

The Signature of a Mid-century Cohort Malaise

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The high and rising rates of adult mortality in the United States relative to peer nations is now widely recognized as one of the most serious public health concerns facing the country. Researchers from multiple disciplines have posited many theories in efforts to explain the problem, yet a consensus explanation remains elusive. We depict the unprecedented stagnation in adult mortality as a “cohort malaise.” We first show that progress in adult mortality stops abruptly with Americans born in the summer of 1947, with no such trend break in other countries. We then look for differential severity by race, sex, and geography within the United States. What we find instead is remarkable pervasiveness, with the cohort break in mortality appearing across all of these demographics. Our conclusion is that successful theories of the malaise, now responsible for over a million excess deaths relative to trend, will demonstrate a distinctive “signature”: sudden cohort-by-cohort changes in the United States around the summer of 1947 that span race, sex, and geography.

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The divergence in life expectancy of the United States from its international peers is one of the most consequential epidemiological and economic facts of the century (Cutler, 2017). Most troubling appears to be high and rising rates of working-age mortality (National Academies, 2021). The number of deaths associated with the country’s exceptionally poor trend in adult mortality since 2000 now exceeds the number of deaths from the Covid-19 pandemic, and the economic valuation for lives lost from the departure from trend is now measured in the trillions of dollars.¹ The social importance of understanding the stagnation in adult mortality matters not just for those Americans currently affected and dying younger, but also for public health generally if causes of the problem can be understood and preventative action taken.

Researchers from across disciplines have studied a wide array of factors contributing to the recent stagnation in mortality. Researchers have considered the role, for example, of short-term economic downturns as well as long-term deteriorations in regional labor markets, such as those driven by the decline in manufacturing jobs (e.g., Pierce & Schott, 2020). They have also reviewed, for instance, the educational divide in healthcare access, job opportunities, and marriage prospects (e.g., Case & Deaton, 2020; Case & Deaton, 2023). Others have examined the role of state policy domains, including policies on tobacco, environment, tax, and labor (e.g., Montez et al., 2020). Others still have studied health behaviors, such as

¹ Authors’ calculation using government estimates of VSL, extrapolations of mortality trends from the 1990s forward, and estimates of Covid-19 excess deaths from the literature (Kearsley, 2025; Paglino et al., 2024; Preston & Vierboom, 2021).

cigarette smoking, alcohol consumption, obesity, and drug use, most notably the opioid epidemic (e.g., Maclean et al., 2020; Preston et al., 2018; Preston et al., 2024). Indeed, there is substantial debate as to what is driving the United States’ status as an outlier, but, as excess deaths continue to climb, a consensus remains out of reach (National Academies, 2021).

We present a set of key empirical facts that we believe will lead to a better understanding of the unprecedented stagnation in adult mortality. We recast the stagnation in mortality through the lens of a cohort perspective and reveal a “cohort malaise.” That is, we ask not how mortality has changed year over year, but how mortality has stagnated with successive birth cohorts, and we reveal a clear break: Decades of progress in adult mortality end not gradually, as they do over time, but abruptly with Americans born in the middle of the 20th Century.

We first define the “signature” of the cohort malaise as consisting of three characteristics: timing, uniqueness, and pervasiveness. The timing refers to when the break from cohort trend in adult mortality sets in, which is suddenly with people born in the middle of 1947. The uniqueness refers to an international comparison, where the trend break for successive US birth cohorts is a clear outlier compared to other rich countries. The pervasiveness refers to the near ubiquity of this cohort malaise within the United States, with abrupt cohort-by-cohort changes in mortality arising across race, sex, and geography. Our thesis is that theories and explanations of the recent stagnation in US mortality should demonstrate the signature of the cohort malaise: Explanations should manifest sharply by birth cohort, set the United States apart from other rich countries, and pervade race, sex, and geography.

We then provide support that a cohort narrative is an important component of what has transpired in recent years.² Although high and rising mortality rates have been ascribed to working-age Americans, we illustrate that the malaise persists into elderly ages in a fashion consistent with a cohort explanation. When we plot age-specific mortality rates, the malaise appears to set in systematically with cohorts born in 1947, suggesting that the poor trends may not be confined to midlife and may continue as these cohorts continue to age. We also consider whether the cohort trend break is persistent through later cohorts. We conclude that, at least at older ages, the signature mortality break is not merely short-term, but that does not necessarily mean that it is permanent.

With these empirical facts established, we lastly discuss and evaluate certain leading explanations through the lens of our findings, such as the baby boom, opioid epidemic, manufacturing decline, and the growing educational divide in mortality. We distinguish theories that center around advantages and disadvantages accumulated over the course of life as opposed to theories focused on contemporaneous shocks or proximate causes of death. We conclude by outlining a possible candidate origin of the cohort malaise that is consistent with the signature.

² Cutler (2017) and Lleras-Muney (2017) as well as Case & Deaton (2017) flagged and reviewed the possibility that cohort phenomena could drive the adverse mortality trends brought to light by Case & Deaton (2015). Reynolds (2025a, 2025b) reopen and develop the case for cohort phenomena to explain declining health, education, and labor market outcomes. This paper, however, neither assumes nor requires knowledge of the past literature on these cohort dynamics; rather, it establishes independently a set of key empirical facts that we believe will direct future research further down the path of select cohorts.

2 Data

Central to our analysis, within the confines of a Federal Statistical Research Data Center, we link person-level data from the 2000 Decennial Census to administrative death records collected by the Social Security Administration. The Decennial Census is the constitutionally mandated enumeration of all Americans every ten years, and the Social Security Administration death records (colloquially, “Numident”) that we link to this Census data are also complete in the years and ages that we study (Finlay & Genadek, 2021). The resulting linked dataset contains person-level survey records and mortality data for well over 200 million Americans.³ The administrative death records we examine are all-cause records (i.e., do not contain cause of death) but remain well-suited to our analysis given the widespread nature of the mortality stagnation (Meara & Skinner, 2015; Mehta et al., 2020).⁴ While linked-survey estimates of mortality rates are generally lower than other estimates, we do not believe this poses a problem for our analysis, as we focus on breaks in trends rather than levels of mortality (Brown et al., 2018; Keyes et al., 2018).

The result of our linkage is a comprehensive single-source mortality file. The single-source nature of the file allows us to reliably estimate mortality rates by granular groupings of the data without the need to find comparable denominators.⁵ Additionally, for a one-sixth sample of those enumerated in the 2000 Decennial Census, we have richer person-level detail (such as educational attainment) than the basic demographic variables observed in our primary linkage.⁶

In addition to providing single-source advantages and rich detail, the breadth of our dataset allows us to examine the timing and pervasiveness of adverse mortality trends in a manner that is challenging to measure with only publicly available data. We highlight two examples. First, we will leverage fine resolution on date of birth (and death) to better understand when the cohort malaise took hold. Specifically, we will begin by plotting adult mortality rates granularly by month of birth.⁷ Second, we will leverage the county of birth of the individuals in our data (from Numident) as we explore the pervasiveness of the malaise. Other sources of mortality data provide only county of residence, which frequently differs from county of birth for American adults. We study specific birth cohorts, and the malaise could theoretically emerge at any age, even at the beginning of life. Place of birth, unlike residence in adulthood, is fixed over the life course and may better capture a broader set of exposures occurring during the first portion of life. Observing place of birth also allows us to determine mortality rates for both the US-born and foreign-

³ The linkage rate between the 2000 Decennial Census and the administrative death records is close to 90 percent. We do not mean that 90 percent of deaths were found in the Census. The restricted-access version of Numident includes the living.

⁴ Notably, we utilize death records with cause of death when we examine the opioids epidemic, as described below.

⁵ See Sasson (2017) for a discussion of the difficulty in estimating mortality trends from dual-sourced data or from smaller publicly available linked-survey data.

⁶ Specifically, we link the Census “long-form” to mortality data in order to obtain richer detail. We refer readers to Arenberg & Stripling (2025) for greater exposition into the usage of these data.

⁷ Public vital registries provide data by year of birth, and publicly available mortality-linked survey instruments have sample sizes too small to effectively leverage month of birth data when collected.

born populations. To avoid conflating compositional changes from immigration, we restrict attention to mortality for the US-born population.⁸ We will, however, compare mortality for the U.S.-born and foreign-born populations at the end of our inquiry.

Our main outcome is mortality from age 61 through age 65, which we call “near-elderly” mortality or sometimes refer to as “adult mortality.” While ostensibly arbitrary, we choose this range for several reasons. First, we want to illustrate an important point about the stagnation in mortality in the United States. It was long described as an issue in midlife (often ages 45 through 54) or at typical working ages (ages 25 through 64) (National Academies, 2021). We will show that even mortality at elderly is breaking sharply from its cohort trend. We focus on ages 61 through 65, secondly, as a balance between precision in estimating mortality rates (wider age bucket) and the ability to plot the mortality rate of more cohorts (narrower age bucket). Because our data is derived from the 2000 Decennial Census, we necessarily condition on survival to 2000. As a consequence, we plot near-elderly mortality for cohorts ranging from 1940 to 1953, approximately seven years on either side of a sharp break from cohort trend in mortality.⁹ We will, however, consider wider age ranges and cohort windows (and other countries) using publicly available data from the Human Mortality Database to give better context for the cohort patterns on which we focus. We will also use the publicly available Multiple Cause of Death file from the NVSS when we examine cause of death, namely deaths associated with the opioid epidemic.

3 The Signature

We first present a set of key empirical facts that we believe will lead to a better understanding of the unprecedented stagnation in U.S. adult mortality. Throughout this paper, we present evidence from a cohort perspective to illustrate the cohort malaise. That is, we plot how mortality changes with successive birth cohorts, rather than changes year over year. The figures reveal a clear pattern and break from sustained progress that are characterized by the timing, uniqueness, and pervasiveness of the trend break. We refer to this distinctive break as the signature of the cohort malaise.

3.1 Timing

Figure 1 shows the sudden onset of the cohort malaise in the middle of the 20th Century. Figure 1 plots near-elderly mortality rates (ages 61 through 65) by month of birth for Americans born from January 1940 to December 1953. The figure shows that adult mortality rates declined steadily for individuals born from 1940 to 1946. In 1947, however, the downward trend in mortality breaks—sharply. Cohorts born after the summer of 1947 even experience higher mortality than their predecessors.

— *Figure 1 here.* —

The timing of the cohort break in adult mortality, however, is made clearer in Appendix Figure 1 and accompanying text, where we “de-season” and further “de-trend” mortality rates by month of birth.

⁸ See Goldin & Katz (2008) for an example of these considerations in the context of educational attainment.

⁹ When we use these data, we exclude deaths from 2020 onward to avoid the period impacted by the pandemic.

Collectively, these results point to a sharp break in mortality for cohorts born around August 1947. The implication is that cohorts born after August 1947 experience worse mortality relative to previous trends, a cohort malaise.¹⁰ We will show more cohorts and ages in later analyses.

3.2 Uniqueness

The sharp break from trend experienced by these cohorts does not appear in other countries. Figure 2 plots mortality rates by year of birth for the United States compared to a collection of other rich countries. The figure shows probability of death for near-elderly individuals by year of birth for individuals born from 1940 to 1953. While other countries experience substantial declines in mortality throughout these birth cohorts, the United States is a clear exception, with a sharp break in mortality for cohorts born around 1947.¹¹ The uniqueness of the sharp break in American mortality is even more shocking when compared to the continued downward trajectory experienced by other rich countries. These countries were already at lower levels of mortality, which runs contrary to the belief that mortality in the United States had reached some irreducible minimum.

