

**Race-Specific Risk Factors for All-Cause, Natural, and Unnatural Deaths Among
Individuals Released from State Prison**

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RESEARCH SUMMARY

Individuals released from prison have an elevated risk of premature death, especially during the first few weeks after release. Furthermore, these consequences of incarceration may be exacerbated by racial and ethnic disparities. This study examined three types of post-release mortality – all-cause mortality, natural deaths, and unnatural deaths which include accidents, suicides, and homicides – among individuals released from Minnesota state prisons in order to identify characteristics and experiences that place individuals at risk. In addition, we conducted race-specific models examining these types of mortality among White, Black, and Native American releasees.

The results of Cox regression models showed, first, that several personal characteristics were related to risk of death. Black, Asian, and Latino people had lower risk of mortality than White people, while Native American people had higher risk. Those affiliated with security threat groups (STG) had higher risk of death, as did those with more mental and physical health diagnoses and those with higher body mass index (BMI). Second, several aspects of criminal history and incarceration were related to post-release mortality. Sex offenders had lower risk of death, while those incarcerated for driving while intoxicated (DWI) had higher risk. Prison visitation reduced the risk of mortality. Risk of death was higher among those with more prior prison admissions, those incarcerated for supervised release revocations, and those with more discipline convictions – but was lower when individuals were incarcerated for longer periods of time. Third, the circumstances of release were related to risk of death. Individuals released to the Twin Cities Metropolitan area had higher risk of mortality, while those released to community programs had lower risk. Finally, the results also showed that, while many risk or protective factors appeared to be universal, some race-specific risk factors do exist.

INTRODUCTION

The struggles encountered by individuals released from prison are well known by now (e.g., Petersilia, 2003; Travis, 2005; Visher & Travis, 2011). Due to the civil and legal restrictions imposed on individuals convicted of felonies, on top of the stigma of incarceration, individuals released from prison struggle to establish conventional and prosocial lives. These individuals face difficulty obtaining and maintaining employment, and incarceration can stifle earnings well into the future (Western, 2002; Western et al., 2001). Financial limitations mixed with the reluctance by landlords to rent to individuals previously involved in the criminal justice system make it hard to secure stable housing (Geller & Curtis 2011; Metraux et al., 2008). Strained relationships with family compound these obstacles (Braman, 2004; La Vigne et al., 2005; Massoglia et al., 2011).

One additional reentry hardship that has historically received less scholarly attention is poor health and increased risk of premature death among the formerly incarcerated (Binswanger et al., 2007; Fazel & Baillargeon, 2011; Massoglia & Pridemore, 2015; Massoglia & Remster, 2019; Schnittker & John, 2007). Individuals who have been incarcerated are more likely to suffer from adverse health conditions, including cardiovascular disease, cancer, infectious diseases, addiction to drugs and/or alcohol, and mental health disorders, among several other ailments (Binswanger et al., 2009; Carson, 2021a; Fazel and Baillargeon, 2011; National Commission on Correctional Health Care, 2002). While some of these conditions may be caused by the lifestyles or heredity of individuals who have experienced incarceration, there is some evidence that the experience of incarceration has a direct effect on health (Massoglia & Pridemore, 2015; Patterson, 2013). This effect is likely due to the stress of incarceration (Massoglia, 2008a; Pridemore, 2014), exposure to infectious diseases (Maruschak, 2008), or that incarceration deepens existing inequities that are directly or indirectly related to health (Wakefield & Uggen, 2010).

Individuals who are currently incarcerated appear to be at lower risk of premature death while they are still behind bars, a phenomenon known as the “mortality advantage” (Mumola, 2007; Spaulding et al., 2011; Patterson 2010, Rosen et al. 2011; Wildeman et al., 2016). However, the risk of premature death increases significantly once individuals are released to the community, especially within the first few weeks of release (Binswanger et al., 2007; Bird & Hutchinson, 2003; Kariminia et al., 2007; Krinsky et al., 2009; Patterson, 2013; Seaman et al., 1998; Verger et al., 2003). Some of the most common causes of death among released individuals include overdose, suicide, homicidal violence, cardiovascular disease, cancer, and accidents (Binswanger et al., 2013; Binswanger et al., 2007; Merrall et al., 2010; Rosen et al., 2008; Spaulding et al., 2011; Zlodre & Fazel, 2012).

Incarceration disproportionately affects communities of color (Carson, 2021b; Pettit and Western, 2004), and there is ample evidence that race intensifies the collateral consequences of incarceration (Pager, 2003; Pager et al., 2009; Wakefield & Uggen, 2010). These stratifying effects may extend to the health consequences of incarceration, exacerbating existing disparities (Massoglia 2008b; Massoglia & Pridemore, 2015). Even without considering incarceration experience, the life expectancy of White individuals is nearly four years longer than that of Black individuals (Murphy et al., 2021). Thus, we might expect formerly incarcerated Black individuals to have greater risk of premature death. However, contrary to what most observers might expect, most research on mortality and incarceration has found that non-Hispanic White individuals face higher risk of mortality than Black individuals, both during and after incarceration (Binswanger et al, 2007, 2013; Spaulding et al., 2011; Rosen et al., 2011; Testa et al., 2018; Wildeman et al., 2016). Of those studies that have examined racial and ethnic differences in mortality, most have been limited to samples comprised of White, Black, and Latino individuals.

This study examined the risk of multiple types of post-prison mortality across a variety of racial and ethnic groups by connecting official data from Minnesota state prisons with state death records. Rather than comparing the mortality rates of incarcerated individuals to the rest of the population, this study examined risk factors related to mortality within a sample of releasees. In addition to race and ethnicity, this study also employed several variables that measure custodial behaviors and characteristics, including offense type, institutional discipline, receipt of health services, prior record, and participation in programming. Past research has demonstrated the heightened mortality risk among formerly incarcerated persons compared to the general public, while the present study highlights both the demographic and custodial characteristics that are most associated with risk of premature death. The field of correctional research has had an outsized focus on recidivism as an outcome (National Academies of Sciences, Engineering, and Medicine, 2022), while this study underscores yet another devastating outcome of mass incarceration and its disproportionate impact on communities of color.

In the following sections, we first review the literature on risk of mortality among those who are incarcerated and formerly incarcerated, followed by a review of racial and ethnic disparities in mortality. Next, we describe how the data were collected, followed by a presentation of multivariate analyses predicting the risk of various types of post-release deaths. Finally, we discuss the implications of these results.

MORTALITY AMONG PEOPLE RELEASED FROM PRISON

Mortality Rates and Causes of Death Among the Formerly Incarcerated

The mortality advantage that exists in prison quickly disappears once individuals are released to the community. Several studies – both international and based in the United States – show that the greatest risk of death among those released from prison occurs during the first few

weeks of release (Binswanger et al., 2007, 2013; Bird & Hutchinson, 2003; Christensen et al., 2006; Farrell & Marsden, 2008; Graham, 2003; Harding-Pink, 1990; Harding-Pink & Fryc, 1988; Joukamaa, 1998; Kariminia et al., 2007; Krinsky et al., 2009; Pratt et al., 2006; Seaman et al., 1998; Seymour et al., 2000; Stewart et al., 2004; Verger et al., 2003). For example, in a study of prison releases in Washington state, Binswanger et al. (2007) found the risk of mortality (adjusted for age, sex, and race) was nearly 13 times higher than the risk for other state residents during the first two weeks after release and remained 3.5 times higher over the entire follow-up period of, on average, two years. In a study of New York state parolees, Patterson (2013) found that each year served in prison shaved an estimated two years off of formerly incarcerated individuals' life expectancy. But after spending time in the community for a period that equaled two-thirds of time spent in incarceration, the mortality risk of the formerly incarcerated matched the risk of the rest of the population. These results suggest that deaths occurring immediately following incarceration may account for much of the difference in mortality risk for the formerly incarcerated and the general population (Massoglia & Pridemore, 2014).

Prior research has also identified several common causes of death among the formerly incarcerated. First, much of the mortality risk after release is driven by drug overdoses (Binswanger et al., 2007, 2013). A majority of those incarcerated in state prisons have diagnosed substance use disorders (Bronson et al., 2017), and most leave prison without participating in treatment (Duwe & Clark, 2017a; National Center on Addiction and Substance Abuse, 2010). The combination of untreated addiction, coupled with decreased physiological tolerance due to prolonged abstinence from drugs, is the likely culprit of overdose deaths among releasees (Binswanger et al., 2007, 2013; Massoglia & Pridemore, 2015).

Second, released individuals are also at increased risk of death from suicide (Binswanger

et al., 2007; Pratt et al., 2006; Zlodre & Fazel, 2012). More than half of persons incarcerated in state prisons have mental health problems, and 13% have previously attempted suicide (James & Glaze, 2006). These mental health issues on top of the common stressors of reentry (e.g., securing employment and housing, reuniting with family [Petersilia, 2003; Travis, 2005; Visser & Travis, 2011]) may explain at least part of the increased risk of suicide among the formerly incarcerated.

Third, another leading cause of death among releasees is homicide (Binswanger et al., 2007; Zlodre, & Fazel, 2012). Individuals who engage in crime are at an elevated risk of becoming victims of crime, including violent crime (Gottfredson, 1981; Jennings et al., 2012). Given the victim-offender overlap and the fact that individuals are often released to disadvantaged neighborhoods with elevated crime rates (Clear et al., 2003; Harding et al., 2013; La Vigne et al., 2003), it should come as no surprise that this population experiences an increased risk of violent death.

Besides overdoses, suicides, and homicides, other common causes of death among the formerly incarcerated include cardiovascular disease, cancer (particularly lung cancer), motor vehicle accidents, and infectious diseases (e.g., human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), viral hepatitis)(Binswanger et al., 2007; Massoglia & Pridemore, 2015; Spaulding et al., 2011; Zlodre & Fazel, 2012). While it is difficult to disentangle health issues that existed prior to incarceration from health issues caused by incarceration (either directly or indirectly), most research has found that previously incarcerated individuals in the United States have a heightened risk of premature death (Binswanger et al., 2007; Pridemore, 2014; Patterson, 2013; Rosen et al., 2008; Spaulding et al., 2011; Zlodre & Fazel, 2012).

Risk Factors for Mortality Among the Formerly Incarcerated

While a growing number of studies have compared mortality risk for those released from

prison to the general population, fewer studies have examined factors that increase or decrease risk among releasees. Massoglia et al. (2014) analyzed national longitudinal survey data to measure risk of premature death for men and women who experienced incarceration. While both groups exhibited an increased risk of mortality after incarceration, the effect of incarceration on mortality was small and non-significant after accounting for socio-demographic characteristics. That is, the effect of incarceration on the risk of premature death was close to zero and non-significant in statistical models that controlled for factors such as race and education level for men only. For women, on the other hand, the effect of incarceration on the risk of premature death remained elevated and significant even after controlling for a host of factors, including race, education level, cigarette use, and involvement in violence, among other factors. Similarly, Binswanger et al. (2013) found formerly incarcerated women had an increased risk of overdose death relative to men, while Spaulding et al. (2011) found formerly incarcerated women had an overall increased risk of mortality relative to other women in the population.

