American Journal of
Preventive Medicine

RESEARCH ARTICLE

Impact of a Prison Therapeutic Diversion Unit on Mental and Behavioral Health Outcomes

Molly Remch, MPSH,[1] Charles Mautz, MA,[2] Emily G. Burke, BS,[2] Gary Junker, PhD,[2] Andrea Kaniuka, MA,[3] Scott Proescholdbell, MPH,[4] Stephen W. Marshall, PhD,[1,5] Rebecca B. Naumann, PhD[1,5]

Introduction: Incarcerated individuals with mental health disorders are disproportionally sent to restrictive housing (i.e., solitary confinement), which is known to have deleterious impacts on mental health. In response, North Carolina's prison system developed Therapeutic Diversion Units, treatment-oriented units for incarcerated individuals with high mental health needs who cycle in and out of restrictive housing. This analysis compares the impact of restrictive housing and Therapeutic Diversion Units on infractions, mental health, and self-harm among incarcerated individuals.

Methods: Data were 2016–2019 incarceration records from North Carolina prisons. Outcomes were rates of infractions, inpatient mental health admissions, and self-harm in restrictive housing and Therapeutic Diversion Units. Inverse probability of treatment weights was used to adjust for confounding, and Poisson regression with generalized estimating equations was used to estimate adjusted rate ratios. Analyses were conducted between January and December 2020.

Results: The analytic sample was 3,480 people, of whom 463 enrolled in a Therapeutic Diversion Unit. Compared with Therapeutic Diversion Unit rates, the rate of infractions was 3 times as high in restrictive housing (adjusted rate ratio=2.99, 95% CI=2.31, 3.87), the inpatient mental health admissions rate was 3.5 times as high (adjusted rate ratio=3.57, 95% CI=1.97, 6.46), and the self-injury incident rate was 3.5 times as high (adjusted rate ratio=3.46, 95% CI=2.11, 5.69).

Conclusions: Therapeutic Diversion Unit use had strong impacts on infractions, mental health, and self-harm. Therapeutic Diversion Units provide a promising alternative to restrictive housing for individuals with mental health disorders.

Am J Prev Med 2021;61(5):619–627.

INTRODUCTION

Incarcerated individuals have disproportionately high levels of mental health disorders,[1] which can be worsened by incarceration. Mental illness is frequently exacerbated by conditions of confinement, such as placement in restrictive housing.[2–4] Restrictive housing (often referred to as solitary confinement, administrative or disciplinary segregation, and supermax)[5] refers to situations in which an incarcerated person is isolated in a cell with limited access to programming, treatment, personal property, reading materials, radio, TV, and visitation.[6]

From the [1]Department of Epidemiology, Gillings School of Global Public Health, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; [2]Division of Adult Correction and Juvenile Justice, North Carolina Department of Public Safety, Raleigh, North Carolina; [3]Department of Public Health Sciences, College of Health and Human Services, The University of North Carolina at Charlotte, Charlotte, North Carolina; [4]Division of Public Health, North Carolina Department of Health and Human Services, Raleigh, North Carolina; and [5]UNC Injury Prevention Research Center (IPRC), The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

Address correspondence to: Molly Remch, MPSH, Department of Epidemiology, UNC Gillings School of Global Public Health, The University of North Carolina at Chapel Hill, CB# 7435, Chapel Hill NC 27599. E-mail: mremch@email.unc.edu.

0749-3797/$36.00
https://doi.org/10.1016/j.amepre.2021.05.023

Individuals with mental health disorders are disproportionately assigned to restrictive housing—often as a consequence of behaviors that may in fact be manifestations of symptoms of these conditions—which is of concern given the negative impacts of restrictive housing assignment on mental health.[3,4] Meta-analyses estimate that individuals with mental illness are 1.3–1.6 times more likely to be assigned to restrictive housing than individuals without such illness, typically as consequence of misbehavior.[7,8] A recent study in Washington state correctional facilities found that people in restrictive housing had more symptoms of depression and anxiety and more psychiatric distress than peers in the general prison population.[5] The study also found that restrictive housing contributed to feelings of dehumanization and loss of identity. As a result, incarcerated people with mental health disorders may become caught in a cycle of decompensation where restrictive housing assignment leads to worsening mental health and behaviors that result in a subsequent restrictive housing assignment.[9]

Exposure to restrictive housing is associated with not only worsening mental health but also worsening physical health, including self-injury.[10] Individuals in restrictive housing experience hyper-responsivity to external stimuli, affective disturbances, impulse control problems, and aggression.[11–13] Continued research has shown further associations between assignment to restrictive housing and higher rates of suicidal ideation and self-injury/self-mutilation.[5,14–19] North Carolina (NC) prisons data have repeatedly shown over many years that nearly half of all incidents of self-injury occurred during restrictive housing (North Carolina Department of Public Safety, unpublished data, 2020).[20]

In response, some jurisdictions have developed therapeutic programs to divert individuals, particularly those with serious mental illness, from restrictive housing. These include programs in the Colorado, Pennsylvania, and Virginia Departments of Corrections and in New York City and Broward County, Florida jails.[21–23] Common elements across these programs are increased out-of-cell time, therapeutic and recreational programming, and mandatory staff training on mental health and crisis intervention. New York City's program has documented reductions in self-injurious behavior.[22] However, published research evaluating the effectiveness of many of these programs is scant. Therefore, there is a need for formal and rigorous evaluation of therapeutic alternatives to restrictive housing.

