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The Distribution of Carceral Harm: County-Level Jail Incarceration and Mortality by Race, Sex, and Age

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ABSTRACT Jail incarceration remains an overlooked yet crucial component of the U.S. carceral system. Although a growing literature has examined the mortality costs associated with residing in areas with high levels of incarceration, far less is known about how local jails shape this burden at the intersection of race, sex, and age. In this study, I examine the relationship between county-level jail incarceration and age-specific mortality for non-Hispanic Black and White men and women, uniquely leveraging race-specific jail rates to account for the unequal racial distribution of jail exposures. This study finds evidence of positive associations between mortality and jail incarceration: this association peaks in late adulthood (ages 50–64), when increases in jail rates are associated with roughly 3% increases in mortality across all race–sex groups. However, patterns vary at the intersection of race, sex, and age. In particular, I find more marked and consistent penalties among women than among men. Additionally, a distinctly divergent age pattern emerges among Black men, who face insignificant but negative associations at younger ages but steep penalties at older ages—significantly larger among those aged 65 or older relative to their White male and Black female counterparts. Evidence further suggests that the use of race-neutral incarceration measures in prior work may mask the degree of harm associated with carceral contexts, because the jail rate for the total population underestimates the association between jail rates and mortality across nearly all race–age–sex combinations. These findings highlight the need for future ecological research to differentiate between jail and prison incarceration, consider the demographic distribution of incarceration's harms, and incorporate racialized measures of exposure so that we may better capture the magnitude of harm associated with America's carceral state.

KEYWORDS Mortality • Jail incarceration • Racial inequality • Criminal justice • Intersectionality

Introduction

Mass incarceration in the United States is increasingly recognized as a pressing population health issue (Massoglia and Pridemore 2015; Turney 2014; Wildeman and Wang 2017). While the individual-level health repercussions of incarceration have long dominated the literature, studies have begun to consider incarceration's broader

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consequences on the health and well-being of communities and neighborhoods (Clear 2007; Wildeman and Wang 2017). Ecological research has examined the aggregate relationship between incarceration and health by using places rather than individuals as the unit of analysis (Weidner and Schultz 2019), and such work suggests incarceration may be an important but neglected determinant of the health and mortality landscape (Nosrati and King 2021), tying worse mortality outcomes to higher levels of incarceration across nearly all geographic levels (Kajeepeta et al. 2021; Kajeepeta et al. 2020; Nosrati et al. 2021; Nosrati and King 2021; Reilly et al. 2019; Weidner and Schultz 2019; Wildeman 2012, 2014, 2016).

Yet the role of local jails remains strikingly neglected in this scholarship. Most studies center state-level data, either focusing on state imprisonment or failing to distinguish between prison and jail settings despite key differences in these exposures (Turney and Conner 2019). Jails are uniquely situated as the "front door" of the carceral system (Subramanian et al. 2015) and see more than 10 million admissions each year, compared with less than 600,000 admissions into prisons (Sawyer and Wagner 2020). While jail stays are generally shorter and more local than prison terms, jails have also been characterized by high levels of inmate turnover and a distinct set of challenges for those who are detained (May et al. 2014; Rabuy and Wagner 2015; Sugie and Turney 2017). Further, many theoretical pathways of harm associated with incarceration at the state level are understood to operate at local community or neighborhood levels (Clear 2007; Kajeepeta et al. 2021; Nosrati and King 2021), where carceral policies are enforced and criminal justice contact is most commonly experienced (Sampson and Loeffler 2010; Sawyer and Wagner 2020). Thus, narrowing a macro-level focus on state incarceration to a meso-level focus on county jail incarceration may provide valuable insight into the role that local jails play in shaping the American landscape of mortality.

Additionally, although research has documented the mortality costs associated with high-incarceration areas, an important question remains: *costs for whom?* Despite well-documented patterns in how incarceration is unequally distributed across race, age, and sex (Pettit and Gutierrez 2018; Pettit and Western 2004; Western and Pettit 2010), evidence on this question remains limited. Although state-level studies suggest that the mortality penalties associated with incarceration are unlikely to be equally shared across population subgroups (Wildeman 2012, 2014), few have considered how patterns at the intersection of race, age, and sex vary in relation to local jail contexts (Kajeepeta et al. 2020). Additional scholarship is needed to illuminate the demographic distribution of jails' local health harms in the United States.

To further this goal, this study uniquely considers race-specific associations between jail incarceration and mortality. Patterns of racial residential segregation are well-documented in the United States (Logan and Parman 2017; Massey 2004), and research has shown clear racial disparities in exposure to policing and arrests (Gaston 2019; Gaston and Brunson 2020; Kirk 2008; Sharp and Atherton 2007). Yet prior work relied exclusively on measures of incarceration for the total population without attention to race-specific patterns in that exposure, potentially obscuring the degree of harm associated with incarceration for Black and White populations. This study is one of the first to leverage race-specific measures of jail incarceration in an effort to better determine how the deeply racialized distribution of carceral burdens might differentially shape pathways of harm for Black and White men and women.

Overall, the present study aims to extend emerging ecological work on the relationship between local jails and mortality (Kajeepeta et al. 2021; Kajeepeta et al. 2020; Reilly et al. 2019), as well as work that examines demographic variation in the incarceration–mortality relationship (Wildeman 2012, 2014, 2016). In doing so, I provide a novel look at how the local harms of the carceral state are distributed at the intersection of age, race, and sex.

Jail Incarceration in the United States

On any given day, more than two million Americans can be found in prisons and jails across the country (Wildeman and Wang 2017). Although incarceration rates have fallen modestly in recent decades from the peak of mass incarceration in the 2000s (Beckett and Beach 2021b), the United States remains the global leader in incarceration (Weidner and Schultz 2019).

The U.S. carceral system is vast and complex, consisting of thousands of prisons and jails under federal, state, and local jurisdictions. Yet there are key differences between prisons and jails despite the often interchangeable use of these terms and conflation of the data in existing scholarship (Dholakia 2023). Prisons operate under federal or state authority and serve primarily as long-term detention facilities for those who have been convicted of sentences of generally more than one year. Jails fall under local city or county jurisdictions and serve as holding facilities for a relatively heterogeneous population, including those awaiting trial or sentencing and those convicted of low-level crimes or serving shorter sentences of less than a year; jails also hold individuals on behalf of other authorities. While all individuals in prisons are serving time for a conviction, almost 75% of individuals in jail have not been convicted of a crime (Sawyer and Wagner 2020).

Despite the continued growth of jail incarceration rates alongside prison rates (Figure 1, panel a), the study of jail incarceration has received little attention since the 1980s, when seminal work described jails as a means of institutionalizing the marginalized "rabble class"—the homeless, the mentally ill, and those with substance abuse (Irwin 1985). Since then, the rapid expansion of incarceration literature has generally focused on the state side of the carceral system, prioritizing imprisonment data or failing to distinguish between prison and jail settings (Turney and Conner 2019). This focus on state-level incarceration is undoubtedly important. Not only are criminal justice policies dictated at the state level but, given that the length of stay in prisons is generally longer, the largest share of the incarcerated population is housed in state prisons (approximately 57%) (Figure 1, panel b).

However, an overfocus on state-level incarceration may obscure the critical role that local jails play in the carceral landscape in the United Sates. State laws are interpreted and enforced at the local level, with a great deal of variation in policing and incarceration practices across more local jurisdictions (Beckett and Beach 2021a; Vera Institute of Justice 2022; Weiss Riley et al. 2018). Further, contact with jails is much more common than with prisons, given their role as the "front door" or entry point of institutionalization in the United States (Subramanian et al. 2015). In 2019, for example, the number of admissions into jails exceeded 10 million, compared with 530,000 into state prisons (Figure 1, panel c).

