



Solitary confinement and institutional harm

Incarceration

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Abstract

In a given year, one in five people incarcerated in the U.S. prisons is locked in solitary confinement. We study solitary confinement along three dimensions of penal harm: (1) material deprivation, (2) social isolation, and (3) psychological distress. Data from a longitudinal survey of incarcerated men who are interviewed at baseline in solitary confinement are used to contrast the most extreme form of penal custody with general prison conditions observed at a follow-up interview. Solitary confinement is associated with extreme material deprivation and social isolation that accompanies psychological distress. Distress is greatest for those with histories of mental illness. Inactivity and feelings of dehumanization revealed in qualitative interviews help explain the distress of extreme isolation, lending empirical support to legal arguments that solitary confinement threatens human dignity.

Keywords

Solitary confinement, incarceration, prisons

Solitary confinement, where prisoners are locked in cells for 23 h each day, is a striking indicator of severe prison conditions in the United States. Whereas European law limits solitary confinement to fewer than several weeks, the U.S. prisoners are often incarcerated in solitary units for months and even years at a time (Beck, 2015; Shalev, 2015). The conditions of solitary confinement are closely regulated in Europe, but the U.S. courts have largely deferred to prison authorities (Resnik et al.,

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2020), yielding “distinctly extreme ways of doing solitary confinement” in the United States (Shalev, 2015, 145). Around 20% of the U.S. incarcerated population are held in solitary confinement in the course of a year, with about half of those confined for 30 days or more (Beck, 2015). Legal scholars argue that the severity, duration, and prevalence of solitary confinement in the United States threatens international standards for human rights (Haney, 2018, 291; Resnik et al., 2020; Shalev, 2015).

Understanding prison conditions is thus an urgent priority, but a critical research gap opened exactly when the U.S. incarceration rates were historically high. The U.S. prisons became more inaccessible. While incarceration rates increased, “prison doors increasingly closed to embedded research” (Kreager et al., 2017, 686).

We contribute to research on the social experience of incarceration by asking what harms are associated with harsh prison conditions, and what mechanisms connect conditions to harm? Our analysis studies three main dimensions of institutional harm: material deprivation, social isolation, and psychological distress. We build on a longstanding sociological tradition that emphasizes the physical deprivations of imprisonment (Sykes, 2007), but incorporate recent research on the social relations of incarceration and the psychological injuries of extreme isolation (Haney, 2006; Ross et al., 2008).

The analysis extends prior research in two ways. First, few studies of contemporary U.S. solitary confinement directly measure prison conditions, yet these conditions are thought to be major dimensions of harm (Foster, 2016; Haney, 2020). Second, correlational results are often given a strong causal interpretation (Kapoor and Trestman, 2016, 203), but causal mechanisms are not clearly specified. We analyze data from two waves of interviews with 99 respondents in solitary confinement in Pennsylvania prisons. The data includes information on the physical conditions of imprisonment, social relationships and attitudes, and mental well-being. The data allow us to contrast baseline measures of material deprivation, social isolation, and psychological distress with follow-up responses 3 months later when most respondents returned to the general prison population. Although causal inference with our observational data requires strong assumptions about omitted variables, we make those assumptions clear, and qualitative interviews suggest causal mechanisms linking prison conditions to psychological distress.

Three types of institutional harm

Researchers widely observe that the hardships of incarceration extend beyond the loss of liberty. Classic studies focused on material deprivation (Goffman, 1961; Sykes, 2007). Subsequent research examined the social relationships of imprisonment and social isolation (Cohen and Taylor, 1972; Ross et al., 2008; Toch, 1977). Finally, research on solitary confinement studied psychological distress (Haney, 2006). In our framework, deprivation and isolation are sources of psychological distress. Because material deprivation and isolation are themselves intrinsically painful, we view all three elements as distinct types of harm. In this perspective, the harms of material deprivation and isolation compound to create the suffering of psychological distress.

Material deprivation

Material deprivation was central to classic accounts of penal harm. Prison-based field research from the early 1950s defined the pains of imprisonment in terms of the deprivations of liberty, goods and

services, heterosexual relationships, security, and autonomy. “The inmate,” wrote Gresham Sykes 2007, 68), “finds himself in a harshly Spartan environment which he defines as painfully depriving.”

Sociological analysis of the “total institution” suggests how harsh conditions are produced by the everyday functioning of the prison (Goffman, 1961). Total institutions meet human needs not through intimate relationships, as in households, but through bureaucratic organization. Housing, clothing, food, and hygiene are organized at scale through the routines and procedures of institutional staff. Managing human needs bureaucratically imposes uniformity. Incarcerated people dress in identical uniforms, eat from a short menu, maintain hygiene with a small number of approved products, and live at close quarters in identical cells.

Researchers argue that material deprivation grew over the last four decades (Crewe, 2011; Haney, 2006). Education and work programs have been curtailed (Phelps, 2011). Overcrowding increased through the 1980s and 1990s (Pitts et al., 2014) and supermax prisons were built, expanding the capacity for solitary confinement (Reiter, 2016). As prison conditions changed, we ask whether contemporary conditions of incarceration meet the basic needs for food, shelter, and hygiene.

Social isolation

The second main type of institutional harm stems from social isolation. We define social isolation as the denial of supportive and intimate relationships that promote well-being. Researchers describe two main threats to such relationships in prison: risks to personal safety and the disruption of family relationships.

Social isolation results in part from feeling unsafe while incarcerated. One indication of safety in prison is given by national statistics on sexual violence. Victimization rates in prison are five to ten times higher than those found in general population surveys (Morgan and Kena, 2018). The threat of violence is isolating because it subverts trust in staff and other incarcerated people causing social withdrawal (Walker, 2016). Prison climate inventories aim to measure the threats to safety and sources of support (Ross et al., 2008; Toch, 1977). Using reports of humane and respectful treatment by staff and trust in staff and other inmates, prison climate describes how social relations during incarceration shapes the quality of prison life (Liebling, 2004).

Social isolation also results from the interruption of relationships with friends and family outside prison (Braman, 2004). Mail and phone calls may sustain regular contact, but these can be costly and are screened by prison authorities. Prison visits can require long-distance travel and are often treated as a privilege that can be revoked by authorities. More than the deprivation of liberty, family separation and fear for one’s safety in incarceration can entail a withdrawal from social interaction leading to “isolated lives of quiet desperation” (Haney, 2006, 173).

Psychological distress

Prison conditions of deprivation and isolation can diminish well-being. Incarceration can lead to hypervigilance, a tough exterior, and flat affect among incarcerated people as they try to avoid conflict and victimization (Haney, 2006, 172–173). Beyond adaptations to prison conditions, researchers find incarceration can be psychologically damaging, particularly in the short term (Cohen and Taylor, 1972; Haney, 2006). Empirical studies find an association between incarceration and lethargy, depression, and serious mental illness (Fazel and Danesh, 2002; Haney, 2020).

