Effects of COVID-19 on Patients in Adult Ambulatory Psychiatry: Using Patient-Rated Outcome Measures and Telemedicine

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Abstract

Introduction: To examine the effects of coronavirus disease 2019 (COVID-19) on patients in an academic psychiatric ambulatory clinic, data from a measurement-based care (MBC) system were analyzed to evaluate impacts on psychiatric functioning in patients using telemedicine. Psychiatric functioning was evaluated for psychological distress (brief adjustment scale [BASE]-6), depression (patient health questionnaire [PHQ]-9), and anxiety (generalized anxiety disorder [GAD]-7), including initial alcohol (U.S. alcohol use disorders identification test) and substance use (drug abuse screening test-10) screening.

Methods: This observational study included MBC data collected from November 2019 to March 2021. Patient-Reported Outcome Measures (PROMs) were examined to determine changes in symptomatology over the course of treatment, as well as symptom changes resulting from the pandemic. Patients were included in analyses if they completed at least one PROM in the MBC system.

Results: A total of 2,145 patients actively participated in the MBC system completing at least one PROM, with engagement ranging from 35.07% to 83.50% depending on demographic factors, where completion rates were significantly different for age, payor status, and diagnostic group. Average baseline scores for new patients varied for the GAD-7, PHQ-9, and BASE-6. Within-person improvements in mental health before and after the pandemic were statistically significant for anxiety, depression, and psychological adjustment.

Discussion: MBC is a helpful tool in determining treatment progress for patients engaging in telemedicine. This study showed that patients who engaged in psychiatric services incorporating PROMs had improvements in mental health during the COVID-19 pandemic. Additional research is needed exploring whether PROMs might serve as a protective or facilitative factor for those with mental illness during a crisis when in-person visits are not possible.

Keywords: *COVID, telepsychiatry, behavioral health, telemedicine, e-Health*

Introduction

The World Health Organization declared the novel coronavirus disease 2019 (COVID-19) a pandemic on March 11, 2020.[1] Since the initial identification of COVID-19 in December 2019,[2] studies have shown pronounced effects on psychiatric health functioning, including depression, anxiety, substance use, and post-traumatic stress disorder.[3–10]

Specific COVID-19 factors impacting mental illness include uncertainty, fears of infection, having adequate basic

supplies, unemployment, and inadequate personal protective equipment.[11,12] Quarantine, lockdown, and shelter in place status create additional psychiatric distress due to changing guidelines and messaging from authorities, loss of personal freedoms, home confinement, boredom, and financial loss.[13] This constellation of factors along with avoidance of health settings and shared transportation creates significant barriers to mental health interventions during a pandemic.[11,12]

We know that individuals with a history of psychiatric illness are at higher risk for worsening psychiatric symptoms during a pandemic[14,15] and that having mental illness increases one's risk of contracting COVID-19 through lack of preventive health care, limited health care access, higher prevalence of comorbid medical illness, and homelessness.[16-18] Taken together, social changes due to the COVID-19 pandemic and its psychiatric consequences are significant, highlighting the need for identification of preventive or prophylactic actions that mitigate negative effects.[19] As the pandemic continues, data on mental health outcomes of individuals receiving psychiatric care before and during COVID-19 are still emerging. The identification and evaluation of the effects of mental illness intervention on psychiatric sequelae in community samples may prove instructive.[20]

The COVID-19 pandemic has provided an unprecedented challenge to health service providers.[21] The rapid transition to telemedicine resulting from the pandemic required significant changes to traditional therapeutic processes.[22-24] Of particular concern is the clinician's ability to reliably assess patients' symptomatology to aid in clinical decision-making in the context of telemedicine.[25] It has also changed the definition of telemedicine since many places adopted a hybrid of services. Our group allowed for phone, video, and in-person visits, although the latter were the least common. We opted to define the delivery method of a case as telemedicine when a patient was seen by phone or video more than 70% of the time.

