Prenatal Exposure to Racial Violence and Later-Life Mortality among Males: Evidence from Lynching*

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Abstract

This study explores the long-term health effects of prenatal exposure to racialized violence by analyzing Social Security Administration death records linked with the 1940 census. We exploit variation in lynching incidences to understand the impact of this type of racialized violence on old-age longevity. The results reveal a 3.7 month decrease in longevity among Black males who were exposed to the lynching of a Black victim during gestation. This exposure accounts for approximately 10% of the life expectancy gap between Black and White men in 1980, with no negative effects observed among White individuals. Further analysis suggests diminished socioeconomic outcomes are likely explanatory factors.

Keywords: Mortality, Longevity, Lynching, Racial Violence

JEL Codes: I14, I18, J15, J18, N31, N32, Z13

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1. Introduction

Throughout the life course, Black Americans are more likely to experience poor health and die prematurely than their non-Black counterparts. For example, beginning in infancy, Black individuals have elevated rates of preterm birth and infant mortality (Osterman, Hamilton, Martin, & Driscoll, 2023; Ely & Driscoll, 2022). These health disparities persist in later stages of life, with Black individuals experiencing higher rates of chronic diseases, including hypertension, diabetes, and heart disease, than non-Black individuals well into old age (Odlum, et al., 2020)

One likely important source of racial inequities in health is the unequal burden of environmental stressors prior to birth. Decades of evidence from the fetal origins literature demonstrates that exposure to in utero stressors or "shocks" can have both more immediate (e.g., low birth weight and premature birth) and latent (e.g., chronic disease and premature mortality) health effects (Almond and Currie 2011). Violence is a prominent example: exposure to intimate partner violence and violent conflict (e.g., terrorism and war) is linked to poor birth outcomes such as preterm birth and low birth weight (Camacho, 2008; Mansour & Rees, 2012; Torche & Villarreal, 2014; Currie, Mueller-Smith, & Rossin-Slater, 2022) as well as later-life disability and mortality (Lee, 2014). Importantly, in the United States, exposure to violence is not random. Black Americans bear a disproportionate burden of exposure to various forms of violence, including both interpersonal and structural violence (e.g., excessive use of police force in the neighborhood). However, the presence of racialized disparities in violence exposure, combined with data limitations, has posed challenges for analyses that seek to establish whether such exposure causally influences health inequities in later life.

In this study, we examine the causal impacts of in utero exposure to a common form of 20th century violence—lynching—on racial inequities in life expectancy. Lynching is a form of extrajudicial punishment in which a group of people, often a mob, kill an individual suspected of a crime without a legal trial. In the United States, lynching was wielded primarily against Black Americans (Price, Darity, and Headen 2008). During the 19th and 20th centuries, White Americans used lynching to enforce racial segregation and maintain white supremacy in the U.S. South. Black Americans were often lynched for alleged offenses such as rape, murder, and other acts that were perceived as a challenge to traditional racial order. Interviews with surviving family members of lynching victims have shown that both family members and the wider community experienced trauma, stress, and fear in the wake of this form of racial terrorism and that the resulting mental health effects persisted across generations (Gaston, 2021). Recent studies have found that counties that experienced historical lynching have lower contemporary levels of Black voter registration (Williams, 2022) and higher contemporary levels of unemployment and poverty among their Black populations (Williams, Logan, & Hardy, 2021).

Emerging evidence suggests that exposure to lynching is also associated with worse population health outcomes. One recent study found that the total number of Black victims as a share of the county-level Black population was associated with higher contemporary levels of overall infant mortality (Abbott et al. 2022). Kihlström and Kirby (2021) showed that counties that experienced lynching in the early 20th century had lower average life expectancies in 2020 than countries with no lynching record. Similarly, Probst, Glover, and Kirksey (2019) documented lower contemporary mortality rates in counties without a history of lynching. Further, Messner, Baller, and Zevenbergen (2016) demonstrated that counties with a history of lynching had higher contemporary rates of homicide. Yet, while these studies provide suggestive evidence of a link between exposure to lynching and poorer health, it remains unclear whether this link is causal and whether exposure to lynching has latent effects that can explain health inequities later in the life course.

Estimating the causal effects of in utero lynching exposure is challenging because there is a lack of individual data on life expectancy linked to the time and place of birth. Existing studies often rely on county-level life expectancy data, which can obscure vital variation in experiences within counties and overlook the long-term impact of violence during individuals' lives. Additionally, research on lynching and health typically compares counties with a history of lynching to those without, potentially failing to account for unobserved factors, such as variations in economic conditions or social attitudes, that could explain any observed differences in health outcomes.

We address these knowledge gaps by leveraging individual-level data on birth month-year and place of birth drawn from the CenSoc Project to examine long-term effects of in utero exposure to lynching on later-life longevity. We integrate the CenSoc Project data and data from the Historical American Lynching Data Collection Project (Project HAL). We define lynching exposure as being born in a county where a lynching incident involving a Black victim occurred during gestation. We posit that such exposure may have long-lasting effects on individuals' health and well-being, potentially leading to differences in longevity outcomes. This hypothesis is grounded in the understanding that traumatic events experienced during early stages of development can have enduring impacts on individuals' physiological and psychological health (Almond and Currie, 2011).

To estimate the long-term effects of in utero exposure to lynching on life expectancy, we implement a difference-in-differences model comparing the longevity of Black individuals who were exposed to a lynching incident in utero to the longevity of those exposed to a lynching just after birth, relative to the analogous difference for White individuals. The main identification assumption is that there are no systematic differences in the selection of individuals between the treatment and control groups that could be associated with their longevity later in life. This assumption is supported by the results of balancing tests for differences in observable parental characteristics between the treatment and control groups. We also considered whether any observed effects of lynching may be driven by changes in the sociodemographic composition of the mortality sample. The analysis reveals that there is no significant impact of in utero exposure to lynching on the sociodemographic composition of the mortality sample, indicating that factors such as migration or differential survival into adulthood are not the driving forces behind the results. We found a significant reduction in longevity, about 3.7 months, among Blacks who were exposed to lynching in utero. The findings suggest that in utero exposure to racial violence played a significant role in exacerbating health disparities between Black men and their non-Black counterparts. Specifically, the estimates indicate that this exposure accounted for approximately 10% of the life expectancy gap between Black and White men in 1980.

One potential explanation for the findings revolves around the severe stress and trauma experienced during pregnancy as a consequence of witnessing a lynching event, which can have long-lasting impacts on developing fetuses via multiple mechanisms. These mechanisms can be broadly categorized into two categories: culling and scarring. First, in extreme cases, in utero exposure to lynching may result in fetal demise due to the severe stress and trauma encountered by the expectant mother. Second, the intense fear, distress, and trauma associated with witnessing or being exposed to a nearby lynching during pregnancy can leave enduring scars on the developing fetus. These scars can manifest in various aspects of life, such as educational attainment, wages, and health outcomes, including increased susceptibility to diseases in adulthood (Almond and Currie, 2011).

There is suggestive evidence that the scarring effect may be the dominant explanatory factor contributing to the main results. To investigate the culling mechanism, we explored outcomes such as infant mortality rate, birth rate, and the share of births to Whites and Blacks, but found no significant effects of exposure to lynching on any of these outcomes. In addition, we used the sex ratio of populations under one, two, three, four, and five years old as a proxy for miscarriage, given the vulnerability of male fetuses to maternal stress, but found no significant effects on the probability of live births being male among the Black population. In contrast, the models showed significant negative effects of in utero exposure to lynching on the socioeconomic scores and occupational income scores of Black individuals, suggesting that this exposure may have left lasting scars on their economic prospects.

Prior research has established a link between shocks experienced during the fetal period and lasting declines in adult health, human capital, and labor market outcomes (Almond, Currie, and Duque, 2018; Barker, 1990). Building upon this body of knowledge, the current study offers significant insights into the consequences of in utero exposure to racialized violence, particularly lynching, for health outcomes, with a specific focus on disparities in longevity between Black and White individuals. By examining the long-term impacts of such exposure on mortality rates later in life, the results expand researchers' understanding of how early-life experiences contribute to health disparities during adulthood. Further, the findings have broader implications for comprehending the potential consequences of contemporary forms of violence for future health outcomes.

