Mental health and suicidal ideation in US military veterans with histories of COVID-19 infection

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ABSTRACT

Introduction There have been reports of increased prevalence in psychiatric conditions in non-veteran survivors of COVID-19. To date, however, no known study has examined the prevalence, risk and protective factors of psychiatric conditions among US military veterans who survived COVID-19.

Methods Data were analysed from the 2019 to 2020 National Health and Resilience in Veterans Study, which surveyed a nationally representative, prospective cohort of 3078 US veterans. Prepandemic and 1-year peripandemic risk and protective factors associated with positive screens for peripandemic internalising (major depressive, generalised anxiety and/or posttraumatic stress disorders) and externalising psychiatric disorders (alcohol and/or drug use disorders) and suicidal ideation were examined using bivariate and multivariate logistic regression analyses.

Results A total of 233 veterans (8.6%) reported having been infected with COVID-19. Relative to veterans who were not infected, veterans who were infected were more likely to screen positive for internalising disorders (20.5% vs 13.9%, p=0.005), externalising disorders (23.2% vs 14.8%, p=0.001) and current suicidal ideation (12.0% vs 7.6%, p=0.015) at peripandemic. Multivariable analyses revealed that greater prepandemic psychiatric symptom severity and COVID-related stressors were the strongest independent predictors of peripandemic internalising disorders, while prepandemic trauma burden was protective. Prepandemic suicidal ideation, greater loneliness and lower household income were the strongest independent predictors of peripandemic suicidal ideation, whereas prepandemic community integration was protective.

Conclusion Psychiatric symptoms and suicidal ideation are prevalent in veterans who have survived COVID-19. Veterans with greater prepandemic psychiatric and substance use problems, COVID-related stressors and fewer psychosocial resources may be at increased risk of these outcomes.

Key messages

- The prevalence of psychiatric disorders and suicidal ideation in US veterans who were infected with COVID-19 was higher than veterans who were not infected.
- Prepandemic greater psychiatric symptom severity and COVID-related stressors were the strongest predictors of peripandemic internalising psychiatric disorders, whereas previous trauma burden was protective.
- Prepandemic suicidal ideation, greater loneliness and lower household income were the strongest independent risk factors of peripandemic suicidal ideation; community integration was protective.
- US veterans who survived COVID-19 may require higher clinical attention in prevention and treatment efforts.

INTRODUCTION

The COVID-19 pandemic has been linked to increased social isolation, economic recession and psychological distress.[1] Numerous studies have reported a substantial increase in the prevalence of depression and anxiety in the general public during the pandemic.[2 3] Previous psychiatric diagnoses, COVID-related stressors, such as worries about being infected with COVID-19, financial stressors and actual COVID-19 infection have been proposed as possible risk factors of both the development and worsening of mental illness during the pandemic.[1]

Veterans may be a highly vulnerable group to the negative mental health effects of the pandemic due to their older age, and higher prepandemic prevalence of physical and psychiatric risk factors and conditions relative to the general population.[4 5i] Further, previous studies on veterans have found that stressful events such as combat deployments were associated with increased rates of depression and substance use disorders in veterans.[6]

As of April 2021, in the USA, over 31 million people have been infected with COVID-19 and over half a million people have died of COVID-19-related complications.[7] Previous studies on survivors of COVID-19 have reported high prevalence of mental disorders, including depression, anxiety and post-traumatic stress disorder (PTSD[8–10]). Thus, there has been increasing attention in closely monitoring for psychiatric symptoms and functioning in those who have been infected with COVID-19 in order to mitigate distress and risk of suicide. However, due to the high burden of COVID-19 infections in the USA and the limited capacity of mental health treatment services, it is challenging to monitor everyone who has been infected. These challenges have been further complicated by infection-control measures implemented by almost all mental health service providers during the pandemic.[11]

One potentially effective way of informing the allocation of limited mental health treatment resources may be to identify subgroups that are at high risk of developing or experiencing a worsening of psychiatric conditions after COVID-19 infection.

