

Black Lives: The High Cost of Segregation

By ROBYNN COX AND JAMEIN P. CUNNINGHAM AND ALBERTO ORTEGA AND
KENNETH WHALEY*

Exploiting the arrangement of railroad tracks in northern cities, we explore the extent to which segregation impacts homicide victimization by race. Our results reveal a robust positive relationship between segregation and non-white homicide victimization. In addition, we find a decrease in public provisions, as highly segregated locations generate fewer revenues and have lower public expenditures. Our findings suggest that white flight and segregation deplete the local tax base, leading to urban decay and higher crime, resulting in the loss of non-white lives.

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Homicide is the leading cause of death for young Black men in the United States.¹ In 2021, young Black males represented 40 percent of all homicide victims, while young white males accounted for 10 percent.² Young Black men and Black Americans, in general, tend to live in more disadvantaged, racially segregated neighborhoods, which restricts their upward mobility (Chetty et al., 2014; Andrews et al., 2017; Bayer, Charles and Park, 2021) while also exposing them to higher levels of violence (Sharkey and Marsteller, 2022). Although the non-white U.S. population share has grown from 10 percent to roughly 40 percent over the last 70 years, U.S. neighborhoods remain highly segregated. The average Black citizen in a metro area resides in a neighborhood that is more than 50 percent non-white (Glaeser and Vigdor, 2001; Frey, 2018) with high levels of concentrated poverty (Firebaugh and Acciai, 2016). Massey and Denton (1989) find that Black segregation is unlike that of any other racial or ethnic group; they describe it as *hypersegregation*. Outside of the South, much of the residential segregation that persists today originated during the first wave of Black migration, peaking at the end of the second wave in 1970 (Cutler, Glaeser and Vigdor, 1999; Logan and Parman, 2017).

* Cox: School of Public Policy at the University of California, Riverside (robynn.cox@ucr.edu). Cunningham: School of Law & LBJ School of Public Affairs at the University of Texas at Austin (jamein.cunningham@law.utexas.edu). Ortega: O’Neill School of Public and Environmental Affairs, Indiana and NBER (alorte@iu.edu). Whaley: Department of Economics, University of South Florida (kennethwhaley@usf.edu). We would like to thank Elizabeth Oltmans Ananat for making the data publicly available. We would also like to thank seminar participants at the Health Policy Workshop at Indiana University, the NEA Sessions at the ASSA Annual Meetings, University of Toronto Bissell-Heyd Conference on Race, Equity and Public Policy, University of Pennsylvania, University of Wisconsin, Institute for Research on Poverty: Summer Research Workshop, Opportunity & Inclusive Growth Seminar Series, Population Association of America Annual Meeting, the 11th Workshop on the Economics of Risky Behaviors, and the NBER Summer Institute Crime Workshop; and Patrick Bayer, Dan O’Flaherty, and Coady Wing for comments and advice. Any errors or omissions are ours alone.

¹We define young as under the age of 45. For statistics, see [CDC – Leading Cause of Deaths for Non-Hispanic Males](#).

²Calculation comes from CDC Multiple Cause of Death 2021 WONDER Search for ICD-10 Codes X85-Y09 (Assault)—comparing total assaults to non-Hispanic white and non-Hispanic black males under the age of 45.

The second wave, in particular, led communities that experienced an increase in Black migration to have higher levels of racial segregation, greater crime rates, greater incarceration rates, and increased expenditures on public safety, resulting in increased contact between the police and Black residents (Derenoncourt, 2021). The strong correlation between Black migration, racial segregation, and higher murder rates post-1970 is consistent with prior research investigating the relationship between racial segregation and violent crime (Peterson and Krivo, 1993; Massey, 1995; Shihadeh and Maume, 1997; Bjerk, 2006), which finds a positive correlation between the two. However, research has yet to find a causal relationship between segregation and homicide victimization by race.³

In this paper, we explore the degree to which residential segregation influences homicide victimization by race. We focus on homicides because of the significant racial disparities that exist in victimization. Evans, Garthwaite and Moore (2018) find that the introduction of crack cocaine dramatically increased homicides for younger men, disproportionately affecting younger Black males.⁴ Yet, homicides were the leading cause of death of young Black males before and after the arrival of crack cocaine. The violence attributed to illegal drug markets was likely exacerbated by pre-determined environmental factors associated with segregation and isolation. Therefore, segregation in and of itself is an important phenomenon plausibly contributing to racial disparities in homicide victimization.

Residential racial segregation isolated Black Americans geographically and separated them from social and economic opportunities as jobs and resources moved from cities to suburbs. Andrews et al. (2017) find that historical racial segregation is correlated with diminished contemporary economic mobility. Therefore, concentrated poverty and its myriad associated problems, including drugs and crime, followed the residential racial segregation experienced by Black Americans. Massey (1995) purports that the interaction between high levels of poverty and residential segregation has led to high rates of violence and victimization within Black communities. Violence and victimization become endemic to this type of environment as residents adopt violent behavioral responses to deter potential criminals and lower their own risk of victimization (Massey, 1995; O'Flaherty and Sethi, 2007, 2010a; Evans and Kotowski, 2021). In addition, these communities have poor social control of crime due to disruptions in social bonds (e.g., family disruption, joblessness) stemming from poverty and isolation. Moreover, city officials and businesses may target racially segregated communities for disinvestment in public and private resources, creating further disadvantages. Such disinvestments could lead to greater crime in segregated communities (if, for example, police are inadequately funded), or decreases in crime, specifically property crime, due to a decrease in the supply of available goods to steal. In this sense, residential segregation not only leads to social disadvantage but may also lower the political efficacy of the isolated group (Ananat

³The work of Bjerk (2006) is closely related. Two-stage least square results reveal a positive relationship between segregation and robbery and aggravated assaults; they reveal no relationship between segregation and property crime (burglary, larceny, motor vehicle theft). Nonetheless, Bjerk (2006) does not explore murder/manslaughter or victimization, leaving this, as well as explanations for potential mechanisms, an open question.

⁴Younger refers to those ages 15-24.

and Washington, 2009).

However, it is not clear who bears the burden of segregation. Krivo, Peterson and Kuhl (2009) hypothesize that residential segregation not only increases violence within the segregated communities but also increases violence in all neighborhoods in more segregated cities. Whites in highly segregated cities may experience higher rates of violent crime because the lack of shared residential spaces breaks down the inter-group coalitions needed to solve pressing social and institutional problems. Segregation allows for the proliferation of distinct beliefs regarding the nature of social problems, which creates barriers to addressing these challenges. For example, Blacks tend to think Black-white inequality results from structural problems, while Whites place more emphasis on behavior (Krivo, Peterson and Kuhl, 2009). Thus, if these differing views make it politically challenging to implement structural solutions to address community violence, this could lead to greater violence in the city, possibly increasing white victimization. Other studies, however, do not find that the harmful effects of segregation spill over into the broader community. For instance, Ananat (2011) finds that segregation increases Black poverty and inequality while at the same time decreasing white poverty and inequality. There is likely considerable heterogeneity across white communities, resulting in varied responses to segregation. Chyn, Haggag and Stuart (2021) find that segregation reduces intergenerational mobility for Black children regardless of their parents' relative income rank, while segregation negatively impacts the economic mobility of white children with parents from the bottom half of the income distribution. Given the literature, the burden of the violence associated with segregation remains unresolved.

We examine the violent consequences of segregation within a causal framework. We focus our analysis on the post-Great Migration period, between 1970 and 2010. During this period, Blacks left northern and western cities and returned to the south, reversing migration patterns. Moreover, during this period there was a reversal in crime and prison admission rates. By examining this period, we can rule out general trends in crime-related outcomes as confounding effects. We also note that, although inextricably linked, we are not explicitly examining the effects of the Great Migration (e.g., Derenoncourt (2021)), but rather, the effects of segregation. To deal with endogeneity concerns, we follow Ananat (2011) and exploit the arrangement of railroad tracks in the nineteenth century. Because railroad tracks acted as distinct boundaries for neighborhoods, they represent a specific technology for segregation and a useful instrument for identifying a causal relationship between racial segregation and crime-related outcomes. We confirm that northern cities, partitioned into a relatively greater number of neighborhoods by railroads, experienced higher segregation levels. As in Ananat (2011), we also consider whether socio-economic factors influence railroad tracks' arrangement within an area during the Great Migration. In addition, we expand our analysis to estimate the effect of segregation during the First Wave of the Great Migration on homicides.

We use the Vital Statistics Multiple Cause of Death files to measure victimization by race. Our regression results reveal a strong positive relationship between segregation and non-white homicides. We find no evidence that segregation influences white homicide victimization. For non-white homicides, we identify a relatively large positive relation-

ship post-1970. While the marginal effect decreases after 1990, the estimates remain statistically significant. A one-standard-deviation decrease in the dissimilarity index would save 0.147 non-white lives per 1,000 non-white residents or approximately 14 non-white lives for a typical MSA with a population of 94,653 in 1990. Our results hold when we include other contemporary local characteristics such as Black population share, poverty, inequality, labor market characteristics, and educational attainment.⁵

Our main finding of increased homicides is substantiated with strong evidence of a positive relationship between violent crime and segregation. We find a robust causal relationship between segregation and the murder rate. An important takeaway from our analysis is that general violent crime statistics mask heterogeneity in victimization by race. Due to structural and environmental factors associated with segregation, the brunt of violence is borne by non-white residents. In addition, the marked increase in homicides is driven by city centers, as we find no effect of segregation on murder or violent crime in non-principal cities across MSAs. We also find that the relationship between segregation and non-white homicides may date as far back as the first wave of the Great Migration.

We also complement our findings on the effect of segregation on non-White victimization by examining the impact on local government finances. First, we find that segregation lowers local government revenue driven by lower property tax revenue, which reduces police expenditures per capita in 1990 and 2000. Interestingly, we also find that segregation leads to a shift in funding toward policing. So, although less funding is available, the share of funding devoted to public safety is greater in segregated MSAs. Moreover, the lack of public safety is reflected in lower arrest rates for violent and property crimes. Interestingly, we find evidence of lower revenues and expenditures during the first wave of the Great Migration, consistent with [Tabellini \(2020\)](#), who finds that Black inflows between 1910 and 1930 negatively impacted northern cities' public spending and tax revenues.

In addition, segregation also lowers school expenditures. This is important because education has been shown to have sizable crime-reducing benefits, even concerning murder ([Lochner, 2020a](#)). Specifically, [Weiner, Lutz and Ludwig \(2009\)](#) find that court-ordered school desegregation significantly decreases homicide victimization among Black youth by 25 percent. Because segregation significantly increases homicide rates and lowers spending on public safety and education, we also test the effect of segregation on police killings. Specifically, if underfunded segregated municipalities become more reliant on fines and fees ([Beck, 2023](#)) to generate revenue, then this would increase the number of (potentially negative) interactions between police and residents that could escalate to excessive use of force. Moreover, a riskier work environment (i.e., increasing homicide rates) coupled with a lack of resources to adequately perform duties could increase stress levels and anxiety among officers and, subsequently, increase police killings in segregated communities ([Nieuwenhuys, Savelsbergh and Oudejans, 2012](#)). Our results reveal

⁵Descriptive work by [Shihadeh and Maume \(1997\)](#) explores the relationship between segregation and Black homicide victimization, finding a weak but positive relationship. Further analysis reveals that the relationship breaks down when accounting for labor market characteristics, poverty, and educational attainment.

little evidence that segregation influences police-related fatalities of white or non-white civilians post-1970. Thus, segregation due to Black migration led to decreased public expenditures in two categories with important crime-fighting benefits, policing, and education, which may have ultimately contributed to increases in non-White homicides.

At the same time, we provide weak evidence that Black prison admissions rates increase and strong evidence that Black imprisonment rates significantly increase. We find no impact on white admissions or imprisonment rates. This finding is in alignment with research finding that prison rates increased due to changes in policies that led to more punitive approaches to violent crime, resulting in longer state prison sentences (Raphael and Stoll, 2013), as well as research that ties the demand for more punitive approaches to mainstream societies desire to deal with “inner city” (i.e., Black) crime with incarceration versus social programming (see Hurwitz and Peffley (2005)). It is likely that local actors respond to higher violent crime rates with a more punitive criminal justice system (Feigenberg and Miller, 2021), reflected by higher rates of Black incarceration. One reason this finding may be important to stakeholders beyond the local level is due to the additional fiscal burden high imprisonment rates places on states.

