

Change in Severity of Mental Disorder for Individuals in Custody in Short-Term Segregation

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The mental health effects of segregation remain contested, with limited longitudinal evidence using clinical data. We conducted a retrospective longitudinal observational study of individuals placed in segregation in British Columbia correctional facilities between 2019 and 2022. Global mental health severity was assessed using serial Clinical Global Impression for Corrections (CGI-C) ratings. Mixed-effects regression models were used to examine change in CGI-C scores over time, accounting for repeated observations nested within segregation encounters and individuals. The sample included 2,288 individuals across 3,273 segregation encounters (9,282 CGI-C observations). The median segregation duration was 10 days. At the encounter level, 24.6 percent showed at least a one-point improvement in CGI-C, 60.3 percent showed no change, and 15.1 percent worsened. In adjusted models, identified mental health needs (MHNs) were associated with higher overall severity (higher CGI-C scores) and a small deterioration (increase in CGI-C scores) over time. Baseline mental health severity strongly differentiated the trajectories: individuals with high initial CGI-C ratings showed a marked early reduction in severity, whereas those with low initial severity exhibited a gradual increase. Despite improvement, high-severity individuals remained more symptomatic overall. Individuals with MHNs at baseline experienced a less favorable trajectory, although persons with a higher severity at baseline modestly improved over time, perhaps because of available support services.

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More than 10 million people are incarcerated globally,¹ and an estimated one in seven experience affective or psychotic disorder.² In the United States, approximately 14 percent of state prisoners and eight percent of federal prisoners are found to report recent serious psychological distress.³ The effects of

incarceration on mental health have received significant attention, with studies reporting mixed findings. Some suggest deterioration, others report no change, or even improvement in mental state over time.⁴

Segregation, also referred to as “separate confinement,” “solitary confinement,” and “restrictive housing,” typically involves isolating an incarcerated person from the general prison population, restricting participation in educational or work programs, reducing out-of-cell time, and substantially reducing “meaningful human contact.”⁵ Historically, segregation was introduced with the aim of promoting “rehabilitation through isolation,” offering time for “reflection” and “creating opportunities for redemption.”⁶ Today, segregation is applied to a substantial minority of the imprisoned population for various reasons, including discipline, observation, or safety.

Concern about the psychological impact of segregation has grown in recent decades. In 2019, Canada

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passed Bill C-83⁷ with the aim of reducing the harms of administrative and disciplinary segregation, but its effects have not yet been assessed.⁸ Systematic reviews have considered the effect of segregation and have revealed a wide range of findings from negative⁹ to mildly negative^{6,10,11} and neutral effects on mental health.^{12–15} The heterogeneity reflects both the diverse methodologies and sample populations of primary studies and the differing degrees of influence of these findings in subsequent reviews. One area of consensus is that people in segregation experience more preexisting psychopathology on average than those in the general prison population. Numerous cross-sectional studies report a higher prevalence of personality and substance use disorders,¹⁶ posttraumatic stress disorder (PTSD),¹⁷ psychological distress,^{18,19} depression, and anxiety²⁰ among those in segregation. Segregation is disproportionately used with individuals identified as having mental health concerns. These individuals are more likely to be placed in segregation, remain there longer,²¹ and have a higher risk of self-harm,^{22,23} institutional violence,²⁴ and recidivism after release.^{25,26}

Despite widespread concerns, few longitudinal studies have prospectively assessed changes in mental state during segregation, and the few studies that do exist provide inconsistent evidence that segregation necessarily worsens symptoms of mental illness. Early research involving volunteers or employing sensory deprivation in laboratory settings provided evidence of detrimental effects, but few studies have carried out real-world longitudinal measurement of severity of mental disorder among people in segregation. Zinger *et al.*²⁷ assessed 23 segregated prisoners and 37 controls over 60 days, reporting minimal group differences and an overall decline in symptom severity. Andersen *et al.*^{28,29} studied 133 prisoners and found higher rates of depression and adjustment disorder during early segregation, which remained stable over time and improved upon release from segregation, whereas nonsegregated individuals experienced gradual symptom decreases. O’Keefe *et al.*³⁰ examined 270 men at multiple time points and found early symptom reductions followed by stability, regardless of setting or presegregation mental illness status.

Limitations in previous longitudinal studies include small sample sizes, relying on individuals capable of completing structured interviews (thus typically excluding those most severely ill), and a lack of data on women. To address these gaps, we carried out a

retrospective cohort study of all men and women placed in segregation in provincial correctional centers in British Columbia (BC), Canada, using the Clinical Global Impression-Corrections (CGI-C)³¹ to measure global symptom severity. Our primary objective was to examine whether global mental illness severity changes during segregation. Secondary objectives included assessing whether trajectories differ by identified mental health needs, type of segregation, demographic characteristics, or number of segregation encounters.

Method

We carried out a retrospective longitudinal observational study to investigate changes in global mental health severity among individuals placed in segregation, using serial ratings from the Clinical Global Impression-Corrections (CGI-C). Data were obtained from the BC Corrections Network (CORNET), an integrated offender case management system that contains electronic demographic, clinical, and contextual information and serves as the provincial repository for all adult and youth offender files.

Sample

All individuals incarcerated across 10 provincial correctional facilities in BC who experienced at least one segregation episode between November 2019 and August 2022 were eligible for inclusion in the study. We included only individuals with two or more CGI-C observations to model change in ratings over time (described below).