— *Figure 2 here.* —

The uniqueness of the cohort malaise is still apparent when we examine mortality at working ages, a period of life on which the literature has, to date, focused (National Academies, 2021). Appendix Figure 3 replicates Figure 2 but for working ages (ages 25 through 60) rather than near-elderly ages (ages 61 through 65). The United States is again a clear outlier, with a sudden departure from trend for cohorts born around 1947.

3.3 Pervasiveness

While we do not find the sudden cohort trend break outside of the United States, we find that it is pervasive within the United States. We see the cohort trend break across race and ethnicity, in all areas of the country, and for both sexes.

Figure 3 plots near-elderly mortality rates by year of birth for both Black and White Americans (non-Hispanic). The sharp break from trend for cohorts born around 1947 occurs for both races. The trend breaks remain true despite them having very different levels of mortality, again casting doubt that mortality in the United States had reached some irreducible minimum. In Appendix Figure 4, we repeat the analysis but for three other standard categorizations of race and ethnicity codes. Namely, we show mortality rates by year of birth for Hispanic, Asian or Pacific Islander, and American Indian or Alaska Native. Although to different degrees, each group breaks from trend around the 1947 cohort.

¹⁰ Appendix Figure 2 presents the same data aggregated to year of birth rather than month of birth. In subsequent sections, we show mortality rates by year of birth due to limitations on the number of estimates that can be released under Census disclosure rules.

¹¹ Notably, Anglo countries (Canada, UK, and Australia) also experience a break from trend, albeit less pronounced. See Arenberg et. al (2025a) for a more devoted treatment to the conclusions we can draw from an international comparison, including whether there may be a common origin.

— *Figure 3 here.* —

Figure 4 plots mortality rates by the nine geographic Census Divisions. The trend break for cohorts born around 1947 is widespread. Each of the nine Census Divisions shows a break from trend, albeit to different degrees. The pervasiveness of the trend break persists even when we observe mortality at the state level. As shown in Appendix Figure 5, in addition to the vast majority of the contiguous 48 states, even Hawaii and Puerto Rico display clear trend breaks.

— *Figure 4 here.* —

However, Census Divisions and states may miss important sub-state heterogeneity. In particular, rural and urban places may differ within states. Accordingly, in Figure 5, we partition the United States into rural and urban categories based on the fraction of homes considered farms at the county level in the 1940 Decennial Census. Figure 5 shows that the trend break applies to individuals born in both rural and urban counties.

— *Figure 5 here.* —

Figure 6 plots mortality rates by sex. Both men and women exhibit the break from trend for cohorts born around 1947. As shown in the figure, the mortality rates actually increase for men born after 1947 compared to their predecessors, while the mortality rates for women born after 1947 level off.

— *Figure 6 here.* —

Collectively, the results presented in this section reveal a stark reversal of progress for cohorts born around 1947. We refer to this distinctive break as the signature of the cohort malaise, characterized by its timing, uniqueness, and pervasiveness. It manifests suddenly with respect to birth cohort, with cohorts born around August 1947 as a clear demarcation. It is unique in suddenness and severity to the United States. It is nearly ubiquitous across race and ethnicity, geography, and sex. Therefore, we believe successful theories of stagnating mortality in the 21st Century should demonstrate this set of empirical facts.

4 The Cohort Perspective

We do not argue that exceptionally poor mortality rates are driven exclusively by cohort effects. To the contrary, there are clearly important period shocks driving mortality upward in the 21st Century, such as the opioid epidemic (Currie & Schwant, 2021; Cutler & Glaeser, 2021). However, in this section we present evidence suggesting that a cohort effect is a substantial component of the 21st-Century mortality stagnation. Specifically, we examine whether it is genuine and of considerable magnitude before asking whether it is persistent with respect to age and cohort.

4.1 Authenticity

We first present descriptive evidence pointing towards a genuine cohort effect. A consensus study report

by the National Academies of Science, Engineering, and Medicine on high and rising mortality rates in the United States says the “best” descriptive evidence is “nonparallelism”:

As highlighted by Kupper and colleagues (1985), evidence for cohort effects in descriptive mortality plots is best detected via “nonparallelism” in the age-specific mortality curves. To find evidence for such “non-parallelism,” researchers plot age-specific mortality rates (M_x) across time periods. If the period-based trends in M_x appear to parallel each other, the trends most likely reflect period-based sources of change. Conversely, if the period-based trends in the age-specific death rates appear to be nonparallel, the age-based variation in the period-based trends may reflect cohort-based sources of change. (p. 207, National Academies, 2021)

Figure 7 shows exactly that. It plots age-specific mortality rates by year. For age 59, the youngest age we can plot given our previously used window of observation, you see a break in 2006, which is when the cohort born in 1947 turned 59.¹² Subsequently, at age 60, you see a break one year later in 2007, which is when the cohort born in 1947 turned 60. This pattern continues through age 67, the oldest age we can measure before Covid impacts our birth window. That is, as we ascend from age 59 to age 67, the year in which age-specific mortality breaks is incrementing by one. This pattern is “nonparallelism,” suggesting cohort-based sources of change in mortality.

— Figure 7 here. —

We show this more directly in Appendix Figure 6, where we put cohort back on the horizontal axis. We see each age-specific mortality curve is breaking with the same birth cohort, the cohort of 1947. Indeed, this cohort malaise is seen even at age 67, far beyond what is typically deemed midlife. It appears these cohorts are carrying some ailment with them (or feeling the cessation of some benefit) as they age, and whatever is causing the trend break does not appear to be time or age specific.

Indeed, Reynolds (2025a, 2025b) additionally shows that outcomes that precede (and predict) mortality, such educational attainment and labor market outcomes, also break trend for cohorts born in the middle of the 20th Century. That work also provides a formal treatment of age-period-cohort distinctions. The results of which support our findings of a genuine and important cohort explanation and, additionally, provide support that the cohort effects manifest at earlier ages of life.

4.2 Magnitude

To illustrate the magnitude of the established cohort effect, we briefly return to a period perspective. Figure 8 plots age-specific mortality rates from age 55 through age 75 between 1960 and 2019.¹³ The vertical axis presents mortality on a log scale in order to better display a wider range of ages and the larger number of series. This figure provides a before-and-after comparison, where the division between before

¹² Recall that our linkage is based on the 2000 Decennial Census, which necessarily conditions on survival until 2000 and thus limits the number of cohorts (ages) we can plot while maintaining several cohorts on both sides of the 1947 trend break.

¹³ To incorporate larger windows of observation, we use data from the Human Mortality Database (rather than our restricted-access data from the Census Bureau).

and after is drawn when the cohort of 1947 reaches a given age. The darkly shaded portion of each curve reflects years and ages prior to the 1947 cohort, and the faded portion reflects year and ages after (and inclusive of) the 1947 cohort. The earlier cohort (darkly shaded) portions do not display a widespread cessation of progress. The cessation instead occurs consistently when the affected cohorts reach each age. We reason accordingly that the magnitude of the cohort effect is considerable: Period trends in mortality at older working ages worsen once the cohorts born on or after 1947 reach those ages.

— *Figure 8 here.* —

4.3 Persistence

The previous analysis focused on the mortality of older Americans. A natural question is when in the life course this break originates. Appendix Figure 7 presents additional age-specific mortality rates in five-year buckets for working-age Americans using data from the 50 cohorts born between 1925 and 1974 from the Human Mortality Database. The cohort trend break is more apparent at older working ages. For the youngest working ages, the break in trend is not clear. Mortality from ages 25 through 44, for example, for these cohorts may be dominated by period factors, such as the HIV/AIDS epidemic in the 1980s and 1990s. We return to life course considerations later in the paper.

Another related question is not how persistent the break is as a given cohort ages, but how persistent the mortality break is for successive cohorts. In other words, is there evidence that the malaise is continuing into younger cohorts, or, alternatively, do they return to their pre-1947 downward mortality path? Appendix Figure 7 shows that, for individuals ages 50 through 54, for example, the break in mortality persists through successive cohorts born through 1965, the last year we measure this age group before Covid. Ultimately, our analysis of persistence is constrained by the fact that younger cohorts have not yet reached near-elderly ages as well as the impact of the pandemic on older cohorts. We conclude that, at least at older ages, the signature mortality break is not merely short-term, but that does not necessarily mean that it is permanent.¹⁴

5 Leading Explanations

While researchers have proposed myriad theories to explain stagnating adult mortality in the 21st Century, there is not yet an academic consensus as to what is causing the stagnation. We consider several leading theories through the lens of the empirical facts we establish in this paper. We ask in this section whether explanations of the stagnation in adult mortality fit with the distinctive pattern or signature of the cohort malaise. We consider the baby boom, opioid epidemic, regional manufacturing decline, and the educational divide in mortality trends. We distinguish theories that center around advantages and disadvantages accumulated over the course of life as opposed to theories focused on contemporaneous shocks or proximate causes of death.

¹⁴ To put this duration into perspective, one traditional definition of the baby boom is those born from 1946 to 1964, suggesting the malaise persists for the better portion of a generation. However, we do not conclude that the malaise continues into younger generations.

5.1 The Baby Boom and Cohort Crowding

The proximity of the cohort malaise for those born around or after 1947 to the end of World War II leads naturally to questions about the baby boom as a possible driver of the stagnation.¹⁵ One explanation for how the baby boom could cause worse outcomes is “cohort crowding,” where resources, such as education and healthcare, are spread thinner across larger cohorts (Bound & Turner, 2007; Card & Lemieux, 2001; Easterlin, 1987).

— *Figure 9 here.* —

Although the baby boom was widespread, it was larger in certain parts of the country than others. Figure 9 splits adults into three groups according to the size of the baby boom in their county of birth. The first group is the tercile of counties with the largest per-capita increase in births during the peak baby boom years. The third tercile of counties had the smallest increase. Figure 9 shows the signature present for all three groups. If cohort crowding were the driver of the malaise, one might expect areas with the largest baby boom to demonstrate the largest trend break in mortality. Nevertheless, each tercile experiences the characteristic cohort malaise, even those where the baby boom was smallest.

Additionally, while the signature of the cohort malaise is distinct to the United States, the baby boom is an international phenomenon, possibly limiting the scope of causes through which the baby boom may drive the malaise.¹⁶ Importantly, however, the impact of the baby boom may extend far beyond cohort crowding in the United States. For example, there could be important cultural differences between boomers and bracketing generations. While our results in Figure 9 may cast doubt on cohort crowding and mortality, they ultimately do not rule out important impacts of the baby boom generally.

5.2 The Opioid Epidemic

A defining feature of mortality in the 21st Century in the United States is the opioids epidemic.¹⁷ We ask whether deaths from drug overdoses and all other causes of death exhibit the characteristic cohort malaise. Figure 10 plots all-cause adult mortality excluding deaths from drug overdoses.¹⁸ The characteristic break

¹⁵ World War II ended in the middle of 1945; June in Europe, September in Japan. Fertility rates rose dramatically (both quantum and tempo) in 1946 and stayed high for many years until the baby bust in the 1960s (Easterlin, 1968). Recall that our cohort trend break is in the middle of 1947, which is notably after the baby boom began in the United States.