To reduce the long-term use of restrictive housing for individuals with mental illness in NC prisons, the NC Department of Public Safety (NC DPS), Adult Correction and Juvenile Justice, Division of Prisons developed Therapeutic Diversion Units (TDUs). TDUs, first implemented in 2016, are multidisciplinary treatment units designed to decrease incidents involving violence, self-harm, and behavioral problems and to enhance the care and custody of individuals with mental illness. TDUs are focused on helping participants develop effective emotional regulation and self-management skills, understand their symptom presentation and patterns, and prepare for re-entry into a less restrictive environment within the prison and ultimately into the community. Treatment curricula incorporate evidence-based approaches such as cognitive behavioral therapy and are focused on psychological and emotional health, physical well-being, relationship building, and social skills development.

Admissions to TDUs are primarily driven by behavioral health clinical staff. Although factors including recent violence or disruptive behavior, length of time spent in restrictive housing, and length of time remaining on sentences are considered, primary eligibility criteria are current placement in restrictive housing and severity of mental illness. The restrictive housing criterion is most commonly met by admitting offenders from Restrictive Housing for Control Purposes, a long-term restrictive housing assignment used when individuals pose repeated disruption, threats to the safety of staff or others, or threats to safe and secure facility operations. Mental illness severity is subject to clinical interpretation, but NC DPS defines *serious mental illness* in its Health Care Policy Manual as "any diagnosed mental disorder (excluding substance abuse disorders) currently associated with serious impairment in psychological, cognitive, or behavioral functioning that substantially interferes with the person's ability to meet the ordinary demands of living and requires an individualized treatment plan by a qualified mental health professional(s)."[24] Once admitted to a TDU, offenders' housing, treatment, and opportunity for advancement through the program are guided by a program manual; however, treatment plans and interventions are individualized according to the offenders' needs and response to treatment. Program progression involves treatment in 3 sequential phases, each offering programming opportunities and incremental increases in unrestrained out-of-cell activity. Treatment is supplemented by an incentive program to afford participants opportunities to earn rewards for positive engagement in the program. This evaluation of the TDU program agrees with the NC DPS, Division of Prisons Strategic Plan 2020–2024.[25] The objective of this analysis is to examine the program's impact on infractions, inpatient mental health admissions, and self-injury outcomes compared with the impacts of placement in restrictive housing.

METHODS

Study Sample

Incarceration data were from the NC DPS. Data included demographic (e.g., date of birth, sex, race, ethnicity) and incarceration-related (e.g., dates of prison entry and [if applicable] exit, number and types of infractions throughout incarceration, mental health grades throughout incarceration, dates of restrictive housing and TDU placements) variables. NC DPS shared data on all incarcerations for adults in the NC DPS system who were released from incarceration between 2000 and 2018 and for all adults who were admitted to a TDU.

Measures

To study the effect of TDUs on outcomes of interest, this analysis compares the time spent in TDUs with TDU-eligible time spent in restrictive housing, referred to as exposure in the remaining part of this paper. A person could contribute person-time to both exposures but could not contribute any person-time after the completion of an initial TDU assignment. During the study period, few people (7%) had a repeat TDU exposure.

Consistent with TDU enrollment guidelines, TDU-eligible days in restrictive housing are days spent in restrictive housing, on or after May 1, 2016, when an adult had a mental health grade ≥3 (M3+) on a 5-point scale, with higher scores indicating more mental health needs. More information about mental health grades can be found below. Once a person became TDU eligible, they could become ineligible if their mental health grade dropped to M1 or M2 while in restrictive housing (in <5% of restrictive housing episodes with M3+ does the individual become M1 or M2 during restrictive housing) or if they entered the general prison population. They could resume contributing person-time if their mental health grade increased to M3+ and they were in restrictive housing.

Individuals could also accrue time in a TDU. Again, consistent with TDU enrollment guidelines, TDU person-time occurred in TDU among people who had spent ≥1 day in restrictive housing during that incarceration and began their TDU assignment with a mental health grade of M3+ (representing 89% of initial TDU admissions). Only days accrued during an initial TDU admission were included. All follow-up time was censored on April 30, 2019. Figure 1 shows a schematic of person-time allocation.

Three categories of outcomes were assessed. Outcome categories were rates of infractions, inpatient mental health admissions, and self injury-related incidents and events during TDU-eligible restrictive housing and TDU.

In NC DPS records, infractions are assigned and then adjudicated internally. Only infractions that were upheld as guilty are included in the analysis. Each infraction is assigned a unique code with the prefix A, B, or C.[24] Codes roughly translate to the severity of the infraction. A-level infractions include holding a hostage, participating in a riot, and assault on an inmate or staff. B-level infractions include property damage, sale or misuse of medications, and disobeying an order. C-level infractions include theft of property and verbal threats. Outcomes were rates of infractions overall and by infraction type (i.e., A, B, and C) per person-time in each level of exposure.

