

2020

Mental health disparities in solitary confinement

Jessica Simes, Bruce Western, Angela Lee. "Mental Health Disparities in Solitary Confinement."

<https://hdl.handle.net/2144/42508>

Downloaded from DSpace Repository, DSpace Institution's institutional repository

Mental Health Disparities in Solitary Confinement

Jessica T. Simes*
Boston University

Bruce Western
Columbia University

Angela Lee
Harvard University

February 2020

*Department of Sociology, 100 Cummington Mall, Boston MA 02215. E-mail: simes@bu.edu. Thanks to Kendra Bradner and Samantha Plummer for their excellent research assistance. We gratefully acknowledge the significant assistance of the Pennsylvania Department of Corrections, which provided access to administrative data used for the analysis. This research was supported by the Project on Race, Class and Cumulative Adversity at Harvard University funded by the Ford Foundation and the Hutchins Family Foundation, the Justice and Poverty Project funded by the Ford Foundation, and National Science Foundation Grant SES-1823846/1823854, and a grant from the Institute for Social and Economic Research and Policy at Columbia University.

Abstract

Harsh prison conditions have been widely examined for their effects on the mental health of incarcerated people. Few studies of punishment examine how mental health status could expose individuals to greater risk of harsh and punitive treatment in the criminal justice system. With prisoners confined to their cells for up to 23 hours each day, often deprived of visitors or phone calls, solitary confinement is an important case for studying both harsh treatment and cumulative disadvantage. Routinely used as punishment for prison misconduct, the quasi-legal process leading to solitary confinement may be subject to the same forces that criminalize the mentally ill in community settings, and drive disparities in treatment. Analyzing a large administrative dataset showing admissions to solitary confinement, we find very high rates of punitive isolation among those with serious mental illness that result from the cumulative effects of disciplinary tickets and disciplinary hearings, in which long periods of solitary confinement are disproportionately dispensed to the mentally ill. We estimate that prisoners with serious mental illness could expect to spend three to four times longer in solitary confinement than a similar person with no history of mental illness. These findings suggest the stigma of dangerousness follows individuals into prison, providing new evidence of how the criminalization of mental health conditions also accompany greater severity of incarceration.

Owing to stigma, behavioral risk factors, and cumulative disadvantage, people with serious mental illness face greater risk of criminalization. However, mental illness is more often conceptualized as an outcome of harsh conditions of the criminal justice system, rather than a potential risk factor for criminalization. The mentally ill have been found to be arrested at high rates in police encounters and engender fears of violence from respondents in general population surveys (Teplin 1983; Phelan and Link 1998). While racial and ethnic disparities at different stages of criminal justice processing have been closely studied, disparities in exposure to harsh prison conditions, particularly by health status, have received little systematic attention (Travis, Western, and Redburn 2014, Chapter 6).

Solitary confinement is a vivid indicator of harsh U.S. prison conditions and offers an important case for examining cumulative disadvantage and the risk of exposure to harsh criminal justice outcomes. Markedly more severe than norms established by the United Nations and other liberal democracies, solitary confinement in the United States typically involves incarcerating people in a prison cell for 23 hours each day, often for months at a time, with strict limits on visits, phone calls, rehabilitative programming, and physical activity (United Nations General Assembly 2011; Liman Program & ASCA 2015). Under these conditions, solitary confinement has been found to be psychologically painful, perhaps causing long-term damage to mental health (Haney 2006; 2018; Grassian 2006). Exposure to solitary confinement has been associated with reincarceration, poor labor market outcomes, and elevated risks of mortality (Nguyen 2018; Brinkley-Rubinstein et al. 2019; Wildeman and Anderson 2020). These effects are felt broadly through the prison population. About 4 to 5% of people in state prisons are estimated to be incarcerated in solitary confinement on

any given day, and 20% of those in state prison report a period of solitary confinement during their incarceration (Beck 2015).

This paper extends research on disparities in the criminal justice system with an analysis of inequalities in the incidence and duration of solitary confinement by mental health status in a large state prison system. We analyze disparities in solitary confinement as a process of “criminalized cumulative disadvantage.” Theories of stigma suggest the mentally ill confront stereotypes of criminality and dangerousness that may affect the likelihood of solitary confinement. Often in the analysis of criminal justice disparities, criminal stigma is offered to explain biased decision-making by officials, with the remaining disparity explained by offending behavior (Blumstein 1982; Tonry 1995, Chapter 2). However, empirical analysis often neglects the process of criminalization of different social groups that is woven into policy and practice, prior to the discretionary decisions by judges or officers. Tracing the sequence of stages leading to a criminal justice sanction illuminates how and where disparities are institutionally produced.

Our empirical strategy examines mental health disparities in solitary confinement with a large administrative dataset showing all prison admissions and discharges from 2007 to 2016 in Pennsylvania. Pennsylvania has the seventh largest state prison population in the country and is demographically similar to the national prison population (Carson 2016). We use a novel mental health classification, rarely available to researchers, where individuals are classified as belonging to one of four categories: (A) No prior mental health history; (B) Prior diagnosis, but not currently in treatment or taking medication; (C) In treatment or taking medication for a mental health conditions; and (D) In treatment or taking medication for a serious mental illness. The administrative data record all misconduct

charges written by prison staff and all admissions to solitary confinement that result from charges of prison misconduct. These data allow us to model solitary confinement as a three-stage process: (1) receiving a misconduct ticket, (2) being sent to solitary confinement after a misconduct ticket was issued, and (3) the duration of solitary confinement. Controlling for charged offending in the community and in prison, risk assessment scores, and prison facility fixed effects, we estimate disparities by mental health status in the disciplinary process among people with similar histories, facing similar charges within the same prison. The three-stage analysis can be decomposed to indicate which stage of the prison discipline process contributes most to overall disparity. While we might expect misconduct tickets to be disproportionately dispensed to those with mental illness due to a combination of behavioral risk factors and stigma, little research indicates whether the stigma of mental illness affects later stages of due process and punishment after an incident of charged misconduct.

Our findings support the hypothesis that the stigmatization of people classified as mentally ill impacts decisions at all stages of the criminal justice process. We find significant mental health disparities that result in very high levels of solitary confinement among incarcerated men and women with mental illness. Our findings suggest that mental illness is source of stigma driving exposure to the harshest prison conditions, and provides evidence that mental illness may expose people to greater and harsher criminalization.

THE CRIMINALIZATION OF MENTAL ILLNESS

Research on the criminalization of mental illness burgeoned in the early 1970s with the widespread closure of psychiatric hospitals (Rothman 2002).

In this context, people who were perceived as too dangerous for community-based treatment were instead committed to prison, which became “the system that can’t say no” (Teplin 1983, p. 55). The history of deinstitutionalization foreshadowed the current period in which “correctional facilities in the United States” have become the “primary mental health institutions in the nation” (Adams and Ferrandino 2008). By 2014, the number of mentally ill persons in prisons and jails was 10 times the number remaining in state hospitals (Torrey et al. 2014).

Researchers have hypothesized that individuals with mental illness are more likely than those with no diagnoses to receive harsh sanctions like solitary confinement (National Academies of Sciences 2016; Cloud et al. 2015; James and Glaze 2006; Haney 2003). Two main theories have offered explanations for the overrepresentation of mentally ill people in the criminal justice system, and solitary confinement specifically. First, theories of stigma propose that labels reinforce negative stereotypes, and when employed in power situations, allow stigma to take hold and impact individual life chances (Goffman 1963; Link and Phelan 2001). Second, psychological and criminological research links a propensity for violence to serious mental illness (Douglas et al. 2009). We explore these theoretical perspectives, and offer a theory of “criminalized cumulative disadvantage” to account for disparities arising from a multistage process of punishment.

