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The Impact of Homicide on State-Level Life Expectancy and Lifespan Inequality in the US, 1968–2020

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Abstract

While life expectancy losses due to homicide are well-documented in the US, their simultaneous effect on lifespan inequality remains underexplored. Therefore, this study examines the impact of homicide on life expectancy and lifespan inequality at the state level in the US from 1968 to 2020, employing Theil's entropy index to measure lifespan inequality. Using a Panel-Corrected Standard Errors (PCSE) econometric model, we also analyzed the demographic, socioeconomic, and policy factors influencing these outcomes. We found substantial regional disparities, with Southern states consistently exhibiting the highest life expectancy losses and lifespan inequality increases due to homicide. Demographic factors, such as a higher proportion of high school graduates, are associated with reduced impacts of homicide, while higher percentages of Black populations and percentage of population 25-34 age group correlate with larger effects, reflecting systemic inequities in exposure to violence. Furthermore, corrections and judicial spending influence both life expectancy and lifespan inequality. Police and health spending mitigate lifespan inequality, while welfare expenditures often correlate with higher inequality, likely reflecting underlying socioeconomic vulnerabilities. Our results emphasize the need for integrated, evidence-based policy approaches targeting structural inequalities and specific demographic vulnerabilities. Strategies such as youth violence prevention, education-focused interventions, and community-based justice reforms are likely to be critical for mitigating homicide's impact. This work underscores homicide's dual role as a public health and societal challenge, calling for tailored policies to address both immediate and systemic factors driving violence.

Keywords

Lifespan inequality

Theil index

Homicide

Socioeconomic factors

United States

JEL Classification

I14

I18

I38

1. Introduction

The homicide rate in the United States has fluctuated significantly over the decades, shaped by various social, economic, and political factors. During the early 1980s, homicide rates peaked at over 10 per 100,000 people, followed by a notable decline beginning in the mid-1990s and continuing into the early 2000s (Levitt, 2004; Blumstein et al., 2000; Cooper & Smith, 2011). However, recent years have seen a resurgence in violent crime, particularly homicides. In 2020, the US experienced a nearly 30% increase in homicides, the largest single-year increase ever recorded (Zimmerman et al., 2024). Regionally, from 2019 to 2020, homicide rates increased in 46 states, with only Alaska, Maine, New Hampshire, and New Mexico reporting declines (Petrosky et al., 2020). This resurgence underscores ongoing challenges in addressing violent crime effectively, with the US consistently ranked as having among the highest homicide rates across developed nations (Riedel & Dirks, 2022).

Some studies have explored the prevalence and distribution of homicide rates, revealing critical insights into racial disparities, geographic variation, and other influencing factors (Buyukozturk et al., 2018; Gobaud et al., 2022; Zimmerman et al., 2024). Key determinants such as age, race or ethnicity, and firearm laws are frequently analyzed to better understand the dynamics of homicide rates (Cooper & Smith, 2011; Rosenfeld & Fox, 2019; Kalesan et al., 2016). For instance, Blumstein (1995) and Cooper & Smith (2011) found that homicide rates are disproportionately higher among adolescents and young adults and that Black/African American communities experience higher homicide victimization rates compared with White populations (Cooper & Smith, 2011; Rosenfeld & Fox, 2019). Studies also indicate that comprehensive firearm regulations are generally associated with lower firearm-related homicide rates (Kalesan et al., 2016; Wintemute, 2015).

A growing body of literature highlights that the consequences of homicide extend far beyond the immediate loss of life, leaving profound social, psychological, and economic impacts on victims' families and communities. For instance, Chapman and Dixon-Gordon (2007) noted that bereaved family members often face psychological distress, including depression, anxiety, anger, and guilt. These effects can manifest in social and behavioural challenges such as aggression, suicidal ideation, and difficulties in school or the workplace. Financially, the economic burden of homicide including funeral costs, medical expenses, criminal justice expenditures, and losses in productivity falls heavily on survivors, employers, and taxpayers. For example, in 2019, the estimated economic cost of fatal injuries from homicides and suicides in the U.S. was $670 billion (Peterson et al., 2021). Additionally, homicide can have a substantial impact on life expectancy. For example, increases in violence-related deaths among young men (ages 15–39) have slowed gains in male life expectancy in Venezuela (García and Aburto, 2019) and Mexico (Aburto and Beltrán-Sánchez, 2019).

While life expectancy provides valuable insights into population health, it can often mask underlying disparities in the distribution of the length of life (Wijesinghe et al., 2024). Lifespan inequality, or variability in age at death, offers a critical perspective by highlighting health disparities and vulnerabilities that life expectancy may fail to capture. Greater lifespan inequality reflects heightened uncertainty about the timing of death, which carries profound psychological and economic consequences. Edwards (2013) argues that, due to general risk aversion, individuals are often willing to trade potential additional years of life for greater certainty regarding their lifespan. When lifespan inequality diverges across socioeconomic groups, it underscores a less-discussed dimension of inequality: those from privileged backgrounds can plan their lives with more confidence, while disadvantaged groups face greater unpredictability in survival. This uncertainty complicates key life decisions, including education, employment, and retirement planning (Brown et al., 2012). For individuals with greater uncertainty, preparing for the future becomes a more stressful and complex process.

At the societal level, lifespan inequality reveals the heterogeneity of health outcomes within a population. High inequality indicates that distinct segments of society experience vastly different health realities. This information is critical for designing effective public policies. From a public health perspective, rising lifespan inequality signals the ineffectiveness of measures intended to protect populations from adverse outcomes. In the context of homicide, increased lifespan inequality may highlight the failure of social protection policies to reduce violent crime and safeguard vulnerable groups.

Despite its importance, the intersection of lifespan inequality and homicide has received limited scholarly attention. Notable exceptions include García and Aburto (2019), who examined the relationship in Venezuela, and Aburto and Beltrán-Sánchez (2019), who conducted a similar study in Mexico, both identifying that increases in homicide contributed significantly to rising lifespan inequality. These findings emphasize the need to explore this relationship further, particularly in contexts where homicide is a significant public health concern, such as in the US. While the impact of homicides on life expectancy and potential years of life lost is well documented at the national level in the US, less is known about the effects of homicide simultaneously on life expectancy and lifespan inequality at the state level.

Therefore, our research addresses two key questions:

1. What is the impact of homicide on life expectancy and lifespan inequality at the state level in the US?
2. What are the socioeconomic and demographic determinants of the impact of homicide on life expectancy and lifespan inequality?

Through this analysis, this article makes two main contributions. First, it advances the literature on life expectancy and lifespan inequality by emphasizing the role of homicide in shaping these outcomes. While most extant studies focus on social determinants of health, such as socioeconomic status or educational attainment, this study highlights how homicide mortality directly affects lifespan inequality and life expectancy. By analyzing these relationships by sex at the state level, this research provides critical insights for policymakers in the US and other nations struggling with similar challenges. Second, this analysis deepens our understanding of lifespan inequality at the regional level, revealing variations across states and the broader implications of these disparities. Policymakers and researchers must recognize that addressing lifespan inequality is not just a health imperative but also a societal one, as it reflects underlying vulnerabilities and inequities.

The remainder of the paper is organized as follows. Section 2 describes the data and provides a brief explanation of the methods. Section 3 presents the results and analysis of the econometric model. The final section concludes.

2. Data and Method

The data on life expectancy and lifespan inequality were sourced from the United States Mortality Database (USMDB), which provides comprehensive life tables by sex for all 50 states and the District of Columbia from 1968 to 2020, with age-specific mortality rates extending to age 110. However, initial analyses identified the District of Columbia as an outlier due to its unique patterns in homicide mortality and distinct socioeconomic and demographic characteristics compared to other states (Wijesinghe et al., 2024). Consequently, the District of Columbia was excluded from this study.

Data on homicide deaths were obtained from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC). Homicide causes of death were classified according to the International Classification of Diseases (ICD), with classifications evolving across different revisions:

- ICD-8 (1968–1978): Homicide coded as E960–E978.
- ICD-9 (1979–1998): Homicide coded as E960–E969.
- ICD-10 (1999–2020): Homicide coded as X85–Y09 and Y87.1.

