

Mortality Trends in the United States: The Roles of Education and Despair

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Outline

- Deaths of Despair
 - What is the “deaths of despair” hypothesis
 - Deaths of despair or drug problems?
 - Drug/Suicide/Liver disease mortality: trends & patterns
- Education and mortality
 - Case & Deaton: College graduate versus less educated: trends
 - Changes in the composition of education groups over time
 - Empirical evidence: education percentiles & mortality (with Adam Leive)
 - Importance of non-monotonic trends
 - Sex, race, & cause of deaths

Case & Deaton's "Deaths of Despair" Hypothesis

- Started with 2015 PNAS article
 - Rising mortality for 45-54 year old non-Hispanic whites (NHW) from 1999-2013
 - Role of drug poisonings, suicides, chronic liver disease highlighted
 - Concentrated among non-college educated (not non-BA degree holders)
 - Later referred to as "Deaths of Despair"

Figures

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 - Later referred to as "Deaths of Despair"
- 2017 paper & 2020 book
 - Not primarily (directly) due to economic factors
 - Loss of social capital
 - Social isolation, decline in marital stability, religiosity, unions, increased non-marital childbearing
 - Unique failures of American capitalism (e.g. pharmaceuticals)
 - Most of these changes started around 1970s

Unanswered Questions for DOD Hypothesis

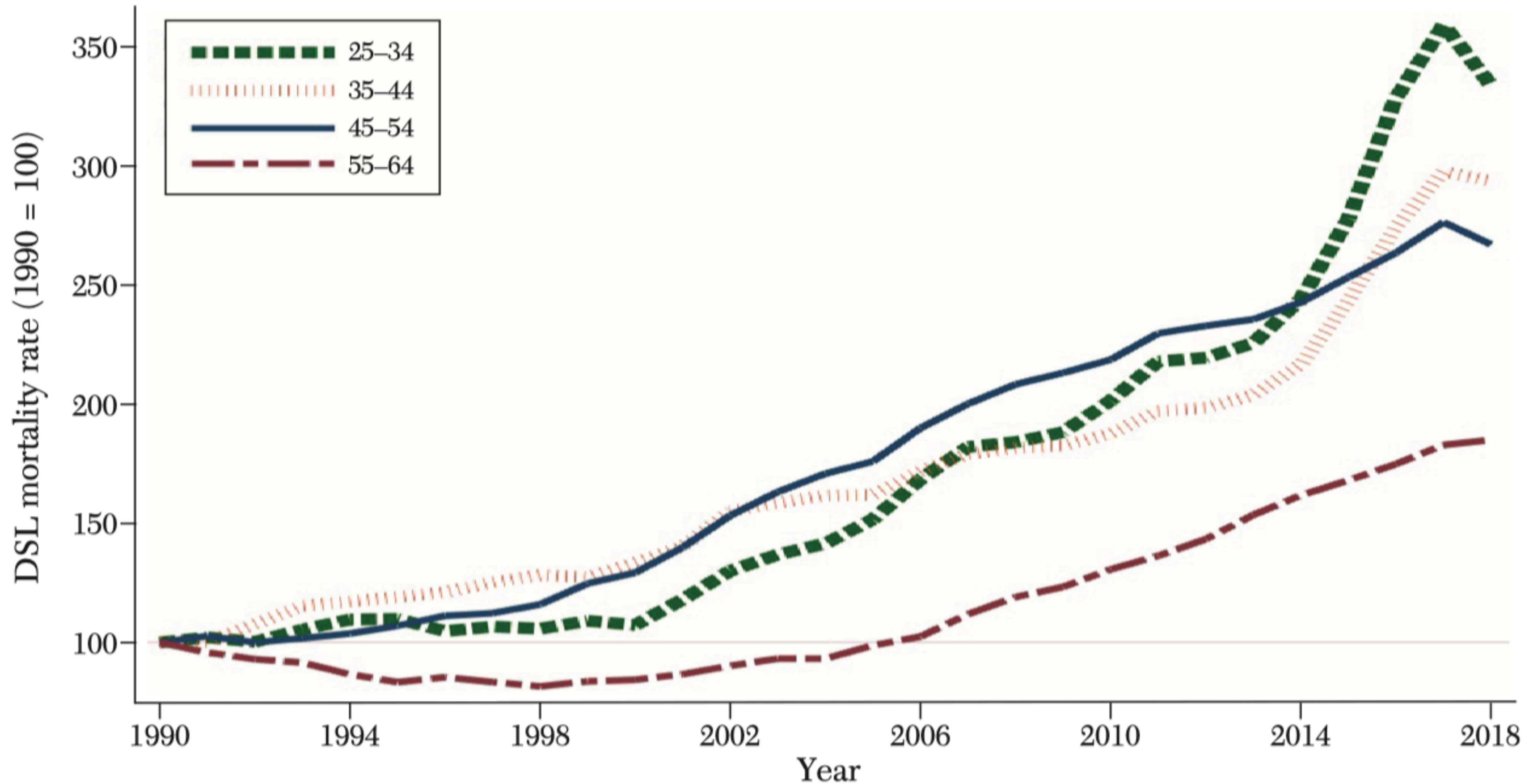
- Do drug, suicide, & liver disease deaths have the same causes?
- If so, is it despair?
- Why didn't mortality rise for blacks at the same time?
 - Black life expectancy stagnated in 1980s/1990s but increased at beginning of 21st century when NHW mortality rates increased

Unanswered Questions for DOD Hypothesis

- Do drug, suicide, & liver disease deaths have the same causes?
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- Why didn't mortality rise for blacks at the same time?
 - Black life expectancy stagnated in 1980s/1990s but increased at beginning of 21st century when NHW mortality rates increased
- Why did changes starting in the 1970s & 1980s take so long (e.g. 40 years) to affect NHW mortality?
- Can known causes of drug deaths explain most of these changes?
 - HIV & crack epidemics particularly affected blacks at end of 20th century
 - Opioid epidemic, starting in early 2000's initially particularly affected whites

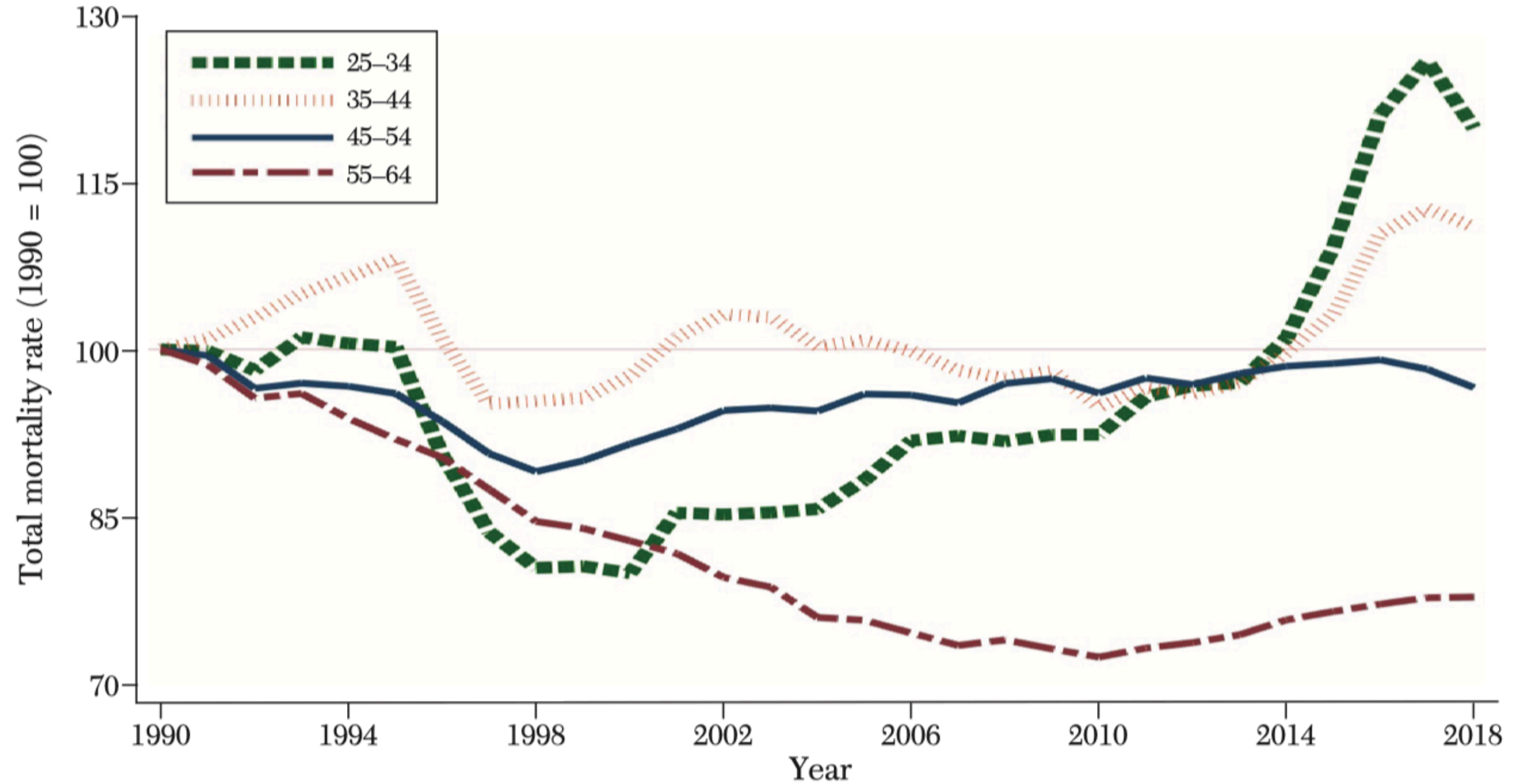
DSL Mortality Rates were flat from 1990-2000