Using a 5-level mental health grade scale, NC DPS regularly assesses the mental health of incarcerated individuals. Grades are assigned only by mental health clinicians and are changed as necessary to reflect the current service need. An M1 grade indicates no current need for behavioral health treatment, whereas an M5 represents someone who is acutely mentally ill or suicidal and requires monitoring and treatment around the clock. An individual with an M5 grade assignment is placed in an inpatient mental health treatment unit, owing to a severe mental health crisis that requires the highest acuity of care. Rates of M5 events per person-time in each level of exposure were calculated.[26]

Incidents of suspected, reported, or observed self-injury or suicidal behavior in NC DPS prisons are reported directly to mental health clinicians. After any necessary medical intervention, clinicians subsequently conduct an assessment, including detailing risk factors, ideation or intent, and any actualized self-injurious behavior. For this outcome, analyses only included person-time on or after September 1, 2016, when a systematic collection of self-injury data through the prisons' electronic health record system began. A self-injury–related incident was any self-injury event or communication of intent to self-injure. A self-injury event was an actualized self-harm event. For both outcomes, rates were calculated per person-time per level of exposure.

Statistical Analysis

The prevalence of demographic and incarceration-related characteristics of individuals included in the analytic cohort are stratified by person-time contributed to each exposure level. Unadjusted rate ratios and adjusted rate ratios (ARRs) were calculated using Poisson regression with a generalized estimating equations approach to account for the correlation within individuals who contribute person-days during multiple exposure periods.

Inverse probability of treatment weights, stabilized by the probability of exposure in the numerator of the weights, were used to adjust for confounding. Selection of variables used to construct weights was informed by a directed acyclic graph (Appendix Figure 1, available online). The variables used in the weights, measured at the beginning of each eligible time period, were sex, current mental health grade, number of days with a mental health grade of M3+ divided by days in that incarceration, number of days in restrictive housing divided by days in that incarceration, number of infractions divided by days in that incarceration, number of days left of their incarceration, and highest substance use treatment recommendation to date during that incarceration. Appendix Table 1 (available online) shows variable balance after weighting. Statistical analyses were performed in SAS, version 9.4, in 2020. This study was approved by The University of North Carolina at Chapel Hill's IRB and the NC DPS.

RESULTS

A total of 3,480 people across 3,584 incarcerations in NC prisons contributed person-time (Table 1). A total of 3,406 people across 3,499 incarcerations contributed person-time while TDU eligible in restrictive housing. A total of 463 people contributed person-time while enrolled in a TDU. There were a total of 367,693 person-days, 80.9% in restrictive housing and 19.1% in a TDU.

Most person-days were contributed by people who were aged 26–50 years and male. Equal numbers were

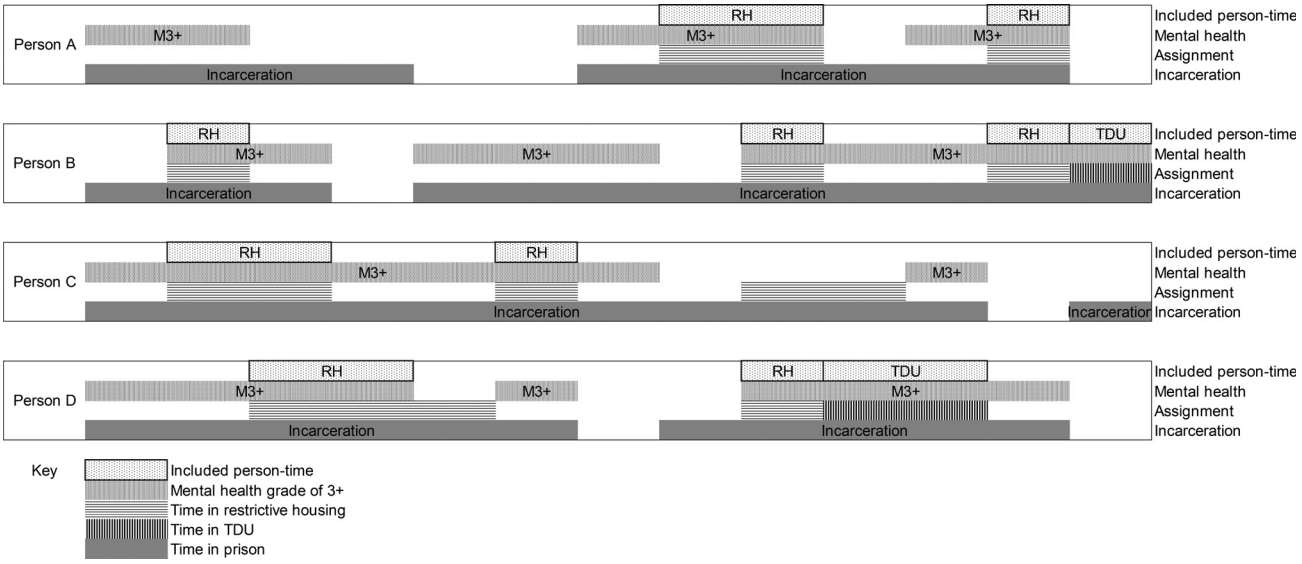

Figure 1. Sample timeline of 4 hypothetical persons.