Measures

Clinical Global Impression-Corrections (CGI-C)

The CGI-C³¹ is a clinician-rated measure of global mental health severity scored on a seven-point scale (one representing no mental disorder, seven representing the most severe). Ratings reflect severity over the previous 24 hours and are informed by clinical interview, direct observation, and collateral information from correctional staff and records. The CGI-C has been shown to be valid³² and have high inter-rater reliability.³³ In BC, trained health care staff complete CGI-C ratings at the start of segregation and approximately every five days thereafter for the duration of the segregation encounter. Analysis of serial CGI-C ratings can thus provide a standardized

measurement of change in symptom severity over time.³⁴

Mental health needs (MHNs)

Mental health needs (MHN) status is a system-level designation applied collaboratively by correctional classification staff and mental health professionals. All individuals undergo a medical assessment within 24 hours of intake and a mental health screening by trained staff. Based on these assessments, individuals may be designated as having MHN, reflecting the presence of identified mental health needs requiring enhanced monitoring, services, or accommodation. MHN designation may involve referral to mental health professionals, specialized housing considerations, and increased clinical follow-up. MHN status may be updated during incarceration in consultation with mental health professionals; however, only the initial MHN was considered in our analyses. Baseline mental health severity was defined as the first CGI-C rating recorded within each segregation encounter. For clinical interpretability and to reduce model complexity, baseline CGI-C ratings were dichotomized into low-severity (scores one to two) and high-severity (scores three to seven) categories. Individuals rated low severity were considered to have either no signs or symptoms of mental disorder or only very mild and intermittent symptoms associated with little to no distress or functional impairment. High-severity ratings reflected increasing levels of clinical severity, ranging from clearly present but mild symptoms or impairment to very severe, persistent symptoms accompanied by significant distress, behavioral dysregulation, physical aggression, or self-harm. The chosen dichotomy distinguished those who had no or very minor symptoms from those who had clear symptoms of mental disorder.

Segregation encounter

Some individuals experienced multiple segregation episodes during the observation period, and so we assigned a sequential number to represent the order of each segregation encounter.

Time in segregation

Time was operationalized as weeks since the start of the segregation encounter, expressed as fractions of a week. Quadratic and cubic polynomial terms were included to model nonlinear change over time.

Age

Age was calculated in years on the date of the initiation of the segregation encounter.

Gender

Gender was recorded in administrative records as either man or woman. Data on gender identity beyond this classification were not available.

Ethnicity

Self-reported ethnicity was categorized as either White, Black, Indigenous (First Nations, Métis, Inuit) or "Other" (East Asian, Southeast Asian, South Asian, Middle Eastern, and Latin American were grouped together because of small sample sizes).

Segregation type

There are three types of segregation in the BC corrections system: administrative, disciplinary, and other. Individuals can be placed on administrative segregation if they are endangering themselves or are likely to endanger themselves; endangering another person or are likely to endanger another person; jeopardizing the management, operation, or security of the correctional center or are likely to do so; would be at risk of serious harm or are likely to be at risk of serious harm if not confined separately; or must be confined separately for a medical reason. Disciplinary segregation is a possible penalty faced (for a period of no more than 15 days) if an individual is found to have breached a rule in section 21^{1,2} of the BC Correction Act Regulation (outlining the rules governing the conduct of inmates in custody).³⁵ For the purpose of this analysis, other included segregation for quarantining related to the COVID-19 pandemic or other supported intervention placements.

According to information provided by BC Corrections, most segregation cells in the province are single-celled. Segregated inmates may be let out together for ablutions if safe to do so. All are provided an opportunity for a minimum of two and a half hours out of cell per day. Individuals in segregation are monitored by health care staff at least once every 24 hours and have access to the same services that others in custody receive, such as daily exercise, reading materials, mail, phone calls, personal visits, health care, and hygiene facilities. Also, they may be escorted to other areas of the correctional center to access programs, services, or other activities. Individuals

in segregation access health care, meet with mental health clinicians, and receive psychiatric medication if appropriate. Despite these provisions, segregation remains a highly restrictive environment, and segregated inmates have substantially reduced opportunities for social interaction and environmental stimulation compared with the general correctional population.

Number of previous incarcerations

The number of previous incarcerations was included as a continuous count variable. We capped the number at the 95th percentile to avoid outlier effects in the analysis.

Duration of incarceration prior to segregation

This was defined as the number of days since intake until first day of segregation, also capped at the 95th percentile to avoid outlier effects in the analysis.

Statistical Analysis

We included only individuals with two or more CGI-C observations to model change in ratings over time. We used descriptive statistics (mean, median, range, standard deviations) to describe the study population and the initial and final CGI-C measures. For initial analysis, we calculated the change in CGI-C rating between first and last measure and calculated the number and proportions of those who had ratings that were higher, lower, or unchanged between first and last CGI-C rating.

For the main analyses, we utilized a mixed-effects regression model using Stata 17³⁶ to analyze the longitudinal data using the mixed command. This model accounts for the hierarchical structure of the data, where repeated observations of the CGI-C (Level 1) are nested within segregation encounters (Level 2), which are in turn nested within individuals (Level 3). To allow for variations in the effect of the initial CGI-C rating, we divided these ratings into two categories, low (1-2) and high (3-7) severity. Fixed effects included cubic polynomial terms for week of rating, baseline CGI-C level (low or high), MHN status, segregation type, segregation encounter number, ethnicity, and age.