A: DSL mortality rates



& All-Cause Mortality Rates were falling

B: Total mortality rates



Source: Ruhm CJ "Living and Dying in America"

The story is mostly about drug deaths

	All causes	Drug, suicide, and chronic liver disease (DSL) deaths				Liver	Respiratory
		All DSL	Drug, non-suicide	Drug suicide	Other suicide		
<i>Males</i>							
Mort. rate: 1999	284.8	49.0	12.4	2.2	22.7	11.7	8.6
Mort. rate: 2018	319.8	109.7	59.5	2.3	34.8	13.1	10.3
Δ: 2018 vs. 1999	34.9	60.8	47.1	0.1	12.1	1.5	1.7
% of DSL Δ			77.5%	0.1%	19.9%	2.4%	
<i>Females</i>							
Mort. rate: 1999	159.4	16.2	5.0	2.4	4.7	4.2	7.6
Mort. rate: 2018	188.9	48.5	28.6	3.0	8.7	8.3	10.4
Δ: 2018 vs. 1999	29.5	32.3	23.6	0.6	4.0	4.1	2.8
% of DSL Δ			73.0%	1.9%	12.5%	12.6%	

Source: Ruhm CJ “Living and Dying in America”

Less So for 45-54 Year Olds

	All deaths	Drug, suicide, and chronic liver disease (DSL) deaths					Respiratory
		All	Drug, non-suicide	Drug suicide	Other suicide	Liver	
<i>Males: 25–34</i>							
MR Δ : 2018 vs. 1999	60.2	66.5	55.4	0.2	9.5	1.4	0.1
% of DSL Δ			83.3%	0.3%	14.2%	2.2%	
<i>Males: 35–44</i>							
MR Δ : 2018 vs. 1999	33.4	61.3	49.0	-0.5	11.9	0.9	0.7
% of DSL Δ			80.1%	-0.8%	19.4%	1.4%	
<i>Males: 45–54</i>							
MR Δ : 2018 vs. 1999	11.2	54.6	37.0	0.5	14.9	2.1	4.2
% of DSL Δ			67.9%	0.9%	27.3%	3.8%	
<i>Females: 25–34</i>							
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% of DSL Δ			83.0%	0.0%	12.1%	4.9%	
<i>Females: 35–44</i>							
MR Δ : 2018 vs. 1999	27.2	30.7	24.2	0.5	3.5	2.5	1.1
% of DSL Δ			78.9%	1.5%	11.5%	8.1%	
<i>Females: 45–54</i>							
MR Δ : 2018 vs. 1999	30.7	36.8	22.4	1.4	4.9	8.0	6.8
% of DSL Δ			61.0%	3.7%	13.4%	21.9%	

Source: Ruhm CJ “Living and Dying in America”

Other Points to Note

- Geographic patterns of drug, suicide, & liver disease deaths differ
- No reason to think they have common causes
- Focus on non-Hispanic whites is limited
 - will address this to some degree in second part of talk
- Specific hypothesis have rarely been defined or examined

Education & Mortality

- Longstanding Interest in disparities & health
 - “Whitehall” studies in UK (Marmot, et al., 1984, 1991)
 - US (Kitagawa & Hauser, 1973)
 - Changes in group-specific mortality rates as indicators of social progress
- Case & Deaton
 - Mortality ↑ concentrated among less educated
 - Recent work draws sharp distinction between college degree holders & everyone else

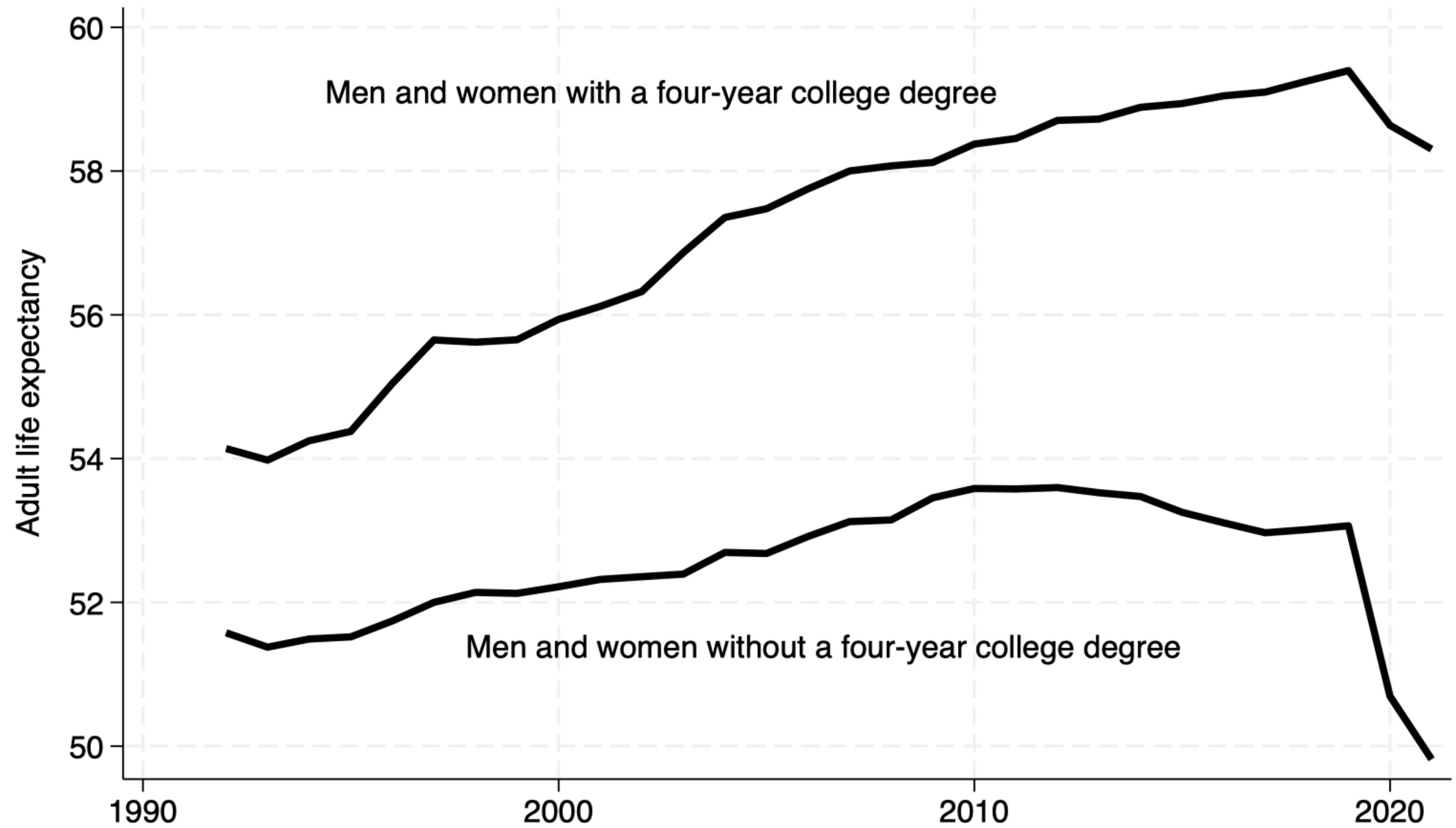


Figure 1: Adult life expectancy for Americans with and without a college degree

Source: Case A, Deaton A “Accounting for the Widening Mortality Gap between American Adults with and without a BA”, Brookings Papers on Economic Activity, 2023