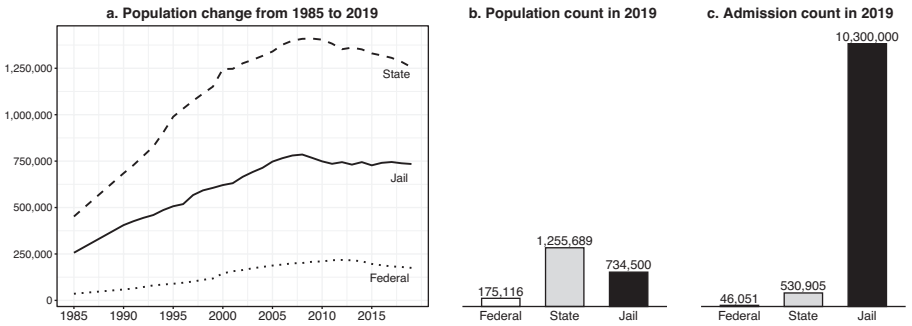

Fig. 1 A snapshot of population and carceral admissions across jurisdictions. Federal and state refer to prisoners under federal and state jurisdiction, and jail refers to those under local jail jurisdiction. Before 2000, population counts are based on counts at midyear. After 2000, counts of prisoners under state and federal authority are based on end-of-year counts, while counts of inmates in local jails are based on counts at midyear. Prison admission counts cover the 12-month period ending on December 31, while jail admission counts cover the 12-month period ending on June 30. This snapshot does not represent a comprehensive coverage of the U.S. carceral system because various jurisdictions and facilities are excluded (e.g., tribal, immigration detention). Data are drawn from Bureau of Justice Statistical Data Tables (Beck and Karberg 2001; Carson 2020; Gilliard and Beck 1996; Guerino et al. 2012; Minton 2011; Zeng and Minton 2021).

Moreover, research has shown that jail incarceration is positively correlated with the likelihood of rearrest: an estimated one in four individuals who have been arrested enter jail more than once during the same year (Sawyer and Wagner 2020). Turnover is also higher in jails than in prisons, with jails facing substantial churn of detainees, or the cycling of individuals in and out of jail facilities (Sawyer and Wagner 2020). Thus, jail incarceration may involve a type of instability that is less common in long-term facilities such as prisons. Prior work has found that jail facilities are characterized by higher levels of unpredictability in daily routines, fewer organized activities and less programming, less physical mobility, closer quarters, less familiarity with fellow detainees, and more impersonal visitation procedures (May et al. 2014; Rabuy and Wagner 2015; Sugie and Turney 2017). Therefore, it is possible the effects of widespread and repeated contact with jails in the aggregate may be both substantial and distinct from the effects of prison exposure.

In reflecting broader inequalities in the carceral system, jail exposure is also deeply unequal, which raises concerns for the ways in which jails create and maintain social hierarchies of disadvantage. Research has shown that the burden of jail falls disproportionately on those who are young, male, and Black. About 61% of arrests involve individuals in early adulthood (ages 20–39), and 73% involve men (Federal Bureau of Investigation 2019). Additionally, Black individuals are more likely than their White counterparts to be subjected to police contact and violence (Crutchfield et al. 2012; Edwards et al. 2019) and to be arrested and incarcerated in jail (Pettit and Western 2004; Western et al. 2021; Western and Wildeman 2009). On average, Black individuals face jail incarceration rates that are three times as high as those of their White peers (Zeng and Minton 2021). Research has also documented a growing rural–urban jail gap, driven by the steadily declining use of jails in urban areas and the stable or increasing use of jails in rural communities (Beckett and Beach 2021b; Eason 2017; Kang-Brown et al. 2018; Simes 2018). It is thus crucial

to better understand how inequalities in local jail exposures may structure broader inequalities in population health and mortality.

Jails, Health, and Mortality

Alongside this varied landscape of incarceration in the United States is an equally varied landscape of mortality. Despite improvements in the past few decades, mortality disparities between Black and White populations remain large and persistent (Cullen et al. 2012; Cunningham 2017; Harper et al. 2014). On average, Black individuals live 3.6 fewer years than their White peers (Schwandt et al. 2021), with the most pronounced disparities at ages before 65 (Cunningham 2017).

Over the past several decades, scholars have turned their attention to the possible link between incarceration and mortality. In addition to the consequences for those most proximal to carceral systems—the individuals who experience incarceration and their children, relatives, and families (Massoglia and Pridemore 2015; Turney 2014; Wildeman and Wang 2017)—research attention has shifted to the meso-level consequences for the health and well-being of the communities and neighborhoods that experience high levels of incarceration (Clear 2007; Freudenberg 2001; Nosrati and King 2021; Wildeman and Wang 2017). Yet, similar to the broader scholarship on incarceration, only a small subset of this literature has focused on the relationship between jail incarceration and mortality (Kajeepeta et al. 2021; Kajeepeta et al. 2020; Reilly et al. 2019). Although both jails and prisons remove individuals from social networks and labor markets (Turney and Conner 2019), the theoretical conflation of these settings may obscure the distinct role that local jails play in patterning mortality. For example, shorter, more frequent stays in jails may impose unique uncertainties and instabilities that are distinct from those imposed by longer, more isolated prison stays (Comfort 2016; May et al. 2014; Turney and Conner 2019).

Drawing on the existing body of research on incarceration and health, the following sections outline the possible mechanistic pathways that underlie the distinct areal association between jail incarceration and mortality, which is summarized by the conceptual framework illustrated in Figure 2.

The Micro-Level Relationship Between Jails and Mortality

Individuals Who Are Incarcerated

Figure 2 depicts how the most direct health effects of jail incarceration are the pathogenic consequences of harmful exposures to jail settings. Within the confines of jails, individuals may face heightened threats of infectious disease spread, as well as the mental and physical toll of encountering violence in jail settings (Adler and Chen 2023). These harms could exacerbate the well-documented existing health vulnerabilities among jail inmates, including higher risks of chronic and infectious disease, chronic noninfectious medical conditions, substance abuse, and major depression (Bronson et al. 2020; Fazel and Baillargeon 2011; Freudenberg and Heller 2016; Maruschak and Berzofsky 2016; Yi et al. 2017).

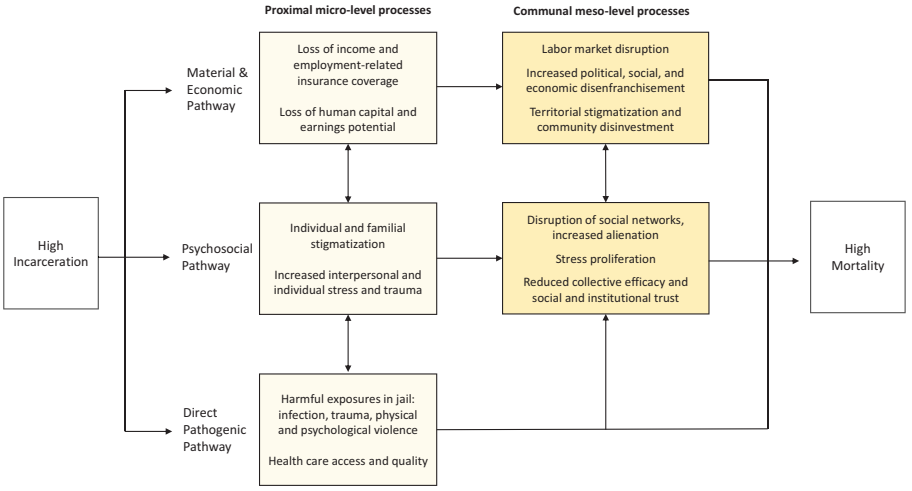

Fig. 2 Conceptual diagram of the areal association between incarceration and mortality. Adapted from Kajeepeta et al. (2021).