We initially conducted stratified analyses for men and women, given known differences in the mental health needs among men and women in the criminal justice system. Women comprised a small proportion of the sample, however, and stratified models yielded trajectories that were broadly similar to those observed in men, with wide confidence intervals reflecting

limited statistical power. We therefore proceeded with a combined analysis, including gender as a fixed effect.

We included interaction effects to explore change in CGI-C scores over time. Interactions between time and MHN status were included as individuals identified as having mental health needs may differ systematically in baseline psychopathology, service engagement, and vulnerability to adverse effects of segregation. Interactions between time in segregation and baseline CGI-C severity were also included to account for the possibility that individuals entering segregation with higher versus lower symptom severity exhibit differential response to the segregated environment. Other interactions were not included to avoid model over-fitting and to maintain interpretability.

To assess whether the inclusion of the above described interaction terms significantly improved model fit, we compared nested mixed-effects models using likelihood ratio tests (LRT). Specifically, we tested a model including interactions between week of rating and baseline CGI-C level, and between week of rating and MHN designation, against a reduced model without these interactions. After fitting the model, we calculated and plotted marginal mean CGI-C values estimated from the fitted mixed-effects model using observed data. These are presented to aid interpretation of time-by-group interactions. The graphs were generated using R Statistical Software (v.4.3.2; R Core Team 2024).³⁷

Results

As seen in Table 1, the majority of the sample were men, with a mean age of 36.3 (standard deviation (SD) 9.9) at the time of first segregation who had, on average, eight prior incarcerations. With respect to ethnicity, the majority of the sample was White, with a significant minority of Indigenous persons. The median number of days from intake to first segregation was one day, with a mean of 43.9 days (SD 103.2). Segregation is an uncommon event in comparison to the number of people passing through the jails, but many who go into segregation do so at intake. Approximately 29 percent of the cohort had identified mental health needs (MHN), although of note, twice as many women as men had MHN.

The median duration of the segregation encounters included in this study was 10 days (interquartile range (IQR): 5–15), with a mean duration of 11.0 days (SD = 8.0; range: 1–40 days). Disciplinary

Table 1 Descriptive Variables

	Women (n = 137)	Men (n = 2,151)	All (N = 2,288)
Age of first segregation (years)			
Mean (SD)	34.1 (7.9)	36.4 (10.0)	36.3 (9.9)
Median [Min, Max]	33.5 [19.1, 63.0]	34.8 [18.2, 77.9]	34.7 [18.2, 77.9]
Ethnic group			
White	69 (50.4%)	1,174 (54.6%)	1,243 (54.4%)
Indigenous	59 (43.1%)	700 (32.6%)	759 (33.2%)
Black	2 (1.5%)	76 (3.5%)	78 (3.4%)
Other	7 (5.1%)	199 (9.3%)	206 (9.0%)
Identified mental health needs			
No	52 (38.0%)	1,568 (72.9%)	1,621 (70.8%)
Yes	85 (62.0%)	583 (27.1%)	668 (29.2%)
Number of prior incarcerations			
Mean (SD)	5.7 (5.8)	8.6 (8.4)	8.4 (8.3)
Median [Min, Max]	4 [1, 31]	6 [1, 31]	5 [1,31]
Days between intake and first segregation event			
Mean (SD)	14.1 (60.5)	45.7 (104.7)	43.9 (103.2)
Median [Min, Max]	1 [1, 442]	1 [1, 442]	1 [1,442]
Category of segregation	n (%)	n (%)	n (%)
Administrative	79 (46.2)	935 (30.7)	1,014 (31.5)
Disciplinary	73 (42.7)	1,287 (42.2)	1,360 (42.2)
Other	10 (5.9)	739 (24.2)	749 (23.3)
Missing	9 (5.3)	88 (2.9)	97 (3.0)

segregation accounted for the largest proportion of encounters (42.2%), followed by administrative segregation (31.5%). Other forms of segregation comprised 23.3 percent of encounters, whereas segregation type was unknown for three percent of encounters. The number of CGI-C ratings per encounter ranged from two to 10, with a median of two (IQR: 2–3) and a mean of 2.84 (SD = 1.20). CGI-C ratings are intended to be completed every five days during segregation. Across 6,012 observed intervals between consecutive CGI-C ratings, the median interval was 5.0 days (mean 5.31, SD 2.77). Most intervals occurred within seven days (87.0%), with eight percent occurring at eight to 10 days and five percent occurring after more than 10 days. At the segregation-encounter level (3,278 encounters), 20.7 percent of encounters had at least one interval exceeding seven days, and 6.3 percent had at least one interval exceeding 10 days.

At entry to segregation, the mean CGI-C score was 2.27 (SD = 1.32; median = 2, IQR = 1–3),

indicating very mild intermittent symptoms associated with little to no distress or functional impairment. At the last observed CGI-C rating within each segregation encounter, the mean score was 2.11 (SD = 1.17; median = 2, IQR = 1–3). On average, CGI-C scores decreased by .16 points between the first and last rating within a segregation encounter. We calculated the proportion of segregation encounters in which there was a clinically meaningful change in CGI-C, defined as an increase or decrease of at least one point. At the segregation-encounter level, 24.6 percent of encounters were associated with at least a one-point reduction in CGI-C score, 60.3 percent showed no change, and 15.1 percent showed at least a one-point increase (see Table 2).