However, incarceration and mental health may be correlated not because imprisonment impairs psychological well-being, but because of selection. With selection, preexisting mental illness raises the risks of incarceration. Selection has been addressed qualitatively by tracing the process from incarceration to adverse outcomes (see Liebling, 1999). Quantitative studies address selection into incarceration in panel designs with fixed effects, matching, and covariate adjustment (e.g. Massoglia, 2008). For example, incarceration has been found to be associated with depression after prison release, even controlling for childhood background, early substance use, prior incarceration, and early-onset depression (Schnittker et al., 2012).

Studies of incarceration's mental health effects rarely analyze physical conditions of confinement and isolation. Analyses of post-release mental health and stress-related illness treat incarceration as a binary status: incarcerated or not (cf. Porter and DeMarco, 2019; Schnittker et al., 2012). Prison-based research on psychological distress often relies on security classifications or the duration of incarceration, and fails to include prison conditions (e.g. food or hygiene) as environmental influences on well-being. We fill this gap with data on material deprivation and social isolation to predict psychological distress.

Solitary confinement as institutional harm

Solitary confinement provides an extreme case of harsh prison conditions. The term solitary confinement describes an intensive type of incarceration where prisoners spend their days confined to their cells. Solitary confinement is imposed as punishment for misconduct, such as fighting or defiance of authorities. It is also used to manage conflicts and to ensure the immediate physical safety of the vulnerable.

In solitary confinement, the three types of institutional harm—material deprivation, social isolation, and psychological distress—converge in extreme form. First, prisoners are deprived of regular access to supplies, food, and other materials (Foster, 2016; Liman Program & ASCA, 2015). Denied access to the commissary and dining hall, prisoners receive meals and supplies through a slot in the cell door or through prison bars. With intensified bureaucratic management of human needs, material hardships like hunger or temperature extremes become more likely (e.g. Rhodes, 2004). Although staff provides regular meals and supplies, interactions with staff in a context of extreme dependence may create painful feelings of deprivation and hardship.

Second, solitary confinement increases social isolation. Daily confinement in a cell for up to 23 h severs communication with others. During medical visits, recreation, or showers, prisoners may be searched and shackled before release from their cells (Reiter, 2016; Rhodes, 2004). The exact protocols of isolation vary from prison to prison, but solitary confinement generally enlarges the control of staff, increasing risks of arbitrary treatment and abuse (Liebling, 2004; Rhodes, 2004). Contact with people outside prison is also restricted. One study found restrictions on visits and phone calls as a sanction of solitary confinement for 36 of the 45 state prison agencies surveyed (Liman Program & ASCA, 2015). Solitary confinement may thus reduce contact and weaken social relationships with family.

Third, a large research literature finds that solitary confinement elevates psychological distress. Through a series of clinical assessments, Grassian (1983) observed symptoms associated with extreme social isolation that included being in a mental fog, having obsessive thoughts, hallucinating, and experiencing other forms of distress. Evidence for the negative effects of solitary confinement is strongest for long periods of isolation and for those with prior mental illness (Haney, 2018; Smith, 2006).

Recent research on the association between solitary confinement and psychological well-being is summarized in Table 1. These studies were obtained from a Google Scholar search identifying all peer-reviewed interview studies published since 2000 that analyzed data from the U.S. prisons and included measures of solitary confinement and psychological well-being.

Among the nine studies identified, two were community-based (Hagan et al., 2018; Valera and Kates-Benman, 2016), with the remainder conducted in prison. Prison conditions were measured with indicators of incarceration in solitary confinement or the general prison population. None of the studies directly measured prison conditions such as noise, food, temperature, or social isolation. Prison conditions were inferred from the type of housing unit. Solitary confinement was treated as a bundle of conditions whose specific effects remain untested. Outcomes included psychological distress, self-harm, posttraumatic stress, and fears of violence. Of the six studies that used a control group or pre-post comparison, four reported that solitary confinement was associated with mental health problems. Two studies analyzing the same data from Colorado report null effects of solitary confinement (O'Keefe et al., 2013; Walters, 2018). The Colorado study has been criticized because comparison group respondents had been held in solitary confinement (Haney, 2018). Neither of the Colorado studies reported a simple contrast between solitary confinement and general population conditions. Analysis relied on strong model assumptions and overlooked statistical tools for causal inference, providing only indirect evidence for null effects. In sum, most recent research finds solitary confinement is associated with psychological distress, but conditions of confinement are overlooked, and the assumptions for causal inference are often unstated.

In addition to interview studies that aim to directly observe psychological harms, researchers have analyzed administrative data. Recent analyses of prison records indicate high rates of solitary confinement in cases of suicide and self-injury (Daniel and Fleming, 2006; Lanes, 2009; Reeves and Tamburello, 2014). However, these studies selected on positive cases of self-harm, and the relative rate of self-harm in solitary confinement compared to that in the general incarcerated population were unexamined.

Our analysis directly measures social isolation and material deprivation, and creates an index of psychological distress that aims to capture symptoms reported in prior research. We expect that: (1) material deprivation, social isolation, and psychological distress will be greater in solitary confinement than in the general prison population; (2) conditions of material deprivation and social isolation will explain the association between solitary confinement and psychological distress; and (3) the effects material deprivation and social isolation will be larger for those with prior mental illness.

Design and measurement

Assessing penal harm in solitary confinement faces two main challenges. Research design must specify a comparison group for a treatment that is highly selective and potentially harmful. Instruments must also be developed for the measurement of material deprivation, social isolation, and psychological distress.

Research design

To study the harms associated with solitary confinement, we conducted a survey of prison conditions and distress that originated in the solitary confinement unit of a large maximum-security prison in Pennsylvania. In 2017, the year of our fieldwork, the Pennsylvania prison population numbered 50,105, the seventh largest prison system in the country. Similar to the national average, 5%

Table 1. Interview studies of solitary confinement and psychological well-being in the U.S. field sites, 2000–2020.

Author(s)	Field site	Sample size	Study design	Comparison group	Conditions measured	Outcome	Solitary confinement effect
Haney (2003)	CA	100	One-sample	No	Housing type	Psychological distress	+
Lovell (2008)	WA	131	One-sample	No	Housing type	Psychological distress	NR
O’Keefe et al. (2013)	CO	60–74	Two-sample	Control	Housing type	Psychological distress	NS
Valera and Kates-Benman (2016)	NYC	110	Retrospective/One-sample	No	Housing type; length of stay	Fear of violence	NR
Chadick et al. (2018)	KS	48	Two-sample	Control	Housing type; length of stay	Psychological distress	Mixed
Hagan et al. (2018)	NY, CT	119	Retrospective	Control	Housing type; length of stay	PTSD	+
Haney (2018)	CA	100	Two-sample	Control	Housing type	Psychological distress	+
Walters (2018)	CO	147	Two-sample	Control	Housing type	Psychological distress	NS
Reiter et al. (2020)	WA	106	Longitudinal	Posttest	Housing type; length of stay	Psychological distress	+

Note: Field sites are state abbreviations except NYC for New York City. Sample sizes for Colorado are for contrasts conditional on mental health status. Study design includes: (1) one-sample that collects data only from respondents in solitary confinement, (2) retrospective that collects data on a history of solitary confinement from formerly incarcerated respondents, (3) two-sample that collects data from a solitary confinement group and control group in the general prison population, and (4) longitudinal that collects data prospectively on respondents in solitary confinement that move into the general prison population. Comparison groups include: (1) control groups defined as a separate subsample in the general prison population and (2) posttest groups who moved from solitary confinement to the general prison population. Conditions include: housing type for respondents incarcerated in solitary confinement, and length of stay for the duration of solitary confinement. Solitary confinement effects are coded as positively and significantly associated with the outcome (+), none reported (NR), or no significant association (NS).

of the Pennsylvania prison population was incarcerated in solitary confinement (Browne et al., 2015; for national figures see Beck, 2015).

