Life Course Predictors of Midlife Mortality

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Planning Meeting on Socioeconomic Status
and Increasing Mid-Life Mortality
National Academy of Sciences
Washington, D.C.
June 16, 2017

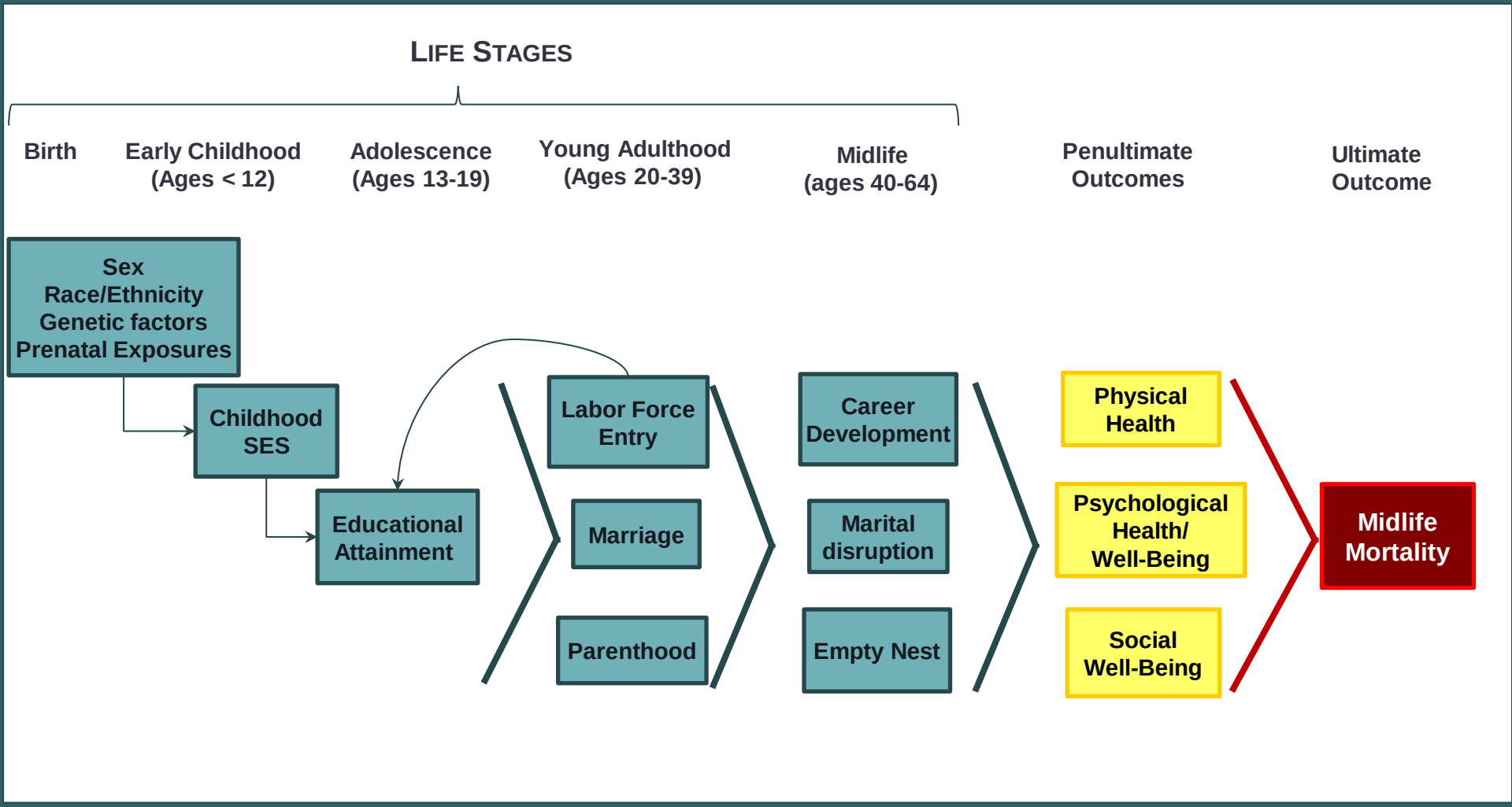
A Key Challenge for Studying Midlife Mortality

- Not many people die in midlife (40-64)
- 2015 life table: 85% of Americans die at ages 65+ (82% in 1999; HMD)
- MIDUS cohort (aged 25-74 in 1995-96):
  - 16% of SAQ sample died within ~18 years
  - Only 285 (<5%) deaths at ages 40-64
- Need a HUGE sample to study midlife mortality at the individual-level.

Sparse Literature on Midlife Mortality

- Few individual-level studies focus on **midlife** mortality.
- Predictors of midlife mortality not necessarily the same as the predictors of **changes over time** in midlife mortality.
- Increases in “deaths of despair”: difficult to study at individual-level because it is so rare (among the few deaths in midlife, <20% result from these causes).

Life Course Predictors of Midlife Mortality



What is the evidence regarding life course predictors of midlife mortality?