The psychiatry clinic also engages patients in Measurement-Based Care (MBC), an evidence-based tool that uses systematic ongoing collaborative evaluation of patient symptoms to inform clinical decision-making.[26] It is poised to address some of the challenges of telemedicine and improve patient and clinician communication in this platform.[27] One essential component of MBC is the regular use of Patient-Reported Outcome Measures (PROMs). MBC has demonstrated ability to assess psychiatric symptoms, psychological functioning, and clinical changes, resulting in improved patient outcomes.[28,29] Remote MBC can enhance care within telemedicine.[30,31]

Consequently, one of MBC's most relevant applications is during a crisis when in-person interventions are not possible.[32] When MBC is integrated into a system before a crisis onset (e.g., COVID-19 pandemic), it provides a cost-effective capacity to evaluate real-time changes in mental illness. This project seizes on the confluence of utilizing MBC in conjunction with in-person psychiatric care 4 months before and with predominantly telemedicine 12 months after the declaration of COVID-19 as an international pandemic.[1,31,32]

The present study aimed to document the mental illness status of patients receiving outpatient psychiatric tele-care with MBC within a regional health care system (~20-county region) and to examine its association with the COVID-19 environment, through the following: (1) examining differences in PROM completion rates across demographic factors; (2) evaluating new patient baseline psychological distress before and during COVID-19; and (3) evaluating within group differences for psychiatric symptomatology before and during COVID-19. It was hypothesized that patient exposure to pandemic-related stressors, along with loss of employment, finances, and social functioning, as well as patients receiving care through telemedicine rather than in person, would be associated with higher levels of psychiatric symptomatology, psychological distress, and decreased well-being.

Methods

STUDY POPULATION AND DESIGN

Participants were identified from the Department of Psychiatry and Behavioral Medicine's (PBM) outpatient clinic in a United States regional hospital. Inclusion criteria comprised patients ≥18 years of age who completed at least one PROM between November 1, 2019 and March 18, 2021 resulting in 2,145 eligible patients.

Telemedicine was defined as care conducted more than 70% of the time through phone or video. Before the pandemic, between November 2019 and February 2020, patients in the PBM clinic received services by phone or video 3–5% of the time. From April 2020 to March 2021, 71–95% of patients received services through telephone or video, depending on the month, spotlighting the swift change to telemedicine as the primary service modality. This study was granted exemption from Institutional Review Board (IRB) review under DHHS regulatory category 4(iii): Secondary Research Without Consent, according to the Carilion Clinic Institutional Review Board.

PROCEDURE

As part of our standard care, adult patients seen in PBM are encouraged to complete PROMs. Patients are given the opportunity to complete a standardized set of PROMs immediately before the initial clinician appointment. Participants are then encouraged to complete specific PROMs

monthly. Measurement data were collected through a secure cloud-based program with results immediately available for review.

MEASURES

Patient demographics. Age, ethnicity, race, payor status, rurality location based on rural-urban commuting area code, and diagnosis were obtained from individual patients' Electronic Medical Records and deidentified datasets exported into a cloud-based secure research environment for analysis.

The following standard administered MBC PROMs were used in this study.

Brief adjustment scale-6 (initial and monthly). The brief adjustment scale-6 (BASE-6) is a 6-item self-report scale designed to address overall psychological functioning and adjustment.[33] All items are rated from 1 (not at all) to 7 points (extremely), and total scores range from 6 to 42 points. Higher scores indicate lower general psychological adjustment with a clinical cutoff of 19 indicating clinically meaningful distress. The BASE-6 has demonstrated good to excellent internal consistency (Cronbach's $\alpha = 0.87–0.93$) in both clinical and nonclinical samples, and test–retest reliability was 0.77 for nonclinical samples.[33]

Drug abuse screening test-10 (initial). The drug abuse screening test (DAST)-10 is a 10-item self-report questionnaire that assesses potential involvement with drugs, excluding alcohol and tobacco, during the past 12 months.[34] Subjects report problematic drug use with yes/no answers. Results provide a quantitative index of the extent of problems related to drug abuse.