The current study was fielded following federal investigations and litigation beginning in 2012 that focused on the treatment of people with disabilities and serious mental illness in solitary confinement in Pennsylvania (U.S. Department of Justice, 2013). By agreement with the Department of Corrections (DOC), we conducted baseline interviews in the solitary confinement unit of one prison and then, as respondents transferred to other facilities, in 20 prisons throughout the state for follow-up. Although the research was conducted with significant DOC assistance, our interview materials were designed independently, interviews were conducted confidentially, and only summary reports of the data were shared with the department.

The complex ethical challenges of prison research are heightened in solitary confinement. Respondents are highly vulnerable, and we could easily cause harm or coercion or fail to report the harm we observed. In addition to a university ethics review, the research team tried to meet these challenges by debriefing at the end of each day, discussing study implementation and its ethical implications. For example, one respondent spoke about suicidal thoughts in an interview and before deciding on follow-up steps, we weighed our obligations to inform authorities and the risks to the respondent by sharing the information. Because the respondent described no immediate plans and informing authorities may have carried its own risks, we kept the interview confidential. In another case, we observed an elderly respondent in very poor health, and again conferred as a team before deciding on a course of action. In this case, we spoke to prison authorities about the respondents' skin lesions.

We recruited respondents recently admitted to the prison's two Restricted Housing Units (RHU). We interviewed men held in disciplinary and administrative custody. Disciplinary custody confines those charged with substance use, fighting, and other misconduct. Administrative custody holds those who felt unsafe in the general population and requested protective custody, or others awaiting hearings or separated from rivals in prior conflicts. Conditions of administrative and disciplinary custody were similar. All were locked in their cells for 22 or 23 h each day, and faced severe restrictions on visits, phone calls, and programming. A few hours out of the cell each day were allowed for showers or recreation in small enclosures outside, secured by a chain-link cage. The median length of stay in solitary confinement was 24 consecutive days, and the average was 38 days. Around 10% of respondents we interviewed reported stays greater than 3 months.

A strong research design with random assignment would yield inferences about the causal effects of solitary confinement. Because it is intrinsically painful (privileges are lost, liberty is curtailed) and part of prison operations, solitary confinement in prisons has been studied observationally not experimentally.

Observational studies have mostly used one of two designs (O'Keefe et al., 2010, 6–7). First, a two-sample design compares those in solitary confinement to a comparison group from the general prison population, sometimes at two points in time (e.g. Chadick et al., 2018; O'Keefe et al., 2013). Causal inference for the two-sample design must account for selection into solitary confinement. A comparison group must be constructed that would experience similar outcomes to the treatment group if it too were in solitary confinement. However, common observed characteristics such as demographics or criminal record often explain only a small fraction of the variation in solitary confinement status, providing little help with forming a comparison group (Labrecque, 2018). Recent studies specified comparison groups with psychiatric assessments at prison intake (Chadick et al., 2018), and from pools of prisoners charged with infractions (O'Keefe et al., 2013). Psychiatric assessments may capture behavioral propensities associated with solitary confinement and its

psychological effects. Prison infractions as a criterion for study recruitment incorporate time-varying information on selection if, for example, prison charges result from episodes of mental health problems. Still, those charged with infractions but never assigned to solitary may be systematically different from those who are assigned.

The second, longitudinal, design addresses selection by comparing people in solitary confinement to a later time after release to the general prison population. Selection is controlled in the longitudinal design because all respondents are exposed to treatment (e.g. Reiter et al., 2020). The longitudinal design provides greater protection against selection bias, but time-varying confounders threaten causal inference in the absence of a comparison group. For example, mental health crisis may cause an infraction that result in solitary confinement. If the crisis is resolved through treatment before follow-up, mental distress and solitary confinement would be correlated. Solitary confinement would not cause distress; instead, it would result from a time-varying selection mechanism. Controlling for the propensity for mental health crisis in a regression would reduce bias in the solitary confinement effect related to this episodic selection process. A limitation of the longitudinal design is that enduring effects of solitary confinement may be observed in the general population, leading to underestimates of the effects of solitary confinement.

We adopt the longitudinal design that controls time-invariant confounders, but leaves time-varying confounders uncontrolled. We account for selection related to mental health problems by controlling for mental health history prior to solitary confinement. Mental health history is also used to form a subsample for a separate analysis to assess the variability in institutional harms for a vulnerable segment of the sample.

We estimate the gap in psychological distress in solitary confinement at baseline and in the general population at follow-up. Interest centers on whether the reduced distress in the general prison population can be explained by controls for material deprivation and social isolation. With observations at baseline and follow-up ($t = 1, 2$), an outcome, y_t , and dummy variables for follow-up incarceration in the general population, G_t , and solitary confinement, S_t , we fit the levels of regression,

$$y_t = \beta_0 + \beta_1 G_t + \beta_2 S_t + \mathbf{x}'_t \boldsymbol{\beta}_3 + e_t,$$

where \mathbf{x}_t is a vector of prison conditions measuring material deprivation and social isolation, demographics, and mental and physical health at baseline. The key estimate, β_1 , describes the difference in the level of the outcome from solitary confinement at baseline to the general population at follow-up.

All time-invariant confounders are removed from the analysis by taking the difference between the follow-up and baseline interviews. In this case, we fit the change-score regression,

$$\Delta y = \beta_0 + \beta_1 \Delta G + \Delta \mathbf{x}' \boldsymbol{\beta}_3 + e$$

where the outcome is now the difference in levels of psychological distress between follow-up and baseline, $\Delta y = y_2 - y_1$. (Demographic characteristics and ΔS are removed because they do not vary from baseline to follow-up.)

Although unobserved confounding still threatens inference, the data are informative about the association between penal harm and solitary confinement. By controlling for time-invariant confounders, the design is likely less biased than a two-sample comparison or a longitudinal design without covariate adjustment. The analysis is causally motivated but will not be identified in the

presence of time-varying confounders. Coefficients thus describe the average difference in distress between solitary confinement and the general prison population for observably similar respondents.