Identifying potential risk and protective factors of psychiatric conditions among COVID-19 survivors in populations with elevated risk, such as US military veterans, may help inform more targeted population-based prevention, screening and intervention strategies.

Toward this end, we analysed data from the National Health and Resilience in Veterans Study (NHRVS[12]) to examine (1) the prevalence of psychiatric conditions in US veterans who have and have not been infected with COVID-19, and (2) prepandemic and peripandemic risk and protective factors of peripandemic psychiatric conditions in veterans who survived COVID-19 infection.

METHODS

Participants

Data were analysed from the 2019 to 2020 NHRVS, which surveyed a nationally representative, prospective sample of US military veterans. A total of 4069 veterans completed the prepandemic survey (median completion date: 21 November 2019) prior to the first documented COVID-19 cases in the USA (19 January 2020), and 3078 (75.6%) completed a 1-year peripandemic follow-up assessment (median completion date 14 November 2020). Both surveys were online, 45–60 min, self-report surveys. All participants received 15 000 points (equivalent to $15) for participating in the prepandemic survey, and 20 000 points (equivalent to $20) for participating in the peripandemic survey. Details of the study have been described previously.[12] Briefly, the NHRVS sample was drawn from KnowledgePanel, a survey research panel of more than 50 000 US households maintained by Ipsos, a survey research firm. To promote generalisability of the results to the US veteran population, poststratification weights based on the demographic distribution of veterans in the contemporaneous US Census Current Population Survey Veterans Supplement were applied in inferential analyses.

Assessments

Online supplemental table 1 presents a detailed description of measures used to assess potential risk and protective factors of peripandemic psychiatric conditions in veterans who survived COVID-19 infection.

Data analysis

χ^2 analyses were conducted to compare the prevalence of psychiatric disorders and suicidal ideation between veterans who were and were not infected with COVID-19. Subsequent analyses focused on veterans who self-reported a history of COVID-19 infection at the peripandemic assessment. Analyses in this subcohort proceeded in two steps. First, we conducted Pearson correlations between participant characteristics and peripandemic internalising psychiatric disorders (ie, major depressive disorder, generalised anxiety disorder and/or pandemic-related stress symptoms); externalising disorders (ie, alcohol and/or drug use disorder); and suicidal ideation; internalising and externalising disorders were grouped together to increase statistical power. Second, we conducted multivariable binary logistic regression analyses to identify factors that independently predicted the aforementioned three categories of peripandemic psychiatric conditions. Variables that differed at the $p<0.05$ level in bivariate analyses for each set of comparisons were entered into each regression analysis. Third, we conducted relative importance analyses to determine the relative contribution of each significant variable in predicting positive screens for the three outcomes. These analyses partitioned the explained variance in the study outcome variables that is explained by each independent variable while simultaneously accounting for intercorrelations among these independent variables.[13]

RESULTS

The final sample included 3078 veterans who completed both prepandemic and 1-year peripandemic assessments. The average age of the sample was 62.2 years old (SD=15.7, range 22–99); the majority was male (90.2%) and Caucasian (78.1%); and 35.0% were combat veterans. A total of 233 veterans (8.6%) reported that they had been infected with COVID-19. The majority (70.5%) reported mild-to-moderate symptoms; 6.3% reported requiring a visit to the emergency room; 4.5% reported severe symptoms with serious concerns about not surviving; 1.9% reported being admitted to an intensive care unit; 1.2% reported requiring an overnight stay at a hospital, and 0.8% reported requiring intubation/mechanical ventilation; the remaining 14.8% of the sample did not provide details about the severity of their illness.