State government spending data were sourced from the Government Finance Database, a comprehensive repository derived from the US Census Bureau's Annual Survey of State and Local Government Finances, covering data from 1967 onward. Spending categories analyzed in this study included: Juridical and legal services; Health; Library services; Education; Police; Public welfare; Unemployment; and Correctional expenditures. All financial data were adjusted to 2017 dollars using the implicit price deflator and converted into per capita spending. Population data including total population, racial composition (Black and White populations), and the population percentage in age groups 15–24 and 25–34 were obtained from the US Census Bureau. Income data were sourced from the Federal Reserve Bank of St. Louis FRED database, while state-level income inequality data, including the Gini coefficient, were drawn from the US State-Level Income Inequality Database. Educational attainment measures, specifically the percentages of high school and college graduates in the population, were derived from a database developed by Frank (2009). Per capita alcohol consumption (in gallons) data were obtained from the National Institute on Alcohol Abuse and Alcoholism. Additionally, three dummy variables were created to capture relevant gun control laws at the state level. The first variable is the No Stand-Your-Ground Law (1 = law provision is present, 0 = law provision is absent). This law does not allow individuals to use deadly force to defend themselves if they feel threatened, without the obligation to retreat. The second variable is the Permit to Purchase Law (1 = Yes, 0 = No), which requires individuals to obtain a permit before purchasing a firearm. The third variable is the Universal Background Checks Law (1 = Yes, 0 = No), which mandates that all gun buyers, whether purchasing from a licensed dealer or a private seller, must undergo a background check to ensure they are not prohibited from owning a firearm. The data for these three variables were obtained from the RAND Corporation firearms law database (Cherney et al., 2020). Descriptive statistics for the independent variables are given in Table 1. This panel data consists of annual observations for 50 states over the period 1980-2020.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
% of Black Population	2050	0.1	0.09	0	0.38
% of White Population	2050	0.84	0.12	0.3	0.99
% Age Group (15-24)	2050	0.15	0.02	0.11	0.2
% Age Group (25-34)	2050	0.15	0.02	0.11	0.24
% of High School Graduate	2050	0.6	0.06	0.39	0.75
% of College Graduate	2050	0.17	0.05	0.07	0.31
Per Capita Corrections Expenditure ($)	2050	139.05	70.28	17.6	578.63
Per Capita Education Expenditure ($)	2050	1742.98	644.23	410.3	4879.75
Per Capita Judicial Expenditure ($)	2050	67.03	53.97	4.42	405.85
Per Capita Health Expenditure ($)	2050	177.1	112	25.96	942.81
Per Capita Library Expenditure ($)	2050	5.09	5.42	0	52.35
Per Capita Police expenditure ($)	2050	47.78	30.75	2.53	253.84
Per Capita Public Welfare Expenditure ($)	2050	1203.06	668.97	142.28	3889.93
Per Capita Unemployment allowances Expenditure ($)	2050	160.32	121.47	13.82	1000.62
Stand Your Ground Law (Gun)	2050	0.18	0.39	0	1
Permit to Purchase Law (Gun)	2050	0.23	0.42	0	1
No Stand Your Ground Law (Gun)	2050	0.84	0.37	0	1
Unemployment Rate (%)	2050	5.83	2.12	2.1	18
Per Capita Income ($thousands)	2050	38101.06	9874.84	18414.98	74361.95
Gini Coefficient	2050	0.57	0.05	0.45	0.73
Per capita alcohol consumption (gallons)	2050	2.43	0.56	1.19	5.75
Population Density (per square mile)	2050	181.81	248.86	0.71	1260.77

Source: Authors' calculations

Demographic and Statistical Techniques

This study uses life table and cause-eliminated life table methods to estimate how homicide affects life expectancy and lifespan inequality (Arias et al., 2013). The process begins with calculating survival probabilities (${}_np_x$) from the all-cause life tables, as follows:

$$ {}_np_x = 1 - {}_nq_x \tag{1} $$

where x is the exact age, n is the number of years in the age interval, and ${}_nq_x$ is the probability of dying between the beginning of an age interval and before reaching the end of that age interval.

The next step involves estimating the probability of death after removing homicide ($_{n}q_{x1}^{(-i)}$), using the following formula.

$$ _{n}q_{x_1}^{(-i)} = 1 - {}_{n}p_{x}^{(\frac{_{n}D_x - _{n}D_x i}{_{n}D_x})} \tag{2}$$

where $_{n}D_x$ is the number of deaths in the age interval x to $x + n$ for all causes, and $_{n}D_x^{i}$ is the number of deaths in the age interval x to $x+n$ attributable to homicide.

Next, the number of person-years lived $_{n}L_{x1}^{(-i)}$ in the age interval x to $x+n$ was estimated for ages 0 to 110 using:

$$ _{n}L_{x_1}^{(-i)} = (n - {}_{n}f_x).\, l_x^{(-i)} + [_{n}l_x \,..\, l_{x+n}^{(-i)} \tag{3}$$

where n=1 for all age intervals (x=0,1, 2,…,110) and $_{n}l_x$ represents the number of individuals from the original life table who survive to the beginning of each age interval, $l_x^{(-i)}$ denotes the number of survivors from the life table after eliminating deaths due to homicide, L_x is the number of person-years lived within a specific age interval x to $x+n$ and $_{n}f_x$ represents the force of mortality (probability of death) for the age interval and is estimated from the all-cause life table, using:

$$ _{n}f_x = \frac{n \cdot {}_{n}l_x - {}_{n}L_x}{l_x - l_{x+n}} \tag{4}$$

The last step is to calculate the number of person-years lived after the exact age x ($T_x^{(-i)}$) using:

$$ T_x^{(-i)} = L_x^{(-i)} + L_{x+1}^{(-i)} + \cdots . + L_{110+}^{(-i)} \tag{5}$$

Finally, the cause-eliminated life expectancy ($e_x^{(-i)}$) is calculated as follows:

$$ e_x^{(-i)} = \frac{T_x^{(-i)}}{l_x^{(-i)}} \tag{6}$$

To assess homicide’s contribution to changes in life expectancy, we calculate the difference between cause-eliminated life expectancy ($e_x^{(-i)}$) and the observed life expectancy e_x in that same year.

The changes in life expectancy were calculated as the difference between life expectancy from the all-cause life table and the homicide elimination life table. The contribution of homicide to life expectancy ranged from 0.05 to 0.64 for the total population, with a mean of 0.18 (SD = 0.10). For males, the average contribution was 0.26 (SD = 0.16), while for females, it was 0.09 (SD = 0.05).

Lifespan inequality measurement - Theil index

In this study, we select the Theil Index to measure lifespan inequality due to its sensitivity to variations across the entire age-at-death distribution. This characteristic makes it more responsive compared to other measures like the Gini Index, which tends to underweight the importance of higher values, crucial for lifespan analysis. Lifespan inequality is calculated for the total population as well as males and females separately.

The Theil Index for lifespan inequality is denoted as T_a can be computed using the following formula:

$$T_a = \frac{1}{l_a} \sum_{x=a}^{\omega} d_x \left(\frac{\alpha_x}{\mu_a}\right) log \left(\frac{\alpha_x}{\mu_a}\right) \quad (7)$$

where a and ω are the youngest and oldest age intervals taken from a given life table, l_x is the radix of the population, μ_a is the average age at death of the population, and d_x and α_x are the life table number of deaths and the average age at death in the age interval x to $x+1$, respectively.

The change in lifespan inequality was calculated as the difference between lifespan inequality from the all-cause life table and the homicide elimination life table using the Theil index. The contribution of homicide to lifespan inequality ranged from -0.01 to 0.75 for the total population, with a mean of 0.1 (SD = 0.09). For males, the average contribution was 0.13 (SD = 0.08), while for females, it was 0.04 (SD = 0.03).

Panel Corrected Standard Error Model (PCSE)

The basic econometric specification of the panel regression model is as follows:

$$Y_{it} = \beta_0 + \beta_K X_{Kit} + \cdots \beta_k X_{kit} + U_{it} \quad (8)$$

where Y_{it} is life expectancy or lifespan inequality for state i in period t, X_{kit} is a vector of independent variables, β_k is a vector of coefficients for the independent variable, and U_{it} is the error term and is assumed to be i.i.d. One set of models was estimated to analyze the loss of life expectancy due to homicide, with models for the total population as well as for males and females separately. Another set of models was estimated to assess the contribution of homicide to lifespan inequality, again focusing on the total population, as well as male and female populations separately.

Initially, pooled OLS regression was conducted, followed by determining whether a random effects or fixed effects model was more appropriate using the Hausman test. The test results indicated that the fixed effects model was the best fit for all three models of life expectancy (total $p<0.001$; male $p<0.001$; female $p<0.001$) and lifespan inequality (total $p=0.028$; male $p<0.001$; female $p<0.001$). Subsequently, fixed effects regression models were estimated, and tests for heteroscedasticity and autocorrelation were carried out using the Wald test and the serial correlation test, respectively. Both tests confirmed the presence of heteroscedasticity and autocorrelation in the panel data (Appendix Tables A1 and A2). To investigate cross-sectional dependence, we used the tests proposed by Pesaran et al., (2004), including the cross-sectional dependence (CD) test, and rejected the null hypothesis of no cross-sectional dependence (Appendix Table A3).