We address limitations of the quantitative results with qualitative interviews. Qualitative accounts of social process can provide empirical evidence of mechanisms (Pawson, 1995; Stolz, 2016), and in this case, suggest mechanisms that connect prison conditions to psychological distress. We identified interview themes with codes developed inductively by the lead interviewers. The interviews were coded and then checked by the lead interviewers to ensure reliability. For qualitative data reported below, we use pseudonyms for respondents and edit quotes to remove repetition and verbal tics.

Measuring institutional harm

Eligible respondents had been admitted to the RHU in the 2 months prior to the baseline interview. Prison authorities allowed us to approach all those incarcerated except men with capital sentences. A small team of university researchers (two professors and two staff researchers) and graduate students conducted the interviews over a baseline field period of several weeks. Members of the research team went cell to cell, explaining the purposes of the study and the interview and inviting prospective respondents to participate. During the field period, 245 people were eligible to be interviewed. Given movements for recreation, showers, and medical visits, we were able to invite 148 to participate. Some declined without explanation or had conflicting appointments with doctors or attorneys, but 117 agreed to participate. Interviews were completed with 99 respondents in the study's timeframe. Correctional staff tended to steer us to prospective respondents they viewed as more manageable. Sample selection may thus have been biased in favor of respondents with better mental health and social adjustment than the overall population.

After agreeing to participate, respondents were escorted to a disused wing of the solitary confinement unit and placed in a vacant cell. Interviewers sat outside on a walkway and conducted the interviews through the bars of the cell. Interviews were conducted out of earshot of prison staff, other incarcerated people, and other research staff.

Respondents were contacted for a follow-up interview 3 months later. The analysis compares the baseline interview ($n = 87$ at baseline who were completely observed on the regression variables) to one follow-up sample who had returned to the general prison population ($n = 63$), and another that remained in solitary confinement ($n = 14$). Of the 77 prison follow-up interviews included in the regression analysis, 40 were at the baseline facility, and 37 at other 20 other prisons throughout Pennsylvania. (At follow-up, 22 respondents from the original sample of 99 were interviewed in the community, could not be located, or declined to be interviewed.) With 87 respondents at baseline and 77 reinterviewed at follow-up 3 months later, 164 observations were included for the two survey waves. Forty-five respondents yielding 82 observations in two survey waves were analyzed in the mental health subsample. Given the small sample size and sample selection, the quantitative results should be viewed as tentative.

Each face-to-face interview took about 75 min and was audio-recorded. Interviews included a structured survey and open-ended questions, which allowed for both quantitative and qualitative data analysis. Table 2 compares respondents to the total population of imprisoned men in Pennsylvania and to a national sample of all men in state prison from the 2004 Survey of Inmates of State Correctional Facilities. Demographic and socioeconomic characteristics in the study sample are similar to those in the state and national prison populations, except for the proportion of Latinos, which is relatively high compared to the Pennsylvania prison population. Compared

Table 2. Percentage distribution of sociodemographic characteristics, Pennsylvania solitary confinement respondents, all Pennsylvania prisoners, and male U.S. prison population.

	Study sample	Pennsylvania prisoners	Survey of inmates
Black	50.0	48.8	41.4
Latino	21.4	10.2	18.1
White	24.5	40.3	34.6
Other	4.1	0.7	5.9
Raised by both parents	33.3	-	43.9
High school dropout	60.0	-	73.2
Never married	82.2	74.7	57.8
Has children	61.6	-	65.0
Ever received drug treatment	34.4	64.4	56.5
Mental illness diagnosis	51.5	29.5	24.0
Serious mental illness diagnosis	21.2	8.3	10.7
Sample size (n)	99	44,189	11,569

Note: Data on the male U.S. prison population are from the 2004 Survey of Inmates of State Correctional Facilities. Data on drug treatment among Pennsylvania prisoners indicates 64.4% currently require intensive or outpatient alcohol or drug treatment.

to the Pennsylvania and national prison populations, respondents were also twice as likely to report a serious mental illness, including the conditions of schizophrenia, bipolar disorder, and psychotic disorders.

The baseline and follow-up surveys measured psychological distress, material deprivation, and social isolation. Earlier studies examine a variety of mental health measures, including standard scales for mental illness (Chadick et al., 2018; Reiter et al., 2020) and distress observed in clinical assessments (O’Keefe et al., 2010). Our key dependent variable, psychological distress, is based on a scale we constructed that also aims to capture symptoms observed in solitary confinement (Grassian, 1983, 2006; Haney, 2006). Hallucination, panic attacks, failures of concentration and memory, paranoia, rage, and unwanted thoughts have been found to cluster together (Haney, 2018, 288–295). We measured these symptoms with 13 survey items on intrusive thoughts, panic, anger, disordered thinking, and self-harm (Table 3). Although these items are based on self-reports and not expert assessments, the domains of measurement overlap with earlier research but are intended to specifically measure the distress observed to accompany solitary confinement, rather than mental illness in general (see Appendix). Responses were dichotomized and summed to form the scale of psychological distress. The scale items were highly correlated yielding a Cronbach’s alpha of .82.

The analysis regresses psychological distress on measures of material deprivation and social isolation. Material deprivation is measured with survey questions about bedding, clothing, supplies for hygiene, cell temperature and noise, food, and the availability of books (see Table A1 in the Appendix). The items are summed to form a material deprivation scale, which is dichotomized in the regression analysis to account for nonlinearities. The measurement of material deprivation could also be extended to deficiencies of programming and treatment in solitary confinement (e.g. Reiter, 2016; Rhodes, 2004). We bracket this issue here, focusing on the physical conditions of confinement.

Table 3. Questions used for a scale of psychological distress in confinement.

<i>Questions on intrusive thoughts^a</i>	
Unwelcome thoughts	I wish I could stop thinking of certain things.
Avoiding thoughts	I have thoughts that I try to avoid.
Uncontrolled thoughts	I have thoughts that I cannot stop.
Persistent images	There are images that come to mind that I cannot erase.
Invasive thoughts	There are thoughts that keep jumping in my head.
<i>Questions on panic, thinking, anger, and self-harm</i>	
Panic attacks	Some people have feelings of fright or panic. They have physical sensations like a pounding heart, shortness of breath, dizziness, or a feeling like they are going to throw up. They sometimes even feel like they are going to lose control, go crazy, or die. Did you ever in the past 3 months have an episode like this, often called an anxiety or panic attack? ^b
Lost temper	In the past 3 months have you lost your temper easily, or had a short fuse more often than usual? ^b
In a dream	In the past 3 months have you had a feeling things don't seem real, like you're in a dream? ^b
More angry	In the past 3 months have you been angry more often than usual? ^b
Thoughts of revenge	In the past 3 months have you thought a lot about getting back at someone you have been angry at? ^c
Difficulty thinking	In the past 3 months have you had difficulty with your thinking, memory, or your ability to concentrate? ^d
Broken things	In the past 3 months have you hurt or broken things on purpose, just because you were angry? ^c
Suicidal thoughts	In the past 3 months have you ever felt so low you thought about committing suicide? ^d

^aAdapted from the White Bear Suppression Inventory (Wegner and Zanakos, 1994).^bAdapted from the National Inmate Survey (2012).^cAdapted from the Survey of Inmates in State and Federal Correctional Facilities (2004).^dDesigned for PASS.