Our results support prior theoretical and descriptive work finding a positive association between segregation and violent crime (Peterson and Krivo, 1993; Massey, 1995; Shihadeh and Maume, 1997; Bjerck, 2006; Krivo, Peterson and Kuhl, 2009). However, we find that Black residents bear the burden of the violence associated with segregation, as we find no effect on white victimization. Our work is closely related to Ananat (2011), but we also contribute to the larger literature on the effects of the Great Migration. In addition, our work complements previous studies on the impact of segregation on mobility and inequality. Our results highlight that segregation significantly influences the number of Black males contributing to greater society, as they are likely the victims of violent crime and a more punitive criminal justice system (Wolfers, Leonhardt and Quealy, 2015). Lack of Black males impacts family structures and, therefore, intergenerational mobility—resulting in long-lasting and persistent inequality in Black communities. Our study illustrates the high cost of segregation and structural racism, where minorities are locked out of opportunity and receive sub-par funding for public amenities, paying for these disadvantages with their lives.

I. Data

We use several data sources to examine the impact of segregation on victimization. We focus our analysis on homicides by implementing a two-stage-least-squares (2SLS) strategy similar to Ananat (2011), though we examine the effects of segregation over several census years, 1970-2010. In addition, we complement our analysis by examining changes in local government finances, particularly public safety and education expenditures, as possible explanations for our main findings. Finally, we explore changes in crime and incarceration. Our analysis will focus on northern MSAs identified in Ananat and Washington (2009) and Ananat (2011). Due to the fact that many of our outcomes are not reported consistently over time, we create two samples. The first sample, the county sample, constructs outcome variables of interest from county-level observations

aggregated up to the MSA. The second sample focuses on the central city (principal city) of the MSA. We have complete and consistent reporting over time for our primary outcome interest, homicide victimization; this is not the case for other outcomes, which we will discuss below.

A. Dissimilarity Index

Our main independent variable of interest is residential segregation. To measure segregation in each census year, we use the commonly employed index of dissimilarity (Duncan and Duncan, 1955; Cutler and Glaeser, 1997). The dissimilarity index captures the degree to which Blacks are located in certain census tracts relative to Whites within an MSA. The index provides the share of the Black population that would need to move to other census tracts to be fully integrated within a city or MSA. Thus, we can capture relative separation or integration across all neighborhoods within the city or metropolitan area in our data.⁶ The following equation is used to construct our measure of segregation:

$$(1) \quad \text{Index of dissimilarity} = \frac{1}{2} \sum_{i=1}^N \left| \frac{\text{Black}_i}{\text{Black}_{total}} - \frac{\text{non-Black}_i}{\text{non-Black}_{total}} \right| \times 100$$

where i represents a census tract in an area. We follow Ananat and Washington (2009) to create our measure of segregation by constructing an index of dissimilarity using census counts from the Census of Population and Housing for 1970, 1980, 2000, and 2010. For 1990, we use the index of dissimilarity from Cutler, Glaeser and Vigdor (1999). From census data, we create the index based on counties that belong to each MSA for locations outside of New England. City and towns, rather than counties, identify MSAs in New England. Therefore, we calculate the index of dissimilarity using census tracts in the cities or towns that belong to a particular MSA in New England. In addition, we impute measurements of segregation for MSAs with insufficient or missing census tract data.⁷ As documented by Ananat and Washington (2009), not every county or location had defined census tracts before 1990. Therefore, we use a predicted dissimilarity index value using segregation levels in 1990, change in the Black population, poverty rates, graduations rates, and employment rates as independent variables.

Online Appendix Table B1 reports summary statistics from our final samples. The index of dissimilarity reported in row 1 is from the county sample, and row 2 is from the central city sample. For the county sample, we are comforted by the fact that our index of dissimilarity closely matches Ananat and Washington (2009) in the census years that overlap. The average for the index of dissimilarity is roughly .556, with a standard deviation of .171. An important point to note is that segregation has decreased significantly over the last 50 years. In our sample, the least segregated MSA in 1970 was Brockton,

⁶For additional explanation and examples, see https://www.census.gov/about_dissimilarity

⁷It is important to note that we use the 1990 definition of MSAs in each census year to construct our measure of segregation.

MA (index of .393), while the most segregated was Oklahoma City, OK (index of .987). In turn, during the last year of our sample, 2010, the most segregated was Detroit, MI (index of .736), while the least segregated remained Brockton, MA (index of .142). An example of an MSA with an average level of segregation in 1970 is Lorain, OH, and in 2010 Portland, OR. By 2010, the dissimilarity index was 39 percent lower than in 1970, the end of the second wave of the Great Migration.

B. Victimization

To construct victimization rates between 1970 and 2010, we use mortality information from the Vital Statistics Multiple Cause of Death Files (US DHHS and ICPSR 2007). The Vital Statistic files are publicly available at the ICPSR from 1959 to 1988. We obtain the restricted detail mortality files for 1989 to 2016 directly from the Center for Disease Control and Intervention National Vital Statistics System (NVSS).

C. Homicides

We construct measures of victimization—homicides by race (deaths per 1,000 civilians).⁸ Online Appendix Figure A2 plots the U.S. fraction of homicides between 1970 and 2010 for white and non-white individuals, respectively. Homicides are reported per 100,000 individuals in each racial group. The figure shows that the homicide trends are similar over time. However, note that the axes differ, with non-white homicides occurring at a much higher rate as a proportion to their population, regularly five times or higher during this period. We can also see this trend in the summary statistics in Online Appendix Table B1, which reports the share of homicides by each census year used in our analysis. In 1970, the number of non-white homicides per 100,00 non-white residents was .22, which is seven times that of white residents. The number of homicides for both groups reached its peak around 1980. However, since then, the number of homicides for both groups has decreased substantially over time; non-white homicides in 2010 were .12 per 100,000 non-white residents. Still, there is a disparity in this number, with the rate of non-white homicides being four times larger in 2010.⁹

We also consider an additional measure of victimization—police-related fatalities (deaths per 100,000 civilians).¹⁰ However, we acknowledge that the Vital Statistics and other government sources of police-related fatalities report roughly half of the deaths recorded

⁸Population counts by race and year are available after 1967 from the Surveillance, Epidemiology, and End Results Program (SEERs).

⁹We examine outcomes for non-whites, rather than only Blacks, for a few reasons. First, we consider the effect on all non-whites because individuals from other ethnicities may suffer similar consequences from segregation (e.g., Hispanics or Native Americans) but whose racial group is not identified in our data (Krivo, Peterson and Kuhl, 2009). Thus, solely examining Black outcomes would omit the effect on these communities. For earlier years in our analysis, we cannot identify racial categories within the non-white grouping. For some specifications, examining non-whites also improves power (e.g., police killings). Nonetheless, Online Appendix Figure B12 also considers an analysis of black homicides.

¹⁰A few examples linking police killings to policing activity, police organizational structure, police culture, and community demographics, which may be affected by segregation include: Ba, Rivera and Whitefield (2021); Deza et al. (2023); Cox, Cunningham and Ortega (2021); Cunningham, Feir and Gillezeau (2021); Ba et al. (2021); Hoekstra and Sloan (2020); Stashko and Garro (2021); García and Ortega (2022); Holz, Rivera and Ba (2019); Weisburst (2019).

in non-governmental sources (Barber et al., 2016; Krieger et al., 2015). Therefore, we supplement our analysis with the Fatal Encounters data.¹¹ Although Vital Statistics data is an undercount of police killings, national time-series strongly correlate with Fatal Encounters (Cox, Cunningham and Ortega, 2021).

D. Crime, Police Contact, and Imprisonment

Data on other crime-related outcomes come from the UCR Offenses Known and Clearance by Arrest. The data on crime includes monthly information on the number of unfounded offenses, actual offenses, offenses cleared by arrest, and offenses cleared. We focus on the number of violent offenses (murder and manslaughter, rape, robbery, and assault) reported and the number of homicides reported (murder and manslaughter).¹² In addition, we obtain the number of arrests by offense from the UCR's "Arrests by Age, Sex, and Race" files, which we use to construct arrest rates by race for violent and property crime and drug-related offenses. Due to the infrequent reporting of crime data, we focus our analysis on the principal city in the sample. Many local municipalities fail to produce a consistent series of crime data over time. We overcome missing data using crime counts from the most recent reporting year within five years of a census year. As a result, we have crime statistics for each principal city in every census year or close to every census year; this is not true for every city in an MSA. For robustness, we compare our results when we include cities outside the MSA in our sample as well as when we only use non-principal cities in the MSA.

As shown in Online Appendix Table B1, both total crime and arrests by race increased until the 1990s and then fell dramatically. Between 1990 and 2010, crime decreased by 37 percent. In comparison, the violent crime rate in our sample dropped by 11 percent after 1990, and the murder rate declined by 18 percent. Similar to crime, we see an increase and then a decrease in arrest rates over time. Since the 1990s, the Black arrest rate fell by over 54 percent. Significant drops in arrests occur for both violent and property crimes (larceny burglary, and motor vehicle theft) as well as for drug sales. White arrests also decrease over time, but the decline is much smaller (13 percent) and is driven by property crime arrests.

Information on prison admission and population by race comes from the Vera Institute of Justice. We focus on the county's contribution to the state prison population. The Vera Institute of Justice compiles county counts of individuals sentenced to state prison. The primary source for county prison information is the Bureau of Justice Statistics National Corrections Reporting Program (NCRP), which began in 1983.¹³ We primarily focus on prison admission and the prison population. It is important to note that the prison custody population is not available until 1999. The Vera Institute report estimates the prison population from 1983 to 1998. The calculations are based on prison admissions and release information by year and county. Unfortunately, NCRP does not provide

¹¹Fatal Encounters data is publicly available at fatalencounters.org.

¹²When discussing murders, we refer to the data in the UCR, and when examining homicides, we refer to the data collected in the CDC's NVSS.

¹³Participation in the NCRP is voluntary and therefore does not contain information for every state or every year.

admission and release information for the same person. The Vera Institute goes through great effort to check the validity of prison and jail records.¹⁴

We use prison data to construct race-specific admission rates (admissions per 1,000 civilians) and imprisonment rates (number of individuals in prison per 1,000 civilians). In our sample, both the imprisonment and admission rates peaked in 2010, well after the crime drop.

E. Local Government Finances and Public Safety

We consider various local finance outcomes as potential mechanisms for any effects resulting from segregation. Data on local government operations, revenue, and expenditures are from the Census of Governments and the Annual Survey of Governments. These sources provide employment counts, which we use to supplement the police employment analysis as well as revenues and expenditures across various categories. We focus our analysis of government finances on total revenue, property tax revenue, and public safety expenditures (police and fire). Total revenue and expenditure values are reported per capita (in the year 2000 dollars). Online Appendix Table B1 shows that over the time of our sample, average MSA spending on police more than doubles from \$88 per person to \$223 per person. There is also a large increase in fire safety expenditure and a more than 31 percent increase in property tax revenue. To complement our analysis on public safety expenditures, we construct police employment rates (police per 1,000 residents) using employment counts from the Uniform Crime Reporting's (UCR) Law Enforcement Officers Killed and Assaulted (LEOKA) files. As with police expenditures, the number of officers increases over time. The number of sworn police officers per 1,000 residents increased by 27 percent between 1970 and 2010.

Given that school segregation and school spending has been associated with improvements in educational attainment (Jackson, 2020; Johnson, 2011; Ananat and Washington, 2009), and school desegregation and education have been shown to reduce violent crime (Lochner, 2020a; Weiner, Lutz and Ludwig, 2009) we also consider the effects of segregation on public school expenditures. We supplement our analysis with school district data from the National Center for Education Statistics (NCES) national school finance survey.¹⁵

F. Final Sample

Our analysis considers two primary samples; the first sample includes 99 MSAs constructed from county-level observation plus 11 counties from New England. MSAs from New England are comprised of towns that are distributed regionally across multiple counties. We take a weighted average across counties to produce a measure of segregation for the New England counties. The Appendix includes an analysis that compares the results

¹⁴For more information, see Kang-Brown et al. (2018) and Hinds, Kang-Brown and Lu (2018).

¹⁵There are roughly 2,500 districts that we can map to the list of MSAs in our sample. We compute measures for median per-pupil spending for the median school district in an MSA.

when we restrict our sample to non-New England counties (see Online Appendix Figure B13). Our results are robust to the exclusion of New England from our sample. The second sample focuses on crime-related outcomes from the principal city of 121 MSAs. Given the voluntary nature of UCR reporting, many of the cities within an MSA do not consistently report over time. As a specification check, we conduct an additional analysis including surrounding cities within an MSA. The inclusion of these cities does not change the main findings but decreases the precision of our estimates. These results are also available in the Online Appendix (see Online Appendix Figure B4 and B7).