Before estimating the model, we also tested the stationarity of the variables. Since first-generation unit root tests can be biased in the presence of heterogeneity and cross-sectional dependence (Pesaran, 2007), second-generation panel unit root tests were applied, specifically the cross-sectional ADF (CADF) and cross-sectionally augmented IPS (CIPS) tests. According to the CADF test, population density, per capita expenditure on library and welfare, percentage of college graduates and per capita alcohol consumption (gallons) were all stationary in first differences, while others were stationary in both levels and first differences (see Appendix Table A4). The CIPS test indicated that the percentage Black Population, percentage White Population, per capita alcohol consumption (gallons), percentage of college graduates and population density had unit roots but became stationary after first differencing (Appendix Table A4).

To address issues such as heteroscedasticity, serial correlation, and cross-sectional dependence in the data, the Feasible Generalized Least Squares (FGLS) method is generally recommended, as noted by Wooldridge (2010). However, Beck and Katz (1995) advocate for using OLS with heteroscedasticity-corrected standard errors (OLS-PCSE) when analyzing cross-sectional time-series data, since the standard errors obtained from FGLS may underestimate the variability of the estimates. The OLS-PCSE method tends to offer more reliable standard error estimates and performs better in such situations, as demonstrated in their Monte Carlo simulations. FGLS is more suitable for panels where the number of time periods (T) exceeds the number of cross-sectional units (N), whereas the PCSE estimator is more appropriate when the number of periods is smaller than the number of cross-sectional units. Given that our sample includes 40 time periods and 50 cross-sectional units, the OLS-PCSE approach should be preferred. Furthermore, the OLS-PCSE method provides robust standard error estimates by addressing heteroscedasticity and contemporaneous correlation across cross-sections, as it adjusts for variations in error variance and potential correlation across units (Reed & Webb, 2010; Bailey and Katz, 2011). Hence, the PCSE estimator is considered the most suitable method for analyzing our panel data.

3. Results and Discussion

Table 2 provides a breakdown of homicide's contribution to changes in life expectancy for selected years for each state, calculated using the cause-elimination method described in the previous section. Positive numbers in Table 2 represent the *decrease* in life expectancy due to homicide. Many states, but particularly those in the South (e.g. Louisiana, Mississippi), West (e.g. New Mexico, Nevada), and Mid-West (e.g. Illinois, Missouri) experienced an increasing impact of homicide on life expectancy from 1968 to 2020. For example, in Louisiana the loss of life expectancy due to homicide increased from 0.33 years in 1968 to 0.42 years in 2000, and to 0.59 years in 2020. The increase was particularly apparent for males, who experienced a life expectancy loss due to homicide that increased from 0.49 years in 1968 to 0.94 years in 2020, although an increase in the loss of life expectancy due to homicide for females is also apparent. States in the Northeast (e.g., New York, Pennsylvania) have generally had lower homicide-related life expectancy losses compared to the South, though there have been slight increases over time in some states. In general, males consistently experienced greater losses in life expectancy due to homicide than females across all states.

Table 2: Contribution of Homicide Mortality to Decreases in Life Expectancy at birth (years) by State: 1968, 2000 and 2020

Region	State	Life Expectancy Decrease (1968)			Life Expectancy Decrease (2000)			Life Expectancy Decrease (2020)		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
South	Alabama	0.31	0.48	0.11	0.29	0.43	0.15	0.41	0.67	0.13
	Arkansas	0.22	0.34	0.08	0.23	0.34	0.11	0.37	0.53	0.19
	Delaware	0.18	0.27	0.09	0.08	0.10	0.07	0.33	0.50	0.15
	Florida	0.37	0.52	0.18	0.19	0.27	0.10	0.25	0.38	0.10
	Georgia	0.39	0.53	0.20	0.23	0.31	0.13	0.64	0.51	0.11
	Kentucky	0.23	0.35	0.08	0.14	0.17	0.11	0.27	0.39	0.14
	Louisiana	0.33	0.49	0.11	0.42	0.61	0.19	0.59	0.94	0.20
	Maryland	0.24	0.35	0.09	0.33	0.53	0.09	0.38	0.60	0.12
	Mississippi	0.28	0.44	0.11	0.31	0.42	0.19	0.57	0.89	0.21
	North Carolina	0.27	0.39	0.12	0.24	0.35	0.10	0.27	0.42	0.10
	Oklahoma	0.15	0.24	0.06	0.16	0.23	0.10	0.25	0.37	0.11

	South Carolina	0.33	0.45	0.16	0.24	0.35	0.12	0.39	0.62	0.13
	Tennessee	0.27	0.40	0.10	0.25	0.36	0.12	0.34	0.52	0.12
	Texas	0.32	0.49	0.12	0.19	0.27	0.10	0.23	0.35	0.10
	Virginia	0.23	0.31	0.12	0.19	0.25	0.11	0.21	0.32	0.07
	West Virginia	0.11	0.17	0.05	0.12	0.17	0.06	0.17	0.24	0.09
West	Alaska	0.23	0.36	0.09	0.19	0.29	0.07	0.20	0.24	0.14
	Arizona	0.21	0.25	0.15	0.25	0.35	0.12	0.22	0.32	0.10
	California	0.17	0.23	0.08	0.20	0.30	0.07	0.19	0.30	0.06
	Colorado	0.15	0.20	0.09	0.11	0.19	0.07	0.17	0.19	0.08
	Hawaii	0.08	0.11	0.03	0.07	0.09	0.06	0.10	0.13	0.06
	Idaho	0.08	0.11	0.06	0.05	0.08	0.02	0.06	0.09	0.03
	Montana	0.09	0.08	0.09	0.11	0.15	0.08	0.18	0.25	0.09
	New Mexico	0.15	0.22	0.07	0.27	0.41	0.13	0.30	0.46	0.10
	Nevada	0.16	0.18	0.13	0.20	0.31	0.08	0.21	0.31	0.09
	Oregon	0.08	0.08	0.08	0.08	0.12	0.03	0.12	0.17	0.05
	Utah	0.09	0.09	0.10	0.07	0.08	0.04	0.09	0.12	0.04
	Washington	0.09	0.11	0.06	0.11	0.15	0.06	0.14	0.19	0.07
	Wyoming	0.09	0.07	0.09	0.05	0.06	0.03	0.10	0.14	0.07
North east	Connecticut	0.08	0.10	0.04	0.10	0.15	0.05	0.15	0.23	0.06
	Massachusetts	0.09	0.12	0.04	0.06	0.10	0.03	0.08	0.15	0.01
	Maine	0.03	0.03	0.01	0.04	0.03	0.04	0.05	0.08	0.01
	New Hampshire	0.04	0.01	0.06	0.03	0.05	0.02	0.03	0.04	0.02
	New Jersey	0.13	0.19	0.07	0.13	0.20	0.04	0.15	0.22	0.06
	New York	0.17	0.28	0.07	0.18	0.27	0.07	0.15	0.24	0.05
	Pennsylvania	0.11	0.16	0.05	0.18	0.27	0.08	0.28	0.44	0.08
	Rhode Island	0.06	0.07	0.05	0.12	0.20	0.03	0.09	0.14	0.03
	Vermont	0.04	0.04	0.03	0.03	0.05	0.03	0.07	0.12	-0.01
Mid-West	Iowa	0.05	0.04	0.05	0.07	0.08	0.05	0.10	0.15	0.05
	Illinois	0.22	0.33	0.10	0.27	0.40	0.10	0.37	0.61	0.10
	Indiana	0.15	0.23	0.07	0.20	0.28	0.11	0.30	0.45	0.12
	Kansas	0.10	0.13	0.06	0.17	0.24	0.10	0.22	0.33	0.08
	Michigan	0.21	0.32	0.09	0.23	0.34	0.11	0.26	0.41	0.10
	Minnesota	0.06	0.08	0.03	0.09	0.11	0.06	0.12	0.19	0.05
	Missouri	0.23	0.35	0.09	0.23	0.32	0.12	0.43	0.64	0.18
	North Dakota	0.02	0.03	0.02	0.04	0.07	0.03	0.11	0.16	0.05
	Nebraska	0.05	0.08	0.03	0.12	0.16	0.08	0.12	0.19	0.04
	Ohio	0.16	0.22	0.09	0.12	0.16	0.08	0.29	0.44	0.11
	South Dakota	0.08	0.09	0.07	0.06	0.09	0.01	0.19	0.27	0.08
	Wisconsin	0.06	0.08	0.05	0.11	0.15	0.06	0.20	0.28	0.10
Mean		0.16	0.23	0.08	0.16	0.23	0.08	0.23	0.34	0.09
SD		0.10	0.15	0.04	0.09	0.13	0.04	0.14	0.20	0.05

Source: Authors' calculations. Note: For each year, the absolute impact of homicide on life expectancy is calculated by subtracting the life expectancy after eliminating homicide-related deaths from the life expectancy based on all-cause mortality for that specific year.