2. Literature Review

2.1 Relationship between in utero exposure to violence and outcomes

Research has explored the association between in utero violence and multiple outcomes, examining both short-term and long-term effects. In research on *short-term* effects, which has investigated prenatal exposures in various contexts, including terrorism (Camacho 2008), wars (Mansour & Rees, 2012), local homicides (Torche & Villarreal, 2014), and intimate partner violence (Currie, Mueller-Smith, & Rossin-Slater, 2022), studies have revealed a link between such exposures and adverse infant health outcomes, such as preterm birth and low birth weight. In studies of the *long-term* effects, prenatal exposure to violence has been associated with a wide range of health issues among adults (Lumey et al., 2011). Additionally, previous research has shown connections to education and labor market outcomes (Neelsen and Stratmann, 2011; Scholte et al., 2015; Duque, 2023) as well as disability and mortality rates (Lee, 2014). The medical literature has provided ample evidence that increased stress and insecurity act as a biological pathway linking exposure to violence to both birth and adult outcomes. Specifically, maternal stress during pregnancy triggers the hypothalamic-pituitary-adrenal (HPA) axis,[6] leading to elevated levels of corticotrophin-releasing hormone (CRH) that can pass to the placenta; high levels of CRH during pregnancy are associated with adverse birth outcomes (Steine et al. 2020; Wadhwa et al. 2004).

Both terrorism and civil conflict are linked to adverse health outcomes at birth. In an examination of the effects of landmine explosions resulting from terrorist attacks in Colombia on birth outcomes, Camacho (2008) found that pregnancies that overlapped with an explosion, which

[6] The HPA axis relates the hypothalamus (located above the brain stream), pituitary gland (located at the base of the brain), and adrenal glands (located on top of the kidneys). It is evolved as the primary basis for stress response and is involved in a wide array of body processes including energy storage, digestion, depression, and immune system response (Smith and Vale 2006).

likely induced fear and stress in pregnant mothers, resulted in reduced birth weights, and the effect was greater when the explosion occurred during the first trimester. Similarly, Mansour and Rees (2012) investigated the effects of the Palestinian-Israeli conflict on pregnancy outcomes and found that an additional conflict-related fatality during the first trimester led to a modest increase in low birth weight. Moreover, fatalities in the third trimester were also associated, although less consistently, with low birth weight. In addition, in a study of the impact of in utero exposure to terrorism in Spain on birth outcomes, Quintana-Domeque and Ródenas-Serrano (2017) found that exposure during the first trimester had detrimental effects on birth outcomes, resulting in lower than average birth weight, a higher prevalence of low birth weight, and a decreased fraction of "normal" (absence of complications during the pregnancy or labor) babies. Evidence from the United States (discussed in detail in the following section) also suggests a link between exposure to violence and adverse birth outcomes.

2.2 Racialized violence and terror and health outcomes

Prior research has also shown that racialized violence contributes to population health inequities at the time of birth. In a prominent example, people of Arab descent experienced a substantial increase in racist harassment, violence, and discrimination after the terrorist attacks of September 11 (Poynting & Noble, 2004; Padela & Heisler, 2010). Lauderdale (2006) found that infants of Arab descent born in the subsequent months had lower birth weight and higher rates of low birth weight. Similarly, a more recent study conducted by Bakhtiari (2020) revealed an increase in the incidence of low birth weight among Middle Eastern, South Asian, and Sikh mothers in California following the events of September 11.

There is also evidence that Black Americans' disproportionate exposure to police violence has negative health consequences. Chegwin et al. (2023) studied the impact of police use of force on infant health outcomes in New Jersey and identified a significant association between use of force and low birth weight among Black mothers but not White mothers. In an examination of more diffuse effects, Curtis et al. (2021) found that highly public anti-Black violence has a significant negative impact on the mental health of Black Americans.

Because of data limitations and the challenges posed by studying long-ago events, prior studies have focused primarily on contemporaneous and short-term effects. For example, data on police use of force has only been collected since 2015 (by the FBI). We seek to extend this body of knowledge by examining the long-term effects of racialized violence on a crucial health outcome: life expectancy. While mortality and longevity may be considered extreme outcomes, they serve as accurately measured proxies for cumulative health in old age (Buchman et al. 2012; Mathers et al. 2001). By focusing on life expectancy, we aim to shed light on the enduring consequences of racialized violence for individuals' health over the life course.

2.3 Lynching and the health of Black Americans

Lynching, an unlawful punishment in which a group of people, often a mob, kill someone suspected of a crime without a proper trial, is a historically prominent form of racial violence in the United States, where it was used primarily against Black Americans (Price, Darity, and Headen 2008). In the 19^{th} and 20^{th} centuries, lynching served as a tool for enforcing racial segregation and white supremacy in the Southern states. Lynchings caused deep trauma, stress, and fear in both the affected families and the broader community, producing lasting mental health effects that persisted through generations (Gaston, 2021). Recent studies show that counties with a history of lynching still face issues such as lower levels of contemporary Black voter registration (Williams, 2022) and higher levels of unemployment and poverty (Williams, Logan, & Hardy, 2021).

A limited body of research has assessed the long-term effects of exposure to lynching on various county-level outcomes. For example, Abbott et al. (2022) examined the association between historical lynching incidents and current infant mortality rates at the county level; the analysis found no evidence of an overall link between historical mob violence and contemporary infant mortality rates, but did find a significant association between mob violence against Black victims and infant mortality rates among Black infants. Messner, Baller, and Zevenbergen (2016) explored the association between historical lynching legacy and present-day homicide rates in the South. Utilizing negative binomial regression analyses, the study found a consistent positive association between past lynching frequency and the overall homicide level. Kihlström and Kirby (2021) studied the connection between historical lynchings and life expectancy in the U.S. South. The authors found that counties with no recorded lynchings had the highest average life expectancy (76.6 years), while those with the most lynchings had the lowest average life expectancy (75.5 years). These findings underscore the lasting impact of lynchings on current health outcomes in the region. Similarly, Probst, Glover, and Kirksey (2019) found lower contemporary mortality rates in counties with no history of lynching, a result that reveals a need for further research to identify the mechanisms linking historical lynching events to contemporary mortality rates and explore the structural characteristics that might contribute to disparities in mortality rates.

All these studies used county-level data, which may obscure important differences in experiences within counties and overlook the lasting impact of violence on individuals. Further, such research potentially neglects unobserved factors, such as economic conditions and social attitudes, that can contribute to observed differences in health outcomes. In contrast, our data links individuals' death records to their county of childhood residence, allowing us to explore their exposure to lynching during the critical in utero period and track their longevity later in life. By examining the long-term impacts of such exposure on longevity, the current study offers valuable insights into how early-life experiences shape health disparities during adulthood. Moreover, these findings have broader implications in that they elucidate the potential consequences of modern forms of violence for overall health outcomes.

3. Data Sources

The main data source is the death records from the Social Security Administration that are contained in the Death Master Files (DMF). These data were extracted from the CenSoc Project website (Goldstein et al. 2021). The DMF data report the deaths of male individuals that occurred from 1975-2005. The primary advantage of using DMF data rather than other data sources is that the former source is linked to the full-count 1940 U.S. census[7], which allows us to infer individuals' county-of-birth. Because our focus is on the long-term effects of the local spread of fear through mob violence, the analysis must include local-level data on place-of-birth.

A second advantage is that DMF data contain millions of observations before sample selection. Therefore, we can restrict the sample to more narrowly defined cohorts (exposure or no exposure to mob violence during gestation) and smaller geographic regions (Southern counties) while still retaining sufficient statistical power.[8] A third advantage of using the 1940-census-DMF linked sample is that the data include information on the family characteristics and socioeconomic outcomes of individuals in 1940. We can use this information to explore potential endogeneity in exposure and to identify possible mechanisms in later analyses.

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[7] One concern that may arise here is the endogenous data linking. If there are characteristics among individuals who can be linked to the death records from the original 1940 population that are correlated with their exposure to lynching as well as longevity, the selection process creates the confounding influence. To address this concern, we examine whether there is a relationship between successful 1940-census-DMF merging and our exposure measure to lynching. We report and discuss these results in Appendix F. We find no evidence to support this concern.