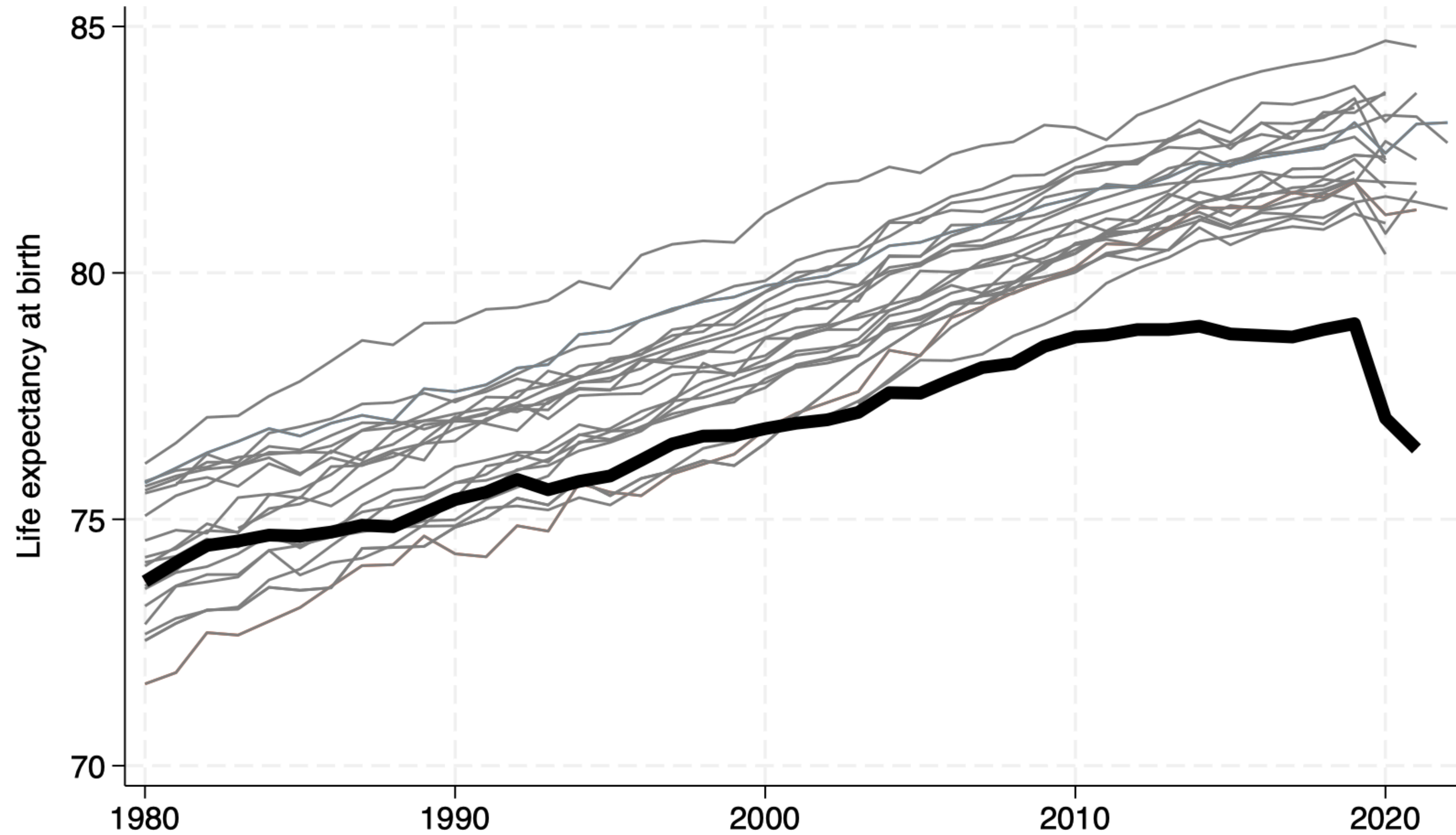
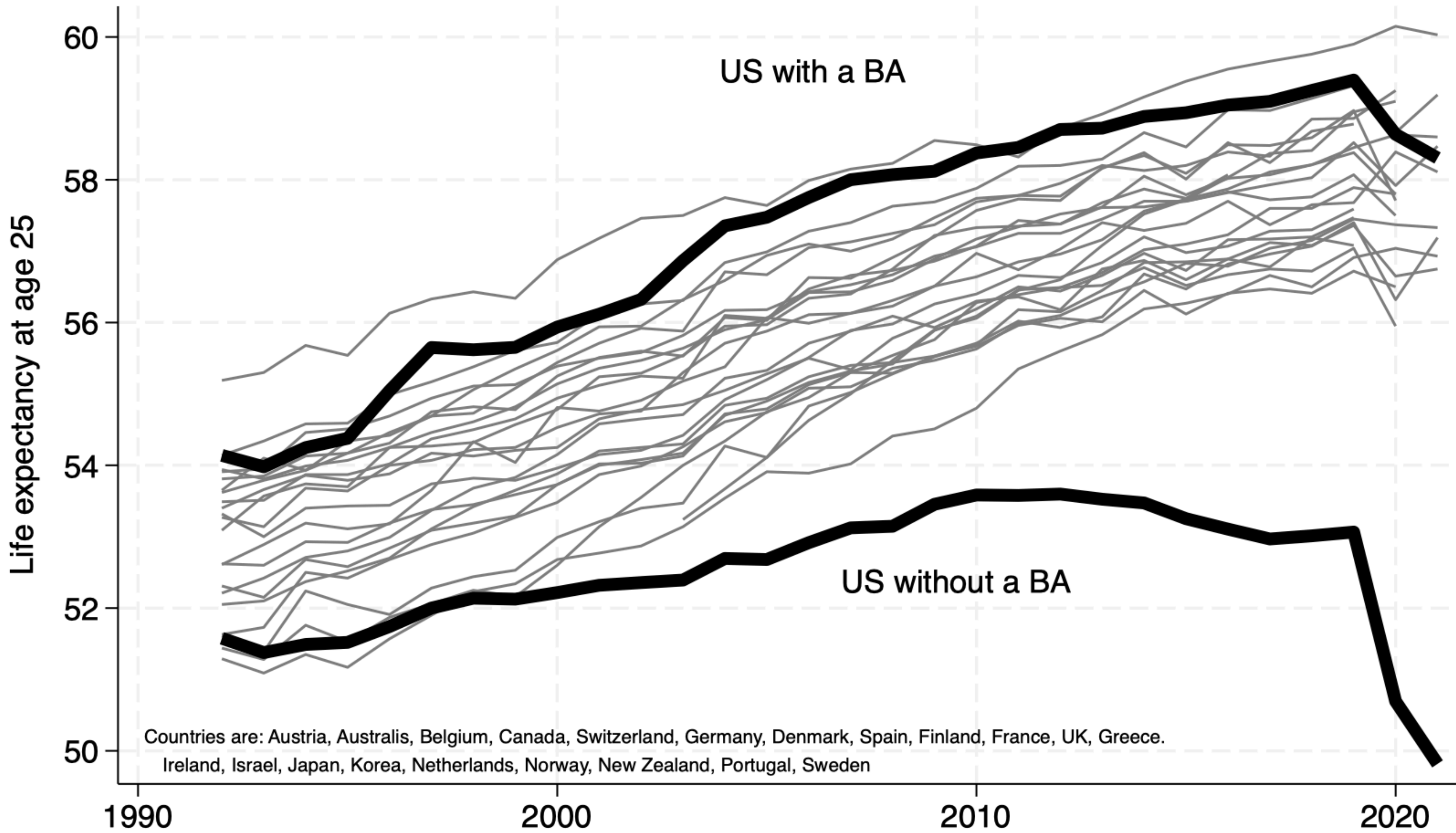


Figure 2: Life expectancy at birth for the US (in bold) and 22 rich countries

Source: Case A, Deaton A "Accounting for the Widening Mortality Gap between American Adults with and without a BA"



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Empirical Challenge

- Changes in composition of education groups
 - % with college degree. 1992 - 22%; 2021 - 35%
 - 18 % point increase for women, 10 % points for men
 - Increasing negative selection, if some people who would have not graduate college in previous cohort now do so

Empirical Challenge

- Changes in composition of education groups
 - % with college degree. 1992 - 22%; 2021 - 35%
 - 18 % point increase for women, 10 % points for men
 - Increasing negative selection, if some people who would have not graduate college in previous cohort now do so
- Examining educational attainment only appropriate if schooling effects purely causal, vs. reflecting selection
- Alternative strategy: use percentiles in education distribution
 - adjusts for selection but not pure education effects