Additionally, there may be enduring health repercussions for those with health conditions whose care is disrupted or who fail to receive adequate care while in jail (Restum 2005). Unlike in longer term state prisons, where access to care, despite variability in quality (Lindquist and Lindquist 1999; Marks and Turner 2014; Sufrin 2017), may paradoxically improve health outcomes for some disadvantaged populations (Wildeman and Wang 2017), it is unclear whether the same protective effects would translate to shorter term facilities such as jails, where stays are highly variable and turnover is constant. The harms of interrupted and inadequate care may extend into the lives of individuals even after release. Studies have tied a history of jail incarceration to increased health care needs across the life course (Booker et al. 2013; Iroh et al. 2015; Lambdin et al. 2018; Lindquist and Lindquist 1999), as well as to higher risks of all-cause, suicide, drug-related, and HIV-related mortality (Lim et al. 2015; Lim et al. 2012).

Figure 2 also highlights mechanisms that might explain the durable effect of jail incarceration on the health of the formerly incarcerated beyond the pathogenic consequences of jail exposure. These include the psychosocial consequences related to the stress and trauma of arrest and incarceration (Massoglia 2008; Turney 2014), as well as to the unpredictability and uncertainty uniquely imposed by jail settings (May et al. 2014; Sugie and Turney 2017). Further, the associated stigma of incarceration and challenge of successfully reintegrating into the labor market (Pager 2003; Pager and Shepherd 2008; Schnittker and John 2007) may translate into material harm for those who experience jail incarceration, limiting one's ability to receive optimal and affordable care. Although interruptions to employment may be shorter and less stigmatized for jail stays relative to prison, evidence has revealed worse socioeconomic outcomes among individuals with prior jail incarceration, including less formal employment, lower earnings and household income, and low rates of health insurance coverage (Apel and Powell 2019; Freudenberg 2004; Freudenberg et al. 2008; Lee et al. 2006; Marks and Turner 2014; Zhao et al. 2023).

Children, Partners, and Families of the Incarcerated

Research has also examined the spillover effects of incarceration on the health of those close to individuals who are incarcerated; Figure 2 illustrates the pathway through which these collateral consequences may materialize. Drawing on the theoretical life course concept of "linked lives," which posits individuals' health trajectories as embedded and influenced by the trajectories of their close relationships (Elder and Johnson 2003), the vast majority of research on the collateral consequences of incarceration on partners and children has focused on longer term stays in state prisons, where families often must travel considerable distance to visit incarcerated loved ones (Turney and Conner 2019). Yet frequent jail involvement may also impose adverse material and psychosocial harms related to continually interrupted cycles of caregiving for family members (Comfort 2016).

These harms include the material repercussions associated with the removal of individuals, primarily men, from households, such as the loss of income and employer-provided health insurance (Geller et al. 2011; Massoglia and Schnittker 2009; Pager 2003; Schwartz-Soicher et al. 2011), as well as the wide range of financial strains that jail and pretrial detention place on individuals and families (Dobbie and Yang 2021). Further, many of the psychosocial spillover effects found to be associated with imprisonment, including the stress and trauma absorbed by the children, partners, and families of those who are incarcerated, may translate to jail settings (Foster 2012; Turney 2014; Turney et al. 2012). For example, Arditti et al. (2003) documented a variety of vulnerabilities among families of those incarcerated in jails, including emotional, financial, and parenting strain. Finally, jails may pose unique pathogenic threats to those in contact with individuals who have been exposed to jail facilities. For example, the susceptibility of jails to infectious disease spread coupled with high turnover in jail settings, highlighted during the recent COVID-19 pandemic, has renewed interest in the possible disease spillover effects for those who come into contact with formerly jailed individuals (Franco-Paredes et al. 2020; Nowotny et al. 2021).

The Meso-Level Relationship Between Jails and Mortality

While these proximal micro processes in the aggregate shape the meso-level association between jail incarceration and mortality, Figure 2 also outlines the distinct processes at the community level that underpin this relationship. Through material and economic pathways, the "coercive mobility" of jails—imposed by the constant cycling of individuals in and out of the system—may result in disrupted labor markets and the proliferation of political and social disenfranchisement (Clear 2007; Freudenberg 2001; Nosrati et al. 2018; White 2019). The entrenchment of this material disadvantage, as well as the stigmatization of areas with high levels of carceral activity, could result in community disinvestment, affecting the availability and quality of social and health services available to the resident population (Kajeepeta et al. 2021).

Further, there may be various meso-level psychosocial repercussions related to the disruption of social networks in areas with high levels of jail incarceration. In particular,

carceral activity associated with expansive use of jails, such as widespread surveillance and policing, may amplify stress and foster institutional and social distrust among neighborhood residents (Clear 2007; Kajeepeta et al. 2021; Nosrati and King 2021; Pattillo et al. 2004). This social alienation might lead to the reduced collective efficacy of residents and deepening of disadvantage and stress. Through these meso-level processes, high jail rates may "get under the skin" to affect the health and mortality of residents, not only through a reduction of quality health-related services but through the cumulative exposure to stress and harm associated with carceral activity and the development of adverse health-related coping behaviors (Galster and Sharkey 2017; Link and Phelan 1995).

Although much of the existing empirical research focuses on prison incarceration, a small body of evidence has documented a link between high jail incarceration and poorer population health, particularly in relation to infectious disease (Reinhart and Chen 2020; Stoltey et al. 2015). High jail rates have also been found to be associated with lower levels of life expectancy at the county and census tract level, as well as higher levels of premature morbidity and mortality, net of other explanatory factors such as concentrated disadvantage and the prevalence of adverse health behaviors (Kajeepeta et al. 2021; Kajeepeta et al. 2020; Reilly et al. 2019).

Variation by Race, Age, and Sex in the Jail–Mortality Relationship

Consideration of the demographic distribution of the mortality harms associated with jail incarceration may provide some insight into the causal pathways that underlie the areal relationship between jails and health. For example, it is possible that county-level mortality associated with incarceration for young Black males may more directly reflect pathways from incarceration exposure, given the disproportionate concentration of young, male, and Black populations in carceral settings. Alternatively, mortality experienced by women or by individuals both earlier and later in the life course, when incarceration is less likely, may be more reflective of the spillover harm associated with exposure to high-incarceration contexts.

State-level research suggests that these burdens are unlikely to be evenly distributed, with evidence emerging of both the direct and spillover harms of incarceration. Prior work has found stronger associations between state incarceration and mortality among Black populations (Wildeman 2012, 2014), as well as among female, rather than male, populations (Wildeman 2012). Wildeman (2012) also documented distinct age patterns of mortality harm at the intersection of race and sex, including a notable reduction in mortality among Black men in young adulthood (20–34), reflecting the hypothesized short-term "protection" associated with prisons for this population subgroup (Patterson 2010; Rosen et al. 2011; Spaulding et al. 2011). Yet only one study focused on variation in the relationship between county-level jail rates and mortality, and it found the largest increases in mortality among those aged 15–34 and stronger associations for populations younger than 75 (Kajeepeta et al. 2020). Thus, the extent to which these state-level patterns at the intersection of race, age, and sex might extend to the local jail context remains unclear.

Notably, work that has examined racial variation in the incarceration–mortality relationship relied exclusively on incarceration measures for the total population,

without considering race-specific patterns in that exposure. Yet patterns of racial residential segregation (Logan and Parman 2017; Massey 2004) and racial disparities in exposure to policing, arrests, and incarceration across neighborhoods within local areas, such as counties (Gaston 2019; Gaston and Brunson 2020; Kirk 2008; Sharp and Atherton 2007), are well-documented. Given that jail incarceration, in particular, can serve as an important indicator of these local on-the-ground carceral practices (Vera Institute of Justice 2022), neglecting racial variation in exposure to jails may obscure the degree of harm for Black and White populations. Thus, this study aims to better capture the racialized relationship between jail incarceration and mortality by considering how racialized exposures to jail might differentially shape pathways of harm for Black and White men and women.