Mental Illness and the Stigma of Dangerousness

Stigma confers discredit, rendering people “bad, or dangerous, or weak” in the eyes of their community (Goffman 1963, p. 3). Taken further, stigmatized people are seen as “not quite human,” and subject to “varieties of discrimination, through which we effectively, if often unthinkingly, reduce

[their] life chances” (Goffman 1963, p. 5). Link and Phelan (2001) specify that we “apply the term stigma when elements of labeling, stereotyping, separation, status loss, and discrimination co-occur in a power situation that allows the components of stigma to unfold” (p. 367).

Individuals diagnosed with serious mental illness often bear a stigma of dangerousness and the propensity for violent behavior (Teplin 1983; Douglas et al. 2009). Vignette studies show that depression, substance use disorder, and schizophrenia have been linked to perceived dangerousness (Link et al. 1999). For many respondents in vignette studies, the “mental patient” label activated stereotyped beliefs about the dangerousness of people with mental illness (Link and Phelan 2001, p. 369). In a national survey, four in ten Americans believed that children and adolescents with depression were likely to be violent (Pescosolido 2013).

Researchers also report attributions of dangerousness to the mentally ill in prisons. In a study of maximum-security prisons, Rhodes (2004, p. 105) observed that “the most obvious cases of psychosis... represent a rupture in the foundation of lawfulness on which an offender can be brought into account.” In his review of institutional settings, Toch (1998) finds that difficult behavior is regularly explained with a diagnosis of mental illness that is often itself suffused with moral judgment. Psychopathy, for example, designates individuals who “are presumptively sleazy, unsavory, repugnant and dangerous” (Toch 1998, p. 151).

In our analysis, total institutions that manage stigmatized groups, such as prisons, tend to reproduce stigma in their everyday operations. In a context of intense power relations, the label of mental illness may lead to stereotyping, discrimination, and segregation, and the process of prison discipline reinforces the perceived criminality of stigmatized groups.

Behavioral Risk and Mental Illness

Beyond the stigma of perceived dangerousness, mental illness can involve illogical thinking, hallucinations, and mood swings that diminish the capacity to follow rules and disrupt the routinized life inside prisons. A meta-analysis examining over 200 studies found psychosis was significantly associated with a 49%–68% increase in the odds of violence (Douglas et al. 2009). In prison, mental health crises may precipitate “throwing body wastes or erupting in unpredictable displays of violence” (Rhodes 2004, p. 107). These behaviors can themselves be disturbing for other incarcerated people, raising the likelihood of fights and other conflicts. Under these conditions, incarcerated people with mental illness may be more likely to be involved in conflicts that are subject to prison discipline. Thus, an association between mental illness and solitary confinement could be in part due to an increased risk of rule-breaking or violence. Here, mental illness in prison has a twofold effect. First, incarcerated people who are mentally ill may have trouble complying with prison rules. Authorities then impose sanctions to try and manage this population in the prison. Second, where mental illness is used by staff to explain behavioral problems, it is often joined to character assessments (Adams and Ferrandino 2008, p. 916; Toch 1998). Attributions of dangerousness coupled with risks of disruptive behavior under the intense of authority relations of the prison subject the mentally ill to elevated risks of prison discipline, and in particular, solitary confinement.

Research also suggests that people with serious mental illness are at high-risk of experiencing both criminal justice contact and violent victimization. Brekke and colleagues (2001) find in a community-based study of 172 individuals with schizophrenia that while nearly half of their sample

reported contact with police over a three-year period, respondents were 14 times more likely to be victims of a violent crime than to be arrested for one. From this discussion of stigma and behavioral risk, we hypothesize that individuals classified as having mental illness, particularly those with serious mental illness, will be more likely than those with no diagnosis to receive misconduct tickets.

Disparity, Cumulative Disadvantage, and Control Variables

The prior discussion follows from research on criminal justice disparities, which often divides disproportionate punishment into “warranted” and “unwarranted” components (e.g., Blumstein 1982; Spohn and Holleran 2000; Steffensmeier and Demuth 2000). Warranted disparities refer to differential involvement in crime. The residual, unwarranted, disparities are interpreted as the result of bias in which people of color or the mentally ill, say, are treated more harshly by authorities. A common empirical strategy uses official measures of offending, such as arrest statistics, to identify the warranted component of disparate punishment (Blumstein 1982; Tonry and Melewski 2008). Researchers have widely observed, however, that enforcement efforts like arrest are imperfect signals of offending because they may also reflect differentiated treatment by authorities (e.g., Langan 1985).

However, even with perfect measures of crime, the distinction between warranted and unwarranted disparities treats discretionary decision-making as the sole source of disparity for which authorities are responsible. Policies and routines of criminal justice agencies may punish some social contexts or conduct more harshly than others. For example, a legal framework that places few constraints on police discretion, or sentencing guidelines that punish criminal history, each might foster disparities (Skogan and Frydl

2004; Reiter 2015; Engel et al. 2019; Frase and Roberts 2019). Criminalization produced by the institutional context in which criminal justice agencies operate are poorly described by a framework that focuses only on decision-making by officials. However, institutional context is often excluded from analysis because research is limited to a single stage of the process of criminalization. Despite a wealth of research on inequality and punishment, little scholarship provides an understanding of cumulative disadvantage in the criminal justice system (Kurlychek and Johnson 2019). Thus, research on “disparity has typically been limited to a single decision-making point...which captures only a static snapshot of the more dynamic process that constitutes criminal punishment,” writes Spohn (2015, p. 227).

To incorporate institutionalized disparities, we characterize criminal justice as a sequential process of cumulative disadvantage. From arrest, to conviction, to sentencing, criminal processing involves discretionary decision-making in a context of formal rules and routinized practices. Hagan (1974, p. 379) describes this dynamic perspective, writing that disparities in law enforcement and punishment are the products of how “transit through the criminal justice system” operates “cumulatively to the disadvantage of minority group defendants.” Instead of dividing disparities into warranted and unwarranted components, the sequential perspective on criminalization and punishment aims to determine where disparities arise and how they are amplified or attenuated with the institutional context.

Like other processes of punishment, discipline within prisons is shaped by policy and marked by points of discretionary decision-making. Prison discipline begins with correctional officers who write tickets for misconduct. Misconduct charges may be referred to a disciplinary hearing, where

a sanction of solitary confinement might be delivered by a hearing examiner, similar to a sentencing judge in a criminal court. Correctional officers have wide discretion in issuing tickets. In our sequential perspective on prison discipline, misconduct charges can be seen not simply as reflecting inmate behavior, but are the point in the disciplinary process in which the scope for bias is widest. Hearing examiners are more constrained by due process and prison regulations that specify the sanctions that can be issued. In the final stage, determining the duration of solitary confinement, discretion is constrained even further as sentences to solitary confinement are prescribed by regulation depending on charge and misconduct history.

The institutionalized stages of prison discipline invites disparity in at least two ways. First, discretion is built into the disciplinary process to varying degrees at different stages. Second, an official history of misconduct influences the severity of the sanction, and such a history may itself be the product of prior biased discretion. We would expect to observe greatest disparity in the earliest stages of the disciplinary process where discretion is greatest. Because official misconduct history is weighed by the sanctions scheme, disparity will likely be sustained in hearings that determine punishment and its severity.

