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Addressing Mental Health Factors to Improve Outcomes in Work-Related COVID-19

A Retrospective Study of Frontline Workers

Daniel B. LeGoff, PhD, Jacob Lazarovic, MD, FAAFP, Miranda Kofeldt, PhD, Hiren Ghayal, PsyD, and Aimee Peters, MS

Objective: This retrospective study investigated the benefits of adding psychological services for frontline workers with delayed recovery from COVID-19 due to psychosocial stressors and/or mental disorders. **Methods:** Both standardized psychological evaluation and at least 3 sessions of work-focused cognitive behavioral therapy were provided to 103 participants. Benefits were assessed by comparing the pretreatment and posttreatment recovery, work status, and self-ratings of work-related and adaptive daily functioning. **Results:** Duration of recovery and return to work were reduced along with improvements in work relevant (40%) and adaptive functioning (31%). The majority (80%) returned to work within 12 weeks despite variable presenting problems, course of illness, demographic, and job factors. **Conclusions:** Brief work-focused cognitive behavioral therapy seems to be an effective adjunct to customary outpatient medical care for COVID-19 in frontline essential workers for whom the return-to-work process may be negatively affected by stress, anxiety, and depressed mood.

Keywords: COVID-19, psychology, health psychology, stress, depressed mood, anxiety, return to work, outcomes, cognitive behavioral therapy, work-focused CBT, telehealth, mental health, behavioral health

Recovering from COVID-19 and returning to work have been significant challenges for many employees and their families across all occupational categories and work environments. The pandemic has been especially stressful for essential workers, who have been identified by the American Psychological Association as having a significantly increased risk of developing mental health disorders.[1] Stress-related mental health issues have had a particularly negative impact on the recovery and return-to-work (RTW) process for healthcare personnel, first responders, and corrections workers, whose duties include attending to the health and well-being of others with COVID-19.[2] The combined effects of daily exposure to severe morbidity and mortality, staff shortages and increased workloads, continuously updated policies and procedures, high re-exposure risk, preexisting health conditions, and negative personal life events or losses represent a virtual barrage of psychosocial stressors for this category of employees.[3]

In the initial months of the spread of the virus, the primary public health concerns were the respiratory effects of COVID-19. For some time, public health initiatives were focused on acute respiratory distress syndrome, or "silent hypoxia," which could result in the need for hospitalizations, including intensive care and access to both supplemental oxygen and ventilators. There were also many worrisome reports that SARS-CoV-2 might infect the central nervous system, based on the history of similar coronaviruses resulting in encephalitis, and the frequent finding of neurological symptoms (eg, loss of sense of smell and taste, headaches, dizziness, altered mental status, and/or delirium).[4] Although these symptoms continued to be reported features of COVID-19, the initial concerns about encephalitis or other central nervous system effects due to viral infection of the brain were not supported by outcome monitoring and postmortem analyses.[5,6] In the interim, however, reports of persistent symptoms have increasingly focused on neurocognitive and mental health features, which may have indirect, multifactorial etiologies.[7–9]

The clinical and functional outcomes for employees with COVID-19 have demonstrated a wide range of severity, from minimal symptoms to multisystem organ failure and death.[9,10] One of the consistent findings has been the unpredictability of post–COVID-19 recovery due to a range of factors that influence the relationship between physical symptoms due to the virus as well as longer-term functional outcomes.[10] Studies have highlighted the fact that many patients with mild initial symptoms were reporting persistent features for weeks or months after the acute phase of the illness.[11] The relationship between initial COVID-19 and what researchers have identified as post-acute sequelae of SARS-CoV-2 infection (PASC), or "long COVID," seems to be a complex one, with little correlation between the number, severity, or type of COVID-19 symptoms and post–COVID-19 persistent symptoms and complications.[10,11] Similarly, identifying factors that affect the restoration of functional capacities and quality of life after COVID-19 has been hindered by the range and variability of these residual features.[12]

The wide range of COVID-related clinical features, course, and outcomes, including variability of functional recovery, has created significant problems for occupational health providers who are tasked with treating COVID-19 and offering rehabilitation strategies with uncertain and evolving practice parameters and utilization guidelines. Employers and the workers compensation insurance industry rely on predictions of the course, treatment, and outcome of work-related illnesses and injuries, which are key to their operations.[13] The combined effects of COVID-19 and severe, prolonged stress create a biopsychosocial vicious cycle, the outcomes of which are difficult to predict.

Hans Selye[14] first described the theory that mental stress—including sociocultural, interpersonal, and emotional factors—can negatively impact physical health and the immune system in *Nature* in 1936. The consensus in the health psychology literature is that the co-occurrence of multiple stressful life events can result in a pattern of excessive worry, pessimism, feelings of confusion, loss of appetite, and sleep disturbance, which is problematic, per se, as well as being a potential roadblock to recovery from physical illnesses or injury.[15,16] These psychosocial factors are clearly relevant to the healing process of frontline workers who are struggling to recover from COVID-19 so that they can face the personal stressors and professional challenges of the pandemic.

In the late 1960s, Maier and Seligman[17,18] demonstrated that repeated exposure to inescapable aversive conditions resulted in suppression of adaptive coping, an effect they called learned helplessness.

From the Licensed Psychologist, Neuropsychologist (Dr LeGoff); Consulting Physician (Dr Lazarovic); Licensed Psychologist (Dr Kofeldt); Licensed Psychologist (Dr Ghayal); and Licensed Clinical Social Worker (Ms Peters).

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Address correspondence to: Daniel B. LeGoff, PhD, Ascellus Health, 9400 4th Street N. Suite 201, St. Petersburg, FL 33702 (dlegoff@ascellus.com).

