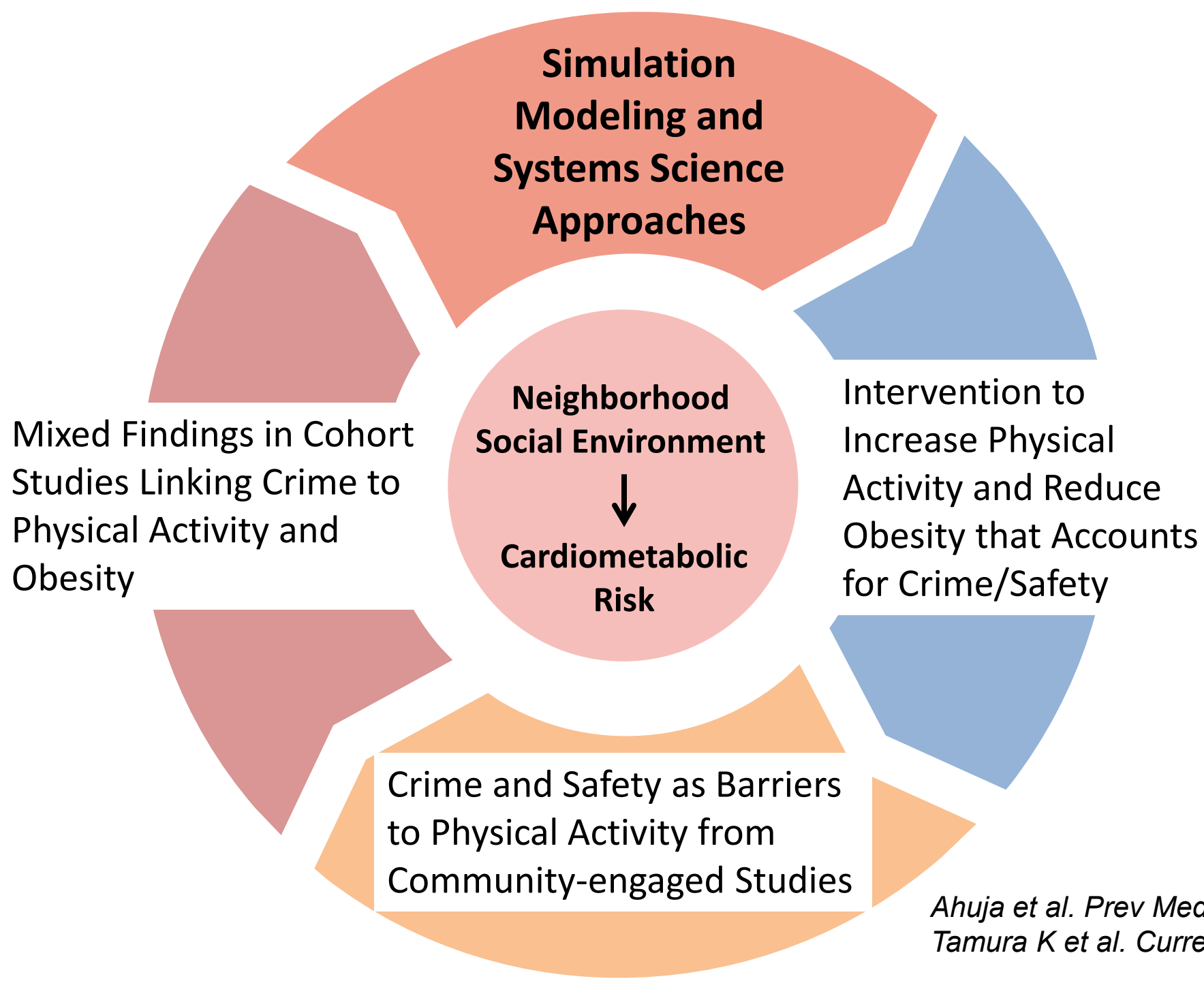
Health behaviors
(physical activity,
caloric intake)