In assessing disparity at each stage of prison discipline, what case characteristics should be controlled? Controlling for behavior that affects solitary confinement and is correlated with mental illness provides estimates of differential treatment of cases that are observably similar in behavior. To distinguish treatment by staff from prisoners' behavior, researchers have controlled for prior criminal record, the conviction offense, and demographic variables like age, race and ethnicity, marital status, and education. Criminal history and the severity of the conviction offense, and youth, have

all been widely found to be associated with prison misconduct and solitary confinement (National Institute of Justice 2016, pp. 176–177; Steiner, Butler, and Ellison 2014). Criminal history is often a factor weighed in sentencing, and is a criterion in assessing length of stay in solitary confinement in Pennsylvania. Controlling for criminal history thus yields a conservative test of disparate treatment. Another set of hypotheses points to the environment of prison management, that varies in its response to misconduct and use of sanctions (DiIulio 1989; Sykes 1958).

Our analysis follows earlier research by controlling for conviction of offense and socioeconomic characteristics. We also control for the severity of charged misconduct, risk assessment scores, and prison and year fixed effects. Because some mental health differences in behavior may be unobserved, the models do not provide sharp estimates of discrimination, defined as differential treatment of otherwise identical cases. Instead, conditioning on covariates yields empirical estimates of disparity among those incarcerated at the same time and place, who present similar criminal records and risk assessments. Comparing a baseline demographic model to a full model with criminal history controls and fixed effects indicates the magnitude of disparity related to observed behavior and institutional environments.

DATA AND METHODS

We study mental health disparities in solitary confinement with prison records on men and women incarcerated in Pennsylvania. The analysis relies on a highly granular administrative dataset rarely available to researchers. The rich and fine-grained data are leveraged to estimate disparities at each stage of the process of solitary confinement, and the expected number of

days in solitary confinement for each person incarcerated in the prison system.

Administrative Data on Solitary Confinement

Our data file includes records on all those who entered a Pennsylvania prison facility between January 1, 2007 and December 31, 2016, and provides information on incarceration for the admission cohort through March 1, 2018. We analyze data for 90,342 individuals who have complete records for the regression variables (89% of the total recorded admissions).

Table 1 reports descriptive statistics for the sample. The key variable for the analysis of disparities is mental health status. All those entering Pennsylvania prisons are given a mental health screening at intake and thus predates any later experience of solitary confinement. The mental health screening assigns all prison admissions to one of four categories: (1) no prior diagnosis of mental illness, (2) a prior diagnosis but no current treatment, (3) current treatment with medication or counseling for mental illness, and (4) current treatment for serious mental illness, or an intellectual disability. Serious mental illness includes major depression, bipolar disorder, schizophrenia, or other psychotic disorders. Over half (51%) of men have no prior history of mental illness compared to just 18% of women. Over half (53%) of women admitted to prison have active diagnoses requiring treatment for mental illness compared to 21% of men. About 11% of women have been diagnosed with serious mental illness or an intellectual disability. In contrast, only 2% of men have been diagnosed with serious mental illness.

Similar to national figures, the Pennsylvania prison population is over 90% male, with a mean age of 33. Over half of those imprisoned in Penn-

Table 1. Percentage distribution of mental health classification, demographic characteristics, and criminal history, Pennsylvania prisoners, 2007–2016.

	All	Men	Women
<i>Mental Health Classification</i>			
No prior history	48.0	50.8	17.7
Prior diagnosis	25.6	26.3	18.5
In treatment: Mental illness	23.6	20.8	52.5
In treatment: Serious mental illness	2.8	2.1	11.3
<i>Demographic Characteristics</i>			
White	46.0	43.7	69.4
Hispanic	11.0	11.4	6.4
Black	42.4	44.3	23.2
Other race	.6	.6	1.0
Age (mean)	33.0	32.9	34.2
Unmarried	75.5	76.4	66.5
Married	14.2	14.1	15.0
Divorced	10.3	9.5	18.5
<i>Risk Scores (Mean)</i>			
Recidivism risk score (0–11)	5.6	5.7	5.0
Substance use risk score (0–9)	3.9	3.9	4.7
<i>Governing Offense</i>			
Drug	26.4	26.3	27.6
Property	17.1	16.3	26.2
Violent and sex	35.8	37.1	21.9
Other	20.7	20.3	24.3
<i>N</i>	90,342	82,463	7,879

sylvania are either black or Hispanic. Women in the admission cohort are more likely to be white and nearly twice as likely as men to have been divorced.

To account for the risk of prison misconduct, we control for risk assessment scores and the governing offense. The first is intended to measure the risk that a person will return to prison for committing a new crime or violating the conditions of their post-release supervision. The recidivism risk score includes indicators of prior criminal and prison misconduct history,

age, and education level. On a scale from 0 to 11, the sample averages a recidivism risk score of 5.6, with a slightly higher average for men than women. The second scale is intended to measure the risk of relapse to substance use. On a scale from 0 to 9, the sample averages a score of 3.9, with women scoring higher at 4.7. Similar to prior research, we also account for criminal history by controlling for governing offenses—the most serious conviction for the current incarceration. Combining violent and sex offenses accounts for 36% of governing offenses. Over one-quarter of governing offenses are for drug-related crimes, and 17% are for property crimes. The most common types of governing offense in the “other” category were weapon or firearm charges.

Measuring the Process of Solitary Confinement

Misconduct charges. Our analysis considers only the punitive use of solitary confinement that follows a charge of prison misconduct. (Solitary confinement is also used administratively for self-protection and to separate those whose conflict is seen as threatening prison security.) In cases of misconduct, the pathway to solitary begins with a misconduct ticket, which often lists several charges, parallel to charging by police officers in free society. Charges include infractions that are specific to the penal context and violent violations that might be charged as criminal offenses outside prison.

In the ten-year observation period, 99,799 prison misconduct charges were recorded on 47,344 tickets (Table 2). Nearly two-thirds of misconduct tickets contained charges for defiance not associated with a violent act. Refusing to participate in prison head counts (“failure to stand count”), lying, and refusing to obey an order were the most common forms of defiance. Only 14% of all misconduct tickets contained any charges of violence such

Table 2. Percentage distribution of charges in prison misconduct tickets by gender and mental health classification in Pennsylvania, 2007–2018.

	Violence	Drugs	Defiance	Number of Tickets
All	13.6	23.2	60.0	47,344
<i>Men</i>	13.6	23.2	59.5	44,067
<i>Mental Health Classification</i>				
No prior history	11.9	22.6	61.6	18,324
Prior diagnosis	13.7	23.9	58.9	12,794
In treatment: Mental illness	15.6	24.1	56.9	11,800
In treatment: Serious mental illness	18.5	16.7	60.0	1,149
<i>Women</i>	12.9	22.7	67.0	3,277
<i>Mental Health Classification</i>				
No prior history	11.4	22.5	69.2	334
Prior diagnosis	9.9	24.4	68.1	574
In treatment: Mental illness	14.5	22.9	64.7	1,912
In treatment: Serious mental illness	11.2	20.4	73.3	457

Note: Misconduct tickets include up to 11 separate charges.

as fighting and assault. Moreover, misconduct varies by significantly mental health status. Among men with serious mental illness, 18.5% of misconduct tickets contain a violence charge compared to 11.9% for men without mental illness. Women were more commonly charged with defiance than were men.