[8] While other data sets can be linked to the 1940 census, they have very small sample sizes. For example, the Health and Retirement Study (HRS) provides an initial linked sample of slightly more than 9,000 individuals, which is too small to divide into narrower geographical, cohort, and specifically racial groups.

As mentioned above, it is important to identify the county-of-birth to assign the local area a specific type of in utero exposure. The 1940 census contains information on county-of-residence in 1940 as well as the county-of-residence five years prior (i.e., in 1935) if the individual had moved. To increase the accuracy of the county-of-birth measure, we used the cross-census linking rules provided by the Census Linking Project (Abramitzky, Boustan, and Rashid 2020) to link data from a portion of individuals from the 1940 census back to their data from earlier censuses (1900-1930). We used the county information in the first census in which individuals were observed as the county-of-birth. For those who were not linked to any of the earlier censuses, we used county-of-residence in 1935 if applicable (if they had moved between 1935 and 1940) or the county-of-residence in 1940 as a proxy for county-of-birth. We are able to identify 76.2% observations in historical censuses and use the 1940 county as a proxy for only 23.7% observations.[9]

The lynching data were obtained from the Historical American Lynching Data Collection Project (Project HAL) and Seguin and Rigby (2019). We merged this data by county-of-birth and month-year of birth. The regression models also include county controls as well as literacy rate, average occupational income score, share of immigrants, share of females, and share of people in different age groups. These covariates were extracted from the full-count decennial censuses (from Ruggles et al. 2020) and were interpolated linearly for inter-decennial years.

We derived the main estimation sample using the following criteria: First, we excluded individuals in states that were not covered in the lynching data. Next, we limited the sample to

[9] The assignment of county of birth in this method might contain measurement errors that confound the estimates. However, in Appendix F, we provide evidence to rule out this concern. Specifically, we use the Berkeley Unified Numident Mortality Database (BUNMD) data provided by the Censoc Project (Goldstein et al. 2021). The main drawback of the BUNMD data is that its death coverage is more concentrated for post-1988 years while the DMF data starts 1975. This is the main reason that we focus on the DMF data in the paper. However, the BUNMD data reports county of birth directly without any need to infer this information. In Appendix F, we replicate the main results using the BUNMD data and discuss that the point estimates are comparable to the main results ruling out the concern regarding measurement errors related to inference of county of birth.

people born either before or more than 18 months after a specific lynching incident (see Appendix Table A-2 for details on sample derivation). Finally, we restricted the sample to those born after 1900 and before 1937.[10]

Figure 1 shows the distribution of lynching incidents across counties in the final sample, revealing that 1,211 counties have encountered at least one such incident.[11] Among these counties, 482 have experienced a singular lynching incident, while 729 have faced multiple incidents. In instances where a county has encountered more than one lynching incident, we treat each occurrence as an independent event, as precise information regarding the temporal spacing between incidents is unavailable.

Appendix Table A-1 reports summary statistics for the final sample. The average age at death in the final sample is 909 months (75.8 years). The average years of schooling in 1940 among these individuals is 7.7 years.[12] Non-Hispanic Blacks and Whites account for 28% and 70% percent of the sample, respectively. Approximately half of the individuals were exposed to a lynching incidence in utero. In the final sample, 15% of individuals were Black and were exposed to a lynching during gestation (treated observations).

4. Empirical Method

The identification strategy is a two-way fixed effects model that compares the difference in lifespan between Black individuals who were in utero during a lynching of a Black victim and those who experienced such an event in the months after birth (first difference) to the difference

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[10] Those born in the late 19th century would have had to reach age 80-90 to appear in the DMF data. Because the average life expectancy of these individuals was less than 50 years, those who reached very old ages may not represent the overall population. Therefore, we removed them from the analyses. Moreover, because lynching data do not cover the years after 1937, we removed subsequent cohorts.
[11] In Appendix C, we show that the results are robust when we drop California and Texas from the final sample.
[12] Individuals in some of these cohorts, specifically those born after 1923, had not completed their education in 1940.

in lifespan between White individuals who experienced a lynching event during those same two periods (second difference). Specifically, we estimated two-way fixed effect models of the following form:[13,14]

$$Y_{ict} = \alpha_1 + \alpha_2 Lynching_{ct} \times Black_i + \alpha_3 Lynching_{ct} + \alpha_4 Black + \alpha_5 X_{ict} + \alpha_6 Z_{ct} + \xi_c + \zeta_t + \varepsilon_{ict} \quad (1)$$

Where Y denotes the longevity of person i who was born in county c at month-year t. $Lynching$ is an indicator variable denoting exposure to a lynching incident in which the victims were Black during the prenatal period. $Black$ is an indicator variable that takes on a value of 1 if the person is Black and 0 if the person is White. The matrix X includes parental education controls (0 years, 1-12 years, and some college) and paternal occupational score dummies (below and above the sample median). The county-level controls (represented by Z) comprise several factors, including the proportion of the population in different age groups (11-18, 19-25, 26-55, >56 years old); the percentages of women, Black people, and immigrants in the population; literacy rate, average occupational score, and proportion of families with children below age 5. We also control for state-by-cohort exposure to significant historical events affecting mortality, such as the Sheppard-Towner Act, Rosenwald schools, the 1918 Flu epidemic, and the Great Depression in Appendix G.

County fixed effects (represented by ξ) control for both the observable and unobservable characteristics of each county that remain constant over time. Birth year-month fixed effects

[13] In Section 5.8, we show the results for models that include only Black Americans. These models compare the longevity of Blacks who were in utero at the time of a lynching to the longevity of those who were exposed just after birth. We find estimated coefficients that are very similar to those reported in the main results.

[14] Regressions were implemented using the ordinary least squares method. In Appendix B, we report results of models using the estimation method outlined by Sun and Abraham (2021). We find that when we considered the heterogeneity of impacts across cohorts, the effects increased in size.

(represented by ζ) are included to capture time-invariant unobserved heterogeneity that might affect birth cohorts. We clustered the standard errors at the county level to account for serial correlation in error terms.

The coefficient of interest is α_2, which estimates the impact of exposure to a lynching event during pregnancy among Black individuals. The coefficient α_3 represents the impact of exposure to lynching during pregnancy among White people and serves as a placebo test (because Black individuals experienced stress and social-emotional pressure as a result of a lynching, while White individuals presumably did not); prior research has documented the race-specific impacts of lynching (Abbott et al. 2022; Kihlström and Kirby 2021; Williams 2022).

5. Results

5.1. Balancing tests

The main assumption in the empirical strategy is that there are no systematic differences in the selection of individuals between the treatment and control groups that could be associated with longevity later in life. If there were differences in survival into adulthood by exposure to lynching between, for example, children of different socioeconomic statuses, the models would provide biased estimates that reflect (in part) endogenous survival rather than solely lynching exposure. We can empirically test this assumption using data on observable family characteristics from the 1940 census. The results in Table 1 assess the credibility of this identifying assumption by revealing whether there are any observable differences in characteristics between the treatment and control groups. Specifically, we estimated parental characteristics as a function of in utero exposure to lynching, county, and birth year-month fixed effects (as in Equation 1).

We observed small and statistically insignificant coefficients across most outcomes. For example, the double-interaction term suggests insignificant associations between lynching exposure and maternal education, paternal education, and paternal occupational income score among Blacks. We observed a similar pattern for exposure among non-Black individuals (Table 1, Row 2, representing α_3 in Equation 1). However, several coefficients were statistically significant. Among Blacks, those exposed to a lynching in utero were less likely to have a non-educated mother than those who were exposed to lynching in utero (Row 1, Column 1). This result suggests that the estimates from Equation 1 may underestimate the true effects of exposure to a lynching in utero because parental education is positively associated with old-age longevity (Huebener 2019, 2020; Noghanibehambari and Fletcher 2022b). In addition, we found a somewhat higher share of fathers with above-median occupational income scores among Blacks who were exposed to a lynching in utero, which also implies underestimation because parental socioeconomic status has a positive influence on lifecycle health and longevity (Almond, Currie, and Duque 2018; Currie 2009; Hayward and Gorman 2004; Montez and Hayward 2011). Importantly, however, these results are not consistent either across measures or for Blacks and Whites—overall, there is no consistently significant pattern in the estimated coefficients, which indicates that there are no notable differences in observable characteristics between the treatment and control groups. Thus, we do not expect to observe an association based on unobservable characteristics (Altonji, Elder, and Taber 2005; J. Fletcher, Kim, et al. 2021).