When stratified by mental health needs (MHN) status, encounters involving individuals with MHN demonstrated greater variability in CGI-C change scores. Among encounters involving individuals without identified MHN (n = 2,175), the mean change

Table 2 Change in CGI-C During Segregation (per Segregation Episode)

CGI-C Change Category	All (N = 3,278)	No Identified MHNs (n = 2,175)	MHNs (n = 1,103)
Improved (≥1-point decrease)	806 (24.6%)	436 (20.1%)	370 (33.5%)
No change (<1 point)	1,978 (60.3%)	1,482 (68.1%)	496 (45.0%)
Worsened (≥1-point increase)	494 (15.1%)	257 (11.8%)	237 (21.5%)
Total	3,278 (100%)	2,175 (100%)	1,103 (100%)

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Table 3 Mixed-Effects Regression Model Predicting Severity and Change in CGI-C Scores

Variable	Coefficient	SE	z	$p > z $	95% CI
Week of rating (time)	0.11	0.05	1.83	0.02	[0.02, 0.20]
Week of rating (time ²)	-0.02	0.05	2.32	0.02	[-0.07, 0.04]
Week of rating (time ³)	0.00	0.00	0.15	0.88	[-0.01, 0.01]
Segregation encounter number	0.03	0.01	5.25	<0.001	[0.02, 0.04]
First CGI-C (high v. low)	2.35	0.04	61.05	<0.001	[2.27, 2.42]
First CGI-C × week of rating	-1.63	0.08	-21.46	<0.001	[-1.78, -1.48]
First CGI-C (high) × time ²	0.55	0.04	13.40	<0.001	[0.47, 0.63]
First CGI-C (high) × time ³	-0.06	0.01	-10.30	<0.001	[-0.07, -0.05]
Mental health needs (yes v. no)	0.20	0.04	4.89	<0.001	[0.12, 0.28]
Mental health needs × time	0.58	0.08	7.54	<0.001	[0.43, 0.73]
Mental health needs × time ²	-0.15	0.04	-3.64	<0.001	[-0.23, -0.07]
Mental health needs × time ³	0.01	0.01	2.60	0.01	[0.00, 0.03]
Segregation type: Administrative	REF	—	—	—	—
Segregation type: Disciplinary	0.06	0.03	2.24	0.03	[0.01, 0.12]
Segregation type: Other	-0.13	0.03	-3.95	<0.001	[-0.19, -0.06]
Segregation type: Missing	0.29	0.07	4.12	<0.001	[0.15, 0.43]
Ethnic group: White	REF	—	—	—	—
Ethnic group: Black	-0.11	0.07	-1.68	0.09	[-0.25, 0.02]
Ethnic group: Indigenous	-0.05	0.03	-1.72	0.09	[-0.10, 0.01]
Ethnic group: Other	-0.08	0.04	-1.82	0.07	[-0.17, 0.01]
Gender (male v. female)	-0.14	0.06	-2.50	0.01	[-0.25, -0.03]
Age (per 10 years)	0.00	0.01	0.20	0.85	[-0.02, 0.03]
Number of prior incarcerations (per 10)	0.00	0.02	0.21	0.83	[-0.03, 0.03]
Weeks since intake	0.00	0.00	-1.11	0.27	[0.00, 0.00]
Intercept	1.44	0.08	18.59	<0.001	[1.30, 1.60]

Coefficients are fixed-effects estimates from a three-level, mixed-effects model with observations nested within segregation encounters and individuals. “High” baseline CGI-C denotes scores 3–7; “low” denotes scores 1–2. Reference categories are indicated. Time was modeled using cubic polynomial terms (time² and time³ allowing for nonlinear change in CGI-C scores).

in CGI-C score was $-.14$ ($SD = .83$), with a median change of zero (IQR: 0–0), indicating that most encounters showed no change in clinician-rated severity. Among encounters involving individuals with MHN ($n = 1,103$), the mean change was $-.21$ ($SD = 1.30$), with a median of zero (IQR: -1–0). Although mean changes were small in both groups, the distribution of change scores was wider among those with MHN, reflecting both greater improvement and greater worsening. Specifically, 33.5 percent of encounters involving individuals with MHN showed improvement and 21.5 percent showed worsening, compared with 20.1 percent and 11.8 percent, respectively, among encounters without identified MHN. Encounters involving individuals without MHN were more likely to show no meaningful change (68.1 percent versus 45.0 percent) (Table 2).

To evaluate whether global severity trajectories changed over time during segregation, we fitted a mixed-effects model including time (weeks since segregation start) as a cubic polynomial, with interactions between time and baseline symptom severity as well as mental health need (MHN) status. This model was compared with a reduced model without

time interactions using a likelihood ratio test. The full time-interaction model demonstrated significantly better fit than a reduced model without time interactions (likelihood ratio (LR) $\chi^2 = 993.6$, $p < .001$),⁸ indicating that CGI-C trajectories varied by baseline severity and MHN status. The final mixed-effects model represented in Table 3 included 2,288 individuals across 3,273 segregation encounters (9,282 observations). Model assumptions were assessed and adequately met; non-linear change over time was accommodated using polynomial terms, residuals were approximately normally distributed, and random effects at both the individual and encounter levels were approximately normal.

