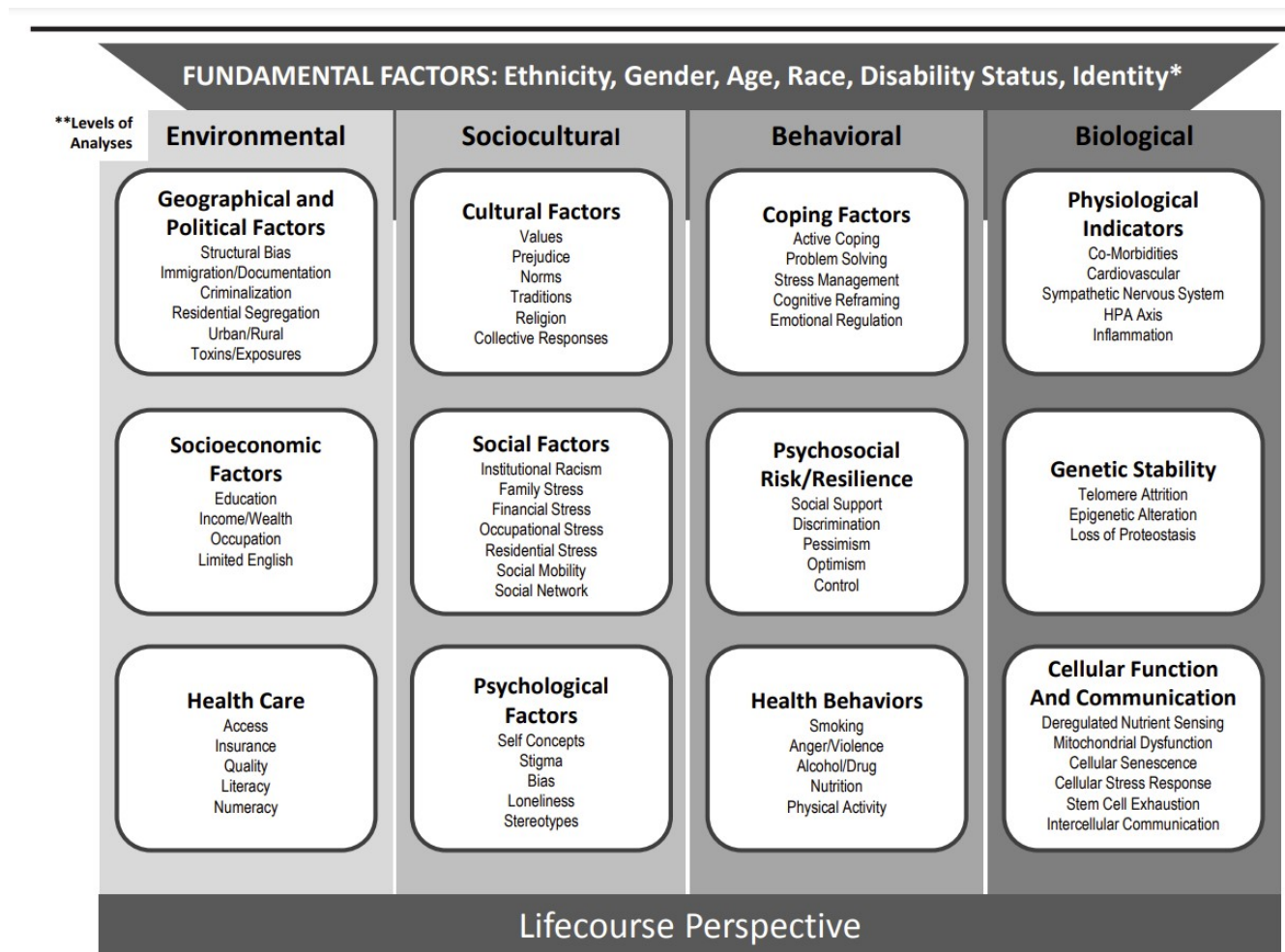


# Target trial emulation for the study of social determinants in dementia research

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Hill et al. *Ethnicity and disease*. 2015