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In a more recent review of this literature, Maier and Seligman[17,18] clarified that diminished coping was not simply the result of learning but reflected enduring neurophysiological changes in adaptive subcortical motivational systems. Neuroimaging studies have identified the frontal-limbic mediating factors associated with learned helplessness, reflecting what the authors call, "the dimension of control." Diminished efforts at self-preservation seem to be a predictable consequence of the combined effects of prolonged aversive conditions and a diminished expectation of control over environmental events; essentially, people give up hope of change and then stop trying to find solutions.[19] The effects of the pandemic in reducing individuals' sense of control and hopefulness about improvement in stressful conditions have been linked to evidence of depressed mood, feelings of helplessness, social isolation, and poor adaptive coping.[20,21]

Despite the potential for negative effects of psychosocial stress and mental illness on COVID-19 recovery, there have been few published studies, which present data on these issues. Liyanage-Don and colleagues[22] followed 153 men and women who had been admitted for treatment of COVID-19 in the spring of 2020 at 2 Columbia University hospitals and discharged home. Three months later, the investigators had the patients complete a brief health survey as well as both the Posttraumatic Stress Disorder (PTSD) Checklist for Diagnostic and Statistical Manual, 5th Revision (PCL-5) and Patient Health Questionnaire (PHQ-8) for signs of depression. The researchers found that higher scores for depression and PTSD were associated with a greater number of persistent COVID-19 symptoms and lower ratings of recovery overall. With the degree of covariance between COVID-19 symptoms and mental health issues addressed through statistical partial regression, the researchers concluded that "Patients with COVID-related PTSD and depression had a higher burden of physical symptoms and were less likely to feel fully recovered 3 months after their COVID-19 illness."[22]

In addition to the finding by Liyanage-Don et al[22] that psychosocial factors negatively affected COVID-19 recovery, multiple other studies have shown increased psychological distress in whole populations resulting from the effects of a quarantine, impacting especially those who were physically ill and should be close up from direct social contact and support for extended periods.[23,24] Mental stress and negative affect were important factors in determining both physical symptoms and adaptive functioning in long-term COVID-19 outcomes.[21,24] The literature clearly supports a biopsychosocial vicious cycle pattern affecting COVID-19 recovery resulting from the interactive effects of physical illness, stress, perceived loss of control, and social isolation.[24,25]

The applicability of the biopsychosocial vicious cycle model for COVID-19 has been previously proposed by Liang et al.[26] These researchers outlined a cyclical negative interaction effect involving COVID-19, PTSD, and immunosuppression. This was also proposed as a stress-related factor for the risk of developing COVID-19 by Heisz,[27] who suggested that increased stress during the pandemic was more likely to weaken the immune systems of those who were most worried about contracting the virus. These hypotheses are supported by the Centers for Disease Control and Prevention, which has summarized the risk factors of both contracting and having more severe symptoms and prolonged recovery due to COVID-19 as those conditions that compromise the immune system.[28] Meta-analytic reviews of predictive factors of delayed recovery and poorer outcomes also highlighted stress-related conditions and those that are associated with compromised immune responses.[9,29]

The objectives of the current study were to examine the benefits of addressing mental health factors, such as traumatic reactions, stress, anxiety, and depressed mood, to improve adaptive and RTW outcomes for frontline workers experiencing a combination of COVID-19 and psychosocial stress. The study was a retrospective, archival analysis of referral and outcomes data for frontline workers referred for mental health intervention related to recovery from COVID-19. The referrals were made by the participants' treating physicians and case managers who determined that the clinical and occupational outcomes for these patients were delayed, suboptimal, or both, because of mental health factors. The benefits of work-related mental health intervention were assessed by focusing specifically on duration of work leave, recovery of adaptive functioning, and RTW readiness. The study used a timeline design to compare pretreatment and posttreatment duration of recovery, lost workdays (LWDs), and self-ratings of both work-relevant functional capacity and adaptive functioning before initiation of mental health treatment (MHT) and then after initiating treatment to determine whether MHT accelerated recovery.

METHODS

Study Design

The current study presents the results of a retrospective analysis of the RTW and functional recovery data from treatment records of frontline essential workers diagnosed with COVID-19. These individuals were referred because of delayed recovery related to psychosocial factors and/or mental illness. These frontline employees were referred for either health behavior assessment and intervention (HBAI) or MHT to support their recovery from COVID-19, overcome related stress reactions, resume their baseline adaptive and work-relevant functional capacities, and return to work. The study included all participants who were consecutively referred within the time frame of the study (15 months, from May 2020 to August 2021) for outpatient mental health services to clinical psychologists who were independent contractors participating in a worker's compensation provider panel. Because this was a retrospective study, both providers and participants were blind to the research goals, and the researchers were not involved in the provision of care process directly. The participants in the study were referred because of delayed recovery from COVID-19 and symptoms of psychosocial stress; they were not diagnosed with "long COVID," and no attempt was made to qualify them as having or not having a specific post–COVID-19 condition.

The data for this study were selected from a larger cohort of COVID-19 cases based on the following inclusion criteria: (1) positive test for SARS-CoV-2 and subsequent diagnosis of COVID-19; (2) job description indicating one of the frontline occupational categories listed below; (3) participants were eligible to participate in outpatient mental health services (ie, were discharged from any inpatient, partial hospital, and/or intensive outpatient programming); and (4) participants completed the initial psychological assessment and at least 3 sessions of psychotherapy. There were no participant data excluded for any specific reason other than not meeting the general inclusion criteria, so the total number of cases included was determined by the duration over which the referrals were made before initiating data analysis for the study, that is, once the study was initiated, no further cases were included.

The working hypothesis was that adding mental health services to medical treatment of COVID-19 would improve RTW readiness as assessed by self-rating of work-relevant mental functioning and general adaptive coping. This null hypothesis that MHT had no benefit was assessed in 2 ways: first, by comparing the duration of work leave before referral with that after initiation of treatment, based on the axiomatic assumption that if the participants were referred under semi-random conditions—there were no selection criteria specified by the researchers regarding the referrals—and treatment had no benefit, the duration of work leave after initiation of treatment would not be different from the duration of work leave before initiating treatment. Second, the participants completed self-ratings of their daily adaptive functioning and work-relevant psychological functioning before initiating treatment (as part of the initial evaluation) and then again after completing treatment, and the 2 sets of ratings were compared. These measures were chosen to reflect outcomes instead of self-reported mental health symptom rating scales (eg, Symptom Checklist-90 Revised, PHQ-9, Generalized Anxiety Disorder Assessment-7) as they are more directly relevant to all stakeholders in the context of work-related illness recovery. Self-reported symptom inventories may be useful for diagnostic purposes, but the assessment process

and intervention modality (a work-focused cognitive behavioral therapy [W-CBT]) for this study were designed to focus on positive work-relevant outcomes rather than self-reported symptom severity. Self-reported levels of social support and demographic variables were also collected and compared using regression analyses.