Data and Methods

Measures

Mortality Outcome

This study used county-level mortality as the primary outcome of interest, as a key indicator of population health and well-being. Restricted vital statistics death data by five-year age group, sex, race, ethnicity, and county from 2010 to 2019 were obtained from the National Center for Health Statistics under a data user agreement. These data were combined with publicly available bridged-race population estimates from the U.S. Census Bureau by age, sex, race, ethnicity, county, and year to calculate age-specific death rates by county and year for non-Hispanic Black and non-Hispanic White men and women. I focused exclusively on the relationship between mortality and jail incarceration among non-Hispanic White and non-Hispanic Black individuals, excluding those racialized as Hispanic or Latinx. Death and population counts were pooled across the five-year periods 2010–2014 and 2015–2019. The age patterns analysis focused on five broad noninfant[1] age groups, largely corresponding to key stages in the life course: childhood (1–19), early adulthood (20–34), middle adulthood (35–49), late adulthood (50–64), and older ages (65+).

Jail Exposure

I used county-level, race-specific jail incarceration data to approximate the exposure each population has to jails and their associated carceral activity (i.e., police surveillance and enforcement) within a given county. County-level average daily jail populations for non-Hispanic White and non-Hispanic Black (hereafter referred to as White and Black, respectively) populations were obtained from the Vera Institute of Justice's Incarceration Trends Dataset, which aggregates individual jail populations

[1] Given the distinct risks and theoretical mechanisms related to neonatal health and infant mortality, I exclude infant deaths (those occurring before the age of 1) from the age pattern analysis presented here. For an in-depth discussion of the link between incarceration and infant mortality, see Wildeman (2012).

to the county level using data collected by the Bureau of Justice Statistics' (BJS) Census of Jails (COJ) and the Annual Survey of Jails (ASJ).[2]

Race-specific jail rates were calculated by dividing the county's race-specific average daily jail population by the race-specific midyear population aged 15–64. Average daily jail population measures reflect the prevalence rather than the actual incidence of jail incarceration, hence race-specific measures approximate the prevalence of jail exposure for a given racial or ethnic group within a county. Race-specific jail rates were compared in a supplementary analysis to a race-neutral measure of incarceration exposures—calculated by dividing the county's average daily jail population by the midyear population aged 15–64 for the total population—conventionally used in prior research (Kajeepeta et al. 2020; Nosrati et al. 2021; Nosrati and King 2021; Weidner and Schultz 2019; Wildeman 2012).

Jail rates were calculated for 2009 and 2014, allowing for a one-year time lag between the incarceration exposure and the subsequent five-year pooled mortality measure to ensure the temporal ordering of the relationship. A robustness check was performed on alternative time lags (for results, see Figure A2, shown in the online appendix, along with all other figures and tables designated with an "A"). Both quartile and continuous measurements of county-level incarceration yielded similar results, thus incarceration measures presented here are modeled in continuous form.

County Covariates

I included a number of county-level risk factors that may confound the relationship between jail rates and mortality: crime and socioeconomic disadvantage indicators, as well as population characteristics (for a detailed table of data sources and calculations, see Table A1). Race-specific violent crime rates[3] were included to account for the direct and racialized link between crime and incarceration, as well as that between violence and mortality. Poverty and college attainment rates were included because of the established areal link between concentrated disadvantage and both incarceration and mortality. To further account for the unequal distribution of the burden of criminalization within the population, I included measures for the proportion of the total county population that identifies as Black, male, and aged 20–34, all subgroups that are disproportionately burdened by policing and jail

[2] The COJ covers all jails in the United States and is conducted every five to eight years, while the ASJ collects data from a nationwide sample of jails and has been conducted each year since 1985, except in years when the COJ is run. Once data were compiled and verified by the Vera Institute of Justice, individual jail data were aggregated at the jurisdictional level and interpolated to fill in values for years where the jurisdiction was not sampled or not reported. The jurisdiction-level jail dataset was then aggregated to a county-level dataset by summing variable values for each jurisdiction in a county within the specific year (for additional methodological details, see Kang-Brown 2022).

[3] It is important to note that this measure reflects only crimes reported to the police, and these numbers have been shown to be biased lower than the actual prevalence of violence and patterned by various population characteristics (Gutierrez and Kirk 2017; Xie and Baumer 2019). Given this situation, crime is likely to be correlated with spatial patterns of policing and jail. Therefore, the robustness of my models is tested across varying operationalizations of violent crime, including the use of race-specific versus race-neutral crime measures and the exclusion of the violent crime measure (for results, see Figure A4).

incarceration. Further, given the distinct spatial geographies of incarceration and mortality, I included a categorical variable for urbanicity. All models also include time period and state fixed effects to account for national-level time trends and state-level time-invariant factors.

Race-specific violent crime rates were estimated using arrest data from the FBI's Uniform Crime Reporting Program and were calculated by dividing the race-specific number of arrests for violent Part I offenses (i.e., murder, nonnegligent manslaughter, forcible rape, robbery, and aggravated assault) in a county by the race-specific county population. Poverty rates, college attainment rates, and race, sex, and age distributions were estimated using the ACS five-year estimates. Poverty rates were calculated as the proportion of the county population living below the federal poverty line, while college attainment rates were calculated as the proportion of the population aged 25+ without a bachelor's degree. The proportions of the population that are Black, male, and aged 20–34 were calculated by dividing the number of Black, male, and aged 20–34 individuals, respectively, by the total county population. Metropolitan status was drawn from the 2013 Department of Agriculture Rural–Urban Continuum codes and includes four categories corresponding to large central metros, large fringe metros, small and medium metros, and nonmetros. To align with the measurement of jail rates, all county covariates were measured in 2009 and 2014 to allow for a one-year time lag to the subsequent five-year pooled mortality outcome.

Analytic Approach

Sample

County FIPS codes were aligned across all years and sources, resulting in a national sample of 3,143 counties. Although no universal standard exists for the minimum population size required to estimate reliable mortality estimates, a common threshold used by the National Center for Health Statistics for reliably estimating small-area life expectancy is a population of 5,000 (Arias et al. 2018). Therefore, although pooling death rates across five-year periods allows for the inclusion of less populous counties, I further restricted my analysis to a subset in which there is a five-year pooled population of at least 5,000 in each race–sex group. The geographic distribution of the population in the final analytic sample of 1,103 counties is presented in Figure 3. Although this results in a reduction in the number of counties included in the study, the sample represents more than 95% of the national Black population and nearly 76% of the national White population (see Table 1). Robustness checks were performed using an alternative restriction criterion with minimal changes to the substantive conclusions (see Figure A3).

Analysis and Modeling

Negative binomial models are used to assess the relationship between jail incarceration and race- and sex-specific mortality. Models are estimated separately by race and sex (White and Black men and women) for all ages and by life course stage: early life

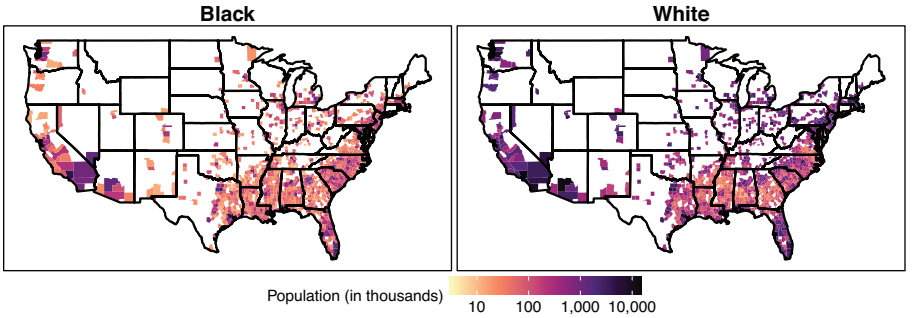

Fig. 3 Geographic distribution of population in the analytic sample, by race, 2010–2014. White and Black refer to non-Hispanic White and non-Hispanic Black, respectively.