Change in Adiposity

- Body Mass Index
- Waist Circumference

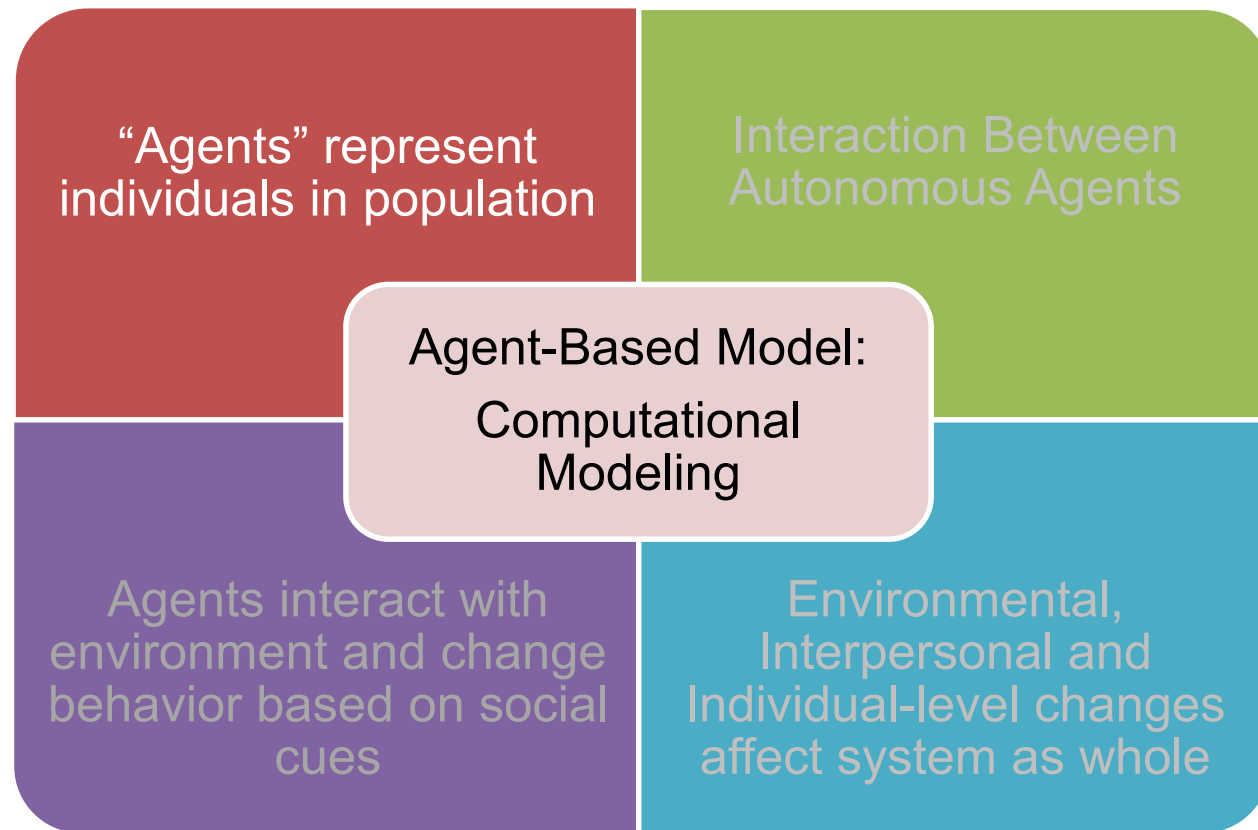
Findings:

- Greater ↓ in safety over time associated with greater ↑ in BMI/WC
- No clear relationship between objective crime and adiposity
- Perceived safety as a potential target for intervention