The summary statistics in Online Appendix Table B1 show that segregation decreases over time. The decrease in segregation occurs in the most and least segregated locations. Online Appendix Figure A1 shows that segregation decreases over time through the entire distribution. Therefore, we can rule out changes in segregation in any one location driving the analysis. Similarly, we see a decline in non-white homicide victimization rates. The decrease in homicides, however, does not follow changes in crime rates. As noted in literature from criminology and sociology, crime rose through the early 1990s and then decreased. By 2010, crime rates were slightly higher than in 1970, but lower property crime rates drive the decrease in crime from the 1990 peak. Relatedly, we see a rise in admissions and imprisonment rates until the year 2000 and then they decrease.

These trends in crime-related outcomes are important for our analysis. Segregation and crime are co-determined. However, we see very different trends in the two series. Segregation mainly decreases due to a decline in overt discrimination, a rise of civil rights litigation in employment and housing, and Black flight as integration expands neighborhood choices (Cutler, Glaeser and Vigdor, 1999). However, crime and imprisonment rates increase until the 1990s, and decarceration begins in the late 2000s. Our sample years also capture various federal interventions into local policing. We see an increase in drug arrests for both Black and white residents in the 1990s. The low rates of drug arrests in 1980 reflect the lack of emphasis on drug-related crimes by local police agencies prior to the Reagan Administration escalation of the War on Drugs (Cox and Cunningham, 2021). We also capture changes in sentencing guidelines and more policing in urban communities through the Violent Crime Control and Safe Streets Act (VCCA) of 1994 and the Community Oriented Policing Servicing (COPS) grants. Although crime and homicide rates decrease during this period, the size of police departments is more prominent than in pre-VCCA years, reflected in increasing expenditures devoted toward public safety over time. In 1970, roughly 10 percent of expenditures are devoted to policing; and by 2000 the share increases to 12 percent.

Figure 1 highlights the relationship between segregation and our primary outcome of interest, homicide victimization rates. Panels (a) and (b) plot 1990 homicide rates by race against segregation (measured by the index of dissimilarity in 1990). It is clear that non-white homicide rates are positively correlated with segregation, but there is no relationship with white victimization rates. Panels (c) and (d) show a similar relationship for violent crime and murder, respectively. As the index of dissimilarity increases, violent crime and murder rates also increase. Nonetheless, Online Appendix Figure A3 shows a decrease in non-white homicides over time across the entire distribution of the index

of dissimilarity. While the top and bottom quartiles experience decreases in non-white homicides, white homicides show little movement over time.

Although segregation decreases over time, the relationship between non-white homicides and segregation is quite robust. Online Appendix Figure A5 plots the relationship between segregation and homicides by decile and over time. In each census year, higher levels of segregation are associated with higher levels of non-white homicides. This provides suggestive evidence of a consistent positive relationship between segregation and non-white homicides. However, this relationship does not exist for white homicides. In many cases, higher deciles of segregation are associated with lower levels of white homicide. As stated before, segregation and crime-related outcomes are co-determined, and therefore descriptive analyses cannot identify a causal relationship. It is possible that homicides drive white flight and increase measures of segregation. White flight also depletes the local tax base and funding for public safety, resulting in higher homicide and violent crime rates for non-white residents.

II. Methodology

To examine the effect of residential segregation on homicides and other crime-related outcomes, we follow Ananat (2011) and use MSA railroad configurations to capture exogenous variation in the dissimilarity index. Below we describe the instrumental variable, along with our empirical strategy.

A. Railroad Division Index

To address the endogeneity concerns, we follow Ananat (2011) and use the configuration of railroad tracks as an instrumental variable. The configuration of railroad tracks within a city or MSA provides distinct geographical markers or boundaries that can be used to define neighborhoods. These distinct boundaries create more easily identified neighborhoods: they act as physical markers for segregated communities. From city maps, Ananat (2011) constructs the railroad division index (RDI), akin to a Herfindahl index, to exploit the configuration of railroad tracks that create subdivisions within a given location. The RDI is defined as:

$$(2) \quad \text{RDI} = 1 - \sum_i \left(\frac{\text{Area}_i}{\text{Area}_{total}} \right)^2$$

where i defines a neighborhood created by railroad track configurations and Area_{total} is the total area of the city. As the number of neighborhoods created by railroad tracks increases, the RDI gets closer to one. Conversely, if a city has no divisions and a single neighborhood comprises the entire city area, the RDI would be zero. For RDI to serve as a valid instrument, it cannot be co-determined or correlated with unobserved propensities of homicide victimization post-Great Migration. The majority of railroad tracks were

laid prior to WWI; therefore, they are not historically determined by post-migration outcomes. Ananat (2011) finds that RDI is not correlated with pre-Great Migration city characteristics. Further, as discussed in Ananat (2011), the considerations and motivations for initially laying railroad tracks were independent of the outcomes we study. The main drivers were related to topographic obstacles, competitive strategies between railroad investors, and federal subsidies to interconnect railroads to improve national security. In addition, in panel (e) of Figure 1, we show that there is no relationship between RDI and 1910 homicide rates.¹⁶ Panel (f) plots the relationship between RDI and 1990 segregation levels. RDI is highly correlated with post-Great Migration segregation. Put another way, we confirm that the additional neighborhoods created by railroads are strongly correlated with the dissimilarity index (i.e., segregation).¹⁷

B. Two-Stage Least Squares

We start with the following naive ordinary least squares (OLS) model:

$$(3) \quad Y_i = \beta_0 + \beta_1 D_i + \beta_2 X_i + \eta_i$$

where Y_i is the outcome variable of interest in MSA i . The independent variable of interest, D_i , is the index of dissimilarity. The vector X_i includes the total length of railroad tracks in MSA i . Additional specification checks will control for percent of the population being Black, manufacturing share, educational attainment, and measures of well-being (inequality and poverty). Our main specification includes minimal controls, because segregation is co-determined and influences many of the control variables of interest. For example, a high degree of segregation is a consequence of white flight and Black migration patterns. Therefore, controlling for percent of Black population will understate the impact of segregation on crime-related outcomes. Thus, our main specification focuses only on segregation, and then we supplement our analysis by including additional covariates (See Online Appendix Table B3).

Given that omitted MSA characteristics can confound our measure of segregation, we implement a two-stage least squares approach to overcome this endogeneity concern. We estimate the following first-stage regression:

$$(4) \quad D_i = \alpha_0 + \alpha_1 RDI_i + \alpha_2 X_i + \varepsilon_i$$

where RDI_i allows us to capture and use exogenous variation in the dissimilarity index independent of any confounding effects. Table 1 shows the first-stage estimates for the relationship between RDI, segregation, and 1910 homicide rates. RDI is positively asso-

¹⁶Data comes from Table 4 of the 1910 Vital Statistics, which is made available by the CDC. Violent deaths by race is only available for a handful of cities in 1910. Online Appendix Figure B18 shows no relationship between RDI and homicides before 1910, and a statistically significant effect does not emerge until 1920.

¹⁷In panel (d) of Online Appendix Figure A3 and panels (k)-(o) of Online Appendix Figure A5, we show that the relationship between segregation and RDI is robust over time.

ciated with the index of dissimilarity and has no relationship with 1910 homicide rates. The F-statistic for the first-stage regression is 15.45 in 1990, larger than the traditional threshold of 10. We also contend with the possibility of the weak instruments problem by incorporating some of the recent literature’s recommendations and presenting weak-instrument-robust inference. As discussed in [Andrews, Stock and Sun \(2019\)](#), we report the effective first-stage F statistics proposed by [Olea and Pflueger \(2013\)](#). In addition, we also present weak-instrument-robust confidence intervals and p-values based on [Anderson and Rubin \(1949\)](#).

The estimation of equation (4) provides exogenous predictions, \widehat{RDI}_i , that can be used in the second stage

$$(5) \quad Y_i = \beta_0 + \beta_1 \widehat{D}_i + \beta_2 X_i + \eta_i.$$

Appendix Table B2 reproduces the [Ananat \(2011\)](#) falsification tests, where we find no effect of RDI on a host of 1910 and 1920 characteristics. These include demographics and measures of economic well-being such as population, ethnic dissimilarity, Black population, literacy rates, and labor force participation. However, this evidence does not definitively rule out that railroads affected segregation or other outcomes during this period or earlier. It may be the case that railroads were used as a technology for segregation well before the first or second wave of the Great Migration. Although segregation increases after the first and second waves of The Great Migration ([Shertzer and Walsh, 2019](#); [Boustan, 2013](#)), Online Appendix Figure A4 shows positive estimates of the dissimilarity index dating back to 1890, where dissimilarity is similar to that of 2010. Possible evidence of the early effects of segregation may be present in [Tabellini \(2020\)](#), who finds that Northern Black inflows, during the first wave, led to a decrease in local public revenues and expenditures. This is consistent with [Logan and Parman \(2017\)](#) who find that segregation stems well beyond periods and places of Black migration into urban centers. Thus, we also consider an analysis that examines the reduced form effect of the RDI measures on revenues, expenditures, and homicides (see Online Appendix Figures B18 and B19).

III. Results

We follow [Ananat and Washington \(2009\)](#) and show our results from equation (5) by decade, 1970–2010. We standardize our regression results for easy comparison across years and outcomes; therefore, our estimates are reported in standard deviations. Panel (a) of Figure 2 reports our first-stage estimates by year. The solid circle marker reports our estimate of α_1 , and the line with an open circle reports the 95 percent confidence intervals constructed from heteroskedastic robust standard errors. Similar to [Ananat and Washington \(2009\)](#), RDI has a strong and positive relationship with the index of dissimilarity over multiple census years. The relationship was the weakest in 1970, but the point estimates increase over time. The weaker relationship in 1970 is likely a byproduct of estimating the index of dissimilarity for several MSAs due to incomplete or missing

census tract identifiers. [Ananat and Washington \(2009\)](#) also report a smaller relationship between the index of dissimilarity and segregation in 1970.

We focus on homicide victimization due to the fact that traditional violent crime and murder rates mask the heterogeneity in victimization by race. As highlighted previously, segregation has been linked to violent crime ([Peterson and Krivo, 1993](#); [Massey, 1995](#); [Shihadeh and Maume, 1997](#); [Bjerk, 2006](#)). However, it is not clear who actually bears the cost. It is possible that segregation only impacts Black residents. [Ananat \(2011\)](#) finds that white inequality and poverty rates decrease with segregation, while Black inequality and poverty rates are positively correlated with segregation. Relatedly, [Derenoncourt \(2021\)](#) uncovers a positive relationship between murder and the Great Migration. However, it is unclear if this relationship exists due to migration patterns, segregation, or racial animus in response to new arrivals.

Panel (b) of Figure 2 shows the effect of segregation on victimization rates by race. For Whites, there is no effect of segregation on homicide victimization rates: the coefficients are near zero and statistically insignificant. This is not surprising, considering the mixed evidence in the literature. For instance, using the National Neighborhood Crime Survey, [Krivo, Peterson and Kuhl \(2009\)](#) finds a positive relationship between segregation and violent crimes in white neighborhoods. However, [Light and Thomas \(2019\)](#) uncovers a negative relationship using a weighted least squares model with fixed effects.¹⁸ Using OLS, we find that segregation and white victimization is statistically significant and positively correlated in 1970 and negatively correlated in 1990 and 2010 (see Table 3). However, 2SLS estimates are statistically indistinguishable from zero in every census year and negative in 4 out of 5 census years.

For non-whites, we see a relatively large and statistically significant effect of segregation and homicides in 1970. The coefficients in Figure 2 remain large and statistically significant but eventually decrease after 1990. Nonetheless, in every census year, the estimated impact of segregation on non-white victimization is positive and statistically significant. Table 2 reports the estimated coefficients from panel (b) of Figure 2 along with the effective F-statistic ([Olea and Pflueger, 2013](#)), weak-instrument-robust 95% confidence intervals and p-values based on the Anderson-Rubin Test ([Anderson and Rubin, 1949](#)). Using the coefficient in 1990, we find that a one-standard-deviation increase (.137) in the dissimilarity index increases non-white homicides by .97 standard deviations or 88 percent. Moreover, 2SLS estimates are larger than OLS estimates (see Table 2), implying that previous descriptive work on the impact of segregation on Black homicides underestimated the true effect. In terms of actual lives, a one-standard-deviation decrease in the dissimilarity index would save 0.147 non-white lives per 1,000 non-white residents or approximately 14 non-white lives for a typical MSA with a population of 94,653 in 1990. If an MSA moved from the top quartile (.69) to the bottom quartile (.46) of the index of dissimilarity, 23 non-white homicides would have been averted. We find a similar result when examining black homicides (as opposed to all non-white). Online

¹⁸[Light and Thomas \(2019\)](#) followed [Cutler and Glaeser \(1997\)](#) and used the number of municipal governments and the share of local revenue as instruments in a robustness check for their finding of decreased white victimization. They did not do this for Black victimization. Also, the relationship is only statistically significant when using population weights, although point estimates are similar.