Finally, isolation is measured by items recording social detachment and the climate of distrust within the prison (see Table A2 in the Appendix). Social detachment is indicated by questions about family contacts, receiving and sending mail, prison visits, and whether respondents are housed with a cellmate. Double celling can indicate overcrowding, but it was adopted for suicide prevention in our field site, and thus we treat it as a measure of social connection. We measured the climate of distrust, drawing on the work of Liebling (2004), by asking whether staff treated prisoners with respect, whether respondents felt they were treated as human beings, and the respondents' trust in their relationships with staff and other prisoners. The social detachment and distrust measures are dichotomized for the regression analysis.

Quantitative results

Figure 1 reports the mean level of each of the indicators of psychological distress at baseline and follow-up in the general population and in solitary confinement. Psychological distress is higher

in solitary confinement at the baseline interview compared to the general population at follow-up for 11 of the 13 indicators. For the respondents who were still in solitary at follow-up, psychological distress had increased from baseline for 7 of the 13 indicators.

Deprivation, isolation, and distress are reported in Table 4. More than half of respondents reported that the solitary confinement unit was noisy and that they were often hungry. Dinner was scheduled at 4:00 p.m. and the next meal was provided 15 hours later at 7:00 a.m. the following morning. Men housed in solitary confinement had no commissary privileges, so they were unable to supplement institutional meals with food from the prison store as they could in the general prison population.

Levels of social isolation—measured by detachment and institutional distrust—were relatively high in solitary confinement. Respondents in solitary confinement reported fewer visits, less mail, less family contact, and more single celling. (About a quarter of the sample were double-celled in solitary confinement.) Institutional distrust was also higher in solitary confinement across most indicators, but the differences tended to be small and not significant.

The scale of psychological distress was standardized for the regressions, with a mean of 0 and a SD of 1. The mean level of psychological distress was .4 of a SD higher in solitary confinement than in the general prison population. The descriptive statistics indicate notable differences between solitary confinement and the general prison population. Material deprivation and social detachment are clearly higher in solitary confinement.

Regression results for the full sample indicate that psychological distress is .420 of a SD higher in solitary confinement than in the general prison population, controlling for demographic

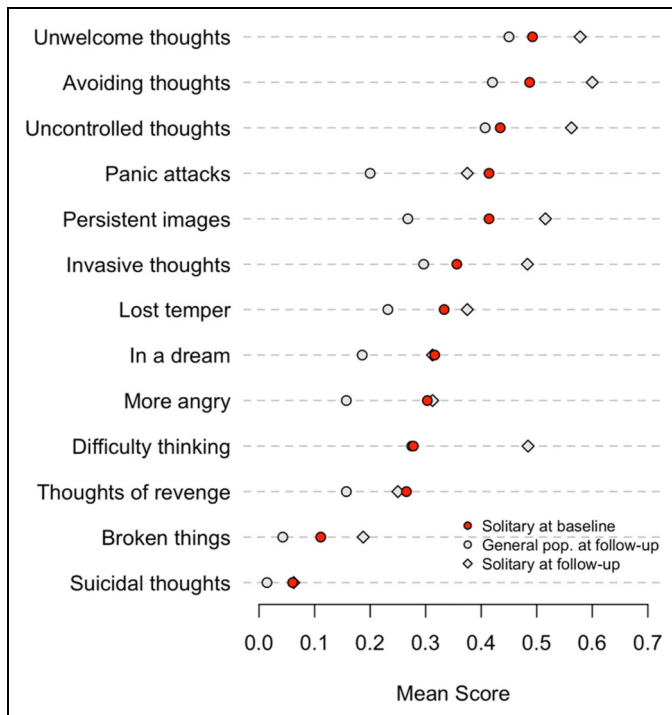


Figure 1. Mean scores on items measuring psychological distress in confinement by solitary confinement status.

Table 4. Means of measures of material deprivation, social isolation, distrust and mistreatment, and psychological distress, by solitary confinement status, Pennsylvania Solitary Study.

	At baseline: Solitary confinement (1)	At follow-up:	
		General population (2)	Solitary confinement (3)
Material deprivation			
Too noisy	0.724	0.667	0.929
Hungry	0.690	0.476*	0.714
Too hot/cold	0.437	0.524	0.429
Inadequate hygiene	0.437	0.016*	0.143*
Inadequate clothing	0.379	0.032*	0.071*
Inadequate bedding	0.310	0.317	0.071
No books	0.184	0.159	0.142
Social detachment			
No visits	0.885	0.413*	0.786
No cellmate	0.712	0.142*	0.643
No family contact	0.253	0.063*	0.143
No mail	0.207	0.063*	0.143
Institutional distrust			
Distrust prisoners	0.851	0.841	0.857
Prisoners not trusted	0.678	0.492*	0.857
Staff unsupportive	0.518	0.412	0.429
Not treated as human	0.322	0.270	0.357
Staff disrespectful	0.264	0.254	0.357
Regression variables			
Psychological distress	0.150	-0.305*	0.477
Material deprivation	0.402	0.190*	0.142*
Social detachment	0.942	0.540*	0.923
Institutional distrust	0.540	0.444	0.643
Sample size (N)	87	63	14

*Significantly different from baseline at $p < .05$ on two-tailed test.

Note: All variables are dichotomous, except psychological distress which is standardized with mean 0 and SD of 1.0.

characteristics, and baseline physical and mental health (Table 5). Controlling for material deprivation, detachment, and distrust explains most of the association between solitary confinement and mental distress, reducing the general population coefficient from $-.420$ to $-.167$ where it is no longer statistically significant. The material deprivation coefficient is not significant, but those with high levels of social detachment and institutional distrust are in significantly greater distress. In the change-score models, moving from solitary confinement to the general prison population is associated with a half SD reduction in psychological distress. In contrast to the levels model, the change-score model yields little evidence for the effects of directly measured prison conditions.

Despite the small sample size, results for the mental health subsample indicate high levels of mental distress in solitary confinement (Table 6). General population coefficients are a third to a

Table 5. Regression analysis of psychological distress in confinement, full sample, Pennsylvania Solitary Study. (Absolute *t* statistics in parentheses.)

	Level of distress		Change in distress	
	(1)	(2)	(3)	(4)
General population (follow-up)	-0.420** (4.14)	-.167 (1.22)	-0.572* (2.24)	-0.551* (2.06)
Solitary (follow-up)	0.350 (1.47)	0.340 (1.60)	—	—
Material deprivation	—	0.071 (0.39)	—	0.056 (0.32)
Social detachment	—	0.484* (2.39)	—	0.001 (0.00)
Institutional distrust	—	0.413** (2.86)	—	0.118 (0.73)
Constant	0.150 (0.56)	-0.583 (1.68)	0.183 (0.78)	0.188 (0.79)
<i>R</i> ²	0.248	0.311	0.071	0.081
No. of respondents	87	87	68	68
No. of observations	164	164	68	68

* *p* < .05 ** *p* < .01 on a two-tailed test.