Note: The dark gray at the bottom indicates when each person was incarcerated in a North Carolina prison. Above the dark gray, the horizontal stripes indicate the time spent in restrictive housing, and vertical stripes indicate the time spent in a TDU. Densely packed dots indicate a mental health score of M3+. Finally, the outlined sparse dots on the top row indicate the included person-time; this could be TDU-eligible person-time in RH or the actual time spent in a TDU. Person A is incarcerated twice during the study period. During their first incarceration, they experience some time with M3+ but no time in either RH or TDU, so no person-time from their first incarceration is included in this analysis. During their second incarceration, they are in RH 2 times, and during the entirety of both RH episodes, they have M3+, and so all person-time from both RH episodes are included in this analysis. However, Person D has an M3+ during the first portion of their first RH episode but not during the latter portion of the episode. Therefore, Person D does not contribute person-time from the latter portion of their first RH episode.

RH, restrictive housing; TDU, Therapeutic Diversion Unit.

contributed by non-Hispanic White and non-Hispanic Black individuals. About half of person-days were contributed by individuals who reported their family SES as low income or in poverty when they entered prison, and about one third were contributed by individuals who, according to NC DPS, needed intermediate or long-term substance use disorder treatment. The mean number of days incarcerated was 1,376.2 (median=741.0) days for TDU-eligible individuals in restrictive housing and 1,634.0 (median=886.0) days for those enrolled in a TDU.

At initiation of a new restrictive housing episode, individuals had spent, on average, 576.5 (median=172.0) previous days in restrictive housing between incarceration and the episode, for a rate of 328.6 (median=262.9) previous days in restrictive housing per 1,000 days incarcerated. At initiation of a TDU episode, individuals had spent, on average, 633.4 (median=288.0) days in restrictive housing, for a rate of 435.6 (median=392.9) days in restrictive housing per 1,000 days incarcerated.

During restrictive housing and in TDUs, the rates of all infractions were 30.40 (95% CI=29.17, 31.69) and 12.35 (95% CI=10.50, 14.53) infractions per 1,000 person-days, respectively (Table 2). After adjustment for confounding, the rate of all infractions in restrictive housing was 3 times the rate in TDU (ARR=2.99, 95% CI=2.31, 3.87). This relationship was more pronounced among A-level infractions (ARR=5.22, 95% CI=3.97, 6.87).

In restrictive housing and in TDUs, the rates of M5 inpatient mental health admissions were 1.09 (95% CI=0.94, 1.26) and 0.25 (95% CI=0.16, 0.39) per 1,000 person-days, respectively (Table 2). After adjustment, the rate of M5 events remained greater while in restrictive housing than while in TDUs (ARR=3.57, 95% CI=1.97, 6.46).

In restrictive housing, the rate of self-injury–related incidents was 4.85 incidents per 1,000 person-days (95% CI=4.31, 5.46); in TDUs, the rate was 1.45 incidents per 1,000 person-days (95% CI=0.99, 2.12) (Table 2). The adjusted rate of self-injury–related incidents in restrictive housing was 3.5 times the rate in TDUs (ARR=3.46, 95% CI=2.11, 5.69). Similarly, the rate of self-injury events in restrictive housing was about 4 times the rate in TDUs (ARR=4.25, 95% CI=2.03, 8.88).

DISCUSSION

Individuals incarcerated in NC prisons who were eligible for TDU or enrolled in TDU spent nearly a third of their

Table 1. Characteristics of Person-Days Contributed by Study Sample in NC Prisons, 2016–2019

Variables	Total	RH	TDU
Number of people	3,480	3,406	463
Number of incarcerations	3,584	3,499	463
Total days (%)	367,693 (100.0)	297,420 (80.9)	70,273 (19.1)
Percentage of person-days			
Age, years[a]			
18–25	20.2	18.9	25.5
26–50	73.1	74.7	66.6
≥51	6.7	6.4	7.9
Sex[b]			
Male	91.4	92.5	86.9
Female	8.6	7.5	13.1
Race[b,c]			
White, non-Hispanic	43.2	42.8	44.6
Black, non-Hispanic	51.3	51.6	49.7
Hispanic	2.0	1.9	2.4
Others	3.6	3.7	3.3
Self-report individual SES[b,d]			
High income	0.9	0.9	1.3
Middle income	32.4	32.4	32.3
Low income	54.0	54.0	54.0
Poverty	12.7	12.8	12.5
Self-report family SES[b,d]			
High income	1.2	1.2	1.5
Middle income	48.0	47.5	50.0
Low income	44.4	45.1	41.3
Poverty	6.4	6.2	7.2
Employment at arrest[b,d]			
Employed	37.9	37.9	38.5
Unemployed	62.2	62.1	62.5
Highest level of education completed[b,c]			
<12 years	81.7	82.1	79.8
12 years	18.2	17.8	20.1
13–15 years	0.0	0.0	0.0
≥16 years	0.1	0.1	0.1
Substance use disorder treatment recommendation[e]			
None	58.1	60.1	49.7
Education	7.0	6.9	7.5
Intermediate or intermediate/long-term	26.1	25.2	30.2
Long-term	8.7	7.8	12.6
Conviction[f]			
Acts leading to death or intending to cause death	18.5	17.9	20.9
Acts causing harm or intending to cause harm to the person	12.1	12.2	11.7
Injurious acts of a sexual nature	9.5	9.0	11.7
Acts of violence or threatened violence against a person that involve property	16.4	16.2	17.0
Acts against property only	10.9	10.9	10.8
Acts involving controlled substances	4.6	4.5	5.1
Acts involving fraud, deception, or corruption	2.7	2.6	3.1
Acts against public order and authority	2.0	2.1	1.5