Generalized anxiety disorder-7 (initial and monthly). The generalized anxiety disorder (GAD)-7 is a 7-item self-report scale designed to measure the severity of GAD symptoms.[35] Participants are asked to report their anxiety symptoms over the past two weeks, and items are rated on a 4-point Likert scale. Scores range from 0 to 21 points, with higher scores indicating greater levels of anxiety. GAD-7 also has excellent internal consistency (Cronbach's $\alpha = 0.92$) and test–retest reliability $(r = 0.83)$.[35]

Patient health questionnaire-9 (initial and monthly). The patient health questionnaire (PHQ)-9 is a 9-item self-report measure of depression symptoms over the past 2 weeks, mapping onto the DSM-5 diagnostic criteria.[36] Items are rated as 0 (not at all) to 3 (almost every day), and the total score ranges from 0 to 27 points. The higher scores represent greater severity of depressive symptoms. PHQ-9 demonstrates good internal consistency (Cronbach's $\alpha = 0.89$) and test–retest reliability $(r = 0.84)$.[36]

U.S. alcohol use disorders identification test (initial). The U.S. alcohol use disorders identification test (USAUDIT) is a brief self-report screening measure to identify subjects using alcohol in a problematic way over the past 12 months.[37] It measures three domains of alcohol use: (1) hazardous use, (2) dependence symptoms, and (3) harmful alcohol use. The total score ranges from 0 to 46 points, with higher scores suggesting a mild/moderate/severe level of alcohol use and dependence.[36]

STATISTICAL ANALYSIS

Analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC). Descriptive analyses were completed where numeric variables were investigated by measures of central tendency and variation, and categorical variables were investigated by frequencies and percentages. Analysis of variance (ANOVA) and *t* tests analyzed the mean difference in survey responses by the various demographic variables.

For aim 1, MBC completion percentage was representative of the number of completions compared to the number of months in treatment (*Table 1*). In addition, chi-square tests were performed to examine differences in completion rate across demographic factors (*Table 1*). Regarding aim 2, regression analyses were conducted for baseline PROMs for each new patient to determine if a significant time trend was apparent (*Table 2* and *Fig. 1a*–c). Aim 3 used paired-sample *t* tests to examine PROM scores before and after COVID-19 onset in patients established in the clinic (*Table 3*). At least 176 pairs of data were collected for each main PROM, achieving at least 74% power to reject the null hypothesis when the population effect size is considered small.

Results

COMPLETION OF PROMs ACROSS DEMOGRAPHICS

PROM completion rates were examined across different demographic factors (aim 1; *Table 1*). Completion rates were calculated for different age bands, gender, diagnostic category, payor status, and rurality, where the percentage represented the number of completions compared to the number of months in treatment, as patients were encouraged to complete PROMs monthly.

The results of chi-square tests showed significant differences in completion rates among different age groups, diagnostic groups, and payor status, while there were no significant differences among gender groups. Differences by

Table 1. Comparison of completion rates across demographics by (a) age, (b) gender, (c) race, (d) diagnostic category, (e) payor status, and (f) rurality

(A) AGE	TOTAL N	N OF COMPLETED PROMS	TREATMENT MONTHS	COMPLETION RATE (%)	P
Unknown	4	4	11	36.36	**<0.00**
18–22	129	252	340	74.12	
23–27	232	456	698	65.33	
28–32	275	680	1041	65.32	
33–37	247	545	980	55.61	
38–42	243	593	1041	56.96	
43–47	210	565	834	67.75	
48–52	187	461	669	68.91	
53–57	168	434	676	64.20	
58–62	168	373	630	59.21	
63–67	117	290	418	69.38	
68–72	91	200	296	67.57	
73–77	48	108	182	59.34	
78–82	21	34	77	44.16	
83–87	5	6	15	40.00	
Total	2,145	5,001	7,908	63.24	

(B) GENDER	N	COMPLETED PROMS	TREATMENT MONTHS	%	P
F	1,485	3,510	5,612	62.54	0.11
M	659	1,489	2,292	64.97	
U	1	2	4	50.00	
Total	2,145	5,001	7,908	63.24	

(C) RACE	N	COMPLETED PROMS	TREATMENT MONTHS	%	
Other	209	442	687	64.34	
White or Caucasian	1,936	4,559	7,221	63.14	
Total	2,145	5,001	7,908	63.24	