Childhood SES

- Associated with mortality [Montez & Hayward, 2014; Chapman et al., 2009; Hayward & Gorman, 2004; Pudrovska & Anikputa, 2013; Galobardes et al. 2004]
- Stronger effect in midlife? [Turrell et al., 2007]
- Operates primarily via adult SES [Pudrovska & Anikputa, 2013; Montez & Hayward, 2014]
  - Not clear if also true for midlife mortality
- Fundamental cause: linked with cluster of associated exposures (e.g., adverse childhood experiences) & related factors

Employment/Career Trajectory

- Aggregate (county-level) analyses
  - Economic opportunity→lower mortality (esp. at working ages) [Venkataramani et al., 2016]
  - Economic mobility (county)→smaller increases midlife mortality [O'Brien et al., 2017]
- Individual-level factors associated with lower mortality in men [Hayward & Gorman, 2004]
  - Substantive complexity of job
  - Total family income
  - Net assets

Marriage & Family Transitions

- Compared with always single or formerly married, those who were consistently married → lower midlife mortality (among college students followed to age 62) [Siegler et al., 2013]
- **Men**: Married/never married lower mortality than widowed/divorced [Hayward & Gorman, 2004]
- **Women:** Mortality lowest for married with children later in life; highest for those with spells of single motherhood [Sabbath et al., 2015]

Midlife Mortality Based on MIDUS

- Completed SAQ in 1995-96 (n=6325)
  - Dropped missing data for age (n=2), vital status (n=7), or other predictors (n=1081)
- Mortality follow-up through May 2013 (mean=17.9, range=16.7-18.3 years)
- Split exposure into age ranges:
  - **Early (age 20-39):** n=1794, 12 (<1%) died
  - **Midlife (age 40-64):** n=4701, 217 (<5%) died
  - **Later (age 65-92):** n=2222, 493 (22%) died
- Cox model, age as “clock”, sex-adjusted