The study included employees from 4 occupational categories deemed essential by the Centers for Disease Control and Prevention: healthcare personnel (nurses, doctors, aides, etc), corrections and institutional workers, first responders, and other essential workers (food services, education, public transit workers).[30] The participants were California-based employees referred for psychological evaluation and therapy after testing positive for SARS-CoV-2, which was presumed to be related to industrial exposure based on state workers' compensation presumption policies in place at the time (eg, California SB 1159) and then being diagnosed with COVID-19 by their primary treating physicians. These individuals were referred to a mental health provider network because of concerns about stress, other psychosocial complications, or comorbid mental health conditions (depressed mood, anxiety, PTSD) in the context of delayed recovery from COVID-19.

All participants were given a standardized psychological evaluation and were either diagnosed with a mental disorder and offered MHT, with a focus on functional recovery and RTW readiness, or they were determined to have psychosocial factors adversely affecting their recovery and were offered health psychology consultative (HBAI) services without a formal mental health diagnosis.[31–34] The psychological evaluations followed a standardized work-relevant protocol, and the interventions used a W-CBT model. This model emphasizes the importance of the workers compensation system on the dynamics of illness and injury, treatment, and RTW planning and includes an emphasis on a synergistic collaboration among all stakeholders to reduce the impact of workplace illnesses. This process includes communication and coordination of efforts toward common goals for the patient/claimant, primary treater, mental health provider, nurse case manager, employer, and claims administrator. This approach has a positive influence on the therapy goals, mental health intervention strategies, and communication patterns resulting in increased efficiency of service delivery and outcome monitoring within the workers compensation system.[32,33,35]

The design and implementation of this study was reviewed and approved by an independent institutional review board. Although no psychiatric medications were prescribed as part of the mental health services reviewed by this study, and the primary treating physicians who referred the participants were not prescribing psychiatric medications, some of the participants may have been receiving psychiatric medication from private providers (eg, primary care or personal psychiatrist). Use of privately prescribed psychiatric medications was not specifically addressed as a variable in this study. In general, there is no official way for workers compensation providers to access private medical records unless the claimant volunteers them.

Participants

The participants were employees of organizations in California who were covered by that state's COVID-19 presumption laws at the time of the study and who were diagnosed with COVID-19 by their primary treating physicians (Table 1). They were subsequently referred for mental health services because of identified psychosocial factors or a possible mental illness due to COVID-19 (adjustment, mood, or traumatic stress). The participants were not distinguished as having or not having a specific post-COVID condition. The participants completed an outpatient mental health assessment provided by psychologists who were part of a worker's compensation provider panel in California. The providers of services in this study were psychologists and did not prescribe psychiatric medication as a component of the HBAI or MHT services. The psychiatric history and diagnoses of the participants were determined by clinical interview and through review of medical and mental health records (if applicable).

TABLE 1. Demographics for All Cases and for HBAI and MHT Subgroups

		All Cases	HBAI	MHT
Sex, *n* (%)	Combined	103 (100%)	71 (68.9%)	32 (31.1%)
	Female	72 (69.9%)	49 (47.5%)	23 (22.3%)
	Male	31 (30.1%)	22 (21.4%)	9 (8.7%)
Age, Y:M	Combined	46:1	46:4	44:1
	Female	5:2	45:11	43:3
	Male	48:3	48:8	46:4
Occupation, *n* (%)	Healthcare	60 (58.3%)	43 (41.7%)	17 (16.5%)
	Corrections	17 (16.5%)	11 (10.7%)	6 (5.8%)
	First responder	17 (16.5%)	12 (11.7%)	5 (4.9%)
	Other	9 (8.7%)	5 (4.9%)	4 (3.9%)

Most of the participants who completed the minimum of the assessment and 3 sessions of therapy ($n = 71$, 68.9%) were referred for ancillary HBAI by their primary treating physician. In those cases, there were no mental disorders diagnosed, but adjunctive health psychology W-CBT was provided in an integrated healthcare model, focused on addressing the psychosocial factors negatively affecting recovery from COVID-19.[34,36] There were 32 participants (31.1%) who met the diagnostic criteria for a mental disorder based on the initial standardized assessment protocol, which was administered by a licensed clinical psychologist and included data from the referral source, such as medical and psychiatric history, if any, and both Generalized Anxiety Disorder Assessment and PHQ-9 results. The participants who were given mental health diagnoses received W-CBT in the context of MHT as opposed to HBAI.

The MHT participants received W-CBT focused on recovery from both the diagnosed mental disorder and to support their recovery from COVID-19. Just more than half of these claimants, 18 (56.3%), were given a diagnosis of an adjustment disorder (with anxiety, depressed mood, or mixed). Other diagnoses included depressive mood disorders (8 participants, 25.0%) and PTSD (6 participants, 18.8%). The W-CBT model included standard features of CBT for adjustment, anxiety, and mood disorders, such as identifying and reframing negative, pessimistic, and catastrophic thoughts, journaling and self-monitoring homework, interpersonal communication and personal health, guidelines on sleep hygiene, and using positive self-statements and personal goals. The W-CBT model prioritizes work-relevant functional goals rather than personal life stressors.[32,33,35] The HBAI model focuses on improving stress management, or resilience, and combines CBT strategies to reduce pessimistic, negative thoughts, and improve health- and work-relevant self-efficacy, with relaxation and mindfulness practice, sleep hygiene, and good general healthcare habits.[36]