Appendix Figure B12 summarizes our findings for young black male homicides. We highlight young black males, as homicide victimization is one of this group's leading causes of death, and black male homicides account for over half of all homicides in the US (Heron, 2021; of Investigation, 2019). Panel (a) shows that over time, Blacks are becoming a smaller share of the non-white population but an increasing share of non-white homicides. Panel (b) shows a strong and positive relationship between segregation and black male homicides similar to the relationship seen for non-whites in Figure 1. Not surprisingly, panel (c) depicts a strong correlation and relationship between non-white homicides and black male homicides. In panel (d), we plot the 2SLS estimates of the effect of segregation on homicides for non-Whites, and young black males, respectively. The point estimates are similar across each census year.

Online Appendix Table B10 considers the overall effect of segregation on all homicides. The estimates for most census years are not statistically significant. This finding is unsurprising given that the point estimates are positive when examining non-white homicides and negative for white homicides. In 1990 and 2000, segregation had a positive and statistically significant effect on all homicides at the 10 percent level. Online Appendix Table B10 also lets us rule out the possibility of a meaningful reduction in overall homicides resulting from segregation. For instance, based on the lower bound of the 90 percent confidence interval in 1990, column (4), a one-standard-deviation increase in the dissimilarity index does not reduce overall homicides due to segregation below .001 standard deviations or a .1 percent increase. Even when considering all years in column (1), no more than a 1.5% reduction in overall homicide when using the lower bound of the 90 percent confidence interval. Together with the results in Table 2 and Table 3, we can rule out any overall reduction in homicides, or substantial benefit, for any one group.

Online Appendix Figure B1 plots the impact of segregation on the racial difference in homicides. We follow Cox and Cunningham (2021) and stack the data so that each MSA is characterized by their white or non-white homicide rates. We then regress homicides on the level of segregation and an interaction term that captures the impact of segregation on racial differences in homicides.¹⁹ As expected, segregation increases the racial gap in homicides. However, the relationship weakens over time as both homicides and segregation decrease. Yet, the estimates are positive and statistically significant in every census year. Moreover, the change in the racial gap in homicides reflects the estimated effects from panel (b) of Figure 2, as the impact of segregation on non-whites decreases over time.

In Online Appendix Table B3, we test the robustness of our results in panel (b) of Figure 2. We follow Ananat (2011) and control for local characteristics that are correlates of urban decay and crime. We first examine how the racial composition of the population influences our results. Our IV is able to disentangle the effects of segregation from migration patterns; *all things equal*, sorting in northern MSAs will vary by pre-

¹⁹To estimate the racial differential in homicide, we estimate the following equation: $Y_{i,r} = \beta_0 + \beta_1 Black_r + \beta_1 \widehat{D}_i + \beta_1 (D_i \times \widehat{Black}_r) + \beta_2 X_{i,r} + \eta_i$. The binary variable, $Black_r$, is equal to one when referencing non-white homicides and zero for white homicides. We instrument for D_i using the RDI_i and $(D_i \times Black_r)$ with $RDI_i \times Black_r$.

Migration configuration of neighborhoods, defined by the placement of railroad tracks. Online Appendix Figure B3 shows that segregation is positively related to the share of the population being Black. Therefore, it is reasonable to assume that our IV is positively correlated with the share of the population being Black, which is the case in panel (b) of Online Appendix Figure B3. However, this relationship functions entirely through segregation. The relationship between our IV and Black population shares goes away when we account for the index of dissimilarity (Online Appendix Table B5). However, the relationship between our IV and segregation still persists when we account for Black population share (Online Appendix Table B5). The second row in Online Appendix Table B3 shows that our results are robust to controlling for the total and non-white population share. In addition, our results are robust to accounting for local educational attainment and labor force participation. We also check to see if our results for non-white homicides are driven by poverty rates or inequality. We find no evidence that the inclusion of these measures of well-being impacts our results.²⁰ We also consider a specification that controls for historical pre-railroad characteristics that reflect other economic and social shocks to cities which would not be affected by the configuration of railroads. We present the results from the inclusion of these historical covariates in Online Appendix Table B4 and find that our results are robust to these control variables.

In addition, we test whether our findings are driven by selective migration. Ananat (2011) finds that migration differs between more and less segregated cities but that this result is unlikely due to outmigration. Cutler and Glaeser (1997) finds similar migration patterns resulting from residential segregation for Black and white individuals across the education spectrum. Derenoncourt (2021) finds that Black individuals outside of the South, at the start of the second wave of the Great Migration, were relatively more educated than those who resided in the South. In Online Appendix Figure B14, we examine the relationship between segregation in an MSA of residence five years ago on respondents' educational attainment in the 1940 census. Each panel reveals a weak and inconsistent relationship between segregation and educational attainment in 1940 for both Black and White individuals. Consistent with the findings from Ananat (2011), we see a slight negative relationship between segregation and black dropout rate and a weak positive relationship for black high school graduation rate.²¹ In concert with the previous literature, the evidence in Online Appendix Figures B14 belies the notion that the findings are driven solely by selective migration at the outset of the second wave of the Great Migration.

With regards to other measures of victimization, panel (c) of Figure 2 reports 2SLS results for the impact of segregation on violent crime and murder per 1,000 residents. For both violent crime and murder, the coefficients for each decade are positive. The relationship between segregation and victimization is stronger for murder than for violent crime, which includes murder, rape, robbery, and assaults. According to the point

²⁰Our results bolster findings from Peterson and Krivo (1993), providing further evidence that residential segregation is the most important explanatory variable for understanding Black homicides.

²¹Online Appendix Figure B15 replicates the results from Table 5 of Ananat (2011) examining the relationship between segregation in an MSA of residence five years ago on respondents' educational attainment in the 1980 census.

estimate in 1990, if our measure of segregation increases by one standard deviation, violent crime increases by .46 standard deviations, or about eight violent crimes per 1,000 residents. Our sample's average number of violent crimes in 1990 is 27 per 1,000 residents, implying a 30 percent increase in violent crime. Our result implies that going from the top segregation quartile to the bottom quartile decreases violent crime by roughly 48 percent, averting 13 violent crimes per 1,000 residents.

Although the impact of segregation on violent crime is positive, it is statistically significant (95% CI) in 1990 and 2010 and marginally statistically significant in 2000. In contrast, the relationship between segregation and murder is positive and statistically significant in 1980, 2000, and 2010; it is marginally statistically significant in 1990. According to our estimates for 1990, a standard-deviation increase in segregation increases the murder rate by .44 standard deviations or .047 murders per 1,000 residents (roughly 44 percent).

Our findings also show that the effect of segregation on non-white homicides is decreasing over time, indicated by smaller point estimates in 2010 relative to 1970. We contend that this may be occurring not only due to declining residential segregation but due to the changing nature of segregation since the 1970s. One aspect of the declining residential segregation has been the increase in mostly white high-income and young college-educated residents in and near city centers. Since the beginning of the 1990s, young white college-educated graduates began moving into and near central cities as they delayed marriage and having children and placed more value on living close to amenities and jobs located in the central city. This was also true for high-income earners' high commuting costs and greater disposable income, which led them to locate in city centers close to jobs and local amenities. This, in turn, brought more educated residents with relatively higher income and greater public investments, increasing the exposure of non-college-educated residents to college-educated residents and increasing expenditures on amenities, quite likely leading to spillover effects on crime (Couture and Handbury, 2023). Nonetheless, of even greater importance is the removal of racial barriers for Blacks to move to the suburbs (Glaeser and Vigdor, 2012), resulting in higher income Blacks' ability to leave disadvantaged urban central cities in search of greater opportunities and amenities and decreases in segregation (Bartik and Mast, 2022). Between 1970 and 2010, the number of Black individuals residing in the suburbs has increased from 4 million to 13 million (Logan, 2014; Frey, 2018; Bartik and Mast, 2022). This increase has led to substantial changes to the central cities and suburbs in the MSAs we analyze in our data. The suburbanization of Black individuals has also not led to suburban white flight, as was true in central cities (Boustan, 2010; Bartik and Mast, 2022). Given the nature of the NVSS homicide data, we cannot estimate suburban-specific effects. Nonetheless, our analysis is likely capturing areas of an MSA that have become less segregated and, as a result, improvements in public amenities and resources. Figure 3 and panel (b) of Online Appendix Figure B10 suggest this could play a role in the decrease in the non-white homicide estimates starting in 1990.²² At the same time, Couture and

²²Panel (b) of Online Appendix Figure B10 plots regression estimates from a two-stage least squares analysis for the impact of segregation on homicides using the supplemental homicides reports (SHR). Using this data we can plot the

Handbury (2023) note that increases in high-income and young white college-educated individuals who moved in and near central cities clustered in specific neighborhoods increasing sorting by education and the segregation of non-college-educated central city dwellers. Thus, the difference in the non-white homicide estimates between the central city and MSA could potentially be explained by Black suburbanization and increases in urban sorting. Support for this claim is evident in our central city analysis; see Online Appendix Figures B4 and B7. The central city point estimates of segregation's effect on violent crime and murder remain relatively stable between 1970 and 2010.²³ Finally, Miller (2023) finds that suburbanization of employment can explain the majority of Black male unemployment from 1970-2000. Given the negative correlation between employment and homicide, if increases in Black suburbanization decreases in segregation lead to improved labor market opportunities, there should be decreases in homicide rates as well (Shihadeh and Ousey, 1998).

Online Appendix Figure B7 replicates the analysis presented in panel (c) of Figure 2 when we include all cities in a given MSA that report crimes in the census year (or a year close to the census year).²⁴ For violent crime, point estimates when using all cities in an MSA are positive but not statistically significant in any census year. However, when we focus on the relationship between the murder rate and segregation, we find a robust, statistically significant relationship. For the principal city analysis, the coefficient for segregation is positive and statistically significant at the 90 percent or 95 percent confidence interval after 1970, while estimates are marginally statistically significant in every census year for the full MSA analysis. This is likely due to the high concentration of homicides in Black communities.

We also consider how changes in segregation over time might be driving changes in homicide rates. Online Appendix Table B6 presents a calculation of the counterfactual in non-white homicides (per 1,000) using the 1970 level of segregation. We find a decrease in segregation lowered non-white homicides by 40% relative to the estimated number of non-white homicides that would have occurred at 1970 levels of segregation. The bottom panel of Online Appendix Table B6 shows that 74% of the change in homicides can be explained by changes in segregation between 1970 and 2010.

Panel (d) of Figure 2 examines the impact of segregation on police killings of civilians by race. There is little to no effect of segregation on police killings of white civilians—point estimates are close to zero in every census year except for 2010 and never statistically significant. For non-white deaths, the coefficients are positive, except in 1970, but only statistically significant in 1980.²⁵ It is important to note that segregation is posi-

estimates for non-white homicides in the central city and for the rest of the MSA, respectively. We do not focus on this data in our primary analysis as the SHR data suffers from the underreporting issues common in UCR data.

²³Online Appendix Figure B18 also shows that segregation leads to an initial increase in homicides followed by a relatively smaller effect in the decades leading up to the second wave. It may be that an initial influx of migrants disrupts some equilibrium that cities do not return to for decades.

²⁴Due to inconsistent reporting, many local municipalities fail to produce a consistent series of crime data over time. We overcome missing data using crime counts from the most recent reporting year within five years of a census year.