Table 3 presents the changes in lifespan inequality due to homicide for each state. Positive numbers in Table 3 represent the *increase* in lifespan inequality due to homicide, and it is apparent that the impact of homicide is to increase lifespan inequality generally across all states and years.The increase in lifespan inequality due to homicide increased in many states, but particularly those in the South (e.g. Louisiana, Mississippi), West (e.g. New Mexico, Nevada) and Mid-West (e.g. Illinois, Missouri). Generally, the states that have experienced the greatest negative impact on life expectancy due to homicide have experienced the greatest increase in lifespan inequality due to homicide. The Pearson correlation between those two impacts (on life expectancy and lifespan inequality) was 0.98 in 1968, 0.99 in 2000, and 0.94 in 2020. Like life expectancy, the impacts of homicide on lifespan inequality are generally larger for men than for women. Moreover, there are only a few instances where lifespan inequality has decreased due to homicide, among females in states in the Northeast.

Table 3: Contribution of Homicide Mortality to Changes in Lifespan Inequality by State: 1968, 2000 and 2020

Region	State	Lifespan Inequality Change (1968)			Lifespan Inequality Change (2000)			Lifespan Inequality Change (2020)		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
South	Alabama	0.13	0.20	0.03	0.15	0.23	0.07	0.21	0.35	0.06
	Arkansas	0.08	0.12	0.02	0.13	0.19	0.06	0.19	0.27	0.10
	Delaware	0.08	0.12	0.04	0.03	0.05	0.02	0.18	0.26	0.08
	Florida	0.16	0.22	0.07	0.09	0.14	0.05	0.13	0.20	0.04
	Georgia	0.17	0.22	0.09	0.12	0.16	0.07	0.16	0.26	0.05
	Kentucky	0.09	0.12	0.03	0.07	0.09	0.05	0.13	0.19	0.07
	Louisiana	0.15	0.22	0.04	0.24	0.33	0.12	0.32	0.50	0.11
	Maryland	0.11	0.16	0.04	0.19	0.31	0.04	0.2	0.31	0.06
	Mississippi	0.10	0.15	0.04	0.16	0.22	0.10	0.29	0.44	0.11
	North Carolina	0.11	0.15	0.04	0.12	0.19	0.04	0.14	0.23	0.05
	Oklahoma	0.05	0.09	0.02	0.08	0.11	0.05	0.11	0.18	0.05
	South Carolina	0.14	0.18	0.07	0.13	0.19	0.06	0.20	0.33	0.06
	Tennessee	0.11	0.16	0.03	0.13	0.19	0.06	0.17	0.27	0.06
	Texas	0.14	1.66	0.05	0.10	0.89	0.05	0.12	1.02	0.05
	Virginia	0.09	0.12	0.05	0.10	0.13	0.06	0.11	0.17	0.03
	West Virginia	0.03	0.06	0.00	0.06	0.08	0.02	0.08	0.11	0.04
West	Alaska	0.09	0.16	0.05	0.13	0.21	0.04	0.08	0.10	0.05
	Arizona	0.09	0.10	0.07	0.13	0.18	0.05	0.11	0.14	0.05
	California	0.07	0.10	0.03	0.11	0.16	0.03	0.08	0.14	0.02
	Colorado	0.06	0.09	0.03	0.05	0.07	0.03	0.08	0.04	0.03
	Hawaii	0.02	0.04	0.00	0.02	0.03	0.02	0.04	0.06	0.04

	Idaho	0.04	0.05	0.02	0.01	0.03	0.00	0.02	0.04	0.00
	Montana	0.03	0.02	0.04	0.05	0.07	0.04	0.09	0.11	0.04
	New Mexico	0.05	0.09	0.02	0.14	0.22	0.06	0.13	0.21	0.04
	Nevada	0.06	0.05	0.06	0.10	0.15	0.04	0.10	0.15	0.04
	Oregon	0.03	0.03	0.03	0.04	0.06	0.00	0.05	0.08	0.01
	Utah	0.04	0.03	0.05	0.03	0.05	0.01	0.03	0.05	0.01
	Washington	0.03	0.03	0.02	0.06	0.09	0.02	0.07	0.10	0.03
	Wyoming	0.02	0.00	0.03	0.02	0.04	0.00	0.03	0.06	0.01
Northeast	Connecticut	0.04	0.04	0.02	0.05	0.08	0.02	0.07	0.12	0.02
	Massachusetts	0.04	0.05	0.01	0.03	0.05	0.01	0.03	0.07	-0.01
	Maine	0.00	-0.01	-0.01	0.01	0.00	0.01	0.01	0.03	0.00
	New Hampshire	0.01	-0.01	0.02	0.01	0.02	0.00	0.01	0.01	0.01
	New Jersey	0.05	0.08	0.03	0.07	0.11	0.02	0.07	0.11	0.02
	New York	0.07	0.13	0.02	0.10	0.15	0.04	0.07	0.12	0.02
	Pennsylvania	0.04	0.08	0.01	0.09	0.15	0.04	0.14	0.23	0.04
	Rhode Island	0.02	0.01	0.03	0.06	0.10	0.02	0.04	0.06	0.01
	Vermont	0.01	-0.01	0.01	0.00	0.01	0.00	0.03	0.05	-0.03
Mid-West	Iowa	0.02	0.00	0.02	0.04	0.05	0.02	0.04	0.06	0.01
	Illinois	0.11	0.17	0.04	0.15	0.22	0.05	0.19	0.32	0.05
	Indiana	0.06	0.10	0.02	0.12	0.17	0.07	0.16	0.24	0.06
	Kansas	0.04	0.06	0.03	0.09	0.12	0.05	0.11	0.17	0.04
	Michigan	0.09	0.14	0.04	0.12	0.18	0.05	0.13	0.22	0.05
	Minnesota	0.02	0.03	0.00	0.04	0.06	0.01	0.06	0.11	0.02
	Missouri	0.09	0.14	0.04	0.13	0.18	0.06	0.23	0.33	0.09
	North Dakota	0.01	0.01	0.00	0.01	0.03	0.02	0.05	0.07	0.01
	Nebraska	0.01	0.03	0.00	0.07	0.09	0.04	0.04	0.08	0.01
	Ohio	0.07	0.10	0.04	0.06	0.08	0.04	0.15	0.24	0.05
	South Dakota	0.02	0.03	0.02	0.03	0.05	0.00	0.09	0.13	0.03
	Wisconsin	0.02	0.02	0.02	0.05	0.08	0.03	0.1	0.14	0.05
Mean		0.06	0.12	0.03	0.08	0.14	0.04	0.11	0.19	0.04
SD		0.04	0.23	0.02	0.05	0.13	0.03	0.07	0.16	0.03

Source: Authors' calculations. Note: For each year, the absolute impact of homicide on lifespan inequality is calculated by subtracting the lifespan inequality after eliminating homicide-related deaths from the lifespan inequality based on all-cause mortality for that specific year.

Table 4 presents the results of the PCSE estimations, where the dependent variables are the decrease in life expectancy due to homicide for the total population (Model 1), for males (Model 2), and females (Model 3).