Prevalence of peripandemic psychiatric conditions of veterans who were infected by COVID-19

Relative to veterans who were not infected with COVID-19, veterans who were infected were significantly more likely to screen positive at the peripandemic assessment for any internalising psychiatric disorder (20.5% vs 13.9%, $\chi^2=7.85$, $p=0.005$), alcohol or drug use disorder (23.2% vs 14.8%, $\chi^2=11.51$, $p=0.001$) and current suicidal ideation (12.0% vs 7.6%, $\chi^2=5.92$, $p=0.015$). With regard to specific disorders, veterans with histories of COVID-19 infection were more likely to screen positive for generalised anxiety disorder (14.3% vs 9.1%, $\chi^2=6.99$, $p=0.008$), pandemic-related stress symptoms (7.3% vs 4.0 %, $\chi^2=5.99$, $p=0.014$), alcohol use disorder (14.8% vs 9.2%, $\chi^2=8.03$, $p=0.005$) and drug use disorder (13.9% vs 7.8%, $\chi^2=10.27$, $p=0.001$) relative to veterans who were not infected. The differences in major depressive disorder (11.8% vs 8.6%, $\chi^2=2.93$, $p=0.087$) and past-year suicide plan/attempt (4.9% vs 4.6%, $\chi^2=1.04$, $p=0.59$) were not significant.

Correlates of peripandemic psychiatric conditions

In table 1, columns 2–4 show bivariate correlates of peripandemic positive screens for psychiatric conditions. Prepandemic psychiatric symptom severity, alcohol use problem severity, psychosocial difficulties and loneliness were positively correlated with all three outcomes, while perceived social support and protective psychosocial characteristics were negatively correlated with these outcomes. With regard to COVID-related variables, pandemic-related stress symptoms were positively correlated with all three outcomes.

Multivariable logistic regression models

Multivariable logistic regression analyses (table 1, columns 5–7) revealed that greater prepandemic psychiatric symptom severity, non-prescription drug use, adverse childhood experiences, perceived social support, and COVID-related worries, social restriction stress and financial stress were independent risk factors for peripandemic internalising psychiatric disorders, whereas greater trauma burden was protective. Relative importance analysis indicated that prepandemic psychiatric symptom severity (34.9%), trauma burden (18.6%), COVID-related worries (14.9%), financial stress (14.5%) and social restriction

Table 1 Correlates of positive screens for peripandemic psychiatric outcomes among US veterans with histories of COVID-19 infection