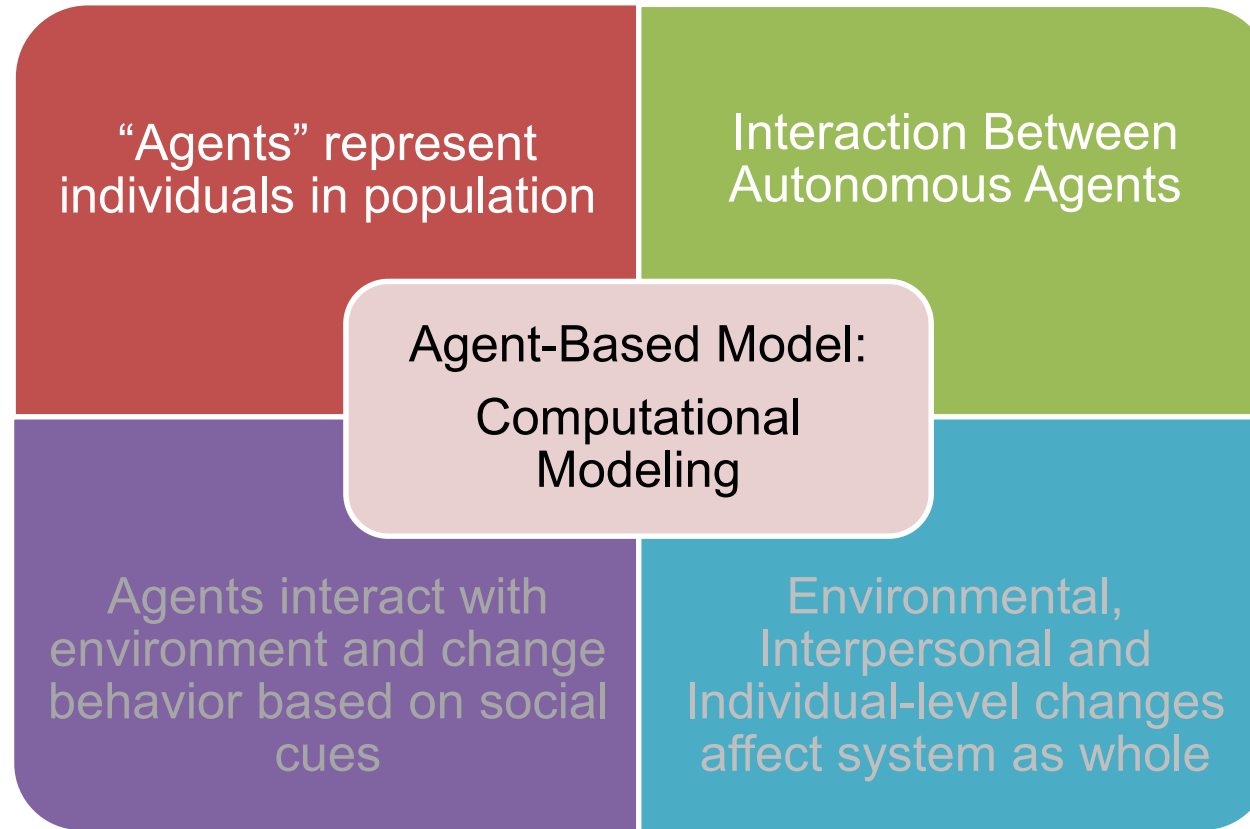
*Ahuja et al. Prev Med Reports 2018
Tamura K et al. Current Card Reports 2019*

Agent-Based Modeling Allows for Simulation of Intervention Effects on Community Members