Table 4: Determinants of decrease in life expectancy due to homicide (PCSE Model Results)

Variable	**Model 1** **Decrease in Life Expectancy due to Homicide -Total Population**	**Model 2** **Decrease in Life Expectancy due to Homicide -Male Population**	**Model 3** **Decrease in Life Expectancy due to Homicide - Female Population**
	Coef.	Coef.	Coef.
% Black Population	0.931 (<0.001)***	1.356 (<0.001)***	0.292 (<0.001)***
% White Population	-0.025 (0.244)	-0.027 (0.381)	-0.021 (0.106)
% Age Group (15-24)	-0.306 (0.138)	-0.443 (0.164)	-0.323 (0.003)***
% Age Group (25-34)	0.718 (<0.001)***	0.797 (0.002)***	0.665 (<0.001)***
% High School Graduate	-0.338 (<0.001)***	-0.478 (<0.001)***	-0.180 (<0.001)***
% College Graduate	0.086 (0.270)	0.137 (0.253)	-0.103 (0.139)
Per Capita Corrections Expenditure (Log)	0.037 (0.019)**	0.047 (0.040)**	0.041 (<0.001)***
Per Capita Education Expenditure (Log)	-0.033 (0.148)	-0.046 (0.169)	-0.034 (0.200)
Per Capita Judicial Expenditure (Log)	-0.050 (<0.001)***	-0.076 (<0.001)***	-0.019 (0.004)***
Per Capita Health Expenditure (Log)	-0.003 (0.739)	-0.001 (0.934)	-0.006 (0.574)
Per Capita library Expenditure (Log)	-0.003 (0.488)	-0.003 (0.667)	-0.008 (0.018)**
Per Capita Police expenditure (Log)	-0.007 (0.452)	0.001 (0.955)	-0.015 (0.126)

Per Capita Public Welfare Expenditure (Log)	0.033 (0.067)*	0.056 (0.039)	0.013 (0.172)
Per Capita Unemployment allowances Expenditure (Log)	0.012 (0.200)	0.018 (0.230)	-0.002 (0.728)
Universal Background Checks Law (Gun)	0.012 (0.066)*	0.023 (0.023)**	0.0002 (0.948)
Permit to Purchase Law (Gun)	-0.008 (0.268)	-0.002 (0.880)	0.001 (0.841)
No Stand Your Ground Law (Gun)	-0.013 (0.068)*	-0.024 (0.024)**	-0.008 (0.059)*
Unemployment Rate (%)	-0.001 (0.300)	-0.002 (0.469)	0.00004 (0.959)
Real Per Capita Income (Log)	0.008 (0.742)	0.008 (0.840)	0.017 (0.496)
Gini Coefficient	0.011 (0.875)	0.046 (0.672)	-0.064 (0.102)
Per capita alcohol consumption (gallons)	0.004 (0.514)	0.001 (0.923)	0.001 (0.757)
Population Density (per square mile-Log)	-0.016 (<0.001)***	-0.021 (<0.001)***	-0.010 (<0.001)***
Constant	0.233 (0.329)	0.335 (0.358)	0.113 (0.571)
R-squared	0.50	0.43	0.43
Sample Size	2050	2050	2050

Source: Authors' calculations

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

Demographic factors play a key role in determining the decrease in life expectancy due to homicide in our models. For example, the percentage Black population shows a strong positive association with increased life expectancy losses due to homicide. Specifically, a one-standard deviation (9 percentage point) increase in the percentage of the Black population corresponds to a 0.84 standard deviation (0.08 year) greater decrease in life expectancy for the total population. The corresponding effects for the male and female populations are 0.76 standard deviations for males and 0.53 standard deviations for females. This aligns with research by Pridemore, 2002; Pridemore, 2011; McCall et al., 2011 Rogers & Pridemore, 2013; Fleegler et al., 2013; Zimmerman et al.,2024, who found that Black populations are more likely to reside in areas characterized by high poverty and unemployment conditions linked to elevated rates of violent crime. In contrast, white populations have historically benefited from more favourable residential patterns and economic advantages, reducing their exposure to violent crime.

Moreover, the proportion of the population aged 25–34 was statistically significant for all three models. This may be because homicide is concentrated among younger people. For example, it is the third leading cause of death for persons aged 25–34 years (Nguyen et al., 2021). A one-standard-deviation increase (2 percentage points) in the population share aged 25–34 years is associated with a 0.14 standard deviation (0.014 years) increase in homicide related life expectancy loss for the total population. For females, this corresponds to a 0.27 standard deviation (0.013 years) increase, while for males, it corresponds to a 0.10 standard deviation (0.015 years) increase.

Educational attainment demonstrates a significant effect, for high school graduates but not for college graduates. A one-standard-deviation (6 percentage point) increase in the proportion of the population with a high school education is associated with a 0.20 standard deviation (0.020 year) lower decrease in life expectancy due to homicide for the total population, with the corresponding figures for males and females being 0.18 standard deviations (0.028 years), and 0.22 standard deviations (0.010 years), respectively. These findings are consistent with prior work suggesting that high school graduation reduces the probability of incarceration and criminal activity (Lochner and Moretti, 2001).

For public expenditures, a one-standard-deviation increase in per capita corrections spending is significantly associated with an increase in homicide-related life expectancy losses. A one-standard-deviation (23 percentage point) increase in the per capita corrections expenditures is associated with a 0.09 standard deviation (0.008 year) lower decrease in life expectancy due to homicide for the total population, with the corresponding figures for males and females being 0.07 standard deviations (0.010 years), and 0.19 standard deviations (0.009 years), respectively. This reflects states with higher crime, and thus higher incarceration rates, having negative impacts of homicide on life expectancy. Further, Hazra and Aranzazu (2022) also found that spending on corrections is linked to an increase in crime rates at the state level. Conversely, per capita judicial expenditures are significantly associated with smaller reductions in life expectancy due to homicide. A one-standard-deviation increase in per capita judicial expenditures is associated with a reduction in homicide-related life expectancy losses of 0.17 standard deviations (0.017 years) for the total population, 0.16 standard deviations (0.025 years) for males, and 0.13 standard deviations (0.006 years) for females.

Firearms policy also appears to have some effect. The absence of Stand Your Ground (SYG) laws is associated with a lesser impact of homicide on life expectancy. Specifically, homicide-related life expectancy losses are 0.013 years lower for the total population, 0.024 years lower for males, and 0.008 years lower for females in the absence of a Stand Your Ground law. These findings align with Cheng and Hoekstra (2013) and Degli Esposti et al. (2022), who both found that SYG laws lead to significant increases in homicide rates.

Finally, population density is associated with statistically significantly lower decreases in life expectancy due to homicide. Specifically, a one standard deviation higher population density is associated with a 0.23 standard deviation (0.022 years) lower decrease in life expectancy for the total population, a 0.19 standard deviation (0.029 years) lower decrease in life expectancy for males, and a 0.28 standard deviation (0.014 years) lower decrease in life expectancy for females. Although it may seem contradictory that more densely populated areas could experience lower homicide-related life expectancy losses, there is empirical evidence that might explain this relationship. For instance, research suggests that urban centres often offer robust institutional structures including higher police presence, faster emergency medical response, and greater social services that can reduce the lethality of violent incidents (Sampson et al., 1997). Moreover, crowded environments typically have more witnesses and surveillance factors that increase the likelihood of crimes being witnessed and quickly reported, thus deterring serious violence or limiting fatalities at the state level in the USA (Piggott, 2015). While it is true that overall levels of non-lethal violent crime may be higher in some urban areas, the combination of quicker medical intervention and more comprehensive law enforcement can help mitigate homicide risk.

Table 5 presents the results of the PCSE estimations, where the dependent variables are the change in lifespan inequality due to homicide for the total population (Model 1), for males (Model 2), and females (Model 3). Comparing the results in this table with those in Table 4 reveals both similarities and differences between the factors associated with the impact of homicide on life expectancy, and the factors associated with the impact of homicide on lifespan inequality.

Table 5: Determinants of changes in lifespan inequality due to homicide (PCSE model results)

Variable	**Model 1** **Change in Lifespan Inequality due to Homicide -Total Population**	**Model 2** **Change in Lifespan Inequality due to Homicide -Male Population**	**Model 3** **Change in Lifespan Inequality due to Homicide - Female Population**
	Coef.	Coef.	Coef.
% Black Population	0.473 (<0.001)***	0.739 (<0.001)***	0.150 (<0.001)***
% White Population	-0.010 (0.506)	0.008 (0.667)	-0.005 (0.439)
% Age Group (15-24)	-0.161 (0.178)	-0.281 (0.083)*	-0.125 (0.012)**
% Age Group (25-34)	0.346 (0.002)***	0.403 (0.001)***	0.323 (<0.001)***
% High School Graduate	-0.164 (<0.001)***	-0.189 (0.002)***	-0.074 (0.001)***
% College Graduate	-0.011 (0.817)	-0.045 (0.49)	-0.044 (0.099)*
Per Capita Corrections Expenditure (Log)	0.038 (<0.001)***	0.054 (<0.001)***	0.032 (<0.001)***
Per Capita Education Expenditure (Log)	-0.008 (0.611)	-0.024 (0.186)	-0.005 (0.513)
Per Capita Judicial Expenditure (Log)	-0.030 (<0.001)***	-0.045 (<0.001)***	-0.011 (<0.001)***
Per Capita Health Expenditure (Log)	-0.013 (0.024)**	-0.004 (0.614)	-0.012 (<0.001)***
Per Capita library Expenditure (Log)	-0.003 (0.257)	0.002 (0.689)	-0.004 (0.022)**
Per Capita Police expenditure (Log)	-0.015	-0.020	-0.008

