Neighborhood disadvantage, biological aging, and psychosocial risk and resilience in heart failure incidence among U.S. Black adults

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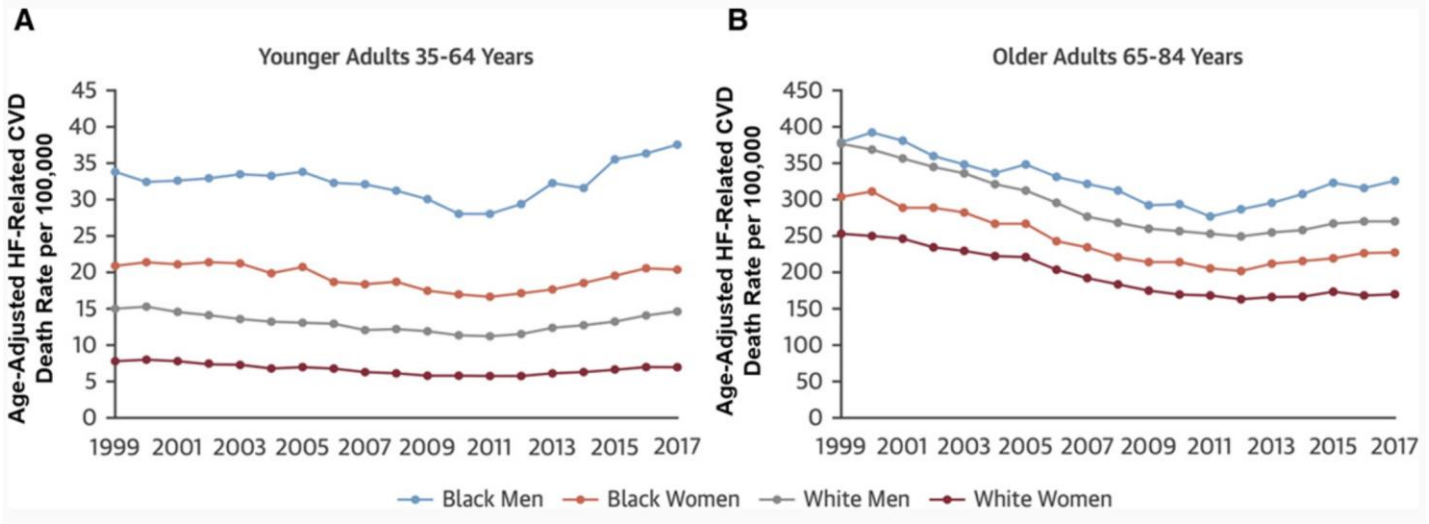
Prominent disparities in heart failure

- Black women and men at greatest risk
- Disparities largest among younger adults
- Disparities worsening over time

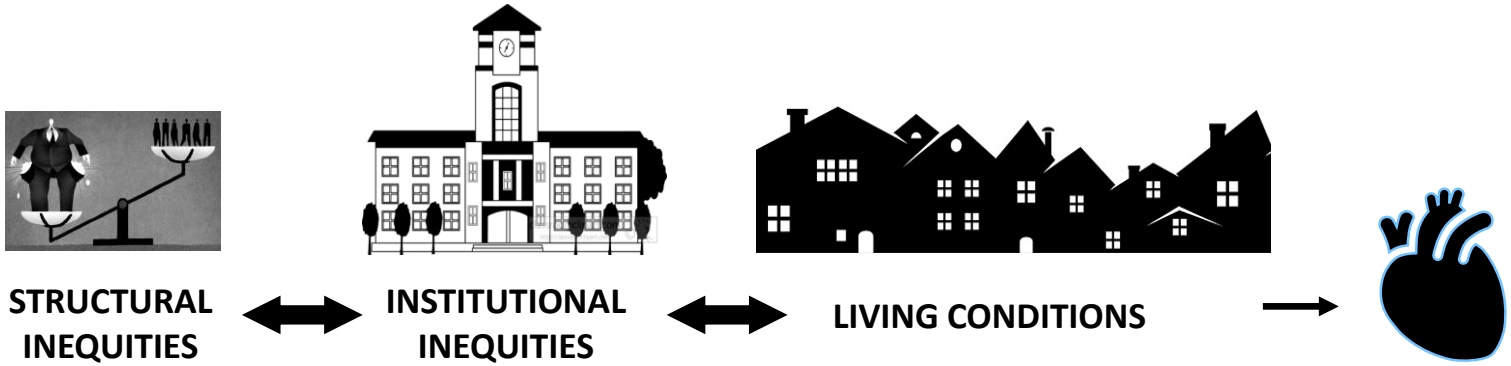


Nayak, Hicks, and Morris (2020). Understanding the complexity of Heart Failure Risk and Treatment in Black Patients. Circulation, 13:8.