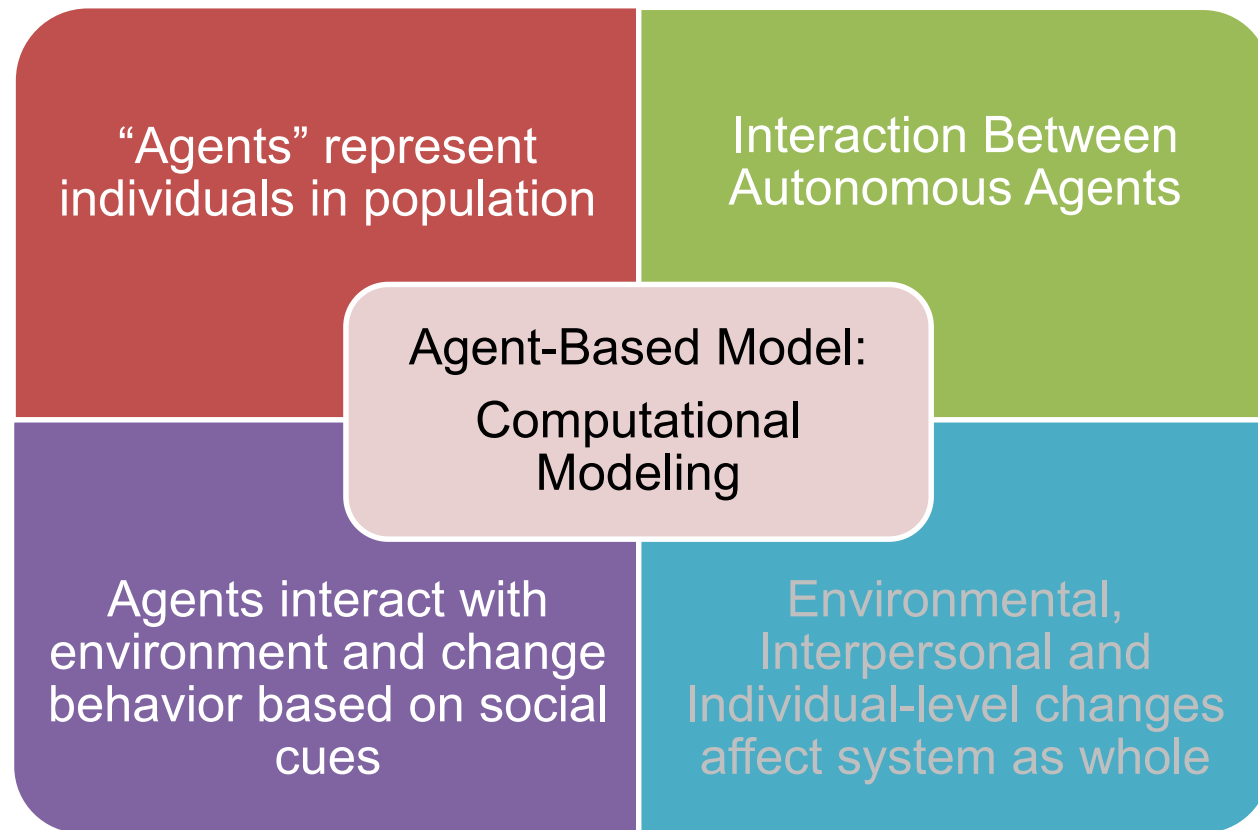
*Hammond RA.
Preventing
Chronic
Disease 2009
Nianogo R et
al, AJPH 2015*

Agent-Based Modeling Allows for Simulation of Intervention Effects on Community Members