	(0.028)**	(0.026)**	(0.020)**
Per Capita Public Welfare Expenditure (Log)	0.037 (0.001)***	0.048 (0.001)***	0.010 (0.025)**
Per Capita Unemployment allowances Expenditure (Log)	0.006 (0.277)	0.009 (0.273)	-0.003 (0.240)
Universal Background Checks Law	0.001 (0.873)	0.007 (0.233)	-0.001 (0.680)
Permit to Purchase Law (Gun)	-0.006 (0.250)	-0.003 (0.582)	-0.002 (0.295)
No Stand Your Ground Law (Gun)	-0.007 (0.103)	-0.009 (0.121)	-0.004 (0.062)*
Unemployment Rate (%)	-0.001 (0.138)	-0.001 (0.515)	0.0003 (0.475)
Real Per Capita Income (Log)	-0.009 (0.59)	-0.001 (0.941)	-0.003 (0.669)
Gini Coefficient	0.002 (0.960)	0.026 (0.657)	-0.040 (0.039)**
Per capita alcohol consumption (gallons)	-0.001 (0.829)	0.0004 (0.928)	0.001 (0.697)
Population Density (per square mile-Log)	-0.007 (0.001)***	-0.008 (<0.001)***	-0.004 (<0.001)***
Constant	0.192 (0.219)	0.113 (0.533)	0.107 (0.106)
R-squared	0.37	0.32	0.47
Sample Size	2050	2050	2050

Source: Authors' calculations

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

As for life expectancy, several demographic factors are associated with the impact of homicide on lifespan inequality. States with a higher proportion of the Black population experience a significantly greater increase in lifespan inequality due to homicide. A one standard deviation (9 percentage point) higher proportion Black population is associated with a 0.473 standard deviation higher impact of homicide on lifespan inequality for the total population, a 0.831 standard deviation higher impact of homicide on lifespan inequality for males, and a 0.450 standard deviation higher impact of homicide on lifespan inequality for females. These results are further supported by the work of Light and Vachuska (2024), who demonstrated that increased homicide rates significantly contributed to widening Black-White disparities in life expectancy and lifespan inequality. Also, like life expectancy, the proportion of the population aged 25-34 is associated with a significantly greater impact of homicide on lifespan inequality. A one standard deviation (2 percentage point) higher proportion of the population aged 25-34 is associated with a 0.076 standard deviation higher impact of homicide on lifespan inequality for the total population, a 0.100 standard deviation higher impact of homicide on lifespan inequality for males, and a 0.215 standard deviation higher impact of homicide on lifespan inequality for females.

Like life expectancy, higher educational attainment is associated with lower impacts of homicide on lifespan inequality, but this is mainly statistically significant only for the percentage of high school graduates. One standard deviation (6 percentage point) higher proportion of high school graduates is associated with a 0.109 standard deviation lower impact of homicide on lifespan inequality for the total population, a 0.141 standard deviation lower impact of homicide on lifespan inequality for males, and a 0.148 standard deviation lower impact of homicide on lifespan inequality for females. In contrast, college education is only marginally statistically significant for females, and not significant for males or the total population.

A wider range of public spending categories is statistically associated with homicide-related lifespan inequality changes than was the case for life expectancy. Corrections expenditures are significantly associated with a larger impact of homicide on lifespan inequality. One standard deviation higher spending on corrections per capita is associated with a 0.097 standard deviation higher impact of homicide on lifespan inequality for the total population, a 0.155 standard deviation higher impact of homicide on lifespan inequality for males, and a 0.245 standard deviation higher impact of homicide on lifespan inequality for females. Judicial expenditure is also significantly associated with a larger impact of homicide on lifespan inequality. One standard deviation higher judicial spending per capita is associated with a 0.113 standard deviation higher impact of homicide on lifespan inequality for the total population, a 0.191 standard deviation higher impact of homicide on lifespan inequality for males, and a 0.124 standard deviation higher impact of homicide on lifespan inequality for females.

Unlike life expectancy, health, police, and welfare spending were all statistically significantly associated with the impact of homicide on lifespan inequality. One standard deviation higher health spending per capita is associated with a 0.034 standard deviation lower impact of homicide on lifespan inequality for the total population, and a 0.096 standard deviation lower impact of homicide on lifespan inequality for females but had no statistically significant association with the impact of homicide on lifespan inequality for males. One standard deviation higher police spending per capita is associated with a 0.040 standard deviation lower impact of homicide on lifespan inequality for the total population, and a 0.064 standard deviation lower impact of homicide on lifespan inequality for both males and females. One standard deviation higher public welfare spending per capita is associated with a 0.106 standard deviation higher impact of homicide on lifespan inequality for the total population, a 0.156 standard deviation higher impact of homicide on lifespan inequality for males, and a 0.086 standard deviation higher impact of homicide on lifespan inequality for females.

If there is no statistically significant effect on homicide's impact on life expectancy, but the effect on homicide's impact on lifespan inequality is statistically significant (as is the case for these three spending variables), then that means there must be some offsetting effects that keep the mean change in the age at death distribution the same (the impact on life expectancy is zero), but at the same time the impact of homicide is increasing lifespan inequality by less (if the effect is negative – health, police) or more (if the effect is positive – welfare).

Homicide generally increases lifespan inequality, because it generally affects younger people. If the impact of homicide on lifespan inequality is lessened by a variable, while there is no impact on life expectancy (e.g. health, police expenditure), then that means that homicide is causing fewer deaths at young ages offset by more deaths at older ages, when health or police spending is higher. For example, increased police spending often targets risk factors that disproportionately affect younger individuals, such as gang violence, firearm-related homicides, and street crime, thereby reducing deaths among youth (Weisburd & Eck, 2011).

Health initiatives, such as mental health and substance abuse programs, and police strategies, including gang deterrence and focused patrols, are particularly effective at mitigating youth-oriented crime and greater primary healthcare access support to reduce youth homicide death (Formica et al., 2019). As these measures succeed, the age distribution of homicides may shift, with more occurring among older populations where interventions are less impactful. For example, domestic violence and elder abuse may become more significant contributors to homicide at older ages.

On the other hand, if a variable (e.g., welfare spending) *increases* the impact of homicide on lifespan inequality while still shaping overall life expectancy, it suggests a rise in homicides among younger groups coupled with comparatively fewer homicides among older adults. One reason may be that states with higher welfare spending often have greater baseline poverty and social disadvantage, disproportionately affecting younger populations (Sampson et al., 1997; Wilson, 2012). Concentrated poverty fosters economic instability and social tension, fueling youth violence. Although welfare programs like the Earned Income Tax Credit and Supplemental Nutrition Assistance Programs provide important financial and material support, they typically do not address core drivers of violence—such as inadequate mental health services, gang prevention, or community conflict resolution (Raphael & Tolman, 1997; Kasturirangan et al., 2004; Brown, 2016).

In contrast, older adults are more likely to benefit from welfare-related healthcare support and stable income streams (e.g., Social Security, Medicaid), which reduce exposure to stressors that can precipitate violent incidents. Younger individuals, meanwhile, may remain vulnerable if welfare initiatives fail to include targeted, youth-focused interventions like violence interruption programs, mental health outreach, or job training (Mason et al., 2022). This gap is compounded by strain theory dynamics, wherein unmet expectations and limited prospects can heighten frustration and increase youth violence (Agnew, 1992; Cullen, 1994). Moreover, systemic inefficiencies—such as the misallocation of resources or disruptions to violence prevention programs—can inadvertently worsen conditions in high-poverty areas, reinforcing the cycle of youth violence (Brown, 2016). As a result, while older adults may experience some protective effects from broader welfare measures, the continued concentration of homicides among younger populations widens the spread of ages at death, thereby increasing lifespan inequality.

Unlike life expectancy, the firearms policy variables are all statistically insignificant in their associations with the impact of homicide on lifespan inequality, except for a marginally significant negative effect of the absence of a Stand Your Ground law for females. Finally, population density is associated with lower impacts of homicide on lifespan inequality. Specifically, one standard deviation higher population density is associated with a 0.109 standard deviation lower impact of homicide on lifespan inequality for the total population, a 0.141 standard deviation lower impact of homicide on lifespan inequality for males, and a 0.188 standard deviation lower impact of homicide on lifespan inequality for females.

4. Conclusion

This study investigated the impact of homicide on life expectancy and lifespan inequality across US states from 1968 to 2020, revealing both shared and distinct influences of socioeconomic, demographic, and policy-related factors. Regional disparities underscore the uneven impact of homicide across the United States: Southern states consistently experienced the highest life expectancy losses and greatest increases in lifespan inequality due to homicide, while states in the Northeast showed comparatively lower impacts and even slight improvements in some cases. The Midwest experienced some of the most concerning recent reversals, with rising lifespan inequality despite a historical trend of improvements. A clear gender difference was also apparent across all states, with impacts of homicide on male life expectancy and lifespan inequality being greater than for females.