²⁵We test several specifications for the impact of segregation on police killings of civilians in Online Appendix Table B7. Using counts of non-white deaths instead of mortality rates produces positive but statistically insignificant coefficients. Also, we find no evidence that segregation influences police killings when using data from Fatal Encounters.

tively correlated with police killings and that the coefficients are statistically significant when do not account for endogeneity. Given these results, we find little evidence that segregation influences police killings of civilians and that not accounting for endogeneity could lead to erroneous conclusions.²⁶

To complement our crime-related outcomes, we also examine the effect of segregation on arrests and incarceration by race in Online Appendix Figure B8 and B9. In general, we find suggestive evidence of lower arrests rates across crime types for both racial groups. The point estimates are negative and statistically significant or marginally statistically significant in many years. In addition, we find no effect of segregation on admission rates, but, we do see a disparate impact on imprisonment rates. For each census year between 1980 and 2010, we find an increase in Black imprisonment rates—there is no such effect for Whites. For instance, in 1990, a one-standard-deviation increase in the dissimilarity index increases the Black imprisonment rate by 74 percent, amounting to about 390 additional Black civilians in prison. A possible explanation for our findings is that racial residential segregation leads to a bifurcation along racial lines of the public’s beliefs about the root causes of crime, especially urban crime: Whites tend to believe that crime results from cultural deficits, while Blacks believe that crime is due to structural reasons (e.g., poor employment and educational opportunities) (Piquero and Brame, 2008).²⁷ In addition, Feigenberg and Miller (2021) finds that criminal justice systems are more punitive in more diverse communities or when there is more political competition along racial lines.²⁸

IV. Potential Mechanisms

We find a positive and robust causal relationship between segregation and non-white homicide rates. These findings align with Ananat (2011), which links segregation to lower educational attainment and higher poverty rates for Black residents. Relatedly, Cutler and Glaeser (1997) link segregation to lower earnings, idleness, and higher rates of single motherhood. All of which could increase victimization. O’Flaherty and Sethi (2010b) finds that increased racial segregation resulting from White flight can expose Black individuals to street vices such as illicit drugs. To the extent that segregation causes or exacerbates social ills, higher rates of victimization for Black Americans are likely to accompany them. Therefore, it is difficult to conclude that any one potential mechanism is the primary determinant of higher victimization. For instance, higher earnings reduce the likelihood of participating in illegal labor markets (Uggen and Thompson, 2003; Agan and Makowsky, 2023), some of which are violent (Evans, Garthwaite and

²⁶Due to heterogeneity in reporting across jurisdictions, it is generally not recommended to conduct cross-location analysis using Vital Statistics data on police-related fatalities (Loftin et al., 2003).

²⁷Prior research finds that the increase in incarceration rates during this period were largely due to changes in public policy rather than other common explanations such as changes in criminal behavior, deinstitutionalization of the mentally ill, or the crack-cocaine epidemic (Raphael and Stoll, 2013; Neal and Rick, 2016). Relatedly, recent work finds that the availability of behavioral health treatment facilities decrease crime, arrests, and police violence (Deza, Lu and Maclean, 2022; Deza et al., 2023, 2024).

²⁸Hurwitz and Peffley (2005) find that Whites prefer to use incarceration over social programming for crime committed by those in the “inner city” (i.e., Black). Forman Jr (2017) presents anecdotal evidence that Black elected officials in majority Black municipalities also chose more punitive approaches to combat violent crime.

Moore, 2018). Segregation also influences academic achievement (Card and Rothstein, 2007) and high school completion (Cutler and Glaeser, 1997). The role of segregation on education is found in various studies that find that court-ordered school desegregation improves Black educational outcomes (Guryan, 2004; Reber, 2010). Conversely, terminating court-ordered desegregation plans can worsen Black student outcomes (Lutz, 2011). Moreover, Weiner, Lutz and Ludwig (2009) find that school desegregation reduces Black victimization. To the extent that segregation reduces educational attainment and enrollment, it will also impact crime, victimization, and incarceration (Lochner and Moretti, 2004).²⁹ Relatedly, neighborhood exposure and peer effects can influence delinquent behavior and victimization (Aizer, 2008; Chetty et al., 2014; Chyn, 2018). Lastly, family structure and higher rates of single-parenting may contribute to higher crime and victimization rates (Antecol and Bedard, 2007; Bezin, Verdier and Zenou, 2022). In the following sections, we identify evidence of two new potential mechanisms: public spending on police and public expenditures on education.

A. Public Spending for Safety

Apart from segregation affects on victimization by worsening social-ills linked to poverty, we examine additional factors related to local government spending. Derenoncourt (2021) shows that local responses to the influx of Black migrants and persistent segregation limited economic mobility for Black residents in northern cities. Also, Boustan (2010) reports lower property values in northern cities that experienced Black migration and white flight. Lower income and property values should result in less revenue and, therefore, fewer resources for public goods. However, Alesina, Baqir and Easterly (1999) also find that diverse cities and metros spend a greater share of their revenue on police but less on fire, education, and sanitation.

Similarly, Derenoncourt (2021) finds higher levels of policing in northern cities that received Black migrants. The lack of public provisions outside police may reflect different preferences in using resources across demographic groups or the inability to coordinate the use of public goods effectively (Ananat and Washington, 2009; Alesina, Baqir and Easterly, 1999; Beach and Jones, 2017). In conjunction with limited resources, this coordination problem could explain the high rates of homicides for non-white residents. However, it is not clear that segregation should lead to fewer resources (defined by government expenditures). Alesina, Baqir and Easterly (1999) find evidence that diverse communities spend less on productive public goods. Beach and Jones (2017) find that increased diversity leads to gridlock in city councils and lower expenditures on public goods with larger effects for segregated cities and cities with high income inequality. However, Trounstine (2016a) finds Segregated cities are more racially divided, which leads to smaller public goods budgets and less revenue raised from their residents. Segregation also allows for greater targeting of public goods to particular ethnic groups

²⁹One can make the same argument about segregation's influence on school quality. Good schools have been linked to lower crime (Deming, 2011) and segregated schools are likely to contribute adversely to crime-related outcomes (Billings, Deming and Rockoff, 2014; Billings, Deming and Ross, 2019).

(Ejdemyr, Kramon and Robinson, 2018a). Conversely, Boustan et al. (2013) link inequality to higher levels of expenditure per capita on police and fire safety. Furthermore, Tabellini (2020) finds that the first wave of the Great Migration had little impact on the share of spending devoted toward policing, education, sanitation, and fire, despite decreases in public spending and tax revenues.

We explore how government finances are influenced by segregation in Figure 3. Panel (a) focuses on revenue per capita, while panel (b) reports the impact of segregation on public safety expenditures. According to our results, segregation is negatively related to general revenue and property tax revenue per capita. Lower general revenue is consistent with lower housing values found in Boustan (2010). When accounting for endogeneity, Boustan (2010) finds that the value of owner-occupied homes decreased between 1950-1970 and attributes the decline in property value to white flight as Blacks often paid more for housing units (Cutler, Glaeser and Vigdor, 1999) and migrated to locations with high labor demand and housing costs. However, according to our results, by 1970, highly segregated cities generated less revenue per capita, and the effects of segregation are stable across census years. According to panel (a), in 1990 a one-standard-deviation increase in the dissimilarity index decreases general revenues by \$665 per resident or .87 standard deviations. Half of the decrease in general revenue is due to lack of revenue from property taxes. A one-standard-deviation increase in segregation decreases property tax revenue by \$271 to \$360 per resident between 1970 and 2010.

Panel (b) highlights that segregation is also negatively related to police expenditures and fire safety spending per capita. Initially, there is little to no difference in spending on police associated with segregation. Still, by 1990 and 2000, there exists a robust negative relationship between the dissimilarity index and public safety expenditures.³⁰ According to our 1990 estimate, a one-standard-deviation increase in the dissimilarity index decreases spending on police by .61 standard deviations or \$64 per resident. We find a similar relationship between fire safety and segregation.

Chalfin et al. (2020) find that more resourced cities benefit from additional police. According to their finding, a one-percent increase in law enforcement reduces Black homicides by 1.1 to 2.5 percent, which amounts to as few as 20 police officers to avert one Black homicide. Panel (c) of Online Appendix Figure B7 shows that segregation is negatively correlated with police department size. We find that in 1990, a one-standard-deviation increase in segregation decreased the number of police by .36 standard deviations or .22 per 1,000 residents or about 21 officers for a typical MSA in 1990. Applying the estimates from Chalfin et al. (2020) to our results from panel (b) of Figure 2, the lack of investment in policing may explain approximately 7% of non-white homicides attributed to segregation for a typical MSA.

Although we find significant decreases in police expenditures per capita, these decreases are only statistically significant in two of the five census years we examine in our main analysis. The evidence is similar for police presence in Online Appendix Figure B7. Highly segregated MSAs have fewer officers. Point estimates are negative in every cen-

³⁰Although the relationship is not statistically significant in 2010 when we include all cities in the MSA, we find a marginally statistically relationship between police expenditures and segregation (see Online Appendix Figure B7d).

sus year we examine and statistically significant in three of the five census years. Even so, according to Online Appendix Figure B11, segregation is positively correlated with the share of expenditures devoted to policing. Therefore, segregated cities with less revenue increase their share of spending on public safety. Fewer resources and investments in public goods that deter crime, such as public safety, are consistent with the possibility that fewer resources in public safety may be related to the increase in non-white homicides. However, the factors that contribute to homicide victimization are multifaceted and are likely beyond public safety expenditures.

Online Appendix Figure B19 extends our analysis to include years back to the early 20th century. Here, we examine the reduced form effect of RDI on expenditures and revenue during the first wave of the Great Migration. We find a statistically significant decrease in all expenditures, including police spending. We also find some evidence of a decrease in the share spent on police. Interestingly, there was also a decrease in city revenues and expenditures in 1900, a decade before the start first wave. This finding suggests that segregation's effects may occur well before the first wave. Although segregation was much lower before 1910, Online Appendix Figure A4 shows that there was still a non-trivial amount as far back as 1890. The finding in Online Appendix Figure B19 suggests that future research should consider the effects of segregation before the first wave of the Great Migration and proceed with caution when considering outcomes before 1910 as falsification.

Conversely, when examining homicides, Online Appendix Figure B18, we find that the relationship between segregation and homicides does not start until after the first wave. Although a decrease in public safety expenditure may contribute to the increase in non-white homicides, the fact that the revenue result precedes the rise in homicide makes this relationship unclear. This result is counter to Tabellini (2020) finding that the first wave of the Great Migration did not cause a change in spending shares toward policing. Instead, our result aligns with the finding in Alesina, Baqir and Easterly (1999) that more diverse cities spend a greater share on public safety. Thus, we provide evidence that segregated cities during the first and second wave of the Great Migration experienced a decrease in public spending and tax revenues. However, after the second wave, we find suggestive evidence that segregated cities disinvest in other public goods to provide additional public safety. The decrease may lead to additional increases in crime, therefore, putting additional strain on public safety. Even though segregated cities reallocate funding toward police, they cannot overcome losses in property tax revenue to provide police and fire safety adequately.

B. Education Spending

Discretionary spending on education is a mechanism in which lower total revenues and a higher share of spending on public safety may, in turn, lead to higher Black victimization rates. First, we ask if segregation causes lower average per-pupil spending and revenues across MSAs. We then test for uneven funding across districts within the same MSA to assess whether districts serving Black neighborhoods receive adequate resources, as residential segregation across the broader housing market has a greater effect

on school segregation than sorting across schools within a district (Reardon 2016). Given the recent explosion of causal evidence that school spending improves education and labor market outcomes (Baron, Hyman and Vasquez, 2022; Jackson, Johnson and Persico, 2016), and that education reduces violent crime and murder (Lochner, 2020a; Weiner, Lutz and Ludwig, 2009), heterogeneity in school resources may explain differences in victimization outcomes within the same MSA.

To identify the effect of segregation on schooling across housing markets, we estimate our main model with MSA median levels of per-pupil spending, state and property tax revenues taken as outcomes. The revenue outcomes highlight how school districts raise revenues in segregated cities. In the top two panels of Online Appendix Table B8, we show that segregated MSAs rely more heavily on local property taxes and less on state revenues, placing an additional burden on local municipalities. Property taxes as a primary funding source for schools is a historical cause for resource deficiencies in non-white districts (Bayer, Blair and Whaley 2020b). Panel C of Online Appendix Table B8 shows that school spending per-pupil is indeed decreasing in segregation, suggestive of weaker mobility prospects in segregated cities. Given that private market tests reveal households are willing to pay more property taxes for higher school spending (Bayer, Blair and Whaley (2020a)), the results in this paper are evidence of structural barriers to adequate public schooling in segregated cities.

With startling differences in outcomes for Black men in segregated housing market, we want to credibly identify how segregation affects school financing for Black households relative to Whites in the same MSA. Using contiguous tract-level demographic data matched to 1990 school district boundaries, we model within-MSA differences using MSA fixed effects μ_i in the regression

$$(6) \quad Y_{ji} = \alpha_0 + \alpha_1 \text{MajorityBlack}_j + \alpha_2 \text{MajorityBlack}_j \times \widehat{D}_i + \alpha_3 X_{ji} + \mu_i + \varepsilon_{ji}.$$

Y_{ji} is per-pupil spending of the school district geographically zoned to census tract j in MSA i . Majority Black neighborhoods are defined as census tracts where Black residents comprise the largest racial share. With over 16,000 census tracts divided over 106 MSAs, this measure gives us rich local variation in school financing. We once again instrument for endogenous segregation using the railroad index, and by employing MSA fixed effects, we are able to credibly recover heterogeneity in school spending for Black neighborhoods: $\hat{\alpha}_1$ and $\hat{\alpha}_2$.