Misconduct tickets, sanctions, and length of stay. Over a third of prison terms contained at least one misconduct ticket event for those in the general prison population (Table 3). Charges for misconduct were more common for the mentally ill. Between 35 and 44% of those with serious mental illness were charged with misconduct, compared to 21 to 31% with no history of diagnosed mental illness. Those with serious mental illness on average received nearly .6 misconduct tickets a year, compared to an average of .4 misconducts a year for the whole sample.

Table 3. Descriptive statistics for misconduct tickets and solitary confinement by gender and mental health classification in Pennsylvania, 2007–2018.

	Ever Issued Ticket (%)	Misconducts Per Year	Solitary Given Misconduct (%)	Median Days of Solitary
All (<i>N</i> = 90,342)	36.1	.41	48.6	31
<i>Men</i> (<i>N</i> = 82,463)	36.6	.41	49.0	31
<i>Mental Health Classification</i>				
No prior history	31.3	.31	42.5	32
Prior diagnosis	38.8	.42	48.0	35
In treatment: Mental illness	45.0	.62	55.2	30
In treatment: Serious mental illness	44.2	.58	58.4	30
<i>Women</i> (<i>N</i> = 7,879)	30.3	.42	43.1	30
<i>Mental Health Classification</i>				
No prior history	20.8	.22	36.2	32
Prior diagnosis	28.4	.32	35.3	30
In treatment: Mental illness	32.6	.48	43.8	30
In treatment: Serious mental illness	34.9	.60	50.1	35

Note: Column 1 indicates the percentage of prison terms where any misconduct ticket was issued between 2007 and 2018. Column 2 indicates the average number of misconduct tickets received per year in a given prison term. Column 3 reports the percentage of misconduct tickets that receive the sanction of solitary confinement. Column 4 displays the median days in solitary confinement conditional on receiving a solitary sanction.

Some misconduct charges lead to a disciplinary hearing where a hearing examiner (similar to a judge in a criminal court) delivers a verdict and decides on a sanction and its severity. There are a variety of possible sanctions after a guilty verdict is decided, but nearly half of misconduct tickets resulted in solitary confinement (49%). The rate of solitary confinement sanctioning was highest for those classified at the highest level of mental illness. The median length of stay in solitary confinement given misconduct sanction was one month.

Analytic Strategy

Incarceration in solitary confinement for prison misconduct is a three-stage process: a correctional officer charges a prisoner with misconduct and writes a ticket for the charge; an examiner at a disciplinary hearing may prescribe the sanction of solitary confinement; the examiner then assigns the length of stay in solitary confinement. In a prison term, t , person i may receive a number of misconduct tickets, and the expected count of the number of tickets, λ_{it} , can be written in a Poisson regression,

$$\log \lambda_{it} = \alpha_0 + \alpha_{1m} + \mathbf{x}'_{it} \boldsymbol{\alpha}_2, \quad (1)$$

where α_{1m} are the coefficients for a four-point mental health classification (m = prior diagnosis, in treatment for mental illness, or in treatment for serious mental illness, with no prior history in the reference category). Covariates in the vector \mathbf{x}_{it} include fixed effects for the year of prison admission, the prison facility, risk scores for recidivism and substance use, demographics, and the governing offense severity. We also include an offset for the log length of stay in prison, so the coefficients describe effects of covariates on misconduct tickets per year.

For each misconduct, j , we have a binary variable that scores 1 for a sanction of solitary confinement, and 0 otherwise. The second-stage analysis estimates the probability of being sent to solitary confinement given a misconduct ticket, p_{ij} ,

$$\log\left(\frac{p_{ij}}{1-p_{ij}}\right) = \beta_0 + \beta_{1m} + \mathbf{x}'_{ij}\beta_2, \quad (2)$$

where β_{1m} are the mental health effects. Among the covariates in \mathbf{x}_{ij} we also include a detailed set of dummy variables indicating if a ticket contains a charge that requires a formal hearing (a measure of misconduct severity), and the type of charge coded as separate categories for violence, threats, defiance, or possession of drugs or other contraband, as well as risk scores, demographics, and prison and year fixed effects.

Finally, each commitment to solitary confinement results in a length of stay. The hearing examiner commonly sentences to solitary confinement for 14, 30, or 60 days, but occasionally length of stay is reduced through a review process or lengthened for later misconduct charges issued in solitary confinement. Being a count of the number of days chosen by the hearing examiner, we assume that length of stay follows a Poisson distribution:

$$\log\mu_{ij} = \gamma_0 + \gamma_{1m} + \mathbf{x}'_{ij}\gamma_2, \quad (3)$$

where μ_{ij} is the expected count of the number of days spent in solitary confinement. Covariates include all those used in equation (2) for the probability of solitary confinement, plus a dummy variable indicating if additional misconduct charges were issued while in solitary. (See Appendix Table A.1 for a complete list of covariates in equations 1–3.)

How should the coefficients for mental illness be interpreted? The coefficients are empirical estimates of differential involvement at each stage

of the prison punishment process among incarcerated people with similar histories, facing similar charges in the same admission cohort and prison. The models imply that the expected annual length of stay in solitary confinement for a person with a given set of covariate characteristics, \bar{x} , and in a given mental health group is given by:

$$E(S|\bar{x}) \equiv \hat{S} = \hat{\lambda} \times \hat{p} \times \hat{\mu}$$

where $\hat{\lambda}$ is the predicted number of misconduct tickets in a prison spell, \hat{p} is the predicted probability of solitary confinement given misconduct, and $\hat{\mu}$ is the predicted length of stay given a sanction of solitary confinement. By accounting for the probability of solitary confinement, \hat{S}_i is the marginal length of stay expected for someone entering prison with covariate characteristics, \bar{x} . The marginal length of stay averages across all prisoners, not just those who are sanctioned to solitary confinement. Standard errors for the marginal length of stay can be simulated by calculating predicted values from random draws from the normal distributions of the coefficient estimates.

Finally, we decompose the total disparity in the marginal length of stay into components related to disparities in the number of misconduct tickets, the probability of solitary confinement, and the days in solitary confinement given a misconduct ticket. For example, for mental health group m ($m = A, B, C$ or D) for men and women, the expected number of days in solitary, given covariate characteristics, can be written in the log scale:

$$\log \hat{S}_m = \log \hat{p}_m + \log \hat{\lambda}_m + \log \hat{\mu}_m.$$

Disparity between incarcerated people with no mental illness or serious mental illness, for example, can be measured as the difference in the log

expected number of days in solitary:

$$\log \hat{S}_D - \log \hat{S}_A = (\log \hat{\lambda}_D - \log \hat{\lambda}_A) + (\log \hat{p}_D - \log \hat{p}_A) + (\log \hat{\mu}_D - \log \hat{\mu}_A).$$

On the natural scale, the disparity is the no diagnosis-serious mental illness ratio and the disparity for each of the components contributes to the overall disparity in days in solitary. The expected number of tickets, λ , probability of solitary, p , and days in solitary, μ , can be calculated for men and women with fixed characteristics, controlling for offense and misconduct histories.

RESULTS

Table 4 reports men's regression results for each stage of the prison disciplinary process. Poisson regression estimates indicate large mental health disparities in the annual number of misconduct tickets even when controlling for risk scores, the governing offense, and institutional and year effects (Table 4, models 1 and 2). Men diagnosed with serious mental illness receive more than twice [$\exp(.863) = 2.37$] as many misconduct tickets each year than observably similar men with no diagnosis of mental illness.

