Post-Pandemic Recovery in Psychiatric Services:

A Crossectional Comparison of Inpatient Admissions and Acuity across Three Time Periods

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Abstract

Background. Directives to restrict movement during the COVID-19 pandemic were related to increased mental health problems in the population, yet admissions to psychiatric hospitals and emergency departments decreased. Whereas early evidence suggested that psychiatric admissions normalized within weeks, we sought to examine the longer-lasting impacts on the psychiatric inpatient population beyond this initial recovery period.

Methods. We investigated the characteristics of patients admitted to eight urban and rural psychiatric hospitals in Ontario during the pandemic's first year, divided into lockdown and post-lockdown periods, compared with the same time period pre-pandemic

Results. The mean number of daily admissions decreased from 16.45 (95% C.I. = [15.49, 17.41]) pre-pandemic to 13.31 (95% C.I. = [12.08, 14.54]) during lockdown, and did not fully recover to pre-pandemic levels post-lockdown, 15.42 (95% C.I. = [14.60, 16.24]), representing a 6% reduction. Post-lockdown, the proportion of involuntary patients (N = 2277, 55.1%, 95% C.I. = [53.59, 56.62]) and patients diagnosed with a psychotic disorder (N = 1454, 35.2%, 95% C.I. = [35.19, 33.73]) or personality disorder (N = 126, 3%, 95% C.I. = [2.52, 3.57]) were higher than pre-pandemic; in contrast, symptoms of social withdrawal (M = 4.17, 95% C.I. = [4.02, 4.31]) and depression (M = 2.90, 95% C.I. = [2.80, 3.01]) were lower.

Interpretation. Psychiatric admissions did not fully recover to pre-pandemic levels and reflected higher acuity in the post-pandemic psychiatric patient population. Psychiatric services must prepare to respond to the increased acuity through interventions for patients, workforce planning, and mental health supports for staff.

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Introduction

The World Health Organization declared the novel coronavirus disease 2019 (COVID-19) a pandemic on March 11, 2020 (1). Despite substantial increases in population anxiety and depression during the pandemic internationally (2-4), psychiatric services were often limited or restricted to urgent care, resulting in reduced psychiatric admissions during initial lockdowns (5-8). Within 8 to 12 weeks, admission rates approached pre-pandemic levels (e.g. 9-11); however, there is little research into whether this apparent recovery continued in the longer term. Furthermore, changes in diagnosis, clinical presentation, and legal status suggest increased acuity of the admission population that are important for planning clinical services (e.g., staffing ratios, skillsets, interventions). This includes increased proportions of psychosis and mania (12-14) as well as suicidal behaviour (9-10). The proportion of involuntary admissions also increased (e.g. 6, 15-17), suggesting increased burden to hospitals due to their association with acute illness and aggression (18-19), longer stays, readmissions (20), and use of restraints (21).

Despite continued pandemic-related pressures on the healthcare system, little is known about post-lockdown impacts. In Ontario, Canada, increased psychiatric hospitalization rates for psychotic and substance-related disorders appeared to return to pre-pandemic levels by the time initial restrictions were eased in June 2020 (11). In contrast, reduced hospitalizations for mood, trauma, and stressor-related disorders had not yet returned to normal (11). Internationally, there seems to have been an increase in involuntary admissions to mental health facilities even prior to COVID-19 (18-19, 22), and further research is needed to determine whether the lockdown trend represents a continuation or temporary exacerbation of that pattern. Thus, there is a need to

examine whether changes in admission patterns and characteristics were sustained, to effectively plan for inpatient psychiatric services under the now prolonged pandemic timeline. The few existing longer-term studies did not distinguish between lockdown and post-lockdown (13, 16), did not investigate involuntary admissions (11), or explored post-lockdown only up to mid-2020 (9-10). The objective of the current study was to examine changes in psychiatric admissions, clinical presentation, and legal status of patients admitted to psychiatric hospitals in Ontario, Canada. We investigated changes from pre-pandemic to the initial lockdown and through post-lockdown up to March 2021.