Structural inequity and neighborhood disparities

Historical and current practices (structural inequity) concentrate U.S. Black populations within under-resourced neighborhoods

- Housing, economic, education policies
- Racial residential segregation → increased risk of physical and mental disease



Potential pathways

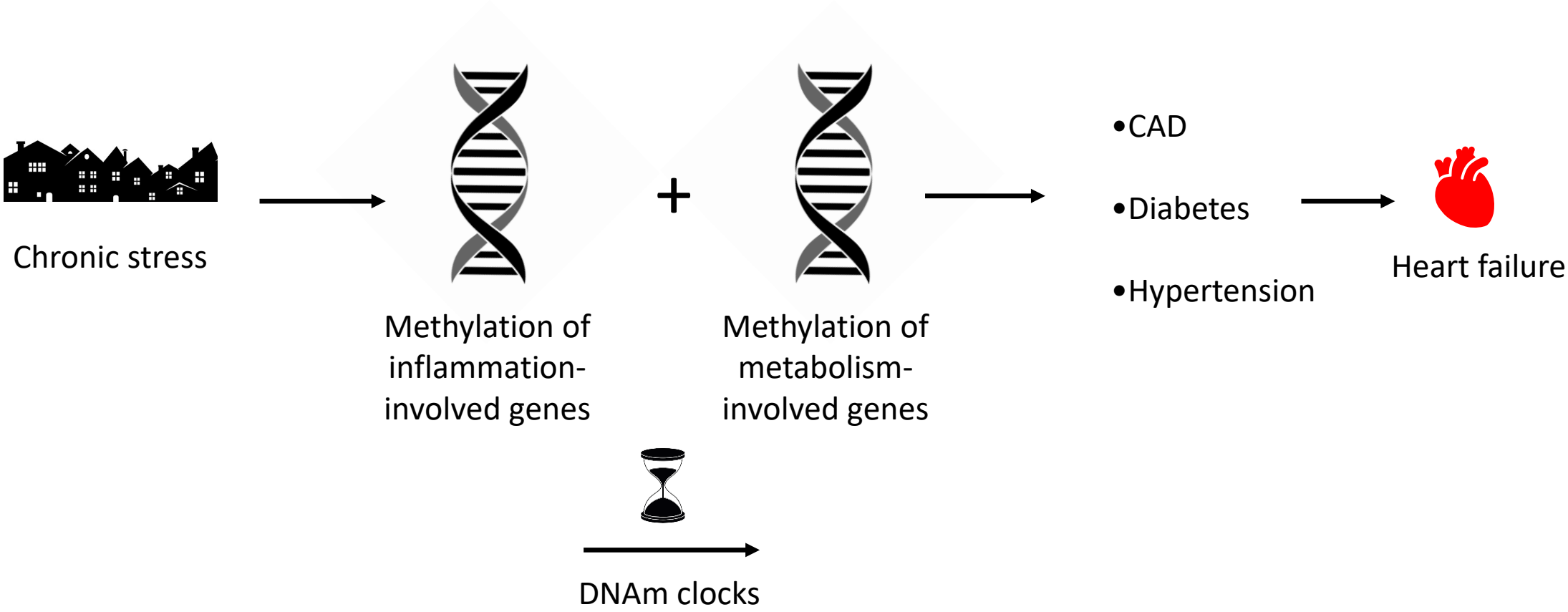
Neighborhoods provide protective resources, increased opportunities for health promoting behaviors

Physical activity, healthy eating, social interaction, access to quality health care