Logistic regressions on the odds of solitary confinement at a disciplinary hearing show that, consistent with the hypothesis of criminalized cumulative disadvantage, mental health disparities at the hearing stage are large. The odds of ending up in solitary confinement after receiving a misconduct ticket are 50% higher for men receiving psychiatric treatment or with serious mental illness compared to those without mental illness [$\exp(.395) = 1.48$], even controlling for the type and severity of misconduct.

A final set of Poisson regressions analyze the number of days in solitary confinement, conditional on being sanctioned to solitary confinement at a disciplinary hearing (Table 4, models 5 and 6). Similar to the earlier stages

Table 4. Regression analysis of misconduct tickets and solitary confinement for men in Pennsylvania prisons, 2007–2018. (Absolute *t* statistics in parentheses.)

	Misconduct Tickets		Solitary Sanction		Days of Solitary	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-.801** (46.91)	-1.508** (34.13)	-.236** (10.57)	-1.132** (14.35)	3.720** (149.61)	3.895** (40.08)
<i>Mental Health Classification</i>						
Prior diagnosis	.425** (32.09)	.337** (25.63)	.207** (12.04)	.154** (8.61)	.048** (2.65)	.030 (1.78)
In treatment: Mental illness	.939** (70.97)	.813** (60.78)	.493** (28.69)	.395** (21.90)	-.002 (-.11)	.065** (3.69)
In treatment: Serious mental illness	.927** (28.07)	.863** (26.42)	.615** (14.30)	.402** (8.48)	.246** (5.22)	.173** (3.96)
Controls:						
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Governing offense	No	Yes	No	Yes	No	Yes
Risk scores	No	Yes	No	Yes	No	Yes
Misconduct severity	-	-	No	Yes	No	Yes
Prison/year effects	No	Yes	No	Yes	No	Yes
Pseudo <i>R</i> ²	.127	.158	.009	.171	.240	.350
No. of individuals	82,812	82,812	38,931	38,931	26,572	26,572
No. of obs.	122,599	122,599	130,430	130,430	63,869	63,869

* *p* < .05 ** *p* < .01

Note: Misconduct severity includes a dummy if the ticket contains a charge that requires a formal hearing, and dummy variables for charge categories (violence, drugs, defiance, threats, contraband). Additional covariates results reported in Appendix Table A.2.

of prison discipline, the disparities are larger across mental health categories. Men with serious mental illness are locked in solitary confinement for nearly 20% longer [$\exp(.173) = 1.19$] than similar men with no history of mental illness. At the median length of stay, men with serious mental illness are estimated to spend an additional week in solitary confinement compared to their counterparts who have no prior history of mental illness.

Poisson regression estimates indicate women classified as having serious mental illness receive two and a half times more misconduct charges each year [$\exp(.938) = 2.55$] than similar women with no history of mental illness.

In logistic regression analyses predicting women's odds of a solitary sanction given a misconduct ticket, we find that women diagnosed with serious mental illness have 47% [$\exp(.387) = 1.47$] higher odds of receiving a solitary sanction, controlling for misconduct severity and type, risk scores, and other offense and demographic characteristics. Estimates for length of stay in solitary confinement suggest few significant differences by mental health status.

Mental health disparities at each stage of the disciplinary process combine to produce significant periods of solitary confinement incarceration for people with mental illness. We calculate the marginal length of stay in solitary confinement at the four levels of classified mental health status for men and women with average covariate characteristics (Figure 1). The lower panel of Figure 1 shows the relative numbers of all men and women classified to each mental health category in prison. In the top panel, men and women show a steep mental health gradient in solitary confinement incarceration. Men classified at the highest level of mental illness (C and D in Figure 1) are expected to spend 22 to 26 days in solitary confinement each year, compared to 8 days for men with no history of mental illness. The

Table 5. Regression analysis of misconduct tickets and solitary confinement for women in Pennsylvania prisons, 2007–2018. (Absolute t statistics in parentheses.)

	Misconduct Tickets		Solitary Sanction		Days of Solitary	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1.149** (12.71)	-1.758** (11.36)	-.639** (5.56)	-1.894** (6.96)	3.854** (30.66)	3.887** (12.64)
<i>Mental Health Classification</i>						
Prior diagnosis	.463** (5.59)	.255** (3.23)	.016 (.14)	-.103 (.86)	.013 (.10)	.018 (.14)
In treatment: Mental illness	1.079** (15.02)	.808** (11.54)	.386** (4.20)	.131 (1.28)	-.145 (1.37)	-.001 (.01)
In treatment: Serious mental illness	1.367** (16.00)	.938** (10.97)	.636** (5.76)	.387** (3.21)	.041 (.34)	-.012 (.11)
Controls:						
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Governing offense	No	Yes	No	Yes	No	Yes
Risk scores	No	Yes	No	Yes	No	Yes
Misconduct severity	-	-	No	Yes	No	Yes
Prison/year effects	No	Yes	No	Yes	No	Yes
Pseudo R^2	.121	.207	.010	.184	.232	.347
No. of individuals	7,922	7,922	2,931	2,931	1,829	1,829
No. of obs.	11,032	11,032	9,270	9,270	3,993	3,993

* $p < .05$ ** $p < .01$

Note: Misconduct severity includes a dummy if the ticket contains a charge that requires a formal hearing, and dummy variables for charge categories (violence, drugs, defiance, threats, contraband). Additional covariates reported in Appendix Table A.3.

long marginal length of stay expected upon entering prison for men with serious mental illness reflects the high probability of a solitary confinement punishment, and the lengthy duration of solitary incarceration given the punishment.

Women entering prison with current treatment needs or serious mental illness are expected to spend between 18 and 23 days in solitary confinement, compared to 8 days for those with no mental illness. As for the men, there are large differences in solitary confinement incarceration among mental health classifications for women, and these differences remain even after controlling for detailed measures of criminal offense, misconduct, and criminal or relapse risk.

Decomposing the disparities in solitary confinement by mental health status reveals a stronger pattern of cumulative disadvantage (Table 6). The largest differences between mental health classifications for men were found between those with no history of mental illness and those receiving treatment for any mental illness. A man entering prison with serious mental illness is expected to stay in solitary confinement more than four times longer than a similar man with no history of mental health problems [$\exp(1.44) = 4.22$]. A woman with serious mental illness will stay in solitary confinement more than three times longer [$\exp(1.31) = 3.71$]. Between 60 and 70 percent of the difference in days of solitary confinement is related to the large number of misconduct tickets received by those classified to the highest level of mental illness. Mental health disparity increases at the following disciplinary stage. Roughly another 30 percent of the mental health disparity is accrued at the disciplinary hearing, where those with serious mental illness face high probabilities of being sanctioned to solitary confinement.