Methods

Sample

We accessed a cross-sectional sample encompassing admissions to eight Ontario psychiatric hospitals. Informed consent was not obtained due to the retrospective, secondary analysis of anonymized healthcare data meeting the criteria for a waiver of consent (23). We included all available cases with unique identifiers, excluding duplicate admissions in each time period; the total sample was 9,848 cases. Over half (n = 5423, 55%) were identified as male, 45% (n = 4411) as women, and 14 (0.1%) as nonbinary. The mean age on admission was 42.75 years (SD = 18.22), and the median length of stay was 19 days (IQR = 9-50).

Study Time Periods

We defined *lockdown* from the date the state of emergency was declared in Ontario to the date the first major restrictions were lifted: March 17, 2020, to June 21, 2020 (97 days). We defined *post-lockdown* as beginning June 22, 2020 and continuing for a year after the emergency was declared, up to March 16, 2021 (268 days). We identified a *pre-pandemic* period of the same

duration and calendar months the year before the pandemic, June 22, 2019, to March 16, 2020 (269 days, including leap day).

Variables

We used psychiatric admission data extracted from the Ontario Mental Health Reporting System (OMHRS). OMHRS data is collected using the Resident Assessment Instrument — Mental Health (RAI-MH) (24). RAI-MH is a standardized clinical instrument used to regularly assess those receiving inpatient mental healthcare with adequate inter-rater reliability (> 80% agreement) and convergent validity reported for inpatient settings (24). Variables included: sex (male, female); age at admission (mean age and four age categories: under 25, 25 to 44, 45 to 64 and 65 and older); marital status ("has ever had a partner", yes or no); education level ("did not complete high school", yes or no); "income insecurity" (no income other than social assistance, yes or no). We used admission and discharge dates to determine the length of stay. As in previous studies in this field, we categorized length of stay into four groups: 7 days or less, 8-30, 30-90 days, and more than 90 days, which captured patients not yet discharged as of June 30, 2021.

For involuntary status, we included applications or orders for a psychiatric assessment (Form 1 or 2), involuntary (Form 3 or 4), and informal status (admitted with designated decision-maker consent).

Primary DSM-5 psychiatric diagnoses were collapsed into seven categories: schizophrenia and other psychotic disorder, substance use disorder, mood or anxiety disorder, neurocognitive disorder, personality disorder, neurodevelopmental disorder, and other disorder.

For clinical presentation, we extracted scores on four RAI-MH symptom scales and two aggression scales, as documented by staff from observations during the first 3 days of admission.

The *Depression Severity Index* scale has 5 items (e.g., made negative statements, expressions of guilt/shame), each scored from 0 (not present) to 3 (present daily); total score range 0 – 15. Depression severity scores ≥ 3 double the likelihood of a mood disorder diagnosis (25). The *Cognitive Performance Scale* identifies patients as having from intact (0) to very severe (6) cognitive performance using 3 items concerning short term memory/recall, daily decision-making, and making self understood. Cognitive performance scores ≥ 3 increase the likelihood of a dementia diagnosis by 14 times (25). The *Positive Symptom Scale* has 8 items (e.g., hallucinations, inflated self-worth), each scored from 0 (not present) to 3 (present daily); total score range 0 – 24. The *Social Withdrawal Scale* has 6 items (e.g., decreased energy, reduced interaction), each scored from 0 (not present) to 3 (present daily); total score range 0 – 18). The *Aggressive Behaviour Scale* includes 4 items (e.g., verbal abuse, physical abuse"), each scored from 0 (not exhibited) to 3 (exhibited daily); total score range 0 – 12, and *Violence Sum* sums 3 items (violent acts, intimidation, ideation"), scored from 0 (never) to 5 (in the last 3 days); total score range 0 –15. Research in multiple settings and locations found that RAI scales met internal consistencies of $\alpha \geq .70$ (26) with average inter-rater agreement Kappa = 0.70 (27).

Statistical Analysis

To test for differences across time periods, we used one-way analysis of variance (ANOVA) for continuous measures (i.e., RAI–MH clinical scale scores), with post hoc comparisons between time periods using Tukey's post hoc test. For categorical measures (i.e., diagnosis, involuntary status), we used Pearson's Chi-squared test with Bonferroni adjustment (28). This was a complete data set with no missing data. Education status was identified as unknown in 26% of cases, and the primary diagnosis was identified as not applicable in two patients.