(D) DIAGNOSTIC CATEGORY	N	COMPLETED PROMS	TREATMENT MONTHS	%	P
Anxiety disorders	150	341	458	74.45	**<0.00**
Bipolar disorders	249	640	871	73.48	
Depressive Disorders	727	1,876	2,554	73.45	
Generalized Anxiety Disorder	197	496	594	83.50	
Other	719	1,426	2,798	50.96	
SUD	103	222	633	35.07	
Total	2,145	5,001	7,908	63.24	

Table 1. Comparison of completion rates across demographics by (a) age, (b) gender, (c) race, (d) diagnostic category, (e) payor status, and (f) rurality *continued*

(E) PAYOR	N	COMPLETED PROMS	TREATMENT MONTHS	%	P
Commercial	835	2,076	2,582	80.40	**<0.00**
Medicaid	504	1,073	1,958	54.80	
Medicare	377	868	1,423	61.00	
Other	22	57	80	71.25	
Self	165	544	864	62.96	
Unknown	242	383	1,001	38.26	
Total	2,145	5,001	7,908	63.24	

(F) RURALITY DESCRIPTION	N	COMPLETED PROMS	TREATMENT MONTHS	%	
Metropolitan area core: primary flow within an urbanized area	1,483	3,410	5,377	63.42	
Other	662	1,591	2,531	62.86	
Total	2,145	5,001	7,908	63.24	

Bold value signifies $p < 0.00$.

PROM, patient-reported outcome measure; SUD, substance use disorder.

Table 2. Mean scores for new patient baseline psychological distress (BASE–6), depression (PHQ–9), and anxiety (GAD–7) are presented for each month from November 2019 to March 2021

COHORT	MEAN (SD)			MEDIAN	
	BASE–6	PHQ–9	GAD–7	DAST–10	AUDIT
November 2019	25.20 (10.81)	12.28 (8.49)	11.49 (6.30)	0.5	1
December 2019	25.42 (9.17)	13.32 (7.06)	12.09 (6.02)	0	3
January 2020	24.88 (9.09)	12.72 (7.08)	11.93 (5.73)	0	3
February 2020	23.46 (10.90)	11.94 (7.09)	10.26 (6.70)	0	1
March 2020	24.56 (10.01)	11.53 (6.80)	11.00 (5.95)	0	1
April 2020	22.91 (10.66)	10.84 (7.24)	10.85 (6.67)	0	2
May 2020	23.84 (10.33)	11.84 (7.09)	10.66 (6.40)	0	2
June 2020	24.56 (10.01)	13.45 (6.58)	13.04 (5.67)	0	2
July 2020	22.91 (10.66)	12.38 (7.34)	11.76 (6.39)	0	2
August 2020	23.84 (10.33)	11.00 (7.06)	11.12 (6.27)	0	1
September 2020	26.38 (9.79)	10.27 (8.38)	10.23 (6.74)	0	1
October 2020	25.80 (10.77)	12.21 (7.30)	11.64 (6.43)	0	1
November 2020	24.24 (9.93)	10.56 (7.41)	10.33 (6.49)	0	1
December 2020	22.71 (11.59)	9.35 (8.28)	9.17 (6.98)	0	0
January 2021	22.33 (10.93)	10.75 (7.67)	10.29 (6.49)	0	1
February 2021	22.72 (11.33)	10.99 (7.53)	10.57 (6.75)	0	1.5
March 2021	23.98 (10.62)	11.46 (6.76)	11.25 (6.16)	0	1
p-value	0.14	0.01**	0.09	0.10	0.03*

*$p \leq 0.05$, **$p \leq 0.01$.

AUDIT, alcohol use disorders identification test; BASE-6, brief adjustment scale-6; DAST-10, drug abuse screening test-10; GAD-7, generalized anxiety disorder-7; PHQ-9, patient health questionnaire-9; SD, standard deviation.