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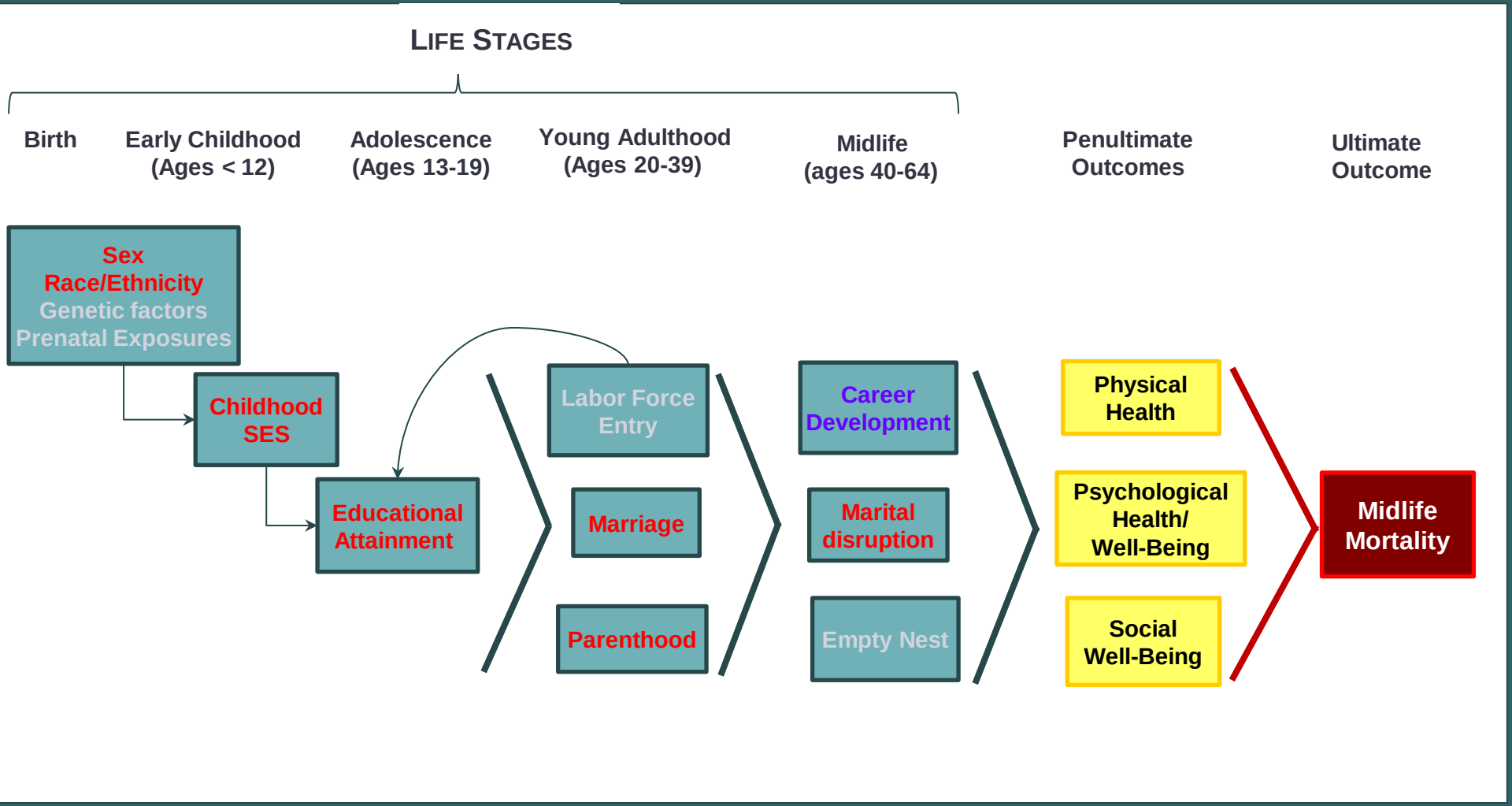
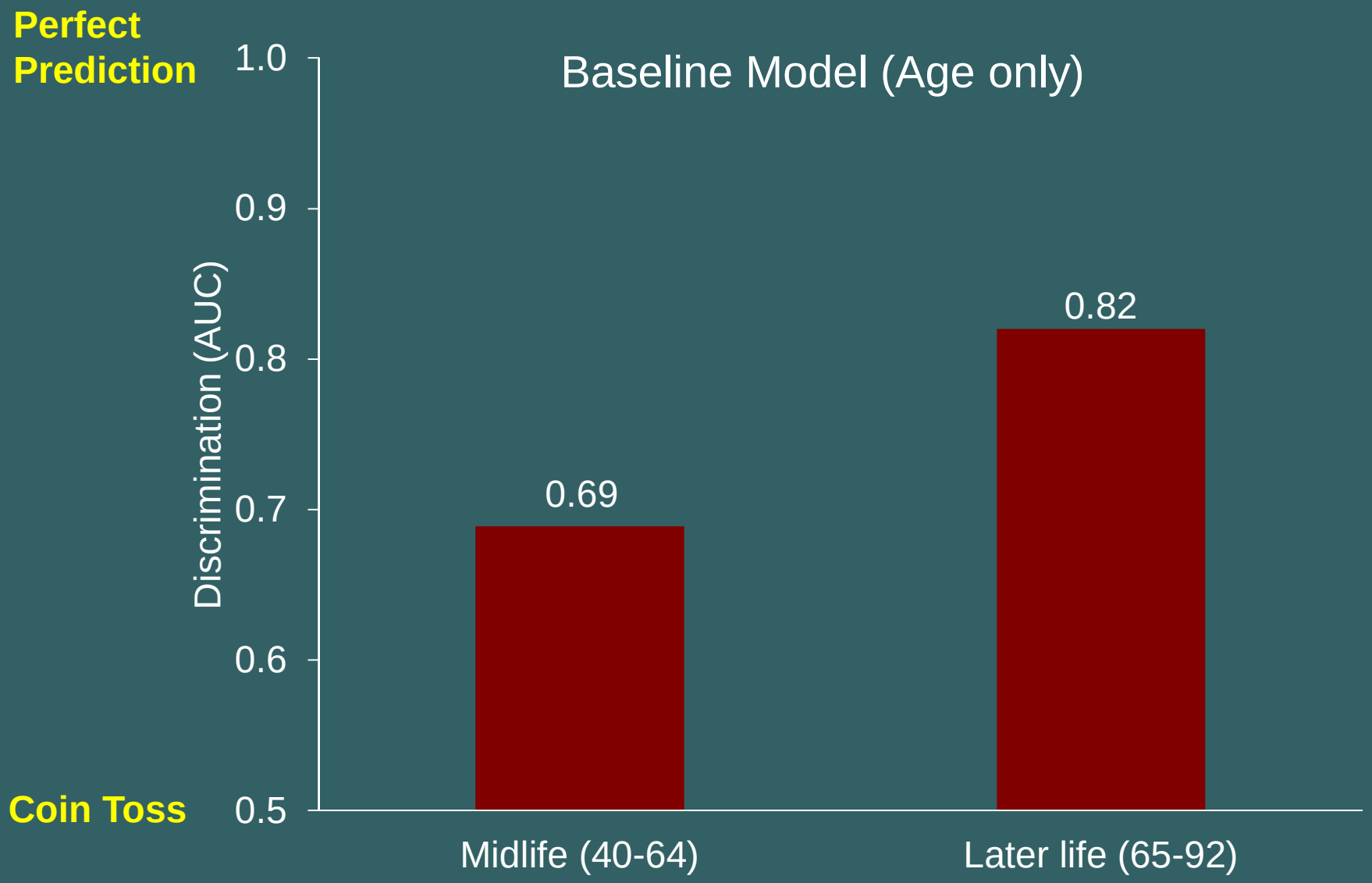
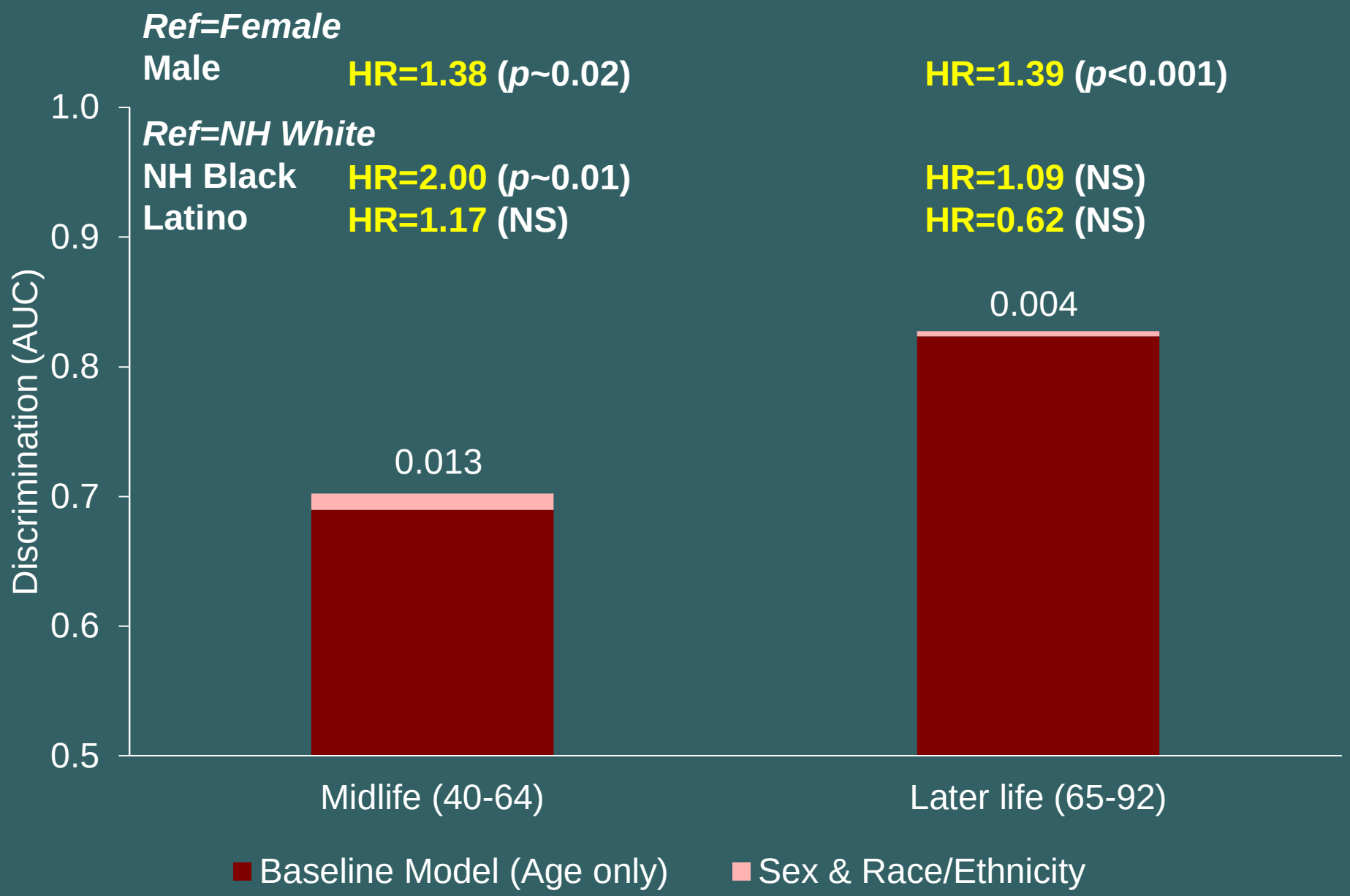