Ethics Approval

This study is exempt from REB approval according to the Tri-Council Policy Statement, 2nd edition (TCPS), as the research relies exclusively on publicly available information, which does not include identifiable information. (Article 2.2).

Results

There were 4425 unique patients (45%) admitted pre-pandemic, 1291 (13%) during lockdown, and 4132 (42%) post-lockdown. Daily admission rates (Figure 1) differed across time periods, F (2, 631) = 6.764, $p < .001$, $\eta^2 = 0.021$, 95% C.I. = [.004, .046]. There was a significant decrease in daily admissions during lockdown (M = 13.31, SD = 6.11) compared to pre-pandemic (M = 16.45, SD = 8.00, $p < 0.001$, 95% C.I. = [-5.16, -1.13]). The admission rate during post-lockdown (M = 15.42, SD = 6.80) was significantly higher than lockdown (p =.038, 95% C.I. = [0.09, 4.12]), but not statistically different from pre-pandemic (p =.225, 95% C.I. = [-2.50, 0.44]).

There were no significant time-period differences in gender, educational attainment, or income security (Table 1). The proportion of admitted patients under the age of 25 was significantly lower during lockdown than pre-pandemic, but no longer different post-lockdown. The proportion of patients who never had a partner increased during lockdown and became significantly higher during post-lockdown than pre-pandemic. Admissions were shorter during lockdown; post-lockdown, the proportion of 8-30 day stays continued to significantly increase compared to pre-pandemic, and 30-90 day stays significantly decreased.

Legal Status and Diagnosis

During lockdown, the proportion of involuntary admissions significantly increased, and this trend was sustained post-lockdown, whereby the total percentage increased by 6 percentage

points from pre-pandemic to post-lockdown (Table 2). During lockdown, the proportion of patients diagnosed with a psychotic disorder significantly increased by 9% and this proportion remained significantly elevated post-lockdown, up by 4% over pre-pandemic (Table 2). Although admissions for patients diagnosed with personality disorder were substantially lower than those for other diagnostic groups, their admissions also increased significantly during lockdown through to post-lockdown. There was a corresponding reduction in the proportions of patients with a mood or anxiety disorder, substance use disorder, or neurocognitive disorder. However, this trend was sustained post-lockdown only for substance use disorder and neurocognitive disorder.

Clinical Presentation

Depression and social withdrawal symptom scores were significantly reduced during lockdown, and did not return to pre-pandemic levels by the post-pandemic period (Table 3 and Figure 2). Patients exhibited higher rates of positive symptoms and violence during lockdown compared to pre-pandemic; however, post-lockdown, these scales were no longer significantly elevated compared to pre-pandemic. Patients did not score significantly higher on the aggression scale during the pandemic and there was no difference in patients' cognitive performance ratings across time (Table 3 and Figure 3).

Interpretation

This study of psychiatric hospital admissions in Ontario during the pandemic lockdown found that daily admission rates dipped by 19%, consistent with previous studies (10, 13-14, 29). Unlike most previous research, we investigated the extent to which admission rates recovered in the remaining year after lockdown and found that admissions remained at 6% below the pre-pandemic rate. While total admissions for all diagnostic groups decreased during lockdown, the

proportion of cases with psychotic disorders increased, particularly relative to mood disorders. Involuntary admissions increased and became dominant during lockdown, at almost 58%. The predominance of patients with psychotic disorders and involuntary admissions was sustained into the longer post-lockdown period, suggesting an ongoing elevated operational burden on psychiatric hospitals.

Our finding of increased proportions of psychotic disorders aligns with previous work (11, 13, 16), and extends evidence to a longer post-lockdown period when it was partly sustained. These changes, along with higher positive symptoms and aggressive behaviour scores, suggest increased acuity in the population served post-pandemic. Similarly, the evidence of increased involuntary admissions is consistent with existing studies of lockdown (6, 13, 15-16) and post-lockdown (9). We examined a longer post-lockdown period, and used more equivalent pre- and post-lockdown time periods. Thus, despite substantial reductions in psychiatric hospital admissions, it appears that priority was given to persons with serious mental illness in terms of active psychotic symptoms and behaviour that was difficult to manage.