5.2. Endogenous fertility

A strand of research has shown that stress, and more specifically racial and ethnic violence, is associated with increased rates of fetal death, miscarriage, and infant mortality (Duncan, Mansour, and Rees 2017; de Oliveira, Lee, and Quintana-Domeque 2021; Quintana-Domeque and Ródenas-Serrano 2017; Sanders and Stoecker 2015). This finding raises the concern that the results might be confounded by changes in fertility and subsequent infant deaths. For example, if there were higher rates of fetal death and miscarriage among Black mothers who were living in a county where a lynching occurred, the surviving infants differ from their counterparts in ways that may impact delayed longevity.

We tested this possibility using historical county-level fertility and mortality data extracted from M. Bailey et al. (2016). One drawback of this test is that the data do not begin until 1915 and cover only a small fraction of U.S. counties.[15] We merged this data with the lynching database and conducted regressions that included county and year fixed effects. The results are reported in Table 2. We found no significant impact of exposure to lynching on the infant mortality rate (Column 1), birth rate (Column 2), or share of births to Whites and Blacks (Columns 3-4). Although the coefficient for Black mothers' fertility indicates a 2% reduction among those exposed to lynching, suggesting a small decrease in fertility likely due to miscarriages, the effect is statistically insignificant, which hinders further interpretations.

To examine the matter further, we conducted additional tests using sex ratio data from the 1900-1940 censuses (Ruggles et al., 2020). Specifically, we used the male indicator as the dependent variable in the same baseline specification used to generate the main findings. This approach uses sex ratio as a proxy for miscarriages because male fetuses are more vulnerable to the adverse effects of maternal stress in utero. A decline in the proportion of male births could indicate an increase in miscarriages (Sanders & Stoecker, 2015). The results of this test are presented in Appendix Table A-3. We found no statistically significant impact of exposure to lynching on the sex ratio.

[15] The data reports fertility for about 366 counties in 1915, 1380 counties in 1920, and 2775 counties in 1930.

5.3. Main results

The main results of regressions based on Equation 1 are reported in Table 3. The model in Column 1 includes county and birth-year-month fixed effects. We then added parental controls and county controls in the models reported in Columns 2 and 3, respectively. The estimated coefficients remained fairly robust across regressions. The fully parametrized model in Column 3 shows a 3.7-month shorter life span among Blacks who were exposed to lynching during prenatal development.

To better understand the magnitude of these intent-to-treat effects, we can compare them with the documented effects of other early-life exposures on longevity. For example, Halpern-Manners et al. (2020) implemented a twin fixed effect strategy and linked Social Security death records with historical censuses to examine the relation between education and longevity. Their results showed that one additional year of education is associated with a 3.4-month increase in longevity. Therefore, the impact of lynching exposure is roughly equivalent to the impact of one fewer years of education. Noghanibehambari and Fletcher (2022a) estimated the impact of in utero and childhood exposure to the topsoil erosion due to the Dust Bowl of the 1930s on old-age longevity. They found an intent-to-treat effect of 0.9 months and estimated an effect of 2.2 months among those whose fathers worked on farms, who were more likely to be in the treated group. Therefore, lynching exposure in utero is about 40% more harmful for longevity than exposure to the most disastrous environmental catastrophe in the 20^{th} century.

Studies that investigate the long-term impacts of lynching have found significant race-specific impacts such that the effects are concentrated exclusively among Black individuals (Abbott et al. 2022; Kihlström and Kirby 2021; Williams 2022). Thus, exploring the impacts of exposure to lynching among Whites—a subpopulation that would not have experienced any consequences if the effects are due to exposure to lynchings rather than other confounders—is informative. The main effects of lynching exposure (Row 2) in Table 3 represent the effects among Whites. The impacts are very small and statistically insignificant, which confirms prior expectations.

5.4. Age at exposure

In the main results, we focus on in utero exposures; however, children of other age groups could also be affected by lynching incidents through various channels. For example, lynching could induce a stressful environment in households, specifically among Black families. Research in various settings has linked childhood stress with later-life health and longevity (Birn et al. 2017; Goodman and Armelagos 1988; Hedges and Woon 2010; Taylor 2010). To examine the impact across other age groups, we extend the analytic sample to include cohorts exposed to lynching between the ages of 0 and 7. We then implement regressions based on the form of Equation 1.[16] The results are reported in two panels in Figure 2. The top panel shows the coefficients for the interaction between age-at-exposure and Black. The bottom panel illustrates the main effects of age-at-exposure (for non-Black individuals). We observe negative effects of exposure to lynching through age 6 for Black individuals; these effects are relatively large compared to the main effects for non-Blacks. However, the effects are larger and statistically significant for in utero exposure and exposure at age 2.

[16] Specifically, we ran regressions of the following form:

$$y_{ict} = \beta_0 + \sum_{j=-1}^{7} (\alpha_{j1} Lynching_{ct}^{j} \times Black_i + \alpha_{j2} Lynching_{ct}^{j}) + \beta_1 Black + \beta_2 X_{ict} + \beta_3 Z_{ct} + \xi_c + \zeta_t + \varepsilon_{ict}$$

where j denotes age at exposure. For example, $j = -1$ for in utero exposure to lynching, $j = 0$ for exposure at age 0-12 months, and so on.

5.5. Robustness checks

Table 4 presents results concerning the robustness of the results to alternative specifications and functional forms. Model 1 reproduces the model in Column 3 of Table 3 as a benchmark. Model 2 adds census-region-of-birth by birth-year fixed effects to account for cross-region convergence in longevity across cohorts. Model 3 controls for all linear evolution of counties' features by including county-specific trends in birth-year. The coefficients for Models 2 and 3 are very similar to those for Model 1.

Model 4 controls for seasonality in mortality by including death-month fixed effects (Marti-Soler et al. 2014; Seretakis et al. 1997). The results are almost identical to those for Model 1. Model 5 accounts for cross-state migration by implementing comparisons among migrants and non-migrants, separately. Specifically, we include birth-state by state-of-residence in 1940 fixed effects. The results remain robust. Model 6 allows for time-invariant features of counties to have a differential effect on Blacks and Whites by including county-by-race fixed effects. The results are comparable to those of Model 1.

To explore functional form sensitivity, Model 7 replaces the outcome with the log of age-at-death. The resulting effect is 0.41%, which is similar to the implied percentage change of the double-interaction term in Model 1 with respect to the mean of age-at-death (3.7 off a mean of 909.6). Therefore, there is little concern regarding nonlinearity issues. To further address the possibility of nonlinearity in the effects, Model 8 uses an alternative outcome that indicates longevity beyond age 70 (0 = age at death ≤ 70; 1 = age at death > 70). The double-interaction term suggests that among Blacks, lynching exposure is associated with a 1.2 percentage point reduction in the probability of living beyond age 70, off a mean of 0.7.

Model 9 adds individual education dummies and Model 10 includes a series of additional county-of-birth controls to account for sociodemographic and other socioeconomic characteristics of counties. The estimated effects are almost identical to those in the main results.

Model 11 uses two-way clustering with clusters at county and birth-year levels to account for both serial and spatial correlations in error terms. The results follow the same pattern of significance as those in Model 1.

Finally, in model 12, we implement the Heckman two-step correction method (Heckman, 1979). In so doing, we start with the original population of 1940 census and implement the same sample selection as in section 3. We then merge this with our final sample to observe which individuals appear in the final sample from their respective population. The Heckman method addresses the concern of the systematic difference between matched individuals and unmatched observations from the original population. The method estimates selection process by regressing the successful merging on a series of observable characteristics. It then calculates the Inverse Mills Ratio (IMR) as a variable that contains information on selection bias. In the second stage, the method implements the original regression equation and adds IMR as an additional control variable to control for potential selection bias. As reported in column 12, we find a difference-in-difference coefficient comparable to the main results of column 1. The point estimate is slightly larger than that of column 1 suggesting that selection bias may underestimate the true effects.