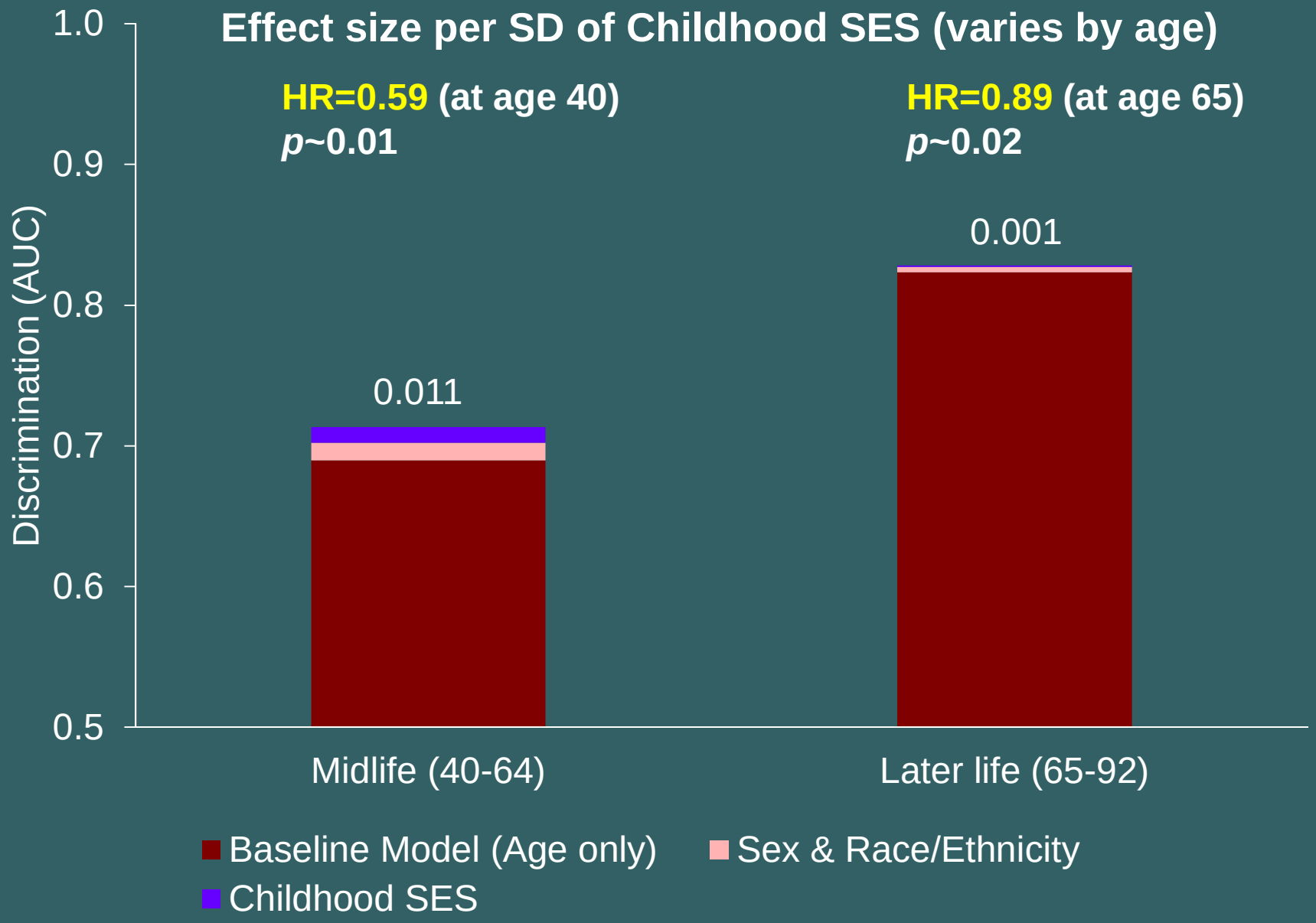
Age is a Better Predictor of Mortality in Later Life than in Midlife