According to our findings, demographic factors emerge as critical, with the proportion of high school graduates consistently associated with lower impacts of homicide on life expectancy and lifespan inequality. Racial disparities are also pronounced, with the proportion of the Black population significantly linked to larger effects on both life expectancy and lifespan inequality, likely reflecting systemic inequities in exposure to violence. This reinforces the understanding that homicides can exacerbate existing social inequalities, particularly in marginalized communities (Elo et al., 2019; Johnson et al., 2021). Additionally, the relative size of the age group 25–34 years, but not 15–24 years, appears to particularly amplify homicide’s impacts. This may reflect homicide disproportionately affecting individuals in their prime working and reproductive years (Tillyer & Race, 2016; García & Aburto, 2019; Aburto & Beltrán-Sánchez, 2019).

Our results also show that structural or system-wide expenditures (e.g., corrections, judicial) are associated with homicide-related mortality across multiple age groups, affecting both life expectancy and lifespan inequality. By contrast, higher health and police spending appears to coincide with fewer homicides at younger ages, leaving total homicide prevalence relatively unchanged yet shifting the age distribution of homicide deaths. Meanwhile, higher welfare spending correlates with a greater concentration of homicides among younger ages, suggesting that general welfare programs alone may not sufficiently address drivers of youth violence. These observed relationships, while not directly testing policy efficacy, highlight areas where targeted interventions, such as violence-prevention programs, mental health services, and youth-focused initiatives, could potentially be beneficial in reducing the disproportionate burden of homicide at younger ages.

In light of these findings, policymakers could consider further evaluating interventions aimed at improving socioeconomic conditions, reducing exposure to violence, and closing racial and educational gaps. For instance, higher high-school graduation rates are associated with a lower homicide burden, suggesting the potential value of education-focused interventions that help keep young people in school and reduce the risk of later criminal involvement. Future research is needed to isolate the mechanisms through which different types of public expenditures influence homicide outcomes. This would ideally involve analysis that aims to identify the *causal* impact of public spending on homicide.

While this study provides valuable insights, several limitations must be acknowledged. First, the analysis focuses exclusively on homicide mortality, neglecting impacts on morbidity and quality of life, which are also critical components of health outcomes. Second, some important cultural and political factors may influence homicide rates but were not included due to data availability and reliability constraints. Third, exploring individual-level pathways and conducting micro-scale analyses (e.g., county-level, city-level or individual-level) could provide a more comprehensive picture of the drivers of homicide and its differential impacts on life expectancy and lifespan inequality. Fourth, international comparisons might yield further insights into the broader structural determinants of homicide-related mortality and inequality. Finally, the analysis does not provide causal evidence of the factors associated with life expectancy and lifespan inequality changes due to homicide. Addressing these gaps in future research would enhance our understanding of homicide's complex effects and contribute to the design of more evidence-based and equitable public health policies.

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Appendix

Table A1: Determinants of decrease in Life expectancy due to homicide: Fixed Vs Random Effect

Variable	**Model 1 Contribution of Homicide to Life Expectancy Loss -Total Population**		**Model 2 Contribution of Homicide to Life Expectancy Loss - Male Population**		**Model 3 Contribution of Homicide to Life Expectancy Loss - Female Population**	
	FE	RE	FE	RE	FE	RE
% of Black Population	1.951 (<0.001)***	1.090 (<0.001)***	2.699 (<0.001)***	1.642 (<0.001)***	0.252 (0.104)	0.326 (<0.001)***
% of White Population	1.053 (<0.001)***	0.259 (<0.001)***	1.486 (<0.001)***	0.425 (<0.001)***	0.294 (0.004)***	0.025 (0.314)
% of Age Group(15-24)	-0.209 (0.013)**	-0.240 (0.005)***	-0.342 (0.007)***	-0.373 (0.004)***	-0.076 (0.242)	-0.183 (0.005)***
% of Age Group(25-34)	0.553 (<0.001)***	0.749 (<0.001)***	0.670 (<0.001)***	0.941 (<0.001)***	0.399 (<0.001)***	0.526 (<0.001)***
% of High School Graduate	-0.343 (<0.001)***	-0.249 (<0.001)***	-0.524 (<0.001)***	-0.389 (<0.001)***	-0.132 (0.001)***	-0.111 (0.002)***
% of College Graduate	0.393 (<0.001)***	0.285 (<0.001)***	0.628 (<0.001)***	0.478 (<0.001)***	0.154 (0.001)***	0.011 (0.800)
Per Capita Corrections Expenditure (Log)	-0.038 (0.001)***	0.003 (0.819)	-0.051 (0.003)***	0.006 (0.732)	-0.005 (0.542)	0.031 (<0.001)***
Per Capita Education Expenditure (Log)	-0.033 (0.106)	-0.013 (0.538)	-0.027 (0.390)	-0.004 (0.898)	-0.046 (0.004)***	-0.020 (0.143)
Per Capita Judicial Expenditure (Log)	-0.009 (0.337)	-0.025 (0.007)***	-0.023 (0.107)	-0.043 (0.002)***	-0.001 (0.902)	-0.016 (0.012)**
Per Capita Health Expenditure (Log)	0.034 (<0.001)***	0.026 (0.001)***	0.052 (<0.001)***	0.042 (0.001)***	0.013 (0.032)**	0.005 (0.383)
Per Capita library Expenditure (Log)	0.010 (0.035)	0.016 (0.001)***	0.019 (0.001)***	0.026 (<0.001)***	0.003 (0.444)	0.00007 (0.984)
Per Capita Police expenditure (Log)	-0.011 (0.306)	-0.018 (0.109)	-0.029 (0.082)*	-0.036 (0.032)**	0.0006 (0.994)	-0.009 (0.249)

Per Capita Public Welfare Expenditure (Log)	0.089 (<0.001)***	0.062 (<0.001)***	0.159 (<0.001)***	0.119 (<0.001)***	0.036 ((<0.001)***	0.017 (0.039)**
Per Capita Unemployment allowances Expenditure (Log)	0.006 (0.293)	0.007 (0.270)	0.011 (0.235)	0.012 (0.204)	0.001 (0.852)	-0.002 (0.590)
Universal Background Checks Law	0.016 (0.003)***	0.012 (0.032)**	0.032 (<0.001)***	0.025 (0.002)***	0.001 (0.829)	-0.002 (0.625)
Permit to Purchase Law (Gun)	-0.019 (0.004)***	-0.007 (0.257)	-0.029 (0.003)***	-0.012 (0.207)	-0.003 (0.607)	0.003 (0.466)
No Stand Your Ground Law (Gun)	-0.003 (0.392)	-0.002 (0.523)	-0.005 (0.373)	-0.003 (0.578)	0.001 (0.66)	-0.001 (0.769)
Unemployment Rate (%)	-0.004 (<0.001)***	-0.005 (<0.001)***	-0.006 (<0.001)***	-0.007 (<0.001)***	-0.002 (0.004)***	-0.002 (<0.001)***
Real Per Capita Income (Log)	0.002 (0.938)	-0.056 (0.007)***	-0.022 (0.498)	-0.101 (0.001)***	0.006 (0.742)	-0.025 (0.080)*
Gini Coefficient	-0.059 (0.148)	-0.077 (0.061)	-0.045 (0.455)	-0.069 (0.258)	-0.058 (0.062)*	-0.081 (0.007)***
Per capita alcohol consumption (gallons)	0.005 (0.350)	0.025 (<0.001)***	0.002 (0.756)	0.032 (<0.001)***	0.013 (0.002)***	0.014 (<0.001)***
Population Density(per square mile-Log)	-0.099 (<0.001)***	-0.023 (<0.001)***	-0.140 (<0.001)***	-0.031 (<0.001)***	-0.065 (<0.001)***	-0.010 (<0.001)***
Constant	-0.487 (0.065)*	0.419 (0.035)**	-0.542 (0.172)	0.653 (0.030)**	0.083 (0.683)	0.363 (0.006)***
Heteroscedasticity test	0.000		0.000		0.000	
Serial correlation test	0.000		0.000		0.175	
R-squared	0.27	0.49	0.22	0.48	0.27	0.44
Sample Size	2050	2050	2050	2050	2050	2050

Source : Authors' calculations

**** p<.01, ** p<.05, * p<.1*

Table A2: Determinants of changes in lifespan inequality due to homicide: Fixed Vs Random Effect