Neighborhoods can cause stress

Stress can lead to accelerated aging, increased disease risk

Neighborhoods, biological age, and HF risk

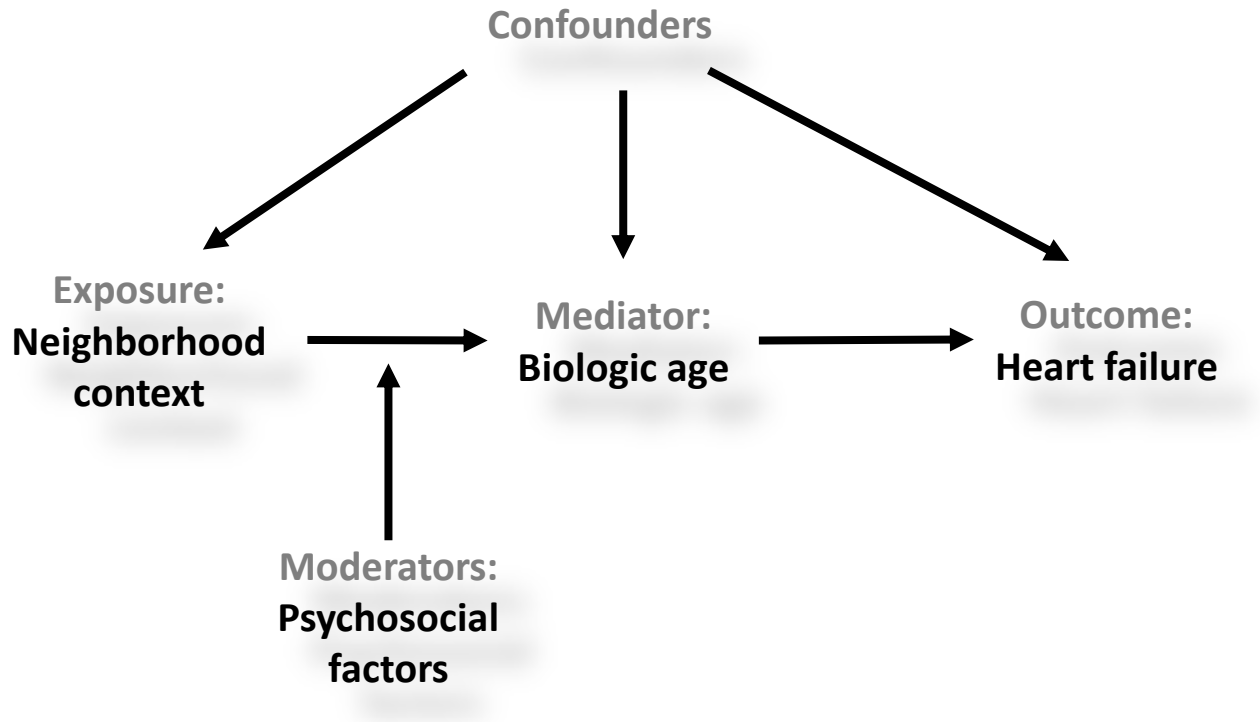


Psychosocial influences

- Psychosocial = psychological characteristics shaped by social contexts
  - Negative affect, optimism
- Risk = factors associated with poorer-than-expected health
- Resilience = factors associated with better-than-expected health
- Evidence for influence of psychosocial characteristics on cardiovascular disease risk → may influence variation
- Modifiable

Study objective

A moderated mediation approach to understanding the relationship of cumulative social disadvantage, individual psychological characteristics, and accelerated aging in HF Risk



Study design + population

- Multilevel longitudinal analysis
- JHS + ARIC cohort of 1,448 self-reported non-Hispanic Black adults
- Jackson, MS with 67 “neighborhoods”

ARIC + JACKSON HEART STUDY

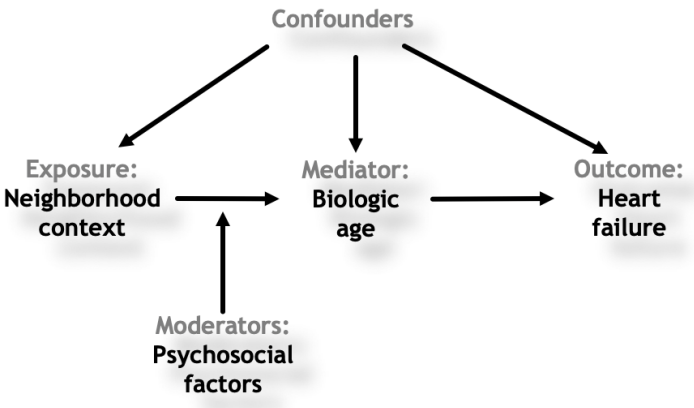
Study variable	Operationalization
Exposure: Baseline neighborhood disadvantage	**National Area Deprivation Index ("objective")** Income, education, employment, and housing quality **Perceived Neighborhood Problems ("subjective")** Neighborhood noise, trash and litter, etc.
Outcome: Incident hospitalized heart failure	Adjudicated by reviewer panel: discharge ICD-9 code for HF, HF mentioned in physician notes, or a Diagnostic record of HF
Mediator: Biological Age	"GrimAge" epigenetic clock calculated using a composite of DNA methylation-based markers for 8 plasma proteins and self-reported smoking packyears.
Moderators: Individual psychosocial factors	Negative affect (risk) – cynicism + anger + depression (validated scales) Optimism (resilience) – Life Orientation Test-R
Confounders	sex, age