Data Analysis

The primary outcome measures for this study included both the timeline of recovery and pretreatment and posttreatment. The timeline of recovery was assessed from the dates of onset of illness and work leave before treatment, the mean of which was compared using *t* test comparison with the mean of duration of illness and work leave after the initiation of treatment. The null hypothesis was that the mean duration of illness and work leave (including LWDs) for the posttreatment timeline would be the same as the pretreatment timeline if the treatment had no effect. Rejecting the null hypothesis that treatment had no effect would be based on evidence that the duration of posttreatment recovery and RTW was shorter than the duration of pretreatment illness and work leave. Additional support for rejecting the null hypothesis was that there was no benefit of treatment based on a comparison of the pretreatment and posttreatment self-ratings of daily adaptive functioning (Resumption of Activities of Daily Living [RADL]), and work-relevant functional capacity (functional Work-Related Data [FWRD]). A similar axiomatic assumption was made

that if the mean posttreatment self-ratings were not significantly different from the pretreatment ratings, based on the *t* tests of these 2 variables, then MHT showed no effect. If the *t* test results showed significant differences between pretreatment and posttreatment self-ratings, then that would support rejection of the null hypothesis. The use of a nonconcurrent group baseline design as a control for maturation effects has been used in numerous behavioral outcomes studies, after it was first described by Watson and Workman.[37]

Primary Measures

Timeline Data

There were 2 related variables used, which were both derived from the timeline of recovery: first, the total duration of work leave from the date of first report of illness to the date of initiation of treatment. This was compared with the duration of work leave from the initiation of mental health services to the date of MMI and release from outpatient treatment. Second, the number of LWDs due to the work-related illness from the date of first report of illness was calculated, and this was compared with the number of LWDs from the date of initiation of mental health services to the date of discharge.

Self-rated Adaptive Functioning

To standardize and quantify work-relevant mental health functional outcomes, an FWRD system was used to rate participants at both initial assessment and then at discharge. The FWRD system is based on a content analysis of RTW goals for participants with mental health and biopsychosocial interfering factors with other physical conditions in addition to COVID-19. Adaptive functioning at intake and discharge was rated collaboratively by the participants and providers on the 4 domains of work-relevant functioning: (1) work readiness, (2) stamina and performance, (3) mental focus and flexibility, and (4) interpersonal interaction and communication. For the purposes of this study, the total scores for each of the domains on the FWRD were compared using pair-wise *t* test at pretreatment and then discharge.

Progress was also assessed using a self-rating measure of the RADL Scale.[38] The RADL Scale was developed to assess the recovery and RTW readiness of individuals participating in a workers' compensation back injury rehabilitation program. This self-report measure is rated from 0% to 100% of recovery of preinjury functioning on 12 life activities, including sleep, self-care, light chores, traveling, socialization, recreation, and employment. The RADL results in a total score with a theoretical maximum range of 0% to 100% on the 12 scales (or a raw score range of 0–1200). Pair-wise *t* scores were also used to compare participant's ratings on the RADL at the initial evaluation and at discharge.

Secondary Measures

The level of social support was also investigated as a possible positive mitigating factor for the effects of stress on recovery. The secondary null hypothesis was formulated as being indicated by a lack of correlation between self-rating of social support and positive outcome. To test this null hypothesis, the participants were asked to provide information about their current levels of social support at the time of injury, which was scored by raters according to the following system, to arrive at a single Social Support Rating score:

1 = Friends or neighbors with whom participant has regular contact;
2 = Children or close dependents;
3 = Cohabitating adults or relatives other than spouse or partner; and
4 = Spouse or life partner.

Using this system, a participant who is married and lives with their parents, has no children, and has 2 friends who live next door would have a score of: 4 + 3 + 3 + 1 + 1 = 12. A participant who is divorced, lives with their mother and one child, and has 2 close friends would be: 3 + 2 + 1 + 1 = 7. The total social support score was then compared with the primary outcome measures (FWRD and RADL) described previously using Pearson correlation coefficients.

As a potential covariate of the changes in the self-ratings (FWRD and RADL), the total number of therapy sessions attended was also included as a variable. The differences between the employment categories were also examined by comparisons of the cell means on the primary variables for these subgroups to determine whether there were any significant differences between them.

RESULTS

Participant Data Selection

The data for this study were extracted from case files of 181 frontline employees who were referred for workers compensation-funded mental health due to delayed recovery from presumed industrial COVID-19 from May of 2020 to August of 2021. The data set included 2 categories of services: (1) cases for which HBAI services had been offered when there was no mental disorder diagnosed but psychosocial factors were contributing to delayed recovery from COVID-19; and (2) cases for which MHT services were provided when there was a diagnosed mental illness related to the claim. Of the initial data set, 122 (67.4%) had successfully completed a standardized psychological evaluation conducted by a licensed clinical psychologist, taking part in a workers compensation provider network. The other 59 claimants (32.6%) declined the initial evaluation because of having recovered and returned to work, that is, all the remaining cases continued to be off work and were reporting some level of active physical and mental health symptoms at the time of the initial assessment. Of those who completed the initial evaluation, 103 took part in at least 3 telehealth therapy sessions: 72 females (mean age, 45.2 years) and 31 males (mean age, 48.2). The uneven sex ratio was largely due to the high number of females in the healthcare personnel group, the largest occupational group in this study, which is a typical sex distribution for that occupational category.[39] The results reported hereinafter are based on a post hoc archival analysis of the assessment and treatment outcome data for these 103 claimants.