¹⁶ A related hypothesis is that characteristics of mothers giving birth around 1947 changed abruptly. We investigated this hypothesis using publicly available Census survey data, but not find meaningful changes in mother characteristics (e.g., educational attainment and age at birth) that could drive this result.

¹⁷ See Maclean et al. (2020) for a literature review of the opioids epidemic. Additionally, the foundational work by Case & Deaton (2015) seeded a literature of explanations for deaths of despair more broadly, which emphasized a catastrophic rise in deaths from suicide, drug overdose, and liver disease.

¹⁸ We consider deaths from drug overdoses generally, rather than just opioid deaths, due to the strong substitution patterns observed between drugs (Alpert et al., 2018). We find the share of opioid deaths for the cohort (age) range using the Multiple Cause of Death file from the NVSS and “exclude” this share of deaths from data in the Human Mortality Database by multiplying by the complement of the share.

from trend remains for cohorts born around 1947, suggesting the cohort malaise extends beyond the opioid epidemic, as recognized by Meara & Skinner (2015) in the context of period trends.¹⁹

— *Figure 10 here.* —

5.3 Regional Manufacturing Decline

Economists have pointed to long-term regional economic decline as a possible driver of the recent mortality stagnation (Austin et al., 2018; Case & Deaton, 2021; Pierce & Schott, 2020).²⁰ A headlining feature of this decline is the loss of working-class or manufacturing jobs. Figure 11 partitions the United States into terciles based on manufacturing prevalence in 1970, measured by manufacturing employment to population ratio by county.²¹ We choose 1970 for two reasons. Our cohorts of interest entered the labor market around this time, and a substantial drop in manufacturing jobs occurred thereafter (Cherlin, 2014).²² The top tercile of counties had the highest manufacturing prevalence and also experienced the steepest decline in manufacturing. Figure 11 plots adult mortality by year of birth for individuals *born* in each of the three terciles of county manufacturing. All three terciles demonstrate the signature, with a break from trend for cohorts born around 1947.

— *Figure 11 here.* —

5.4 The Educational Divide

Researchers have noted that the poor mortality outcomes of Americans in the 21st Century relative to other rich countries are driven by Americans without a four-year college degree. Case & Deaton (2023), in particular, highlights the many ways in which Americans with and without a BA are growing apart.²³ They argue that Americans with a BA in the 21st Century generally progressed downward in mortality along with their European peers, while Americans without a BA drove the unprecedented pattern of worsening mortality. We reassess this educational divide from a cohort perspective in Figure 12 using data from the 2000 Decennial Census “long-form,” which contains detailed information on educational attainment (in addition to the standard battery of questions in the “short-form”). Figure 12 splits our sample by educational attainment: no high school degree, high school degree only, some college, or a bachelor’s

¹⁹ We emphasize that the opioid epidemic is likely a distinct shock suppressing life expectancy at the same time as the cohort malaise (Currie & Schwant, 2021; Cutler & Glaeser, 2021).

²⁰ See Abraham & Kearney (2020), Autor et al. (2013), Charles et al. (2019), Cherlin (2014), and Pierce & Schott (2016) for work on manufacturing decline more generally.

²¹ We use the NBER-CES Manufacturing Industry Database to obtain data on manufacturing employment by county. Specifically, we use the 2012 NAICS version of the data, and measure manufacturing employment as NAICS sectors 31-33.

²² The choice of manufacturing presence in 1970 also matches the setup of Bound & Holder (1993), who study the impact of industrial shifts on aggregate wages and employment.

²³ See Goldin & Katz (2008) for work preceding Case and Deaton (2023) that demonstrates how changes across successive birth cohorts can explain important trends decades later, key labor market puzzles of the 20th Century in their case.

degree. Americans with low and moderate levels of education (i.e., the three categories without a BA) experience a sudden worsening in mortality for cohorts born around 1947. While Americans with a bachelor’s degree may depart from trend, they, at least, do not experience a lasting increase in the adult mortality rate.²⁴ We caution, however, that a true comparison of the trend breaks may be complicated by selection into education and the coincident compositional change. While the BA divide may ultimately prove a central demarcation, the driver of the cohort break remains elusive.²⁵

— *Figure 12 here.* —

5.5 Cumulative Disadvantage?

The goal of this paper is not to solidify the cause of the recent stagnation. Rather, it is to lay out facts that would guide the search in a more productive direction. We believe our facts direct the search away from contemporaneous shocks proximate to the time of death towards possibly much more distal events. That is, our facts direct the search to determinants of mortality that may have impacted individuals even decades before they actually die. Case & Deaton (2017), for example, outline such cohort-based theories as those of “cumulative disadvantage.”²⁶ The characteristic sharp timing in the middle of the 20th Century, the uniqueness of the United States, and the pervasiveness within the United States may act as a filter to refine and even limit the scope of plausible theories. Indeed, we believe any successful theory of the cohort malaise will leave the signature.

6 Candidate Origins

We conclude by outlining a candidate origin of the 21st-Century stagnation in mortality that exemplifies the signature of the cohort malaise. In the middle of the 20th Century, public health officials noted with alarm that mortality rates among *children* broke from decades of progress (Moriyama, 1960). The break in childhood mortality in the 20th Century demonstrates timing, uniqueness, and pervasiveness, just as we observe for adult mortality in this paper. It seems to set in around cohorts born in 1947. The United States is an outlier when compared to its international peers. It seems pervasive across race, sex, and geography (Arenberg et al., 2025b). In our final figure, Appendix Figure 8, we note a potentially related exception to the pervasiveness. Our previous figures display mortality for the US-born population. We juxtapose mortality rates for both US-born and foreign-born adults. Foreign-born adults do not exhibit the sharp trend break characteristic of the signature. These results may direct the search for causes to disadvantages that manifested in the United States longer ago than previously recognized. We further take up this search for the origins of the cohort malaise in Arenberg et al. (2025a).

²⁴ Although not shown, we also consider income, which, like education, is a measure of status reported on the 2000 “long-form.” Income is difficult to analyze because many people from the cohorts we study will no longer be working at the time of survey, but we find a break from trend in 1947 across the income distribution, even for the richest portion of the distribution.

²⁵ For more on the protective nature of the BA in the context of the 21st-Century stagnation, see Arenberg & Stripling (2025).

²⁶ The economic literature also proposes the concept of “health capital,” which suggests that there may be a long lag time between when health inputs occur and when health outcomes change (Couillard et al., 2021; Grossman, 1972).

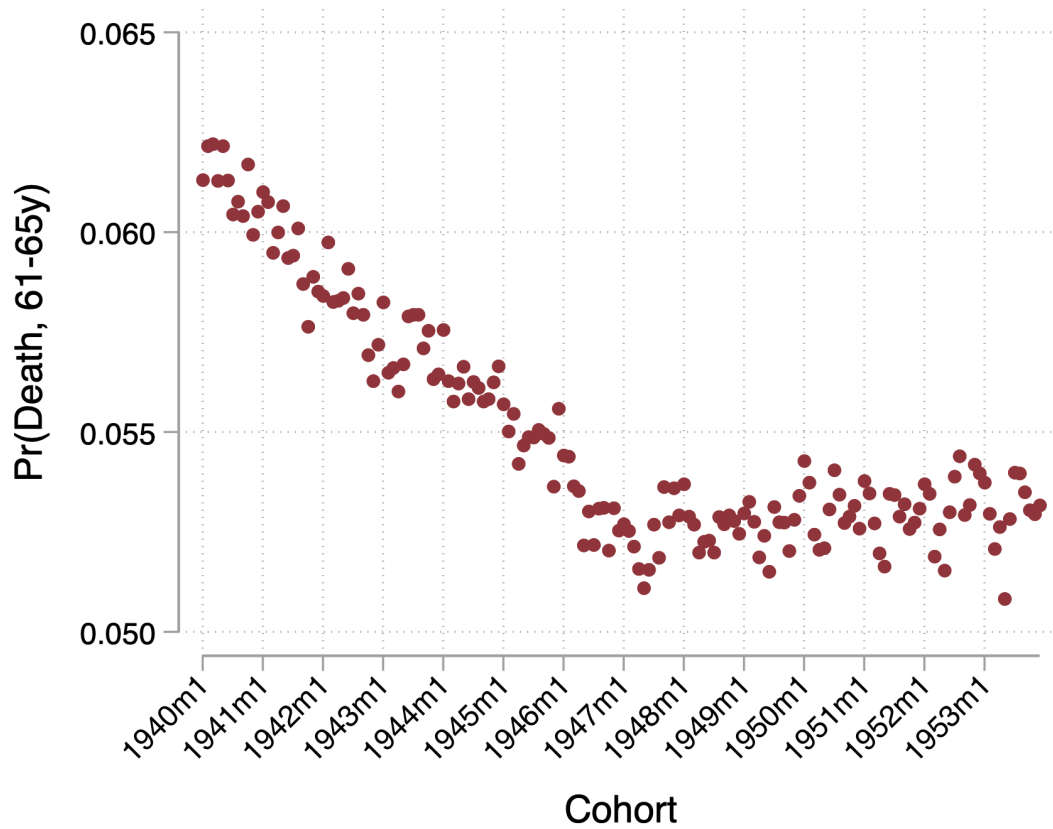
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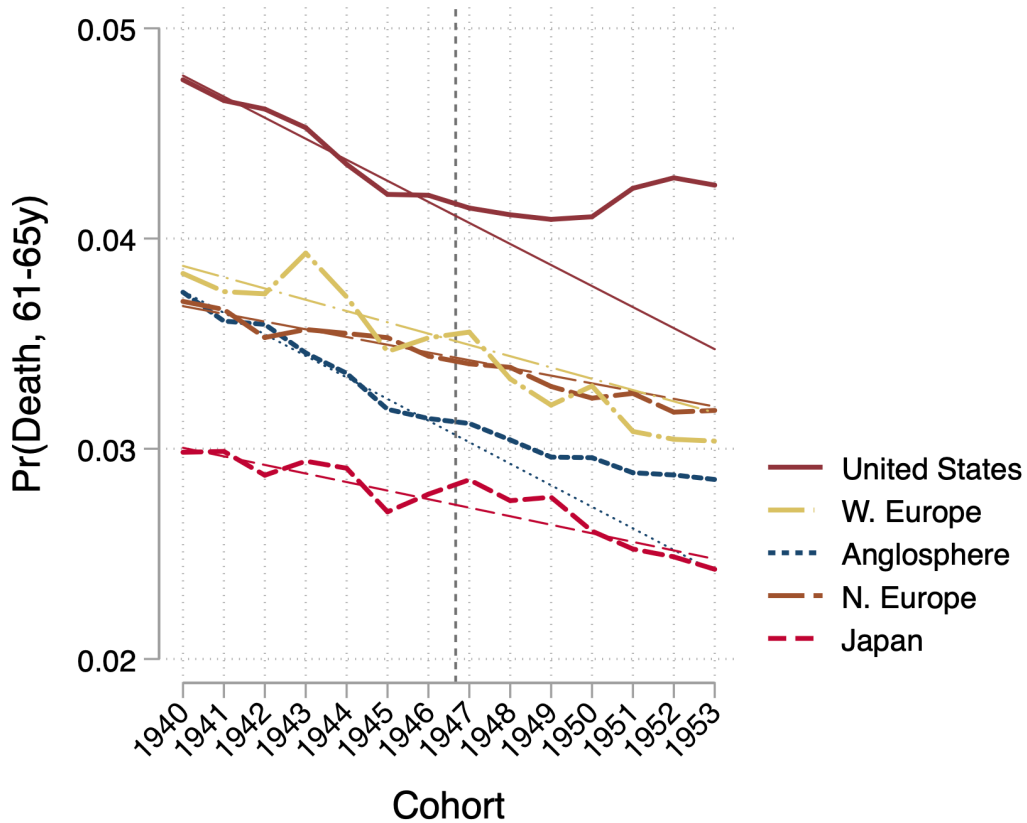
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Fig. 1. Timing: Adult mortality by month of birth