Mental Health Needs

In the adjusted mixed-effects model, MHN status at entry into segregation was associated with both higher overall CGI-C scores and a significantly different pattern of change over time (Table 3). Across the follow-up period, individuals with MHN had higher clinician-rated severity compared with those without MHNs ($\beta = .20$, $SE = .04$, $z = 4.89$,

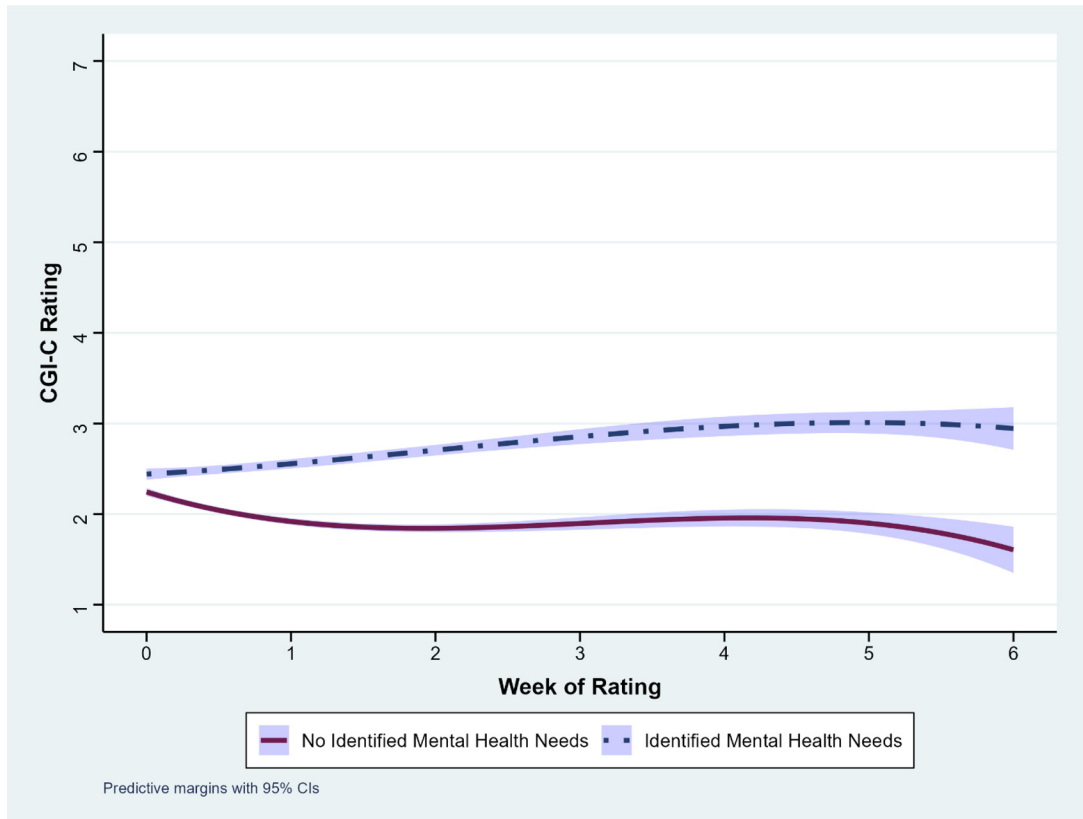


Figure 1. CGI-C trajectories as a function of identified MHNs status. CGI-C = Clinical Global Impression for Corrections; MHNs = mental health needs.

$p < .001$), confirmed by a contrast of marginal means ($\chi^2 = 23.91$,¹ $p < .001$; see Fig. 1; in table interaction: $\chi^2 = 56.88$,¹ $p < .001$). When linear, quadratic, and cubic interaction terms were considered jointly, the overall MHN-by-time effect remained significant ($\chi^2 = 223.16$,³ $p < .001$), indicating differential nonlinear change over time. As shown in Figure 1, individuals without identified MHN demonstrated an early decline in CGI-C scores followed by relative stability and subsequent improvement, whereas those with MHN showed a gradual increase in CGI-C scores over time, with severity rising through approximately week five before plateauing. Individuals with MHN therefore entered segregation with higher global severity and also experienced a less favorable trajectory during segregation.

Baseline Global Severity

To examine whether initial CGI-C rating was associated with differences over time, we dichotomized the first CGI-C scores into low^{1,2} and high³⁻⁷ severity categories for clinical interpretability. Initial severity

was a strong predictor of both overall CGI-C scores and patterns of change over time. Individuals with higher initial CGI-C ratings had substantially higher clinician-rated severity across the observation period compared with those with lower initial severity ($\beta = 2.35$, standard error (SE) = .04, $z = 61.05$, $p < .001$) (Table 3). In addition, baseline severity significantly modified the trajectory of CGI-C scores over time. A joint Wald test of the linear, quadratic, and cubic interactions between baseline CGI-C level and time was significant ($\chi^2 = 981.88$,³ $p < .001$), indicating distinct nonlinear trajectories by initial severity. As shown in Figure 2, individuals with high baseline CGI-C ratings exhibited a pronounced early reduction in severity during the first weeks of segregation, followed by partial stabilization and modest worsening, whereas those with low baseline severity showed a gradual increase in CGI-C scores during segregation.