In Online Appendix Table B9, we estimate our original model and then incorporate MSA fixed effects. The positive coefficient for Majority Black, $\hat{\alpha}_1$, implies that Black neighborhoods receive higher relative school spending in the absence of segregation. This is perhaps the byproduct of reforms targeting historically underfunded schools resulting in an implicit increase in expenditures for Black school districts. For local segregation to be considered innocuous in this process, the interaction term coefficient $\hat{\alpha}_2$ must be a precisely estimated null effect. The fixed effect estimates in Online Appendix Table B9 show a sharp, precise decline in school spending for Black neighborhoods as segregation rises.

The cumulative effects of lessor-funded schools for Blacks create a path to violent crime and victimization through a cycle of lower human capital attainment (Atems and Blankenau, 2021) and ultimately poverty. Online Appendix Figures B16 and B17 descriptively highlight that poverty rates for Black residents increase with segregation across all years, while White poverty rates largely decline with segregation. Using estimates from the literature, we can compute the effect of segregation-induced reductions in educational spending on murder.³¹ In 1970, a one standard deviation increase in segregation decreased school expenditures $0.48 \times \$1,436 = \689 or 12% from the mean (Panel C of Online Appendix Table B8). Although less precise, a similar number is obtained for 2010, in which segregation decreased school spending by $0.40 \times \$3,006 = \$1,202.4$ or 10% from the mean. Jackson, Johnson and Persico (2016) estimates that a 10% decrease in education expenditures will lead to a .31 decrease in years of education. Thus, if a one year increase in average education leads to an approximately 30% decrease in murder (Lochner, 2020b), our back-of-the-envelope calculations estimate that a one standard deviation increase in segregation in 2010 resulted in a roughly 9% increase in murder. Figure 1 suggests these effects are concentrated among non-Whites. Taking into consideration the results from Ananat (2011), segregation causes lower school spending, worse educational outcomes and higher poverty rates for black residents. It follows that lower quality education and lack of human capital investment may help to explain violent crime and homicide differentials.

V. Conclusion

In this paper, we examine the relationship between residential racial segregation and violent crime using a causal inference approach. Overall, we find evidence that residential racial segregation leads to an increase in homicides of non-white residents. This is largely consistent with prior literature establishing a positive association between residential segregation and violent crime (Peterson and Krivo, 1993; Massey, 1995; Shihadeh and Maume, 1997; Bjerk, 2006). Within a rent-seeking framework (Roback, 1989), racial residential segregation acts as an economic protectionist policy for white Americans, ensuring for them lower levels of economic uncertainty (Massey, 1995; Light and Thomas, 2019). Nonetheless, we uncover a causal link between segregation and non-white homicide victimization, providing new evidence of the detrimental negative externality that such rent-seeking behavior imposes on society: a high and lasting cost on Black lives.

Though our research is closely related to Derenoncourt (2021), a few key differences distinguish our analysis. First, the featured phenomenon driving our results is segregation, not Black migration. As shown in Online Appendix Table B3, we are able to isolate the effects of segregation from Black Migration patterns. Secondly, our analysis focuses on MSAs and central cities rather than commuting zones. In particular, our main spending results come from the central city sample, though we find similar results in the MSA

³¹Jackson, Johnson and Persico (2016) finds that a 10% increase in school spending decreases adulthood poverty incidence by 3.2 percentage points.

sample. We find that the geographic unit of analysis is an important distinction, as a large share of Black migrants moved to city centers. Therefore, the division of neighborhoods in these locations matter for sorting: thus our emphasis on segregation.

In addition, our sample focuses on select northern cities for which we have the railroad division index. Although [Ananat and Washington \(2009\)](#) found similar OLS results for northern MSAs when including non-RDI locations,³² our results lack external validity. Therefore, the reader should interpret our results with this caveat in mind.³³ Nonetheless, we find the deleterious effects of de facto segregation on communities of color. Segregation is strongly associated with higher homicide rates of non-white civilians and higher imprisonment rates. The lack of provision of public goods is a possible mechanism, reflected in less spending on public expenditures that deter crime such as public safety and education. Our results not only highlight the role of local institutions, but also complement findings by [Chyn, Haggag and Stuart \(2021\)](#) linking segregation to intergenerational mobility, or the lack thereof.

Unfortunately, the rate of homicide victimization is still a concern for Black Americans. We uncover additional channels through which segregation likely contributes to elevated homicide rates. These factors include, among others, the loss in local revenue, depleted tax base, and decreased public expenditures associated with segregation, resulting in insufficient provision of public goods. This is consistent with theories and research that find that racial residential segregation allows communities to be targets for disinvestment by governments and businesses ([Massey, 1995](#); [Alesina, Baqir and Easterly, 1999](#); [Ananat and Washington, 2009](#); [Trounstine, 2016b](#); [Ejdemyr, Kramon and Robinson, 2018b](#); [Gordon, 2020](#)), which is reflected in fewer police officers, less spending on public safety, and lower school expenditures per pupil. Ultimately, segregation undermines pluralist politics through the formation of coalitions across racial lines, allowing politicians to make budget cuts in Black neighborhoods either because they expect minimal political fallout or to maintain the privileged status of white communities ([Krivo, Peterson and Kuhl, 2009](#); [Ananat and Washington, 2009](#)).

Our findings also suggest that some of the structural and environmental factors that influence homicides may not affect other forms of victimization, such as police killings. Therefore, policy recommendations that address segregation and upward mobility may impact violent crime and homicides but plausibly have a negligible effect on police-related fatalities. Similarly, police reform may reduce racial disparities in police killings but have little effect on racial differences in homicide rates.³⁴ Therefore, separate targeted policies should be implemented to address racial disparities in homicides and police-related fatalities.

Furthermore, segregation and white flight discourage collective action where all groups

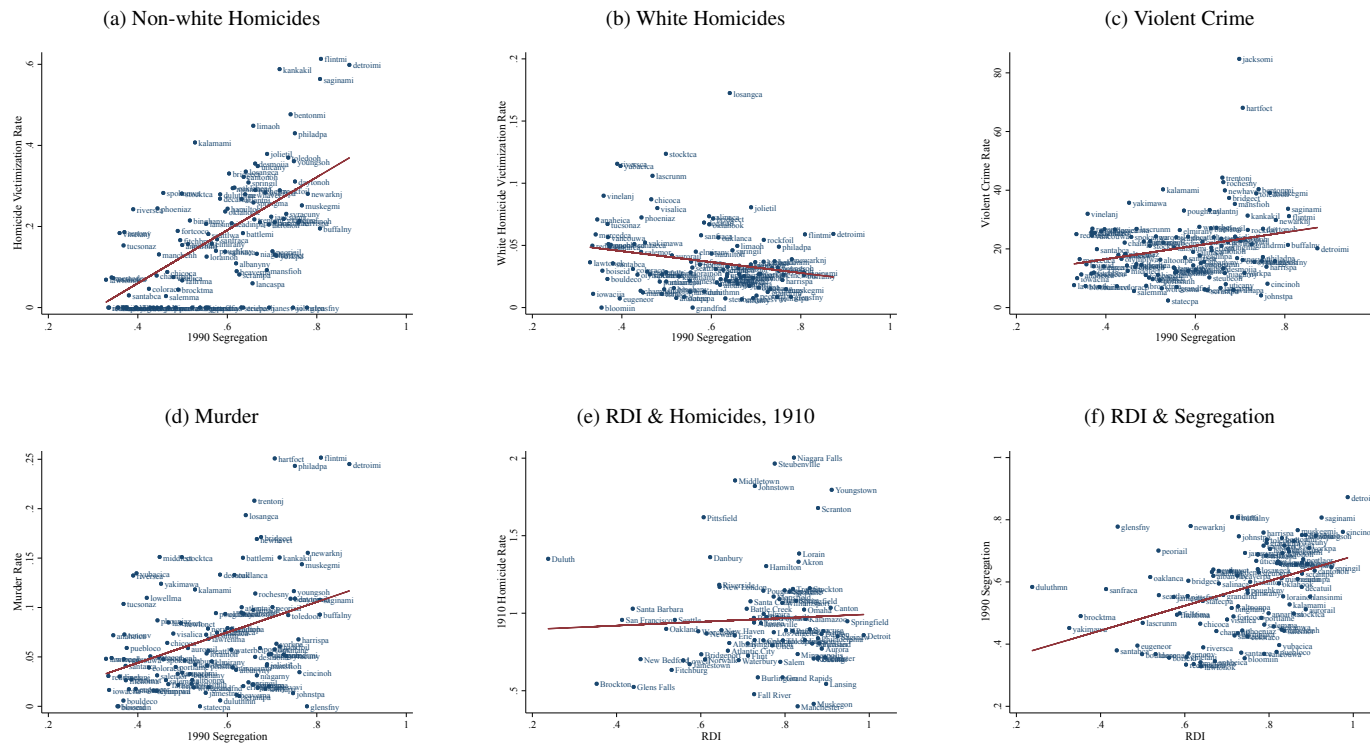
³²See Table 4 of [Ananat and Washington \(2009\)](#).

³³For instance, [Bayer, Charles and Park \(2021\)](#) find higher levels of Black-white neighborhood inequality in northern and midwestern MSAs, the MSAs in our sample. It is plausible, that our findings may weaken in southern MSAs with lower levels of neighborhood inequality.

³⁴[Cunningham and Gillezeau \(2019\)](#), [Cunningham, Feir and Gillezeau \(2021\)](#), and [Cox, Cunningham and Ortega \(2021\)](#) provide examples of policies and events that influence police-related fatalities while having little to no effect on crime and homicide victimization.

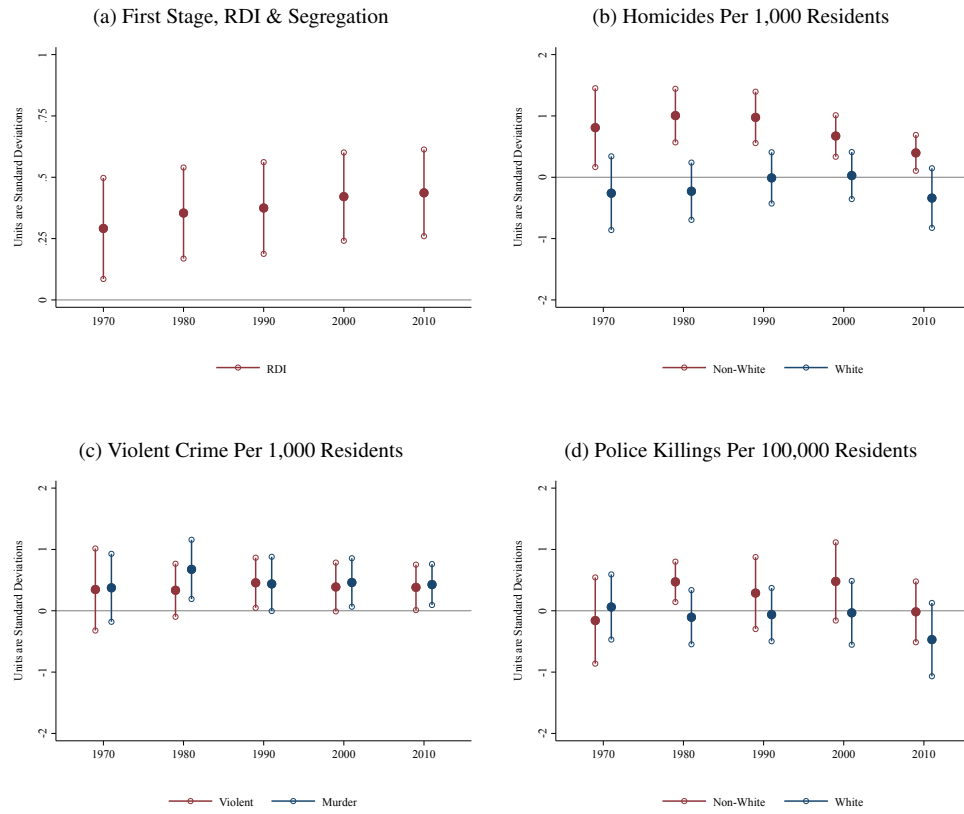
have a vested interest in fighting crime in Black communities (Massey, 1995; Shihadeh and Maume, 1997; Krivo, Peterson and Kuhl, 2009; Trounstein, 2016a). Massey (1995) argues, "[i]f [B]lacks are segregated across municipal as well as neighborhood boundaries [W]hites minimize their exposure to crime and other social problems, but to a large extent they can also avoid paying the costs" (p. 1227). Thus, Blacks not only experience social and physical isolation, but also fiscal isolation. However, it would be ill-advised to recommend policies that only increase funding toward public safety. Residential segregation is multifaceted and a result of a deep-rooted and complex racial history where structural racism has trapped Black Americans in a permanent underclass. Therefore, targeted policies that improve socio-economic conditions and increase opportunities for upward mobility would have long-lasting and persistent effects, decreasing non-white homicides in the long-run.