Note: Models in the level specification control for age, race, and prior mental and physical health diagnoses at the baseline interview. Results for covariates are shown in Table A3 of the Appendix. Standard errors are adjusted for clustering by the respondent.

half larger for respondents with a history of mental illness compared to the full sample. In the levels specification, nearly half the gap in distress between solitary confinement and the general population is associated with material hardship and isolation. As for the full sample, prison condition effects are weaker in the change-score model for respondents with a history of mental illness. Still, the estimates indicate a large reduction in psychological distress for those leaving solitary confinement.

Specifying mechanisms with qualitative interviews

The qualitative data suggest two main mechanisms linking prison conditions to psychological distress. First, isolation produces inactivity that intensifies the stress of incarceration. Second, extreme conditions of confinement produce feelings of degradation and humiliation among the respondents. The stress of inactivity and humiliation appeared to be greatest for respondents with histories of mental illness.

Inactivity in solitary confinement

When incarceration prevented social interaction, study respondents spent long periods wrestling with boredom and inactivity. Respondents often spoke of doing little or nothing during their waking hours, struggling with lethargy, and sleeping for long periods through the day.

Table 6. Regression analysis of psychological distress in confinement, respondents with prior mental illness, Pennsylvania Solitary Study. (Absolute *t* statistics in parentheses.)

	Level of distress		Change in distress	
	(1)	(2)	(3)	(4)
General population (follow-up)	−0.845** (5.71)	−0.437** (2.06)	−0.838* (2.33)	−0.726 (1.75)
Solitary (follow-up)	0.341 (0.88)	.252 (0.77)	—	—
Material deprivation	—	0.135 (0.56)	—	0.163 (0.46)
Social detachment	—	0.789** (2.90)	—	0.165 (0.46)
Institutional distrust	—	0.523** (2.67)	—	−0.062 (0.28)
Constant	0.854** (2.81)	−.063 (0.18)	0.015 (0.04)	−0.013 (0.04)
<i>R</i> ²	0.307	0.413	0.153	0.170
No. of respondents	45	45	32	32
No. of observations	82	82	32	32

* *p* < .05 ** *p* < .01 on a two-tailed test.

Note: Models in the level specification control for age, race, and physical health diagnoses at the baseline interview. Results for covariates are reported in Table A3 of the Appendix. Standard errors are adjusted for clustering by the respondent.

Michael was a white respondent in his early thirties. He had returned to prison from a halfway house after violating the conditions of his release by relapsing to heroin use. Facing a misconduct charge for drug use, he was placed in solitary confinement for 30 days. Michael told us the most challenging thing about his day was “waking up too early.” Waking up each morning at 2 a.m. meant “having to wait four or five hours for breakfast.” Like many respondents we interviewed, Michael was regularly hungry, and hours were spent each day waiting for meals.

Sleep was an important strategy for passing time, mentioned by 45 out of 99 baseline respondents. Respondents often reported poor sleep and traced it to inactivity through the day and noise in the unit at night. Half of the respondents reported that they had trouble sleeping either “all of the time” or “most of the time.”

Michael said he was “trying to sleep through one or two days on the schedule,” but he left his cell several times a week for recreation in the small enclosed cages adjoining the solitary confinement unit. We asked him how often he left his cell for recreation: “It’s supposed to be an hour... some guys like to be out there for an hour, and then being out there for two hours in a cage just drags on.” As he spoke about his day, recreation time was just one of many small interludes that occupied his waking hours. He outlined his daily routine the day before the interview:

I washed clothes. That lasted fifteen minutes. It’s all intervals. I’m laying down, wash the clothes. Break it up. Fifteen minutes. Lay down for another hour, and then find something else to break it up. I might try my workout. Yesterday evening, I just kinda sat around. Just in my imagination. And then I walked for an hour inside my cell. Just back and forth. Just trying to burn some of that energy.

Tedium, hunger, disrupted sleep, and the dirtiness of a cellblock in which clothes and bodies were washed in a sink next to a toilet were sources of stress. Michael spoke of intrusive thoughts and images, frequent panic attacks and said he felt like he “was in a dream.” He rated his mental health just fair, the second lowest rating on a 5-point scale. We spoke to Michael 3 months later at a halfway house in Philadelphia. He called his mental health “very good,” and his sleep had returned to a normal pattern.

Michael’s experience in solitary confinement was typical. A total of 67 out of 99 respondents spoke about inactivity and lethargy. Other respondents echoed Michael’s feelings of distress under conditions of abnormal sleep, hunger, and boredom. One respondent remarked, “You are just in a cell going crazy, hoping to sleep your day away, or eat.”

Inactivity amplified feelings of loneliness reported by other respondents that followed from the loss of phone calls and family visits. Only 29% of respondents in solitary confinement said there were people in their lives they could talk to about important matters compared to 55% of respondents who had returned to the general prison population.

A young African American respondent, Elijah, had requested protective custody after being punched in the face by another prisoner in the general population. Although he felt safer in protective custody, inactivity accentuated feelings of isolation:

It’s really not much. I sit on the bed and do absolutely nothing. Sometimes I’m just doing nothing. I don’t know. I’ve never felt this. I’m not gonna lie to you, I feel abandoned and alone at the same time.

We asked Elijah how he spent his time the previous day. The morning, he said, mostly involved “staring at the wall” and his afternoon and evening was spent listening to people screaming while he sat in his cell.

The qualitative interviews suggest how the inactivity of solitary confinement interacted with mental illness. Peter, a white man in his early 30s, was a military veteran with a dependency on painkillers and diagnoses of posttraumatic stress, depression, anxiety, and bipolar disorder. We asked Peter about his anxiety and how he was managing his symptoms:

This [solitary unit] has really gotten to me because when I’m outside I’m able to interact with people, I’m able to keep my mind off the things that I’ve done in the past. But when I’m in [solitary confinement], my mind does not shut off in here. Especially the things I did overseas. I think about, “If I did this different, would that have happened?” It honestly drives me nuts.

The hours of inactivity in solitary confinement contrasted with the hour of recreation time, several times each week. Peter described his time in the small wire pens used for recreation:

You basically just walk in circles... I, on the other hand, I sneak out bread, and I feed the geese. That’s my thing. It’s very calming and relaxing. It’s nice to see some type of interaction with something else.

Peter had been unable to see a counselor for his anxiety or posttraumatic stress at the time of his baseline interview. Inactive and socially isolated, he confronted intrusive thoughts that rekindled experiences of wartime violence that were the context for his mental illness.