In addition to gender, the effect of incarceration on post-release mortality also appears to vary by race, with studies consistently showing post-release mortality appears to be higher among White releasees than Black or Latino releasees. For example, based on a large sample of individuals released from Georgia prisons, Spaulding et al. (2011) found an increased risk of mortality among the formerly incarcerated relative to the rest of the state's population. When this relationship was disaggregated by gender and race, the authors found that the increased risk was smallest for Black men, and largest for White women. Another study looking only at released men in North Carolina, Rosen et al. (2008) found that the risk of mortality was higher for White individuals than for Black individuals, both compared to their respective non-incarcerated populations. In addition, Binswanger et al. (2011a) found that formerly incarcerated Latinos had

lower risk of all-cause mortality compared to White individuals in Washington state. The authors also found that released Native Americans appeared to have higher risk of mortality, but the sample they had was insufficient to detect such differences. More recently, Testa and colleagues (2018) found that released Black and Hispanic individuals in Pennsylvania had lower risk of mortality compared to released White individuals. Overall, it appears that the mortality disadvantage for incarcerated White individuals follows them into the community.

Most notably, Testa et al. (2018) examined additional risk factors associated with mortality risk within a sample of individuals released from Pennsylvania prisons. Being male and older in age were both associated with increased mortality risk. Other factors that increased the risk of mortality included body mass index (BMI), institutional misconduct, documented medical conditions, and elevated recidivism risk (based on the Level of Service Inventory-Revised score). Conversely, being married decreased mortality risk. Testa et al. (2018) also divided the sample by race and ethnicity to examine differences in mortality risk between White, Black, and Hispanic releasees. While some custodial and criminal history variables did vary by race/ethnicity, the authors generally found few differences in mortality risk across the three groups.

The Current Study

A number of studies have examined risk of death among formerly incarcerated populations; however, more research is warranted given the importance of replication for identifying best practices (McNeeley & Warner, 2015). Accordingly, this study extended the research on post-prison mortality to a new state that has not been previously examined: Minnesota. Minnesota is unique in that it has one of the lowest incarceration rates in the United States (Carson, 2021b). At a rate of 189 per 100,000 in the population, only four states incarcerate adults at a lower rate than Minnesota. Despite having one of the lowest rates of incarceration, Minnesota is among the states

with the widest racial and ethnic disparities in use of incarceration (Nellis, 2021). For every 100,000 adults in Minnesota, 130 White individuals are incarcerated, compared to 1,180 Black, 1,422 Native American, and 294 Latino individuals.¹ In addition to wide disparities in the use of incarceration, Minnesota often ranks among the worst in terms of racial gaps in employment, income, and health (Myers et al., 2018; Nanney et al., 2019).

This study adds to the handful of prior studies that examine risk factors for mortality among a sample of formerly incarcerated individuals. In addition to sociodemographic characteristics, we were able to include a large number of predictors that encompass many aspects of individuals' criminal history, their experiences and behaviors during their most recent incarceration, and their release to the community. In addition, we build upon the work of Testa and colleagues (2018) – who tested for racial differences in risk factors for all-cause mortality – by examining potential racial differences in factors that contribute to mortality across different types of death: in addition to all-cause mortality, we examine deaths by natural causes and deaths by unnatural causes such as homicide, suicide, and accidents.

Moreover, given the demographic makeup of Minnesota prisons, the present study included a previously under-examined group: formerly incarcerated Native Americans. This research was able to provide a meaningful examination of mortality among formerly incarcerated Native American individuals due to the sizeable Native American population in Minnesota prisons. Despite making up only 1.3 percent of Minnesota's general adult population (National Center for Health Statistics, 2021), Native Americans account for more than 9 percent of the state's adult

¹ Based on population estimates from the Minnesota Department of Corrections (2020) and the National Center for Health Statistics (2021).

prison population (Minnesota Department of Corrections, 2023).

METHODS

Data and Sample

This study examines a sample of individuals released from Minnesota state prisons between 2010 and 2019. The sample and all independent variables were obtained from the Corrections Operations Management System (COMS) operated by the Minnesota Department of Corrections (MnDOC). These records were linked with mortality data from the Minnesota Department of Health (MnDOH).² When individuals were released multiple times during that period, only their most recent release from prison was included in the sample. Because death data came from the Minnesota Department of Health, individuals who were released to another state were removed from the sample ($n = 78$). Individuals were also removed from the sample if they were released with a hold ($n = 6$), released on conditional medical release ($n = 35$), or if they died in prison ($n = 139$). Missing data were handled using listwise deletion.³ The sample size after listwise deletion was 36,739.

A majority of the sample (86%) were men. About half (54%) were non-Hispanic White, while 28% were Black, 2% were Asian, 10% were Native American, and 6% were Hispanic or Latino. The average age was 36 years, with a range of 16 to 90 years.⁴ About a quarter (28%) were incarcerated for non-sexual violent offenses, while 9% were incarcerated for sexual offenses, 17% for property offenses, 29% for drug offenses, 7% for DWI, and 11% for other offense types. The individuals in the sample were incarcerated between less than one month and 494 months (41 years), with an average of about 16 months.

² The linking of records between MnDOC and MnDOH was achieved using name, date of birth, and social security number.

³ Twelve individuals were removed during listwise deletion due to missing data for body mass index (BMI).

⁴ Four individuals in the sample were under the age of 18 when released.

Measures

Dependent variables. Death data for individuals in the sample were obtained from the Minnesota Department of Health. The study tracked mortality through January 2020. Three outcome variables are examined. First, all-cause mortality measures whether an individual died following their release from prison, regardless of manner or cause of death (coded as 1) or survived until the end of the follow-up period (coded as 0). Second, natural deaths indicate whether the individual died of natural causes (coded as 1) or survived until the end of the follow-up period (coded as 0), with unnatural or undetermined causes of death excluded from the analyses. Third, unnatural deaths indicate whether the individual died of homicide, suicide, or accident (see Graham, 2003; coded as 1) or survived until the end of the follow-up period (coded as 0), with natural or undetermined causes of death excluded from the analysis. Descriptive statistics for all study variables are presented in Table 1 (see Appendix A for differences across racial groups).

Independent variables. First are a number of personal characteristics. Race/ethnicity is a series of binary variables indicating whether the individual was non-Hispanic White (reference group), Asian, Black, Hispanic or Latino, or Native American. Gender is a binary variable indicating whether the individual is female (coded as 1) or male (coded as 0). Education is a binary variable indicating whether the individual had a high school diploma or GED at the time of release. Another binary variable measured whether the individual was known to have a current or former security threat group (STG) affiliation. Prior research suggests administrative data on gang membership corresponds fairly well with self-reported data (Pyrooz et al., 2020). Four continuous variables were included to measure (1) age in years at the time of release, (2) the number of mental health diagnoses recorded in COMS, (3) the number of physical illnesses or disabilities recorded in COMS, and (4) body mass index (BMI).

Table 1. Descriptive Statistics

	<i>Mean or %</i>	<i>SD</i>	<i>Min-Max</i>
Dependent Variables			
All-cause mortality	4.0%	---	0-1
Natural deaths	1.5%	---	0-1
Unnatural deaths	2.3%	---	0-1
Independent Variables			
White (reference group)	54.4%	---	0-1
Asian	2.4%	---	0-1
Black	27.5%	---	0-1
Latino	6.0%	---	0-1
Native American	9.7%	---	0-1
Female	14.0%	---	0-1
High school diploma/GED	74.0%	---	0-1
STG affiliation	18.1%	---	0-1
Age at release	36.22	10.916	16-90
Mental health concerns	0.48	0.895	0-10
Physical health concerns	0.40	0.755	0-8
BMI	28.27	5.365	14-59
Person offense (reference group)	27.7%	---	0-1
Sexual offense	8.5%	---	0-1
Property offense	17.3%	---	0-1
Drug offense	28.9%	---	0-1
DWI offense	6.6%	---	0-1
Other offense type	11.1%	---	0-1
New commitment	67.8%	---	0-1
Program participation	63.7%	---	0-1
Prior prison admissions	1.67	2.461	0-27
Length of stay (months)	15.50	27.777	0-494
Discipline convictions	2.60	8.226	0-278
Visits per month	0.931	2.433	0-46.43
Days in segregation	19.28	111.641	0-6639
Health service visits	2.83	3.612	0-152
Twin Cities metro	44.6%	---	0-1
Standard supervision (reference group)	59.2%	---	0-1
Program release	14.1%	---	0-1
ISR	11.8%	---	0-1
Discharge	14.8%	---	0-1
Release year	2015.20	2.893	2010-2019

Several details about the individual's criminal history and most recent incarceration are included. First, offense type is a series of binary variables indicating whether the person was incarcerated for a person (reference group), sexual, property, drug, DWI, or other offense. Second is a binary variable indicating whether the individual's incarceration was a new admission (coded as 1) versus a release return (coded as 0). Third is a binary variable indicating whether the individual participated in programming (including education or vocational programming, substance use disorder treatment, sex offender treatment, cognitive-behavioral treatment) while incarcerated. Next, six continuous variables measured (1) the number of prior prison admissions, (2) the length of incarceration in months, (3) the number of discipline convictions, (4) the average number of visits received per month, (5) the number of days spent in solitary confinement, and (6) the average number of prison health service visits per month.

Finally, information about the individual's release from prison is also included. First is a binary variable indicating whether they were released to the seven-county Twin Cities metropolitan area (coded as 1) or the Greater Minnesota area (coded as 0). Next is a series of binary variables indicating whether the person was released to standard supervision (reference group), conditional medical release, a community program such as work release or the Challenge Incarceration Program (CIP, see Duwe & Kerschner, 2008), intensive supervised release (ISR), or was discharged with no supervision. Finally, release year is included to control for unobserved differences between the different release cohorts from 2010 to 2019.

Analysis

Cox regression was used to analyze mortality in order to examine not only whether an individual died after release from prison, but also how long after release this occurred. This type of analysis also accounts for variation in the length of follow-up periods. Cox regression uses both

“status” and “time” variables to estimate the association between the independent variables and the risk of post-release mortality. The “status” variable measures whether or not the individual died after release from prison. The “time” variable measures the amount of time between release from prison and either the date of death, the date the individual was returned to prison, or the end of the follow-up period (for those who did not die and did not return to prison). Checks for collinearity were performed and no problems were found; tolerance values for all independent variables were above 0.4 and VIFs were below 2.5.

To test for racial differences in risk factors for mortality, separate Cox regression models were estimated for each racial group that had a sufficient sample size (White, Black, and Native American). Models were not estimated for Asian or Latino individuals because of the small number of events, or cases with a score of “1” on the dependent variable (15 and 42, respectively). We used the equality of coefficients test (Paternoster et al., 1998) to examine differences in coefficients across the race-specific models.

RESULTS

Descriptive Results: Mortality Among Those Released from Minnesota State Prisons

Table 2 provides the major causes of death across the full sample and the main racial groups being examined (Whites, Blacks, and Native Americans). In the full sample, there were a total of 1,456 deaths between 2010 and early 2020, resulting in a mortality rate of 3,965.57 out of 100,000. This is substantially higher than mortality rates among the general population in Minnesota; in 2019, the all-cause mortality rate in Minnesota was 790 per 100,000 (Minnesota Department of Health, n.d.).