Figure 1. : Relationship Between Segregation, Crime, and RDI



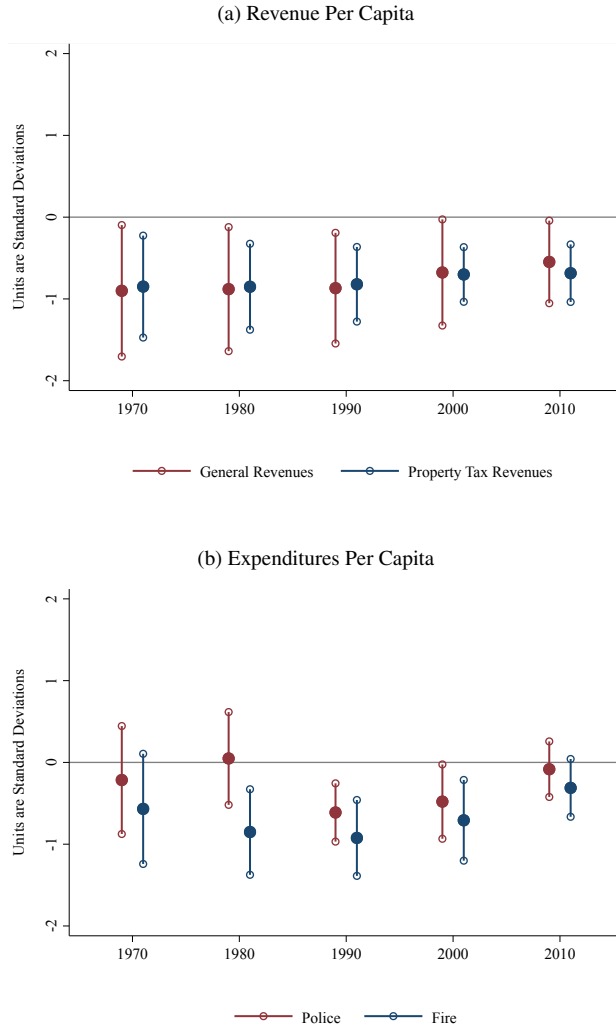
Note: Figure panels (a) - (d) show the relationship between crime and segregation in 1990. Panel (e) shows the relationship between RDI and the homicide rate in 1910. The slope of the line is 0.12 (0.25). Panel (f) plots the relationship between RDI and segregation in 1990. Segregation is measured by the index of dissimilarity.

Figure 2. : Two-Stage Least Squares Results: Segregation, RDI, and Victimization



Note: Notes: Figure plots regression estimates from a two-stage least squares analysis of the impact of segregation on crime and victimization by census year. Panel (a) plots estimates from the first-stage regression of the RDI on the index of dissimilarity by census year. Confidence intervals are constructed from heteroskedastic robust standard errors.

Figure 3. : Two-Stage Least Squares Results: Segregation, Government Finances, and RDI



Note: Notes: Figure plots regression estimates from a two-stage least squares analysis of the impact of segregation on local government expenditures by census year. Confidence intervals are constructed from heteroskedastic robust standard errors.

Table 1—: First-Stage Results

	(1)	(2)	(3) First-Stage			(5)	(6)	(7) Homicide Rate
	All	1970	1980	1990	2000	2010	1910	
RDI	0.316*** [0.072]	0.291*** [0.105]	0.354*** [0.095]	0.375*** [0.095]	0.421*** [0.092]	0.437*** [0.09]	0.063 [0.106]	
Track Length	22.24** [9.739]	12.27** [6.102]	21.12** [10.54]	17.84* [10.45]	31.53*** [11.45]	28.46*** [10.77]	-15.45** [6.761]	
Observations	550	110	110	110	110	110	85	
Effective F-Stat	19.41	7.719	13.97	15.45	21.17	23.43	—	
Mean DV	0.556	0.705	0.588	0.576	0.477	0.432	0.962	

Note: Robust standard errors in brackets. ***1%, **5%, and *10%.

Table 2—: Relationship Between Segregation and Non-White Homicide

DV: Non-White Homicides	(1) All	(2) 1970	(3) 1980	(4) 1990	(5) 2000	(6) 2010
Panel (a): OLS						
Dissimilarity Index	0.524*** [0.043]	0.254*** [0.084]	0.573*** [0.082]	0.574*** [0.088]	0.573*** [0.086]	0.547*** [0.091]
Panel (b): 2SLS						
Dissimilarity Index	0.842*** [0.142]	0.809** [0.328]	1.006*** [0.223]	0.976*** [0.214]	0.673*** [0.173]	0.397*** [0.149]
Observations	550	110	110	110	110	110
Robust Conf. Int.	[.522, 1.086]	[.6079, 3.8706]	[.7356, 1.916]	[.6522, 1.726]	[.1854, .6002]	[.0602, .5091]
AR p-value	0	0.0024	0	0.0001	0.0019	0.0213
Effective F-Stat	19.41	7.719	13.97	15.45	21.17	23.43
Mean DV	0.163	0.225	0.195	0.175	0.100	0.119
Std. Dev.	0.155	0.196	0.168	0.150	0.0927	0.109

Note: The table reports regression estimates for the impact of segregation on non-white homicides by census year. Panel (a) reports the OLS estimates, see equation (3). Panel (b) reports the two-stage least squares estimates, see equation (5). Robust standard errors in brackets. ***1%, **5%, and *10%.

Table 3—: Relationship Between Segregation and White Homicide

DV: White Homicides	(1) All	(2) 1970	(3) 1980	(4) 1990	(5) 2000	(6) 2010
Panel (a): OLS						
Dissimilarity Index	-0.001 [0.046]	0.249** [0.11]	-0.011 [0.088]	-0.217** [0.096]	-0.037 [0.077]	-0.173** [0.082]
Panel (b): 2SLS						
Dissimilarity Index	-0.144 [0.17]	-0.35 [0.414]	-0.216 [0.226]	-0.011 [0.223]	0.025 [0.173]	-0.319 [0.233]
Observations	550	110	110	110	110	110
Robust Conf. Int.	[-.0886, .0366]	[-.2552, .0501]	[-.1554, .0577]	[-.0804, .1144]	[-.04171, .0516]	[-.1227, .01887]
AR p-value	0.400	0.350	0.346	0.961	0.886	0.162
Effective F-Stat	19.41	7.719	13.97	15.45	21.17	23.43
Mean DV	0.0332	0.0287	0.0458	0.0377	0.0268	0.0273
Std. Dev.	0.0246	0.0185	0.0299	0.0282	0.0184	0.0203

Note: The table reports regression estimates for the impact of segregation on non-white homicides by census year. Panel (a) reports the OLS estimates, see equation (3). Panel (b) reports the two-stage least squares estimates, see equation (5). Robust standard errors in brackets. ***1%, **5%, and *10%.

REFERENCES

- Agan, Amanda Y, and Michael D Makowsky.** 2023. "The minimum wage, EITC, and criminal recidivism." *Journal of Human Resources*, 58(5): 1712–1751.
- Aizer, Anna.** 2008. "Neighborhood violence and urban youth." National Bureau of Economic Research.
- Alesina, Alberto, Reza Baqir, and William Easterly.** 1999. "Public goods and ethnic divisions." *The Quarterly journal of economics*, 114(4): 1243–1284.
- Ananat, Elizabeth Oltmans.** 2011. "The wrong side (s) of the tracks: The causal effects of racial segregation on urban poverty and inequality." *American Economic Journal: Applied Economics*, 3(2): 34–66.
- Ananat, Elizabeth Oltmans, and Ebonya Washington.** 2009. "Segregation and Black political efficacy." *Journal of Public Economics*, 93(5-6): 807–822.
- Anderson, Theodore W, and Herman Rubin.** 1949. "Estimation of the parameters of a single equation in a complete system of stochastic equations." *The Annals of mathematical statistics*, 20(1): 46–63.
- Andrews, Isaiah, James H Stock, and Liyang Sun.** 2019. "Weak instruments in instrumental variables regression: Theory and practice." *Annual Review of Economics*, 11: 727–753.
- Andrews, Rodney, Marcus Casey, Bradley L Hardy, and Trevon D Logan.** 2017. "Location matters: Historical racial segregation and intergenerational mobility." *Economics Letters*, 158: 67–72.
- Antecol, Heather, and Kelly Bedard.** 2007. "Does single parenthood increase the probability of teenage promiscuity, substance use, and crime?" *Journal of population economics*, 20: 55–71.
- Atems, Bebonchu, and William Blankenau.** 2021. "The 'time-release', crime-reducing effects of education spending." *Economics Letters*, 209: 110143.
- Ba, Bocar A, Dean Knox, Jonathan Mummolo, and Roman Rivera.** 2021. "The role of officer race and gender in police-civilian interactions in Chicago." *Science*, 371(6530): 696–702.
- Ba, Bocar, Roman Rivera, and Alexander Whitefield.** 2021. "Market Response to Racial Uprisings." *Working Paper*.
- Barber, Catherine, Deborah Azrael, Amy Cohen, Matthew Miller, Deonza Thymes, David Enze Wang, and David Hemenway.** 2016. "Homicides by police: comparing counts from the national violent death reporting system, vital statistics, and supplementary homicide reports." *American journal of public health*, 106(5): 922–927.

- Baron, E Jason, Joshua M Hyman, and Brittany N Vasquez.** 2022. "Public School Funding, School Quality, and Adult Crime." National Bureau of Economic Research.
- Bartik, W Alexander, and Evan Mast.** 2022. "Black Suburbanization: Causes and Consequences of a Transformation of American Cities." University of Illinois Working Paper.
- Bayer, Patrick, Kerwin Kofi Charles, and JoonYup Park.** 2021. "Separate and Unequal: Race and the Geography of the American Housing Market."
- Bayer, Patrick, Peter Q Blair, and Kenneth Whaley.** 2020a. "Are We Spending Enough on Teachers in the US?" National Bureau of Economic Research.
- Bayer, Patrick, Peter Q Blair, and Kenneth Whaley.** 2020b. "The impact of school finance reforms on local tax revenues." Vol. 110, 416–418, American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203.
- Beach, Brian, and Daniel B Jones.** 2017. "Gridlock: Ethnic diversity in government and the provision of public goods." *American Economic Journal: Economic Policy*, 9(1): 112–136.
- Beck, Brenden.** 2023. "Police Killings and Municipal Reliance on Fine-and-Fee Revenue." *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 9(2): 161–181.
- Bezin, Emeline, Thierry Verdier, and Yves Zenou.** 2022. "Crime, Broken Families, and Punishment." *American Economic Journal: Microeconomics*, 14(4): 723–60.
- Billings, Stephen B, David J Deming, and Jonah Rockoff.** 2014. "School segregation, educational attainment, and crime: Evidence from the end of busing in Charlotte-Mecklenburg." *The Quarterly journal of economics*, 129(1): 435–476.
- Billings, Stephen B., David J. Deming, and Stephen L. Ross.** 2019. "Partners in Crime." *American Economic Journal: Applied Economics*, 11(1): 126–50.
- Bjerk, David J.** 2006. "The effect of segregation on crime rates." 13, bepress.
- Boustan, Leah, Fernando Ferreira, Hernan Winkler, and Eric M Zolt.** 2013. "The effect of rising income inequality on taxation and public expenditures: Evidence from US municipalities and school districts, 1970–2000." *Review of Economics and Statistics*, 95(4): 1291–1302.
- Boustan, Leah Platt.** 2010. "Was postwar suburbanization "White flight"? Evidence from the Black migration." *The Quarterly Journal of Economics*, 125(1): 417–443.
- Boustan, Leah Platt.** 2013. "Racial residential segregation in American cities." Working Paper 19045.
- Card, David, and Jesse Rothstein.** 2007. "Racial segregation and the black–white test score gap." *Journal of Public Economics*, 91(11): 2158–2184.