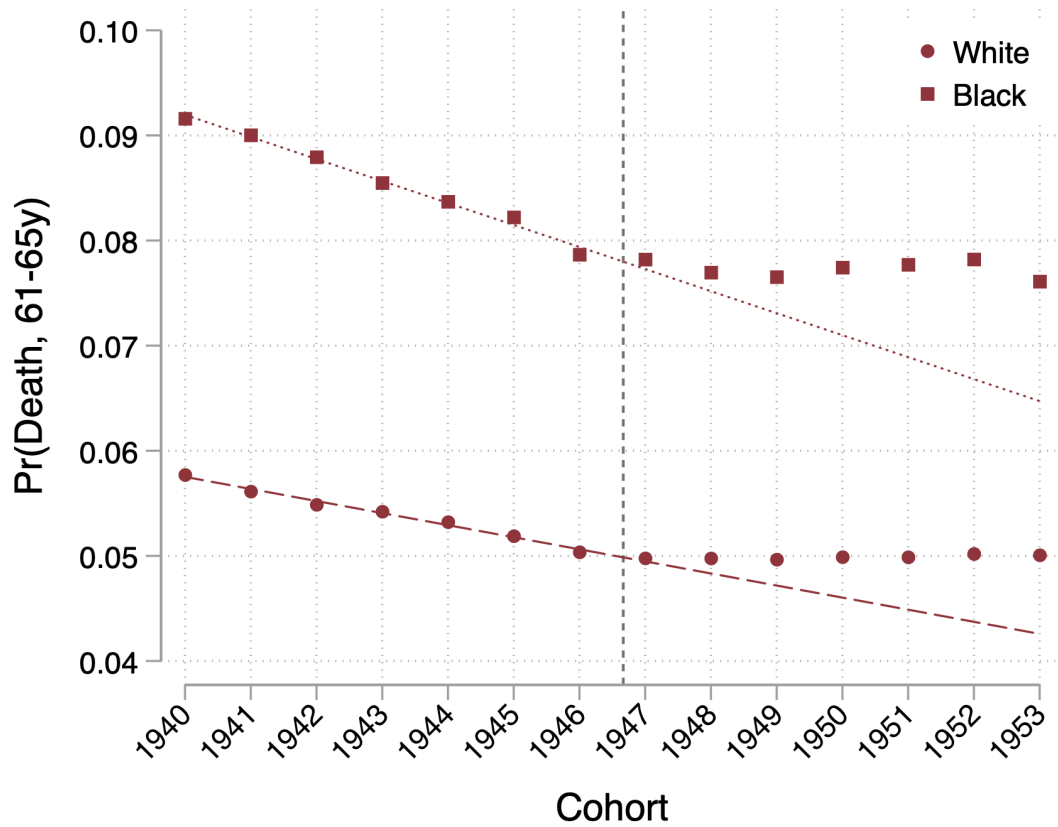
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by month of birth for US-born Americans. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

Fig. 2. Uniqueness: Comparison of adult mortality between US and peers



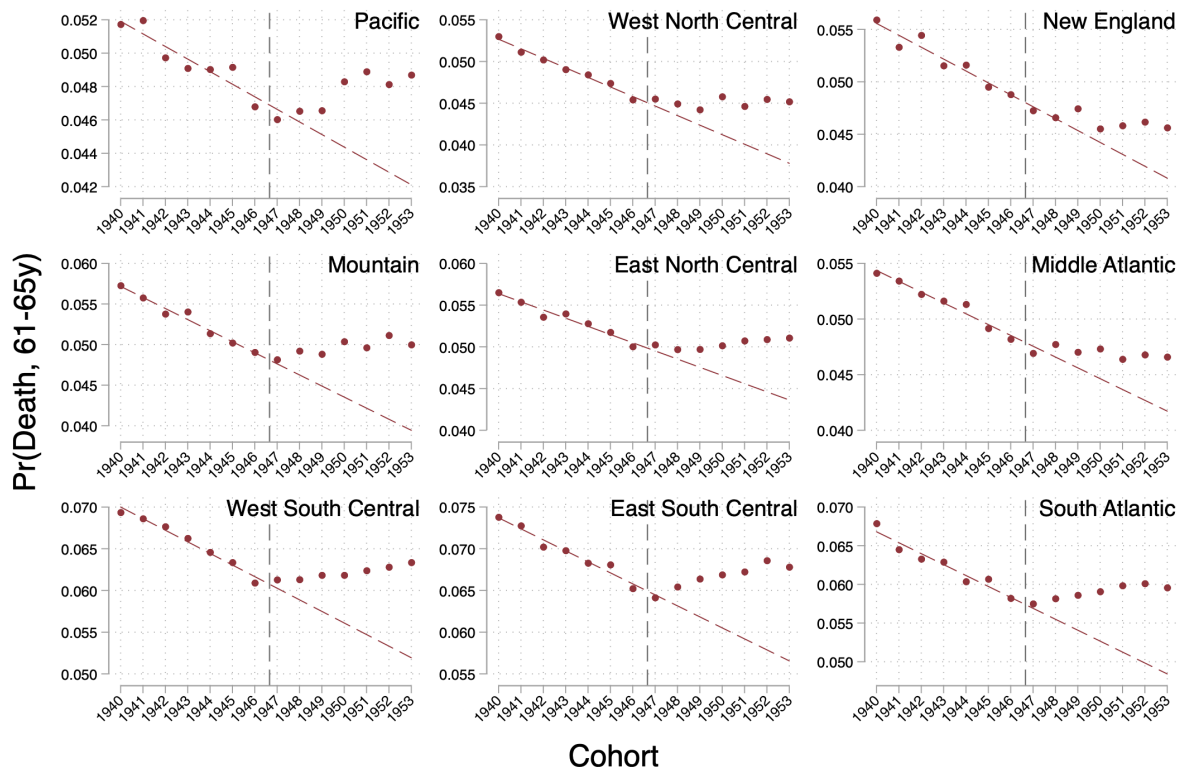
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for a collection of countries in addition to the United States. Western Europe includes Austria, Belgium, Switzerland, France, and The Netherlands; the Anglosphere includes Australia, Canada, and The United Kingdom; Northern Europe includes Denmark, Finland, Iceland, and Norway. These lists are constrained by which countries have the necessary years of data available. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is the Human Mortality Database, which, unlike our primary data source, cannot be restricted to the US-born population (for the United States).

Fig. 3. Pervasiveness: Adult mortality for White and Black Americans



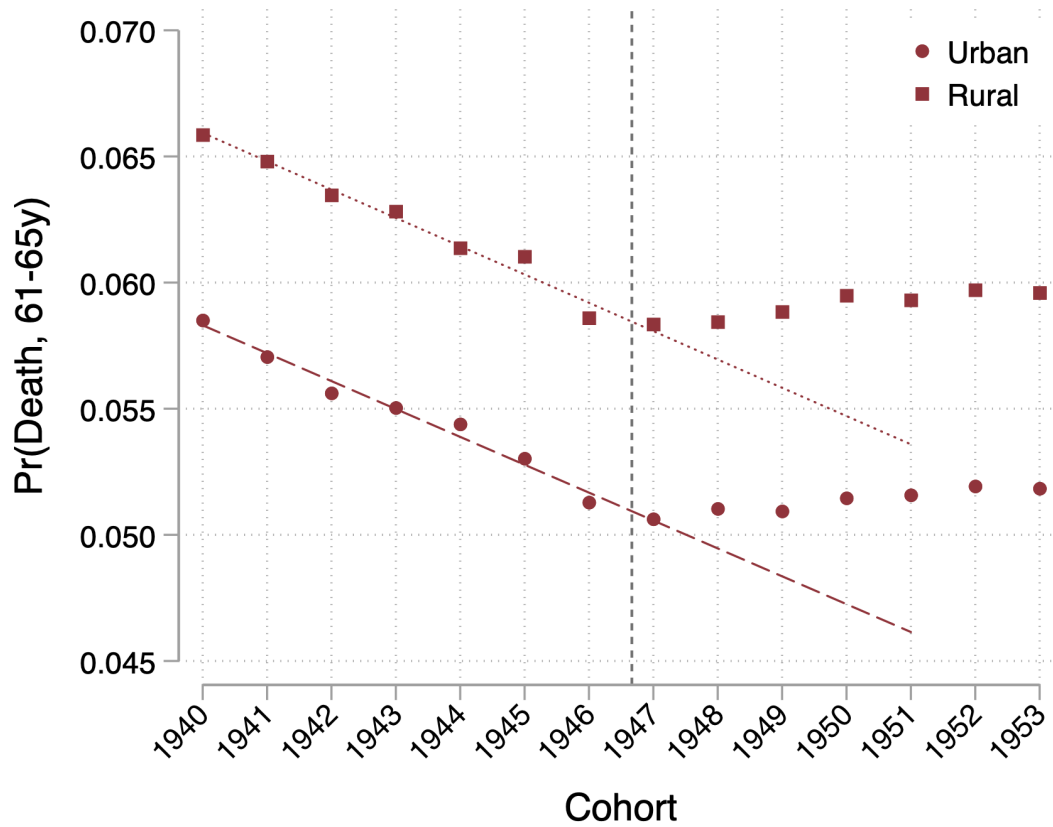
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born, non-Hispanic Black and White Americans. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