(*continued on next page*)

Table 1. Characteristics of Person-Days Contributed by Study Sample in NC Prisons, 2016–2019 (*continued*)

Variables	Total	RH	TDU
Acts against public safety and national security	2.2	2.1	2.6
Acts against the natural environment or against animals	0.0	0.0	0.0
Other criminal acts not elsewhere classified	19.5	20.6	14.9
Unknown	1.8	2.0	0.9
Gang affiliation[g]			
None	87.5	87.5	85.6
V1	0.5	0.5	0.7
V2	1.0	0.9	1.0
V3	11.0	11.1	10.7
Facility[a]			
Central prison[h]	12.1	9.2	24.5
Maury Correctional Institution[h]	19.6	18.9	22.5
NC Correctional Institution for Women[h]	6.6	5.0	13.0
Foothills Correctional Institution[h]	3.2	1.7	10.0
Polk Correctional Institution[h]	3.9	1.8	12.7
Other men's facility	52.4	60.9	16.7
Other women's facility	2.1	2.5	0.4
Mean (25th percentile, median, 75th percentile) among person-days contributed			
Number of previous incarcerations[b,i]	2.8 (1.0, 2.0, 4.0)	2.9 (1.0, 2.0, 4.0)	2.3 (0.0, 1.0, 4.0)
Number of infractions/1,000 days incarcerated[i,j]	22.7 (8.1, 15.1, 28.3)	24.6 (8.1, 15.4, 29.2)	19.1 (7.8, 13.7, 24.9)
Number of days incarcerated in current period of incarceration[i,j]	1,425.4 (253.0, 770.0, 1,977.0)	1,376.2 (235.0, 741.0, 1,940.0)	1,634.0 (342.0, 886.0, 2,099.0)
Expected days left of current incarceration[a,i,k]	983.0 (308.0, 718.0, 1,172.0)	983.1 (301.0, 728.0, 1,169.0)	982.7 (318.0, 695.0, 1,203.0)
Days with mental health Grade 3+ (M3+)/1,000 days incarcerated[i,j]	708.2 (500.0, 849.5, 972.1)	708.9 (502.4, 848.2, 970.1)	705.2 (474.7, 856.2, 978.0)
Days in RH[i,j]	587.4 (35.0, 198.0, 693.0)	576.5 (29.0, 172.0, 695.0)	633.4 (107.0, 288.0, 659.0)
Days in RH/1,000 days incarcerated[i,j]	349.0 (96.7, 288.2, 564.0)	328.6 (80.0, 262.9, 533.7)	435.6 (199.4, 392.9, 698.2)

[a]Calculated at the beginning of each eligibility period.
[b]Measured at the beginning of the relevant incarceration period.
[c]Data missing for people who, combined, contribute <1% of person-days.
[d]Data missing for people who, combined, contribute <5% of person-days.
[e]Substance use disorder treatment recommendation made by NC DPS on the basis of structured assessments, with the length of recommended treatment based on disorder severity.
[f]Based on Classification of Crime for Statistical Purposes (short version) presented in National Academies of Sciences, Engineering, and Medicine. *Modernizing Crime Statistics: Report 1: Defining and Classifying Crime*. Washington, DC: The National Academies Press; 2016. https://doi.org/10.17226/23492.
[g]The highest level of gang affiliation recorded in the prison record during this incarceration by the beginning of the eligibility period. The lowest level of gang affiliation, called affiliate is not represented in this table owing to incomplete information about timing. V1–V3 levels roughly translate to the degree of involvement in a gang and DPS's assessment of potential for disruption of the secure and orderly operation of the prison where V1 poses the least threat, and V3 poses the greatest.
[h]During dates that TDU was operational.
[i]As illustrated by means and medians, many continuous variables had skewed distributions. Ranges for these variables are as follows: number of previous incarcerations (total: 0–45; RH: 0–45; TDU: 0–26); number of infractions per 1,000 days incarcerated (total: 0–3,000; RH: 0–3,000; TDU: 0–147.1); number of days incarcerated (total: 1–15,010; RH: 1–15,010; TDU: 31–11,236); expected days left of current incarceration (total: 1–4,395; RH: 1–4,395; TDU: 4–4,263); days with mental health Grade 3+ (total: 0–1,000; RH: 0–1,000; TDU: 9–1,000); days in RH (0–9,062; RH: 0–8,682; TDU: 0–9,062); and days in RH per 1,000 days incarcerated (total: 1–1,000; RH: 1–1,000; TDU: 1–1,000).
[j]Describes events or days between the start of the incarceration and the start of the eligibility period.
[k]Calculated as days until planned release, if such a date existed in the record and had not yet passed. Otherwise, it was calculated as the days until the person was released, and finally, if no meaningful planned release date was in the record and the person has not been released, this was calculated as the difference between the number of days incarcerated and the median length of incarceration for people who were charged with the same primary charge and who had been incarcerated at least as long as this person.
DC, District of Columbia; DPS, Department of Public Safety; NC, North Carolina; RH, restrictive housing; TDU, Therapeutic Diversion Unit.