Dehumanization and stripping of the self

Beyond inactivity, respondents also spoke about solitary confinement as degrading and dehumanizing. Sociologists have described how inmates are stripped of personal identity by incarceration (Goffman, 1961, 21), and legal scholars have argued that imprisonment threatens human dignity (Simon, 2017). Respondents' accounts of the degradation of solitary confinement indicate how such assaults on the self are subjectively experienced.

Many in the sample asserted their status as "human beings" in a setting they felt denied their humanity. A total of 49 out of 99 respondents either asserted their humanity ("I'm human like everybody else") or likened their treatment to animals ("I feel like I'm a dog"). Material deprivation and social isolation were stressful in part because they were experienced as humiliating.

Respondents commonly spoke of being treated like animals when going to the small wire cages used for recreation (see also Rhodes, 2009, 196–197). One respondent described how degrading treatment began with the movement of prisoners from their cells to the recreation area:

You'll see guys, but they're in kennels! And I ain't no fuckin' dog. I ain't no animal, and then they handcuff guys with the little leashes on them, and they walk them out to the kennels, and lock them in the kennels, and they come down, and come on, man! Being here is humiliating enough. But to be further humiliated—I'm not going to go through it.

Another respondent found the recreation area ("the yard") so degrading that he avoided leaving his cell: "Yard is a dog cage... I'm gonna strip naked [to be searched], and then get walked to a dog cage. I don't like going out there. You're in a dog kennel."

Food too—served in small portions on a schedule mismatched to regular meal times—deepened respondents' sense of dehumanization. Meals were described as dog food, and served in quantities barely sufficient for survival. When asked if they currently get enough food, one respondent described the lack of food as a bodily assault: "You go to the hole [solitary confinement] and you starvin'. They cut your body up. It's terrible in the hole." Meals, said another respondent, were insufficient for grown men:

Sunday that just passed we had grilled cheese sandwiches, but you only get one grilled cheese sandwich. But you a grown man, you only get one grilled cheese sandwich. And, the rest, you got some water soup. Literally water soup. That's it.

Unable to supplement their diets from the prison commissary, 70% of respondents in solitary confinement reported they did not get enough food. Similar to recreation time, the inadequacy of food caused not just hunger but was felt to disrespect the humanity of those who were incarcerated.

The isolation imposed through lengthy periods of lockdown and the denial of visits and phone calls also threatened the respondents' sense of self. Describing differences between solitary confinement and the general prison population, one respondent tied dehumanization in solitary confinement to psychological distress:

I don't think that anybody should be isolated for such lengthy times as they were doing, just because human interaction is kind of like a basic necessity. And it's already taken away from us to a degree

in [general] population. And then to completely be deprived of that down here, it affects the mind a little bit, regardless of what kind of mind you possess.

The imperative for social contact was also a reason for respondents' participation in the study. At the end of each interview, we asked respondents why they had consented to an interview. Many saw the interview as an alternative to social isolation. For example, when asked why he participated in the study, one respondent replied:

Because I like to interact with people. That's what it's about. I looked that guy in the face yesterday and said, "Thanks for including me." Because this is no way to go through life, this is not what life is. Life is holding your child's hand, and life is making mistakes but not having to go to jail for it. Not minimizing what happened or anything like that. But life is just so much better than this. Like the walk between here and going back there [to the prison cell] is gonna be such a bummer. I can't describe to you. And you have no idea.

Two respondents, Peter and Elijah, who spoke about inactivity and boredom, also talked about the indignity of solitary confinement. At 20 years old, Elijah contrasted his personal vulnerability to harsh conditions of penal confinement:

I love everybody, I'm a hard lover. I love people's love pretty much. Like if you love me, I love you back and that's how it helps me live. Me not being able to do that, it's heartbreaking to me. It's tearing me down piece by piece. It hurts.

Peter reflected on imposing harsh prison conditions on people with mental illness:

I think, to be honest with you, it's very inhumane. Especially when a person with PTSD that can literally think about all the things that have happened in his life. I think there's other ways that they could punish you other than just sticking you in a cell and just leaving you by yourself.

These two respondents, vulnerable through youth and mental illness, described how the conditions of solitary confinement threatened their core identities.

Another respondent similarly described the difficulties of being a loving person during incarceration as an affront to his moral worth. When asked what it was like to be incarcerated at the baseline prison, he said:

It's tough. It's tough—it's rough. There's no sympathy, no compassion. It's just, for somebody who comes from any type of a loving background or something like that—you almost have to lose your sense of humanity. Because there is none—none demonstrated publicly.

The qualitative interviews suggest causal mechanisms explaining how material deprivation and social isolation are linked to psychological distress. Inactivity disrupts sleep, magnifies hunger, and interacts with mental illness. Harsh prison conditions also violate human dignity and personal identity.

Discussion

We explored harsh prison conditions in a framework in which incarceration denied basic needs, isolated people from supportive relationships, and created psychological distress. The analysis yields three main findings. First, as in other studies, we found high levels of psychological distress in solitary confinement, and high levels of material deprivation and social isolation compared to the general prison population. Many respondents reported intrusive thoughts, panic attacks, and feelings of anger. Solitary confinement was often described as noisy, lacking adequate food, cleanliness, and clothing. Solitary confinement also reduced family contact and fueled distrust. Incarceration inflicted mental and physical suffering, and higher levels of custody were experienced as more painful.

Second, psychological distress in solitary confinement was weakly related to material deprivation, but significantly associated with social isolation. High levels of social isolation in solitary confinement compared to the general population explained about half the elevated level of distress in solitary confinement. Psychological distress in solitary confinement was higher among men with a history of mental illness.

Third, qualitative interviews revealed that inactivity and humiliation were two mechanisms connecting the conditions of solitary confinement to psychological distress. Inactivity distorted sleep, accentuated hunger, and fueled boredom and loneliness. The routines of solitary confinement—shackling, inadequate food, and caged recreation—were felt to be degrading and assaulted the respondents' sense of self.

What are the implications for the effects of solitary confinement after prison release? There is little systematic data collection on post-release outcomes following solitary confinement. Related research reports higher rates of recidivism at higher levels of prison security (cf. Wildeman and Andersen, 2020). Similar to other studies, we found that psychological distress was higher in solitary confinement than in the general prison population (Reiter et al., 2020). However, the current design cannot illuminate either long-term effects or the effects of long-term solitary confinement. Assessing effects either years after solitary confinement or for long periods of solitary confinement requires longer term follow-up.

Despite evidence of elevated distress, the difference between solitary confinement and the general prison population may be underestimated for at least two reasons. First, although the response rate was high, prison staff directed us to those they regarded as more manageable. Sample selection may have underrepresented respondents with serious mental illness. Second, given the short, 3-month period between baseline and follow-up, distress recorded at baseline may have persisted to follow-up, reducing the observed difference between solitary confinement and general population.

Although our analysis includes information about material deprivation and social isolation from 21 different prisons at the follow-up interview, other jurisdictions may yield different findings. The heterogeneity of penal institutions indicates the need for data on prison conditions at a large scale (Foster, 2016). Some large-scale data collections are already conducted by the Bureau of Justice Statistics (Groves and Cork, 2009). Our survey instruments could be used to measure distressing and harmful conditions in other prisons.