Fig. 4. Pervasiveness: Adult mortality by region of birth



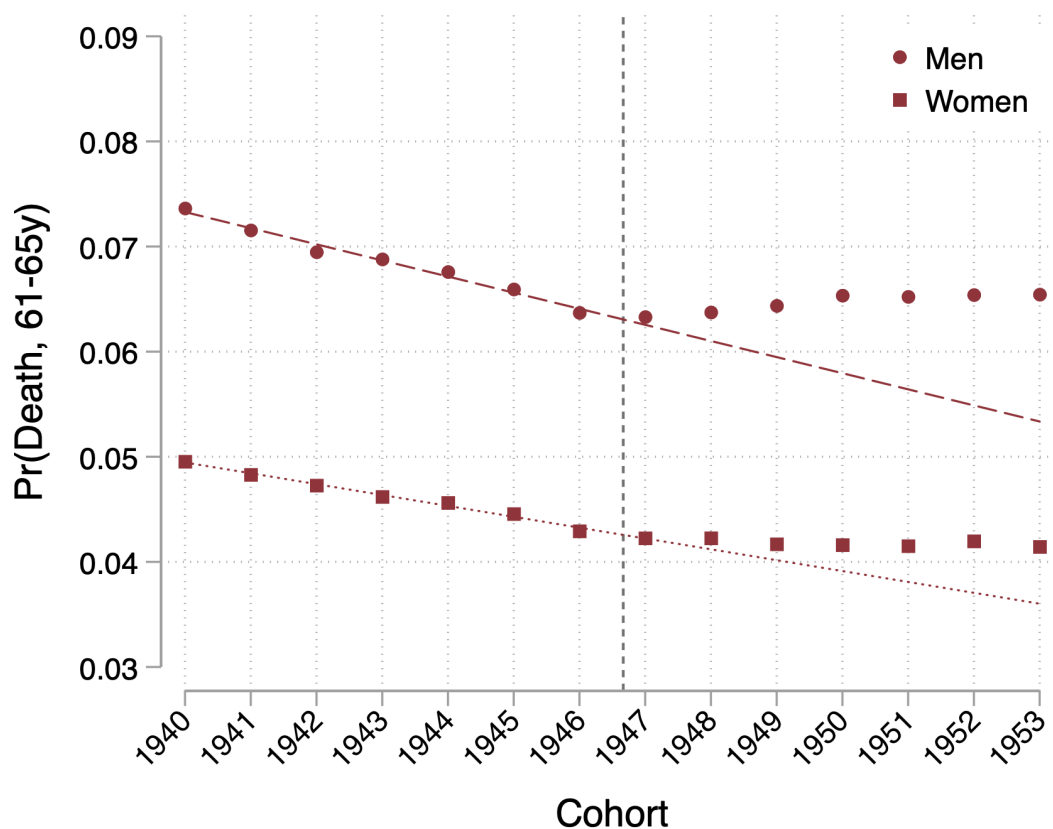
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans, broken out by their Census Division of birth. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

Fig. 5. Pervasiveness: Adult mortality for rural and urban areas



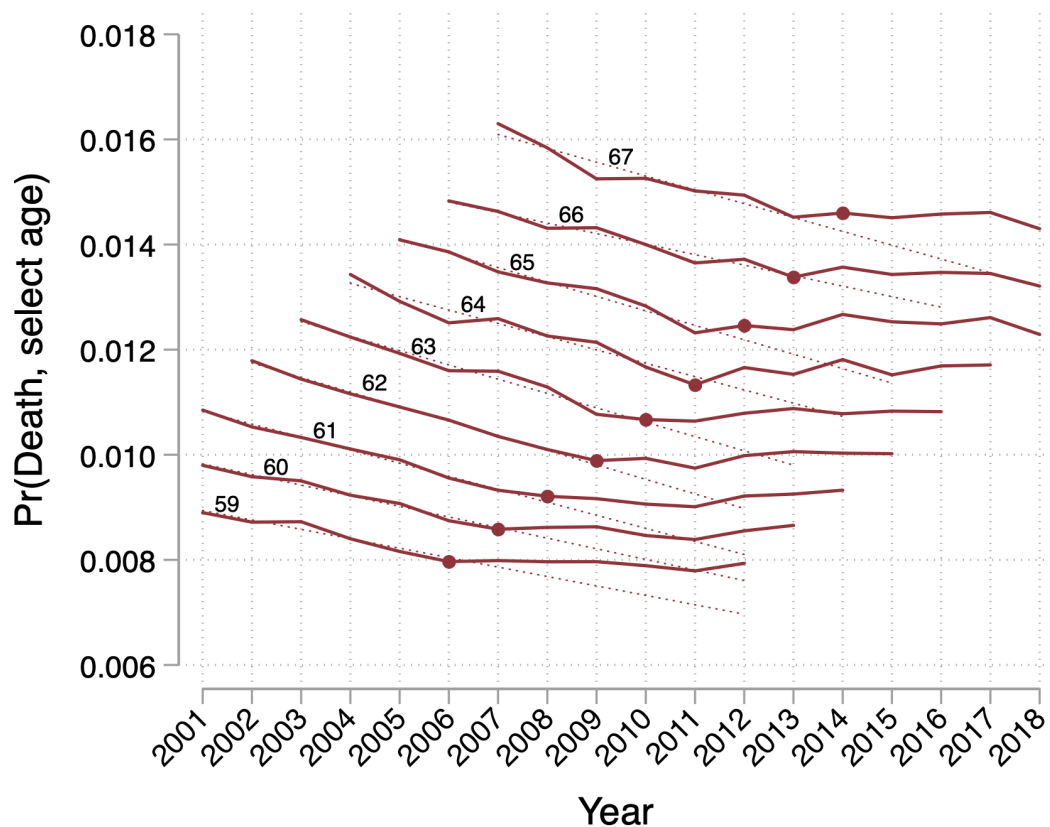
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans, broken out by whether they were born in an urban or rural county. We define urban as the top tercile of counties (population weighted) in terms of the fraction of households designated as farms in 1940 and rural as all others. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration; data on farm status come from the 1940 Decennial Census (Ruggles et al., 2024).

Fig. 6. Pervasiveness: Adult mortality for men and women



Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born men and women. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

Fig. 7. Authenticity: Non-parallelism in age-specific mortality rates by year



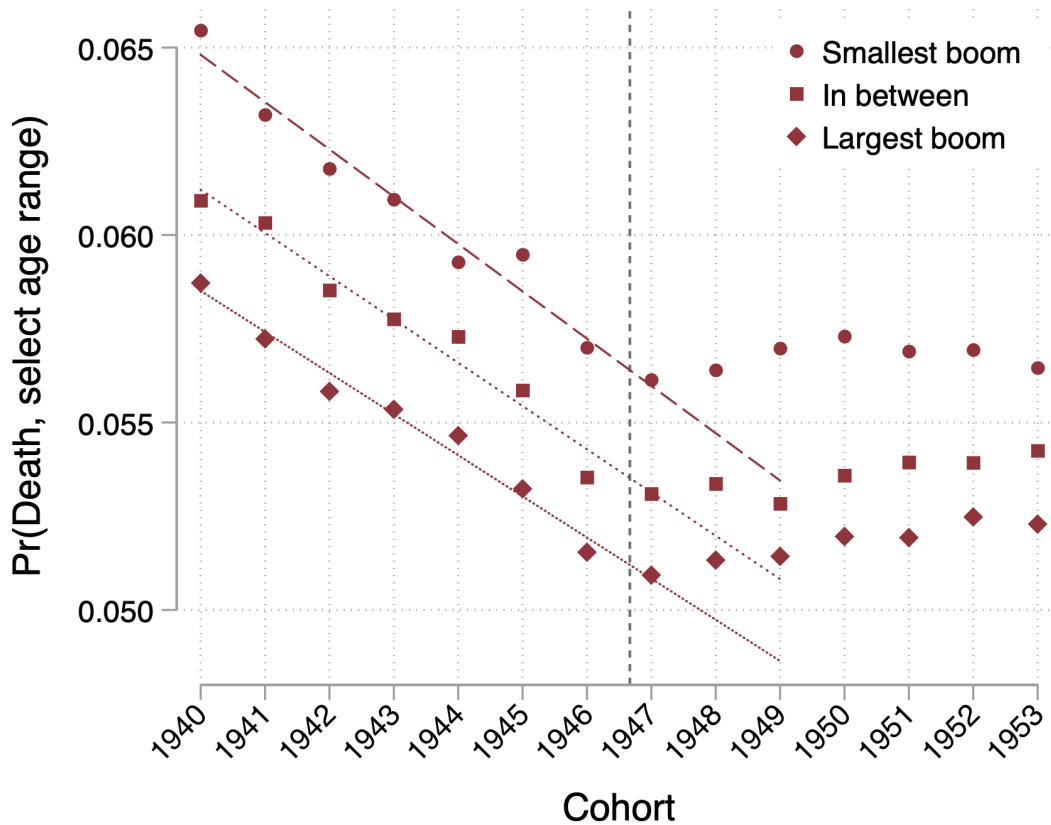
Note: We plot age-specific mortality rates, the probability that someone dies at a particular age, ($1q_x$ in standard notation, where 'x' ranges from 59 to 67), by year for US-born Americans. For each age, the dot appears at the year when the cohort of 1947 reaches that age. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the years prior to the entry of the 1947 cohort (non-inclusive). The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

Fig. 8. Magnitude: Trends over time in age-specific mortality rates



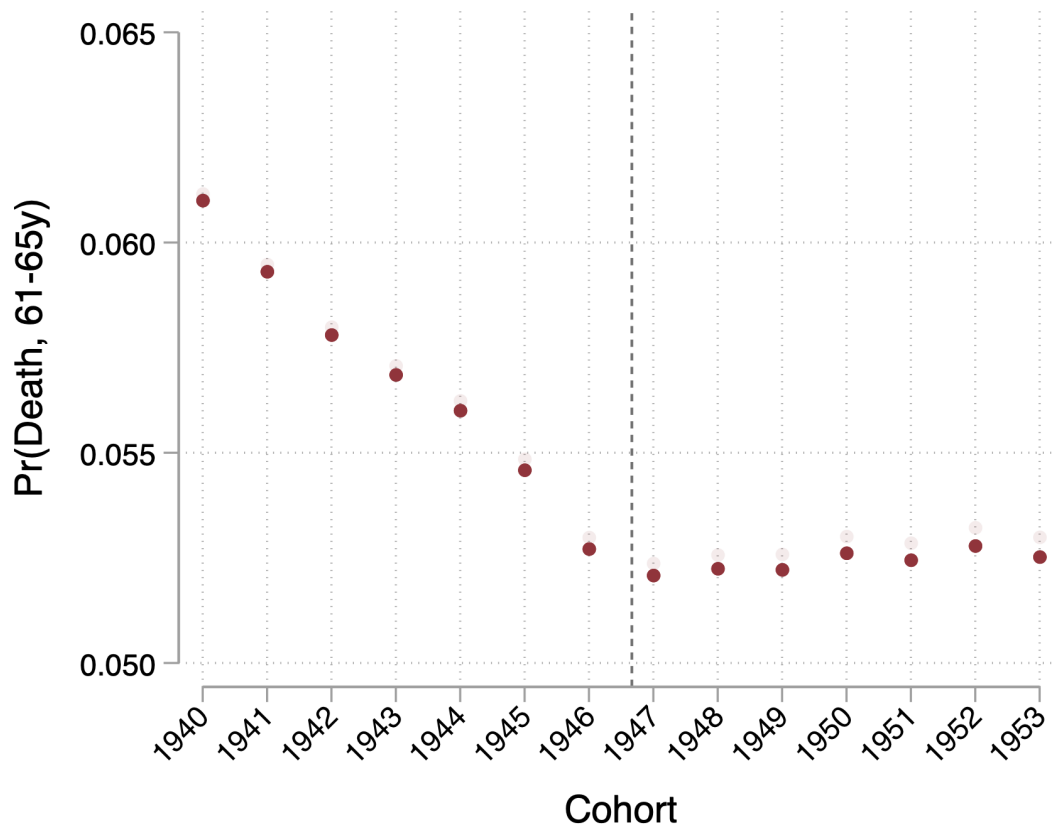
Note: We plot age-specific mortality rates, the probability that someone dies at a particular age, ($1q_x$ in standard notation, where 'x' ranges from 55 to 73), by year for the United States. For each age, the curve is faded when the cohort of 1947 reaches that age. The data source is the Human Mortality Database, which, unlike our primary data source, cannot be restricted to the US-born population.

