# Factors Associated With Remission of Suicidal Ideation During the COVID-19 Pandemic:

## A Population-Based, Longitudinal Study in US Military Veterans

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The COVID-19 pandemic, first declared a global public health emergency by the World Health Organization (WHO) on January 30, 2020,[1] has resulted in profound social and economic hardship and over 5 million deaths worldwide as of October 2021.[2] Scholars have forecast a secondary crisis of mental illness and suicidality extending far beyond those sickened by the virus[3–6] as individuals struggle to cope with financial losses, fear of infection, uncertainty about the future, and unprecedented disruptions to their daily lives. However, it is difficult to accurately anticipate the mental health repercussions of COVID-19 without accounting for protective or mitigating factors that may confer resilience to adversity or promote remission of suicidal ideation (SI). Indeed, nearly 2 years since the WHO's declaration, early data suggest that the COVID-19 pandemic has wrought heterogeneous mental health impacts[7,8] and that the projected increase in suicidality has borne out in some populations more than in others.[9–11]

In their review of mental health sequelae following ecological disasters, Morganstein and Ursano[12] suggested that suicidal thoughts and behaviors tend to diminish in the early aftermath, likely reflecting the buoying effect of community support and human capacity for posttraumatic growth,[13] before gradually increasing in later months and years as these protective factors erode. Consistent with this conceptualization, a review of global population-level studies found evidence of considerable resilience to the psychological effects of lockdown during COVID-19 and no evidence of increased suicide rates.[10] However, conflicting evidence suggests that rates of suicidal ideation and behavior have indeed increased during the pandemic, but perhaps unevenly across time and subpopulations.[8] For example, a study conducted in Japan[7] found a decline in suicide rates in the first 5 months of the pandemic, followed by an above-average increase in suicide in the subsequent 5 months, particularly among women, adolescents, and children. This is consistent with meta-analytic reviews of prior infectious disease outbreaks[14] that indicate that certain populations (eg, older adults, disenfranchised or low-income individuals, those with preexisting psychiatric conditions) may be more vulnerable to increases in suicidality during this time than others.

One population vulnerable to increased suicide rates is US military veterans, whose rates of mental illness and suicide far exceed those of the general population. Despite their vulnerability, however, a recent longitudinal study of 3,078 US veterans assessed both prior to and during the pandemic found that SI decreased from pre- to peri-pandemic.[15] Further, a substantial proportion of veterans in this cohort demonstrated resilience to COVID-19–related increases in psychological distress, and this was predicted by adaptive psychosocial factors such as pre-pandemic social connectedness and secure attachment style.[16] Despite accumulating evidence of psychological resilience and decreases in SI during the pandemic, no known study has longitudinally examined factors associated with remission of SI. In the current study, we compared veterans with and without remission of SI during the pandemic (defined as endorsement of SI before but not during the pandemic) on pre- and peri-pandemic clinical and psychosocial characteristics to identify factors related to remission of SI.

## METHODS

### Sample

The National Health and Resilience in Veterans Study (NHRVS) is a nationally representative survey of US veterans.

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A total of 4,069 veterans completed a Wave 1 pre-pandemic (median completion date: November 21, 2019) survey prior to the first documented COVID-19 case in the US, and 3,078 completed a Wave 2 peri-pandemic follow-up assessment 1 year later (median completion date: November 14, 2020). A total of 7,860 veterans were invited to participate in the study, and 4,069 completed Wave 1 (51.8% participation rate); of these 4,069 veterans, 3,929 (96.6%) remained in the survey panel when the follow-up survey was launched and 3,078 completed the follow-up survey (78.3% participation rate and 75.6% of the baseline cohort). All participants provided informed consent, and the study was approved by the Human Subjects Subcommittee of the VA Connecticut Healthcare System.

The NHRVS sample was drawn from KnowledgePanel, a research panel of more than 50,000 households that is maintained by Ipsos, a survey research firm. KnowledgePanel is a probability-based, online non-volunteer access survey panel of a nationally representative sample of US adults that covers approximately 98% of US households. Panel members are recruited through national random samples, originally by telephone and now almost entirely by postal mail. Households are provided with access to the Internet and computer hardware if needed. KnowledgePanel recruitment uses dual sampling frames that include both listed and unlisted telephone numbers, telephone and non-telephone households, and cell-phone–only households, as well as households with and without Internet access.

To permit generalizability of study results to the entire population of US veterans, the Ipsos statistical team computed post-stratification weights using the following benchmark distributions of US military veterans from the most recent (August 2019) Current Veteran Population Supplemental Survey of the US Census Bureau's American Community Survey[17]: age, gender, race/ethnicity, Census region, metropolitan status, education, household income, branch of service, and years in service. An iterative proportional fitting (raking) procedure was used to produce the final post-stratification weights.