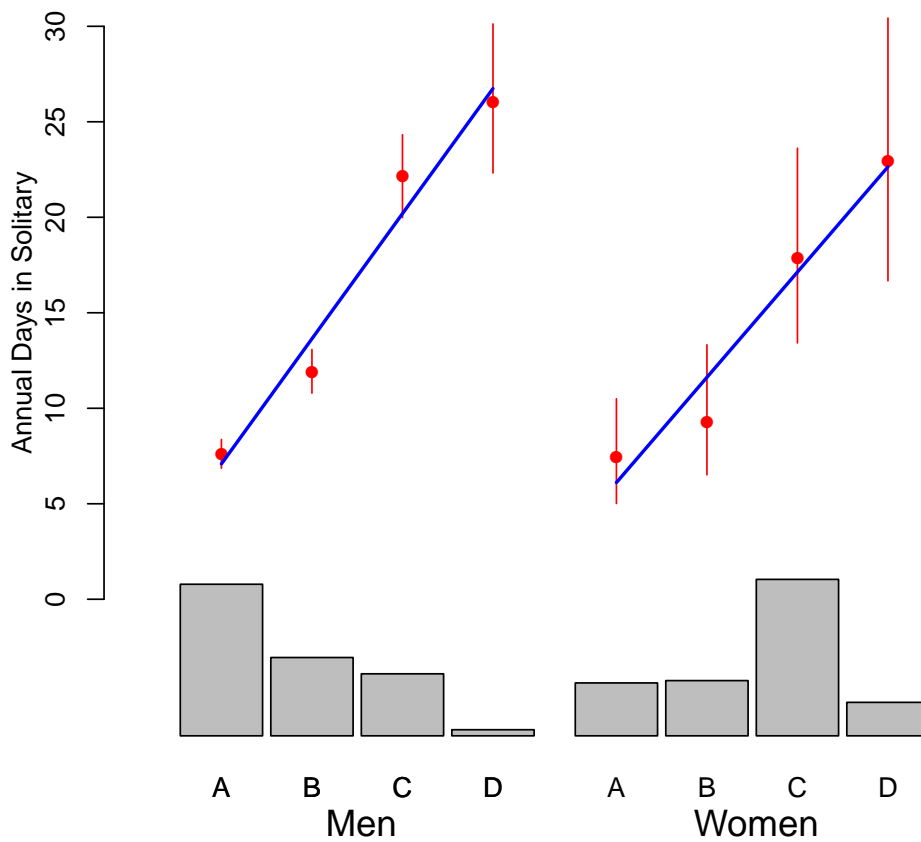


Figure 1. The lower panel of the figure shows the distribution of the prison population by mental health classification for men and women. (A = no prior history of mental illness; B = prior diagnosis; C = in treatment for mental illness; D = in treatment for serious mental illness.) The top panel shows the estimated annual rate of admission to solitary confinement for incarcerated men and women with fixed covariate characteristics by mental health classification.

Table 6. Decomposition of mental health disparity by the number of misconduct tickets, the probability of solitary confinement, and the duration of solitary confinement.

	Men		Women	
	Difference of Logs	Percentage	Difference of Logs	Percentage
<i>B to A Disparity</i>				
Tickets	0.34	64.66%	0.25	150.21%
Prob. of solitary	0.15	29.53	-0.10	-60.53
Days of solitary	0.03	5.80	0.02	10.31
Total	0.52	100.00	0.17	100.00
<i>C to A Disparity</i>				
Tickets	0.81	63.89	0.81	86.20
Prob. of solitary	0.40	31.04	0.13	13.95
Days of solitary	0.06	5.07	0.00	-0.15
Total	1.27	100.00	0.94	100.00
<i>D to A Disparity</i>				
Tickets	0.86	59.97	0.94	71.46
Prob. of solitary	0.40	27.97	0.39	29.46
Days of solitary	0.17	12.06	-0.01	-0.92
Total	1.44	100.00	1.31	100.00

Note: A = no prior history of mental illness; B = prior diagnosis; C = in treatment for mental illness; D = in treatment for serious mental illness. Disparity is defined as the difference in the log expected number of misconduct tickets, probability of solitary confinement, and days of solitary confinement for a prisoner, aged 31 to 40, with average risk assessment and drug screen scores, median offense severity, and mean level of misconduct in solitary confinement.

DISCUSSION

High rates of incarceration and other criminal justice contact among the mentally ill have been traced to stereotyped attributions of dangerousness that distort the discretion of criminal justice officials. We extend this theory to study the stages of prison discipline from misconduct charging to sentencing to solitary confinement. In a criminal justice system characterized by harsh policing, sentencing, and incarceration, we find that the severity of prison conditions is also intensified for the most vulnerable groups. Criminal stigma that accompanies mental illness is associated with unusually harsh experiences of incarceration. The swift assessments made by corrections officers to respond to the chaotic and sometimes violent conditions of prison create opportunity for unchecked biases in an institutional context that provides line officers with wide discretion.

We find evidence of large disparities in solitary confinement that produce lengthy periods of isolation for people with serious mental illness. Controlling for crime and misconduct histories, the data indicate frequent and lengthy periods of solitary confinement among those with serious mental illness or who are otherwise receiving treatment. We estimate that the modal male prisoner with serious mental illness could expect to spend four times longer in solitary confinement than a similar man with no history of mental illness. We estimated similar disparities for women. Disproportionate solitary confinement among the mentally ill is mostly attributable to misconduct ticketing in the general prison population. But reflecting a process of criminalized cumulative disadvantage, disparity grows at the hearing stage, where the mentally ill face a higher probability of solitary given a misconduct charge than those without mental illness. Moreover, misconduct most commonly involved charges of defiance to authority, rather than

violent behavior. An important question for further research asks whether the high rate of solitary confinement among people with mental illness is chiefly a response to harmful conduct in the prison, or a management tool for a behaviorally challenging population. Further analysis would require detailed data on the underlying incident for which misconduct was charged.

One limitation of the current analysis is that behavior in prison is incompletely observed. We assume that detailed measures of the governing offense, misconduct severity, and risk scores are associated with behavioral differences among prisoners. However, behavior in prison that does not result in a misconduct charge is unobserved. Mental health differences in the number of misconduct tickets, the largest component of disparity, may reflect unmeasured behavioral differences. Despite the influence of unmeasured variables, the current analysis of cumulative criminalized disadvantage highlights the leading importance of line officers at the first stage of the prison disciplinary process.

A second limitation is that these results describe Pennsylvania state prisons, but may not apply elsewhere. Additional data collection on the conditions of prison confinement across jurisdictions and regions would provide greater insight into the prevalence and disparities of solitary confinement in the United States.

The current findings raise the urgent question of whether the mentally ill are disproportionately incarcerated in solitary confinement in other jurisdictions. Although the effects of solitary confinement on mental health have been studied closely, the question of whether and under what conditions mental illness is a risk factor for solitary has not been systematically examined. Previous research has shown how the stigma of criminality con-

tributes to disparate involvement of the mentally ill in the criminal justice system. The current results suggest that the stigma of criminality that attaches to mental illness also operates inside the prison to produce more punishing conditions of imprisonment among those whose risks of incarceration are highest. Common markers of criminal justice inequalities such as health group ratios in incarceration rates thus underestimate the disproportionate burden of incarceration on disadvantaged groups.

Finally, these findings raise important questions regarding the use of solitary confinement within penal institutions and the long-term risks associated with its practice. Despite a call for the absolute prohibition of solitary confinement in excess of 15 days by the United Nations Special Rapporteur on Torture (United Nations General Assembly 2011), isolation as a punishment in American prisons widely exceeds the 15-day standard to this day. Indeed, our results show that the median period of solitary confinement is double the upper limit set by the United Nations. Often analyzed in terms of its *effects* on mental health, solitary confinement offers a case for examining the cumulative criminalization of mental illness across the stages of a criminal justice process. Our evidence indicates that the harms of solitary confinement are not distributed evenly across the prison population. Instead they are concentrated among those with mental illness. These results point not only to the great scale of American penal confinement, but also to its severity that heaps the harshest punishment on the most vulnerable.