Fig. 9: Leading Explanations: Adult mortality by “size” of baby boom



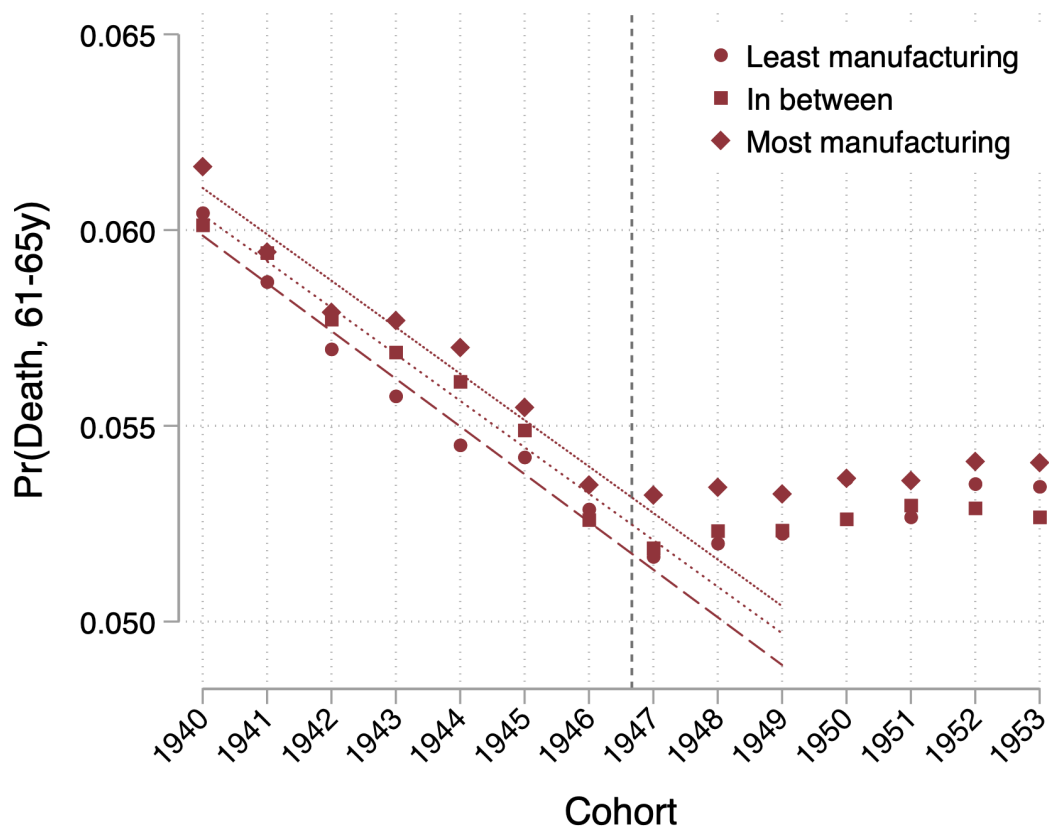
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 ($_{5q_{61}}$ in standard notation), by year of birth for US-born Americans, broken out by whether they were born in a county with a small, medium, or large baby boom. We assign counties to one of the three categories by splitting them into terciles of the change in per capita birth between 1946 and 1953, approximately the peak of the boom nationwide. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration; data on births at the county level come from Bailey et al. (2016).

Fig. 10. Leading Explanations: Adult mortality excluding overdose deaths



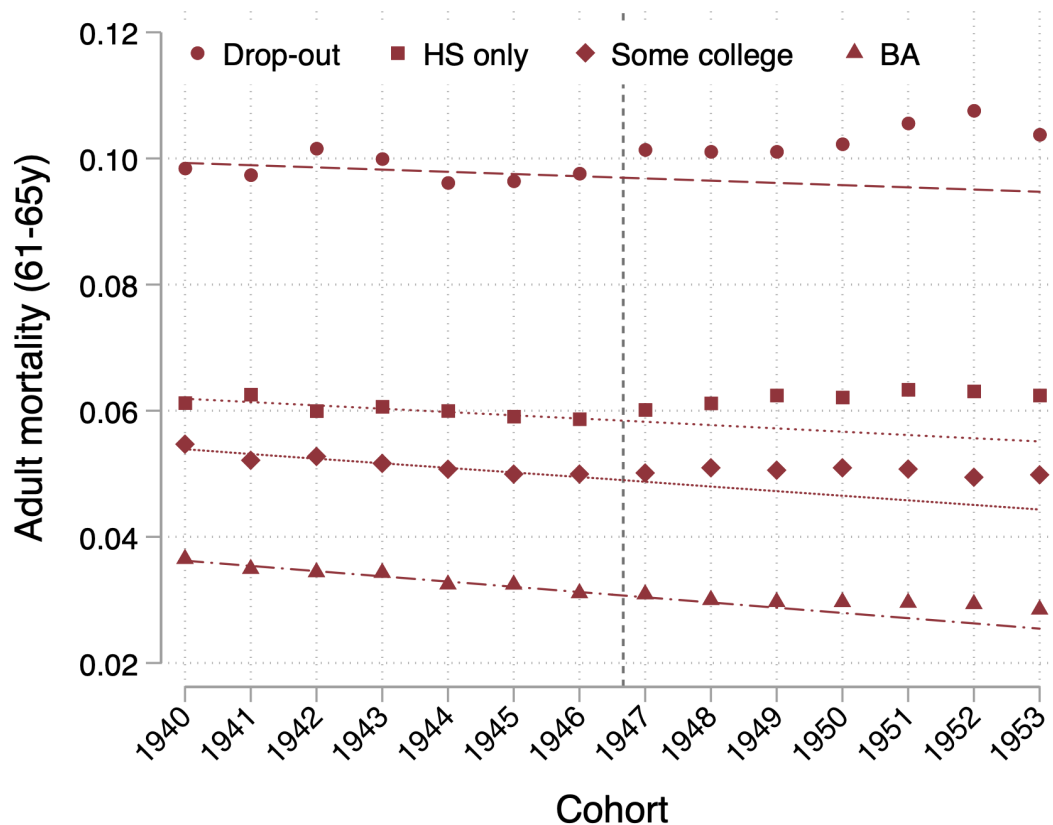
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans, excluding deaths from overdoses. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration; shares of overdose (ICD codes X40-44, X60-64, X85, Y10-14) are taken from Multiple Cause of Death data from the National Vital Statistics System.

Fig. 11. Leading Explanations: Adult mortality by “size” of baby boom



Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans, broken out by whether they were born in a county with a small, medium, or large presence of manufacturing. We assign counties to one of the three categories by splitting them into terciles of manufacturing employment (NAICS 31-33) per (working-age) capita in 1970. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration; data on manufacturing employment at the county level come from NBER-CES Manufacturing Industry Database.

Fig. 12. Leading Explanations: Adult mortality by educational attainment



Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans, broken out by whether their educational attainment. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