(1–19), early adulthood (20–34), middle adulthood (35–49), late adulthood (50–64), and older ages (65+); models are represented by the following equation in simplified form. I denote the number of deaths in each five-year age group a, county c, and time period t as $D_{a,c,t}$, the county population as $P_{a,c,t}$, the corresponding mortality rate with $m_{a,c,t}$, and the overdispersion parameter of the negative binomial distribution as θ. I assume a negative binomial distribution for $D_{a,c,t}$ and model the risk $m_{a,c,t}$ as

$$D_{a,c,t} = NB(m_{a,c,t} \cdot P_{a,c,t}, \theta)$$

$$\log(m_{a,c,t}) = \beta_0 + \beta_a + \beta_1 \cdot JailRate_{c,t} + \boldsymbol{\beta}_2 \cdot \mathbf{X}_{c,t} + \pi_{s(c)} + \gamma_t + \varepsilon_{c,t},$$

where $JailRate_{c,t}$ is the race-specific jail rate in the primary analysis and the jail rate for the total population in the supplementary analysis, and β_1 is the associated coefficient of interest, representing the association between jail exposure and mortality. Additionally, β_0 is the intercept, β_a is an age-specific intercept for each five-year age group within each life course stage, $\mathbf{X}_{c,t}$ is a vector of the county-level covariates with $\boldsymbol{\beta}_2$ as the associated vector of regression coefficients, $\pi_{s(c)}$ is a state fixed effect where $s(c)$ indicates the state in which county c is located, and γ_t is the time period fixed effects. Unadjusted models (Model 1) do not include county covariates ($\mathbf{X}_{c,t}$), while the adjusted models (Model 2) include the full list of county covariates, including violent crime; poverty; race, sex, and age distributions; and metropolitan status. Standard errors and confidence intervals for the race and sex ratios discussed in the results are obtained using a regression approach with an interaction term for the race–sex groups of study and the delta method (for details, see Figure A1).

All independent variables are standardized (mean = 0 and standard deviation = 1), such that coefficient estimates are associated with a 1-standard-deviation increase relative to the national average. Given that the distribution of jail rates varies substantially across racial and ethnic groups, race-specific jail measures in this study are standardized within the respective race-specific population in order to derive more comparable estimates. Therefore, in race-specific models, a 1-standard-deviation increase in jail rate corresponds to a larger increase for the Black population relative to the White population. All model analyses were conducted in R studio using the *tidyverse* (Wickham et al. 2019) and *MASS* (Venables and Ripley 2002) packages.

Table 1 Descriptive statistics

	United States (N = 3,123 counties)				Analytic Sample (n = 1,103 counties)			
	2009		2014		2009		2014	
Population (in 000s)								
White	200,598		201,087		151,466		152,229	
Black	40,408		42,499		38,530		40,467	
Mortality Rate (per 100,000; mean and SD)								
White	806.1	(121.2)	806.0	(134.4)	797.9	(115.6)	795.9	(128.9)
Black	923.9	(236.5)	912.9	(243.4)	937.9	(154.1)	933.8	(165.0)
Jail Rate (per 100,000; mean and SD)								
White	2.6	(3.7)	2.8	(3.4)	2.4	(2.2)	2.6	(2.6)
Black	16.2	(37.3)	13.3	(24.9)	12.2	(8.6)	10.6	(8.4)
County Covariates (%; mean and SD)								
Violent crime, White	0.17	(0.29)	0.15	(0.25)	0.17	(0.22)	0.15	(0.21)
Violent crime, Black	0.62	(5.30)	0.51	(3.48)	0.51	(0.43)	0.43	(0.39)
Poverty	13.5	(5.2)	15.6	(5.4)	13.4	(5.1)	15.7	(5.3)
College	71.4	(9.4)	70.2	(10.0)	69.8	(9.0)	68.6	(9.5)
Black	12.4	(12.8)	12.6	(12.7)	14.7	(12.9)	14.9	(12.9)
Male	49.3	(1.3)	49.2	(1.3)	49.2	(1.1)	49.0	(1.0)
Ages 20–34	20.4	(3.6)	20.6	(3.7)	20.9	(3.4)	21.1	(3.5)
Urbanicity (proportion; n)								
Large central	0.02	(64)			0.06	(62)		
Large fringe	0.12	(366)			0.22	(238)		
Small/medium	0.23	(728)			0.39	(428)		
Nonmetropolitan	0.63	(1,965)			0.34	(375)		
Region (proportion; n)								
South	0.46	(1,422)			0.70	(769)		
Northeast	0.34	(1,055)			0.15	(165)		
Midwest	0.14	(433)			0.07	(75)		
West	0.07	(213)			0.09	(94)		

Notes: Means are the average across counties weighted by the respective size of the county's population. Mortality rates reflect the age-standardized death rate, standardized using the 2010 midyear age distribution. Population counts and mortality rates correspond to the average across the lagged five-year pooled periods (2010–2014 and 2015–2019, respectively). White and Black refer to non-Hispanic White and non-Hispanic Black, respectively. Race-specific violent crime rates refer to the racial identification of perpetrators, the poverty measure refers to the proportion of individuals living below the federal poverty line, and the college measure refers to the proportion of individuals aged 25+ without a bachelor's degree.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for the analytic sample of 1,103 counties, relative to the full set of counties at the national level. Despite the reduced number of counties, the sample represents 95% and 76% of the national Black and White populations,

Table 2 Associations between race-specific jail incarceration and race-, sex-, and age group–specific mortality

	White				Black			
	Model 1		Model 2		Model 1		Model 2	
Male (ages)	1.054	***	1.014	***	1.031	***	1.018	***
1–19	1.107	***	1.004		1.004		0.996	
20–34	1.054	***	0.996		0.990		0.986	
35–49	1.081	***	1.020	***	1.044	***	1.025	***
50–64	1.073	***	1.029	***	1.048	***	1.030	***
65+	1.033	***	1.011	***	1.032	***	1.021	***
Female (ages)	1.060	***	1.019	***	1.036	***	1.017	***
1–19	1.128	***	1.030	†	1.052	**	1.026	
20–34	1.106	***	1.022	†	1.061	***	1.013	
35–49	1.102	***	1.027	***	1.068	***	1.033	***
50–64	1.082	***	1.034	***	1.055	***	1.034	***
65+	1.032	***	1.014	***	1.019	***	1.010	***

Notes: Coefficients are presented as rate ratios. All coefficients other than jail incarceration were suppressed to conserve space. Models were estimated separately by life course group. Model 2 adjusts for county covariates, including crime; poverty; college attainment; proportions Black, male, and aged 20–34; metropolitan status; and state and time period fixed effects. A 1-standard-deviation increase in the race-specific jail rate corresponds to an increase of approximately 0.4 percentage points in White incarceration and an increase of 1.5 percentage points in Black incarceration. White and Black refer to non-Hispanic White and non-Hispanic Black, respectively.

†$p < .10$; **$p < .01$; ***$p < .001$

respectively. However, some key compositional differences between the analytic sample and the national set of counties emerge given the geographic distribution of populations across the United States. A higher proportion of the counties in the sample are located in the South, driven by the concentration of the Black population in that region (Figure 3). Further, because of the study's population size restrictions, the analytic sample represents a slightly more populous and diverse set of counties, with a higher proportion of Black residents and a smaller proportion of nonmetro rural areas. Despite these compositional differences, there are only marginal differences between the sample and the national set of counties across mortality, jail incarceration, and county covariates of interest.