5.6. Truncation

The DMF data, which covers death records from 1975-2005, is truncated from left and right. One concern is the possible confounding influence of earlier and later deaths. For example, if the delayed impacts of the pregnancy insult appear during early adulthood rather than at older ages, including deaths prior to 1975 might produce much larger coefficients. Similarly, if the effects are revealed at very old ages, the main results may underestimate the true effects because the data do not include deaths that occurred after 2005.

While data limitations make it difficult to test this concern directly, we implemented a simulation analysis to gauge the relative under- or over-estimation of the main results. In this analysis, we generated a fake dataset of individuals randomly distributed among cohorts, counties, and racial groups. To members of each cohort, we assigned their cohort-level average life expectancy and a random error. We then treated this as the primary data source and implemented the same sample selections as described in Section 3. We assigned an arbitrary treatment effect of 3.7 months to Black people who were exposed to a lynching event (paralleling the results in Table 3). We then conducted the same regressions as in the main analysis but limited the sample to various death-year windows to observe how the effects varied when the sample was truncated. The results are reported in Appendix Table D-1. We started with the full sample and then removed the cohorts born before 1940, 1950, 1960, 1970, and 1975 (results shown in Columns 1-6, respectively). In the final column, we restricted the sample to death years included in DMF data (i.e., 1975-2005). Comparing the double-interaction coefficient across columns suggests that truncation may underestimate the true effects for the death years of 1940-2020 through 1970-2020, although the extent of the underestimation is not substantial. In contrast, the coefficients in the last two columns are slightly higher than those in Column 1. The coefficient in Column 7 is only 13% larger than the coefficient for the model using the full death years (Column 1). Overall, the results of this simulation exercise do not raise significant concerns about endogeneity caused by truncation.

5.7. Mechanisms

The stress resulting from exposure to a lynching event during pregnancy can have lasting effects on a developing fetus through various mechanisms, which can be broadly categorized as either *culling* or *scarring* mechanisms. First, in extreme cases, in utero exposure to lynching may lead to fetal demise, resulting from the severe stress and trauma experienced by the expectant mother. Severe emotional distress, fear, and anxiety can trigger physiological responses such as increased heart rate, blood pressure, and the release of stress hormones like cortisol (Kinsella & Monk, 2009). Prolonged exposure to heightened stress levels can have detrimental effects on the developing fetus, potentially leading to miscarriage or stillbirth. Second, exposure to lynching during pregnancy can have profound and enduring effects on the developing fetus. Research suggests that fetuses can perceive and respond to external stimuli, including the mother's emotional state and experiences (Goodlin & Schmidt, 1972). The intense fear, distress, and trauma associated with witnessing or being exposed to a nearby lynching can have a lasting impact on the developing fetus, which can manifest in various aspects of life, such as educational attainment, wages, and health, including susceptibility to diseases later in adulthood (Almond and Currie, 2011).

Unfortunately, the scarcity of available data has hindered researchers' ability to directly test and differentiate the culling and scarring mechanisms—there are no documented detailed surveys focused on the health of both mothers and infants during the early 1900s. To explore these dynamics, we turned to three individual-level measures from the 1940 census: schooling, socioeconomic score, and occupational income score. Several studies have suggested that maternal stress and mental pressure influence developmental outcomes, education, and later-life socioeconomic measures (Caruso and Miller 2015; Noghanibehambari 2022; Vaiserman 2015). Because socioeconomic outcomes contribute to health and longevity, they could operate as potential mediatory channels (Chetty et al. 2016; Salm 2011). Thus, we use schooling, socioeconomic score, and occupational income score as the outcomes in Equation 1; results are reported in Table 5. The coefficient of in utero exposure to lynching among Blacks (the interaction term) is negative, although it is not statistically significant, which limits further interpretation. Further, exposure among Blacks is associated with 0.6-unit and 0.3-unit reductions in the socioeconomic score and occupational income score, respectively (Columns 2-3). These coefficients represent drops of about 2.7% (socioeconomic score) and 1.7% (occupational income score) with respect to the means of these outcomes.

5.8. Result with Black Subsample

In this section, we present the estimation of regressions similar to Equation 1 for the subsample of Black individuals. These regressions estimate changes in longevity for those individuals who were in utero versus those who were born just after a lynching incidence. Specifically, we implemented the following regressions:

$$y_{ict} = \alpha_1 + \alpha_2 Lynching_{ct} + \gamma_1 X_{ict} + \gamma_2 Z_{ct} + \xi_c + \zeta_t + \varepsilon_{ict} \quad (2)$$

where all parameters are as in Equation 1. We started by conducting a series of balancing tests to examine the association between lynching and observable family characteristics. The results, reported in Table 6, do not reveal a significant pattern of associations, which supports the exogeneity of variations in lynching incidences.

Next, we report the main results for the subsample of Black individuals across the columns of Table 7. The results of the fully parametrized model in Column 3 suggest a reduction in longevity of about 3.2 months due to in utero exposure to lynching. This finding is very similar to the estimates in the main results of the paper, shown in Table 3.

6. Conclusion

Several studies have examined the negative short-term impacts of racism and racial violence on various social and health outcomes (Jones, Troesken, and Walsh 2017; Kramer et al. 2017; Mujahid et al. 2021; Probst, Glover, and Kirksey 2019). The current study extends the scope of this literature by examining the long-term effects of racial violence. Specifically, we examined how maternal exposure to racial violence during pregnancy affects the child's longevity during adulthood and old age. We exploited county-level variation in the incidence of mob violence and lynching, with a focus on Black infants.

We employed Social Security Administration death records linked to the full-count 1940 census and implemented difference-in-differences models. The results showed that, among Black infants, pregnancy overlap with lynching is associated with an approximately 3.7-month reduction in later-life longevity. Further analyses suggested that this effect is not driven by changes in the socioeconomic composition of the sample and that exposure is not correlated with other observable determinants of longevity. Two-way fixed effect models using a comparison group of Black infants with in utero exposure to a lynching incident with non-Black victims showed a similar reduction in longevity of 3.7 months. Finally, placebo tests found small and statistically insignificant impacts of exposure to lynchings with Black victims on longevity among Whites.

In sum, this research reveals the enduring and profound impacts of historical racial violence on the later-life longevity of Black individuals. The results have significant implications given the persistence of racial violence in the United States and the extent of new sources of exposure to such violent events, namely video recordings and social media. The identified reduction in longevity among Black infants exposed to lynching suggests that high-profile contemporary incidents of violence, such as police use of excessive force against Black individuals, may also have lasting consequences. It is imperative for policymakers and law enforcement to acknowledge the fundamental importance of addressing systemic racism at its roots and to develop effective interventions. Only by doing so can U.S. society move toward ending the persistent impacts of racial violence.

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Tables

Table 1 – In Utero Exposure to Lynching and Observable Parental Characteristics, Two-Way Fixed Effects Model

	Outcomes:										
	Mother's education zero	Mother's education 1-12 years	Mother's education college	Mother's education missing	Father's education zero	Father's education 1-12 years	Father's education college	Father's education missing	Father's occupational income score below median	Father's occupational income score above median	Father's occupational income score missing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
In utero exposure to lynching × Black	-.00637**	.00954	.00069	-.00386	-.00028	.00786	-.00119	-.00639	-.00515	.00952**	-.00437
	(.00291)	(.00674)	(.00179)	(.00627)	(.00346)	(.00667)	(.00175)	(.00656)	(.00721)	(.00389)	(.00642)
In utero exposure to lynching	.00165	-.00779*	.00043	.0057	-.00018	-.01066***	.00068	.01017***	-.00513	-.00364	.00878**
	(.00129)	(.00415)	(.0014)	(.00394)	(.0014)	(.00369)	(.00143)	(.00346)	(.00345)	(.00254)	(.00343)
Black	.01977***	-.05227***	-.02589***	.05839***	.01973***	-.08382***	-.02138***	.08547***	.02029**	-.10729***	.087***
	(.00288)	(.00678)	(.00235)	(.00679)	(.00303)	(.00614)	(.00268)	(.00725)	(.00793)	(.00832)	(.00707)
Observations	86910	86910	86910	86910	86910	86910	86910	86910	86910	86910	86910
R-squared	.04412	.36186	.04633	.41586	.04378	.34247	.04917	.40066	.25	.2143	.40799
Birth-year-month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2 – The Effects of Lynching on County-Level Fertility and Infant Mortality