	Bivariate analyses			Multivariable analyses		
	Internalising psychiatric disorders	Externalising psychiatric disorders	Suicidal ideation	Internalising psychiatric disorders	Externalising Psychiatric disorders	Suicidal ideation
Variables	r	r	r	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sociodemographics						
Age	−0.124	−0.096	−0.153*			
Male gender	−0.036	0.037	0.022			
White race/ethnicity	−0.065	0.021	0.016			
College graduate or higher education	−0.035	−0.164*	−0.067		0.52 (0.16 to 1.72)	
Married/partnered	−0.028	−0.070	0.080			
Household income $60K or higher	−0.059	−0.061	−0.142*			0.15** (0.04 to 0.51)
Combat veteran	0.010	0.012	−0.059			
Prepandemic risk factors						
Psychiatric symptom severity	0.582***	0.251***	0.358***	4.02** (1.47 to 10.95)	0.76 (0.35 to 1.67)	0.53 (0.26 to 1.09)
Alcohol use problem severity	0.342***	0.556***	0.281***	1.05 (0.92 to 1.20)	1.37*** (1.19 to 1.57)	1.14*(1.02 to 1.26)
Non-prescription drug use days past year	0.248***	0.559***	0.102	1.01*(1.00 to 1.01)	1.01*** (1.01 to 1.02)	
Cumulative trauma burden	−0.126*	−0.048	−0.062	0.85** (0.77 to 0.95)		
Adverse childhood experiences	0.321***	0.094	0.213**	1.32*(1.01 to 1.71)		1.18 (0.94 to 1.49)
Suicidal behaviours						
Lifetime suicide attempt	0.222**	0.031	0.151*	2.34 (0.19 to 29.74)		
Past-year suicidal ideation	0.060	−0.008	0.479***			37.60*** (8.44 to 167.1)
Psychosocial difficulties	0.484***	0.264***	0.418***	1.03 (0.99 to 1.08)	1.01 (0.97 to 1.06)	1.04 (0.99 to 1.09)
Loneliness	0.330***	0.149*	0.344***	0.99 (0.64 to 1.53)	0.95 (0.62 to 1.45)	1.46*(1.00 to 2.12)
Impulsivity	0.238***	0.084	0.263***	0.84 (0.69 to 1.03)		1.19*(1.01 to 1.40)
Physical health characteristics						
Number of medical conditions	0.113	−0.110	−0.098			
Any disability	0.267***	0.018	0.103	1.01 (0.17 to 5.98)		
Prepandemic protective factors						
Engagement in mental health treatment	0.189**	0.001	0.225***	0.62 (0.09 to 4.16)		
Perceived social support	−0.263***	−0.154*	−0.182**	1.18*(1.01 to 1.39)	1.06 (0.93 to 1.22)	1.35** (1.13 to 1.60)
Protective psychosocial characteristics	−0.351***	−0.275***	−0.307***	0.49 (0.23 to 1.06)	0.58 (0.29 to 1.16)	0.44*(0.22 to 0.88)
COVID-related variables (peripandemic)						
Hours consuming COVID-media	0.238***	0.039	−0.020	1.01 (0.74 to 1.38)		
Pandemic-related stress symptoms	0.516***	0.148*	0.218**		1.67 (0.29 to 9.71)	
Household member infected with COVID-19	0.008	−0.045	0.025			9.40*(1.45 to 60.93)
Non-household member infected with COVID-19	0.073	0.020	0.072			
Know someone died of COVID-19	0.101	−0.018	0.037			
COVID-related worries	0.263***	0.096	0.081	2.53** (1.33 to 4.81)		
COVID-related social restriction stress	0.379***	0.256***	0.073	2.19** (1.27 to 3.76)	1.26 (0.76 to 2.08)	
COVID-related financial stressors	0.356***	0.018	0.254***	2.08** (1.24 to 3.48)		

*P<0.05, **P<0.01, ***P<0.001.
r, Pearson correlation coefficient.

stress (11.6%) explained the majority of variance in this outcome, with drug use severity (5.5%) explaining the remainder.

Prepandemic severity of alcohol and non-prescription drug use were the only independent risk factors for peripandemic externalising psychiatric disorders, each explaining 48.0% and 52.0% of the variance, respectively.

Prepandemic alcohol use severity, past-year suicidal ideation, loneliness, impulsivity, perceived social support and having a household member infected with COVID-19 were independent risk factors for peripandemic suicidal ideation, whereas greater protective psychosocial characteristics (specifically greater community integration: OR=0.51, 95% CI 0.34 to 0.79) and higher household income were protective. Relative importance analysis showed that prepandemic suicidal ideation (29.3%), loneliness (25.2%), household income (12.0%), community integration (10.8%) and impulsivity (9.4%) explained the majority of variance in this outcome, with household member COVID-19 infection (5.0%), prepandemic social support (4.9%) and alcohol use severity (3.4%) explaining the remaining variance.

DISCUSSION

This study compared the prevalence of peripandemic psychiatric disorders and suicidal ideation between US veterans with

and without histories of COVID-19 infection, and examined prepandemic and peripandemic risk and protective factors for these outcomes among COVID-19 survivors. Results revealed that veterans who were infected with COVID-19 had a significantly higher prevalence of positive screens for psychiatric conditions, as well as suicidal ideation relative to those who were not infected. Prepandemic greater psychiatric symptom severity and COVID-related stressors were the strongest predictors of peripandemic internalising psychiatric disorders in veterans who survived COVID-19, while previous trauma exposure was found to be protective. Prepandemic suicidal ideation, loneliness and impulsivity were the strongest independent risk factors of peripandemic suicidal ideation, while greater prepandemic community integration and higher annual household income were protective.