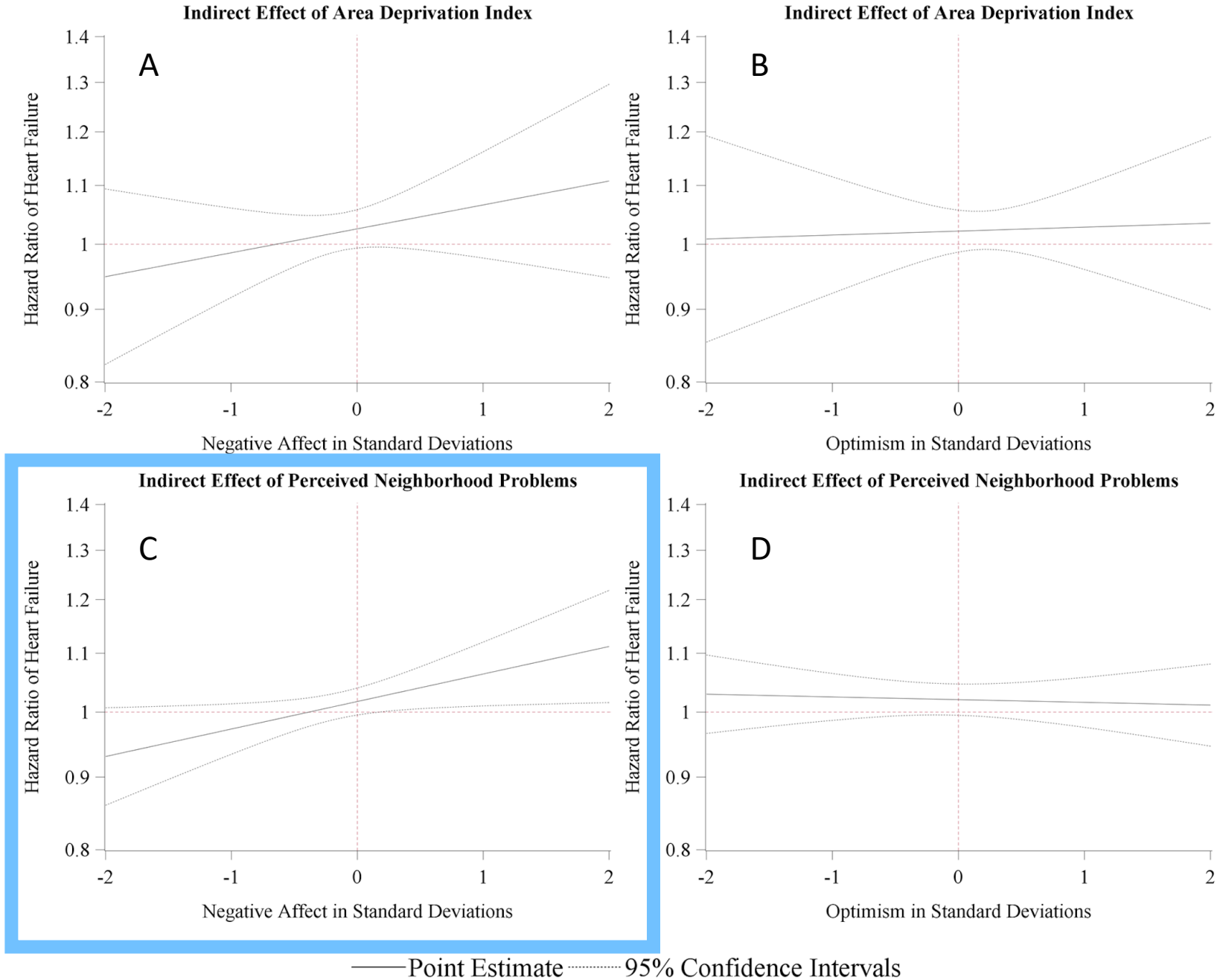
Methods

- Multilevel age- and sex-adjusted causal moderated mediation structural equation model employing cause-specific, Cox proportional hazards
- Follow-up: January 1, 2000 – December 31, 2017
- Missing data: Full-information maximum likelihood

Interpreting estimates

- Moderated mediation = conditional indirect effect = **effect of exposure on outcome through mediator differs across levels of moderator**
- Hayes' conditional process analysis includes *index of moderated mediation* term
  - Roughly equivalent to an interaction term; statistical significance indicates moderated mediation is supported by the data
- Estimates exponentiated to produce hazard ratios





Among sample of Black adults in the ARIC–JHS cohort 2000–2017 (*N* = 1,448) in highest versus lowest level of perceived neighborhood problems:

For each 1-*SD* higher level of negative affect, the adjusted hazard of HF was 18% higher (HR 1.18, 95% CI 1.05–1.36).

Overall takeaways

- Analyses provide important novel information on moderation and mediation
  - Factors that influence resilience and susceptibility
  - Physiological pathways these factors may operate on

- Outline benefits of reducing susceptibility AND promoting resilience
  - Targets multiple pathways

- Lots more work to be done!

Among a sample of U.S. Black adults, the effect of neighborhood disadvantage on heart failure risk acting through accelerated biological aging was greater among those with higher levels of a modifiable psychosocial risk factor, indicating potential novel avenues for intervention.

Thank you!