Table 2. Rates of Mental and Behavioral Health Outcomes Among People in NC Prisons, 2016–2019

Variables	Rate per 1,000 person-days	Unadjusted rate ratio (95% CI)	Adjusted[a] rate ratio (95% CI)
Infractions			
Any infraction			
Restrictive housing	30.40 (29.17, 31.69)	2.46 (2.09, 2.89)	2.99 (2.31, 3.87)
TDU	12.35 (10.50, 14.53)	1.00 (ref)	1.00 (ref)
A-level infractions[b]			
Restrictive housing	8.18 (7.78, 8.61)	4.32 (3.55, 5.28)	5.22 (3.97, 6.87)
TDU	1.89 (1.55, 2.31)	1.00 (ref)	1.00 (ref)
B-level infractions[b]			
Restrictive housing	18.23 (17.33, 19.19)	2.21 (1.82, 2.69)	2.60 (1.91, 6.87)
TDU	8.24 (6.79, 10.00)	1.00 (ref)	1.00 (ref)
C-level infractions[b]			
Restrictive housing	3.99 (3.67, 4.33)	1.80 (1.39, 2.32)	2.51 (1.85, 3.40)
TDU	2.22 (1.74, 2.84)	1.00 (ref)	1.00 (ref)
Inpatient mental health admissions			
M5 events			
Restrictive housing	1.09 (0.94, 1.26)	4.37 (2.74, 6.97)	2.57 (1.97, 6.46)
TDU	0.25 (0.16, 0.39)	1.00 (ref)	1.00 (ref)
Self-harm			
Self-injury–related incident[c,d]			
Restrictive housing	4.85 (4.31, 5.46)	3.35 (2.27, 4.95)	3.46 (2.11, 5.69)
TDU	1.45 (0.99, 2.12)	1.00 (ref)	1.00 (ref)
Self-injury event[c]			
Restrictive housing	2.39 (2.01, 2.85)	3.84 (2.32, 6.36)	4.25 (2.03, 8.88)
TDU	0.62 (0.38, 1.01)	1.00 (ref)	1.00 (ref)

[a]Adjusted for one's sex, their mental health grade, the number of days they had a mental health Grade ≥3 up to that point/days incarcerated that incarceration, the number of days they had been in restrictive housing up to that point/days incarcerated that incarceration, the number of infractions/days incarcerated that incarceration, the number of days left in their incarceration period, and their highest substance use disorder treatment recommendation to date during that incarceration.
[b]Infractions were recoded for consistency across the study period and reflect a releveling of infractions that NC DPS put into effect on July 17, 2017. A, B, and C levels are intended to categorize infractions from the most severe to the least severe. A-level infractions include assault of an inmate or staff and substance possession. B-level infractions include property damage and disobeying an order. C-level infractions include theft and verbal threat.
[c]Analyses of self-injury were restricted to person-time on or after September 1, because that is when NC DPS began systematically capturing these data.
[d]A self-injury incident was any actualized attempt to or communication of intent to self-injure.
DPS Department of Public Safety; NC, North Carolina; TDU, Therapeutic Diversion Unit.

incarceration, on average, in restrictive housing. Furthermore, for more than half of their incarceration, they had a mental health grade of M3+, indicating sustained, high levels of mental health needs. These results are expected because the definition of TDU eligibility is intended to capture individuals with high mental health needs and who have spent extended periods in restrictive housing, particularly in Restrictive Housing for Control Purposes. Given the extensive literature on the deleterious effects of restrictive housing on mental health, physical health, mortality, and recidivism,[2–5,10–19,27–29] a program such as a TDU that diverts individuals away from repeated restrictive housing episodes into a therapeutic treatment-oriented unit has the potential to fill a critical need in prison systems.

This study found strong associations between TDUs and reduced rates of infractions, inpatient mental health admissions, and self-harm outcomes when compared with the associations with restrictive housing. Compared with TDUs, the rate of infractions in restrictive housing was about 3 times as high, the rate of specifically A-level infractions was 5 times as high, the rate of inpatient mental health admissions was 4 times as high, the rate of self-injury–related incidents was about 3.5 times as high, and the rate of self-injury events was 4 times as high. This suggests that the TDU environment may help prevent behavioral infractions, particularly the more severe A-level infractions, mental health crises, and self-harm.

The evaluation of the Clinical Alternatives to Punitive Segregation program in New York City jails compared self-harm outcomes while in that program with outcomes during a modified restrictive housing program with an incentive structure in which individuals could earn up to 4 hours a day out of their cells.[22] Individuals

who experienced both programs during a single incarceration had nearly 5 times the rate of self-harm while in the modified restrictive housing program as the rate while in the therapeutic program. These results are similar to the present findings and further support the use of therapeutic alternatives to restrictive housing for individuals with mental illness. However, this analysis expanded on their work by including analyses of inpatient mental health admissions and infractions, controlling for confounding, utilizing a larger sample size, and accounting for correlation within individuals who contribute time during multiple exposure periods.

Generally, rates of infractions were higher in restrictive housing than in TDUs. In the Broward County Jail in Florida, individuals had similar numbers of incident reports while in closed single-cell confinement, akin to that found for restrictive housing in the current analyses, and while in a Transitional Unit.[21] However, that analysis did not adjust for confounders nor for the length of time in each program. The present analysis builds on this previous study in methodologic rigor. Taken together, these findings suggest that systematic movement of individuals from restrictive housing into therapeutic alternative programs in a less restricted environment does not pose a threat to the safe operation of prisons and may result in fewer infractions.