Note: Since drug use (DAST-10) and alcohol use (AUDIT) data were heavily skewed, the median total score is presented.
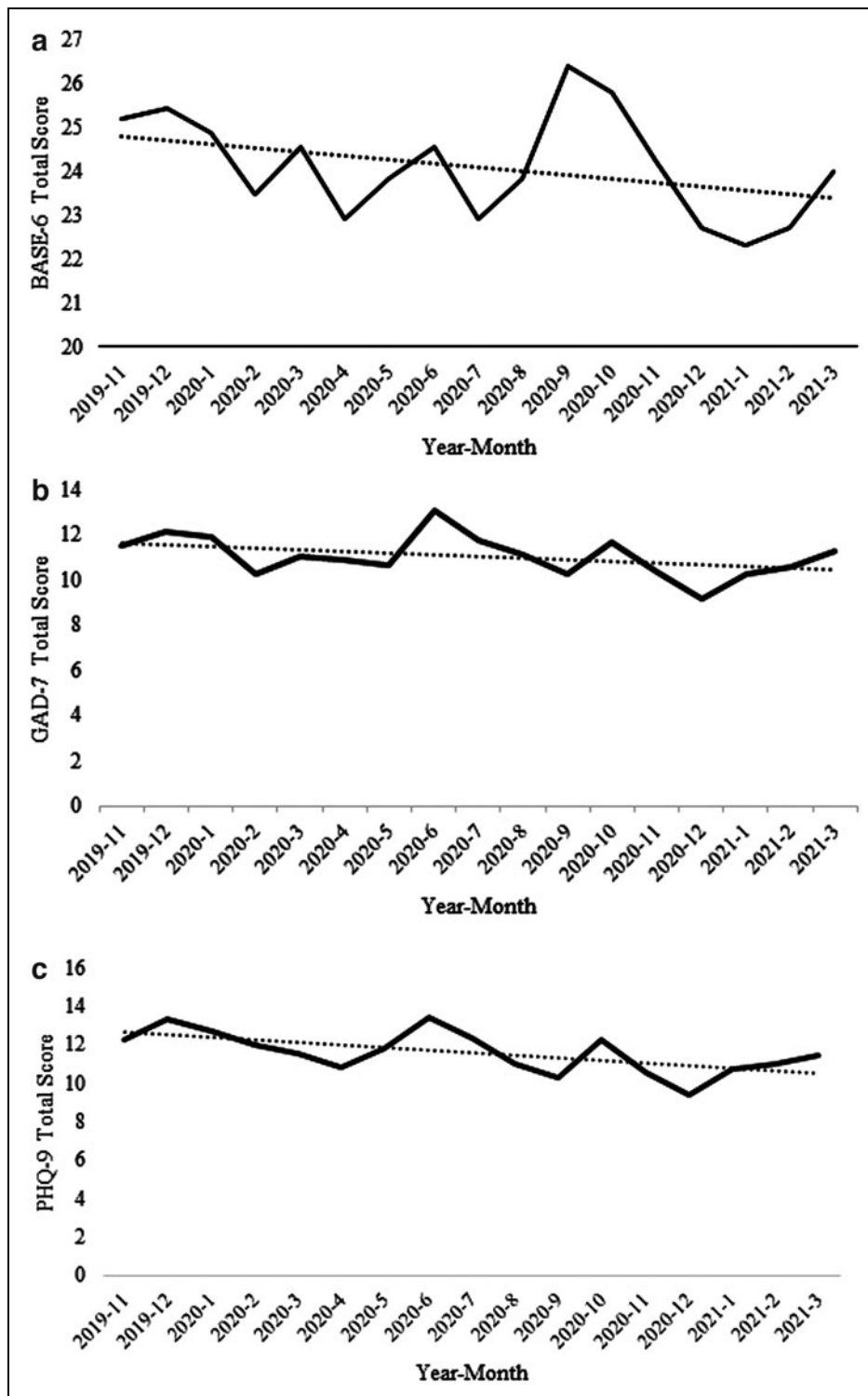
Fig. 1. (a) Average monthly new patient baseline scores of the BASE-6. **(b)** Average monthly new patient baseline scores of the GAD-7.**(c).** Average monthly new patient baseline scores of the PHQ-9. BASE-6, brief adjustment scale-6; GAD-7, generalized anxiety disorder-7; PHQ-9, patient health questionnaire-9.