	Outcomes:			
	Infant mortality rate (per 1,000)	Births per 1,000 women	Share of White births	Share of Black births
	(1)	(2)	(3)	(4)
In utero exposure to lynching	.78576	.43902	.01031	-.01031
	(1.80804)	(.60212)	(.01174)	(.01174)
Observations	231	231	199	199
R-squared	.91576	.98851	.96706	.96706
Mean DV	71.532	36.294	0.543	0.457
% Change	1.098	1.210	1.899	-2.257
Birth-year-month FE	✓	✓	✓	✓
County FE	✓	✓	✓	✓
County-level controls	✓	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses. County covariates include share of population in different age groups, share of different occupations, share of females, share of blacks, share of immigrants, and literacy rate. Regressions are weighted using county level population. FE = fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Table 3 – In Utero Exposure to Lynching and Later-Life Longevity, Two-Way Fixed Effects Model

	Outcome: Age at death (months)		
	(1)	(2)	(3)
In utero exposure to lynching × Black	-3.6109**	-3.6144**	-3.6884**
	(1.6884)	(1.6997)	(1.6939)
In utero exposure to lynching	.2542	.2574	.3275
	(.841)	(.8424)	(.8386)
Black	-2.1834	-2.1193	-2.1111
	(1.5219)	(1.5429)	(1.5355)
Observations	86910	86910	86910
R-squared	.3094	.3095	.3096
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental Controls		✓	✓
County-level controls			✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Table 4 - Robustness Checks

	Outcome: Age at death (months)											
	Column 3 of Table 3	Adding region-by-birth-year FE	Adding county trend	Adding death-month FE	Adding birth-state by 1940-state FE	Adding county-by-race FE	Outcome: Log age at death	Outcome: Age at death > 70 years	Adding individual controls	Adding more county controls	Two-way clustering on county and birth-year	
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	
In utero exposure to lynching × Black	-3.6884**	-3.6187**	-3.2451*	-3.6535**	-3.6202**	-3.4519**	-.0041**	-.0118*	-3.6578**	-3.7116**	-3.7116*	-4.1227**
	(1.6939)	(1.6886)	(1.7118)	(1.6993)	(1.6931)	(1.7267)	(.0019)	(.0067)	(1.6939)	(1.6889)	(2.0814)	(1.7596)
In utero exposure to lynching	.3275	.2781	.2194	.3532	.3202	.3003	.0003	.0017	.3291	.332	.332	1.1747
	(.8386)	(.8463)	(.8822)	(.8391)	(.8365)	(.8418)	(.0009)	(.0038)	(.8376)	(.8339)	(.8193)	(1.1573)
Black	-2.1111	-2.1572	-2.3701	-2.1171	-1.8268	-	-.0027	-.0131**	.7025	-2.0924	-2.0924	-1.6798
	(1.5355)	(1.5292)	(1.5561)	(1.527)	(1.5664)		(.0017)	(.0052)	(1.7402)	(1.5347)	(1.8843)	(1.588)
Observations	86910	86906	86910	86910	86826	86876	86910	86910	86910	86910	86910	841465
R-squared	.3096	.3099	.3149	.3102	.3146	.3148	.3158	.205	.3108	.3098	.3098	--
Birth-year-month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on county (except Column 11), are in parentheses. All regressions include parental controls and county controls. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. Controls in Column 9 include dummies for education in 1940. County controls in Column 10 include share of homeowners, share of married, share of children, and average occupational income score. All controls and fixed effects are added to those in Column 1. FE = fixed effects.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5 - Mechanism Channels: In Utero Exposure to Lynching and Later-Life Education and Socioeconomics Status

	Outcomes:		
	Schooling	Socioeconomic score	Occupational income score
	(1)	(2)	(3)
In utero exposure to lynching × Black	-.0669 (.0522)	-.5977* (.3082)	-.3454** (.1555)
In utero exposure to lynching	.0408 (.0325)	.4214* (.2307)	.2057* (.1112)
Black	-3.1524*** (.1271)	-13.4227*** (.7979)	-5.6995*** (.3112)
Observations	84678	67233	68114
R-squared	.3668	.1895	.2674
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental Controls	✓	✓	✓
County-level controls	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Table 6 – In Utero Exposure to Lynching and Observable Parental Characteristics, During Versus After Pregnancy Model

	Outcomes:										
	Mother's education zero	Mother's education 1-12 years	Mother's education college	Mother's education missing	Father's education zero	Father's education 1-12 years	Father's education college	Father's education missing	Father's occupational income score below median	Father's occupational income score above median	Father's occupational income score missing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
In utero exposure to lynching	-.004 (.0025)	.0043 (.0054)	.0005 (.0009)	-.0009 (.0057)	.0013 (.0033)	-.0008 (.0056)	-.0013 (.001)	.0008 (.0061)	-.0029 (.0059)	.002 (.0023)	.0009 (.0061)
Observations	24488	24488	24488	24488	24488	24488	24488	24488	24488	24488	24488
R-squared	.0805	.3737	.066	.3969	.0951	.3239	.0592	.3682	.344	.1004	.3767
Birth-year-month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7 – In Utero Exposure to Lynching and Later-Life Longevity, During Versus After Pregnancy Model

	Outcome: Age at death (months)		
	(1)	(2)	(3)
In utero exposure to lynching	-3.2156** (1.5041)	-3.1702** (1.5112)	-3.1256** (1.5239)
Observations	24488	24488	24488
R-squared	.3373	.3379	.3383
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental controls		✓	✓
County-level controls			✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Online Appendix

Prenatal Exposure to Racial Violence and Later-Life Mortality among Males: Evidence from Lynching