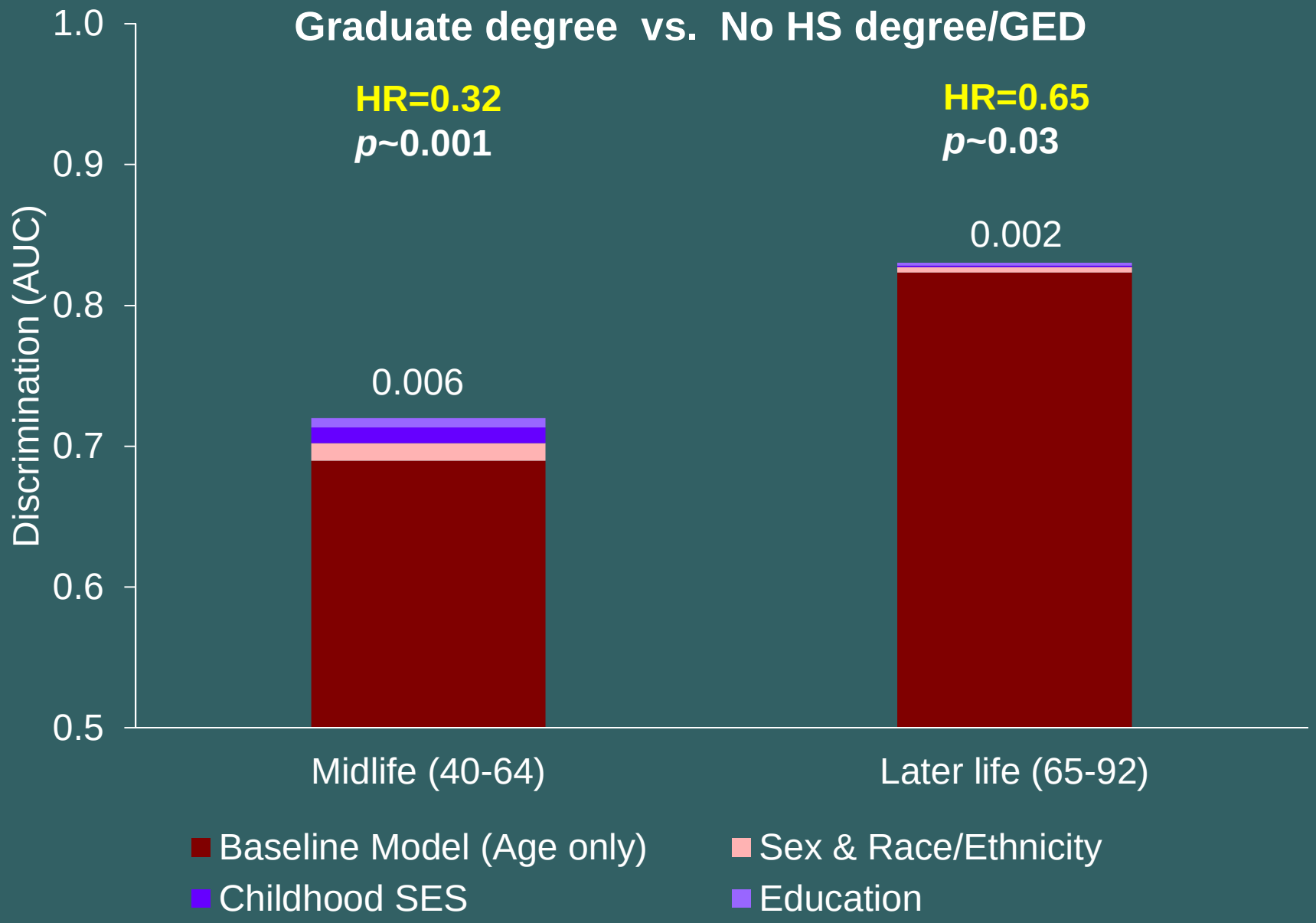
Added Value of Sex and Race/Ethnicity



Added Value of Childhood SES



Added Value of Own Education

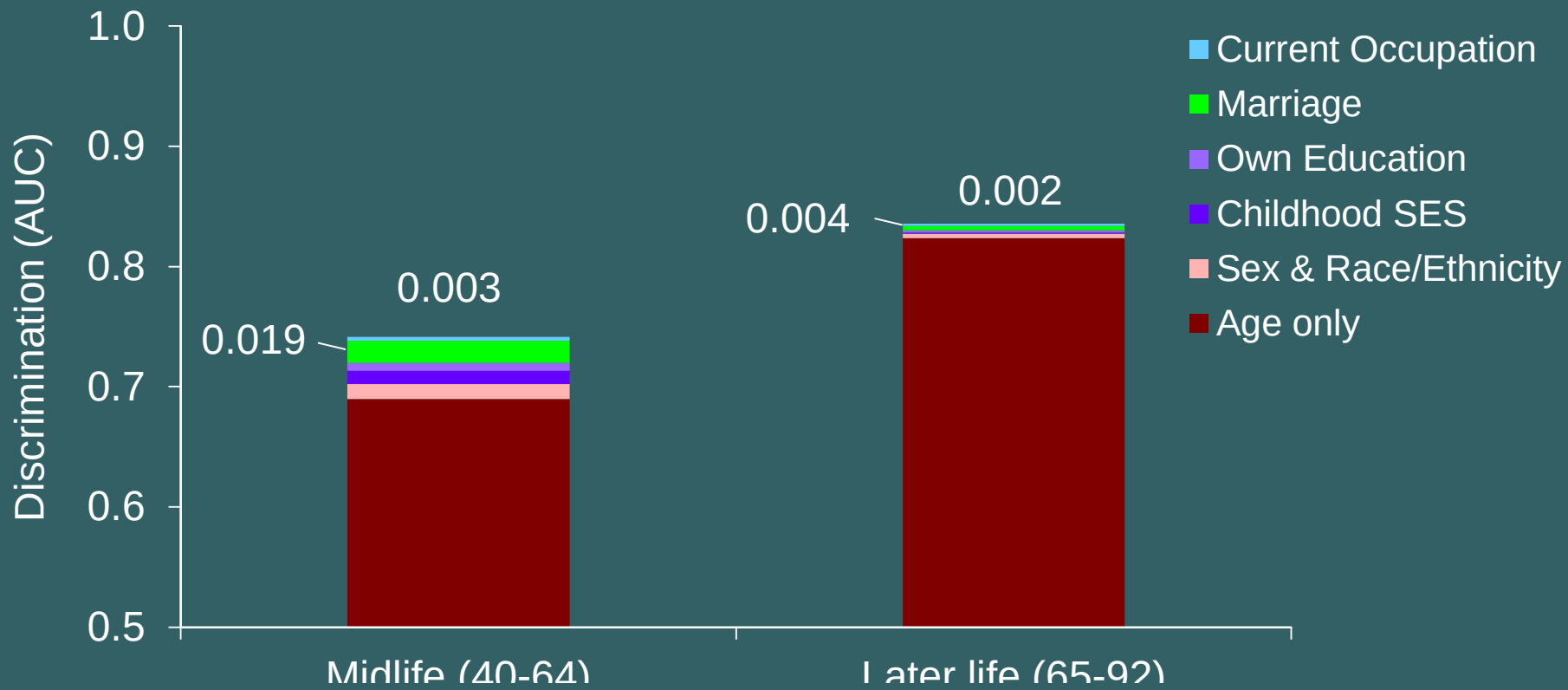


Add Marriage, Parenthood, & Current Occupation

Ref=Never Married