Of the other 19 claimants whose data were not included in the study (15.6%), 11 completed the assessment but fewer than 3 therapy sessions. They returned to work without restrictions and were discharged. Another 8 completed the assessment but did not attend any scheduled therapy sessions and were discharged after repeated attempts to contact them were unsuccessful. The data from these cases were excluded to reduce the influence of spontaneous recovery on the analyses of treatment outcome data, which were based on the claimants who completed at least 3 therapy sessions. The data from 3 claimants (all female healthcare personnel) were excluded from the data analysis because of nonindustrial factors (personal losses due to COVID-19 during their recovery), which resulted in significant differences in their treatment and outcomes. All the evaluations and therapy sessions were conducted using video-conferencing platforms compliant with the Health Insurance Portability and Accountability Act of 1996 (HIPAA).[40]

Of the 103 claimants who completed the evaluation and at least 3 therapy sessions, the breakdown of occupational types was as follows:

a. Healthcare personnel: $n = 60$ (58.3%)
b. Corrections and institutional workers: $n = 17$ (16.5%)
c. First responders: $n = 17$ (16.5%)
d. Other essential workers: $n = 9$ (8.7%)

Primary Measures

Timeline Data

The timeline for recovery and RTW was calculated from date of the first report of illness (DFR). The first period of interest was the

duration from the DFR until the date of initiation of psychological services. This was used as a potential prognostic indicator of overall treatment outcome and as a benchmark against which treatment efficacy could be assessed (ie, if psychological treatment were effective, one indicator would be a reduction in the duration of illness after the initiation of psychological treatment relative to the duration before treatment started). The duration of recovery is also a general indicator of the overall costs of WC claims due to work leave and medical expenses. The mean duration from DFR to the date of referral for psychological services was 104.5 days (median, 85.5 days). After referral, the mean number of days that passed until the participants' first telehealth appointment was 27.5 days (median = 21.5 days). Thus, the mean total duration from the DFR to the initiation of therapy was 132.0 days, approximately 19 weeks (median, 109 days; range, 22–430 days).

The mean duration of intervention from initiation of services until the participant was deemed to be at maximum medical improvement (MMI) and discharged for all participants was 84.1 days (approximately 12 weeks) with a median of 73 days (10.5 weeks; range, 14–247 days). For the participants who did not receive a mental health diagnosis but were provided with W-CBT using health psychology consultative (HBAI) services (n = 71), the mean treatment duration was 79.9 days (approximately 10 weeks; median, 71 days; range, 14–221 days). The participants who were diagnosed with a mental disorder in addition to COVID-19 and were provided with W-CBT (n = 32) focused on both MHT and physical health outcomes were in treatment for a mean treatment duration of 86.1 days (just more than 12 weeks; median, 83 days; range, 15–218 days). A t test of the difference between the treatment duration of these 2 groups after initiation of W-CBT (mean difference, 6.3 days) was not statistically significant. See Figure 1.

At the time of the referral for psychological services, all participants were on leave (off work) because of COVID-19. The mean duration of work leave for all participants before initial RTW (either full or modified duty) after beginning psychological treatment was 67.5 days (9.5 weeks; median, 60 days; range, 14–237 days). Most participants (82 or 79.6%) had returned to work at either full[40] or modified duty (47) within 12 weeks of starting therapy. The HBAI group showed higher rates of RTW (88.0%) than the MHT group (77.8%) at the 12-week mark, but this difference was not statistically significant. The mean duration of work leave before full-duty RTW after starting treatment for both groups was 73.0 days (just more than 10 weeks; median, 61 days; range, 19–237 days). For the MHT group, all participants who completed treatment were determined to be at MMI were released from outpatient treatment with no further recommendations, and none of the participants met diagnostic criteria for a mental disorder at discharge/MMI.

The difference between mean duration of work leave before the initiation of psychological treatment and that after the initiation of treatment (132.0–73.0 = 59.6 days) was statistically significant using t test ($P < 0.01$). This change in mean duration of work leave from before referral to after referral represented a mean decrease in duration of illness-related work leave of 44.7%. This reduced duration of work leave after starting psychological treatment represented a mean gain of 41.6 workdays for all participants. The mean number of LWDs before and after treatment for all participants and for each subgroup is presented in Figure 2. The mean duration of the claims overall from DFR to discharge was 216.2 days (approximately 7 months), with a range of 46 to 500 days (454 days; Fig. 3). The median overall duration was 209 days. The mode, or most frequent duration of illness, was 87 days (approximately 3 months), which may be an underestimate of the central tendency of duration due to the low frequency of that value and the wide range of values for this variable.

Self-rated Adaptive Functioning

The FWRD results for all participants, as well as the breakdown for the subgroups, HBAI and MHT, are presented in Table 2 and Figure 4. The difference for the whole group (N = 103) on total FWRD scores pretreatment and posttreatment was 2.01, which compared with the pretreatment mean total score (5.01) is a 40.1% improvement. A pair-wise t test of the pre-post difference in mean FWRD scores was statistically significant ($P < 0.01$). For the HBAI subgroup (n = 71), the mean pre-post total FWRD score improvement was 1.79 (35%), which was also a statistically significant difference ($P < 0.01$). The mean improvement in FWRD scores from pretreatment to posttreatment rating for the MHT group (n = 32) was 2.15 (45.0%), which was also a statistically significant difference ($P < 0.01$).

The RADL ratings reflect the participants' assessment of their own current capacity for engaging in daily living activities by comparing their current level as a percentage of their premorbid level (eg, a rating of 50% indicates the participant felt they could only do half of what they could in that domain of functioning compared with their premorbid level of functioning). The total rating of the RADL, also a percentage, represents an average of the 12 RADL items, which were compared at the initial assessment and at discharge. The mean overall rating for the pretreatment RADL for all 103 participants was 50.3%, and the mean total rating at discharge was 65.8%, which is an improvement of 15.5% in absolute terms, and 30.8% relative to the initial mean RADL total. The pretreatment and posttreatment ratings were compared using a pair-wise t test and was found to be statistically significant ($P < 0.01$).

For the HBAI participants (n = 71), the pretreatment RADL mean total rating was 48.3%, and their posttreatment mean total RADL

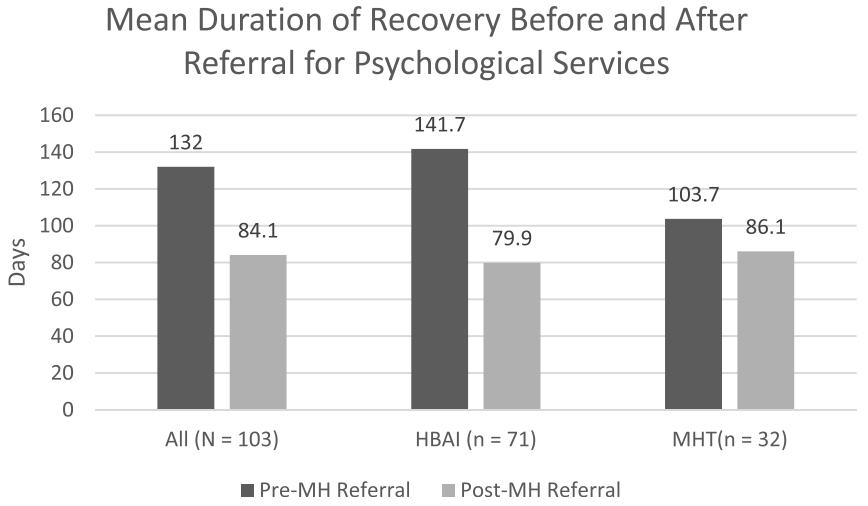

FIGURE 1. Mean duration of recovery in days before and after referral for HBAI or MHT.