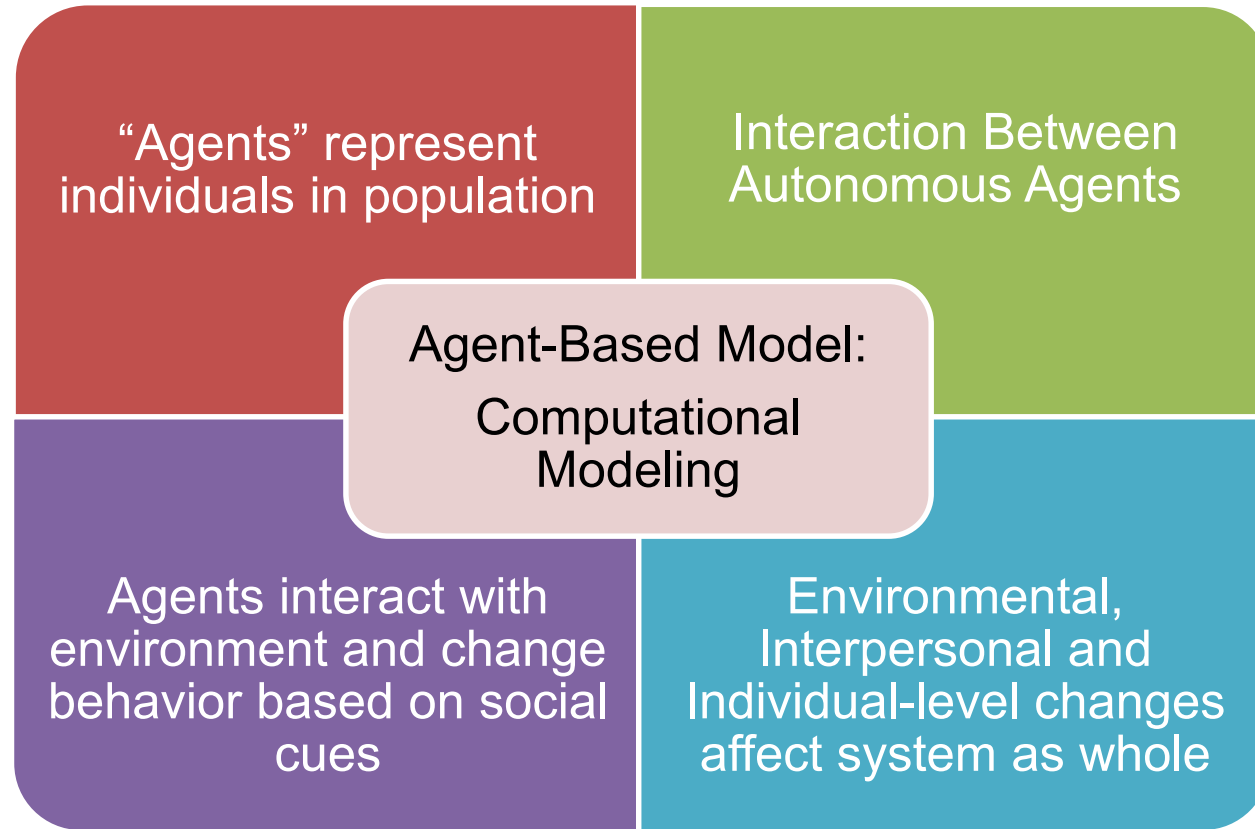
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Simulating the Impact of Crime on African American Women's Physical Activity and Obesity

Tiffany M. Powell-Wiley¹, Michelle S. Wong ^{2,3}, Joel Adu-Brimpong⁴, Shawn T. Brown^{2,5,6}, Daniel L. Hertenstein^{2,5}, Eli Zenkov^{2,5,6}, Marie C. Ferguson^{2,5}, Samantha Thomas⁴, Dana Sampson¹, Chaarushi Ahuja¹, Joshua Rivers¹, and Bruce Y. Lee ^{2,5}