An increase in involuntary admissions is concerning because they create an administrative burden, are distressing to patients' informal caregivers (30), and are considered by some scholars to represent a failure of psychiatric treatment (31). An increase in clinical acuity is problematicbecause an inpatient population that is more mentally ill (i.e., increased diagnosis of psychosis, increased positive symptoms) requires more intensive treatment than previously. The psychiatric system might have recovered up to the same number of admissions, but each admission may now be more costly because beds are filled with patients who are likely to be more treatment-resistant, prone to readmissions, and in need of individualized care and supervision. Reduced service for mood, anxiety, and substance use disorders is a concern

because research has shown that these problems increased in the general population during the pandemic (3-4, 33-34). With healthcare providers reporting an increased demand for virtual mental health services, perhaps less acute patients found psychiatric support through virtual healthcare (35-37). However, providers have indicated a sharp increase in demand for virtual mental healthcare services that, without a corresponding increase in resources, has impacted those who receive care and providers alike (38).

Psychiatric patient populations may be more challenging to care for post-pandemic, requiring commensurate human resource planning and development. For example, psychiatric healthcare organizations should analyze whether their current workforce, already challenged by the pressures of the pandemic, can meet the ongoing needs of the inpatient population, and determine the steps to meet future staffing needs. These plans may involve training more staff in evidence-based guidelines for psychosis and supporting the development of skillsets needed to care for more ill and disturbed individuals. Aggression against hospital staff and chronic stressors in the provision of psychiatric care are associated with trauma among psychiatric workers (32), adding to pandemic-related stressors. Consequently, there is a growing need to support psychiatric healthcare workers through wellness activities and mental health supports such as critical incident debriefing that is evidence-based and trauma-informed, and appropriate assessment and treatment for staff experiencing trauma, anxiety, and depression.

Our study included a large sample using anonymous, publicly available data encompassing non-forensic admissions to eight Ontario psychiatric hospitals. We used the RAI-MH, a standardized and well-validated assessment tool used in hospitals across Canada (additional RAI instruments are used internationally, 26), which enhances the potential for our findings to generalize to other health regions in Canada and elsewhere. Some knowledge gaps

remain, and future research should investigate multiple admissions and admissions not associated with a health insurance number, which likely indicates under-represented groups such as patients without a valid Ontario health insurance card. Future research on forensic admissions is warranted to investigate the pandemic's impact on forensic psychiatric services and may inform understanding of the rise in involuntary admissions. Future research is needed to determine workforce planning and development needs in light of the apparent post-pandemic shift towards higher acuity in the psychiatric inpatient population, and to investigate impacts on patient health outcomes.

Limitations

The study was a secondary analysis of available, anonymized health records using a retrospective, cross-sectional design. Consequently, we could not examine the circumstances surrounding admissions, such as whether pandemic-related restrictions contributed. We defined the lockdown period according to the Government of Ontario's declaration of an emergency. In some cases, the restrictions may have eased sooner, so we potentially under-estimated the acuity of the psychiatric inpatient population during lockdown. However, by examining the post-lockdown period for the remaining year, we illustrated how the population acuity was sustained for a long period. We excluded multiple admissions per time period; nevertheless, we found that lockdown admissions for higher acuity patients increased proportionately and absolutely, and positive symptom and violence scores also increased.

Conclusion

This study examined the characteristics of patients admitted to eight rural and urban psychiatric hospitals across Ontario during the pandemic. Admissions declined during lockdown and did not fully recover within a year. Changes in inpatient characteristics reflected higher

acuity, including increases in schizophrenia and other psychotic disorders, positive symptoms and aggression, and involuntary admissions. Psychiatric healthcare services must prepare to respond to the increased acuity, behavioural, and legal burdens through commensurate human resource planning and development and the advancement of staff wellness services and mental health supports.