Veterans who endorsed past-year SI at the pre-pandemic assessment but denied SI at the peri-pandemic follow-up were characterized as remitted, while veterans who denied pre-pandemic SI but reported SI at follow-up were characterized as having new-onset SI. Veterans who endorsed SI at both assessments were characterized as having persistent SI.

### Assessments

Details regarding assessment instruments are provided in Table 1 (assessment references included in Supplementary Material).

### Data Analysis

Baseline characteristics of SI courses were compared with bivariate tests (Table 2), and variables associated with SI groups at the $P < .05$ level were entered into a multinomial logistic regression with backward elimination estimation to identify pre- and peri-pandemic factors associated with (1) remitted SI vs new-onset SI and (2) remitted SI vs persistent SI. Relative importance analyses were conducted to compare the relative variance explained (RVE) in remitted SI by each significant variable.

## RESULTS

The prevalence of remitted SI, new-onset SI, and persistent SI was 5.2%, 2.3%, and 5.5%, respectively. Of the 2,746 veterans without SI at the pre-pandemic assessment, 82 (2.6%) developed SI during the pandemic. Of the 285 veterans with pre-pandemic SI, 134 (48.6%) denied SI during the pandemic.

### Remitted SI vs New-Onset SI

Relative to veterans with new-onset SI, remitted veterans reported less exacerbation of psychological distress during the pandemic (RVEs = 55.5%), were less likely to report a prior suicide attempt (RVE = 17.2%) and reported greater increases in social support (RVE = 12.7%). They also reported fewer COVID-19 disease-related worries (RVE = 6.0%), more adverse childhood experiences (RVE = 5.8%), greater pre-pandemic social support (RVE = 2.0%), and lower likelihood of knowing someone infected with COVID-19 (RVE = 0.9%).

### Remitted SI vs Persistent SI

Relative to veterans with persistent SI, remitted veterans scored higher on measures of pre-pandemic purpose in life (RVE = 36.0%) and reported greater increases in purpose in life during the pandemic (RVEs = 20.3%). They also reported lower stress resulting from pandemic-related social distancing (RVE = 14.9%) and more pre-pandemic potentially traumatic events (RVE = 12.6%), were less likely to be a combat veteran (RVE = 9.6%), and reported greater pre- to peri-pandemic increases in perceived resilience (RVE = 6.6%). See Table 3 for odds ratios of group comparisons.

## DISCUSSION

This population-based prospective cohort study examined factors associated with remission of SI during the COVID-19 pandemic in US military veterans. SI remission—defined as endorsement of SI prior to but not during pandemic—was nearly 19 times more prevalent than peri-pandemic new-onset SI (48.6% vs 2.6%). This is consistent with prior work in non-veteran samples[10] indicating stable or decreasing SI during the early stages of the pandemic and suggests that, contrary to expectations, SI remission during the pandemic is prevalent even in vulnerable populations such as military veterans.

Several variables distinguished veterans with remitted SI from veterans with persistent or new-onset SI. Pre-pandemic purpose in life accounted for the largest proportion of explained variance in SI remission relative to persistent SI (36.0%, OR = 1.84, 95% CI = 1.41–2.41), while pre- to peri-pandemic increases in purpose in life and perceived resilience accounted for a collective 27% of explained