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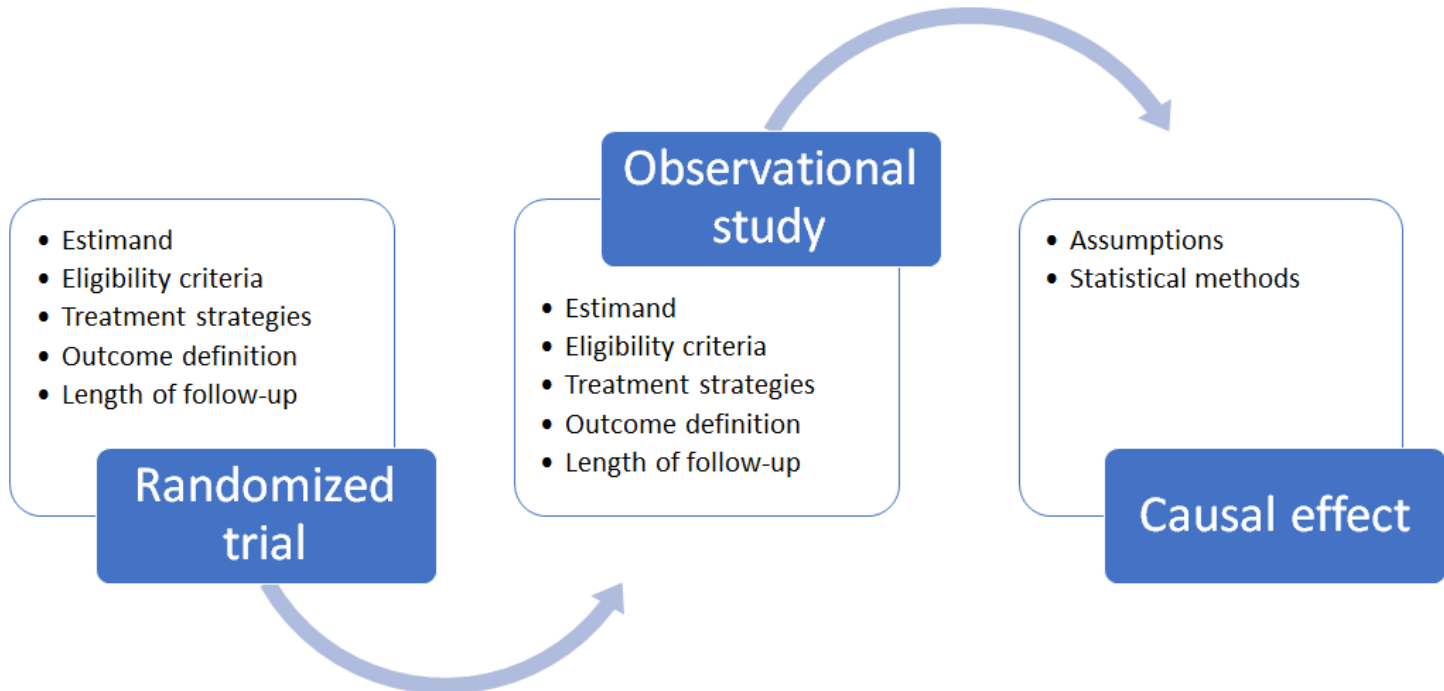
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- Time points aligned by design:
  - Eligibility criteria
  - Treatment assignment (randomization)
  - Follow-up starts

# Target trial emulation framework



# Research question

*What is the effect of early-life racial residential segregation in 1940, measured by the dissimilarity index, on later-life memory decline in US population, represented by the Health and Retirement Study (HRS)?*

*Work led by Taylor Mobley (UCLA, Mayeda's research lab)*





Section	Target trial protocol	Emulation using observational data
<b>Eligibility criteria</b>	Population who self-identify as white or Black, born in the US by 1940, who resided in a county with Black residents	Same + participated in HRS, with linked data for 1940 census, living in counties with > 1 enumeration district and with memory assessment measured by 1998

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<b>Causal contrast</b>	Intention-to-treat	Same

# Estimand

$$E[Y_{1998}^{a=1}] - E[Y_{1998}^{a=0}]$$

# Estimand

$$E[Y_{1998}^{a=1}] - E[Y_{1998}^{a=0}]$$

$$E[Y_{2000}^{a=1,c=0}] - E[Y_{2000}^{a=0,c=0}]$$

....



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....

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# Identifiability assumptions

- Consistency
- Exchangeability
- Positivity
- No interference

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  - *What does it mean to intervene on residential segregation in 1940?*
  - *Is the dissimilarity index a good a proxy of all the racist policies that resulted in residential segregation?*
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- At best, this hypothetical intervention would be reducing the impact of all the racist policies that influenced residential segregation, determined by the frequency of these in the studied population.
- It requires deep interdisciplinary dialogue, and only with subject matter expertise we can inform how well we feel about satisfying this assumption.

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- Since there are many factors that can influence residential segregation, whatever we adjust for is not accounted into how we would intervene.
- There is a moral and ethical value in terms of what variables to adjust. "Non-allowable" sources are considered unfair and contribute to disparities (*Jackson J. Epidemiology. 2021*).

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- The target trial framework helps us in being more transparent about our questions, assumptions and interpretations.
- We can use the target trial framework even if the intervention of interest is not measured (or exists!).
- Having a better design can already prevent some sources of bias, and help us detect other sources that could be prevented (or quantified) through the analytic strategies.
- It is a dynamic process, since it requires a deep understanding of the data sources and a constant check that the causal contrasts and subsequent results are informative.



***To search for all the refutable consequences of a hypothesis demands highly imaginative thinking. Imagination is needed to arrive at the hypothesis in the first place, let alone to suggest rigorous tests for it.***  
***(Carol Buck)***

*Buck C. Popper's Philosophy for Epidemiologists, IJE. 1975*

# Thank you, Gracias!

## Mayeda Research Group

### Study Contributors:

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- Joan Casey
- Taylor Mobley
- Kara Rudolph
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# Come work with us!

## Dementia Epidemiology Equity and Methods Training Program

- María Corrada, UC Irvine
- Paola Gilsanz, Kaiser Permanente Northern California
- Maria Glymour, Boston University
- Elizabeth Rose Mayeda, UCLA
- Rachel Whitmer, UC Davis



## Themes:

- Eliminating dementia disparities
- Methods for dementia and cognitive aging research
- Data harmonization and triangulation
- Determinants of health in the oldest-old
- Lifecourse determinants of health
- Neuroimaging