Table 3. Comparison of scores for clinic patients with at least one PROM before and after pandemic declaration as measured by paired–sample *t*-test of survey responses for the BASE–6, GAD–7, and PHQ–9					
	N	PRE	POST	PRE–POST	*p*
BASE-6	196	23.91	21.01	2.9	<0.00
GAD-7	199	10.55	8.39	2.16	<0.00
PHQ-9	176	11.88	9.7	2.18	0.00

BASE-6 range 6–42, >19 = higher distress. GAD-7 range 0–21, clinically meaningful change = 6 with change from one severity level to another. PHQ-9 range 0–27, clinically meaningful change = 5.

race were not calculated due to 90.26% of subjects being White/non-Hispanic. For different age groups, completion rates ranged from 40.00% (83- to 87-years-old) to 74.12% (18- to 22-years-old). White/non-Hispanic patients (63.14%) had similar completion rates to other racial groups (63.34%), as did female (62.54%) and male (64.97%), or metropolitan (63.42%) and other areas (62.86%).

Rates varied by payor status with the lowest completion among unknown (38.26%) and the highest completion in commercial patients (80.40%), followed by other (71.25%). Diagnostic groups varied in completion rates with the least completion from patients with substance use disorders (35.07%) compared to the highest completion rates in GAD patients (83.50%).

BASELINE PSYCHOLOGICAL DISTRESS

Baseline psychological symptoms (BASE-6, PHQ-9, GAD-7, DAST-10, and USAUDIT) were compared for new patients entering treatment each month from November 2019 to March 2021 (aim 2; *Table 2* and *Fig. 1a*–c). Linear regression analyses were conducted to determine if month entering treatment was significant to the mean BASE-6, GAD-7, PHQ-9, DAST-10, and USAUDIT survey scores. Month entering care was not a significant predictor for mean BASE-6 ($p = 0.14$), GAD-7 ($p = 0.09$), and DAST-10 ($p = 0.10$) scores, but month entering care was significant to mean PHQ-9 ($p = 0.01$) and USAUDIT ($p = 0.03$) scores. *Figure 1a*–c shows average scores and trends of the BASE-6, GAD-7, and PHQ-9.

WITHIN–GROUP PROMs SPANNING THE ONSET OF COVID-19

Within-group differences were evaluated for psychological distress (BASE-6), depression (PHQ-9), and anxiety (GAD-7). Due to the high volume of missing data, only the first survey for the pre-COVID-19 period (November 2019 through

February 2020) and the final survey of the examined post-COVID-19 period were considered. Patients who completed at least 1 survey before and after the pandemic onset for the BASE-6 ($n = 196$), PHQ-9 ($n = 176$), and GAD-7 ($n = 199$) were included. Paired samples *t* tests were conducted to determine changes related to COVID-19 (*Table 3*). The GAD-7 showed significant improvements from before ($M = 10.55$) and after March 2020 ($M = 8.39$; $p < 0.00$). Both the BASE-6 ($p < 0.00$) and PHQ-9 ($p < 0.00$) also showed significant positive change (*Table 3*).

WITHIN–GROUP DEMOGRAPHICS

Within-group demographic differences were evaluated using ANOVA and *t* tests to analyze the mean difference in survey responses by the following variables: age groups, male or female gender, race, payor, rurality, and diagnosis. Multiple variables were recorded for testing to combine less frequent subgroups, resulting in the following: age (in 5-year spans), race (white or other), gender (male or female), payor (commercial, Medicaid, Medicare, self, or other), rurality (primary flow in an urban area or other), and diagnosis (anxiety [excluding GAD], bipolar, depressive, substance, generalized anxiety, other disorders).

Regarding psychological distress, no significant differences were found for change in mean BASE-6 score by age ($p = 0.56$), race ($p = 0.28$), payor status ($p = 0.39$), rurality ($p = 0.51$), or diagnosis ($p = 0.69$). A significant difference was found for gender ($p = 0.04$). For anxiety, there were no significant differences in mean change on the GAD-7 for age ($p = 0.70$), gender ($p = 0.14$), race ($p = 0.38$), payor status ($p = 0.21$), rurality ($p = 0.12$), or diagnosis ($p = 0.18$). There were no significant changes in depression by mean change on the PHQ-9 by age ($p = 0.96$), gender ($p = 0.69$), race ($p = 0.41$), payor status ($p = 0.07$), or rurality ($p = 0.56$); however, there was a significant difference by diagnosis ($p = 0.03$) (*Table 4*).