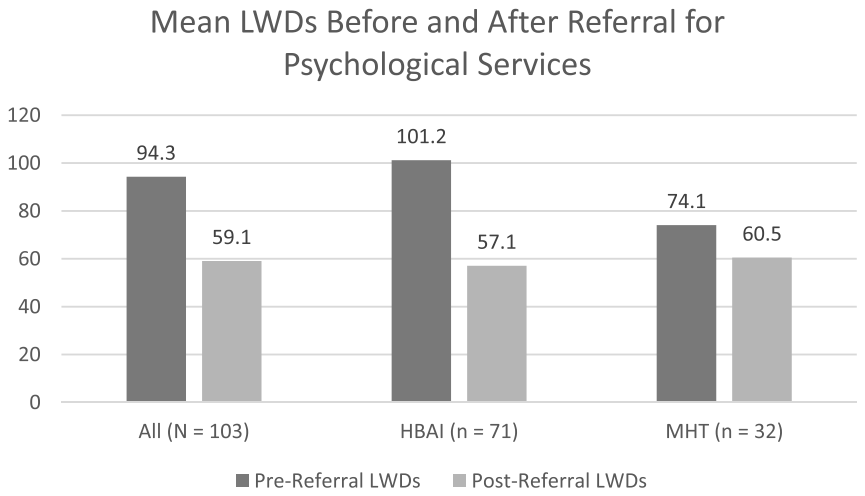

FIGURE 2. Mean LWDs before and after referral for HBAI or MHT.

rating was 62.4%, which is an absolute gain of 14.1%, or 29.2% relative to their baseline level. For the MHT group (n = 32), the pretreatment mean total RADL rating was 47.8%, and their posttreatment mean total RADL rating was 67.3%, which was an absolute gain of 19.5%, or 40.8% relative to their pretreatment mean total rating. The pretreatment and posttreatment ratings for each group were compared using pair-wise t tests, and both groups were significantly different ($P < 0.01$). The pretreatment to posttreatment changes in RADL ratings are presented in Figure 5 and are included along with other findings in Table 3.

Secondary Analyses

Estimated Social Support

The mean estimated social support score, using the scoring system above for self-described available family and friend support, for the whole group (N = 103), was 4.25, with a range from 0 to 9. For the HBAI participants (n = 71), the mean social support score was 4.35, with a range of 0 to 9, and for MHT participants (n = 32), the social support score was 3.77, with a range of 0 to 7. Social support level for all participants was mildly but not significantly predictive of gains on RADL ratings (r = 0.17) and was even less strongly related to improvements on FWRD scores (r = 0.13). Levels of social support were not correlated overall with number of sessions attended (r = −0.08), or the duration of total leave after initiation of treatment (r = −0.09), but were mildly inversely correlated with duration of partial leave, or duration to return to modified duty (r = −0.17).

Age at the onset of illness for all participants was not significantly correlated with duration of recovery (r = −0.07), improvement on RADL rating (r = −0.09), or FWRD scores (r = 0.01), and neither was sex ($r < 0.10$). Neither age nor sex was significantly correlated with level of social support ($r < 0.10$).

Therapy Sessions Attended

The mean number of W-CBT telehealth therapy sessions attended by all participants was 9.2 with a range of 3 to 40 sessions; the median number of therapy sessions was 7, and the mode was 3. The participants receiving HBAI attended a mean of 8.3 sessions (median, 7; mode, 5), and the participants receiving MHT attended a mean of 13.5 sessions (median, 8; mode, 7). The difference in mean number of sessions attended between the HBAI and MHT groups (5.2 sessions) was assessed using an uneven 2-sample t test and was found to be significant ($P < 0.01$).

In addition to having clinically meaningful and consistent gains from the initiation of treatment to discharge, the changes in RADL scores for all participants were significantly and positively correlated with the number of treatment sessions (Pearson r = 0.25), which was a stronger correlation with number of therapy sessions than the FWRD

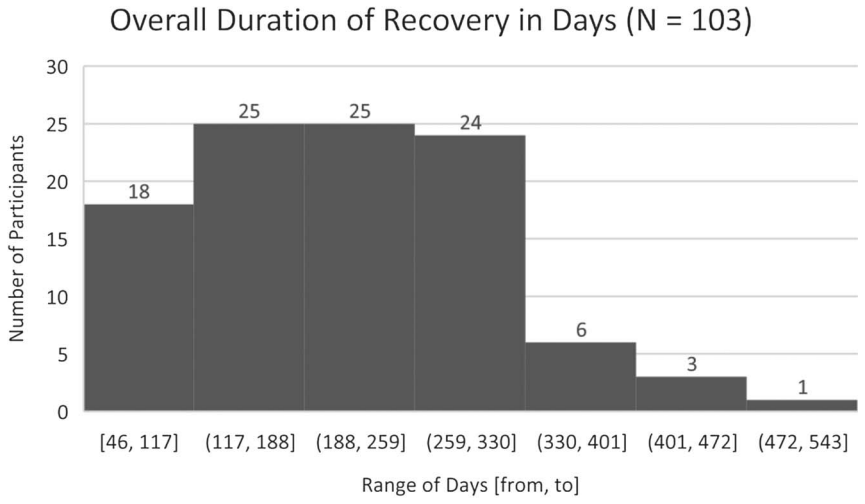

FIGURE 3. Histogram of distribution of overall duration of recovery in days (N = 103).