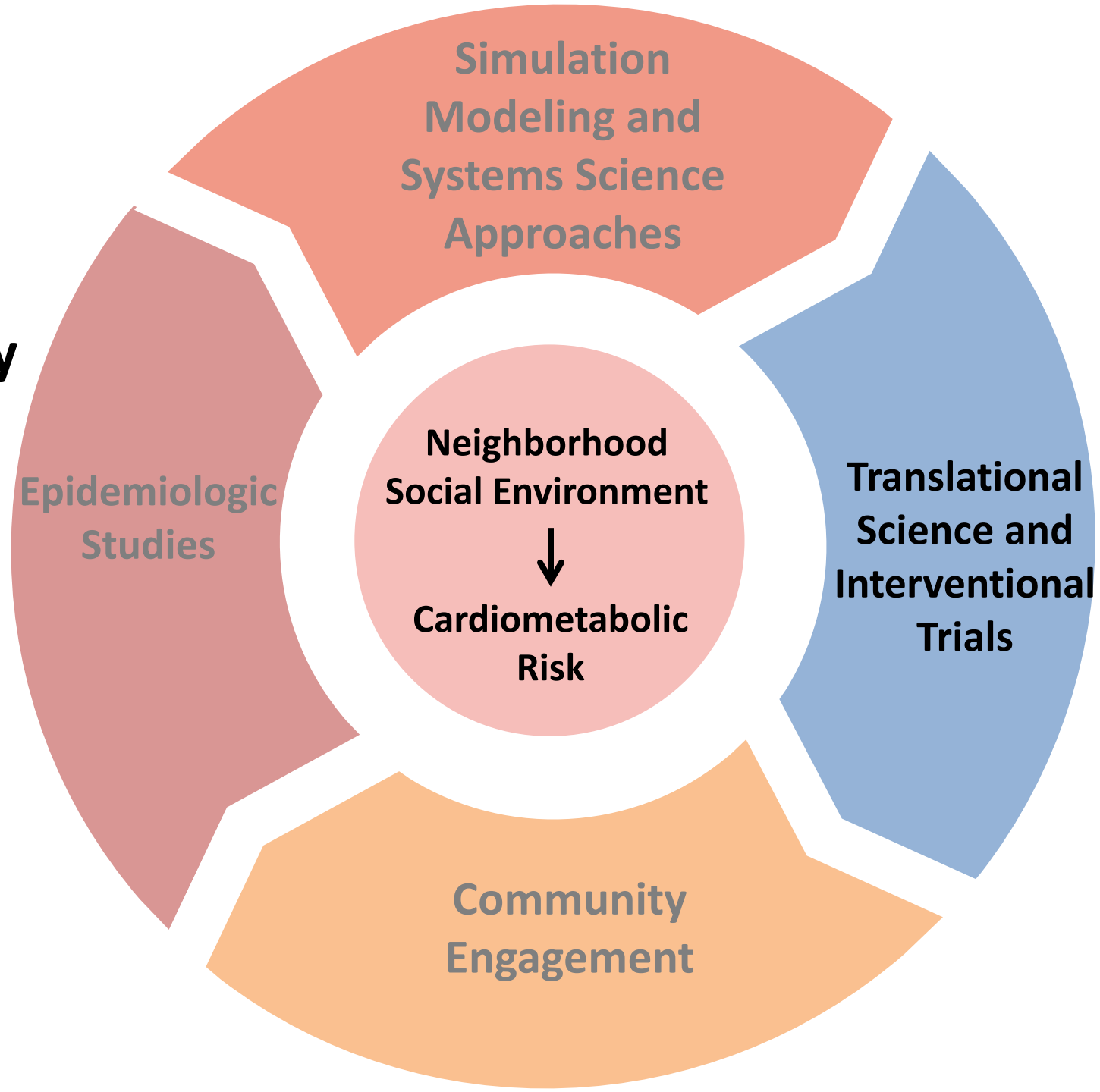
- As exercise propensity increases, crime reductions and increase in PA location accessibility have larger impact
- Policies aimed at reducing obesity by increasing leisure-time PA should take multi-level approach
- Consider targeting crime through urban renewal and policies to improve perceived safety in resource-limited urban communities

Example of Urban Renewal Process with Health Equity Focus



Slide From:
Mustafa Abdul-Salaam
Managing Partner
Community Economic
Development Partners
<http://www.linkedin.com/in/mabdulsalaam/>

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Systems Science Modeling in Community-based Physical Activity Intervention Development