Discussion

Surveys suggest that people with a history of psychiatric illness are experiencing worsening depression and anxiety during the COVID-19 pandemic.[3–10] Higher rates of depression and anxiety, as well as substance use, have been documented in those who contracted or were exposed to COVID-19, as well as in those impacted by the pandemic socially and economically. Parallel to these early clinical findings, measures required to prevent the spread of COVID-19 necessitated a shift in psychiatric care to virtual platforms, a sudden change for the vast majority of patients and clinicians.

Our clinic's use of PROMs allowed for symptom tracking before and during the COVID-19 pandemic and provided novel information about the symptoms of new and returning

Table 4. Differences in PROM means by demographic variables (age, gender, race, payor status, rurality, and diagnostic group)

	N	BASE–6	N	GAD–7	N	PHQ–9
Age group (p)	195	0.56	198	0.70	173	0.96
18–22	12	−5.17 (7.81)	12	−5.17 (4.63)	12	−3.75 (10.34)
23–27	12	−5.92 (9.22)	12	−3.00 (6.54)	10	−2.20 (6.39)
28–32	22	0.50 (9.64)	22	0.09 (5.73)	18	0.44 (10.17)
33–37	23	−4.09 (8.56)	22	−3.41 (6.01)	22	−2.27 (9.85)
38–42	23	−4.22 (11.31)	25	−1.88 (6.50)	18	0 (12.27)
43–47	20	−1.85 (8.93)	20	−2.25 (4.94)	14	−1.57 (12.18)
48–52	21	−3.38 (7.94)	21	−1.67 (5.59)	21	−3.43 (9.74)
53–57	16	−1.75 (9.66)	17	−2.65 (7.20)	17	−2.24 (8.48)
58–62	18	−4.22 (7.93)	18	−1.44 (5.71)	16	−3.69 (8.40)
63–67	15	0.67 (10.89)	16	−1.56 (7.35)	14	−1.79 (9.98)
68–72	9	−6.11 (13.50)	9	−3.33 (7.12)	8	−5.75 (6.32)
73–77	4	−1.25 (6.13)	4	−2.75 (4.99)	3	−1.67 (4.93)
Gender (p)		0.04*		0.14		0.69
Female	147	−3.76 (9.55)	150	−2.55 (5.93)	132	−2.01 (9.62)
Male	48	−0.48 (8.79)	48	−1.08 (6.39)	41	−2.71 (9.79)
Race (p)		0.28		0.38		0.41
White or Caucasian	180	−3.16 (9.23)	183	−2.31 (5.86)	158	−2.36 (9.50)
Other	15	−0.40 (11.85)	15	−0.87 (8.29)	15	−0.20 (11.16)
Payor (p)		0.39		0.21		0.07
Commercial	71	−4.00 (9.48)	71	−2.82 (6.14)	66	−4.18 (9.89)
Medicaid	38	−3.87 (10.10)	39	−3.13 (6.44)	33	0.82 (9.62)
Medicare	40	−2.40 (9.61)	40	−2.10 (5.98)	37	−1.43 (9.24)
Self	43	−0.70 (8.51)	45	−0.40 (5.66)	34	−1.29 (8.33)
Other	3	−6.00 (11.36)	3	−3.67 (0.58)	3	−10.00 (15.72)
Rurality (p-values)		0.51		0.12		0.56
Primary urban area	157	−2.73 (9.18)	159	−1.87 (5.87)	134	−2.40 (9.58)
Other	38	−3.87 (10.60)	39	−3.54 (6.69)	39	−1.38 (9.91)
Diagnostic group (p)		0.69		0.18		0.03*
Anxiety disorders	16	−3.44 (10.35)	16	−2.13 (5.03)	14	−3.64 (7.92)
Bipolar disorder	33	−2.30 (8.66)	33	−2.73 (6.25)	33	0.76 (9.21)
Depressive disorders	75	−3.33 (9.82)	78	−2.45 (5.74)	68	−3.88 (9.41)
Substance use disorder	15	0.07 (6.82)	14	0.93 (3.58)	14	2.21 (10.38)
Generalized anxiety disorder	15	−5.67 (12.85)	15	−4.80 (8.13)	12	1.75 (12.66)
Other	41	−2.68 (8.58)	42	−1.45 (6.44)	32	−4.31 (8.37)

*p ≤ 0.05.