Variable	Model 1 Contribution of Homicide to Lifespan Inequality -Total Population		Model 2 Contribution of Homicide to Lifespan Inequality - Male Population		Model 3 Contribution of Homicide to Lifespan Inequality - Female Population	
	FE	RE	FE	RE	FE	RE
% of Black Population	1.048 (<0.001)***	0.917 (<0.001)***	1.727 (<0.001)***	0.903 (<0.001)***	0.198 (0.006)***	0.188 (<0.001)***
% of White Population	0.618 (<0.001)***	0.487 (<0.001)***	0.946 (<0.001)***	0.257 (<0.001)***	0.224 (<0.001)***	0.037 (0.012)
% of Age Group(15-24)	-0.156 (0.001)***	-0.156 (0.001)***	-0.230 (0.002)***	-0.241 (<0.001)	-0.035 (0.246)	-0.067 (0.029)**
% of Age Group(25-34)	0.361 (<0.001)***	0.395 (<0.001)***	0.466 (<0.001)***	0.609 (<0.001)***	0.217 (<0.001)***	0.277 (<0.001)***
% of High School Graduate	-0.121 (<0.001)***	-0.101 (<0.001)***	-0.172 (<0.001)***	-0.108 (0.012)**	-0.052 (0.004)	-0.030 (0.082)*
% of College Graduate	0.155 (<0.001)***	0.138 (<0.001)***	0.231 (<0.001)***	0.162 (0.003)***	0.075 (0.001)	0.013 (0.547)
Per Capita Corrections Expenditure (Log)	-0.005 (0.436)	0.002 (0.772)	-0.012 (0.239)	0.016 (0.093)*	0.004 (0.302)	0.021 (<0.001)***
Per Capita Education Expenditure (Log)	-0.009 (0.428)	-0.006 (0.616)	-0.007 (0.720)	0.003 (0.861)	-0.011 (0.149)	-0.002 (0.786)
Per Capita Judicial Expenditure (Log)	-0.006 (0.256)	-0.009 (0.109)	-0.008 (0.309)	-0.020 (0.015)**	0.0002 (0.942)	-0.007 (0.029)
Per Capita Health Expenditure (Log)	0.015 (0.001)***	0.014 (0.003)***	0.024 (0.001)***	0.019 (0.008)***	0.002 (0.466)	-0.002 (0.603)
Per Capita library Expenditure (Log)	0.007 (0.014)**	0.008 (0.004)***	0.012 (0.003)***	0.017 (<0.001)***	0.001 (0.608)	0.001 (0.679)
Per Capita Police expenditure (Log)	-0.011 (0.085)*	-0.012 (0.051)*	-0.018 (0.067)*	-0.023 (0.017)**	0.001 (0.746)	-0.004 (0.349)
Per Capita Public Welfare Expenditure (Log)	0.052 (<0.001)***	0.046 (<0.001)***	0.082 (<0.001)***	0.067 (<0.001)***	0.015 (0.001)***	0.006 (0.127)

Per Capita Unemployment allowances Expenditure (Log)	0.006 (0.059)*	0.007 (0.043))*	0.011 (0.038)**	0.011 (0.035)**	-0.001 (0.714)	-0.001 (0.524)
Universal Background Checks Law	0.007 (0.002)	0.006 (0.046)**	0.013 (0.009)***	0.009 (0.047)**	-0.001 (0.526)	-0.003 (0.101)
Permit to Purchase Law (Gun)	-0.007 (0.060)	-0.005 (0.175)	-0.012 (0.033)**	-0.005 (0.405)	-0.001 (0.526)	0.002 (0.353)
No Stand Your Ground Law (Gun)	0.003 (0.890)	0.001 (0.712)	-0.002 (0.609)	-0.001 (0.665)	0.001 (0.519)	0.0004 (0.766)
Unemployment Rate (%)	-0.003 (<0.001)***	-0.003 (<0.001)***	-0.004 (<0.001)***	-0.005 (<0.001)***	-0.001 (0.002)***	-0.001 (<0.001)***
Real Per Capita Income (Log)	-0.013 (0.283)	-0.023 (0.058)*	-0.028 (0.152)	-0.067 (<0.001)***	-0.004 (0.639)	-0.021 (0.002)***
Gini Coefficient	-0.035 (0.126)	-0.038 (0.099)*	-0.009 (0.808)	-0.012 (0.730)	-0.039 (0.007)***	-0.050 (<0.001)***
Per capita alcohol consumption (gallons)	-0.001 (0.807)	0.004 (0.209)	-0.007 (0.114)	0.008 (0.057)*	0.005 (0.004)***	0.008 (<0.001)***
Population Density(per square mile-Log)	-0.045 (<0.001)***	-0.029 (<0.001)***	-0.050 (<0.001)***	-0.012 (0.006)***	-0.030 (<0.001)***	-0.004 (<0.001)***
Constant	-0.270 (0.073)*	-0.135 (0.328)	-0.489 (0.036)**	0.326 (0.064)	-0.017 (0.860)	0.202 (0.002)***
Heteroscedasticity test	0.000		0.000		0.000	
Serial correlation test	0.000		0.000		0.0395	
R-squared	0.25	0.08	0.19	0.44	0.34	0.44
Sample Size	2050	2050	2050	2050	2050	2050

Source: Authors’ calculations

**** p<.01, ** p<.05, * p<.1*

Table A3: Cross-sectional dependence test

	Life Expectancy			Lifespan Inequality		
	Model1	Model2	Model 3	Model 1	Model 2	Model 3
Pesaran's test of cross-sectional independence	27.145 (0.000)	25.866 (0.000)	10.038 (0.000)	23.839 (0.000)	24.948 (0.000)	8.214 (0.000)
Average absolute value of the off-diagonal elements	0.248	0.248	0.180	0.241	0.242	0.166

Source: Authors' calculations

Table A4: Second Generation Unit root test

Variable	CADF		CIPS	
	I(0)	I(1)	I(0)	I(1)
Loss of Life expectancy due to Homicide -Total Population	-1.909	-4.382 ***	-3.180 ***	-6.074 ***
Loss of Life expectancy -Male Population	-1.938	-4.297 ***	-3.496 ***	-6.082 ***
Loss of Life expectancy -Female Population	-2.720 ***	-4.897	-4.707 ***	-6.190 ***
Contribution of Homicide to Lifespan Inequality -Total Population	-1.932	-4.635 ***	-3.398 ***	-6.115 ***
Contribution of Homicide to Lifespan Inequality -Male	-1.986 *	-4.394	-3.624 ***	-6.129 ***
Contribution of Homicide to Lifespan Inequality -Female	-2.862 ***	-5.097 ***	-4.944 ***	-6.179 ***
% of Black Population	-2.009 ***	-2.121 ***	-1.824	-3.102 ***
% of White Population	-1.948 *	-2.292 ***	-1.721	-3.141***
% Age Group (15-24)	-2.224 ***	-2.355***	-2.473 ***	-2.556 ***
% Age Group (25-34)	-2.673***	-1.944 *	-2.567 ***	-2.403 ***
% of High School Graduate	-2.477 ***	-4.173***	-3.232 ***	-6.038 ***
% of College Graduate	-1.548	-3.617 ***	-1.821	-5.630 ***
Per Capita Corrections Expenditure (Log)	-2.467 ***	-3.832 ***	-2.661 ***	-5.872 ***
Per Capita Education Expenditure (Log)	-2.267 ***	-3.529 ***	-2.616 ***	-5.915 ***
Per Capita Judicial Expenditure (Log)	-2.188 ***	-3.942 ***	-2.582 ***	-5.801 ***
Per Capita Health Expenditure (Log)	-1.952*	-3.648***	-2.143 ***	-5.789 ***
Per Capita Library Expenditure(Log)	-1.747	-3.820 ***	-2.604 ***	-6.075***
Per Capita Police expenditure (Log)	-2.269 ***	-3.818 ***	-2.526 ***	-5.971***
Per Capita Public Welfare Expenditure (Log)	-1.872	-3.632 ***	-2.256 ***	-5.809 ***
Per Capita Unemployment allowances Expenditure (Log)	-1.996 ***	-3.723 ***	-2.253 ** *	-5.589 ***
Unemployment Rate (%)	-2.290 ***	-3.523 ***	-2.526 ***	-5.604 ***
Real Per Capita Income (Log)	-2.549 ***	-2.928 ***	-2.232 ***	-4.477 ***
Gini Coefficient	-2.521***	-2.914***	-2.489 ***	-4.866 ***
Per capita alcohol consumption (gallons)	-1.493	-3.645 ***	-1.938	-5.881 ***
Population Density (per square mile-Log)	-1.550	-2.193 ***	-1.969	-2.121***

Source: Authors' calculations