The current data come from a small sample originating at one state prison, but the hardships we observed resulted from processes that characterize incarceration in general. These hardships were not linked to misconduct or abuse by prison staff. Instead, material deprivation, social isolation, and psychological distress resulted from the daily routines and functioning of a unit whose


purpose was an extreme level of penal custody. When human needs are met through bureaucratic procedures under intense power relations, basic well-being along the dimensions of hunger, hygiene, sociability, and mental health are at risk.

Public policy governing prisons sometimes appeals to a principle of human dignity that conditions of incarceration should not infringe (Simon, 2017). Some punishments are so severe as to be inherently degrading, threatening an individual's personal integrity and membership in a community (Simon, 2017). The evidence here suggests that human dignity is not just inferred from the objective conditions of incarceration, but is also experienced subjectively. Harsh conditions of penal confinement create great stress and are experienced as degrading. These threats to human dignity appear to be woven into the structure of solitary confinement itself, where material deprivation, social isolation, and psychological distress are commonplace.

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Appendix

Measuring psychological distress, material deprivation, and social isolation in Pennsylvania prisons

Psychological distress. Grassian's (1983; 2006) work on Special Housing Unit (SHU) syndrome is a starting point for much of the contemporary research on psychological distress in solitary confinement. Through clinical assessment, he identified seven distinct domains of symptoms of SHU syndrome, the psychological symptoms presented by men housed in the SHU of the Massachusetts state prison at Walpole. The syndrome consisted of (1) hyperresponsivity to external stimuli; (2) perceptual distortions, illusions, and hallucinations; (3) panic attacks; (4) difficulties with thinking, concentration, and memory; (5) intrusive obsessional thoughts; (6) overt paranoia; and (7) problems with impulse control (Grassian, 2006, 335–336). Recent studies of psychological distress in solitary confinement have relied on a variety of validated instruments that used clinical ratings and self-report inventories to measure psychological distress (e.g. Reiter et al., 2020; O'Keefe, 2010). Like the Brief Psychiatric Rating Scale, instruments often adapted diagnostic tools used with psychiatric patients and were designed to indicate psychosis and other serious mental illness (e.g. Reiter et al., 2020).

Our measurement of psychological distress was guided by two main considerations. First, we aimed to measure the symptoms associated with SHU syndrome specifically, and not a broader range of mental health problems. Second, our research team consisted of trained interviewers not clinicians, so our data collection had to rely on self-reported symptoms rather than clinical assessment. The items making up the scale of psychological distress were adapted from existing validated self-report scales in each of the domains identified with SHU syndrome. To obtain greater variation, we collected data on the period prevalence in each symptom area, asking respondents about their experiences in the last 3 months and the last year. The reported scale was based on the 3-month prevalence. The psychological distress items were measured at baseline and follow-up.

Material deprivation. The survey measured conditions of confinement with questions that asked about the sufficiency of food, whether food was withheld as punishment, the noise level on the unit, the air temperature on the unit, sufficiency of bedding in the cells, the availability of clean clothing, the availability of toiletries, the availability of books, and out-of-cell time. We chose to measure these physical conditions of incarceration guided by three considerations: prior research,

Table A1. Questions used for scale of material deprivation.

1.	Is the noise ever uncomfortable or painful?
2.	Do you currently have enough food?
3.	Are you satisfied with the temperature of your cell?
4.	Do you currently have adequate supplies to maintain personal hygiene?
5.	Do you currently have enough bedding?
6.	Do you currently have enough clean clothing?
7.	Do you currently have any books or other reading materials

particularly field studies that identified potentially harmful conditions of incarceration (e.g. Cohen and Taylor, 1972; Reiter, 2016; Sykes, 2007; Toch, 1977); survey research using the Survey of Inmates of State and Federal Correctional Facilities; and our own field experience conducting research in prisons. We used questions in all these domains to construct a measure of material deprivation, except time out of cell. Once in the field, we saw that there was a volitional component to spending time out of the cell, and not all respondents left their cells for recreation or showers. The questions used to construct the material deprivation scale are shown in Table A1. The questions on material deprivation were administered at baseline and follow-up.

Social isolation

Social isolation was measured by scales for institutional distrust and social detachment. Questions for the scales for institutional distrust and social detachment are shown in Table A2. The scale for social detachment was based on a set of questions that collected information about meeting with visitors, religious visits (e.g. meeting with a chaplain or imam), receiving mail, having any contact with family, having a cellmate, and a set of questions on social networks in prison. The social detachment scale combines questions on visitors, family contact, receiving mail, and having a cellmate. Religious visits were uncommon in our field site and this question yielded very little variation. The dichotomized network question was split more evenly (39% of responses reported having someone that talked to about important things) and was correlated with solitary

Table A2. Questions measuring social isolation during incarceration.

Questions on social detachment:	
1.	Have you met with any visitors since entering RHU/since the last interview
2.	How often do you send or receive mail?
3.	Do you currently have a cellmate/cellie
4.	Are you in contact with your family
Questions on institutional distrust:	
5.	Staff address and talk to me in a respectful manner
6.	I am treated as a human being in here
7.	This prison is good at placing trust in inmates
8.	I receive support from staff in this prison when I need it
9.	My experience of imprisonment in this prison has been stressful
10.	I trust the other inmates in here

confinement status ($r = -.25$), but did not correlate highly with other measures of social isolation, so it was omitted from the scale.

The institutional distrust scale was designed to measure the quality of social relationships inside prisons related to feelings of safety, trust, and humane treatment. A variety of survey of instruments has been developed to measure the quality of these relationships (Ross et al., 2008, 448–455, discusses this research). We drew on a set of questions developed by Liebling (2004) to measure prison climate. Our survey instrument included six questions on respectful treatment by staff, humane treatment, trust extended by the prison to prisoners, staff support, trust of other prisoners, and stress in prison. Our scale used five questions but dropped the question on whether prison was stressful. The question about prison stress, unlike the others, did not directly ask about social relationships and was conceptually similar to the outcome of interest, psychological distress. Questions on social detachment and institutional distrust were administered at baseline and follow-up interviews.

Table A3. Results for covariates in regression analyses of psychological distress in prison are shown in Tables 5 and 6, Pennsylvania solitary study. (Absolute t statistics in parentheses.)

	Table 5 Model:		Table 6 Model:	
	(1)	(2)	(1)	(2)
Black	-.313 (1.57)	-.259 (1.32)	-.737 (2.40)	-.714 (2.63)
Latino	.098 (.33)	.098 (.33)	-.262 (.84)	-.252 (.95)
Age (years)	-.010 (1.64)	-.011 (1.69)	-.002 (.26)	-.005 (.59)
Chronic conditions	.461 (2.46)	.428 (2.38)	.372 (1.54)	.357 (1.67)
Prior mental illness	.513 (2.78)	.611 (3.48)	—	—