Note: Mean survey differences were calculated by subtracting the pre-March survey score from the post-March survey score. Numbers are represented as mean (SD).

psychiatry patients during this time. Based on the early research findings noted above, we hypothesized that psychiatric symptomatology would increase both between and within subject groups during the COVID-19 pandemic compared to prepandemic times. In fact, this did not occur.

New patients entering the clinic had statistically lower scores on all scales from November 2019 to March of 2021 (*Table 2* and *Fig. 1*). Statistically significant improvements were also observed in PHQ-9, GAD-7, and BASE-6 scores for patients followed longitudinally before and through the pandemic (*Table 3*).

Thus, despite uncertainty surrounding a novel coronavirus and its impact on communities, workforce, health care, finances, daily living, and a change to telemedicine, subjects improved. In particular, for returning patients, women showed improved functioning during the study period more than men, and there was a difference in PHQ-9 scores dependent on the diagnostic group. Differences in gender and diagnostic group completion could reflect greater willingness for certain groups to engage in PROMs, an area that deserves further study.

Differences in completion rates for new patients based on demographics and mental health diagnosis were significant for age, diagnosis, and payor status. Comparing initial symptom severity of depression, anxiety, and functional status from pre-COVID to COVID months, there was no evidence that patients new to the clinic were more severely ill following the state stay-at-home mandate or as the pandemic persisted; however, care became more challenging to access in the earliest stages which may have prevented those with severe psychopathology from accessing necessary care.

Alcohol and substance use severity pre- and post-COVID could not be assessed given overall low PROM completion, again suggesting that there may be additional barriers to MBC that could be investigated in this population. Since only 35% of patients in this category completed PROMs, we may not have captured data from patients who would endorse higher scores.

Previous studies suggested development or worsening of mental health issues during the pandemic, but our group did not replicate that finding. We suspect that, consistent with MBC efficacy studies, use of PROMs allowed for closer monitoring of symptoms in the context of telemedicine, as it has been shown to do for in-person visits. Therefore, it may have facilitated patient engagement and allowed more regular symptom assessment and treatment adjustments.

The study has several limitations. One is the absence of a patient comparison group who did not complete measures. It is possible that those who did not engage in MBC may have

also experienced improvement in psychiatric symptoms. In addition, many patients only completed the PROMs, in part, and at different frequencies.

In some areas, insufficient data points exist to show any potential relationship between PROM completion frequency and outcomes. While we considered that COVID-19 stimulus checks may have mitigated the anticipated symptom decline in this population, measurement of this factor was not within the scope of this study. Finally, our psychiatric assessment was in a geographical area, predominantly White/non-Hispanic, not initially affected by high rates of infection. That said, patients were dealing with uncertainty and unprecedented isolation surrounding the pandemic and high rates of infection and hospitalization later in the pandemic, much like other areas of the United States.

Navigating the switch to telemedicine during the COVID-19 pandemic has been demanding. Through use of PROMs, this study reveals that patients with psychiatric illness in an ambulatory psychiatry clinic experienced improvement in their symptoms. As psychiatric practice pivots to greater use of telemedicine and is faced with managing the impact of COVID-19 on patients with psychiatric illness, it is important that we optimize patient care. While additional research is needed, this study suggests that MBC, utilizing PROMs in particular, can be used proactively in telemedicine to track symptoms and minimize psychiatric sequelae through a crisis, when psychiatric care remains paramount.

Disclosure Statement

The authors declare that this represents original work, that we have the rights to this work, and that this work is not being considered for publication elsewhere and has not been published elsewhere. In addition, we have obtained and can supply all necessary permissions for the reproduction of any copyright works that are not owned by us. The authors declare that there is no conflict of interest.

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