1st Married @Age 23+ **HR=0.50 (*p*~0.002)** **HR=0.68 (*p*~0.04)**

Div/Sep **HR=1.71 (*p*~0.002)** **HR=1.53 (*p*~0.01)**

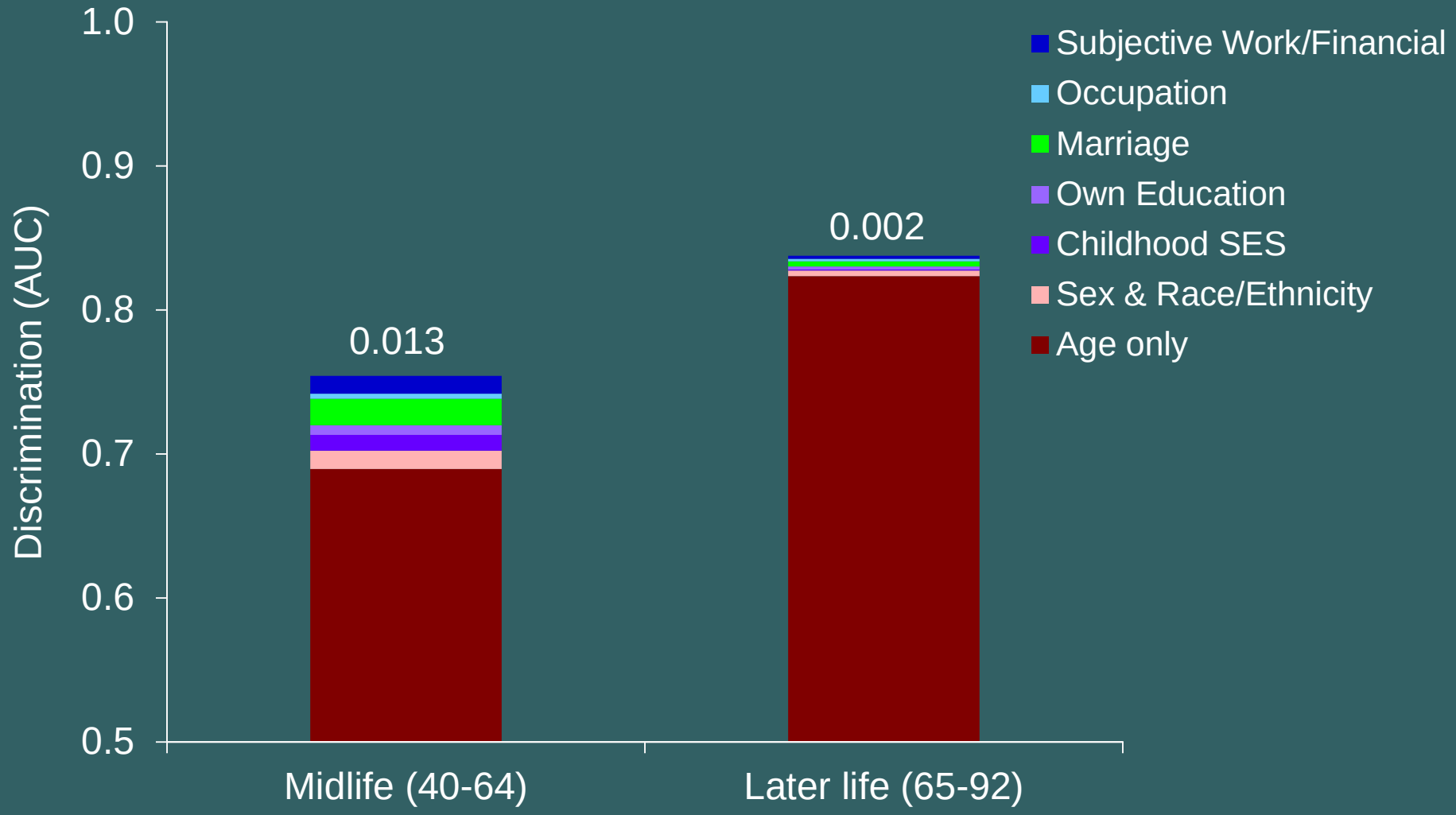


Marriage: Age at first marriage; whether divorced/separated by MIDUS 1

Parenthood: Age at first birth; whether first birth after marriage [ΔAUC<0.001]