Associations by Race, Sex, and Age

Table 2 presents the age- and sex-specific associations between the primary exposure—race-specific jail incarceration—and mortality across models unadjusted and adjusted for county covariates, and Figure 4 depicts results across age groups. In unadjusted models (Model 1), the size of the association between White mortality and jail incarceration is substantially larger than that observed in the Black population. For example, a 1-standard-deviation increase in the White jail rate corresponds to 6.0% and 5.4% increases in mortality for White women and men, respectively, whereas a 1-standard-deviation increase in the Black jail rate corresponds to only 3.6% and 3.1% increases in mortality for Black women and men, respectively (Table 2). However, after controlling

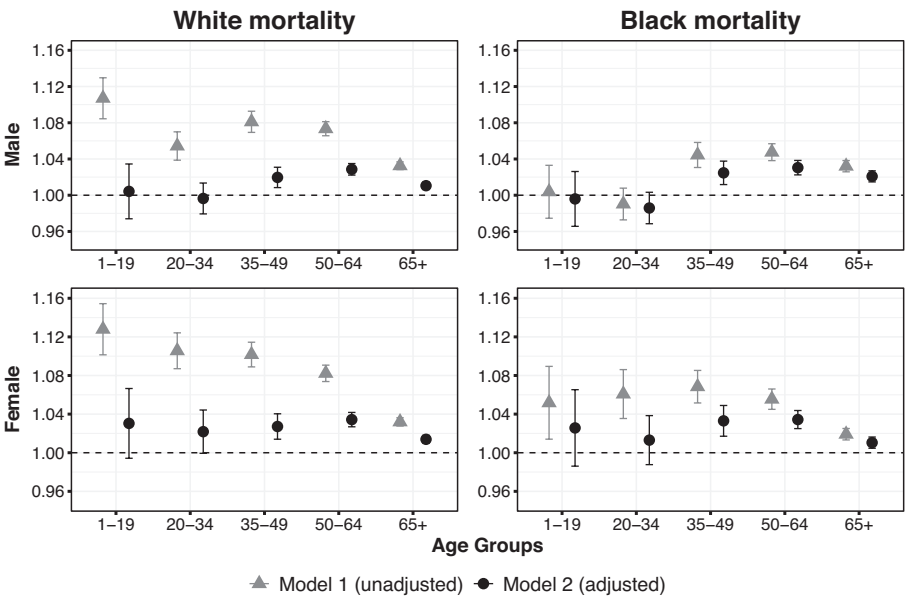

Fig. 4 Associations between race-specific jail incarceration and race-, age-, and sex-specific mortality. Coefficients represent race-specific jail incarceration in rate ratio form from both unadjusted (Model 1) and adjusted (Model 2) models with corresponding 95% confidence intervals. Models are estimated separately by life course group. Model 2 adjusts for county covariates, including violent crime; poverty; college attainment; proportions Black, male, and aged 20–34; metropolitan status; and state and time period fixed effects. A 1-standard-deviation increase in race-specific jail rate corresponds to an increase of approximately 0.4 percentage points in White jail rates and an increase of 1.5 percentage points in Black jail rates. White and Black refer to non-Hispanic White and non-Hispanic Black, respectively.

for other county covariates (Model 2), the adjusted models reveal that a larger portion of the association between jail rates and mortality for the White population is explained by contextual characteristics (Figure 4). For example, net of other explanatory factors, the size of the association between race-specific jail rate and mortality is reduced to similar increases ranging between 1.4% and 1.9% across all population groups.

Nonetheless, the positive associations in adjusted models between jail rates and all-age mortality are significant across all groups. Further, positive associations appear across nearly all age groups, with the exception of slightly negative but insignificant associations among Black males before age 35 and White males at ages 20–34. At ages 35 and above, positive associations are significant for all race–sex groups, with the size of the associations in middle to late adulthood (ages 35–64) larger than that at older ages (65+). White women are the only group that faces marginally significant increases at younger ages (under age 35). Across all race–sex groups, mortality penalties peak in late adulthood (ages 50–64), where a 1-standard-deviation increase in race-specific jail rates is associated with roughly 3% increases in mortality.

However, findings also reveal varying patterns in associations at the intersection of race, sex, and age. Women generally face more marked and consistent penalties associated with jail incarceration, with gaps being largest at younger ages. White women experience stronger penalties than White males across all age groups, while Black

women experience stronger penalties than Black males at all ages except the oldest (65+)—though these differences are statistically significant only in early adulthood (ages 20–34) (see Figure A1). Relative to all other race–sex groups, White women experience the largest associations between jail rates and mortality at younger ages (under 35), while Black women face the strongest associations in middle adulthood (ages 35–49).

Black men appear to face a particularly divergent age pattern in associations between jail rates and mortality. Following insignificant and negative associations in early adulthood, Black men experience a spike in the size of association between jail rates and mortality in middle adulthood (ages 35–49), which, as in the other age–sex groups, peaks in late adulthood (ages 55–64). However, Black men then face the strongest penalties at the oldest ages (65+), with a statistically larger increase in mortality (more than 2%) that is almost double that experienced by both White males and Black females (roughly 1%) (see Figure A1).

Estimation of Hypothetical Scenarios

Another way to quantify the mortality toll associated with jail incarceration is illustrated in Figure 5, which presents the model-predicted age group–specific mortality rate as a function of change in jail incarceration rate from the adjusted model (for a full table of estimates, see Table A3). The figure depicts how age group–specific death rates (per 100,000) would be expected to change by race, ethnicity, and sex across two hypothetical scenarios: one in which there is no jail incarceration, corresponding to race-specific jail rates fixed at 0%, and another in which there are high levels of jail incarceration (99th percentile in the analytic sample), corresponding to jail rates fixed at 4.0% and 1.5% of the Black and White populations, respectively.

Differences in predicted death rates at younger ages between no- and high-jail scenarios are minimal, owing to the small number of deaths earlier in life and smaller associations between jail rates and mortality; however, an insignificant "protective" effect of jail incarceration on young Black men is somewhat visible at ages 20–34. As age increases, however, the potential human costs of high jail incarceration become more apparent. In particular, Figure 5 illustrates the growing disadvantage imposed on Black populations, particularly among Black men at older ages, that is driven by the coupling of an increasing penalty of jail incarceration on already high levels of mortality. At ages 35 and older, Black men face the steepest mortality toll associated with high-jail scenarios. By the oldest ages (65+), Black men would be expected to experience a death rate that is 459 per 100,000 higher in the high-jail scenario relative to the no-jail scenario, net of other factors, as compared with increases of 185, 197, and 240 per 100,000 among Black women, White men, and White women, respectively.

Analysis of Race-Neutral Measures

Figure 6 compares the primary race-specific associations with those estimated from adjusted models (Model 2) using conventional race-neutral jail rates employed in prior literature (coefficients can be found in Table A2). These findings show that the conventional race-neutral measures of jail incarceration for the total population

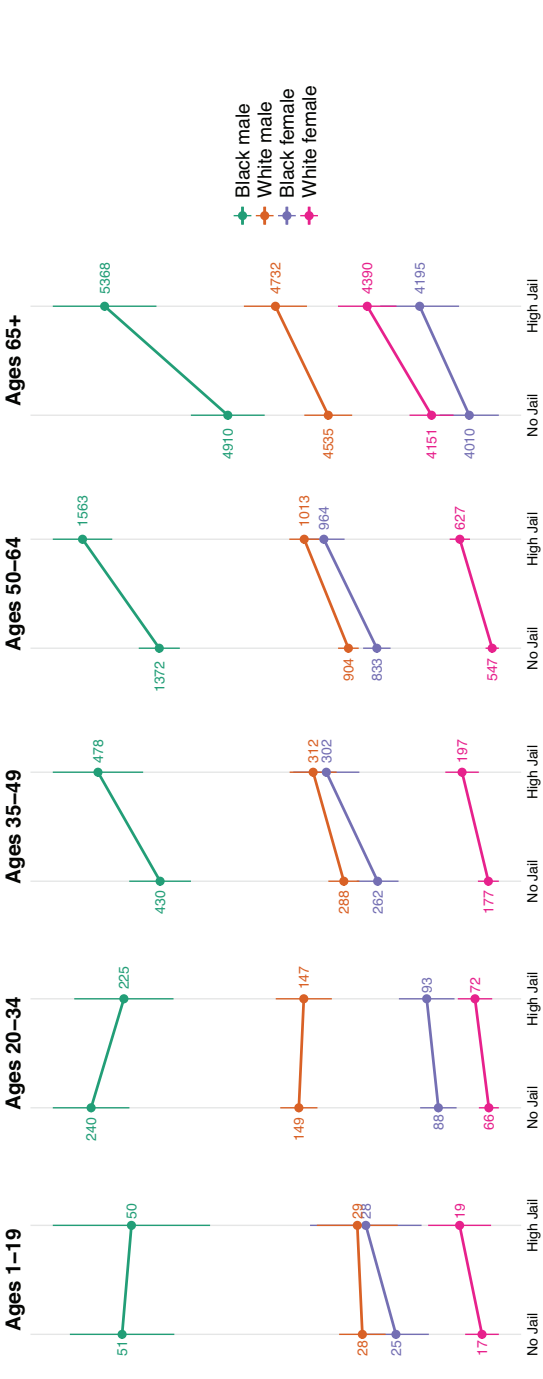

Fig. 5 Model-predicted race-, sex-, and age group–specific death rates (per 100,000) in two hypothetical jail scenarios. Predictions are based on fully adjusted models run separately by age group, race, and sex. The no-jail scenario reflects jail rates fixed at 0% for both Black and White populations, while the high-jail scenario reflects jail rates of 4.0% and 1.5% for Black and White populations, respectively (99th percentile of the sample). Estimates are presented with 95% confidence intervals. White and Black refer to non-Hispanic White and non-Hispanic Black, respectively.