REFERENCES

- Adams, Kenneth and Joseph Ferrandino. 2008. "Managing Mentally Inmates in Prisons." *Criminal Justice and Behavior* 35:913–927.
- Beck, Allen J. 2015. "Use of Restrictive Housing in U.S. Prisons and Jails, 2011–12." Washington DC: U.S. Department of Justice. NCJ 249209.
- Blumstein, Alfred. 1982. "On Racial Disproportionality of the United States' Prison Populations." *Journal of Criminal Law and Criminology* 73:1259–81.
- Brekke, John S., Cathy Prindle, Sung Woo Bae, and Jeffrey D. Long. 2001. "Risk for Individuals With Schizophrenia Who Are Living in the Community." *Psychiatric Services* 52:1358–66.
- Brinkley-Rubinstein, Lauren, Josie Sivaraman, David L. Rosen, David H. Cloud, Gary Junker, Scott Proescholdbell, Meghan E. Shanahan, and Shabbar I. Ranapurwala. 2019. "Association of Restrictive Housing During Incarceration With Mortality After Release." *JAMA Network Open* 2:1–11.
- Carson, E. Ann. 2016. "Prisoners in 2016." Bureau of Justice Statistics NCJ 251149.
- Cloud, David H., Ernest Drucker, Angela Browne, and Jim Parsons. 2015. "Public Health and Solitary Confinement in the United States." *American Journal of Public Health* 105:18–26.
- DiIulio, John J. 1989. *Governing Prisons: A Comparative Study of Correctional Management*. New York: Free Press.
- Douglas, Kevin S., Laura S. Guy, and Stephen D. Hart. 2009. "Psychosis as a Risk Factor for Violence to Others: A Meta-Analysis." *Psychological Bulletin* 135:679–706.
- Engel, Robin S., Robert E. Worden, Nicholas Corsaro, Hannah D. McManus, Danielle Reynolds, Hannah Cochran, Gabrielle T. Isaza, and Jennifer Calnon Cherkaskas. 2019. "Explaining the Decision to Arrest." In *The Power to Arrest*. Springer, Cham.

- Frase, Richard S. and Julian V. Roberts. 2019. *Paying for the Past: The Case Against Prior Record Sentence Enhancements*. New York: Oxford University Press.
- Goffman, Erving. 1963. *Stigma: Notes on the Management of Spoiled Identity*. Englewood Cliffs, N.J.: Prentice-Hall.
- Grassian, Stuart. 2006. "Psychiatric Effects of Solitary Confinement." *Washington University Journal of Law & Policy* 22:325–84.
- Hagan, John L. 1974. "Extra-Legal Attributes and Criminal Sentencing: An Assessment of a Sociological Viewpoint." *Law and Society Review* 8:357–384.
- Haney, Craig. 2003. "Mental Health Issues in Long-Term Solitary and 'Supermax' Confinement." *Crime & Delinquency* 49:124–56.
- Haney, Craig. 2006. *Reforming Punishment: Psychological Limits to the Pains of Imprisonment*. Washington, DC: American Psychological Association.
- Haney, Craig. 2018. "Restricting the Use of Solitary Confinement." *Annual Review of Criminology* 1:285–310.
- James, Doris J. and Lauren E. Glaze. 2006. "Mental Health Problems of Prison and Jail Inmates." Washington DC: U.S. Department of Justice. NCJ 213600.
- Kurlychek, Megan C. and Brian D. Johnson. 2019. "Cumulative Disadvantage in the Criminal Justice System." *Annual Review of Criminology* 2:291–319.
- Langan, Patrick. 1985. "Racism on Trial: New Evidence to Explain the Racial Composition of Prisons in the United States." *Journal of Criminal Law and Criminology* 76.
- Liman Program & ASCA. 2015. "Time-In-Cell: The ASCA-Liman 2014 National Survey of Administrative Segregation in Prison." New Haven, CT: Yale Law School.
- Link, Bruce G and Jo C Phelan. 2001. "Conceptualizing Stigma." *Annual Review of Sociology* 27:363–85.
- Link, Bruce G., Jo C. Phelan, Michaeline Bresnahan, Ann Stueve, and Bernice A. Pescosolido. 1999. "Public Conceptions of Mental Illness:

- Labels, Causes, Dangerousness, and Social Distance.” *American Journal of Public Health* 89:1328–1333.
- National Academies of Sciences. 2016. *Ending Discrimination Against People with Mental and Substance Use Disorders: The Evidence for Stigma Change*. Washington, DC: National Academies Press.
- National Institute of Justice. 2016. *Restrictive Housing in the U.S.: Issues, Challenges, and Future Directions*. Washington, DC: U.S. Department of Justice. NCJ 250315.
- Nguyen, Anh P. 2018. *The Determinants and Consequences of Solitary Confinement: Risk Factor, Future Criminal Justice Involvement, and Mortality*. Ph.d. thesis, University of Michigan.
- Pescosolido, Bernice A. 2013. “The Public Stigma of Mental Illness: What Do We Think; What Do We Know; What Can We Prove?” *Journal of Health and Social Behavior* 54:1–21.
- Phelan, Jo C. and Bruce G. Link. 1998. “The Growing Belief that People with Mental Illnesses are Violent: the Role of the Dangerousness Criterion for Civil Commitment.” *Social Psychiatry and Psychiatric Epidemiology* 33:S7–S12.
- Reiter, Keramet. 2015. “Supermax Administration and the Eighth Amendment: Deference, Discretion, and Double Bunking, 1968–2010.” *University of California Irvine Law Review* 89:89–152.
- Rhodes, Lorna A. 2004. *Total Confinement: Madness and Reason in the Maximum Security Prison*. Berkeley: University of California Press.
- Rothman, David J. 2002. *Conscience and Convenience: The Asylum and Its Alternatives in Progressive America*. New York: Aldine de Gruyter, revised edition.
- Skogan, Wesley and Kathleen Frydl (eds.). 2004. *Fairness and Effectiveness in Policing: The Evidence*. Washington, DC: National Academy Press.
- Spohn, Cassia. 2015. “Evolution of Sentencing Research.” *Criminology and Public Policy* 14:225–232.
- Spohn, Cassia and David Holleran. 2000. “The Imprisonment Penalty Paid by Young, Unemployed Black and Hispanic Male Offenders.” *Criminology* 38:281–306.

- Steffensmeier, Darrell and Stephen Demuth. 2000. "Ethnicity and Sentencing Outcomes in U.S. Federal Courts: Who is Punished More Harshly?" *American Sociological Review* 65:705–29.
- Steiner, Benjamin, H. Daniel Butler, and Jared M. Ellison. 2014. "Causes and Correlates of Prison Inmate Misconduct: A Systematic Review of the Evidence." *Journal of Criminal Justice* 42:462–70.
- Sykes, Gresham M. 1958. *The Society of Captives: A Study of a Maximum Security Prison*. Princeton, NJ: Princeton University Press.
- Teplin, Linda A. 1983. "The Criminalization of the Mentally Ill: Speculation in Search of Data." *Psychological Bulletin* 94:54–67.
- Toch, Hans. 1998. "Psychopathy or Antisocial Personality in Forensic Settings." In *Psychopathy: Antisocial, criminal and violent behavior*, edited by T. Millon, E. Simonsen, M. Birket-Smith, and R. Davis, pp. 144–158. Guilford.
- Tonry, Michael. 1995. *Malign Neglect: Race, Crime, and Punishment in America*. New York: Oxford University Press.
- Tonry, Michael and Matthew Melewski. 2008. "The Malign Effects of Drug and Crime Control Policies on Black Americans." *Crime and Justice* 37:1–44.
- Torrey, E. Fuller, Mary T. Zdanowicz, Aaron D. Kennard, H. Richard Lamb, Donald F. Eslinger, Michael C. Biasotti, and Doris A. Fuller. 2014. "The Treatment of Persons with Mental Illness in Prisons and Jails: A State Survey." Arlington, VA: Treatment Advocacy Center.
- Travis, Jeremy, Bruce Western, and Steve Redburn (eds.). 2014. *The Growth of Incarceration in the United States: Exploring Causes and Consequences*. Washington D.C.: National Academies Press.
- United Nations General Assembly. 2011. "Interim report of the Special Rapporteur of the Human Rights Council on Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment."
- Wildeman, Christopher and Lars H. Anderson. 2020. "Solitary Confinement Placement and Post-Release Mortality Risk Among Formerly Incarcerated Individuals: A Population-Based Study." *Lancet Public Health* 5:107–13.