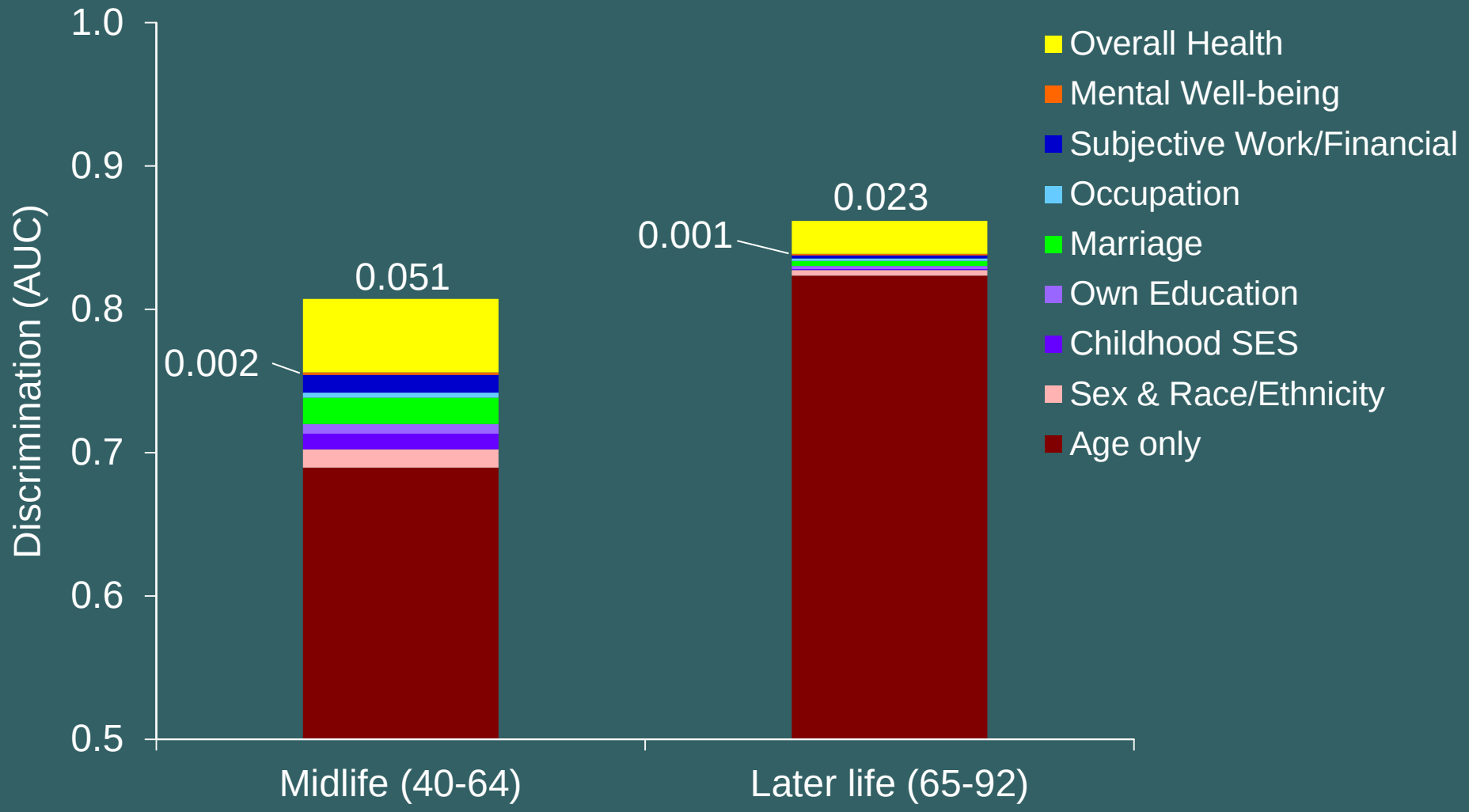
Occupation: SEI score of current occupation; not currently employed

Added Value: Subjective Measures of Work and Financial Situation



Subjective Measures: Rating of expected work situation 10 years in the future; Perceived financial situation compared with parents at same age

Added Value: Mental Well-Being and Other Health-Related Measures



Mental Well-Being: Purpose in life index; Negative affect index

Other Health-Related Measures (self-reported): Smoking status; overall health status; physical limitations; diabetes; hypertension

Biomarkers: Predict Midlife Mortality?

Notable predictive ability (ΔAUC≥0.01)*:

- C-Reactive protein
- Homocysteine

Poor discrimination (ΔAUC<0.01)*:

- Body mass index
- Waist circumference
- Blood pressure (SBP, DBP)
- Lipids (TC, HDL, ratio TC/HDL)
- Leukocyte telomere length

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* Compared with age and sex only.

Sources: Goldman et al. (forthcoming); Glei et al. (2016)

What Can be Done with MIDUS?