Results of this study are largely consistent with previous studies of non-representative patient samples who were hospitalised for COVID-19 infection, which observed a higher prevalence of psychiatric conditions, including depression, anxiety and PTSD.[8] It is possible that being infected with COVID-19 may have aggravated psychological distress during the pandemic. Further, it is also plausible that those who had prepandemic psychiatric conditions and more psychosocial difficulties may have been at higher risk of infection given less resources and protective measures to avoid infection.[9] Of note, the strongest predictors of peripandemic internalising disorders and externalising disorders in those who survived COVID-19 were prepandemic psychiatric symptom and substance use severity, respectively. This finding suggests that veterans with greater severity of prepandemic psychiatric distress and substance use may sensitise veterans to the deleterious mental health effects of COVID-19 infection.

A growing body of literature suggests that COVID-related stressors may contribute to risk of pandemic-related psychiatric distress.[14 15] Results of the current study extend this work to suggest that COVID-related worries, financial distress and social restriction stress were independently associated with increased risk of screening positive for any internalising psychiatric disorders in veterans who survived COVID-19 infection.

Previous research has identified previous suicidal behaviour as a strong predictor of future suicidal behaviour.[16] The results of this study are consistent with these findings, as prepandemic suicidal ideation was the strongest predictor of peripandemic suicidal ideation. The negative impact of loneliness on mental health outcomes, including suicidal ideation, has been well established.[17] In addition, due to the increased social restrictions imposed during the pandemic, increasing loneliness has been suggested as a possible contributor to worsening mental health.[1] In this study, greater prepandemic loneliness was the second strongest predictor of peripandemic suicidal ideation. This finding suggests that loneliness may be a clinically relevant intervention target to help mitigate risk of suicidal behaviour in veterans during the pandemic. Moreover, impulsivity was a strong predictor of peripandemic suicidal ideation, which is consistent with previous research that reported strong positive association between impulsivity and suicidal behaviour.[18] Of note, all of these factors were assessed prior to the pandemic, suggesting that they may represent increased vulnerability for suicidal ideation during the pandemic in US military veterans who survived COVID-19 infection.

Greater prepandemic community integration was protective against peripandemic suicidal ideation, even after controlling for other variables. This finding accords with previous research describing the protective effects of community integration in promoting psychological resilience and mitigation of risk for suicidal behaviour.[19 20] Further, higher prepandemic household income was protective against risk of peripandemic suicidal ideation. This finding, which is consistent with the conservation of resources theory,[21] suggests that fewer prepandemic financial resources may have led to increased peripandemic distress and suicidal ideation. This finding underscores the importance of assessing, monitoring and ameliorating financial distress brought on by the pandemic in veterans with histories of COVID-19 infection.

Greater trauma burden was identified as a protective factor to internalising psychiatric disorders during the pandemic. While previous trauma is a well known risk factor for psychiatric distress,[22] previous exposure to traumatic events may also have 'stress inoculating' effects and help protect against risk of adverse mental health outcomes.[23] Specifically, exposure to prior traumas may help promote engagement in adaptive coping strategies and may give rise to positive psychological changes (eg, greater sense of personal strength)[24 25] that may in turn help foster resilience to new stressors, such as COVID-19 infection.

Further, it is noteworthy that perceived social support was found to be associated with increased risk of both internalising psychiatric disorders and suicidal ideation during the pandemic. One interpretation of this finding is that greater prepandemic severity of psychiatric distress may have increased support-seeking behaviours during the pandemic. Further research is needed to elucidate prospective associations between aspects of social support and risk for pandemic-related psychiatric conditions, particularly given the imposition of social restrictions during the pandemic.