Furthermore, the opportunity for infractions may be quite different in restrictive housing from that in TDUs. In TDUs, there are opportunities to commit certain infractions that are not likely in restrictive housing because individuals in restrictive housing spend ≥22 hours a day alone in their cells. This, coupled with the presented results, further supports the comparatively safe environment of TDUs when evaluated against restrictive housing.

Limitations

The inverse probability of treatment weighted model accounted for factors reported to play a role in TDU selection that were also likely related to outcomes. However, TDU selection is ultimately based on a multitude of complex factors that impact mental health clinicians' perceptions of individuals' needs and their likelihood of success in a TDU environment. As such, there may be unmeasured residual confounding. In addition, having complete data on infractions, inpatient mental health admissions, and self-harm depends on a complete collection of information on these events. It is possible that not all incidents are captured or that the recording of these incidents is differential by environment. However, in both TDU and restrictive housing environments, inmates are generally under increased scrutiny, compared with the level of scrutiny in the general prison setting, where one might expect greater differences in reporting likelihood.

CONCLUSIONS

These findings indicate that TDUs have considerable promise to lead to better outcomes than restrictive housing while incarcerated, particularly in terms of behavioral infractions, mental health, and self-harm. There are individuals with prolonged, elevated mental health needs who cycle in and out of restrictive housing throughout their incarceration. These findings support the limited but growing research suggesting that therapeutic-oriented alternatives to restrictive housing may improve the mental health of incarcerated individuals without posing a risk to the safe operation of correctional facilities. Future research should assess the prolonged effectiveness of these programs in improving mental and behavioral health outcomes as well as effect measure modification by sex and race.

ACKNOWLEDGMENTS

Lewis "Jon" Peiper, PhD, Director of Behavioral Health at North Carolina (NC) Department of Public Safety, contributed significantly to the ability of this group to conduct this project, lending critical subject matter expertise to the project. Hannah Turner, a former Clinical Programs Specialist at NC Department of Public Safety, conducted initial data collection on Therapeutic Diversion Unit (TDU) participants. The TDU staff across NC provide the daily services to offenders that make such a project possible. Their efforts to implement this program across NC, despite numerous challenges, are what create the environment in which TDU offenders strive to achieve their goals.

The Centers for Disease Control and Prevention had no role in the study design; data collection, analysis, interpretation of results; or the decision to publish these findings.

This work was supported by an award from the National Center for Injury Prevention and Control of the Centers for Disease Control and Prevention to the NC Division of Public Health (Overdose Data to Action, Cooperative Agreement #5NU17CE925024-02-00). Authors from The University of North Carolina at Chapel Hill were funded through a subcontract under this grant (Contract #5118396). A researcher from the NC Division of Public Health was a member of the study team and helped to contextualize the study results.

CM and GJ are employed and EGB was employed by the NC Department of Public Safety and were involved in the development and implementation of the TDU program evaluated in this study. No other financial disclosures were reported.

SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2021.05.023.