The Signature of a Mid-century Cohort Malaise

Appendix

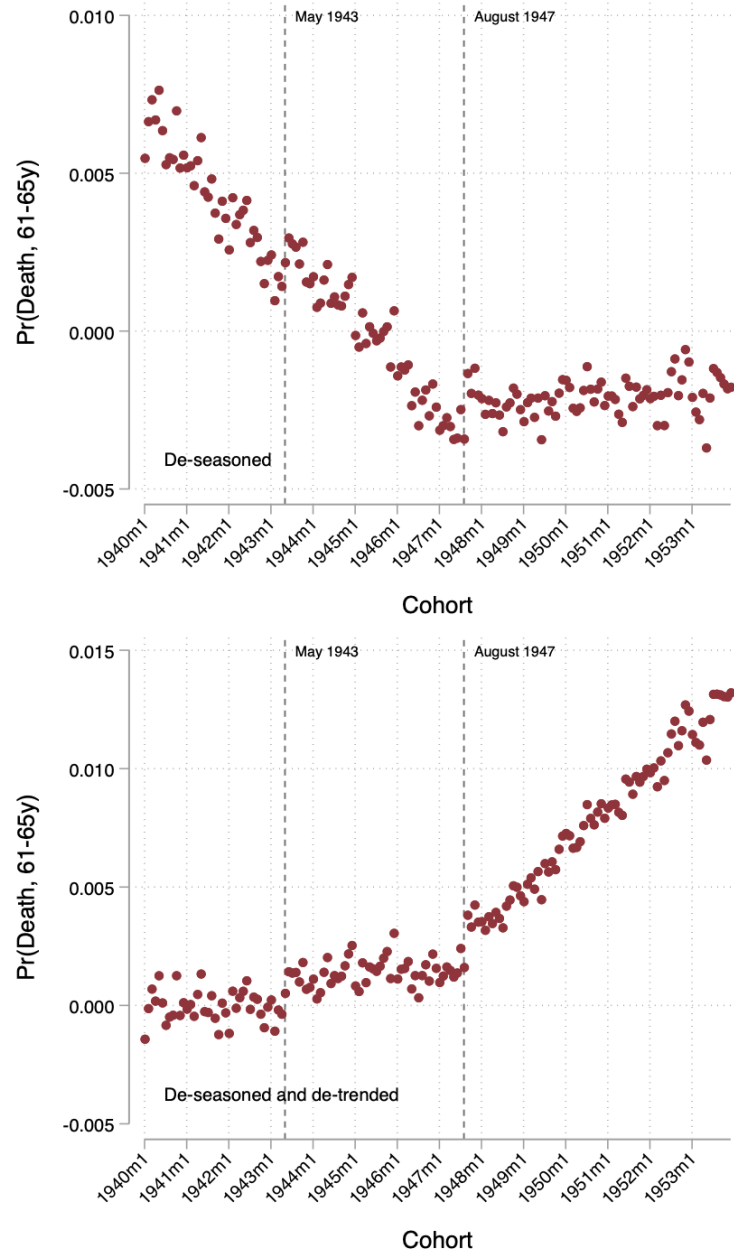
Sam Arenberg University of Houston

Nick Reynolds University of Essex

Sam Stripling Texas A&M University

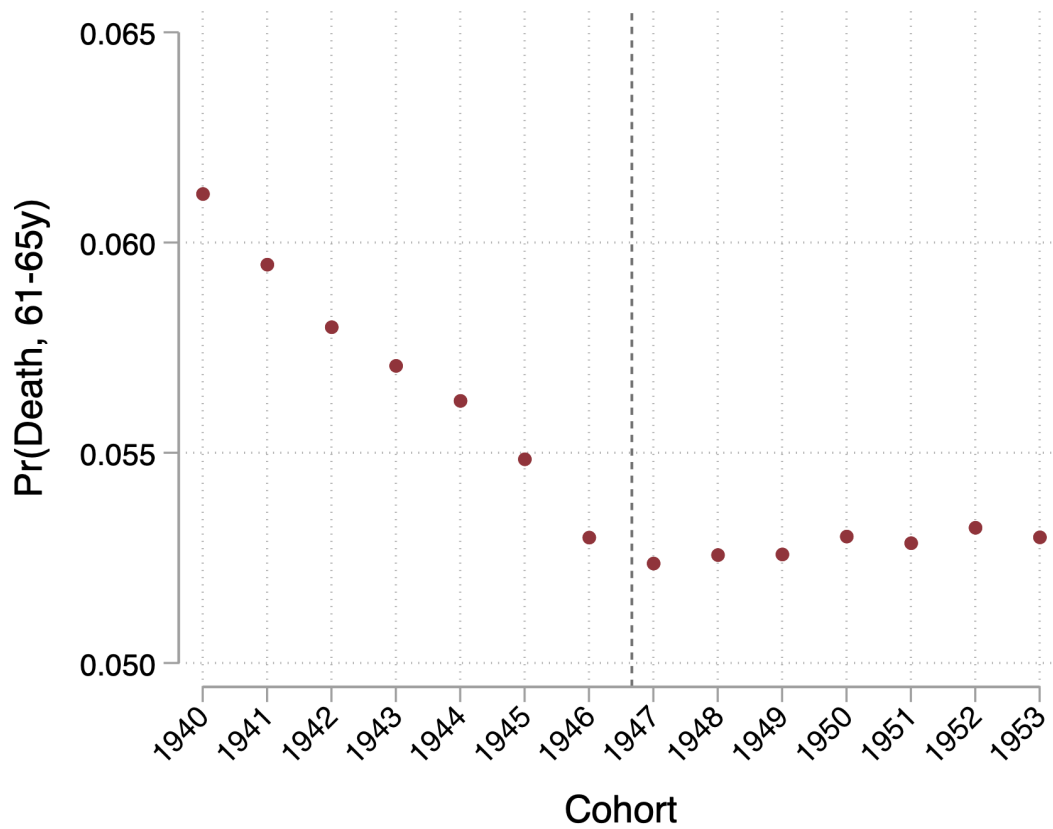
The high and rising rates of adult mortality in the United States relative to peer nations is now widely recognized as one of the most serious public health concerns facing the country. Researchers from multiple disciplines have posited many theories in efforts to explain the problem, yet a consensus explanation remains elusive. We depict the unprecedented stagnation in adult mortality as a “cohort malaise.” We first show that progress in adult mortality stops abruptly with Americans born in the summer of 1947, with no such trend break in other countries. We then look for differential severity by race, sex, and geography within the United States. What we find instead is remarkable pervasiveness, with the cohort break in mortality appearing across all of these demographics. Our conclusion is that successful theories of the malaise, now responsible for over a million excess deaths relative to trend, will demonstrate a distinctive “signature”: sudden cohort-by-cohort changes in the United States around the summer of 1947 that span race, sex, and geography.

App. Fig. 1. Timing: Adult mortality by month of birth, de-seasoned and de-trended



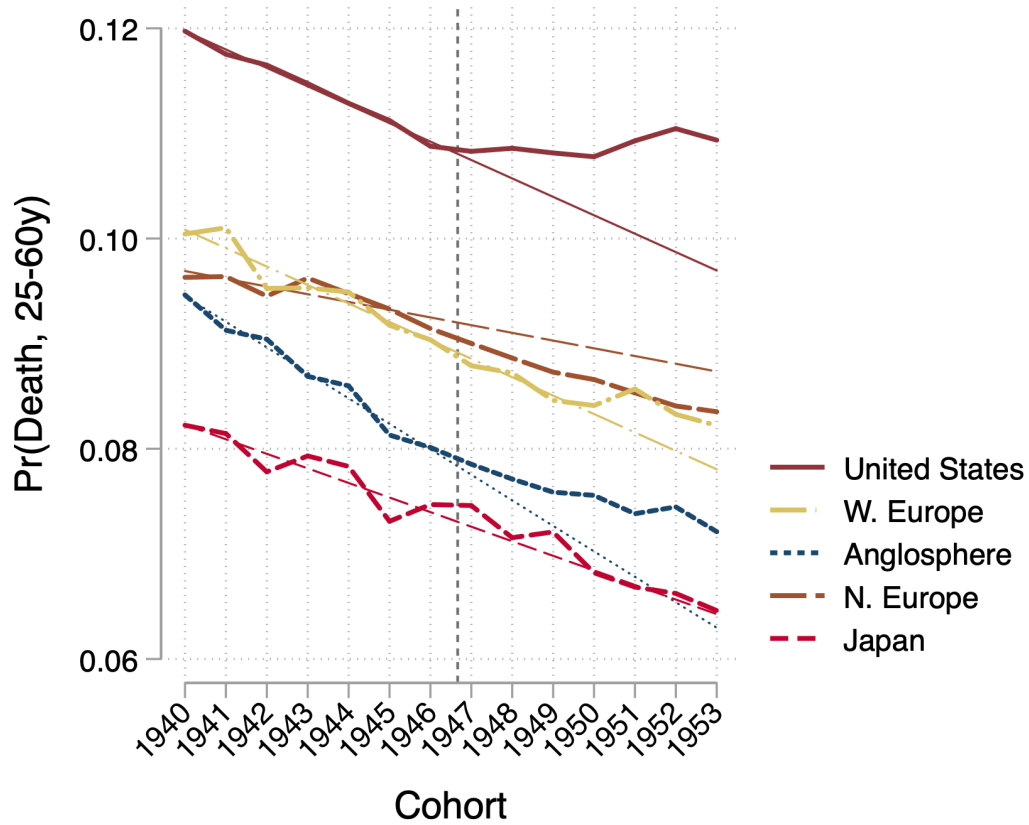
Note: We plot two transformations of “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by month of birth for US-born Americans. We first “de-season” by regressing mortality rates on a calendar-month fixed effect (and retaining the residual). We further “de-trend” by plotting departures from an extrapolation of the line of best fit (from ordinary least squares) for birth months from January of 1940 through December of 1942. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

App. Fig. 2. Timing: Adult mortality by year of birth



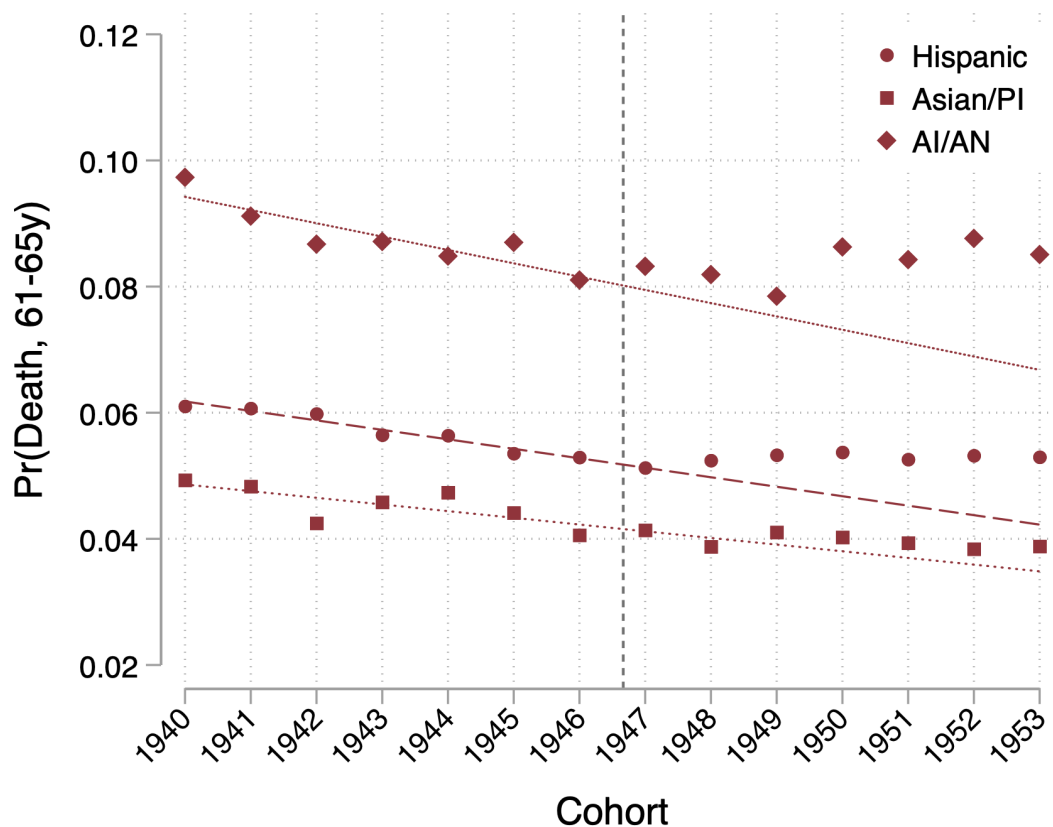
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

App. Fig. 3. Uniqueness: Comparison of working-age mortality between US and peers



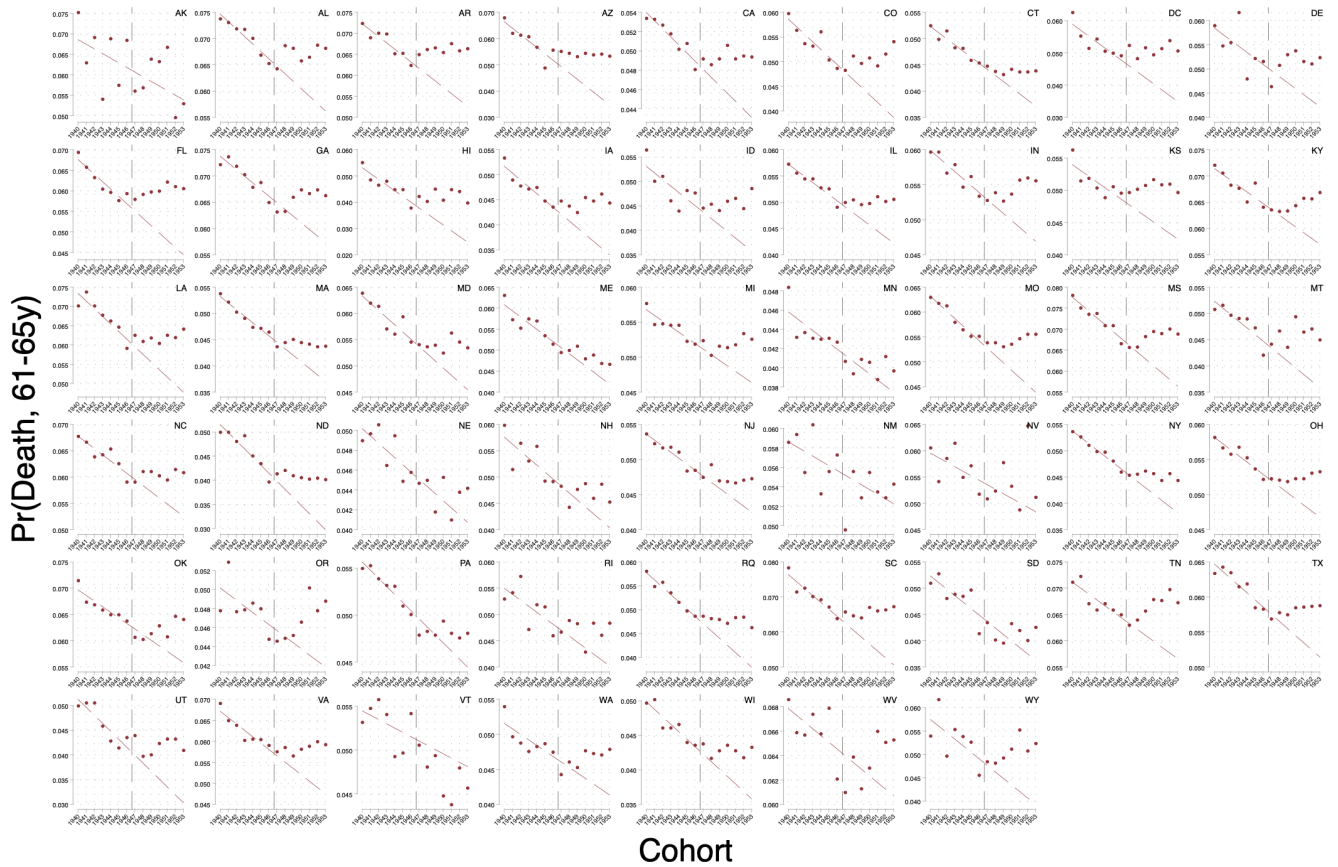
Note: We plot “working-age” mortality rates, the probability that someone turning 25 dies before they turn 61 ($_{35q25}$ in standard notation), by year of birth for a collection of countries in addition to the United States. Western Europe includes Austria, Belgium, Switzerland, France, and The Netherlands; the Anglosphere includes Australia, Canada, and The United Kingdom; Northern Europe includes Denmark, Finland, Iceland, and Norway. These lists are constrained by which countries have the necessary years of data available. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is the Human Mortality Database, which, unlike our primary data source, cannot be restricted to the US-born population (for the United States).