TABLE 2. Mean FWRD Domain Ratings Pretreatment and Posttreatment for the Participants Overall and for HBAI and MHT Subgroups

	Pretreatment	Posttreatment	Difference
All ($N = 103$)			
Total score	5.01	7.02	+2.01*
Work preparedness	4.98	7.03	+2.05*
Stamina and performance	5.44	7.25	+1.81†
Mental focus and flexibility	4.95	6.95	+2.00*
Interpersonal interaction	4.67	6.85	+2.18*
HBAI ($n = 71$)			
Total score	5.09	6.89	+1.80†
Work preparedness	5.12	6.88	+1.76
Stamina and performance	5.53	7.12	+1.59
Mental focus and flexibility	5.03	6.80	+1.77
Interpersonal interaction	4.68	6.75	+2.07*
MHT ($n = 32$)			
Total score	4.78	7.41	+2.63*
Work preparedness	4.58	7.46	+2.88*
Stamina and performance	5.19	7.65	+2.46*
Mental focus and flexibility	4.73	7.38	+2.65*
Interpersonal interaction	4.65	7.15	+2.50*

*Statistically significant difference using t test, $P < 0.01$.
†Statistically significant difference using t test, $P < 0.05$.

scores. Improvements on the FWRD ratings from pretreatment to discharge in relation to the number of sessions was weak (Pearson $r = 0.18$) but still statistically significant ($P < 0.05$). The FWRD scores and RADL ratings were expected to be moderately correlated with each other, given that they assessed different domains of functional capacity. There was a moderately strong and statistically significant correlation between these outcome measures for all participants (Pearson $r = 0.40$, $P < 0.01$).

Occupational Category

As indicated previously, most of the participants referred for HBAI or MHT services in relation to COVID-19 recovery were healthcare personnel ($n = 60$). An equal number of corrections/institutional workers ($n = 17$) and first responders ($n = 17$, fire, Emergency Medical Technician, police) were included. Finally, there was a small group of participants ($n = 9$), who had other essential duty jobs and were presumed eligible for workers compensation benefits for COVID-19. As can be seen in Table 3, the healthcare personnel group showed the greatest improvement in FWRD scores and RADL ratings, although this difference was not statistically significant ($P > 0.05$). Overall, there were no meaningful or statistically significant differences between the different occupational groups on the variables measured.

DISCUSSION

This study supports the general conclusion that psychosocial and mental health factors can play a significant role in COVID-19 recovery for frontline workers. In this study, the participants who were referred for psychological services to assist in their recovery from COVID-19 rated their pretreatment functional capacities at work and at home at 50% of their premorbid levels, and the average absence from work before the referral was 15 weeks. The findings also support the hypothesis that adding psychological services to standard medical treatment can significantly improve outcomes and reduce the duration of work leave. After initiating therapy, almost 80% of frontline essential workers referred for psychological services to assist with recovery from work-related COVID-19 returned to their original jobs at either full capacity or with modified duties within a 12-week period.

The difference in duration of recovery before and after initiation of psychological services represented a reduction in work leave of 45% and a net gain of 42 workdays per employee. Recovery was defined in this study as being at MMI and discharged from all forms of treatment related to the claim for COVID-19 and full or modified work status. The data show that the participants who were diagnosed with mental disorders had both a longer mean duration of treatment and a greater number of therapy sessions on average compared with the health psychology participants. Both the reduction of leave and decrease in LWDs from pretreatment duration to postinitiation of psychological services were statistically significant improvements in outcome ($P < 0.01$).

In addition to potential reductions in duration of recovery, work leave, and LWDs, the participants showed significant improvement on self-ratings of work-relevant and adaptive daily functioning. The FWRD served as a guide for goal-selection and progress tracking during W-CBT for both psychosocial factors and mental disorders associated with delayed recovery from physical conditions. The RADL is also a self-rating system designed to assess resumption of daily activities after injury or illness. In the current study, the FWRD scores increased by a mean of 40% for all participants and RADL ratings improved by 31%. Both represented statistically significant ($P < 0.01$) and clinically meaningful improvements. The outcome measures used were also correlated with each other, and with the number of therapy sessions provided, supporting the conclusion that the improvement in

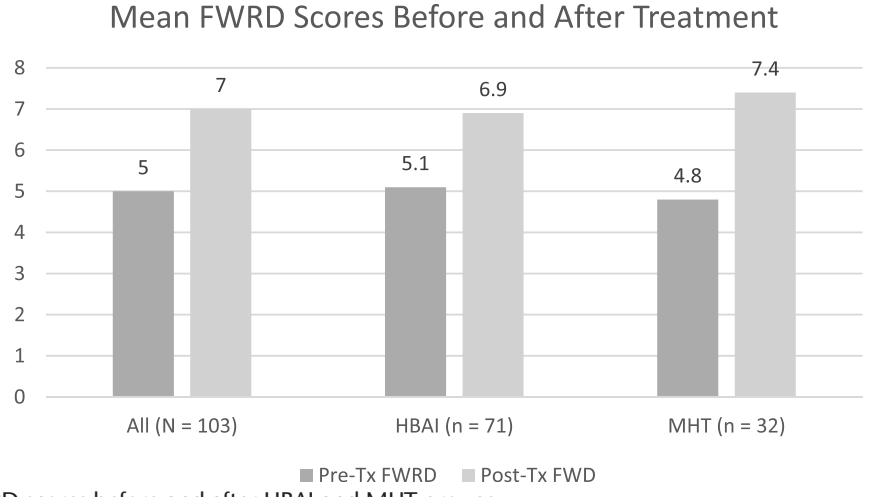

FIGURE 4. Mean FWRD scores before and after HBAI and MHT groups.