Competing interests: We have no known conflict of interest to disclose.

Contributors: Elke Ham, N. Zoe Hilton and Soyeon Kim conceptualized and designed this study, Soyeon Kim aquired the data, Elke Ham and Jennifer Crawford analyzed the data and interpreted the results. Elke Ham drafted the manuscript, and N. Zoe Hilton, Jennifer Crawford and Soyeon Kim revised it critically for important critical content. Elke Ham, N. Zoe Hilton, Jennifer Crawford and Soyeon Kim gave final approval and and agreed as guarantor of the work.

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Table 1

Changes in Admission Characteristics during Pre-pandemic, Lockdown and Post-lockdown

	Pre-pandemic (N=4425)	Lockdown (N=1291)	Post-lockdown (N=4132)	Time difference tests	
	N (%)	N (%)	N (%)	X^2	p
Age Category				**18.285**	**.006**
<25	886 (20.0)[a]	216 (16.7)[b]	883 (21.4)[a]		
25-44	1737 (39.3)[a]	516 (40.0)[a]	1550 (37.5)[a]		
45-64	1135 (25.6)[a]	347 (26.9)[a]	1115 (27.0)[a]		
≥65	667 (15.1)[a]	212 (16.4)[a]	584 (14.1)[a]		
Sex				1.788	.409
Female	2003 (45.4)[a]	558 (43.3)[a]	1850 (44.8)[a]		
Male	2413 (54.6)[a]	732 (56.7)[a]	2278 (55.2)[a]		
Has had a Partner				**10.339**	**.006**
Yes	1484 (33.5)[a]	417 (32.3)[a,b]	1252 (30.3)[b]		
No	2941 (66.5)[a]	874 (67.7)[a,b]	2880 (69.7)[b]		
Education[t]				1.806	.405
High school or more	2329 (72.3)[a]	697 (74.0)[a]	2285 (73.6)[a]		
Less than high school	893 (27.7)[a]	245 (26.0)[a]	821 (26.4)[a]		
Income security				4.784	.091
Has some income	3458 (78.1)[a]	1045 (80.9)[a]	3243 (78.5)[a]		
No income except Social Assistance	967 (21.9)[a]	246 (19.1)[a]	889 (21.5)[a]		
LOS category				**14.490**	**.025**
7 days or less	730 (16.5)[a]	237 (18.4)[a]	710 (17.2)[a]		
8 to 30 days	2055 (46.4)[a]	598 (46.3)[a,b]	2040 (49.4)[b]		
30 days to 90 days	1033 (23.3)[a]	285 (22.1)[a,b]	867 (21.0)[b]		
> 90 days	607 (13.7)[a]	171 (13.2)[a]	515 (12.5)[a]		

Note: Column proportions in a row not sharing superscripts are significantly different from one another. [t]26% of patients had unknown education status

Table 2

Changes in Admission Status and Diagnoses during Pre-pandemic, Lockdown and Post-lockdown

	Pre-pandemic (N=4425)	Lockdown (N=1291)	Post-lockdown (N=4132)	Time difference tests	
	N (%)	N (%)	N (%)	X^2	p
Inpatient Status				**48.155**	**<.001**
Involuntary	2164 (48.9)[a]	745 (57.7)[b]	2277 (55.1)[b]		
Voluntary	2261 (51.1)[a]	546 (42.3)[b]	1855 (44.9)[b]		
Diagnosis[t]				**58.667**	**<.001**
Psychotic D/O	1381 (31.2)[a]	502 (38.9)[b]	1454 (35.2)[c]		
Substance Use D/O	984 (22.2)[a]	265 (20.6)[a,b]	812 (19.7)[b]		
Mood and Anxiety D/O	1545 (34.9)[a]	396 (30.7)[b]	1415 (34.2)[a,b]		
Neurocognitive D/O	298 (6.7)[a]	62 (4.8)[b]	212 (5.1)[b]		
Personality D/O	93 (2.1)[a]	37 (2.9)[a,b]	126 (3.0)[b]		
Neurodevelopmental D/O	78 (1.8)[a]	13 (1.0)[a]	78 (1.9)[a]		
Other	46 (1.0)[a]	14 (1.1)[a]	35 (0.8)[a]		

Note: Column proportions in a row not sharing superscripts are significantly different from one another.
[t]2 patients did not have psychiatric diagnosis.