Hoa Vu Hamid Noghanibehambari Jason Fletcher Tiffany Green

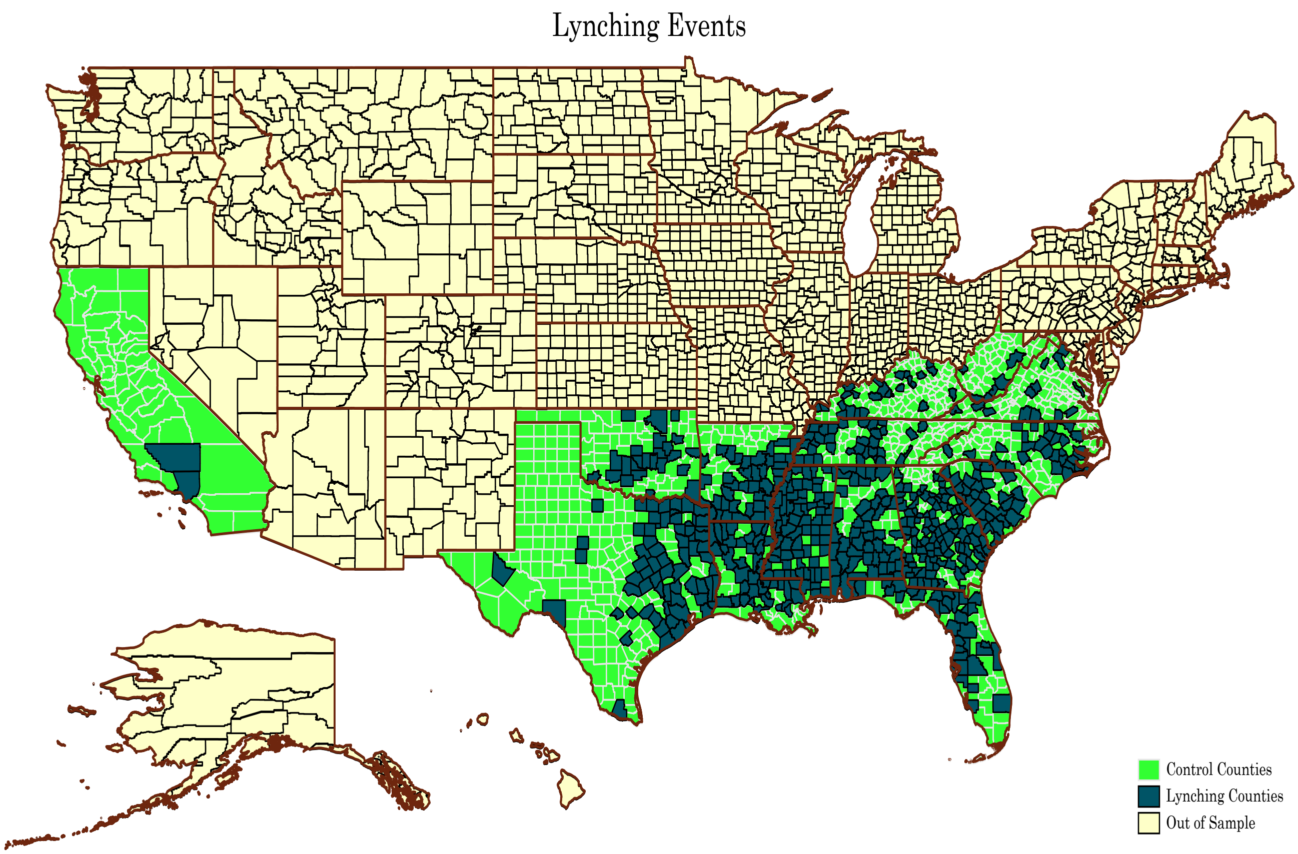

Figure 1 - Map of Lynching Events by County in the Final Sample

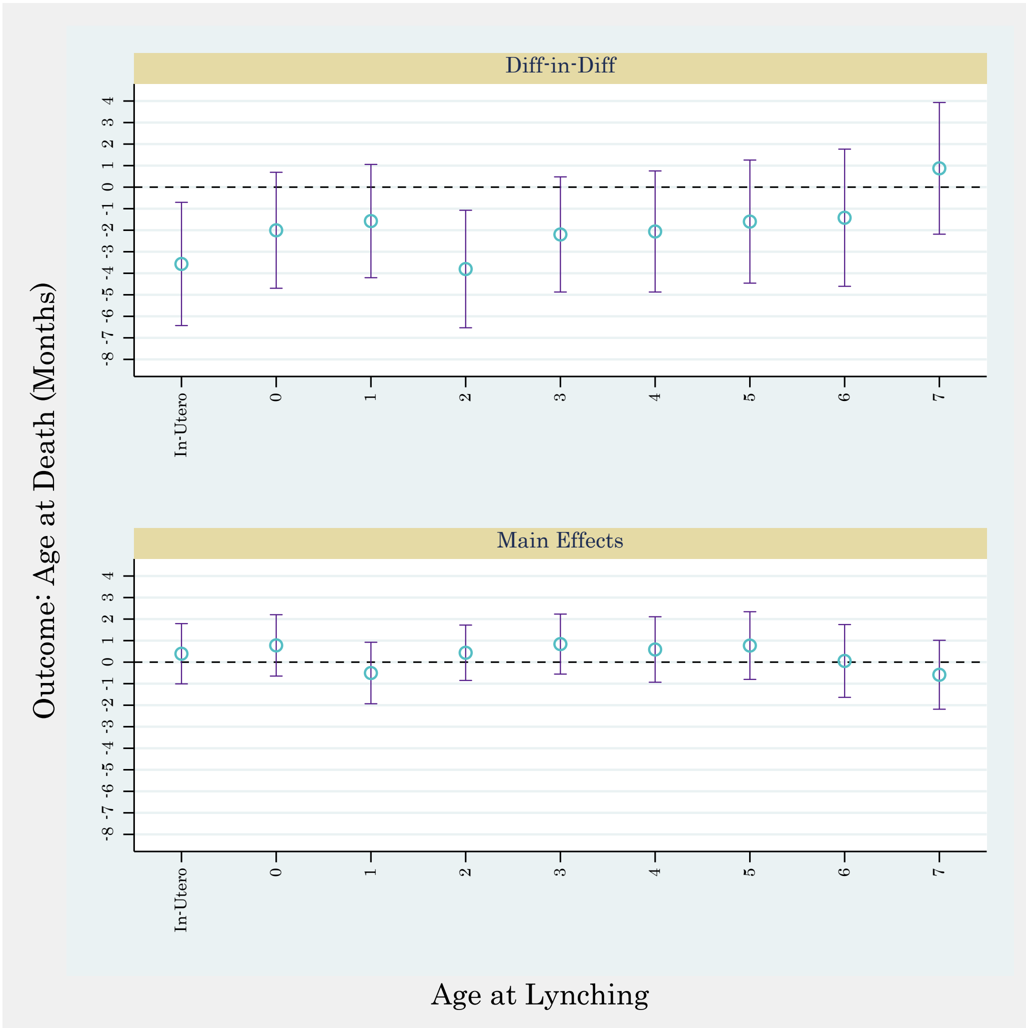

Figure 2 - Effects of Lynching by Age at Exposure

Appendix A

Appendix Table F-1 - Summary Statistics

	Mean	SD	Min	Max
Age at death (months)	909.6314	113.234	475	1269
Log age at death	6.8049	.1291	6.1633	7.146
Age at death > 70 years	.7048	.4561	0	1
Year of birth	1913.6852	8.0639	1900	1937
Year of death	1989.5	8.4566	1975	2005
Black × in utero exposure to lynching	.1452	.3523	0	1
In utero exposure to lynching	.519	.4996	0	1
Non-Hispanic Black	.2823	.4501	0	1
Non-Hispanic White	.7015	.4576	0	1
Years of schooling	7.699	3.8078	0	20
Socioeconomic index	22.6852	19.4734	3	96
Occupational income score	20.2119	10.0944	3	80
Mother's education zero	.0204	.1414	0	1
Mother's education 1-12 years	.3416	.4743	0	1
Mother's education college	.0227	.1489	0	1
Mother's education missing	.6153	.4865	0	1
Father's education zero	.0235	.1515	0	1
Father's education 1-12 years	.2756	.4468	0	1
Father's education college	.0214	.1446	0	1
Father's education missing	.6795	.4667	0	1
Father’s occupational score below median	.2196	.414	0	1
Father’s occupational score above median	.1093	.312	0	1
Father’s occupational score missing	.6711	.4698	0	1
Observations		86,921		

Appendix Table A-2 - Sample Derivation

Number of individuals in the DMF sample	N = 6,003,269
Exclude individuals in states not in the lynching database	n_1 = 4,202,351
Exclude individuals born before 1900 or after 1937	n_2 = 187,275
Exclude individuals born before or more than 18 months after a specific lynching incident	$n_3 = 1{,}523{,}733$
Final sample	$N - n_1 - n_2 - n_3 = 89{,}910$

Notes: DMF = Death Master File

Appendix Table A-3 - The Effects of Lynching on Gender Ratio

	Outcome: Indicator of being male				
	Age ≤ 1	*Age* ≤ 2	*Age* ≤ 3	*Age* ≤ 4	*Age* ≤ 5
	(1)	(2)	(3)	(4)	(5)
In utero exposure to lynching	0.0493	0.0013	-0.0100	-0.0077	0.004
	(0.0371)	(0.0301)	(0.0273)	(0.023)	(0.0193)
Observations	2,761	4,421	5,735	7,066	8,802
R-squared	0.1152	0.0847	0.0769	0.0750	0.0645
Mean DV	0.487	0.506	0.509	0.504	0.503
Birth-year-month FE	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓
County-level controls	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses. County covariates include share of population in different age groups, share of different occupations, share of females, share of blacks, share of immigrants, and literacy rate. Regressions are weighted using personal weight. FE = fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Appendix B

In the main analyses of the paper, we focus on birth cohorts who were in utero or whose pregnancy occurred in the months shortly after a lynching. This approach assumes similar impacts of lynching across cohorts. However, the effects could be heterogenous. As an alternative to OLS models, we use the estimation method proposed by Sun and Abraham (2021), which relaxes this assumption and allows for effects to be heterogenous across cohorts. The results are reported in Appendix Table B-1. The interaction effect is about 27% higher than those reported in Table 3. Therefore, the estimations in the main results likely underestimate the true effects due to potential heterogeneity in effects.