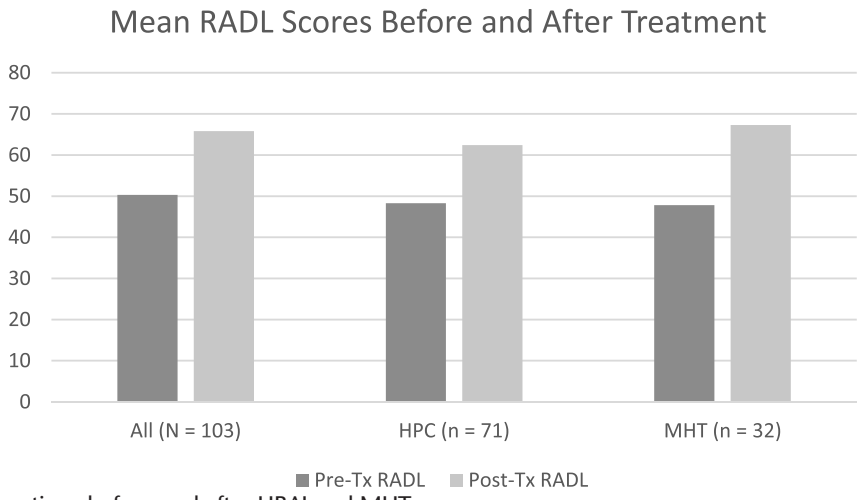

FIGURE 5. Mean RADL ratings before and after HBAI and MHT.

RADL and FWRD scores were due to treatment and not just maturation effects (ie, spontaneous recovery). The introduction of the FWRD instrument in this study as a unique tool for assessing outcomes in W-CBT seems to be a promising measure.

The use of psychological services in addition to ongoing medical care to improve outcomes supports the conceptualization of COVID-19 as a biopsychosocial condition. In COVID-19, as well as other chronic or delayed recovery medical conditions complicated by negative affect (anxiety, depressed mood), or traumatic stress, the evidence from the present study supports the use of W-CBT to stop the vicious cycle and even reverse it, resulting in a positive recovery cycle. In a workers compensation context, the benefits are twofold: improved recovery of health and functioning, along with decreased duration of work leave, LWDs, and, by extension, additional medical expenses.

Estimated levels of personal social support were not found to be important variables in either of the 2 groups of participants in this study, and neither were age or sex. The reported levels of social support were noted to be lower for the participants who presented with clinically significant mental conditions, though: health psychology participant social support mean rating was 4.35, and for mental health participants, it was 3.77, but that was not a statistically significant difference. Demographic variables, such as occupational category, sex, and age, were also not predictive of duration of recovery or measure of functional outcome.

Limitations of the Current Study

This study presents a post hoc analysis of the timeline of illness and recovery and self-rating of adaptive functioning before and after implementation of psychological services for frontline workers diagnosed with COVID-19. There was a modest sample size and no control group. A timeline design was used, which allowed for a comparison of some work-relevant variables (duration of leave, LWDs) before and after the initiation of psychological services, and data for participants who showed spontaneous recovery within the initial phase of mental health services (ie, did not complete the evaluation and at least 3 therapy sessions) were excluded. The primary functional outcome measures (FWRD and RADL) were self-rated, and although they were operationally defined, they were not norm referenced. The treating providers were qualified and licensed psychologists with experience in W-CBT, rehabilitation, and health psychology, and the evaluations used a standardized protocol, but the study did not involve use of a manualized treatment protocol. A randomized control group design may have yielded more conclusive findings regarding the beneficial impact of treatment, as opposed to the timeline design used here, which compared duration of recovery before and after treatment, especially because the natural course of COVID-19 recovery is not well known. The use of a randomized control group design in the context of MHT of frontline workers who had been referred under workers compensation benefits due to COVID-19, however, would not have been feasible or ethical.

CONCLUSIONS AND RECOMMENDATIONS

The current study provides data that support the provision of psychological services as a beneficial adjunctive treatment for delayed recovery due to COVID-19 in healthcare personnel, first responders, and other essential workers. Although preliminary, the data presented demonstrate decreased duration of illness and work leave and improvements in work-relevant and adaptive functional outcomes despite a wide range of potential psychosocial interfering factors, such as psychological stress and mental disorders. The participants were offered psychological assessments and received brief W-CBT via telehealth to improve recovery and accelerate the RTW process.

Most of the 103 participants who completed the standardized evaluation and at least 3 sessions of telehealth therapy returned to work within a reasonable period (12 weeks) despite the severity of their COVID-19 illness and the stressful nature of their jobs: 60 of the

TABLE 3. Mean Duration of Treatment, Number of Therapy Sessions, LWDs During Treatment, and Pre-Post Treatment Change in FWRD Scores and RADL Ratings by Occupational Category

Occupational Category	*n*	Duration of Tx	No. Sessions	LWDs	Δ FWRD	Δ RADL
a. Healthcare personnel	60	99.3 d	9.8	71.0	+2.4	+19.1%
b. First responders	17	101.9 d	8.5	72.8	+1.4	+10.7%
c. Corrections/institution staff	17	103.2 d	10.7	73.7	+1.6	+11.3%
d. Other essential	9	80.3 d	8.4	57.4	+1.3	+17.4%

participants were healthcare personnel who were returning to work directly with COVID-19 patients. The timeframe for RTW for HBAI participants who did not meet diagnostic criteria for a mental disorder was briefer than those who did have a diagnosis. On average, both groups of the participants rated themselves as being at approximately half of their premorbid functional capacity at intake, but they were much closer to premorbid levels at discharge.

The current study found a wide range of total duration of illness and work leave during recovery from COVID-19, which was multifactorial and not strongly predicted by any of several psychosocial and demographic factors. Based on the current findings, the use of W-CBT is helpful across the entire spectrum of psychosocial factors experienced by frontline essential workers experiencing COVID-19, including anxiety, depressed mood, and traumatic stress. The use of work-relevant psychotherapy enabled timely functional and occupational recovery. Further extensive and comprehensive research with a higher level of standardization and control for maturation effects, and especially focused on COVID-19–delayed recovery, will clarify the needs of this population, and enhance the effectiveness of this intervention model. Given that the participants in this study were risking further SARS-CoV-2 exposure by resuming their jobs, it seems reasonable to assume that the use of psychological services to assist with COVID-19 recovery in other occupations, where there is less risk exposure and fewer psychosocial hurdles, will yield similar benefit.

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