Table 2. Common Causes of Death Among Individuals Released from Prison

	<i>Full sample</i> (<i>N</i> = 36,716)	<i>White</i> (<i>N</i> = 19,968)	<i>Black</i> (<i>N</i> = 10,093)	<i>Native American</i> (<i>N</i> = 3,548)
All-cause mortality	1,456 (3,965.57)	844 (4,226.76)	351 (3,477.66)	206 (5,806.09)
Natural Deaths	564 (1,536.12)	349 (1,747.80)	120 (1,188.94)	71 (2,001.13)
Cardiovascular disease	204 (555.62)	122 (610.98)	51 (505.30)	23 (648.25)
Cancer	150 (408.54)	103 (515.83)	31 (307.14)	11 (310.03)
Liver disease	70 (190.65)	42 (210.34)	7 (69.35)	14 (394.59)
Respiratory disease	51 (138.90)	34 (170.27)	9 (89.17)	8 (225.48)
Unnatural Deaths	846 (2,304.17)	476 (2,383.81)	215 (2,130.19)	126 (3,551.30)
Accident	591 (1,609.65)	367 (1,837.94)	107 (1,060.14)	97 (2,733.93)
Drug overdose	416 (1,133.02)	251 (1,257.01)	80 (792.63)	74 (2,085.68)
Motor vehicle accident	106 (288.70)	72 (360.58)	18 (178.34)	11 (310.03)
Fall	18 (49.02)	10 (50.08)	4 (39.63)	3 (84.55)
Drowning	16 (43.58)	10 (50.08)	2 (19.82)	3 (84.55)
Homicide	136 (370.41)	32 (160.26)	87 (861.98)	15 (422.77)
Gunshot	110 (299.60)	22 (110.18)	78 (772.81)	9 (253.66)
Sharp force injury	15 (40.85)	4 (20.03)	7 (69.35)	3 (84.55)
Blunt force injury	6 (16.34)	3 (15.02)	1 (9.91)	2 (56.37)
Strangulation	2 (5.45)	1 (5.01)	1 (9.91)	0 (0.0%)
Suicide	119 (324.11)	77 (385.62)	21 (208.06)	14 (394.59)
Hanging	80 (217.89)	53 (265.42)	12 (118.89)	11 (310.03)
Gunshot	19 (51.75)	10 (50.08)	6 (59.45)	1 (28.18)
Drowning	6 (16.34)	5 (25.04)	1 (9091)	0 (0.0%)
Drug overdose	5 (13.62)	4 (20.03)	0 (0.00)	1 (28.18)
Sharp force injury	5 (13.62)	4 (20.03)	0 (0.00)	1 (28.18)
Undetermined manner of death	46 (125.29)	19 (95.15)	16 (158.53)	9 (253.66)

Number of deaths are presented with rate per 100,000 in parentheses.

Unintentional accidents – such as drug overdose, motor vehicle accident, fall, or drowning – were the most common manner of death, followed by natural causes such as cardiovascular disease, cancer, liver disease, or respiratory disease. While homicide and suicide were relatively less common among the sample of formerly incarcerated people, they were much higher than would be expected among the general population. For example, in 2019, the homicide rate in Minnesota was 2.1 per 100,000 (Federal Bureau of Investigation, 2020), compared to a homicide rate of about 370 per 100,000 observed here.

The race-specific information presented in Table 2 shows the mortality rate was highest among Native American releasees (about 5,806 deaths per 100,000), lower among White individuals (about 4,227 deaths per 100,000), and lowest among Black people (about 3,478 deaths per 100,000). While the patterns observed for manners of death were similar across all racial groups – accidents were the most common manner of death, followed by natural deaths – the most common of the specific causes of death varied somewhat by race. For example, the mortality rate due to liver disease was higher for Native American people (394.59 per 100,000) than for White (210.34 per 100,000) or Black people (69.35 per 100,000), while there were no suicides by drowning among the group of Native American releasees. Another notable difference is that suicide was more common among White releasees (385.62 per 100,000) than was homicide (160.26 per 100,000), while the opposite was observed for Black (about 208 suicides and 862 homicides per 100,000) and Native American (about 395 suicides and 423 homicides per 100,000) releasees.

Multivariate Results: Risk Factors for Mortality

All-cause mortality. The results of the Cox regression models predicting all-cause mortality are presented in Table 3. The left column shows the results for the full sample. Several

personal characteristics were related to death after release from prison. Compared to White individuals, risk of mortality was 45% lower among Asian individuals ($p < .05$), 34% lower among Black individuals ($p < .001$), and 59% lower among Latino or Hispanic individuals ($p < .001$), while it was 46% higher among Native American individuals ($p < .001$). Those with known STG affiliations had 21% higher risk of mortality ($p < .05$). The risk of death increased by 4% for every additional year older ($p < .001$), by about 27% for each additional physical health problem recorded in COMS ($p < .001$), by 5.5% for each additional mental health problem recorded in COMS ($p < .05$), and by 1.5% for every additional point on the BMI ($p < .01$).

Criminal history and details of the individual's last incarceration and release from prison were also related to all-cause mortality. Those incarcerated for sex offenses had about 52% lower risk of death ($p < .001$), while risk was about 28% higher for those incarcerated for DWI offenses ($p < .05$). Risk of death increased by 2% for each additional prior prison stay ($p < .05$), but was 18% lower among those incarcerated for a new commitment than among those incarcerated after their supervised release was revoked ($p < .01$) and was 0.3% lower for each additional month incarcerated ($p < .05$). Each additional conviction for misconduct while incarcerated increased the risk of death by 1.4% ($p < .001$) and each visit with prison health services per month increased the risk of death by 1.3% ($p < .01$), while risk of death decreased by 3.6% for each visit received per month ($p < .05$) and by 0.1% for each additional day spent in segregation of any type ($p < .05$). The risk of death was about 21% higher among those released to the Twin Cities metropolitan area than those released to Greater Minnesota ($p < .01$), while it was about 43% lower for those released to community programs such as work release or CIP ($p < .001$) than those released to standard supervision.

Table 3. Cox Regression Models Predicting All-Cause Mortality After Release from Prison

	<i>Full sample</i> (<i>N</i> = 36,704)	<i>White</i> (<i>N</i> = 19,958)	<i>Black</i> (<i>N</i> = 10,091)	<i>Native American</i> (<i>N</i> = 3,548)	<i>z1</i>	<i>z2</i>	<i>z3</i>
Asian	0.545 (0.263)*	---	---	---	---	---	---
Black	0.659 (0.072)***	---	---	---	---	---	---
Latino	0.414 (0.165)***	---	---	---	---	---	---
Native American	1.461 (0.081)***	---	---	---	---	---	---
Female	0.936 (0.083)	0.898 (0.109)	0.894 (0.229)	1.088 (0.183)	0.02	-0.90	-0.68
High school diploma/GED	0.988 (0.063)	1.048 (0.092)	0.939 (0.115)	0.724 (0.152)*	0.75	2.08*	1.36
STG affiliation	1.213 (0.077)*	1.013 (0.128)	1.222 (0.126)	1.733 (0.182)**	-1.04	-2.41*	-1.58
Age at release	1.040 (0.003)***	1.041 (0.003)***	1.035 (0.006)***	1.034 (0.008)***	0.89	.094	0.20
Mental health concerns	1.055 (0.027)*	1.063 (0.034)	0.991 (0.062)	1.036 (0.073)	0.99	.032	-0.46
Physical health concerns	1.274 (0.027)***	1.337 (0.035)***	1.160 (0.056)**	1.184 (0.078)*	2.14*	1.42	-0.21
BMI	1.015 (0.005)**	1.016 (0.006)*	1.018 (0.009)*	1.018 (0.013)	-0.28	-0.21	0.00
Sexual offense	0.476 (0.128)***	0.447 (0.160)***	0.518 (0.285)*	0.656 (0.393)	-0.45	-0.90	-0.49
Property offense	1.007 (0.083)	0.821 (0.113)	1.252 (0.161)	1.218 (0.208)	-2.15*	-0.66	0.11
Drug offense	1.087 (0.076)	0.960 (0.102)	1.291 (0.149)	1.469 (0.208)	-1.64	-1.83	-0.50
DWI offense	1.277 (0.103)*	1.313 (0.127)*	0.781 (0.338)	1.290 (0.259)	1.44	0.07	-1.18
Other offense type	0.946 (0.098)	0.833 (0.137)	1.262 (0.170)	0.681 (0.292)	-1.91	0.63	1.83
New commitment	0.816 (0.074)**	0.889 (0.098)	0.807 (0.144)	0.724 (0.197)	0.55	0.93	0.45
Any program participation	1.012 (0.065)	1.027 (0.085)	0.941 (0.136)	1.147 (0.170)	0.54	-0.58	-0.90
Prior prison admissions	1.019 (0.011)	1.047 (0.016)**	0.995 (0.022)	1.013 (0.028)	1.87	1.02	-0.51
Length of stay (months)	0.997 (0.001)*	0.998 (0.001)	0.996 (0.003)	0.997 (0.004)	0.63	0.24	-0.20
Discipline convictions	1.014 (0.003)***	1.010 (0.007)	1.014 (0.005)**	1.024 (0.009)*	-0.46	-1.23	-0.97
Visits per month	0.964 (0.014)*	0.948 (0.019)**	0.996 (0.023)	0.983 (0.053)	-1.64	-0.64	0.23
Days in segregation	0.999 (0.000)*	0.999 (0.001)	0.999 (0.001)	0.999 (0.001)	0.00	0.00	0.00
Health service visits	1.013 (0.004)**	1.011 (0.005)*	1.011 (0.016)	1.013 (0.011)	0.00	-0.17	-0.10
Twin Cities metro	1.212 (0.058)**	1.179 (0.073)*	1.357 (0.141)*	1.204 (0.158)	-0.88	-0.12	0.56
Program release	0.569 (0.102)***	0.570 (0.125)***	0.510 (0.226)**	0.500 (0.377)	0.43	0.33	0.05
ISR	1.014 (0.093)	0.904 (0.653)	1.252 (0.173)	1.004 (0.250)	-1.52	-0.38	0.72
Discharge	0.946 (0.085)	0.932 (0.116)	0.827 (0.168)	0.987 (0.211)	0.59	-0.24	-0.66
Release year	0.987 (0.012)	0.975 (0.016)	0.996 (0.024)	0.989 (0.031)	-0.73	-0.40	0.18

z1 = White-Black, *z2*=White-Native American, *z3* = Black-Native American. ****p* < .001, ***p* < .01, **p* < .05

Table 3 also displays the results of Cox regression models using subsamples of White, Black, and Native American releasees. The three columns on the right show z scores calculated using the equality of coefficients test. A couple of notable racial differences in risk factors for all-cause mortality were observed. First, among Native Americans, risk of death after release from prison was 28% lower among those who had a high school diploma or GED at the time of release ($p < .05$); this coefficient was significantly different from that calculated for White individuals ($z = 2.08, p < .05$). Second, STG affiliation was more predictive of death among Native American individuals than among White individuals ($z = -2.41, p < .05$). Third, physical health appeared to be more strongly related to all-cause mortality for White individuals than it was among Black individuals ($z = 2.11, p < .05$).