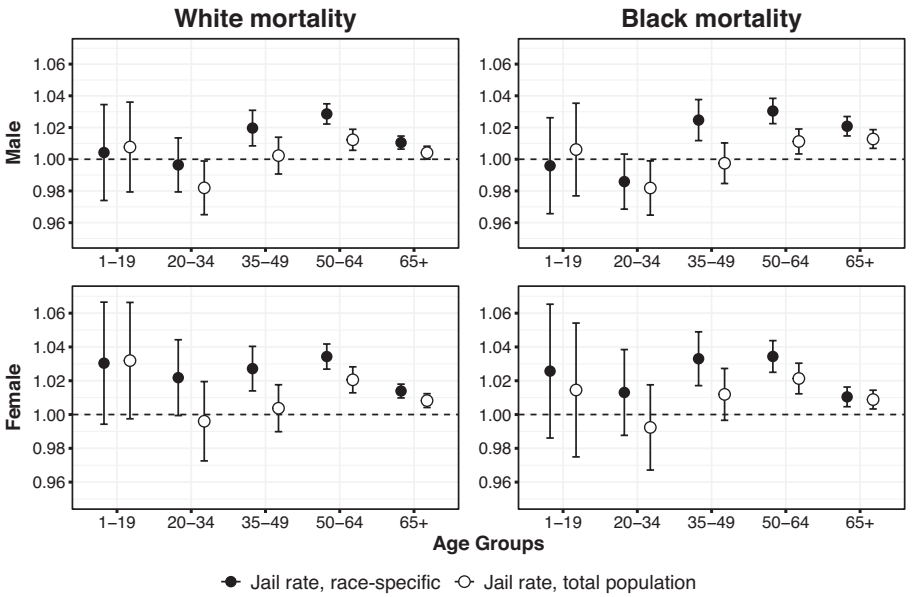

Fig. 6 Comparison of race-specific and race-neutral incarceration measures. Coefficients on race-specific jail incarceration are relative to jail incarceration for the total population in rate ratio form from adjusted models (Model 2) with corresponding 95% confidence intervals. Models are estimated separately by life course group. Model 2 adjusts for county covariates, including violent crime; poverty; college attainment; proportions Black, male, and aged 20–34; metropolitan status; and state and time period fixed effects. A 1-standard-deviation increase in race-specific jail rate corresponds to an increase of approximately 0.4 percentage points in White incarceration and an increase of 1.5 percentage points in Black incarceration, whereas a 1-standard-deviation increase in jail rate for the total population corresponds to an increase of 1 percentage point. White and Black refer to non-Hispanic White and non-Hispanic Black, respectively.

underestimate the magnitude of association between jail rates and mortality for both Black and White individuals across nearly every age–sex combination. For example, while race-specific jail rates were shown to be associated with increases in mortality ranging from 1.4% to 1.9% (Table 2), the size of the increase associated with jail rates for the total population drops to a range of 0.3% to 1.0% (see Table A2). In particular, the use of race-neutral jail exposures masks statistically significant mortality penalties for certain subgroups, including in middle adulthood (ages 35–49) across all race–sex groups and at younger ages for White women (before age 35). Notably, the statistically protective benefit of jail incarceration for males in young adulthood (ages 20–34), which emerges with the use of race-neutral measures, is reduced to an insignificant association with the use of race-specific jail rates.

Discussion

Scholars have increasingly pointed to incarceration as an overlooked but important determinant of mortality inequality across the United States (Nosrati and King 2021). A growing body of ecological work documents the mortality burden associated with

high-incarceration contexts (Kajeepeta et al. 2020; Nosrati et al. 2021; Nosrati and King 2021; Weidner and Schultz 2019; Wildeman 2012, 2016). Yet far less is known about the role of local jails in patterning this burden across race, sex, and age, despite widespread contact with jails (Gaston 2019; Gaston and Brunson 2020; Kirk 2008; Sharp and Atherton 2007) and the established association of these demographic characteristics with jail involvement (Pettit and Gutierrez 2018; Pettit and Western 2004; Western and Pettit 2010). Building on this literature, I assess the relationship between county-level jail incarceration and age- and sex-specific mortality for Black and White populations, using race-specific jail incarceration rates to better capture known racial inequalities in incarceration exposure.

This study delivers several key findings. First, I find that increases in county-level jail incarceration are associated with increases in mortality among Black and White populations, ranging from 1.4% to 1.9% in all-age mortality. These findings call attention to "why misdemeanors matter" (Roberts 2011) for population health and well-being and highlight local jails as a crucial yet overlooked arm of the U.S. carceral system (Turney and Conner 2019). Although the majority of individuals who are incarcerated in the United States are housed in prisons, widespread and frequent contact with jails (Sawyer and Wagner 2020) may impose its own set of uncertainties and instabilities on individuals and communities (Comfort 2016; May et al. 2014). Some evidence indicates that relationships between incarceration and community health may be stronger in relation to prison (Thomas and Torrone 2008), yet this finding highlights the potential human costs associated with even low-level or local contact with America's carceral state.

Second, I document varying patterns in these associations at the intersection of race, age, and sex, revealing more marked and consistent penalties among the female population as well as a particularly notable age pattern among Black men. Despite insignificant and negative associations between jail rates and mortality earlier in life, strong mortality penalties emerge later in life for Black men, who witness a spike in penalties in middle adulthood (ages 35–49) and face the highest associations at the oldest ages (65+).

These patterns of harm provide some insight into the processes that underlie the relationship between areal incarceration and mortality in the United States. As found in prior work at the state level (Wildeman 2012), the observed pronounced mortality penalties among females extend evidence of incarceration's collateral consequences to the context of local jails. Although the health consequences for the partners and families of those in prison are well-documented (Schwartz-Soicher et al. 2011; Turney 2014; Wildeman and Lee 2021; Wildeman et al. 2012), less attention has been paid to jail incarceration. Yet there may be spillover strains associated with shorter and more frequent stays in jails, which are likely to be distinct from those imposed by prison exposure (Comfort 2007, 2016; May et al. 2014; Sugie and Turney 2017; Turney and Conner 2019). Therefore, although jail stays tend to be more local and shorter than prison stays, these findings call attention to the spillover harm that may still occur with this type of low-level carceral contact.

Additionally, I document marginally significant negative associations between incarceration and mortality among Black men in early adulthood (ages 20–34). This runs counter to prior work on jail incarceration, which found the largest increases in mortality among those aged 15–34 (Kajeepeta et al. 2020)—though this

may be partly related to disentangling the relationship between jail rates and mortality by race and sex. Instead, these findings align with work that has found similar decreases in mortality associated with incarceration among young Black men, primarily in prison settings (Patterson 2010; Rosen et al. 2011; Spaulding et al. 2011; Wildeman and Wang 2017), suggesting that the counterintuitive "protective" effect of imprisonment on early-life mortality, particularly for Black males, may extend to jail settings. Despite the shorter and more variable length of stays in jails, short-term mortality reductions may also be driven by reduced risks of mortality from causes such as homicide and drug overdoses (Massoglia et al. 2014; Patterson 2010). This mortality avoidance may be particularly salient for those in jails given the high rates of substance abuse documented among jail inmates (Bronson et al. 2020). However, my use of a race-specific measure of incarceration, rather than the traditional race-neutral jail rate measure used in prior work, reduces the significance of this protection for men, suggesting that studies should be careful not to overestimate the protection granted to these subgroups by high levels of jail incarceration.