Table 3

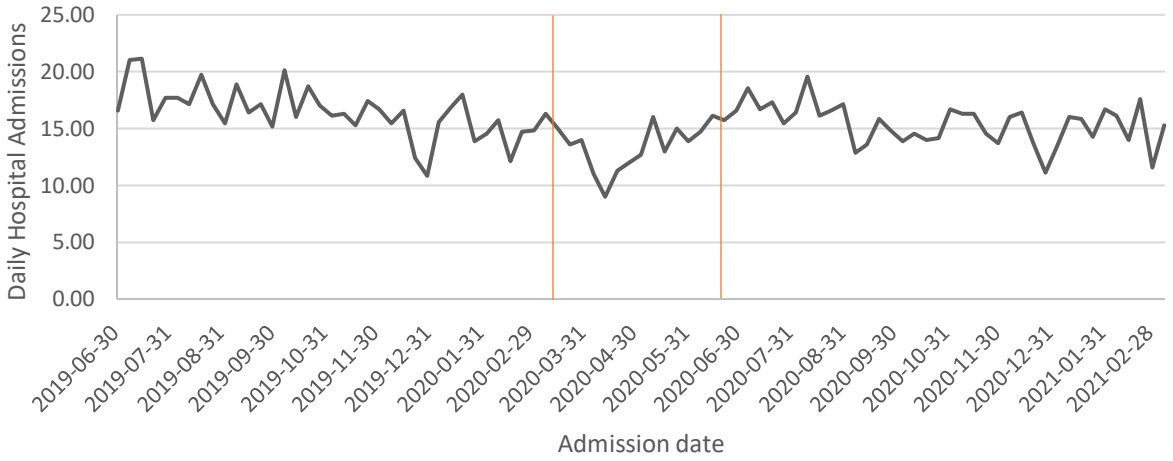
Changes in Clinical Presentation during Pre-pandemic, Lockdown and Post-lockdown

	Pre-pandemic (N=4425)	Lockdown (N=1291)	Post-lockdown (N=4132)	Time difference tests	
	M (SD)	M (SD)	M (SD)	F (2, 9203)	P
Clinical Rating Scales					
Violence Sum	2.26 (3.70)[a]	2.68 (3.84)[b]	2.39 (3.82)[a]	**6.517**	**.001**
Aggressive Behaviour Scale	1.62 (2.80)[a]	1.78 (2.88)[a]	1.72 (2.87)[a]	2.252	.105
Depression Severity Index	3.15 (3.52)[a]	2.75 (3.35)[b]	2.90 (3.50)[b]	**9.185**	**<.001**
Positive Symptom Scale	3.52 (4.56)[a]	4.42 (5.21)[b]	3.74 (4.62)[a]	**18.261**	**<.001**
Social Withdrawal Scale	4.80 (5.08)[a]	3.98 (4.69)[b]	4.17 (4.87)[b]	**23.900**	**<.001**
Cognitive Performance Scale	0.71 (1.29)[a]	0.72 (1.21)[a]	0.73 (1.24)[a]	0.496	.609

Note: Means in a row not sharing superscripts are significantly different from one another.