Natural deaths. Table 4 shows the results of the Cox regression models predicting natural deaths. Among the full sample of releasees, several variables were associated with risk of natural death. Compared to White individuals, Black individuals had 38% lower risk of natural death ($p < .001$) while Native American individuals had 38% higher risk of natural death ($p < .05$). Women had 34% higher risk of natural death than men ($p < .05$). Risk of natural death increased by 10.1% for each additional year of age ($p < .001$), 45% for each additional physical health problem noted in COMS ($p < .001$), and 2.9% for each additional point on the BMI scale ($p < .001$). Compared to non-sexual violent offenses, those incarcerated for sex offenses had 40% lower risk of natural death ($p < .01$) and those incarcerated for DWI offenses had 47% higher risk of natural death ($p < .05$). Risk of natural death increased by 4.7% for each prior prison admission ($p < .01$), by 1.3% for each additional discipline conviction, and by 1.1% for each average health services visit per month while incarcerated ($p < .05$) but decreased by 0.5% for each additional month incarcerated during the most recent prison stay ($p < .01$) and by 7% for each additional visit received per month

Table 4. Cox Regression Models Predicting Natural Death After Release from Prison

	<i>Full sample</i> (<i>N</i> = 35,812)	<i>White</i> (<i>N</i> = 19,463)	<i>Black</i> (<i>N</i> = 9,860)	<i>Native American</i> (<i>N</i> = 3,413)	<i>z1</i>	<i>z2</i>	<i>z3</i>
Asian	1.094 (0.417)	---	---	---	---	---	---
Black	0.619 (0.121)***	---	---	---	---	---	---
Latino	0.618 (0.248)	---	---	---	---	---	---
Native American	1.377 (0.136)*	---	---	---	---	---	---
Female	1.340 (0.133)*	1.389 (0.168)	0.805 (0.417)	1.683 (0.322)	1.21	-0.53	-1.40
High school diploma/GED	0.893 (0.099)	0.955 (0.138)	0.861 (0.193)	0.627 (0.254)	0.43	1.46	1.00
STG affiliation	0.777 (0.157)	0.882 (0.233)	0.655 (0.269)	1.253 (0.404)	0.84	-0.75	-1.34
Age at release	1.101 (0.004)***	1.098 (0.005)***	1.103 (0.010)***	1.117 (0.013)***	-0.45	-1.22	-0.73
Mental health concerns	1.023 (0.042)	1.050 (0.052)	0.953 (0.099)	0.970 (0.120)	0.86	0.60	-0.11
Physical health concerns	1.451 (0.036)***	1.511 (0.047)***	1.303 (0.077)**	1.355 (0.112)**	1.63	0.89	-0.29
BMI	1.029 (0.007)***	1.032 (0.009)**	1.022 (0.015)	1.059 (0.022)*	0.57	-1.05	-1.31
Sexual offense	0.592 (0.175)**	0.544 (0.219)**	0.976 (0.373)	0.720 (0.564)	-1.35	-0.46	0.45
Property offense	0.974 (0.143)	0.807 (0.194)	1.161 (0.280)	1.014 (0.392)	-1.07	-0.52	0.28
Drug offense	1.044 (0.131)	0.911 (0.173)	1.207 (0.267)	1.473 (0.389)	-0.88	-1.13	-0.42
DWI offense	1.467 (0.153)*	1.516 (0.191)*	1.369 (0.431)	1.108 (0.413)	0.22	0.69	0.36
Other offense type	1.113 (0.157)	1.174 (0.199)	1.286 (0.325)	0.623 (0.560)	-0.24	1.07	1.12
New commitment	0.838 (0.116)	0.899 (0.147)	0.906 (0.257)	0.640 (0.339)	-0.03	0.92	0.82
Any program participation	1.116 (0.104)	1.111 (0.132)	1.048 (0.235)	1.673 (0.310)	0.22	-1.21	-1.20
Prior prison admissions	1.047 (0.017)**	1.065 (0.025)*	1.033 (0.031)	1.018 (0.049)	0.78	0.82	0.24
Length of stay (months)	0.995 (0.002)**	0.995 (0.002)**	0.996 (0.004)	0.989 (0.008)	-0.22	0.73	0.78
Discipline convictions	1.013 (0.007)*	1.008 (0.010)	1.016 (0.010)	1.025 (0.015)	-0.57	-0.89	-0.44
Visits per month	0.931 (0.030)*	0.925 (0.037)*	0.925 (0.069)	0.948 (0.122)	0.00	-0.20	-0.18
Days in segregation	1.000 (0.001)	1.000 (0.001)	0.999 (0.001)	0.998 (0.002)	0.71	0.89	0.45
Health service visits	1.011 (0.004)*	1.008 (0.005)	1.039 (0.017)*	1.024 (0.014)	-1.75	-1.08	0.68
Twin Cities metro	1.081 (0.093)	1.010 (0.116)	1.219 (0.239)	1.231 (0.279)	-0.71	-0.66	-0.03
Program release	0.602 (0.173)**	0.550 (0.211)**	0.759 (0.359)	0.487 (0.744)	-0.77	0.16	0.54
ISR	1.050 (0.143)	0.877 (0.181)	1.317 (0.295)	1.319 (0.429)	-1.18	-0.88	0.00
Discharge	0.942 (0.136)	0.790 (0.184)	0.857 (0.298)	1.242 (0.366)	-0.23	-1.11	-0.79
Release year	0.962 (0.021)	0.967 (0.027)	0.936 (0.046)	0.965 (0.059)	0.60	0.03	-0.40

z1 = White-Black, *z2*=White-Native American, *z3* = Black-Native American. ****p* < .001, ***p* < .01, **p* < .05

($p < .05$). Finally, those released to community programs had 40% lower risk of death than those released on standard supervision ($p < .01$).

The race-specific models showed that several variables were only significantly related to natural death when examining White individuals (e.g., offense type, prior admissions, length of stay, visitation, release type). However, the equality of coefficients tests presented in Table 4 show no significant differences in the coefficients calculated for each racial group. Therefore, it is possible the lack of statistical significance for these variables among Black or Native American individuals could be due to the smaller sample sizes available for those analyses.

Unnatural deaths. Table 5 displays the results of the Cox regression models predicting unnatural deaths, which include homicides, suicides, and accidents. The left column shows results for the full sample of releasees. Compared to White individuals, Asian people had 64% lower risk of unnatural death ($p < .01$), Black individuals had 35% lower risk ($p < .001$), and Latino or Hispanic individuals had 66% lower risk ($p < .001$), while Native American people had 47% higher risk of unnatural death ($p < .001$). Women's risk of unnatural death was 20% lower than men's. Those with known STG affiliations had 38% higher risk of death by unnatural causes ($p < .01$). Risk of unnatural death increased by 12.6% for each additional mental health issue recorded in COMS ($p < .01$) and 10.5% for each additional physical health diagnosis ($p < .05$). Those incarcerated for sexual offenses had 67% lower risk of death compared to those incarcerated for non-sexual violent offenses ($p < .001$). Risk of unnatural death increased by 4.3% for each prior prison admission ($p < .01$) and by 1.3% for each additional conviction for institutional misconduct ($p < .01$), while risk was 19% lower among those incarcerated for a new offense than for those incarcerated after violating supervised release ($p < .05$). Individuals released to the Twin Cities Metropolitan area had 36% higher risk of death than those released to Greater Minnesota ($p < .001$),

Table 5. Cox Regression Models Predicting Unnatural Death After Release from Prison

	<i>Full sample</i> (<i>N</i> = 36,094)	<i>White</i> (<i>N</i> = 19,590)	<i>Black</i> (<i>N</i> = 9,955)	<i>Native American</i> (<i>N</i> = 3,468)	<i>z1</i>	<i>z2</i>	<i>z3</i>
Asian	0.357 (0.360)**	---	---	---	---	---	---
Black	0.647 (0.094)***	---	---	---	---	---	---
Latino	0.339 (0.227)***	---	---	---	---	---	---
Native American	1.467 (0.105)***	---	---	---	---	---	---
Female	0.800 (0.111)*	0.684 (0.150)*	1.031 (0.279)	1.035 (0.233)	-1.30	-1.50	-1.40
High school diploma/GED	1.133 (0.085)	1.173 (0.128)	1.156 (0.153)	0.790 (0.198)	0.07	1.68	1.00
STG affiliation	1.378 (0.093)**	1.039 (0.157)	1.514 (0.156)**	2.008 (0.219)**	-1.70	-2.44*	-1.34
Age at release	0.996 (0.004)	1.000 (0.005)	0.995 (0.008)	0.981 (0.012)	0.53	1.46	-0.73
Mental health concerns	1.126 (0.036)**	1.119 (0.047)*	1.072 (0.082)	1.111 (0.093)	0.45	0.07	-0.11
Physical health concerns	1.105 (0.043)*	1.207 (0.055)**	0.924 (0.095)	1.035 (0.116)	2.43*	1.20	-0.29
BMI	1.012 (0.006)	1.009 (0.009)	1.022 (0.012)	1.009 (0.016)	-0.87	0.00	-1.31
Sexual offense	0.332 (0.209)***	0.312 (0.255)***	0.288 (0.523)*	0.522 (0.611)	0.14	-0.78	0.45
Property offense	0.979 (0.104)	0.787 (0.142)	1.238 (0.203)	1.245 (0.255)	-1.83	-1.57	0.28
Drug offense	1.096 (0.097)	0.993 (0.130)	1.360 (0.189)	1.333 (0.257)	-1.37	-1.02	-0.42
DWI offense	1.160 (0.148)	1.212 (0.180)	0.319 (0.724)	1.285 (0.366)	1.79	-0.14	0.36
Other offense type	0.807 (0.129)	0.585 (0.202)**	1.236 (0.204)	0.637 (0.358)	-2.61*	-0.21	1.12
New commitment	0.814 (0.097)*	0.882 (0.134)	0.834 (0.184)	0.761 (0.254)	0.24	0.52	0.82
Any program participation	0.989 (0.085)	1.001 (0.113)	0.951 (0.174)	0.989 (0.215)	0.25	0.05	-1.20
Prior prison admissions	1.043 (0.015)**	1.070 (0.021)**	1.021 (0.030)	1.048 (0.035)	1.26	0.49	0.24
Length of stay (months)	0.999 (0.002)	0.999 (0.002)	0.992 (0.005)	1.001 (0.005)	1.30	-0.37	0.78
Discipline convictions	1.013 (0.004)*	1.014 (0.009)	1.014 (0.006)*	1.024 (0.014)	0.00	-0.60	-0.44
Visits per month	0.970 (0.017)	0.953 (0.023)*	1.002 (0.026)	1.002 (0.057)	-1.47	-0.83	-0.18
Days in segregation	0.999 (0.000)	0.999 (0.001)	1.000 (0.001)	0.999 (0.001)	-0.71	0.00	0.45
Health service visits	1.007 (0.009)	1.004 (0.012)	0.986 (0.027)	1.009 (0.016)	0.61	-0.20	0.68
Twin Cities metro	1.358 (0.076)***	1.348 (0.096)**	1.553 (0.186)*	1.136 (0.204)	-0.67	0.76	-0.03
Program release	0.602 (0.130)***	0.632 (0.157)**	0.445 (0.304)**	0.531 (0.479)	1.03	0.35	0.54
ISR	0.827 (0.130)	0.784 (0.185)	0.987 (0.237)	0.756 (0.322)	-0.76	0.10	0.00
Discharge	0.910 (0.111)	1.020 (0.153)	0.823 (0.210)	0.746 (0.273)	0.83	1.00	-0.79
Release year	0.994 (0.015)	0.967 (0.020)	1.044 (0.030)	0.992 (0.038)	-2.11*	-0.58	-0.40

z1 = White-Black, *z2*=White-Native American, *z3* = Black-Native American. ****p* < .001, ***p* < .01, **p* < .05

while those released to community programs had 40% lower risk of death than those released to standard supervision ($p < .001$).