Other Variables

The number and type of segregation encounters also had a significant association with CGI-C ratings. Each additional segregation encounter was associated

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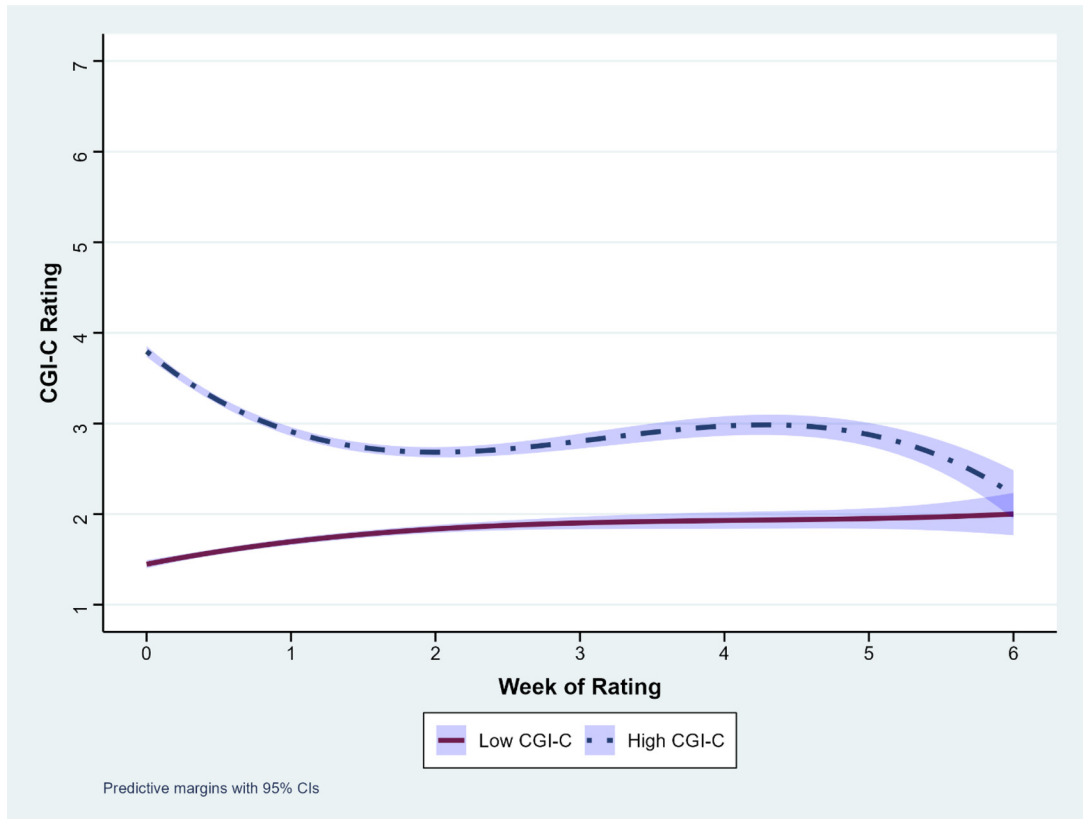


Figure 2. CGI-C trajectories as a function of baseline severity. CGI-C = Clinical Global Impression for Corrections.

with a statistically significant but clinically negligible increase in CGI-C ratings ($\beta = .03$, 95% confidence interval (CI) (.02, .04), $p < .001$).

Segregation type was also associated with differences in initial CGI-C ratings. Compared with administrative segregation, disciplinary segregation was associated with slightly higher CGI-C scores ($\beta = .06$, $p = .025$), whereas other forms of segregation were associated with lower scores ($\beta = -.13$, $p < .001$). Encounters classified as “unknown” also showed higher CGI-C scores ($\beta = .29$, $p < .001$).

In terms of demographic variables, there were no statistically significant differences in CGI-C ratings by age or ethnicity after adjustment. Compared with White individuals, those identified as Black, Indigenous, or Other showed slightly lower CGI-C ratings, although these differences did not reach statistical significance. With regard to gender, preliminary stratified analyses showed similar trajectories between men and women. Estimates among women were less precise, however, because of the smaller sample size, and therefore, the data were combined for further analysis. In the adjusted mixed-effects model, men had lower CGI-C scores than women ($\beta = -.14$, $SE = .06$,

$p = .01$) across the observation period. The magnitude of the difference was small, suggesting limited clinical significance.

Discussion

In this large retrospective cohort study of over 2,200 individuals and over 3,200 segregation events in British Columbia provincial correctional facilities, we found meaningful differences across individuals related to baseline global severity and identified mental health needs, whereas changes in clinician-rated severity over time were more modest. Individuals with identified MHN at entry into segregation had higher clinician-rated severity at the start of segregation encounters. Individuals without MHN tended to show early reductions in severity followed by relative stability, whereas those with MHN demonstrated a gradual increase in severity over the course of segregation before plateauing.

Baseline global severity was the strongest predictor of CGI-C scores over time. Individuals entering segregation with high initial severity had substantially higher CGI-C scores overall throughout the period of observation but also demonstrated a pronounced

early reduction in severity. In contrast, those with low initial severity showed small and gradual worsening over time.

These patterns may reflect, in part, regression to the mean as well as differential responses to the segregated environment. Individuals with high initial severity may receive more intensive clinical attention early in segregation, contributing to early improvement, whereas those entering with lower apparent severity may experience accumulating stressors over time. Regardless of mechanism, these findings highlight that initial clinical severity is important in understanding subsequent symptom trajectories during segregation.

Repeated exposure to segregation was associated with a statistically significant increase in CGI-C scores; however, the effect size was small, indicating no clear evidence of meaningful cumulative burden of repeated segregation events as measured on the CGI-C.

Segregation type was also associated with differences in initial CGI-C ratings. Disciplinary segregation was linked to slightly higher severity, whereas other forms of segregation (including pandemic-related quarantine) were associated with lower severity. These differences may reflect variations in the clinical profiles of those entering different types of segregation and the individuals' perceptions of and response to the placement.