This study has several limitations. First, history of COVID-19 infection was based on self-report and may be subject to response bias, as well as access to and use of testing for COVID-19 infection. Thus, it is possible that the prevalence of self-reported COVID-19 infection may not capture the accurate prevalence of infections in US veterans. Second, due to the survey design of this study, we used screening instruments to assess psychiatric conditions. Further research using diagnostic instruments such as structured clinical interviews are needed to replicate the results reported herein. Third, while nationally representative, our sample was composed entirely of US military veterans who are predominantly older, male and white, which makes it difficult to generalise results to non-veteran and more diverse veteran populations. Fourth, although this was a prospective cohort study, given the cross-sectional nature of the surveys and limited follow-up time frame, it is difficult to draw conclusions regarding temporal/causal associations between independent variables, and peripandemic psychiatric disorders and suicidal ideation.

Despite these limitations, this study provides the first known nationally representative data on the prevalence and prepandemic and pandemic-related risk and protective factors of peripandemic psychiatric outcomes in US military veterans who survived COVID-19 infection. Given the enormous toll of COVID-19 infections in the USA,[4] this information may help inform targeted population-based prevention, monitoring and intervention strategies. For example, US veterans who are COVID-19 survivors may be at elevated risk of peripandemic psychiatric conditions, and those with less socioeconomic resources and greater symptom severity at baseline may require higher clinical attention. Further, veterans who endorse greater COVID-related stressors may be at increased risk of peripandemic psychiatric disorders and suicidal ideation. Further research is needed to replicate and extend these results to other populations who are also at higher risk of psychiatric conditions; identify mechanisms

leading to increased risk of psychiatric conditions during the pandemic; and assess the efficacy of interventions targeting such evidence-based risk and protective factors in mitigating risk of psychiatric conditions in veterans and other populations.

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Patient consent for publication Not required.

Ethics approval This study was approved by the West Haven VA institutional review board. The NHRVS was approved by the Human Subjects Subcommittee of the VA Connecticut Healthcare System, and all participants provided informed consent.

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Supplemental Table 1. Measures of potential correlates of psychiatric conditions among U.S. veterans who were infected with COVID-19

Sociodemographic characteristics	Age, gender, race, education, marital status, income ($60,000 or more vs less than $60,000), employment, and combat status
Peri-pandemic psychiatric diagnosis	
Major depressive disorder (MDD)	A score ≥ 3 on the two depressive symptoms of the PHQ-4 occurring in the past two weeks[1].
Generalized anxiety disorder (GAD)	A score ≥ 3 on the two generalized anxiety items of the PHQ-4 occurring in the past two weeks[1].
Pandemic-related stress symptoms	A score ≥ 5 on the brief, 4-item PTSD Checklist for DSM-5[2]: "Thinking about the Coronavirus/COVID-19 pandemic, please indicate how much you have been bothered by repeated, disturbing, and unwanted memories of the pandemic"
Alcohol use disorder	A score ≥ 8 on the Alcohol Use Disorders Identification Test (AUDIT)[3].
Drug use disorder	Screen for Drug Use question: How many days in the past year have you used non-prescription drugs?; a response of ≥ 7 days on this question is indicative of a positive screen for DUD; if the response to this question is 6 or fewer days, a response of ≥ 2 days to the question "How many days in the past 12 months have you used drugs more than you meant to?" is indicative of a positive screen for drug use disorder.
Suicidal ideation	Suicidal ideation was assessed using two items adapted from the PHQ-9[4] Item 9, which asked participants to report suicidal thoughts during the prior two weeks. A positive screen was indicated by a response of "several days," "more than half the days," or "nearly every day" to at least one of the following questions: "How often have you been bothered by thoughts that you might be better off dead?" and "How often have you been bothered by thoughts of hurting yourself in some way?"
Pre-pandemic risk factors	
Psychiatric symptom severity	MDD symptoms – participant responses on the two depressive symptoms of the PHQ-4 occurring in the past two weeks[1]; Posttraumatic stress disorder (PTSD) symptoms- assessed with the PTSD Checklist for DSM-5[5]; GAD symptoms – participant responses on the two generalized anxiety items of the PHQ-4 occurring in the past two weeks[1].
Alcohol use problem severity	AUDIT total score[3]
Non-prescription drug use days in past year	Screen for Drug Use question: How many days in the past year have you used non-prescription drugs?
Cumulative trauma burden	Count of potentially traumatic events on the Life Events Checklist for DSM-5[6].
Adverse childhood experiences	Score on Adverse Childhood Experiences Questionnaire[7].
Suicide variables	
Lifetime suicide attempt	"Have you ever tried to kill yourself?"
Past-year suicidal ideation	Positive endorsement of question 2 of the Suicide Behaviors Questionnaire-Revised (SBQ-R): "How often have you thought about killing yourself in the past year?"[8]
Psychosocial difficulties	Score on the Brief Inventory of Psychosocial Functioning[9].
Loneliness	Score on 3-item measure adapted from the UCLA Loneliness Scale[10].
Impulsivity	Barratt Impulsiveness Scale-Brief (BIS)[11], which assesses for the personality construct of impulsiveness through measurement of three subtraits, including attentional, motor, and non-planning impulsiveness. Higher scores indicate greater impulsivity.
Physical health characteristics	
Number of medical conditions	Sum of number of medical conditions endorsed in response to question: "Has a doctor or healthcare professional ever told you that you have any of the following medical conditions?" (e.g., arthritis, cancer, diabetes, heart disease, asthma, kidney disease). Range: 0-24 conditions.
Any disability	Any disability in activities of daily living or instrumental activities of daily living. The following questions were asked: "At the present time, do you need help from another person to do the following?" (e.g., bathe; walk around your home or apartment; get in and out of chair; pay bills or manage money; prepare bills; get dressed)[12]
Pre-pandemic protective factors	