The results of the race-specific models showed notable differences in coefficients predicting unnatural death across racial groups. First, STG affiliation was not associated with risk of unnatural death among White individuals but was related to higher risk among Black and Native American individuals; this coefficient was significantly different when comparing the White and Native American analyses ($z = -2.44, p < .05$). Second, the number of physical health diagnoses noted in COMS was only significantly associated with risk of unnatural death among White individuals; this coefficient was significantly different from that calculated for Black individuals ($z = 2.43, p < .05$). Third, among the White subsample, those incarcerated for miscellaneous offense types had 41% lower risk of unnatural death than those incarcerated for person offenses; this coefficient was significantly different from the coefficient calculated for Black individuals ($z = -2.71, p < .05$).

DISCUSSION

While a number of studies have demonstrated that incarceration increases risk for mortality (e.g., Jones et al., 2017; Kariminia et al., 2007; Kinner et al., 2012), fewer have examined factors that increase or decrease risk among the formerly incarcerated (e.g., Testa et al., 2018). This study served as an external replication of that growing body of work while further contributing to the literature by (1) including an expanded number of incarceration-related predictors, (2) using these predictors to examine all-cause mortality as well as deaths by natural and unnatural causes, and (3) testing for differences in risk factors for post-release mortality across White, Black, and Native American releasees. The results confirmed that both all-cause mortality and mortality due to specific causes of death were much higher among individuals released from state prison than

among the general population.

A large body of research shows that racial and ethnic minority groups face more difficult barriers to reentry than their White peers (e.g., Benson et al., 2011; Olusanya & Cancino, 2012; Pager et al., 2009; Walker et al., 2007; Wheelock, 2005). However, as with prior research (Binswanger et al., 2007; 2011a; 2013; Pizzicato et al., 2018; Rosen et al., 2008; Spaulding et al., 2011; Testa et al., 2018), we found that post-release mortality was significantly lower among Black, Latino, and Asian people than among White people. Compared to White releasees, risk of death was 34-38% lower among Black releasees, 59-66% lower among Latino releasees, and 45-64% lower among Asian releasees. It has been suggested that, because non-White people are more likely to be reincarcerated (e.g., Durose et al., 2014; McGovern et al., 2009; Veeh et al., 2018), and mortality may be less likely to occur while incarcerated (Dumont et al., 2013; Massoglia & Pridemore, 2015; Patterson, 2010; Wildeman et al., 2016), White people who are released from prison may have additional exposure time in the community during which they are at risk of dying. On the other hand, given racial and ethnic disparities in health care in the general population (e.g., Harris et al., 1997; Wenneker et al., 1989), the reduction in access to or quality of health care to a greater extent after being incarcerated could be more pronounced among White people (see Binswanger et al., 2011b).

However, the analyses also showed that Native American releasees had 38-47% higher risk of death than White people, depending upon the manner of death examined. Prior research outside the prison context has also shown worse mortality outcomes for indigenous people (e.g., Arias et al., 2021; Kunitz, 1994). Scholars have tied this higher mortality rate among Native Americans to other disparities among the indigenous population, such as lower levels of education, income, and employment; a higher prevalence of behaviors associated with premature mortality (such as

substance use, lack of physical activity, and not using seatbelts); lower health care participation including cancer screenings, having a personal doctor or health care provider, and forming a health plan; and higher rates of violence (e.g., Adakai et al., 2018; Beauvais, 1998; Cobb et al., 2014; Perry, 2004). Prior research on reentry among Native Americans implies the barriers to reentry are exacerbated by poor economic conditions within reservation communities, although they may have greater access to social services when returning to reservation communities (Wodahl & Freng, 2017).

In addition, as with previous research (e.g., Testa et al., 2018), this study revealed some notable racial differences in risk factors for mortality after release from prison. First, while age was positively associated with all-cause mortality and natural deaths among all three racial groups, it was significantly related to lower risk of unnatural death only among Native American people. This suggests that the higher risk of mortality among Native American people may be partially attributable to higher mortality among younger Native Americans. Future comparative life-course research may help to inform this interaction between race/ethnicity and age. Second, STG affiliation was less predictive of death among White individuals and was most predictive among Native Americans. While this may be due to differences between predominantly White, Black, and Native American gangs, it is also possible there could be racial differences in the effect of antisocial peers on health outcomes. We suggest additional research on how gang activity relates to reentry and health, as well as incorporating other measures of involvement with antisocial peers. Third, having a high school diploma or GED was related to lower risk of all-cause mortality among Native American people, but was not significantly associated with death among White or Black individuals. When examining racial differences in risk factors for violent victimization in prison, McNeeley (2022) also found that possessing a secondary education operated differently for Native

American individuals. More research into educational achievement and its effects among Native Americans is needed.

This is the first study to explore the relationship between prison visits and post-release mortality, finding that visits were protective. The importance of social support during reentry has been established in the literature (La Vigne et al., 2006; Mears & Cochran, 2015). Consistently, visitation while incarcerated is associated with positive outcomes after release, such as lower recidivism (Bales & Mears, 2008; Cochran, 2014; Duwe & Clark, 2013; Duwe & McNeeley, 2021; McNeeley & Duwe, 2020; Mears et al., 2012; Mitchell et al., 2016) and higher chances of finding employment (Duwe & Clark, 2017b; Fahmy et al., 2022). The relationship between prison visitation and post-release mortality suggests that – in addition to the myriad benefits visits were already known to provide to incarcerated people – policies that expand visitation could also result in lower mortality rates. Because past research has shown that the effects of visitation can vary based on several factors, such as the individual’s relationship to the visitor, the visitors’ distance from the prison, or the conditions of confinement (Duwe & Clark, 2013; McNeeley & Duwe, 2020; Turanovic & Tasca, 2022), more research on the link between visitation and post-release mortality is warranted.

As with prior research on mortality outside the context of incarceration (Ding et al., 2015; Piquero et al., 2014; Shepherd et al., 2009) as well as among formerly incarcerated populations (Kariminia et al., 2007; Testa et al., 2018), indicators of past antisocial behavior and criminal history were associated with post-release mortality. In particular, risk of death was higher among those with more prior prison admissions, those incarcerated for supervised release revocations, those with more discipline convictions, and those known to be affiliated with security threat groups. These factors were especially important predictors of unnatural deaths, which included

accidents, homicides, and suicides. In addition to being markers for future antisocial behavior, these factors may also help identify people at risk for other negative outcomes, such as non-fatal violent victimization (Labrecque et al., 2014; Labrecque et al., 2018; Logan & McNeeley, 2022; McCafferty & Scherer, 2017) and death during or after incarceration. However, individuals who were incarcerated for longer periods of time had *lower* risk of post-release mortality. Scholars have suggested incarceration can improve health among the justice-involved population, as access to health care can actually increase while in prison (Massoglia & Pridemore, 2015; Patterson, 2010; Wildeman et al., 2016).

Prior research suggested being released without supervision increases mortality (Binswanger et al., 2013), while other studies showed no relationship between community supervision and post-release mortality (Testa et al., 2018). The current study provides a more nuanced examination of this relationship. While those discharged from prison with no supervision were no more or less likely to die compared to those under standard supervision, the analyses did show that those released to community programs such as CIP or work release – which involve closer supervision and higher standards of compliance than standard supervision- had significantly lower risk of both natural and unnatural death, as well as all-cause mortality. This could be due to the additional observation beyond that provided by standard supervision, which could have resulted in early detection of physical or other problems that could otherwise have led to death. On the other hand, these programs may provide social support or other resources that facilitate accessing health care. Finally, an alternative explanation may be that these programs tend to have high revocation rates (e.g., Clark, 2016). If it is true that incarceration sometimes leads to benefits in terms of health and mortality (Massoglia & Pridemore, 2015; Patterson, 2010; Wildeman et al., 2016), it is possible that individuals participating in community programs may have been less

likely to die because they were more likely to return to prison and may have done so more quickly.

We were also able to account for indicators of mental and physical health problems, as well as to explore the relationship between receiving health care while incarcerated and post-release mortality. Consistent with prior research (Kariminia et al., 2007; Pizzicato et al., 2018; Testa et al., 2018), mental health concerns were associated with risk of death by unnatural causes, which points to a need to expand mental health care while incarcerated. Physical health concerns were also consistently positively related with risk of death, as was BMI. Both in regard to physical health and mental health, the results emphasize the need to ensure continuum of care from the facility into the community after release, especially for individuals with known health conditions or risk factors for later health problems. Notably, physical health diagnoses were more strongly predictive of death among White individuals than among Black or Native American releasees. It is possible that illnesses are more likely to be accurately diagnosed among White people because of disparities in access to or quality of health care (e.g., Richardson & Norris, 2010; Smedley et al., 2002), leading these diagnoses to be more strongly associated with subsequent death. More research on screening for and treating health problems in prisons and during reentry to the community is needed to help unpack this finding. In addition, those who received more health service visits were more likely to die, especially of natural causes. This is logical, as those with serious health problems are likely to require more health care resources, but it could also indicate a need for improvements in preventative care in correctional facilities. Indeed, about 9% of the sample had no recorded visits with health services.

The results did not confirm some relationships observed in past research. First, although a couple of prior studies found those who spent time in restrictive housing were more likely to die after release from prison, especially of unnatural causes (Brinkley-Rubenstein et al., 2019;

Wildeman & Andersen, 2020), this study found a small but statistically significant protective effect of time spent in segregation on all-cause mortality. This contradictory finding warrants further research. Second, prior research showed male releasees were at greater risk of mortality (Binswanger et al., 2007; 2013; Testa et al., 2018). Our cause-of-death-specific analyses showed that this pattern may be more nuanced than suggested by previous research. Although women had lower risk of death by unnatural causes—consistent with previous research—women’s risk of death by natural causes was 34% higher than that of men. More research is needed to understand how gender shapes risk of death among those released from prison. Third, our binary measure of participation in programming (e.g., education or vocational programming, substance use disorder treatment, sex offender treatment, cognitive-behavioral treatment) was not associated with post-release mortality. However, future research should examine unique effects of different types of programs. For example, scholars have examined whether those who participate in drug treatment have better outcomes in terms of mortality, with mixed results (Kearley et al., 2019; Lloyd et al., 2017). Likewise, future research should evaluate whether the timing and duration of programming has an impact on post-release mortality.