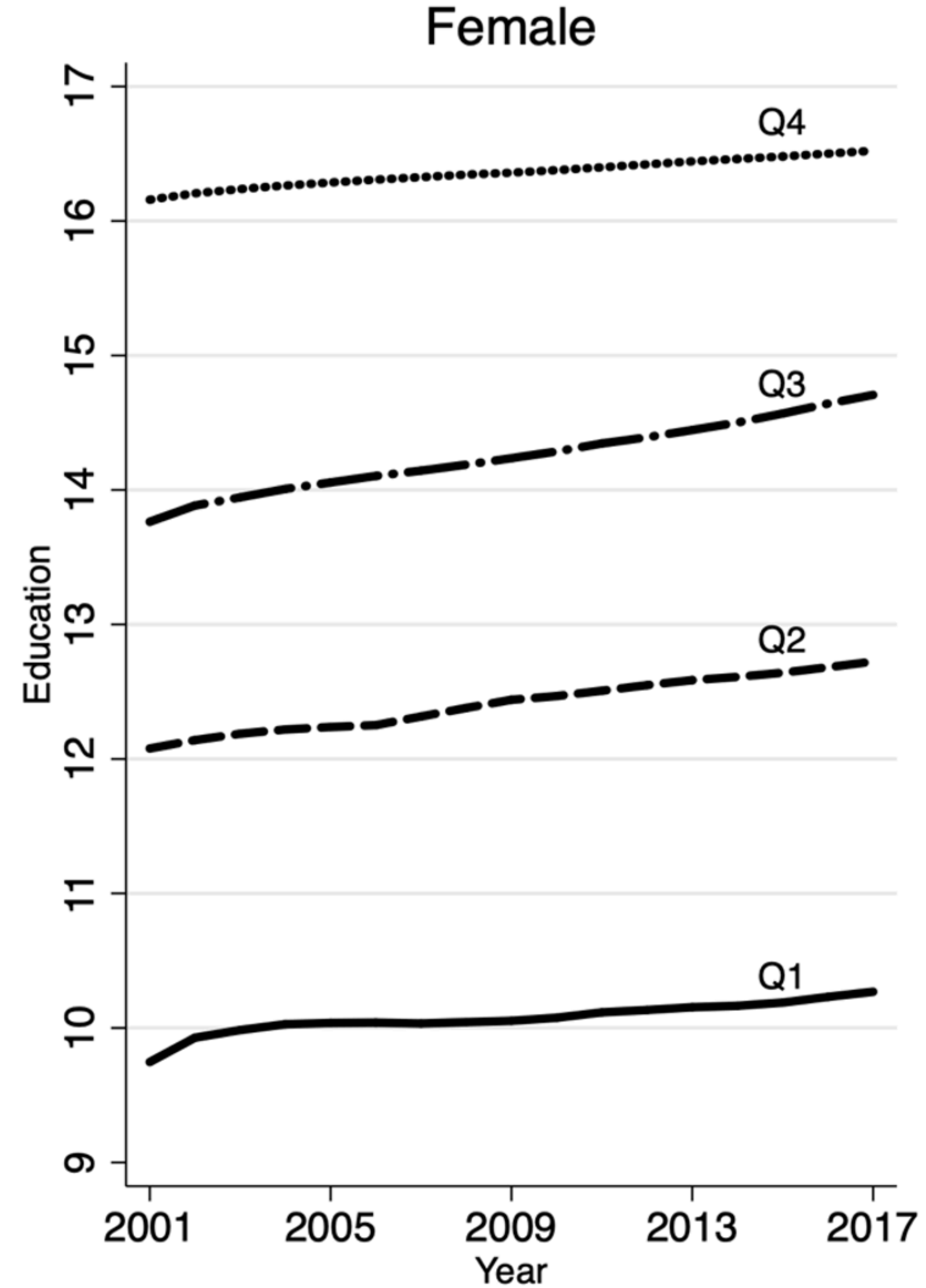
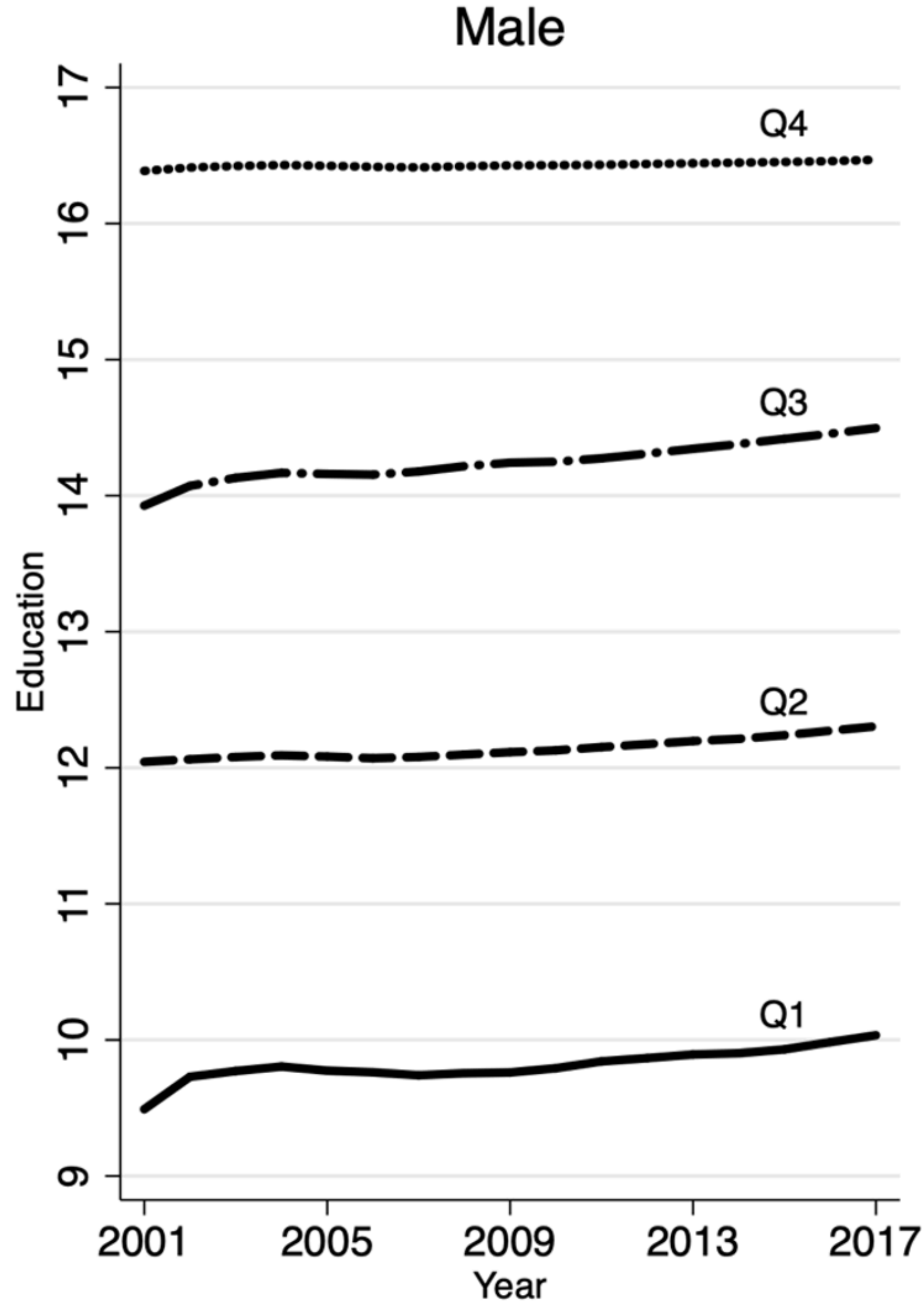
Our Research

- Estimate mortality trends by education quartile
 - sex, race/ethnicity, 5-year age groups (25-74 year olds), education quartile - 320 groups total (160 for each sex)
 - combine administrative & survey data for 2001-2018
 - lots of complications (e.g. switch from continuous years of education to categories)
 - education categories span quartiles

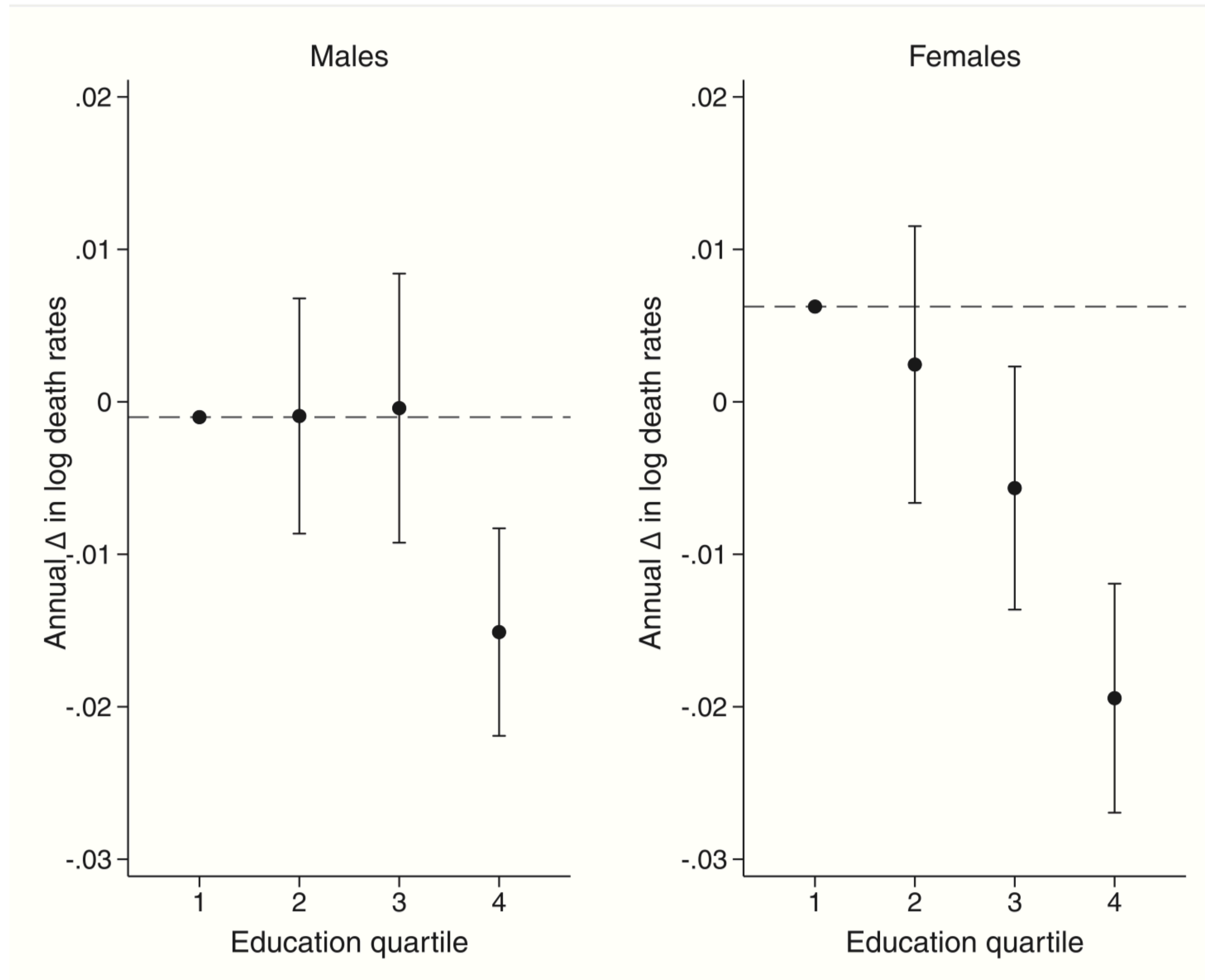
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- “Typical” Regression Model:
$$M_{arist} = \beta_{aris} + \delta_{aris} \times t + u_{arist}$$
 - a, r, i, s, t indicate age, race/ethnicity group, education quartile, sex, & year
 - β_{aris} is group-specific “fixed-effect” (controls for differences in levels)
 - δ_{aris} is group-specific trend, which is of interest here
- Non-monotonicity: Higher education quartile has worse trend than lower one