The strengths of this study are that it comprises a complete cohort of all incarcerated individuals in segregation in 10 provincial correctional facilities in British Columbia over a two-year period. We were able to model change in global mental health severity ratings while controlling for various demographic and contextual variables.

Previous research on the mental health effects of segregation has yielded mixed findings, with significant criticisms of prior methodologies, particularly those with a lack of longitudinal design, small sample sizes, participant recruitment and measurement processes that excluded severely ill individuals, and high attrition rates, all of which we were able to address in the current study.⁶ Differences in segregation practices across correctional facilities, such as the amount of time allowed out of the cell, access to reading materials or other stimulation, and the degree of human contact (e.g., as described by Brown *et al.*³⁸), likely all influence individuals' experiences of segregation as well as the resulting mental health impacts.

Although not measured in this study, the mental health of individuals in segregation is also likely

influenced by a combination of individual factors and correctional environmental factors. Individual factors may include the presence and type of mental disorder as well as psychological or personality traits that determine resilience and coping mechanisms. An interaction between the individual and environmental factors would suggest that individuals with higher psychological resilience or no pre-existing mental illness or those who opt for segregation over general population housing are likely to experience fewer adverse mental health effects, even in more challenging environments. Conversely, individuals with lower resilience or pre-existing mental health needs may experience greater negative consequences, particularly in environments with fewer supportive features.

Our study has several limitations. First, this was a retrospective observational study utilizing routinely collected clinical data. Although health care staff were trained in using the CGI-C, formal reliability testing of the ratings was not conducted, and ratings may therefore be subject to variability across raters. Although the CGI-C provides standardized anchoring descriptors, it remains a global clinical judgment and thus inherently involves some degree of subjectivity. The large number of ratings across multiple correctional facilities, however, likely reduces the impact of individual reliability errors. Second, all of the segregation encounters in our study lasted less than six weeks. As a result, our findings may not generalize to longer segregation events. Third, we relied on a single global measure of illness severity, which is practical for routine use but is likely not sensitive enough to detect small changes in illness severity or distress. We also could not corroborate the reliability of CGI-C scores against other measures of symptom acuity. Fourth, our study lacked a control group, preventing us from comparing changes in symptom severity between those in segregation and individuals housed in the general prison population. Fifth, the variable used to identify mental health needs was not a formal clinical diagnosis. Instead, it reflects a system-wide approach in British Columbia to flag individuals broadly considered to have mental health needs. Sixth, the segregation practices in British Columbia as well as the population demographics may differ from those in other jurisdictions, potentially limiting the generalizability of our findings to other settings.

Overall, our findings indicate that, in this cohort, short-term segregation is associated with small

average changes in global mental health severity but with heterogeneity associated with baseline severity and mental health needs. Individuals with identified mental health needs appear more vulnerable to experiencing an increase in symptom severity; however, those with higher severity at baseline generally showed a reduction over time, possibly because of receiving additional support. These results highlight the importance of close monitoring, early intervention, and tailored supports for individuals with mental health needs placed in segregation. There is a need for more longitudinal studies with validated and multidimensional measures of mental health, control groups to compare outcomes with general population housing, and longer follow-up periods to better understand the mechanisms through which segregation affects mental health and to inform evidence-based policy and practice. Future research should also examine the role of environmental modifications and the efficacy of targeted interventions on individual trajectories.