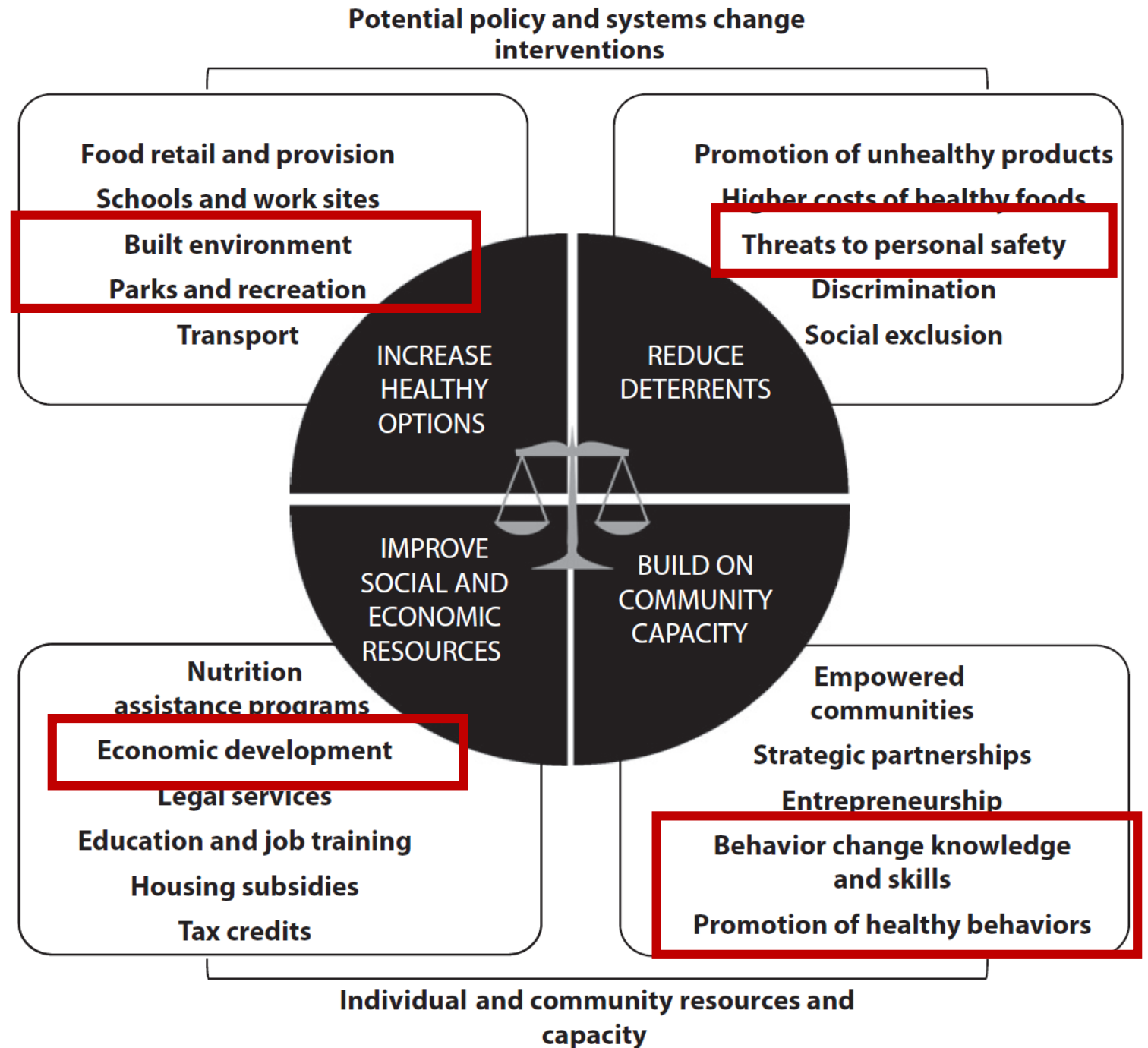
- Agent-based modeling to test multi-level interventions for African American women in DC:
 - mHealth intervention promoting PA at most accessible recreation center classes
 - Potential to test how crime may limit intervention
 - Simulates community-based intervention developed by team



Getting to Health Equity: A Framework for Obesity Prevention

Kumanyika S. AJPH 2019

Cardiovascular Health Equity as the Ultimate Goal





Thank you for your attention



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