Ave. Years of Education by Quartile & Sex



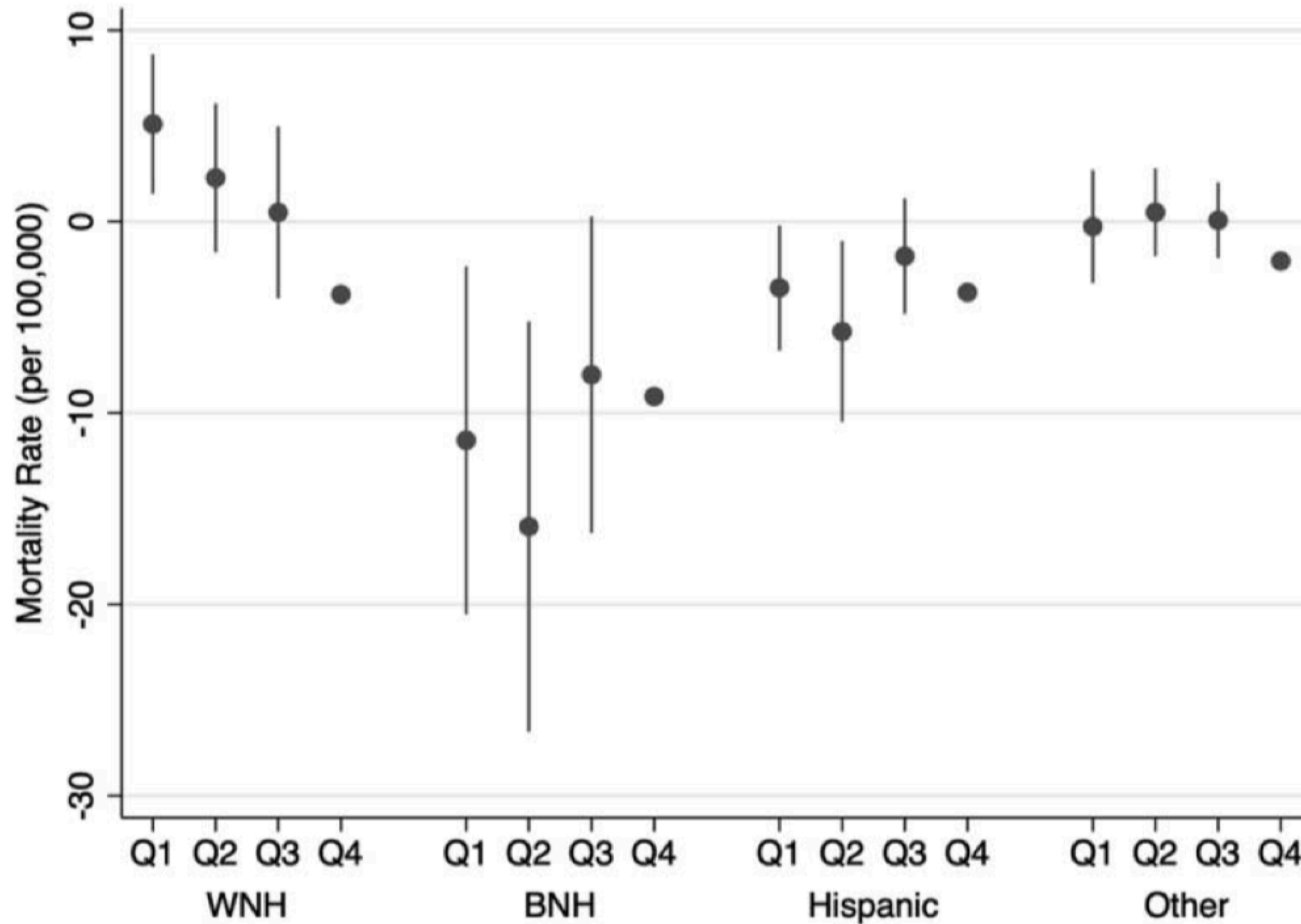
Estimates (Overall) Mortality Trend Differences by Quartile



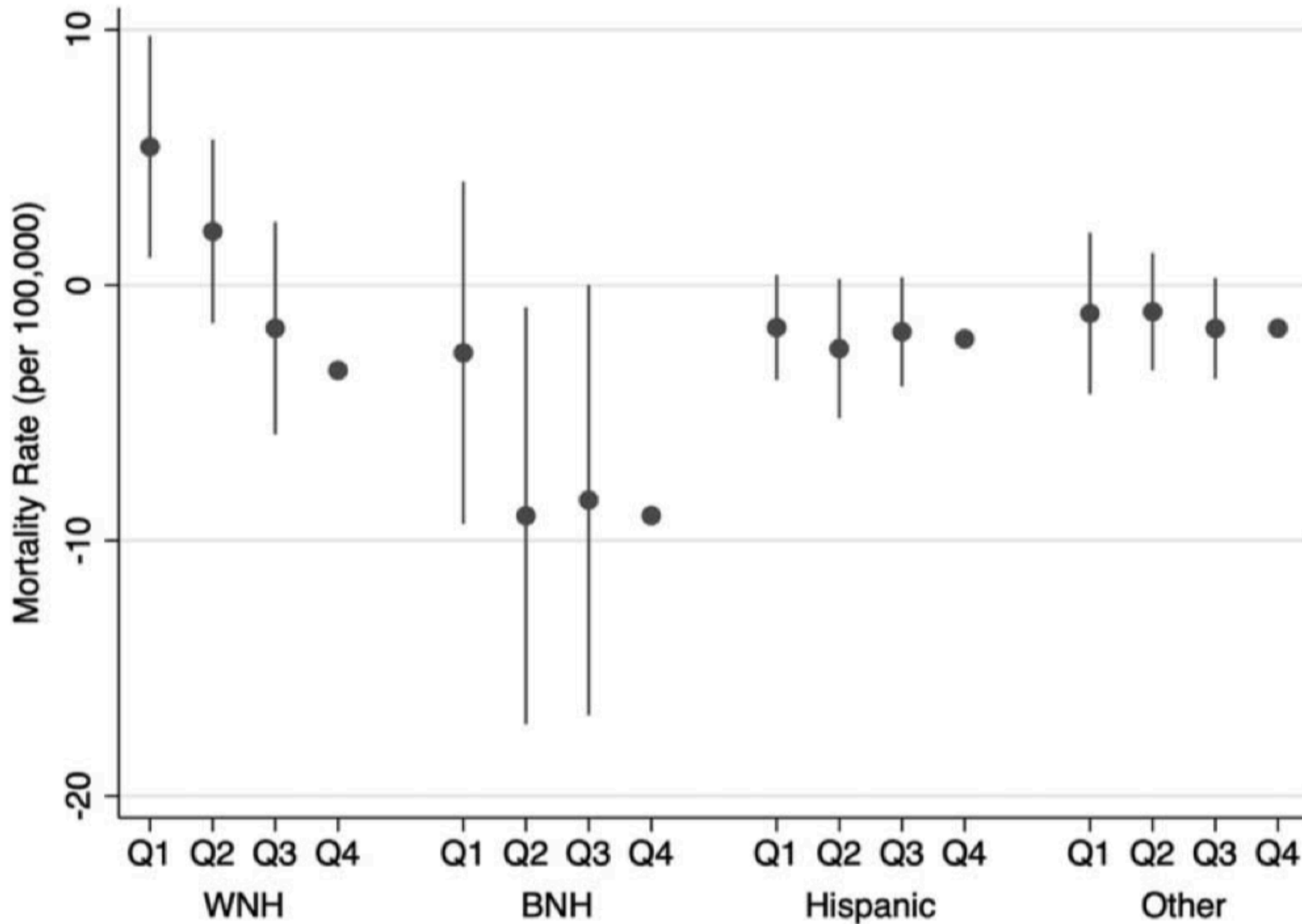
Violations of Monotonicity of Education Trends

Group	Males		Females	
	Log Death Rate	Death Rate	Log Death Rate	Death Rate
Any Violation (max = 40)	30	31	16	25
Type of Violation				
$Q_1 < Q_2$	10	7	4	4
$Q_1 < Q_3$	17	17	3	7
$Q_1 < Q_4$	0	9	1	10
$Q_2 < Q_3$	22	22	10	15
$Q_2 < Q_4$	2	16	3	17
$Q_3 < Q_4$	3	14	5	16

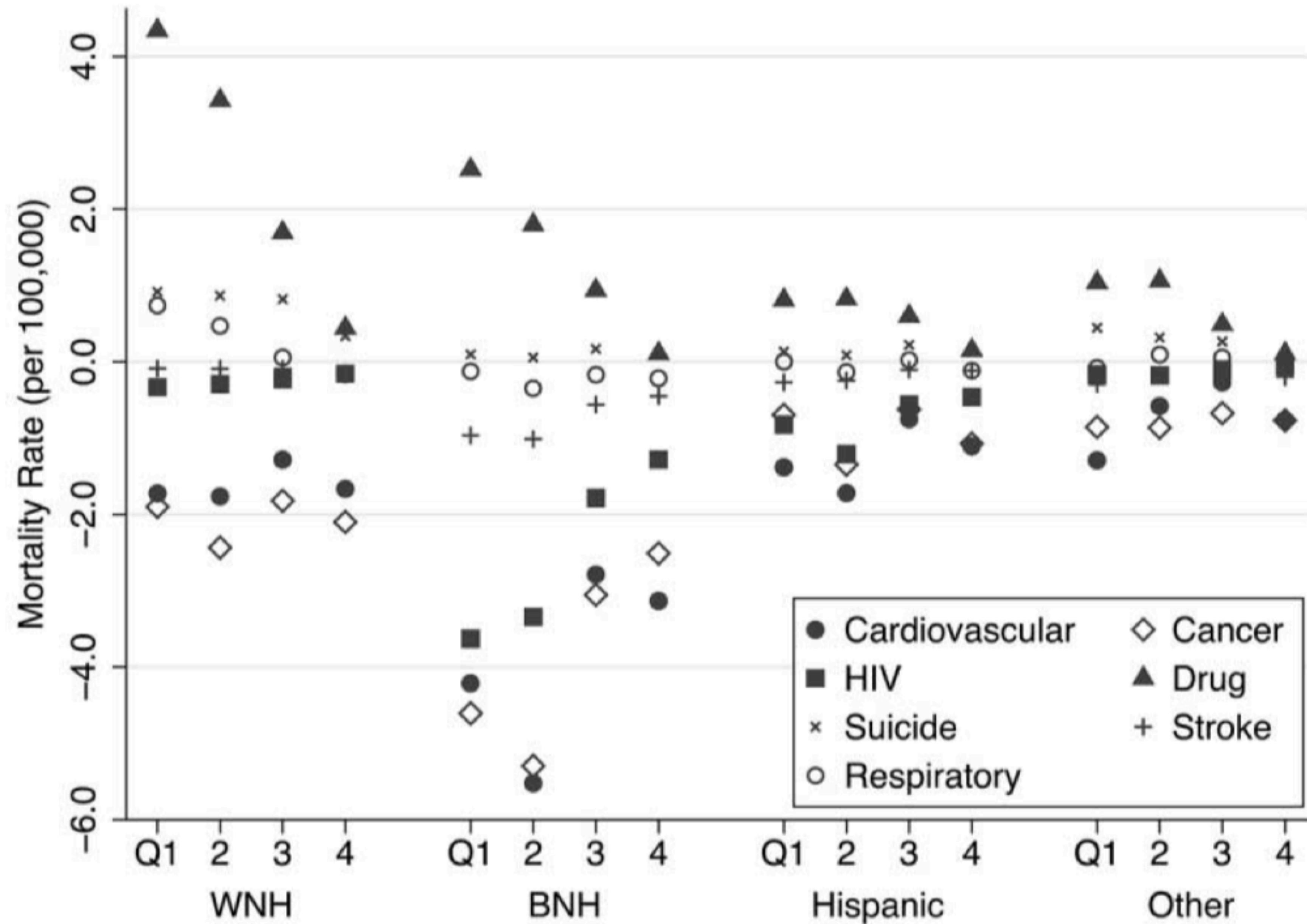
Education Quartile Trends by Race: Males