Advantages

- Extensive measures of:
  - Childhood adversity
  - Psychological health
  - Personality traits
  - Hardship related to Great Depression
- Cohort aged 25-74 (in ~1995)
- 18+ years of follow-up
- Refresher cohort (aged 25-74 in ~2013)

Disadvantages

- Limited power
- Few minorities
- Sparse information about labor force entry & career development
- Geocoding?
- ≈10 years between follow-up waves
- Retrospective info regarding childhood

Other Datasets

- HRS: Sample limited to age 50+
- WLS: Only HS graduates, represents Wisconsin only, cohort now aged ~78
- NLSY79: Cohort now aged 53-60; first interviewed in young adulthood
  - No mortality follow-up (yet); may add it?
- National Longitudinal Mortality Study (NLMS): State and urban/rural/SMSA identifiers, but limited information regarding life course history?

Funding

This work was supported by:

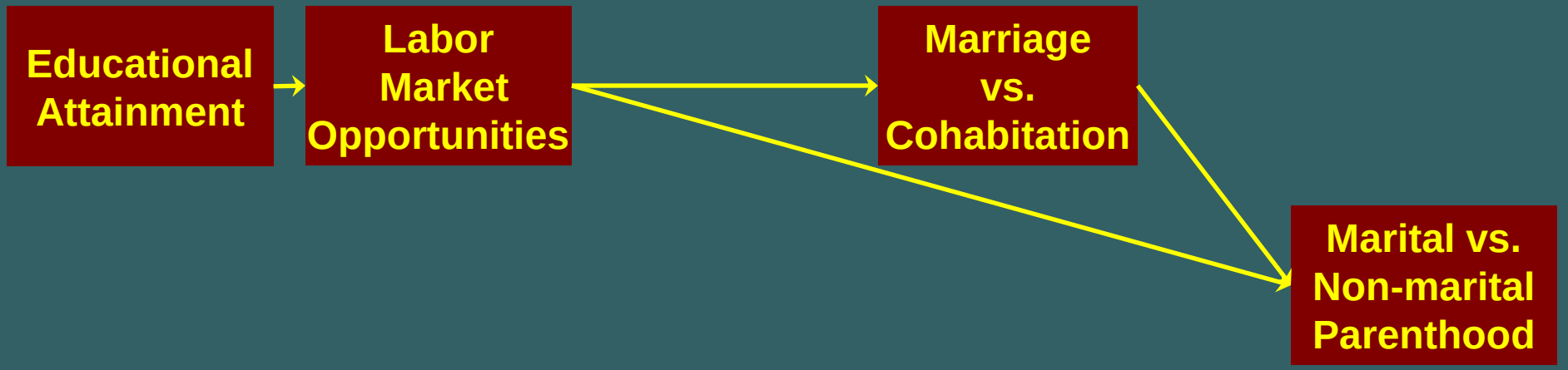
- NIA [P01 AG020166];
- NICHD [P2CHD047879];
- NIH General Clinical Research Centers Program [M01-RR023942, M01-RR00865];
- NIH National Center for Advancing Translational Sciences [UL1TR000427]; and
- Graduate School of Arts and Sciences, Georgetown University.

EXTRA SLIDES

What kinds of policy interventions might be effective for addressing life-course effects on midlife mortality?

Intervene At What Point in Life?

- Evidence of irreversible damage?
  - Need to intervene in early childhood?
- Target in young adulthood?
  - But early enough to influence trajectory of education → labor force entry
  - Case & Deaton (2017): Labor market entry as the trigger → marriage prospects, etc.



Symptoms versus Causes

- Opioid epidemic: Cause or symptom?
  - Need to get at the root causes; may require more than cutting off the supply of opioids
    - Macro-level influences, educational & labor market opportunities, etc.
- Prognosis identifies those at high risk
  - BUT, does not tell you what are the causal, modifiable factors (selection vs. causation)
- Identifying the vulnerable (or resilient) pathways: necessary starting place?

Critical research gaps in our understanding of life course predictors of midlife mortality and possible interventions?

Future Research

- Specific pathways leading to high risk of midlife mortality?
  - Which social chains are highest risk?
  - Constellation of factors related to low SES that really matter?
  - AND pathways to resilience?
- Additive models may not be adequate
  - Clustering of exposures and interactions between them
- Why is the U.S. different? (comparative)

Parting Thoughts

- Midlife mortality: Just the tip of the iceberg?
  - High levels of “despair” in US (misery that doesn’t end in death)?
  - More power to study health than mortality
  - Broader view of disparities in well-being
- Need to consider differences in both levels (at a given time) and change (over time)
  - Mortality improved more for blacks than for whites, but blacks still have higher mortality!
- Numerator-denominator bias in calculation of mortality rates by ethnicity?

Mortality Among the MIDUS Cohort: Effect of Predictor Varies by Age?

- Stronger association at younger ages for:
  - Race/ethnicity
  - Childhood socioeconomic status*
  - Own Education
  - Age at first marriage (or never married)
  - Age at first birth (or childless)
  - Psych well-being subscale: Purpose in Life
  - Overall self-assessed health status
  - Self-reported physical limitations
  - Self-reported hypertension†
  - Self-reported diabetes*

* Also within midlife

† Also within later life mortality

What theories might explain these patterns?

Life Course Theories

- **Critical (Sensitive) Period**
  - Biological imprinting; irreversible damage
- **Accumulation of Risks**
  - Additive and/or interactive effects
- **Pathway Model**
  - Early life shapes life-course trajectory
- **Social Mobility Model**
  - Circumstances later in life modify effects of early life exposures/factors

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Sources: Pudrovska & Anikputa (2013)