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References

1. United Nations Office on Drugs and Crime. 2024 prison matters: Global prison population and trends: A focus on rehabilitation [Internet]; 2024. Available from: https://www.unodc.org/documents/data-and-analysis/briefs/Prison_brief_2024.pdf. Accessed March 19, 2026
2. Fazel S, Hayes A, Bartellas K, *et al.* Mental health of prisoners: Prevalence, adverse outcomes, and interventions. *Lancet Psychiatry*. 2016; 3(9):871–81
3. Maruschak LM, Bronson J, Alper M. Indicators of mental health problems reported by prisoners [Internet]; 2021. Available from: <https://bjs.ojp.gov/media/44841/download>. Accessed March 19, 2026
4. Walker J, Illingworth C, Canning A, *et al.* Changes in mental state associated with prison environments: A systematic review. *Acta Psychiatr Scand*. 2014; 129(6):427–36
5. United Nations Office on Drugs and Crime. United Nations standard minimum rules for the treatment of prisoners (the Nelson Mandela rules) [Internet]; 2015. Available from: https://www.unodc.org/documents/justice-and-prison-reform/Nelson_Mandela_Rules-E-ebook.pdf. Accessed March 19, 2026
6. Smith PS. The effects of solitary confinement on prison inmates: A brief history and review of the literature. *Crime & Just*. 2006; 34:441–528
7. Government of Canada. An act to amend the Corrections and Conditional Release Act and another act (S.C. 2019, c.27) [Internet]; 2019. Available from: https://laws-lois.justice.gc.ca/eng/annualstatutes/2019_27/FullText.html. Accessed March 19, 2026
8. Dobson L. Out of sight, out of mind: Bill C-83, solitary confinement, and mental health. *The J L & Soc Pol’y*. 2020; 33(1):93–110
9. Ahalt C, Haney C, Rios S, *et al.* Reducing the use and impact of solitary confinement in corrections. *Int J Prison Health*. 2017; 13(1): 41–8
10. Arrigo BA, Bullock JL. The psychological effects of solitary confinement on prisoners in supermax units: Reviewing what we know and recommending what should change. *Int’l J Offender Therapy & Comp Criminology*. 2008; 52(6):622–40
11. Brown E. A systematic review of the effects of prison segregation. *Aggress Violent Behav*. 2020; 52:101389
12. Astor JH, Fagan TJ, Shapiro D. The effects of restrictive housing on the psychological functioning of inmates. *J Correct Health Care*. 2018; 24(1):8–20
13. Morgan RD, Gendreau P, Smith P, *et al.* Quantitative syntheses of the effects of administrative segregation on inmates’ well-being. *Psychol Pub Pol’y & L*. 2016; 22(4):439–61
14. Glancy GD, Murray EL. The psychiatric aspects of solitary confinement. *Vict Offender*. 2006; 1(4):361–8
15. Bonta J, Gendreau P. Reexamining the cruel and unusual punishment of prison life. *Law & Hum Behav*. 1990 Aug; 14(4): 347–72
16. Coid J, Petruckevitch A, Bebbington P, *et al.* Psychiatric morbidity in prisoners and solitary cellular confinement, I: Disciplinary segregation. *J Forensic Psychiatry Psychology*. 2003; 14(2): 298–319
17. 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):141–8
18. Miller HA. Reexamining psychological distress in the current conditions of segregation. *Journal of Correctional Health Care*. 1994; 1(2):39–53
19. Miller HA, Young GR. Prison segregation: Administrative detention remedy or mental health problem? *Criminal Behav Ment Health*. 1997; 7(1):85–94
20. Suedfeld P, Ramirez C, Deaton J, Baker-Brown G. Reactions and attributes of prisoners in solitary confinement. *Crim Just & Behav*. 1982; 9(3):303–40
21. Ministry of the Solicitor General. Segregation in Ontario: Independent review of Ontario corrections [Internet]; 2017. Available from: <https://hsjcc.on.ca/wp-content/uploads/IROC-Segregation-Report-2017-03.pdf>. Accessed March 19, 2026
22. Jones A. Self-mutilation in prison: A comparison of mutilators and nonmutilators. *Crim Just & Behav*. 1986; 13(3):286–96
23. Kaba F, Lewis A, Glowka-Kollisch S, *et al.* Solitary confinement and risk of self-harm among jail inmates. *Am J Public Health*. 2014; 104(3):442–7
24. Morris RG. Exploring the effect of exposure to short-term solitary confinement among violent prison inmates. *J Quant Criminol*. 2016; 32(1):1–22
25. Mears DP, Bales WD. Supermax incarceration and recidivism. *Criminology*. 2009; 47(4):1131–66
26. Motiuk LL, Blanchette K. Characteristics of administratively segregated offenders in federal corrections. *Canadian Journal of Criminology*. 2001; 43(1):131–43
27. Zinger I, Wichmann C, Andrews DA. The psychological effects of 60 days in administrative segregation. *Canadian Journal of Criminology*. 2001; 43(1):47–83
28. Andersen HS, Sestoft D, Lillebaek T, *et al.* A longitudinal study of prisoners on remand: Psychiatric prevalence, incidence and

- psychopathology in solitary vs. non-solitary confinement. *Acta Psychiatr Scand.* 2000; 102(1):19–25
29. Andersen HS, Sestoft D, Lillebaek T, *et al.* A longitudinal study of prisoners on remand. Repeated measures of psychopathology in the initial phase of solitary versus nonsolitary confinement. *Int'l J L & Psychiatry.* 2003; 26(2):165–77
30. O'Keefe ML, Klebe KJ, Metzner J, *et al.* A longitudinal study of administrative segregation. *J Am Acad Psychiatry Law.* 2013 Mar; 41(1):49–60
31. Jones RM, Moscovici M, Patel K, *et al.* The Clinical Global Impression-Corrections (CGI-C) [Internet]; 2019. Available from: https://www.researchgate.net/publication/330482937_The_Clinical_Global_Impression-Corrections_CGI-C. Accessed February 23, 2026
32. Jones RM, Gerritsen C, Maheandiran M, Simpson AIF. Validation of the Clinical Global Impression-Corrections Scale (CGI-C) by equipercentile linking to the BPRS-E. *Front Psychiatry.* 2020; 11:180
33. Jones RM, Patel K, Moscovici M, *et al.* Adaptation of the Clinical Global Impression for Use in Correctional Settings: The CGI-C. *Front Psychiatry.* 2019; 10:687
34. Jones RM, Gerritsen C, Maheandiran M, *et al.* Change in severity of mental disorder of remand prisoners: An observational group-based trajectory study. *Can J Psychiatry.* 2023; 68(6):418–25
35. British Columbia. B.C. Reg. 58/2005 [Internet]; 2005. Available from: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/10_58_2005?utm. Accessed March 19, 2026
36. StataCorp. *Stata Statistical Software: Release 17.* College Station, TX: StataCorp; 2021
37. R Core Team. *R: A Language and Environment for Statistical Computing.* Vienna, Austria: R Foundation for Statistical Computing; 2024
38. Brown GP, Hirdes JP, Fries BE. Measuring the prevalence of current, severe symptoms of mental health problems in a Canadian correctional population: Implications for delivery of mental health services for inmates. *Int'l J Offender Therapy & Comp Criminology.* 2015; 59(1):27–50