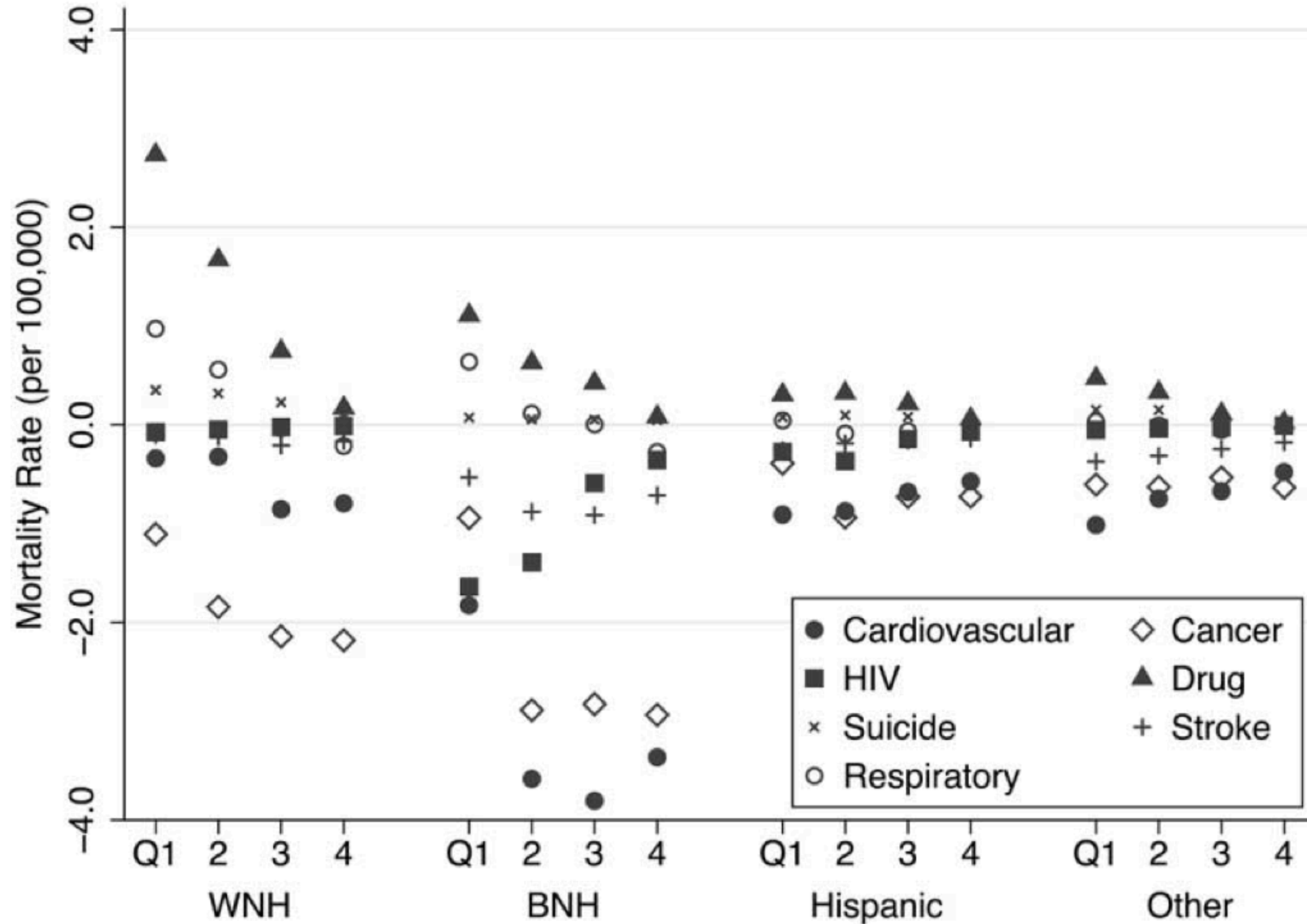
Education Quartile Trends by Race: Females



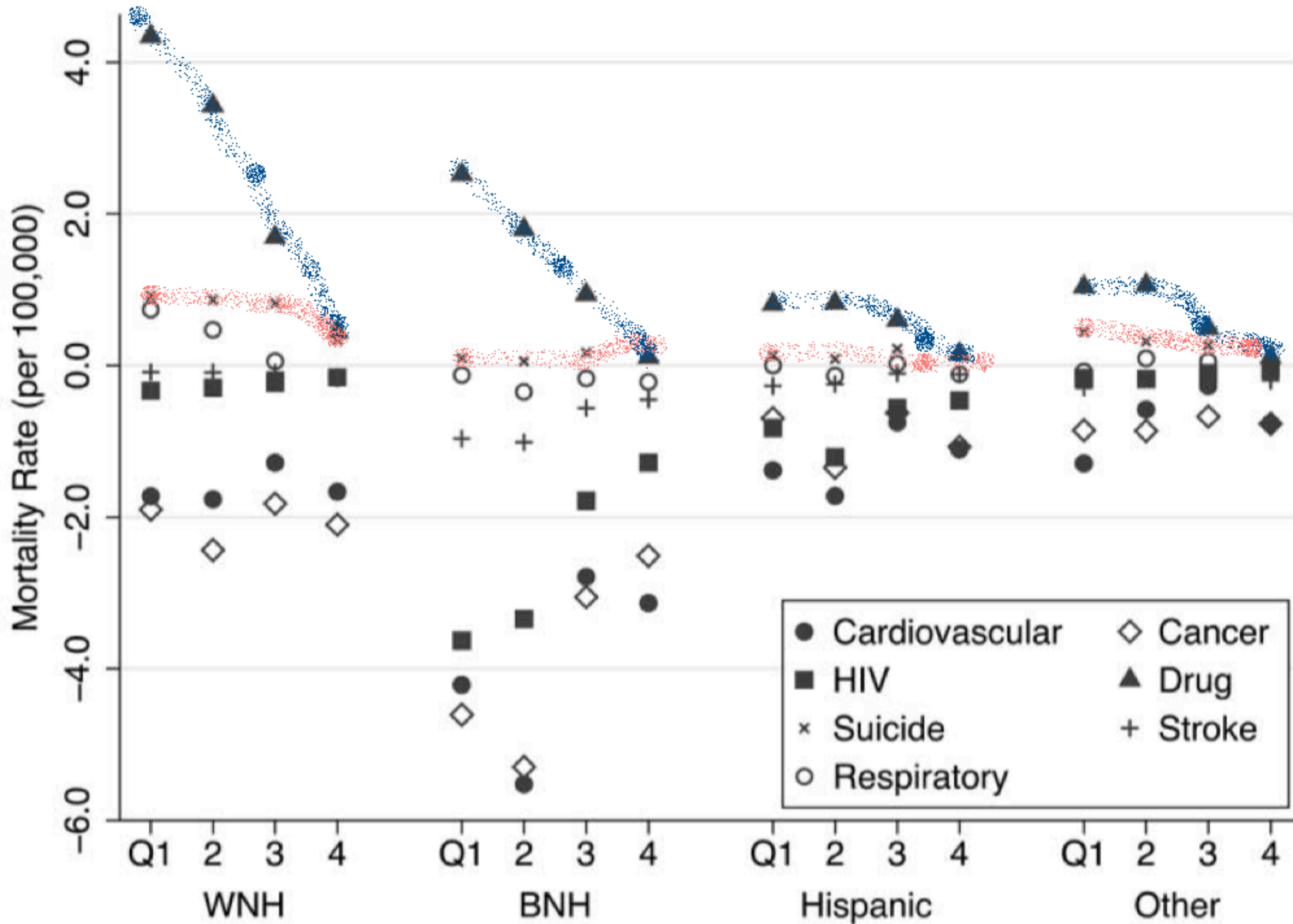
Trends by Race, Education Quartile & Major Cause: Males