- Chalfin, Aaron, Benjamin Hansen, Emily K Weisburst, Morgan C Williams, et al.** 2020. "Police Force Size and Civilian Race." National Bureau of Economic Research.
- Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez.** 2014. "Where is the land of opportunity? The geography of intergenerational mobility in the United States." *The Quarterly Journal of Economics*, 129(4): 1553–1623.
- Chyn, Eric.** 2018. "Moved to Opportunity: The Long-Run Effects of Public Housing Demolition on Children." *American Economic Review*, 108(10): 3028–56.
- Chyn, Eric, Kareem Haggag, and Bryan Stuart.** 2021. "The Effects of Racial Segregation on Intergenerational Mobility: Evidence from Historical Railroad Placement." *Working Paper*.
- Couture, Victor, and Jessie Handbury.** 2023. "Neighborhood change, gentrification, and the urbanization of college graduates." *The Journal of Economic Perspectives*, 37(2): 29–52.
- Cox, Robynn, and Jamein P Cunningham.** 2021. "Financing the war on drugs: the impact of law enforcement grants on racial disparities in drug arrests." *Journal of Policy Analysis and Management*, 40(1): 191–224.
- Cox, Robynn, Jamein Cunningham, and Alberto Ortega.** 2021. "The Impact of Affirmative Action Litigation on Police Killings of Civilians." *Working Paper*.
- Cunningham, Jamein, Donna Feir, and Rob Gillezeau.** 2021. "Collective bargaining rights, policing, and civilian deaths."
- Cunningham, Jamein P, and Rob Gillezeau.** 2019. "Don't Shoot! The Impact of Historical African American Protest on Police Killings of Civilians." *Journal of Quantitative Criminology*, 1–34.
- Cutler, David M, and Edward L Glaeser.** 1997. "Are ghettos good or bad?" *The Quarterly Journal of Economics*, 112(3): 827–872.
- Cutler, David M, Edward L Glaeser, and Jacob L Vigdor.** 1999. "The rise and decline of the American ghetto." *Journal of political economy*, 107(3): 455–506.
- Deming, David J.** 2011. "Better schools, less crime?" *The Quarterly Journal of Economics*, 126(4): 2063–2115.
- Derenoncourt, Ellora.** 2021. "Can you move to opportunity? Evidence from the Great Migration." *Working Paper*.
- Deza, Monica, Thanh Lu, and Johanna Catherine Maclean.** 2022. "Office-based mental healthcare and juvenile arrests." *Health Economics*, 31: 69–91.
- Deza, Monica, Thanh Lu, Catherin Maclean, and Alberto Ortega.** 2024. "Losing Medicaid and Crime." *NBER Working Paper*, , (w32227).

- Deza, Monica, Thanh Lu, Johanna Catherine Maclean, and Alberto Ortega.** 2023. "Behavioral Health Treatment and Police Officer Safety." National Bureau of Economic Research.
- Duncan, Otis Dudley, and Beverly Duncan.** 1955. "A methodological analysis of segregation indexes." *American sociological review*, 20(2): 210–217.
- Ejdemyr, Simon, Eric Kramon, and Amanda Lea Robinson.** 2018a. "Segregation, ethnic favoritism, and the strategic targeting of local public goods." *Comparative Political Studies*, 51(9): 1111–1143.
- Ejdemyr, Simon, Eric Kramon, and Amanda Lea Robinson.** 2018b. "Segregation, ethnic favoritism, and the strategic targeting of local public goods." *Comparative Political Studies*, , (9): 1111 – 1143.
- Evans, William N, and Maciej H Kotowski.** 2021. "The Persistence in Gun Violence Among Young Black Males." *Working Paper*.
- Evans, William N, Craig Garthwaite, and Timothy J Moore.** 2018. "Guns and violence: The enduring impact of crack cocaine markets on young black males." National Bureau of Economic Research.
- Feigenberg, Benjamin, and Conrad Miller.** 2021. "Racial divisions and criminal justice: Evidence from southern state courts." *American Economic Journal: Economic Policy*, 13(2): 207–40.
- Firebaugh, Glenn, and Francesco Acciai.** 2016. "For blacks in America, the gap in neighborhood poverty has declined faster than segregation." *Proceedings of the National Academy of Sciences*, 113(47): 13372–13377.
- Forman Jr, James.** 2017. *Locking up our own: Crime and punishment in Black America*. Farrar, Straus and Giroux.
- Frey, William H.** 2018. *Diversity explosion: How new racial demographics are remaking America*. Brookings Institution Press.
- García, Raffi E, and Alberto Ortega.** 2022. "Racial Protests and Credit Access." *Available at SSRN 4304551*.
- Glaeser, Edward, and Jacob Vigdor.** 2012. *The end of the segregated century: Racial separation in America's neighborhoods, 1890-2010*. Manhattan Institute for Policy Research New York.
- Glaeser, Edward Ludwig, and Jacob L Vigdor.** 2001. *Racial segregation in the 2000 Census: Promising news*. Citeseer.
- Gordon, Daanika.** 2020. "The police as place-consolidators: The organizational amplification of urban inequality." *Law & Social Inquiry*, 45(1): 1–27.

- Guryan, Jonathan.** 2004. "Desegregation and black dropout rates." *American Economic Review*, 94(4): 919–943.
- Heron, Melonie P.** 2021. "Deaths: leading causes for 2018."
- Hinds, Oliver, Jacob Kang-Brown, and Olive Lu.** 2018. "People in Prison 2017."
- Hoekstra, Mark, and Carly Will Sloan.** 2020. "Does race matter for police use of force? Evidence from 911 calls." National Bureau of Economic Research.
- Holz, Justin, Roman Rivera, and Bocar A Ba.** 2019. "Spillover effects in police use of force." *U of Penn, Inst for Law & Econ Research Paper*, , (20-03).
- Hurwitz, Jon, and Mark Peffley.** 2005. "Playing the race card in the post–Willie Horton era: The impact of racialized code words on support for punitive crime policy." *Public Opinion Quarterly*, 69(1): 99–112.
- Jackson, C Kirabo.** 2020. *Does school spending matter? The new literature on an old question.* American Psychological Association.
- Jackson, C Kirabo, Rucker C Johnson, and Claudia Persico.** 2016. "The effects of school spending on educational and economic outcomes: Evidence from school finance reforms." *The Quarterly Journal of Economics*, 131(1): 157–218.
- Johnson, Rucker C.** 2011. "Long-run impacts of school desegregation & school quality on adult attainments." National Bureau of Economic Research.
- Kang-Brown, Jacob, Oliver Hinds, Jasmine Heiss, and Olive Lu.** 2018. *The new dynamics of mass incarceration.*
- Krieger, Nancy, Jarvis T Chen, Pamela D Waterman, Mathew V Kiang, and Justin Feldman.** 2015. "Police killings and police deaths are public health data and can be counted." *PLoS medicine*, 12(12): e1001915.
- Krivo, Lauren J, Ruth D Peterson, and Danielle C Kuhl.** 2009. "Segregation, racial structure, and neighborhood violent crime." *American journal of Sociology*, 114(6): 1765–1802.
- Light, Michael T, and Julia T Thomas.** 2019. "Segregation and violence reconsidered: Do whites benefit from residential segregation?" *American sociological review*, 84(4): 690–725.
- Lochner, Lance.** 2020a. "Education and crime." In *The economics of education*. 109–117. Elsevier.
- Lochner, Lance.** 2020b. "Education and crime." In *The economics of education*. 109–117. Elsevier.

- Lochner, Lance, and Enrico Moretti.** 2004. "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports." *American Economic Review*, 94(1): 155–189.
- Loftin, Colin, Brian Wiersema, David McDowall, and Adam Dobrin.** 2003. "Under-reporting of justifiable homicides committed by police officers in the United States, 1976–1998." *American Journal of Public Health*, 93(7): 1117–1121.
- Logan, John R.** 2014. "Separate and unequal in suburbia." *Census Brief prepared for Project US2010*.
- Logan, Trevon D, and John M Parman.** 2017. "The national rise in residential segregation." *The Journal of Economic History*, 77(1): 127–170.
- Lutz, Byron.** 2011. "The end of court-ordered desegregation." *American Economic Journal: Economic Policy*, 3(2): 130–168.
- Massey, Douglas S.** 1995. "Getting Away with Murder: Segregation and Violent Crime in Urban America, 143 U." *Pa. L. Rev.*, 1203: 1210–17.
- Massey, Douglas S., and Nancy A. Denton.** 1989. "Hypersegregation in US metropolitan areas: Black and Hispanic segregation along five dimensions." *Demography*, 26(3): 373–391.
- Miller, Conrad.** 2023. "When work moves: Job suburbanization and black employment." *Review of Economics and Statistics*, 105(5): 1055–1072.
- Neal, Derek, and Armin Rick.** 2016. "The prison boom and sentencing policy." *The Journal of Legal Studies*, 45(1): 1–41.
- Nieuwenhuys, Arne, Geert JP Savelsbergh, and Raoul RD Oudejans.** 2012. "Shoot or don't shoot? Why police officers are more inclined to shoot when they are anxious." *Emotion*, 12(4): 827.
- of Investigation, Federal Bureau.** 2019. "Expanded Homicide."
- Olea, José Luis Montiel, and Carolin Pflueger.** 2013. "A robust test for weak instruments." *Journal of Business & Economic Statistics*, 31(3): 358–369.
- O'Flaherty, Brendan, and Rajiv Sethi.** 2007. "Crime and segregation." *Journal of Economic Behavior & Organization*, 64(3-4): 391–405.
- O'Flaherty, Brendan, and Rajiv Sethi.** 2010a. "Homicide in black and white." *Journal of Urban Economics*, 68(3): 215–230.
- O'Flaherty, Brendan, and Rajiv Sethi.** 2010b. "The racial geography of street vice." *Journal of Urban Economics*, 67(3): 270–286.
- Peterson, Ruth D, and Lauren J Krivo.** 1993. "Racial segregation and black urban homicide." *Social Forces*, 71(4): 1001–1026.

- Piquero, Alex R, and Robert W Brame.** 2008. "Assessing the race–crime and ethnicity–crime relationship in a sample of serious adolescent delinquents." *Crime & Delinquency*, 54(3): 390–422.
- Raphael, Steven, and Michael A Stoll.** 2013. *Why are so many Americans in prison?* Russell Sage Foundation.
- Reardon, Sean F.** 2016. "School segregation and racial academic achievement gaps." *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2(5): 34–57.
- Reber, Sarah J.** 2010. "School desegregation and educational attainment for blacks." *Journal of Human resources*, 45(4): 893–914.
- Roback, Jennifer.** 1989. "Racism as rent seeking." *Economic Inquiry*, 27(4): 661–681.
- Sharkey, Patrick, and Alisabeth Marsteller.** 2022. "Neighborhood inequality and violence in Chicago, 1965-2020." *U. Chi. L. Rev.*, 89: 349.
- Shertzer, Allison, and Randall P Walsh.** 2019. "Racial sorting and the emergence of segregation in American cities." *Review of Economics and Statistics*, 101(3): 415–427.
- Shihadeh, Edward S, and Graham C Ousey.** 1998. "Industrial restructuring and violence: The link between entry-level jobs, economic deprivation, and black and white homicide." *Social forces*, 77(1): 185–206.
- Shihadeh, Edward S, and Michael O Maume.** 1997. "Segregation and crime: the relationship between black centralization and urban black homicide." *Homicide Studies*, 1(3): 254–280.
- Stashko, Allison, and Haritz Garro.** 2021. "Prosecutor Elections and Police Accountability." *Working Paper*.
- Tabellini, Marco.** 2020. "Racial heterogeneity and local government finances: Evidence from the great migration."
- Trounstine, Jessica.** 2016a. "Segregation and inequality in public goods." *American Journal of Political Science*, , (3): 709 – 725.
- Trounstine, Jessica.** 2016b. "Segregation and inequality in public goods." *American Journal of Political Science*, 60(3): 709–725.
- Uggen, Christopher, and Melissa Thompson.** 2003. "The socioeconomic determinants of ill-gotten gains: Within-person changes in drug use and illegal earnings." *American journal of sociology*, 109(1): 146–185.
- Weiner, David A, Byron F Lutz, and Jens Ludwig.** 2009. "The effects of school desegregation on crime." National Bureau of Economic Research.
- Weisburst, Emily K.** 2019. "Police use of force as an extension of arrests: Examining disparities across civilian and officer race." Vol. 109, 152–56.

Wolfers, Justin, David Leonhardt, and Kevin Quealy. 2015. "1.5 million missing black men." *The New York Times*, 20: A1.