App. Fig. 4. Pervasiveness: Adult mortality for other races and ethnicities



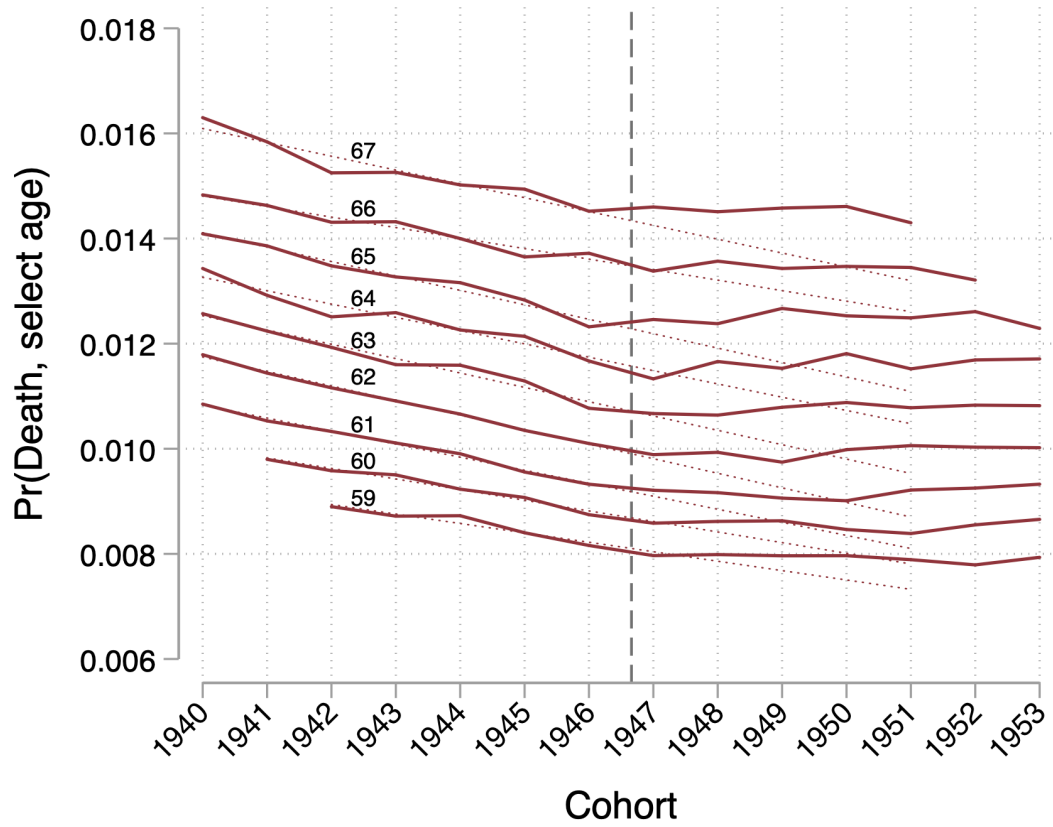
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by month of birth for US-born Hispanic Americans, Asian Americans (or Pacific Islanders), and American Indians (or Alaska Natives). The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

App. Fig. 5. Pervasiveness: Adult mortality by state of birth



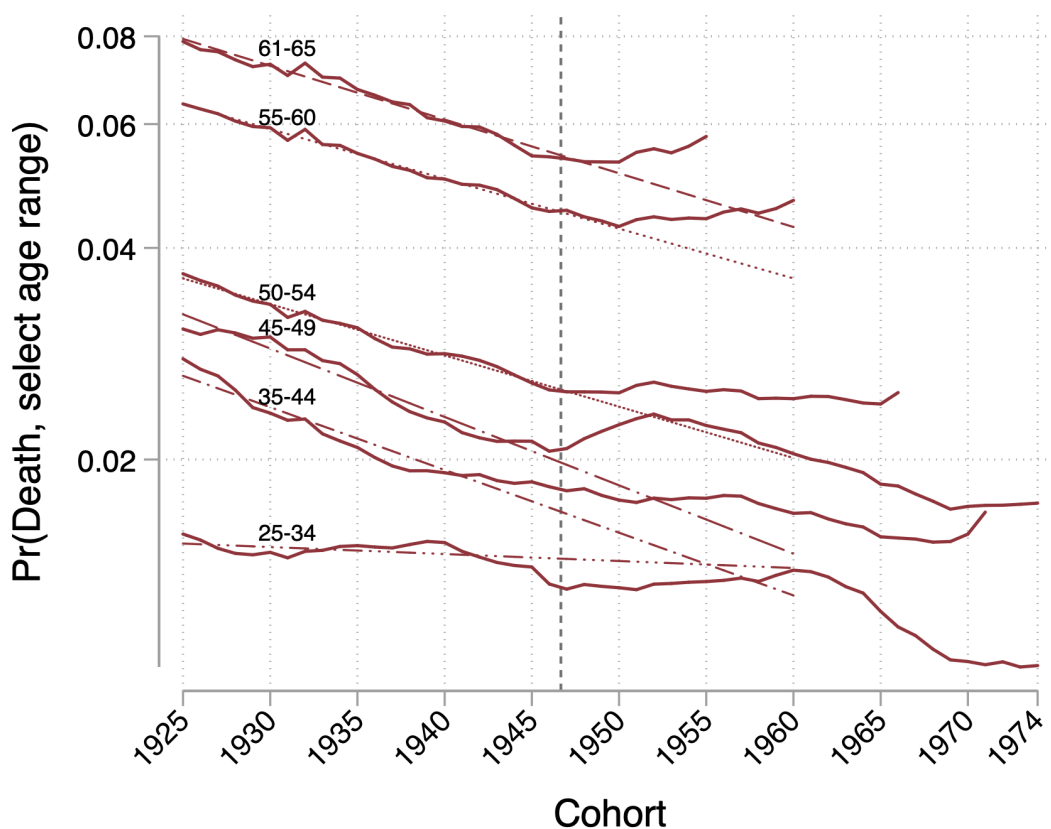
Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born Americans by their state of birth (including The District of Columbia and Puerto Rico). The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

App. Fig. 6. Authenticity: Parallelism in age-specific mortality rates by year of birth



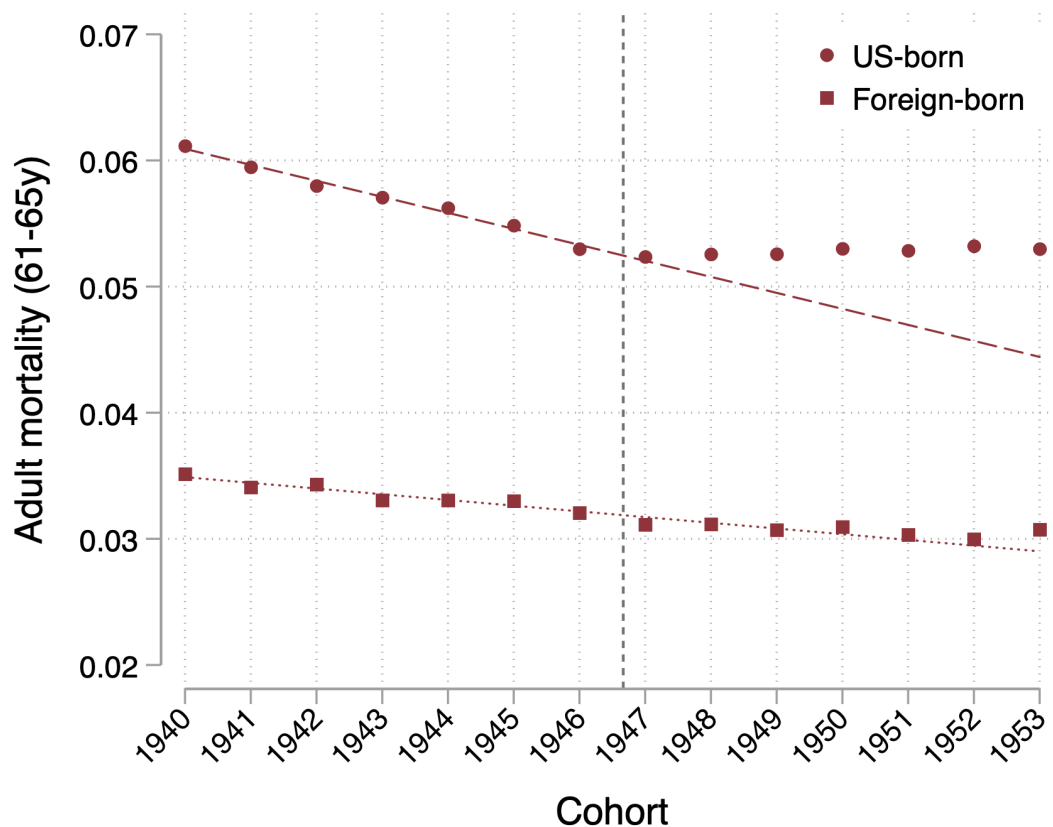
Note: We plot age-specific mortality rates, the probability that someone dies at a particular age, ($1q_x$ in standard notation, where 'x' ranges from 59 to 67), by year of birth for US-born Americans. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the years prior to the entry of the 1947 cohort (non-inclusive). The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

App. Fig. 7. Persistence: Age-specific mortality rates by year of birth



Note: We plot age-specific mortality rates, the probability that someone dies in a particular age range, (${}_nq_x$ in standard notation, where 'n' is either 10 or 5 and 'x' spans working ages), by year for US-born Americans. For each age, the dot appears at the year when the cohort of 1947 reaches that age. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the years prior to the entry of the 1947 cohort (non-inclusive). The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.

App. Fig. 8. Candidate Origins: Adult mortality for US-born and foreign-born



Note: We plot “near-elderly” mortality rates, the probability that someone turning 61 dies before they turn 66 (sq_{61} in standard notation), by year of birth for US-born and foreign-born Americans. The dashed lines are linear extrapolations of the lines of best fit (from ordinary least squares) from the cohorts prior to 1947 (non-inclusive). The vertical line is drawn between the cohorts of 1946 and 1947. The data source is a linkage, conducted in a Federal Statistical Research Data Center, between the 2000 Decennial Census and death records from the Social Security Administration.