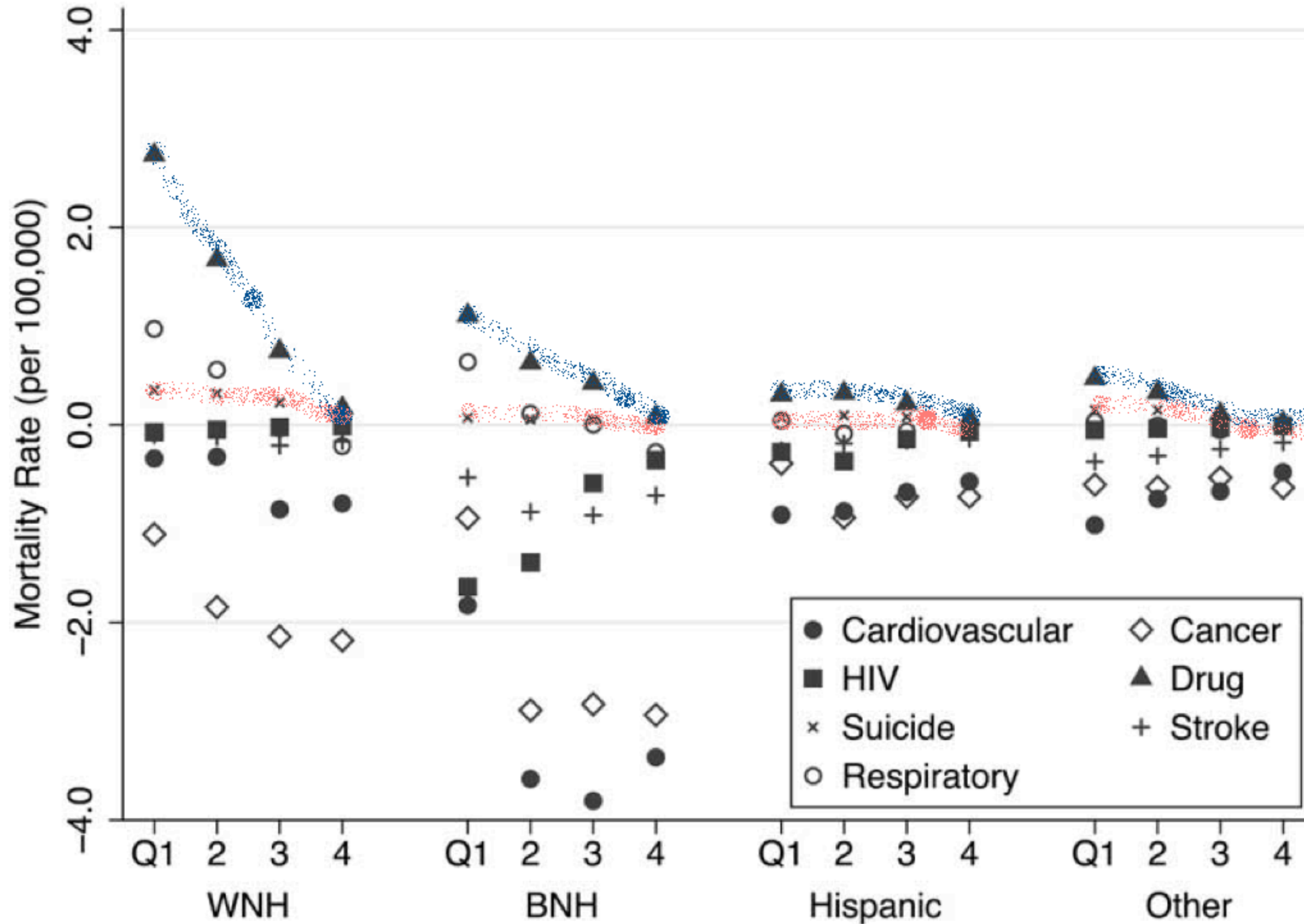
Trends by Race, Education Quartile & Major Cause: Females



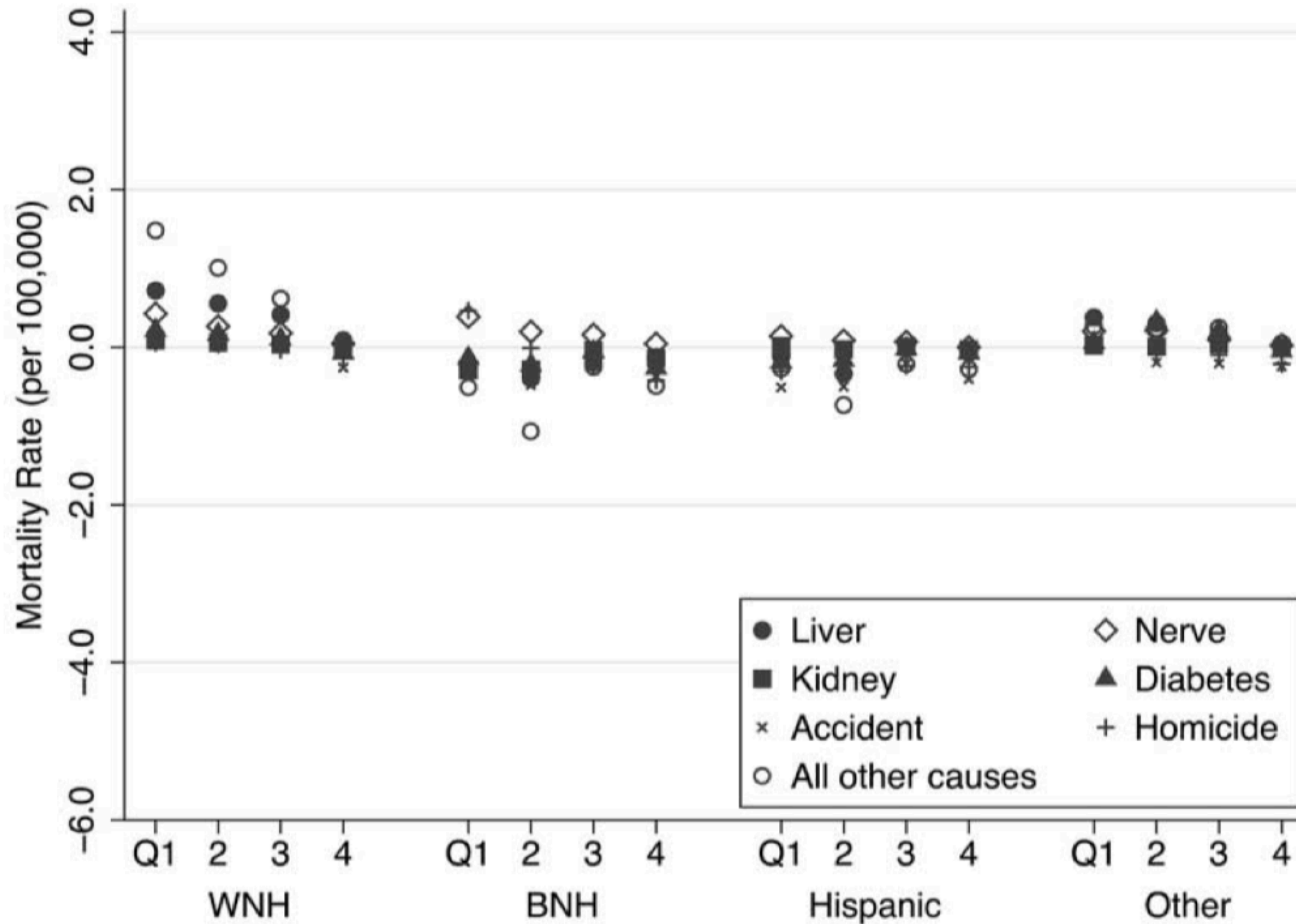
Drug vs. Suicide Mortality: Males



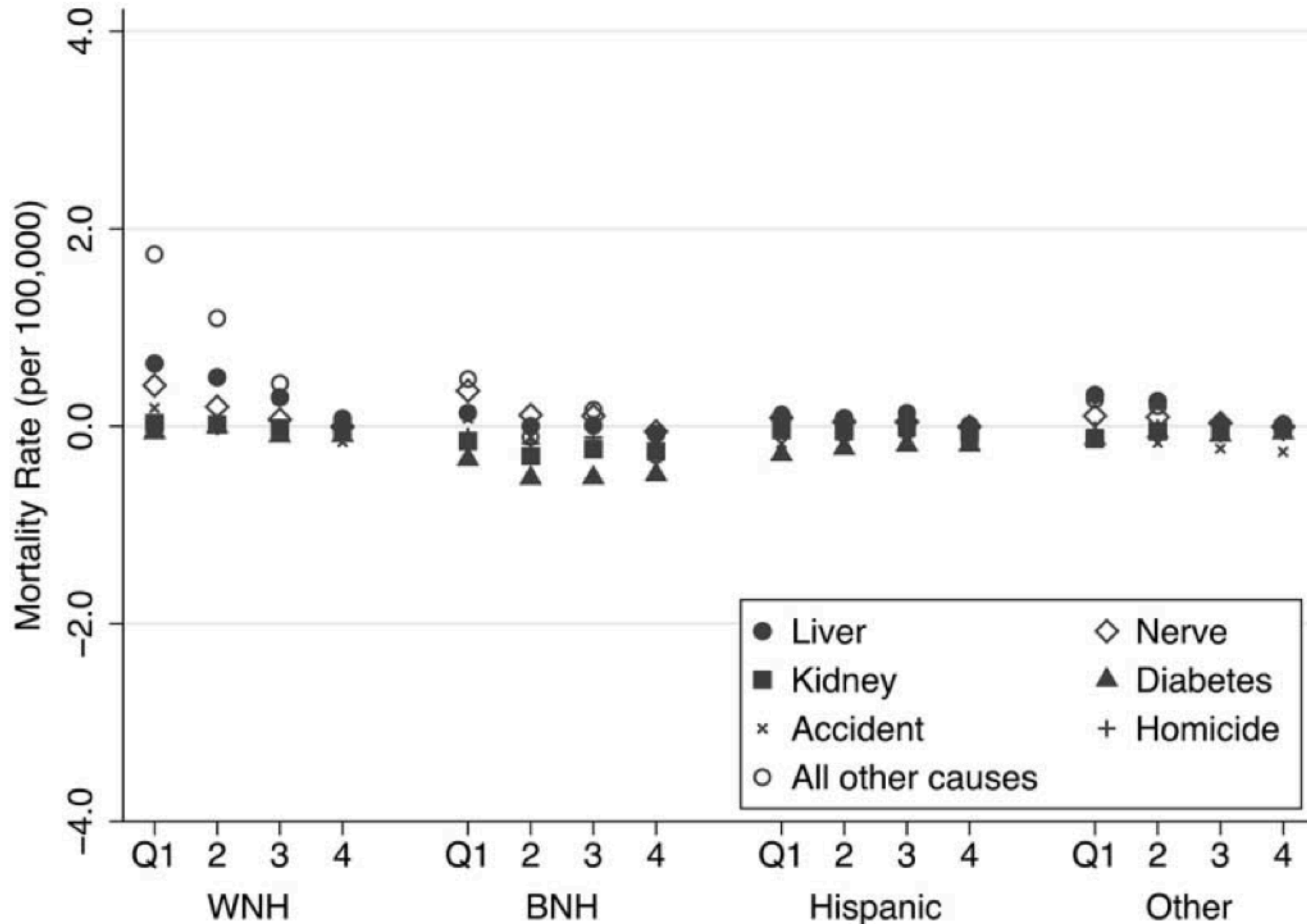
Drug vs. Suicide Mortality: Females



Trends for Minor Causes: Males



Trends for Minor Causes: Females



Discussion

- “Deaths of Despair” conceals more than it reveals
 - drug deaths by far most important
 - as is understanding cardiovascular, cancer deaths etc.