As with all research, this study has limitations that must be acknowledged. First, death data were obtained from the Minnesota Department of Health; therefore, it is possible that some individuals who died in other states were counted as survivors in the analyses reported here. We attempted to account for this by removing those who were released to other states, but additional deaths might have occurred outside of Minnesota. Second, notwithstanding the measures included for community program participation and the type and location of release from prison, the data available on post-release, community-based risk factors were somewhat limited. Third, there was an insufficient number of events to predict the specific types of unnatural deaths (i.e., homicide,

suicide, accident) with the models used here. However, given the substantial variation between these categories, it is important for future research to examine factors associated with risk of these causes of death. Finally, death data were collected before the COVID-19 pandemic; therefore, we were unable to examine risk factors for COVID-19 death among those released from prison.

The results point to several avenues for future research. First, continuing to study post-release mortality in other states and countries with different correctional practices will better inform how incarceration impacts health outcomes, as well as what changes can be made to reduce those impacts. Second, compared to those incarcerated for violent offenses, risk of both natural and unnatural death was lower among individuals incarcerated for sexual offenses. More research is needed to identify aspects of reentry among those with sexual offense histories that might contribute to lower risk for mortality. Third, there is a great deal of variation in reentry experiences for formerly incarcerated individuals. Future research should continue to examine how differences in the reentry experience can impact health outcomes, especially mortality. Fourth, while this study was able to incorporate many aspects of the incarceration experiences, more detailed measures examining how people spend their time in prison – for example, time spent working or in treatment compared to idle time – may provide additional insights into risk of death during reentry.

Finally, the results regarding visitation as well as those regarding community programs suggest that social support may improve health outcomes such as mortality. Social support from family during reentry has been shown to lead to better health outcomes (Fahmy & Wallace, 2019), and social support from supervision agents and mentors has also been linked to better reentry outcomes (Bares & Mowen, 2020; Kjellstrand et al., 2023). Given prior arguments that social capital available to White releasees might mitigate the barriers to successful reentry (Olusanya & Cancino, 2012), it is notable that visitation was greater among White releasees and that a greater

proportion of White people were released to community programs compared to Black and Native American releasees. Consequently, while not definitive due to a lack of significantly different coefficients, the race-specific models suggested these relationships could have been stronger among White individuals. More research examining the link between social support and risk of death after release from prison, as well as how social support during incarceration and reentry may vary across racial/ethnic groups, is warranted.

The results also have important implications for policy. First, correctional agencies should work to strengthen health care and, most importantly, to establish a continuum of care from the facility to the community. As a start, supervision agents may be able to encourage and assist their clients in locating and accessing health care providers. Second, policies and conditions that promote and facilitate visits from friends and family, as well as other measures that improve social support, could have long-lasting health benefits. Third, it may be useful to target health-focused interventions toward those with more extensive criminal histories, those with records of institutional misconduct, and those known to be affiliated with gangs. Finally, our findings regarding race suggest that cultural competency training for correctional health care workers could help to ameliorate any racial/ethnic disparities that might exist in quality of health care. Relatedly, those designing interventions meant to improve health among incarcerated or formerly incarcerated people must carefully consider how race and ethnicity may interact with their proposed strategies. In particular, among the Native American population, involvement in traditional cultural activities may be protective against the negative aspects of incarceration and reentry that might increase risk of post-release mortality (Wodahl & Freng, 2017).

REFERENCES

- Adakai, M., Sandoval-Rosario, M., Xu, F., Aseret-Manygoats, T., Allison, M., Greenlund, K. J., & Barbour, K. E. (2018). Health disparities among American Indians/Alaska Natives – Arizona, 2017. *Morbidity and Mortality Weekly Report*, 67(47): 1314-1318. <http://dx.doi.org/10.15585/mmwr.mm6747a4>
- Arias, E., Xu, J., Curtin, S., Bastian, B., & Tejada-Vera, B. (2021). *Mortality profile of the non-Hispanic American Indian or Alaska Native population, 2019. National Vital Statistics Reports; vol 70 no 12*. National Center for Health Statistics.
- Bales, W. D., & Mears, D. P. (2008). Inmate social ties and the transition to society: Does visitation reduce recidivism? *Journal of Research in Crime and Delinquency*, 45(3): 287–321.
- Bares, K. J., & Mowen, T. J. (2020). Examining the parole officer as a mechanism of social support during reentry from prison. *Crime & Delinquency*, 66(6-7): 1023-1051. <https://doi.org/10.1177/0011128719881599>
- Beauvais, F. (1998). American Indians and alcohol. *Alcohol Health and Research World*, 22(4): 253-259.
- Benson, M. L., Alarid, L. F., Burton, V. S., & Cullen, F. T. (2011). Reintegration or stigmatization? Offenders' expectations of community re-entry. *Journal of Criminal Justice*, 39(5): 385-393. <https://doi.org/10.1016/j.jcrimjus.2011.05.004>
- Binswanger, I. A., Blatchford, P. J., Lindsay, R. G., & Stern, M. F. (2011). Risk factors for all-cause, overdose and early deaths after release from prison in Washington state. *Drug and Alcohol Dependence*, 117(1), 1-6.
- Binswanger, I. A., Blatchford, P. J., Mueller, S. R., & Stern, M. F. (2013). Mortality after prison release: Opioid overdose and other causes of death, risk factors, and time trends from 1999 to 2009. *Annals of Internal Medicine*, 159(9), 592-600.
- Binswanger, I. A., Krueger, P. M., & Steiner, J. F. (2009). Prevalence of chronic medical conditions among jail and prison inmates in the USA compared with the general population. *Journal of Epidemiology & Community Health*, 63(11), 912-919.
- Binswanger, I. A., Redmond, N., Steiner, J. F., & Hicks, L. S. (2011). Health disparities and the criminal justice system: An agenda for further research and action. *Journal of Urban Health*, 89(1): 98-107. <https://doi.org/10.1007%2Fs11524-011-9614-1>
- Binswanger, I. A., Stern, M. F., Deyo, R. A., Heagerty, P. J., Cheadle, A., Elmore, J. G., & Koepsell, T. D. (2007). Release from prison—a high risk of death for former inmates. *New England Journal of Medicine*, 356(2), 157-165.
- Bird, S. M., & Hutchinson, S. J. (2003). Male drugs-related deaths in the fortnight after release from prison: Scotland, 1996–99. *Addiction*, 98(2), 185-190.

- Braman, D. (2004). *Doing time on the outside: Incarceration and family life in urban America*. University of Michigan Press.
- Brinkley-Rubinstein, L., Sivaraman, J., Rosen, D. L., Cloud, D. H., Junker, G., Proescholdbell, S., Shanahan, M. E., & Ranapurwala, S. I. (2019). Association of restrictive housing during incarceration with mortality after release. *JAMA Network Open*, 2(10), e1912516. <https://doi.org/10.1001/jamanetworkopen.2019.12516>
- Bronson, J., Stroop, J., Zimmer, S., & Berzofsky, M. (2017). *Drug use, dependence, and abuse among state prisoners and jail inmates, 2007–2009*. United States Department of Justice, Office of Juvenile Justice and Delinquency Prevention.
- Carson, E. A. (2021a). *Mortality in State and Federal Prisons, 2001–2018–Statistical Tables*. Bureau of Justice Statistics.
- Carson, A. (2021b). *Prisoners in 2020*. Bureau of Justice Statistics. Accessed at: <https://bjs.ojp.gov/content/pub/pdf/p20st.pdf>
- Carson, E. A., & Cowhig, M. P. (2020). *Mortality in state and federal prisons, 2001–2016 statistical tables*. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.
- Christensen, P. B., Hammerby, E., Smith, E., & Bird, S. M. (2006). Mortality among Danish drug users released from prison. *International Journal of Prisoner Health*, 2(1): 13-19.
- Clark, V. A. (2016). Predicting two types of recidivism among newly released prisoners: First addresses as “launch pads” for recidivism or reentry success. *Crime & Delinquency*, 62(10): 1364-1400.
- Clear, T., Rose, D., Waring, E., & Scully, K. (2003). Coercive mobility and crime: A preliminary examination of concentrated incarceration and social disorganization. *Justice Quarterly*, 20(1): 33-64.
- Cobb, N., Espey, D., & King, J. (2014). Health behaviors and risk factors among American Indians and Alaska Natives, 2000-2010. *American Journal of Public Health*, 104(Supplement 3): S481-S489. <https://doi.org/10.2105%2FAJPH.2014.301879>
- Cochran, J. C. (2014). Breaches in the wall: Imprisonment, social support and recidivism. *Journal of Research in Crime and Delinquency*, 51(2): 200–229.
- Ding, D., Rogers, K., van der Ploeg, H., Stamatakis, E., & Bauman, A. E. (2015). Traditional and emerging lifestyle risk behaviors and all-cause mortality in middle-aged and older adults: Evidence from a large population-based Australian cohort. *PLoS Medicine*, 12: e1001917.
- Dumont, D. M., Allen, S. A., Brockmann, B. W., Alexander, N. E., & Rich, J. D. (). Incarceration, community health, and racial disparities. *Journal of Health Care for the Poor and Underserved*, 24(1): 78-88.

- Durose, M. R., Cooper, A. D., & Snyder, H. N. (2014). *Recidivism of prisoners released in 30 states in 2005: Patterns from 2005 to 2010* (NCJ 244205) (Special report). Bureau of Justice Statistics.
- Duwe, G., & Clark, V. (2013). Blessed be the social tie that binds the effects of prison visitation on offender recidivism. *Criminal Justice Policy Review*, 24(3): 271–296.
- Duwe, G., & Clark, V. (2017a). The rehabilitative ideal versus the criminogenic reality: The consequences of warehousing prisoners. *Corrections: Policy, Practice and Research*, 2(1), 41–69.
- Duwe, G., & Clark, V. A. (2017b). Nothing will work unless you did: The predictors of postprison employment. *Criminal Justice and Behavior*, 44, 5, 657-677.
- Duwe, G., & McNeeley, S. (2021). Just as good as the real thing? The effects of prison video visitation on recidivism. *Crime & Delinquency*, 67(4): 475-497.
- Fahmy, C., Gricius, M., Chameralain, A. W., & Wallace, D. (2022). Prison visitation and the likelihood of post-release employment. *Crime & Delinquency*, 68(12): 2200-2224.
- Fahmy, C., & Wallace, D. (2019). The influence of familial social support on physical health during reentry. *Criminal Justice and Behavior*, 46(12): 1738-1756.
<https://doi.org/10.1177/0093854819870268>
- Farrell, M., & Marsden, J. (2008). Acute risk of drug-related death among newly released prisoners in England and Wales. *Addiction*, 103(2), 251-255.
- Fazel, S., & Baillargeon, J. (2011). The health of prisoners. *The Lancet*, 377(9769), 956-965.
- Federal Bureau of Investigation. (2020). *Crime in the United States, 2019*. Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019/topic-pages/tables/table-4>.
- Geller, A., & Curtis, M. A. (2011). A sort of homecoming: Incarceration and the housing security of urban men. *Social Science Research*, 40, 1196–1213.
- Gottfredson, M. G. (1981). On the etiology of criminal victimization. *Journal of Criminal Law and Criminology*, 72, 714–726
- Graham, A. (2003). Post-prison mortality: Unnatural death among people released from Victorian prisons between January 1990 and December 1999. *The Australian and New Zealand Journal of Criminology*, 36(1): 94-108.
- Harding, D. J., Morenoff, J. D., & Herbert, C. W. (2013). Home is hard to find: Neighborhoods, institutions, and the residential trajectories of returning prisoners. *The Annals of the American Academy of Political and Social Science*, 647(1), 214-236.
- Harding-Pink, D. (1990). Mortality following release from prison. *Medicine, Science and the*

Law, 30(1), 12-16.