Appendix Table B-1 – Replication of the Main Results Using Sun and Abraham (2021) Estimates

	Outcome: Age at death (months)		
	(1)	(2)	(3)
In utero exposure to lynching × Black	-4.7977*** (1.3045)	-4.7322*** (1.2829)	-4.7305*** (1.2871)
In utero exposure to lynching	.8465 (.8249)	.8236 (.8297)	.8918 (.8266)
Observations	86910	86910	86910
R-squared	.3094	.3095	.3096
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental controls		✓	✓
County-level controls			✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix C

One concern regarding the final analytic sample is the influence of larger states such as California and Texas. As shown in Figure 1, California is geographically separated from the other states in the final sample and experienced a relatively lower lynching rate than the other states. Moreover, Texas has historically had a lower share of Black individuals than the other states in the final sample. In Appendix Table C-1, we examine the robustness of the results to excluding these states. In Column 1, we replicate Column 3 of Table 3. In Columns 2-3, we drop California and Texas from the models. We observe relatively robust estimates in the subsamples relative to the full sample.

Appendix Table C-1 – Robustness to Excluding California and Texas

	Outcome: Age at death (months)		
	Full sample	Drop California	Drop Texas
	(1)	(2)	(3)
In utero exposure to lynching × Black	-3.6884** (1.6939)	-3.6335** (1.6924)	-3.7786** (1.7301)
In utero exposure to lynching	.3275 (.8386)	.2816 (.8464)	.2175 (.9529)
Black	-2.1111 (1.5355)	-2.2173 (1.5351)	-1.6247 (1.6504)
Observations	86910	84350	74053
R-squared	.3096	.2945	.307
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental controls	✓	✓	✓
County-level controls	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Appendix D Truncation Issue

Appendix Table D-1 - Exploring Possible Effects of Truncation Using a Simulated Data Set

	Outcome: Age at death (months), subsamples:						
	Full sample	Death year > 1940	Death year > 1950	Death year > 1960	Death year > 1970	Death year ≥ 1975	Death Year ≥ 1975 & death year ≤ 2005
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
In utero exposure to lynching × Black	-3.8437**	-2.0755	-2.9183	-2.0837	-3.3784	-4.7119*	-4.3105*
	(1.8962)	(1.8234)	(1.8867)	(1.9964)	(2.3391)	(2.5048)	(2.2097)
In utero exposure to lynching	.4257	.7591	.8935	.4183	.1704	-.1143	.474
	(.7518)	(.71)	(.68)	(.6624)	(.7734)	(.732)	(.7058)
Black	-1.0022	-2.2084	-1.5643	-2.2268	-.1164	1.2104	.4458
	(1.5534)	(1.5224)	(1.6147)	(1.6618)	(1.7805)	(1.9766)	(1.7518)
Observations	281780	265683	226936	164337	96571	67926	66584
R-squared	.0698	.0416	.0321	.0792	.1601	.2026	.2673
Birth-year-month FE	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on county, are in parentheses. FE = fixed effects.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix E

In the paper, we used the information in 1940 with linking to historical censuses to infer county of birth. The Censoc project provides an alternative data source that contains the information on county of birth as reported in death records. The Berkeley Unified Numident Mortality Database (BUNMD) data covers death records to both genders. Although the data starts much earlier than the DMF data, its coverage is extremely limited prior to 1980s. Indeed, about 90% of the records lie in the death years of post-1988. Another drawback is that it does not link to the 1940 census, hence we are unable to extract further individual and family characteristics. Due to these limitations, in the paper were mainly focused on the DMF analysis. However, in this appendix, we show the results using the BUNMD data. We employ similar regressions and report the results in Appendix Table E-1. The difference-in-difference coefficient suggests a reduction of about 2.3 months due to exposure to lynching among Blacks. This is comparable to the point estimates using the DMF data. This is also in line with our analysis of section 5.6 that suggests the exclusion of earlier deaths due to data truncation may underestimate the point estimates. However, the important take from this table is that the assignment of county of birth (inferred from historical censuses and 1940 census) is not likely to have confounded the estimates.

Appendix Table E-1 - Replicating the Main Results Using BUNMD Data with Exact County-of-Birth Information

	Outcome: Age at death (months)		
	(1)	(2)	(3)
In utero exposure to lynching × Black	-2.2925** (1.0689)	-2.2694** (1.0693)	-2.3171** (1.0757)
In utero exposure to lynching	-.2905 (.6018)	-.297 (.6)	-.2197 (.5997)
Black	-11.459*** (1.123)	-23.0448*** (2.4001)	-23.069*** (2.4013)
Observations	180097	180097	180097
R-squared	.3257	.3259	.326
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental controls		✓	✓
County-level controls			✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Appendix F

One concern in interpreting the results is the potential confounding influence of endogenous data linking. For instance, if people of lower socioeconomic status are more likely to be in the DMF-census linked sample and at the same time have higher probability of exposure to lynching, the results may overstate the true effects as these people usually have lower longevity for other reasons. We can empirically test this concern and explore whether those with higher exposure to lynching are more likely to appear in the DMF-census data. In so doing, we start by the original population of the full count 1940 census and implement the same sample selection criteria as in section 3. We then merge this with our final sample at the individual level and generate a dummy variable that indicates successful merging. We then regress this successful merging dummy on the exposure measures of equation 1, conditional on covariates and fixed effects. The results are reported in Appendix Table F-1. We observe very small and statistically insignificant coefficients. For instance, the difference-in-difference coefficient of column (3) suggests a 8.9 basis-points change in the probability of successful merging. This only represents 0.8% change with respect to the mean of the outcome, although statistically significant at 10% level it is economically quite small in magnitude. The overall results of this table do not point to a significant concern for endogenous data merging.

Appendix Table F-1 - Exposure to Lynching and Endogenous Data Linking

	Outcome: successful merging between DMF and 1940 census		
	(1)	(2)	(3)
In utero exposure to lynching × Black	-.00148	-.00285	-.00089*
	(.0039)	(.00261)	(.0005)
In utero exposure to lynching	.00246	.00534	.00007
	(.00561)	(.00382)	(.00087)
Black	-.02735***	-.01877***	.00071**
	(.00337)	(.00305)	(.0003)
Observations	841465	841465	841465
R-squared	.02397	.33222	.99282
Mean DV	0.103	0.103	0.103
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Parental controls		✓	✓
County-level controls			✓

Notes. Standard errors, clustered on county, are in parentheses. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. FE = fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Appendix G

Our results remain robust when we account for significant historical events affecting mortality, such as the Sheppard-Towner Act, Rosenwald schools, the 1918 Flu epidemic, and the Great Depression. In Appendix Table G-1, we examine the robustness of the results to including controls for exposure to these events. The results in Appendix Table G-1 closely align with the main findings.

Appendix Table G-1 - Robustness to Account for Historical Events as Possible Confounders

	Outcome: Age at death (months)		
	(1)	(2)	(3)
In utero exposure to lynching × Black	-3.6168**	-3.6202**	-3.6891**
	(1.6873)	(1.6986)	(1.6934)
In utero exposure to lynching	.2655	.2687	.3291
	(.84)	(.8414)	(.8385)
Black	-2.1818	-2.1195	-2.1111
	(1.5218)	(1.5431)	(1.5356)
Observations	86910	86910	86910
R-squared	.3094	.3095	.3096
Birth-year-month FE	✓	✓	✓
County FE	✓	✓	✓
Historical events controls	✓	✓	✓
Parental controls		✓	✓
County-level controls			✓

Notes. Standard errors, clustered on county, are in parentheses. All regressions include parental controls and county controls. Parental controls include dummies for maternal education, paternal education, and paternal socioeconomic status. County covariates include share of population in different age groups, share of different occupations, share of females, share of Blacks, share of immigrants, and literacy rate. Historical events controls include exposure to Sheppard-Towner Act, Rosenwald schools, 1918 Flu epidemic, and the Great Depression. FE = fixed effects.
*** p<0.01, ** p<0.05, * p<0.1