REFERENCES

1. Prins SJ, Draper L. *Improving outcomes for people with mental illnesses under community corrections supervision: a guide to research-informed policy and practice*. New York, NY: Council of State Governments Justice Center; 2009. https://csgjusticecenter.org/wp-content/uploads/2020/02/Community-Corrections-Research-Guide.pdf. Published 2009. Accessed July 7, 2020.
2. National Research Council. The Growth of Incarceration in the United States: Exploring Causes and Consequences. Washington, DC: The National Academies Press, 2014. https://doi.org/10.17226/18613.
3. American Public Health Association. Solitary confinement as a public health issue. Washington, DC: American Public Health Association; November 5, 2013. https://apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/14/13/30/solitary-confinement-as-a-public-health-issue. Published November 5, 2013. Accessed June 4, 2021.
4. Cloud DH, Drucker E, Browne A, Parsons J. Public health and solitary confinement in the United States. *Am J Public Health*. 2015;105(1):18–26. https://doi.org/10.2105/AJPH.2014.302205.
5. Reiter K, Ventura J, Lovell D, et al. Psychological distress in solitary confinement: symptoms, severity, and prevalence in the United States, 2017-2018. *Am J Public Health*. 2020;110(S1):S56–S62. https://doi.org/10.2105/AJPH.2019.305375.
6. Mears DP. *Restrictive housing in the U.S.: issues, challenges, and future directions. Chapter 7: critical research gaps in understanding the effects of prolonged time in restrictive housing on inmates and the institutional environment*. Washington, DC: U.S. Department of Justice, National Institute of Justice; 2016. https://www.ojp.gov/pdffiles1/nij/250322.pdf. Published 2016. Accessed August 12, 2020.
7. Clark K. The effect of mental illness on segregation following institutional misconduct. *Crim Justice Behav*. 2018;45(9):1363–1382. https://doi.org/10.1177/0093854818766974.
8. Dellazizzo L, Luigi M, Giguère CÉ, Goulet MH, Dumais A. Is mental illness associated with placement into solitary confinement in correctional settings? A systematic review and meta-analysis. *Int J Ment Health Nurs*. 2020;29(4):576–589. https://doi.org/10.1111/inm.12733.
9. Wallace R. *Out of sight, out of mind. Colorado's continued warehousing mentally ill prisoners solitary confinement*. Denver, CO: American Civil Liberties Union of Colorado; 2013. http://aclu-co.org/wp-content/uploads/files/imce/SolitaryReport.pdf. Published 2013. Accessed October 7, 2020.
10. Williams BA, Li A, Ahalt C, Coxson P, Kahn JG. Bibbins-Domingo K. The cardiovascular health burdens of solitary confinement. *J Gen Intern Med*. 2019;34(10):1977–1980. https://doi.org/10.1007/s11606-019-05103-6.
11. Grassian S. Psychopathological effects of solitary confinement. *Am J Psychiatry*. 1983;140(11):1450–1454. https://doi.org/10.1176/ajp.140.11.1450.
12. Haney C. Mental health issues in long-term solitary and "supermax" confinement. *Crime & Delinq*. 2003;49(1):124–156. https://doi.org/10.1177/0011128702239239.
13. Miller HA, Young GR. Prison segregation: administrative detention remedy or mental health problem? *Criminal Behav Ment Health*. 1997;7(1):85–94. https://doi.org/10.1002/cbm.146.
14. Kaba F, Lewis A, Glowa-Kollisch S, et al. Solitary confinement and risk of self-harm among jail inmates. *Am J Public Health*. 2014;104(3):442–447. https://doi.org/10.2105/AJPH.2013.301742.
15. Hagan BO, Wang EA, Aminawung JA, et al. History of solitary confinement is associated with post-traumatic stress disorder symptoms among individuals recently released from prison. *J Urban Health*. 2018;95(2):141–148. https://doi.org/10.1007/s11524-017-0138-1.
16. Bonner RL. Stressful segregation housing and psychosocial vulnerability in prison suicide ideators. *Suicide Life Threat Behav*. 2006;36(2):250–254. https://doi.org/10.1521/suli.2006.36.2.250.
17. Smith PS. The effects of solitary confinement on prison inmates: a brief history and review of the literature. *Crime Justice.*. 2006;34(1):441–528. https://doi.org/10.1086/500626.
18. Morgan RD, Gendreau P, Smith P, et al. Quantitative syntheses of the effects of administrative segregation on inmates' well-being. *Psychol Public Policy Law*. 2016;22(4):439–461. https://doi.org/10.1037/law0000089.
19. Toch H. The Future of Supermax Confinement. *Prison J*. 2001;81(3):376–388. https://doi.org/10.1177/0032885501081003005.
20. Haney C, Lynch M. Regulating prisons of the future: a psychological analysis of supermax and solitary confinement. *N Y Univ Rev Law Soc Chang*. 1997;23(4):477–570. https://socialchangenyu.com/wp-content/uploads/2017/12/Craig-Haney-Mona-Lynch_RLSC_23.4.pdf.
21. Hagar GM, Ludwig TE, McGovern K. Program evaluation for a jail-based mental health treatment program. *J Correct Health Care*. 2008;14(3):222–231. https://doi.org/10.1177/1078345808318257. Accessed August 13, 2020.
22. Glowa-Kollisch S, Kaba F, Waters A, Leung YJ, Ford E, Venters H. From punishment to treatment: the "clinical alternative to punitive segregation" (CAPS) program in New York City jails. *Int J Environ Res Public Health*. 2016;13(2):182. https://doi.org/10.3390/ijerph13020182.
23. Promising practices. Vera Institute for Justice. https://www.safealternativestosegregation.org/promising-practices/. Accessed August 13, 2020.
24. Policy & procedure manual. North Carolina Department of Public Safety. https://www.ncdps.gov/adult-corrections/prisons/policy-procedure-manual. Updated August 1, 2017. Accessed October 20, 2020.
25. NC DPS Department of Public Safety. Division of prisons strategic plan 2020-2024. Raleigh, NC: NC DPS Department of Public Safety; 2020. https://files.nc.gov/ncdps/documents/files/Division-of-Prisons-Strategic-Plan.pdf. Published 2020. Accessed October 27, 2020.
26. North Carolina Department of Public Safety Prisons Health Services. Health service policy & procedure manual. Raleigh, NC: North Carolina Department of Public Safety Prisons Health Services; December 2011. https://files.nc.gov/ncdps/div/Prisons/HealthServices/A_AssessmentPatient/a2(1).pdf. Published December 2011. Accessed July 20, 2020.
27. Wildeman C, Andersen LH. Solitary confinement placement and post-release mortality risk among formerly incarcerated individuals: a population-based study [published correction appears in *Lancet Public Health*. 2020;5(7):e374]. *Lancet Public Health*. 2020;5(2):e107–e113. https://doi.org/10.1016/S2468-2667(19)30271-3.
28. Brinkley-Rubinstein L, Sivaraman J, Rosen DL, et al. Association of restrictive housing during incarceration with mortality after release. *JAMA Netw Open*. 2019;2(10):e1912516. https://doi.org/10.1001/jamanetworkopen.2019.12516.
29. Brinkley-Rubinstein L, Johnson T. Solitary confinement and health. *N C Med J*. 2019;80(6):359–360. https://doi.org/10.18043/ncm.80.6.359.