APPENDIX

Table A.1. Covariates used in regression analyses of misconduct and solitary confinement.

	Description	Equation
<i>Health and demographic covariates</i>		
Mental health classification	Four mental health categories assigned at admission to prison: (A) No diagnosis or history of mental illness or intellectual disability; (B) No treatment, but some history of mental illness and no intellectual disability; (C) Receiving treatment for mental illness, but no serious mental illness or intellectual disability; (D) Receiving treatment for a serious mental illness or intellectual disability.	(1)(2)(3)
Race/ethnicity	Four racial and ethnic categories: Black, Hispanic, white, and other race/ethnicity (i.e. Asian, Native American, other).	(1)(2)(3)
Age	Five categories of age at first admission: 21 and under, 22–25, 26–30, 31–40, Over 40.	(1)(2)(3)
Marital status	Five categories of marital status: Single, married, divorced, widowed, unknown.	(1)(2)(3)
<i>Criminal history covariates</i>		
Recidivism risk score	Score (0–11) indicating a person’s risk of criminally re-offending. The seven questions used in the risk assessment include: person’s age at first arrest; current age; prior adult convictions, prior sanctions for institutional misconduct in prison, prior violations of community supervision (e.g., probation or parole supervision); less than 12th grade education; ever had a drug problem. Score of 0–4 indicates low risk, 5–6 indicates medium risk, and 7–11 indicates high risk.	(1)(2)(3)
Substance use risk score	Score (0–9) indicating the severity of substance use disorder. The screening tool asks about substance use type and frequency, and history of addiction and treatment. A score of 2–3 indicates mild substance use disorder, 4–5 indicates moderate disorder, and a score of 6 or more indicates severe disorder.	(1)(2)(3)
Governing offense severity	An ordinal variable of offenses described by the Pennsylvania criminal code severity levels (1-15), where 1 is the most severe (e.g. homicide), and 15 is the least severe (e.g. traffic violations).	(1)(2)(3)

Continued on next page

Table A.1 – *Continued from previous page*

	Description	Equation
Misconduct severity	A dummy variable indicating if a misconduct ticket contains a charge that requires a formal hearing (e.g., assault, rape, fighting, threatening another person, possession or use of controlled substance).	(2)(3)
Misconduct type	A set of five dummy variables indicating if the misconduct ticket contains any charges of: violence, drug use or possession, defiance, threats, or possession of contraband other than drugs.	(2)(3)
Misconduct in solitary	A dummy variable indicating if additional misconduct tickets were issued during the solitary confinement spell.	(3)
<i>Fixed effects covariates</i>		
Prison fixed effects	A dummy variable for the main prison of commitment (27 dummy variables).	(1)(2)(3)
Year fixed effects	A dummy variable for the year of the admission (equation 1) or the year of the misconduct event (equations 2 & 3).	(1)(2)(3)

A.2. Regression coefficients for covariates in models of misconduct tickets and solitary confinement for men in Pennsylvania prisons, 2007–2018. (Absolute t statistics in parentheses.)

	Misconduct Tickets		Solitary Sanction		Days of Solitary	
	(1)	(2)	(3)	(4)	(5)	(6)
Black	.455** (36.98)	.404** (30.28)	-.086** (-5.36)	-.074** (-4.08)	.052** (2.94)	.039* (2.23)
Hispanic	.179** (9.81)	.177** (9.54)	.025 (1.04)	.011 (.41)	.056* (2.27)	.029 (1.25)
Other race	-.001 (.02)	.054 (.70)	.008 (.07)	-.046 (.41)	-.100 (1.62)	-.118 (1.82)
Age 22–25	-.257** (16.24)	-.274** (17.73)	-.027 (1.35)	-.041* (1.98)	-.046* (2.13)	-.007 (.31)
Age 26–30	-.539** (33.33)	-.521** (32.67)	.009 (.44)	-.004 (.18)	-.049* (2.12)	-.016 (.74)
Age 31–39	-.865** (52.67)	-.837** (51.26)	.052* (2.43)	.031 (1.31)	-.065** (2.79)	-.042 (1.83)
Over 40	-1.118** (56.79)	-.978** (49.17)	.019 (.75)	.021 (.75)	-.081** (2.80)	-.088** (3.04)
Married	-.161** (8.70)	-.112** (6.22)	-.097** (4.19)	-.061* (2.49)	.029 (1.06)	-.002 (.09)
Recidivism risk score		.124** (37.67)		.029** (6.22)		.005 (1.09)
Substance use risk score		-.015** (7.63)		.005* (1.97)		-.001 (.31)

* $p < .05$ ** $p < .01$

Note: Reference category for age is 21 and under. Covariates for governing offense and misconduct severity, year and prison effects are suppressed.

A.3. Regression coefficients for covariates in models of misconduct tickets and solitary confinement for women in Pennsylvania prisons, 2007–2018. (Absolute t statistics in parentheses.)

	Misconduct Tickets		Solitary Sanction		Days of Solitary	
	(1)	(2)	(3)	(4)	(5)	(6)
Black	.720** (14.71)	.555** (10.51)	.210** (3.76)	.091 (1.47)	.022 (.33)	-.013 (.22)
Hispanic	.491** (6.08)	.457** (5.77)	.200* (2.32)	.098 (1.00)	-.252** (2.74)	-.211** (3.04)
Other race	.643** (3.14)	.443* (1.99)	-.113 (.42)	-.067 (.29)	-.096 (.75)	-.285* (2.46)
Age 22–25	-.273** (3.56)	-.212** (2.87)	-.082 (.94)	-.119 (1.37)	-.113 (1.14)	-.074 (.77)
Age 26–30	-.582** (7.79)	-.459** (6.21)	-.065 (.76)	-.119 (1.32)	-.076 (.69)	.007 (.07)
Age 31–39	-.876** (11.28)	-.713** (9.29)	-.009 (.11)	-.013 (.15)	-.145 (1.46)	-.082 (.88)
Over 40	-1.064** (12.29)	-.739** (8.22)	-.010 (1.07)	-.091 (.92)	-.122 (1.17)	-.038 (.36)
Married	-.113 (1.50)	-.065 (.94)	-.116 (1.41)	-.127 (1.55)	-.086 (1.02)	-.082 (.95)
Recidivism risk score		.167** (10.53)		-.001 (.05)		.019 (1.08)
Substance use risk score		-.015* (2.20)		.019* (2.23)		-.015 (1.65)

* $p < .05$ ** $p < .01$

Note: Reference category for age is 21 and under. Covariates for governing offense and misconduct severity, year and prison effects are suppressed.