- Harding-Pink, D., & Fryc, O. (1988). Risk of death after release from prison: a duty to warn. *BMJ: British Medical Journal*, 297(6648), 596.
- Harris, D.R., Andrews, R., & Elixhauser, A. (1997). Racial and gender differences in use of procedures for Black and White hospitalized adults. *Ethnicity and Disease*, 7(2):91-105.
- James, D. J., & Glaze, L. E. (2006). Mental health problems of prison and jail inmates. Washington, DC: Bureau of Justice Statistics.
- Jennings, W. G., Piquero, A. R., & Reingle, J. M. (2012). On the overlap between victimization and offending: A review of the literature. *Aggression and violent behavior*, 17(1), 16-26.
- Jones, M., Kearney, J. D., Xu, X., Norwood, T., & Proescholdbell, S. K. (2017). Mortality rates and cause of death among former prison inmates in North Carolina. *North Carolina Medical Journal*, 78(4): 223-229.
- Joukamaa, M. (1998). The mortality of released Finnish prisoners; a 7 year follow-up study of the WATTU project. *Forensic Science International*, 96(1), 11-19.
- Kariminia, A., Law, M. G., Butler, T. G., Corben, S. P., Levy, M. H., Kaldor, J. M., & Grant, L. (2007). Factors associated with mortality in a cohort of Australian prisoners. *European Journal of Epidemiology*, 22(7): 417-428.
- Kearley, B. W., Cosgrove, J. A., Wimberly, A. S., & Gottfredson, D. S. (2019). The impact of drug court participation on mortality: 15-year outcomes from a randomized control trial. *Journal of Substance Abuse Treatment*, 105: 12-18.
- Kinner, S. A., Forsyth, S., & Williams, G. (2012). Systematic review of record linkage studies of mortality in ex-prisoners: Why (good) methods matter. *Addiction*, 108(1): 38-49. <https://doi.org/10.1111/add.12010>
- Kjelsberg, E., & Laake, P. (2010). Is the high mortality risk in sentenced offenders independent of previous imprisonment? *European Journal of Epidemiology*, 25(4), 237-243.
- Kjellstrand, J., Matulis, J., Jackson, A., Smith, J., & Eddy, J. M. (2023). The importance of positive social support during reentry from prison: Examining the role of volunteer mentoring. *International Journal of Offender Therapy and Comparative Criminology*, 67(5): 567-587. <https://doi.org/10.1177/0306624X211059316>
- Krinsky, C. S., Lathrop, S. L., Brown, P., & Nolte, K. B. (2009). Drugs, detention, and death: a study of the mortality of recently released prisoners. *The American Journal of Forensic Medicine and Pathology*, 30(1), 6-9.
- Kunitz, S. J. (1994). *Disease and social diversity*. Oxford University Press.
- La Vigne, N. G., Cowan, J., & Brazzell, D. (2006). *Mapping prisoner reentry: An action*

- research guidebook*. Retrieved from <http://www.urban.org/publications/411383.html>
- La Vigne, N. G., Mamalian, C. A., Travis, J., Visher, C. (2003). *A portrait of prisoner reentry in Illinois*. The Urban Institute.
- La Vigne, N. G., Naser, R. L., Brooks, L. E., & Castro, J. L. (2005). Examining the effect of incarceration and in-prison family contact on prisoners' family relationships. *Journal of Contemporary Criminal Justice*, 21(4), 314-335.
- Labrecque, R. M., Scherer, H., & McCafferty, J. T. (2018). Reducing violence in correctional institutions: Revalidation of the inmate risk assessment for violent, nonsexual victimization. *Violence and Victims*, 33(1), 126-141.
- Labrecque, R. M., Smith, P., & Wooldredge, J. D. (2014). Creation and validation of an inmate risk assessment for violent, nonsexual victimization. *Victims & Offenders*, 9(3), 317-333.
- Lloyd, B., Zahnow, R., Barratt, M. J., Best, D., Lubman, D. I., & Ferris, J. (2017). Exploring mortality among drug treatment clients: The relationship between treatment type and mortality. *Journal of Substance Abuse Treatment*, 82: 22-28.
- Logan, M. W., & McNeeley, S. (2022). *Victimization among incarcerated military veterans: A target congruence approach*.
- Maruschak, L. M. (2008). *Medical problems of prisoners*. Bureau of Justice Statistics.
- Massoglia, M. (2008a). Incarceration as exposure: the prison, infectious disease, and other stress-related illnesses. *Journal of Health and Social Behavior*, 49(1), 56-71.
- Massoglia, M. (2008b). Incarceration, health, and racial disparities in health. *Law & Society Review*, 42(2), 275-306.
- Massoglia, M., & Pridemore, W. A. (2015). Incarceration and health. *Annual Review of Sociology*, 41, 291-310.
- Massoglia, M., & Remster, B. (2019). Linkages between incarceration and health. *Public Health Reports*, 134(1_suppl), 8S-14S.
- Massoglia, M., Pare, P.-P., Schnittker, J., & Gagnon, A. (2014). The Relationship Between Incarceration and Premature Adult Mortality: Gender Specific Evidence. *Social Science Research*, 46, 142-154.
- Massoglia, M., Remster, B., & King, R. D. (2011). Stigma or separation? Understanding the incarceration-divorce relationship. *Social Forces*, 90(1), 133-155.
- McCafferty, J. T., & Scherer, H. (2017). Beyond recidivism: Exploring the predictive validity of a correctional risk assessment tool on offender victimization. *The Prison Journal*, 97(6), 674-691.

- McGovern, V., Demuth, S., & Jacoby, J. E. (2009). Racial and ethnic recidivism risks: A comparison of postincarceration rearrest, reconviction, and reincarceration among White, Black, and Hispanic releasees. *The Prison Journal*, 89(3): 309-327.
- McNeeley, S., & Duwe, G. (2020). Keep your friends close and your enemies closer: Prison visitation, spatial distance, and concentrated disadvantage of visitor neighborhoods, and offender recidivism. *Justice Quarterly*, 37(4): 571-589.
- McNeeley, S., & Warner, J. J. (2015). Replication in criminology: A necessary practice. *European Journal of Criminology*, 12(5): 581-597.
<https://doi.org/10.1177/1477370815578197>
- Mears, D. P., & Cochran, J. C. (2015). *Prisoner reentry in the era of mass incarceration*. Sage.
- Mears, D. P., Cochran, J. C., Siennick, S. E., & Bales, W. D. (2012). Prison visitation and recidivism. *Justice Quarterly*, 29(6): 888-918.
<http://dx.doi.org/10.1080/07418825.2011.583932>
- Merrall, E. L., Kariminia, A., Binswanger, I. A., Hobbs, M. S., Farrell, M., Marsden, J., ... & Bird, S. M. (2010). Meta-analysis of drug-related deaths soon after release from prison. *Addiction*, 105(9), 1545-1554.
- Metraux, S., Roman, C. G., & Cho, R. S. (2008). Incarceration and homelessness. In D. Dennis, G. Locke, and J. Khadduri (Eds.), *Toward Understanding Homelessness: The 2007 National Symposium on Homelessness Research*. U.S. Department of Housing and Urban Development.
- Minnesota Department of Corrections. (2020). *Adult prison population summary*. Retrieved from https://mn.gov/doc/assets/Adult%20Prison%20Population%20Summary%201-1-2020_tcm1089-418232.pdf.
- Minnesota Department of Corrections. (2023). *Adult prison population summary*. Retrieved from https://mn.gov/doc/assets/Adult%20Prison%20Population%20Summary%201-1-2023_tcm1089-561955.pdf
- Minnesota Department of Health. (2014). *Advancing health equity in Minnesota: Report to the legislature*. St. Paul, MN. Retrieved from http://www.health.state.mn.us/divs/che/reports/ahe_leg_report_020114.pdf.
- Minnesota Department of Health. (n.d.). *Mortality (deaths)*. Retrieved from <https://www.health.state.mn.us/data/mchs/vitalstats/death.html>.
- Mitchell, M. M., Spooner, K., Jia, D., & Zhang, Y. (2016). The effect of prison visitation on reentry success: A meta-analysis. *Journal of Criminal Justice*, 47: 74–83.
- Mumola, C. J. (2005). *Suicide and Homicide in State Prisons and Local Jails*. Bureau of Justice Statistics.

- Mumola, C. J. (2007). *Medical causes of death in state prisons, 2001-2004*. Bureau of Justice Statistics.
- Murphy, S. L., Xu, J., Kochanek, K. D., Arias, E., & Tejada-Vera, B. (2021). *Deaths: final data for 2018*. Centers for Disease Control.
- Myers, S.L., Jr.; Ha, I. (2018). *Race Neutrality: Rationalizing Remedies to Racial Inequality*. Rowman & Littlefield: Lanham, MD.
- Nanney, M. S., Myers Jr, S. L., Xu, M., Kent, K., Durfee, T., & Allen, M. L. (2019). The economic benefits of reducing racial disparities in health: The case of Minnesota. *International Journal of Environmental Research and Public Health*, 16(5), 742.
- National Academies of Sciences, Engineering, and Medicine. (2022). *The limits of recidivism: Measuring success after prison*. Available online at: <https://nap.nationalacademies.org/read/26459/chapter/1>.
- National Center for Health Statistics. (2021). *Vintage 2020 postcensal estimates of the resident population of the United States (April 1, 2010, July 1, 2010-July 1, 2020), by year, county, single-year of age (0, 1, 2, ..., 85 years and over), bridged race, Hispanic origin, and sex*. Prepared under a collaborative arrangement with the U.S. Census Bureau. Available online from https://www.cdc.gov/nchs/nvss/bridged_race.htm
- National Center for Health Statistics (2021). *Vintage 2020 postcensal estimates of the resident population of the United States (April 1, 2010, July 1, 2010-July 1, 2020), by year, county, single-year of age (0, 1, 2, ..., 85 years and over), bridged race, Hispanic origin, and sex*. Prepared under a collaborative arrangement with the U.S. Census Bureau. Available online from https://www.cdc.gov/nchs/nvss/bridged_race.htm as of September 22, 2021, following release by the U.S. Census Bureau of the unbridged Vintage 2020 postcensal estimates by 5-year age groups on June 17, 2021.
- National Center on Addiction and Substance Abuse. (2010). *Behind bars II: Substance abuse and America's prison population*. Columbia University.
- National Commission on Correctional Health Care. (2002). *The health status of soon-to-be-released inmates: A report to Congress*. Chicago, IL.
- Nellis, A. (2021). *The color of justice: Racial and ethnic disparity in state prisons*. The Sentencing Project. Accessed at: <https://www.sentencingproject.org/publications/color-of-justice-racial-and-ethnic-disparity-in-state-prisons/>
- Noonan, M. E., & Ginder, S. (2015). Understanding mortality in state prison: Do male prisoners have an elevated risk of death? *Justice Research and Policy*, 16(1), 65-80.
- Olusanya, O., & Cancino, J. M. (2012). Cross-examining the race-neutral frameworks of prisoner re-entry. *Critical Criminology*, 20(4): 345-358. <https://doi.org/10.1007/s10612-011-9143-y>