Figure 1

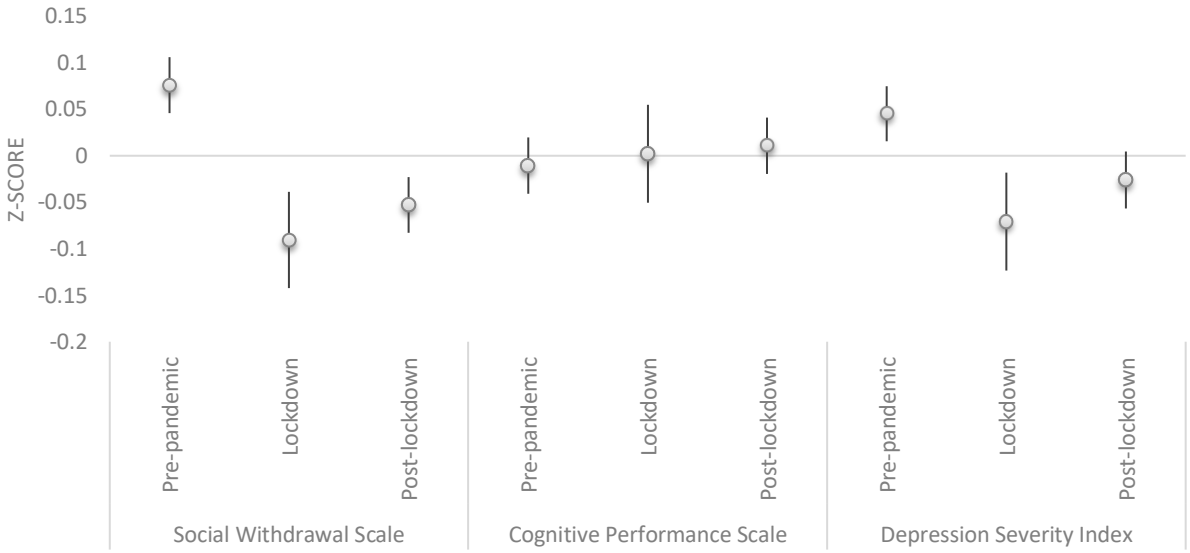
Daily Hospital Admissions (Seven Day Mean)



Note: Vertical lines indicate start and end of lockdown period.

Figure 2

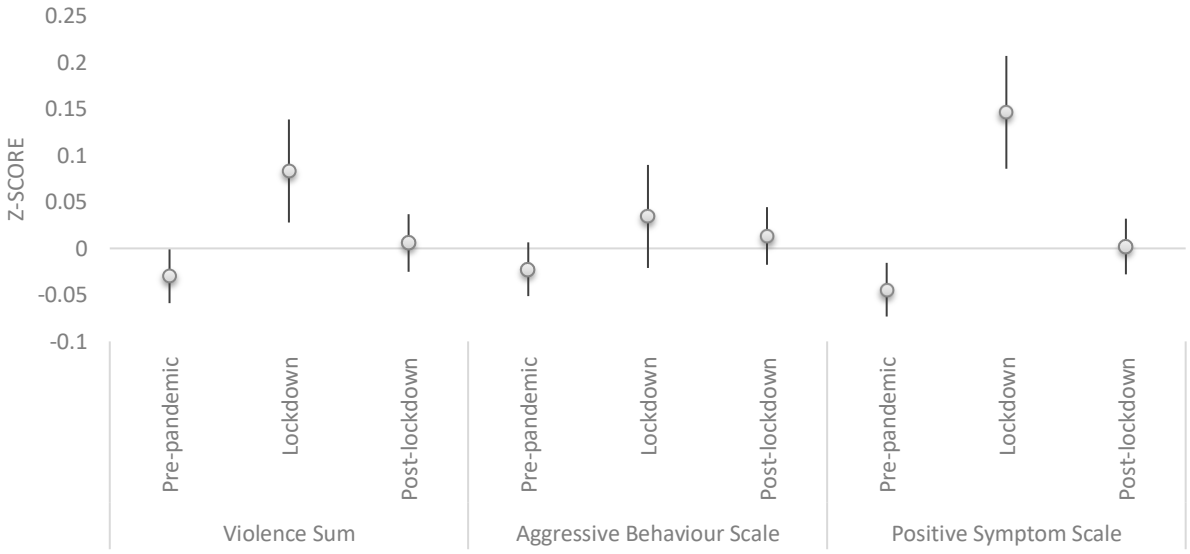
Clinical Indicators for Social Withdrawal, Cognitive Performance and Depression per Time Period



Note: Error bars show 95% confidence intervals.

Figure 3

Clinical Indicators for Violence, Aggression and Positive Symptoms per Time Period



Note: Error bars show 95% confidence intervals.