Engement in mental health treatment	Positive endorsement of current treatment with psychotropic medication and/or psychotherapy or counseling: "Are you currently taking prescription medication for a psychiatric or emotional problem?" Are you currently receiving psychotherapy or counseling for a psychiatric or emotional problem?
Perceived social support	Score on 5-item version of the Medical Outcomes Study Social Support Scale[13,14].
Protective psychosocial characteristics	
Resilience	Score on Connor-Davidson Resilience Scale-10[15].
Purpose in life	Score on Purpose in Life Test-Short Form[16].
Dispositional optimism	Score on single-item measure of optimism from Life Orientation Test-Revised[17]; "In uncertain times, I usually expect the best"; (rating 1=strongly disagree to 7=strongly agree).
Dispositional gratitude	Score on single-item measure of gratitude from Gratitude Questionnaire[18]; "I have so much in life to be thankful for"; (rating 1=strongly disagree to 7=strongly agree).
Curiosity/exploration	Score on single-item measure of curiosity/exploration from Curiosity and Exploration Inventory-II[19]; "I frequently find myself looking for new opportunities to grow as a person (e.g., information, people, resources"); (rating 1=strongly disagree to 7=strongly agree).
Community integration	Perceived level of community integration: "I feel well integrated in my community (e.g., regularly participate in community activities)"; (rating 1=strongly disagree to 7=strongly agree).
COVID-19 variables (peri-pandemic)	Hours consuming COVID-related media, self, household, and non-household member infected with COVID and COVID-related worries, social restriction stress, and financial stress were assessed using a questionnaire developed by the National Center for PTSD based on the Coronavirus Health Impact Survey[20]. COVID-related worries(e.g., "In the past month, how worried have you been about being infected with coronavirus?"); COVID-social restriction stress (e.g., "How stressful have these changes in social contacts been for you?"); COVID-related financial hardship (e.g., "In the past month, to what degree have changes related to the pandemic created financial problems for you or your family?")

COVID=coronavirus disease, DSM-5=Diagnostic and Statistical Manual of Mental Disorders, 5th edition, PHQ=patient health questionnaire

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