Importantly, the emergence of steeper mortality penalties at older ages among the Black male population may be suggestive of the long-term health consequences of jail exposure for Black men, who are disproportionately incarcerated in the United States. Similar spikes in middle to late adulthood, when individuals are generally released from prisons, have been observed at the state level among men (Wildeman 2012). Although scholarship on the long-term health repercussions of incarceration has been dominated by a focus on prisons, a growing body of evidence points to the potential long-term health costs associated with a history of jail incarceration, tying prior jail incarceration to increased health care needs and higher mortality risks (Freudenberg 2001; Freudenberg et al. 2008; Iroh et al. 2015; Lambdin et al. 2018; Lim et al. 2015; Lim et al. 2012; Lindquist and Lindquist 1999; Marks and Turner 2014). Further, the disproportionate toll absorbed by older Black populations—particularly men, and largely driven by coupling of the increasing penalties of jail incarceration with already high levels of mortality—calls attention to the ways racial inequalities in incarceration may exacerbate other forms of socioeconomic, political, social, and health disadvantage that have been historically shouldered by Black individuals in the United States (Bailey et al. 2021; Powell 2013; Roberts 2003).

A secondary finding revealed by the analysis is that a larger portion of the relationship between jail incarceration and mortality among the White population is explained by the included contextual covariates in adjusted models. One possible explanation is that the link between jail and mortality is a more select experience for White individuals (i.e., more concentrated in disadvantaged areas) but more diffusely experienced among Black individuals. This is consistent with prior evidence showing that adverse White mortality tends to be clustered in disadvantaged counties, whereas the characteristics of counties with persistently high Black mortality are more varied (James et al. 2020). Although work has examined the geographic determinants of jail use more broadly (Carmichael 2005), less research has explored how these determinants might vary in relation to race-specific jail exposure. Emerging evidence underscores the importance of this line of inquiry by linking historical legacies of slavery to differential contemporary outcomes for Black and White populations (O'Connell et al. 2024; Ward 2024). Nonetheless, clarifying how determinants may differentially shape

race-specific relationships between jail incarceration and mortality may be a particularly promising avenue for future work.

A final finding of this study is that conventional race-neutral measures of incarceration exposures used in prior work may mask the degree of harm associated with carceral contexts. In particular, I find evidence to suggest that race-neutral measures of incarceration underestimate the association between incarceration and mortality, significantly so for multiple race–sex–age combinations, and may potentially obscure a great deal of the harm across the life course associated with incarceration exposure.

There are many reasons why a reliance on incarceration for the total population, without consideration of the race-specific patterns in that exposure, might mask the relationship between incarceration and health. Given the entrenched nature of racial segregation within county contexts (Logan and Parman 2017; Massey 2004) and the deeply racialized nature of carceral activity, such as policing surveillance and enforcement (Gaston 2019; Gaston and Brunson 2020; Kirk 2008; Sharp and Atherton 2007), Black populations and neighborhoods are subjected to a disproportionate share of the incarceration exposure within any given area. Race-neutral incarceration measures may therefore be a poor proxy for the level of incarceration exposure faced by differently racialized populations. This may be particularly true for White populations, whose exposure to incarceration may be substantially obscured by the overall incarceration rate—which disproportionately falls on the shoulders of their Black peers—as well as in more populous counties where patterns of neighborhood segregation are more pervasive and lead to stronger race-specific relationships between jail exposure and mortality. Nonetheless, racial distributions of incarceration exposure may better capture the magnitude of race-specific harm associated with incarceration.

This study comes with a number of limitations that merit discussion. First, given the unequal distribution of where populations reside in the United States and the analytic incentive to include counties with sufficient populations of both Black and White individuals to allow for valid comparisons (Oakes 2004, 2006), the study relied on a restricted sample of counties that had a sufficient number of Black and White individuals to derive stable measures of mortality. Although the county sample represents approximately 95% and 76% of the national Black and White population, respectively, it reflects a slightly more diverse and less rural subset of counties. Given the growth of jail rates in rural areas in recent decades, I pooled mortality across a five-year period to allow for the inclusion of as many rural areas as possible, with nearly 375 counties classified as nonmetro included in the analysis. To further mediate concerns regarding the reliability of the estimates given stratification by age group, I tested stricter thresholds for inclusion and found no meaningful changes to the substantive conclusions, thus reinforcing the representativeness and validity of the estimates presented here (see Figure A3). Nonetheless, the findings cannot be generalized to counties with either too small of a Black population or total population to be included, and future research is needed to illuminate how the race-specific patterns observed here may translate to these less diverse, rural areas in the United States.

Second, the county-level jail incarceration rates used in the study were drawn from the Vera Institute of Justice, who compiled data from the Bureau of Justice

Statistics. Although these data have been used in multiple studies on county-level incarceration and mortality (Kajeepeta et al. 2021; Nosrati et al. 2019; Nosrati et al. 2021), linear imputation procedures are used to fill in missing data from smaller jail jurisdictions, which may affect the reliability of the race-specific estimates in certain counties (Kajeepeta et al. 2020; Kang-Brown 2022). However, my restriction of the sample to counties with sufficient population sizes to estimate mortality mitigates concern regarding jail rate reliability for small geographic areas.

Third, I include violent crime rates in adjusted models by using data drawn from the Uniform Crime Reporting Program, which includes only crimes reported to the police. This measure has been shown to represent less than the actual prevalence of violence and be patterned by various population characteristics, such as race, ethnicity, age, income, and rurality (Gutierrez and Kirk 2017; Xie and Baumer 2019). Given the likelihood that this measure is correlated with spatial patterns of policing and jail exposure, I conducted a robustness check of models across varying operationalizations of violent crime, including the exclusion of the violent crime measure, and found little meaningful change in the findings (see Figure A4). Nonetheless, it is crucial that future population health research on the criminal legal system address the limitations associated with police-recorded measures of crime and violence.

Fourth, previous research has shown that the association between jail incarceration and mortality weakens as time lags increase from one year to five years (Kajeepeta et al. 2021), a finding suggestively confirmed in robustness checks (see Figure A2). Given that I pooled mortality data across a five-year period, it is likely that the combination of a one-year time lag with a pooled mortality estimate results in conservative estimates of the association between county-level jail incarceration and mortality.

Finally, although this study builds on prior ecological work by using race-specific incarceration rates, the lack of additional age or sex detail and of individual-level incarceration data limits the causal conclusions we can draw from the observed associations. For example, this strategy is unable to distinguish between the direct consequences and indirect spillovers of jail incarceration on mortality. Thus, the marked mortality penalties observed among the female population may reflect direct consequences of contact with jails. Indeed, female incarceration rates have increased in recent decades, although women still comprise only a small portion of the incarcerated population (Sawyer and Wagner 2020). Even though well-documented racial, age, and gender disparities in incarceration at the population-level allow for credible conjecture regarding the nature of these relationships, the estimates presented here should be interpreted as associations rather than causal estimates.

Despite the foregoing limitations, this study presents novel evidence of the demographic distribution of mortality harm associated with exposure to local carceral contexts and calls attention to the potential human costs associated with the widespread reach of jails in the United States. In particular, these findings highlight how local jails and their associated carceral activity (i.e., surveillance, policing) may represent key intervention points for improving community health and well-being. In building on a growing body of work that underscores the role of mass incarceration in shaping an uneven geography of health and mortality, this study urges that we more seriously consider local jails as both a unique feature of the broader carceral system and an important determinant of population health. ■

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