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- “Deaths of Despair” conceals more than it reveals
 - drug deaths by far most important
 - as is understanding cardiovascular, cancer deaths etc.
- Education trends are complicated
 - BA vs. less-educated not adequate distinction, particularly for females
 - Selection is an issue
- Results vary by cause of death
 - Less educated whites had largest increases in drug mortality (through 2018)
 - Substantial progress for less educated blacks reducing deaths from HIV &, for males, those from cancer & CVD

Thank You!

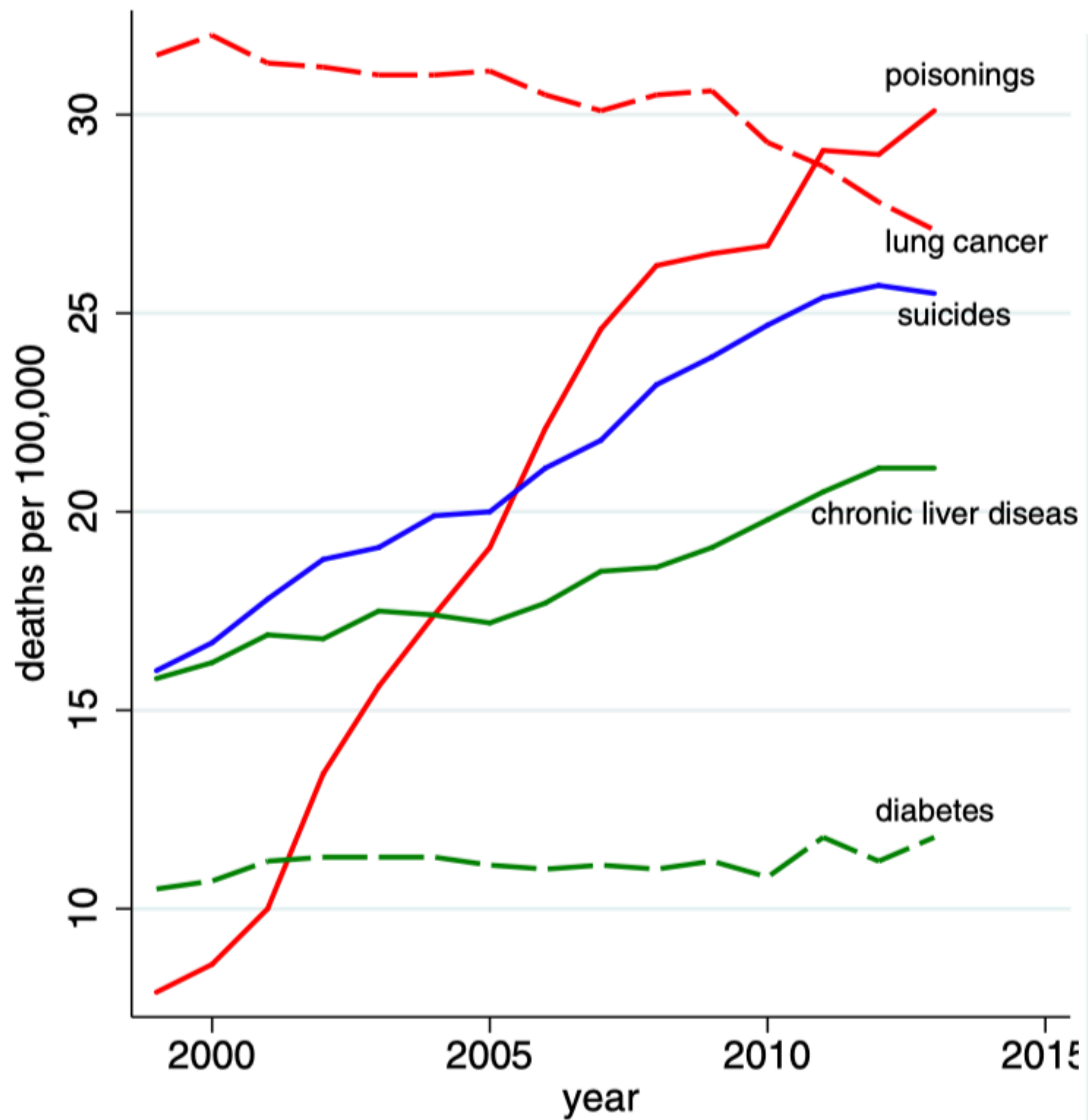


Fig. 2. Mortality by cause, white non-Hispanics ages 45–54.

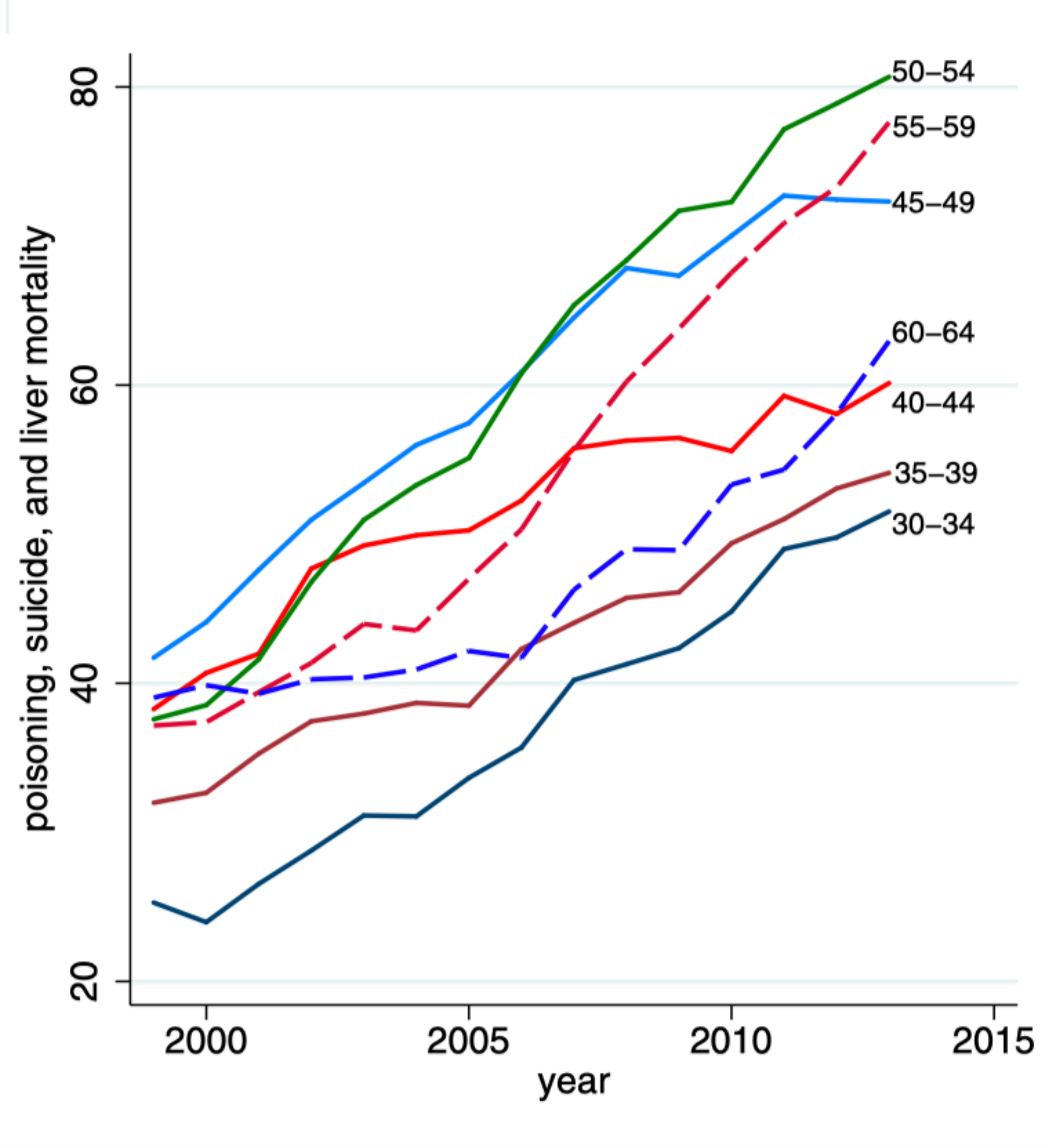


Fig. 4. Mortality by poisoning, suicide, chronic liver disease, and cirrhosis, white non-Hispanics by 5-y age group.

Source: Case A, Deaton A “Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century”, PNAS, 112(49), 2015

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