- Pager, D. (2003). The mark of a criminal record. *American Journal of Sociology*, *108*(5), 937-975.
- Pager, D., Western, B., & Sugie, N. (2009). Sequencing disadvantage: Barriers to employment facing young black and white men with criminal records. *The Annals of the American Academy of Political and Social Science*, *623*(1), 195-213.
- Paternoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology*, *36*(4): 859-866.
<https://doi.org/10.1111/j.1745-9125.1998.tb01268.x>
- Patterson, E. J. (2010). Incarcerating death: Mortality in US state correctional facilities, 1985-1998. *Demography*, *47*(3), 587-607.
- Patterson, E. J. (2013). The dose-response of time served in prison on mortality: New York State, 1989-2003. *American Journal of Public Health*, *103*(3), 523-528.
- Perry, S. (2004). *American Indians and crime*. Bureau of Justice Statistics.
- Petersilia, J. (2003). *When prisoners come home: Parole and prisoner reentry*. Oxford University Press.
- Pettit, B., & Western, B. (2004). Mass imprisonment and the life course: Race and class inequality in US incarceration. *American Sociological Review*, *69*(2), 151-169.
- Piquero, A. R., Farrington, D. P., Shepherd, J. P., & Auty, K. (2014). Offending and early death in the Cambridge study in delinquent development. *Justice Quarterly*, *31*(3): 445-472.
- Pizzicato, L. N., Drake, R., Domer-Shank, R., Johnson, C. C., & Viner, K. M. (2018). Beyond the walls: Risk factors for overdose mortality following release from the Philadelphia Department of Corrections. *Drug and Alcohol Dependence*, *189*: 108-115.
- Pratt, D., Piper, M., Appleby, L., Webb, R., & Shaw, J. (2006). Suicide in recently released prisoners: a population-based cohort study. *The Lancet*, *368*(9530), 119-123.
- Pridemore, W. A. (2014). The mortality penalty of incarceration: Evidence from a population-based case-control study of working-age males. *Journal of Health and Social Behavior*, *55*(2), 215-233.
- Pyrooz, D. C., Decker, S. H., & Owens, E. (2020). Do prison administrative and survey data sources tell the same story? A multitrait, multimethod examination with application to gangs. *Crime & Delinquency*, *66*(5): 627-662.
<https://doi.org/10.1177/0011128719879017>
- Richardson, L. D., & Norris, M. (2010). Access to health and health care: How race and ethnicity matter. *Mount Sinai Journal of Medicine*, *77*(2): 166-177.
- Rosen, D. L., Schoenbach, V. J., & Wohl, D. A. (2008). All-cause and cause-specific mortality

- among men released from state prison, 1980–2005. *American Journal of Public Health*, 98(12): 2278-2284. <https://doi.org/10.2105%2FAJPH.2007.121855>
- Rosen, D. L., Wohl, D. A., & Schoenbach, V. J. (2011). All-cause and cause-specific mortality among black and white North Carolina state prisoners, 1995–2005. *Annals of Epidemiology*, 21(10), 719-726.
- Schnittker, J., & John, A. (2007). Enduring stigma: the long-term effects of incarceration on health. *Journal of Health and Social Behavior*, 48(2), 115-130.
- Seaman, S. R., Brettler, R. P., & Gore, S. M. (1998). Mortality from overdose among injecting drug users recently released from prison: database linkage study. *BMJ*, 316(7129), 426-428.
- Seymour, A., Oliver, J. S., & Black, M. (2000). Drug-related deaths among recently released prisoners in the Strathclyde Region of Scotland. *Journal of Forensic Science*, 45(3), 649-654.
- Shepherd, J. P., Shepherd, I., Newcombe, R. G., & Farrington, D. (2009). Impact of antisocial lifestyle on health: Chronic disability and death by middle age. *Journal of Public Health*, 31(4): 506-511. <https://doi.org/10.1093/pubmed/fdp054>
- Smedley, B. D., Stith, A. Y., & Nelson, A. R. (2002). *Unequal treatment: Confronting racial and ethnic disparities in health care*. National Academies Press.
- Spaulding, A. C., Seals, R. M., McCallum, V. A. (2011). Prisoner survival inside and outside of the institution: Implications for health-care planning. *American Journal of Epidemiology*, 173(5): 479-487. <https://doi.org/10.1093/aje/kwq422>
- Spaulding, A. C., Seals, R. M., McCallum, V. A., Perez, S. D., Brzozowski, A. K., & Steenland, N. K. (2011). Prisoner survival inside and outside of the institution: implications for health-care planning. *American Journal of Epidemiology*, 173(5), 479-487.
- Stewart, L. M., Henderson, C. J., Hobbs, M. S., Ridout, S. C., & Knuiman, M. W. (2004). Risk of death in prisoners after release from jail. *Australian and New Zealand Journal of Public Health*, 28(1), 32-36.
- Testa, A., Porter, L. C., & Nakamura, K. (2018). Examining all-cause and cause-specific mortality among former prisoners in Pennsylvania. *Justice Quarterly*, 35(5): 782-815.
- Travis, J. (2005). *But they all come back: Facing the challenges of prisoner reentry*. The Urban Institute.
- Turanovic, J. J., & Tasca, M. (2022). Conditions of contact: Reexamining the relationship between prison visitation and recidivism. *Justice Quarterly*, 39(5): 923-952.
- Veeh, C. A., Tripodi, S. J., Pettus-Davis, C., & Scheyett, A. M. (2018). The interaction of serious mental disorder and race on time to reincarceration. *American Journal of*

Orthopsychiatry, 88(2): 125-131. <https://doi.org/10.1037/ort0000183>

- Verger, P., Rotily, M., Prudhomme, J., & Bird, S. (2003). High mortality rates among inmates during the year following their discharge from a French prison. *Journal of Forensic Sciences*, 48(3), 614-616.
- Visher, C. A., & Travis, J. (2011). Life on the outside: Returning home after incarceration. *The Prison Journal*, 91(3_suppl), 102S-119S.
- Wakefield, S., & Uggen, C. (2010). Incarceration and stratification. *Annual Review of Sociology*, 36, 387-406.
- Walker, S., Spohn, C., & Delone, M. (2007). *The color of justice* (4th ed.). Thomson Wadsworth.
- Wenneker, M.B., & Epstein, A.M. (1989). Racial inequalities in the use of procedures for patients with ischemic heart disease in Massachusetts. *Journal of the American Medical Association*, 261(2): 253-257. doi:10.1001/jama.1989.03420020107039
- Western, B. (2002). The impact of incarceration on wage mobility and inequality. *American Sociological Review*, 526-546.
- Western, B., Kling, J. R., & Weiman, D. F. (2001). The labor market consequences of incarceration. *Crime & Delinquency*, 47(3), 410-427.
- Wheelock, D. (2005). Collateral consequences and racial inequality: Felon status restrictions as a system of disadvantage. *Journal of Contemporary Criminal Justice*, 21(1): 82-90. <https://doi.org/10.1177/1043986204271702>
- Wildeman, C., & Andersen, L. H. (2020). Solitary confinement placement and post-release mortality risk among formerly incarcerated individuals: A population-based study. *Lancet Public Health*, 5, e107-113. [https://doi.org/10.1016/S2468-2667\(19\)30271-3](https://doi.org/10.1016/S2468-2667(19)30271-3)
- Wildeman, C., Carson, E. A., Golinelli, D., Noonan, M. E., & Emanuel, N. (2016). Mortality among White, Black, and Hispanic male and female state prisoners, 2001–2009. *SSM-Population Health*, 2: 10-13. <https://doi.org/10.1016/j.ssmph.2015.12.002>
- Wodahl, E. J., & Freng, A. (2017). The challenges of prisoner reentry faced by Native American returning offenders. *Journal of Ethnicity in Criminal Justice*, 15(2): 160-184. <https://doi.org/10.1080/15377938.2016.1264336>
- Zlodre, J., & Fazel, S. (2012). All-cause and external mortality in released prisoners: systematic review and meta-analysis. *American Journal of Public Health*, 102(12), 67-75.

Appendix A. Racial Differences in Study Variables

	<i>White</i> (<i>N=19,989</i>)		<i>Black</i> (<i>N=10,102</i>)		<i>Native American</i> (<i>N=3,550</i>)		<i>F</i>
	Mean	SD	Mean	SD	Mean	SD	
Dependent Variables							
All-cause mortality	0.04	0.201	0.03	0.183	0.06	0.234	18.041*
Natural deaths	0.02	0.133	0.01	0.110	0.02	0.143	8.873*
Unnatural deaths	0.02	0.154	0.02	0.145	0.04	0.187	11.793*
Independent Variables							
Female	0.16	0.368	0.06	0.246	0.27	0.446	541.796*
High school diploma/GED	0.82	0.386	0.66	0.475	0.71	0.455	518.044*
STG affiliation	0.09	0.283	0.33	0.472	0.22	0.416	1,485.117*
Age at release	36.84	10.991	36.06	10.522	35.16	9.539	45.877*
Mental health concerns	0.32	0.467	0.26	0.437	0.35	0.476	81.300*
Physical health concerns	0.39	0.739	0.46	0.809	0.46	0.802	28.907*
BMI	27.93	5.139	28.56	5.812	29.23	5.432	111.122*
Person offense (reference group)	0.22	0.411	0.40	0.489	0.30	0.460	571.567*
Sexual offense	0.10	0.295	0.07	0.248	0.05	0.214	72.196*
Property offense	0.19	0.394	0.14	0.352	0.18	0.385	50.980*
Drug offense	0.32	0.468	0.21	0.408	0.25	0.436	217.435*
DWI offense	0.08	0.268	0.04	0.193	0.09	0.284	94.604*
Other offense type	0.10	0.294	0.14	0.349	0.12	0.330	76.184*
New commitment	0.71	0.452	0.62	0.486	0.57	0.495	229.501*
Program participation	0.64	0.482	0.63	0.482	0.55	0.498	56.376*
Prior prison admissions	1.40	2.163	2.14	2.829	2.29	2.945	401.425*
Length of stay (months)	14.75	27.534	16.58	28.530	10.88	23.212	57.492*
Discipline convictions	1.89	6.366	3.71	10.790	3.01	8.447	174.442*
Visits per month	1.07	2.510	0.87	2.438	0.35	1.528	138.748*
Days in segregation	12.98	91.504	25.69	123.402	25.80	125.893	58.561*
Health service visits	2.96	3.545	2.62	3.161	3.34	5.178	57.478*
Twin Cities metro	0.31	0.463	0.76	0.426	0.23	0.421	3,795.627*
Standard supervision (reference group)	0.60	0.490	0.56	0.496	0.58	0.494	15.602*
Program release	0.17	0.374	0.12	0.326	0.07	0.260	142.938*
ISR	0.11	0.311	0.13	0.341	0.13	0.333	23.052*
Discharge	0.13	0.332	0.18	0.385	0.22	0.414	148.242*
Release year	2015.19	2.863	2015.12	2.953	2015.85	2.763	91.725*

*p < .001