**Table 1. Study Measures**

| | |
|---|---|
| Suicidal behaviors | |
| Past-year suicidal ideation | Past-year SI was assessed at pre-pandemic and peri-pandemic waves via endorsement of item 2 of the Suicide Behaviors Questionnaire-Revised (SBQ-R): "How often have you thought about killing yourself in the past year?" Response options range from "rarely" (1 time) to "very often" (5+ times) |
| Past-year suicide plan and attempt | Past-year suicide plan or attempt was assessed at the peri-pandemic assessment via endorsement of item 1 of the SBQ-R: "In the past year, have you ever thought about or attempted to kill yourself?" Response options indicating suicide plan or attempt included: "I have had a plan at least once to kill myself but did not try to do it," "I have had a plan at least once to kill myself and really wanted to die," "I have attempted to kill myself, but did not want to die," and "I have attempted to kill myself, and really hoped to die" |
| Sociodemographic characteristics | The following characteristics were assessed: age (continuous), sex (male/female), race/ethnicity (white/nonwhite), education (college graduate or higher, up to high school diploma), marital status (married or living with partner/not partnered), household income (less than $60,000/$60,000 or more), combat veteran status, years of military service |
| Pre-pandemic risk factors | |
| Adverse childhood experiences | Adverse Childhood Experiences Questionnaire total score |
| Number of lifetime potential traumas | Life Events Checklist for *DSM-5* (LEC-5) total score |
| Current PTSD and/or MDD | A score of ≥ 33 on PTSD Checklist for *DSM-5*, which assesses PTSD symptoms in relation to the "worst" criterion A trauma on the LEC-5, indicated probable present of PTSD. Current MDD was screened for using the Patient Health Questionnaire-2. Veterans who met screening criteria for either disorder were coded positive for current PTSD/MDD |
| Current generalized anxiety disorder | Current generalized anxiety was screened for using the Patient Health Questionnaire-4 |
| Current AUD and/or DUD | Current AUD/DUD was assessed using the Alcohol Use Disorders Identification Test and Screen of Drug Use. A score ≥ 8 ($\alpha$=0.85) is indicative of probable current AUD. A response of ≥ 7 days to the question, "How many days in the past 12 months have you used drugs other than alcohol?" or ≥ 2 days to the question, "How many days in the past 12 months have you used drugs more than you meant to?" was classified as a positive DUD screen. A positive screen for either disorder was coded positive for current AUD/DUD |
| Loneliness | UCLA Loneliness Scale total score |
| Suicide attempt history | Endorsement of either of 2 responses to item 2 of the Suicide Behaviors Questionnaire-Revised: "I have attempted to kill myself, but did not want to die" or "I have attempted to kill myself, and really hoped to die" |
| Current mental health treatment | Endorsement of current receipt of psychotropic medication and/or psychotherapy or counseling |
| Cognitive functioning | Medical Outcomes Study Cognitive Functioning Scale |
| Trait impulsivity | Barratt Impulsiveness Scale-Brief total score |
| Physical health difficulties | Factor score composed of (1) the sum of medical conditions in response to the question, "Has a doctor or healthcare professional ever told you that you have any of the following medical conditions: arthritis, cancer, etc?" (2) score on Brief Symptom Inventory-Somatization subscale, and (3) endorsement of disability with activities of daily living and instrumental activities of daily living |
| Social network size | Response to the following question: "About how many close friends and relatives do you have (people you feel at ease with and can talk to about what is on your mind)?" |
| Perceived social support | Medical Outcome Study Social Support Scale-5 |
| Religion/spirituality | Factor score containing scores from the Duke University Religion Index |
| Adaptive psychosocial traits | A composite score of adaptive psychosocial traits was used to assess dispositional attitudes and capacities for coping that are associated with more positive mental health outcomes, including qualities such as resilience; a sense of life purpose; dispositional gratitude, optimism, and curiosity/exploration; and perceived community integration. Resilience was measured using the Connor-Davidson Resilience Scale, a 10-item scale with items such as "I am able to adapt when changes occur," measured on a scale from 1 ("not at all") to 5 ("nearly true all the time"); the Purpose in Life Test, Short Form, a 4-item scale, was used to index sense of meaning and purposefulness in life, assessed on a scale from 1 ("no goals/purpose/progress/meaning") to 7 ("very clear goals/purpose/progress/meaning"). Dispositional gratitude, optimism, and curiosity were each assessed using single 7-point Likert scale items adapted from the Gratitude Questionnaire, the Life Orientation Test-Revised, and the Curiosity and Exploration Inventory-II, respectively. Sense of community integration and acceptance was assessed with a single item, "I feel well integrated in my community" |
| Pandemic-related factors | |
| COVID-19 infection stressors | Endorsement of personal prior COVID-19 infection or someone in the household or outside the household who contracted COVID-19 or knowing someone who died of COVID-19, on a COVID-19 exposure measure developed by the National Center for PTSD |
| COVID-19 pandemic stressors | Coronavirus Health Impact Survey (CRISIS), which assessed for COVID-19-related disease worries, social restriction stress, financial stress, and relationship difficulties during the pandemic. The CRISIS has been psychometrically validated to have high reliability and construct validity |
| Potentially traumatic events during pandemic | Count of potentially traumatic events in the past year assessed using the Life Events Checklist for *DSM-5* |
| COVID-19 related PTSD symptoms | Score on a 4-item measure of COVID-19 pandemic-related PTSD symptoms |
| Change in psychosocial risk factors from pre- to peri-pandemic | Pre- to peri-pandemic changes in severity of MDD/GAD/PTSD symptoms, loneliness, adaptive psychosocial traits, and perceived social support |

Abbreviations: ADL = activities of daily living, AUD = alcohol use disorder, AUDIT = Alcohol Use Disorders Identification Test, COVID-19 = coronavirus disease 2019, DUD = drug use disorder, GAD = generalized anxiety disorder, MDD = major depressive disorder, PTSD = posttraumatic stress disorder.

**Table 2. Sociodemographic, Military, Trauma, and Clinical Characteristics by Suicidal Ideation Course During the COVID-19 Pandemic**

| | Weighted mean (SD) or n (weighted %) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 No SI, n = 2,664 (87.0%) | 2 Remitted SI, n = 134 (5.2%) | 3 New-onset SI, n = 82 (2.3%) | 4 Persistent SI, n = 151 (5.5%) | $F/\chi^2$ | *P* | Pairwise contrasts |
| Suicidal behaviors during pandemic | | | | | 1,499.16 | <.001 | |
| No suicide plan or attempt | 2,657 (99.8%) | 131 (95.4%) | 55 (66.7%) | 58 (36.7%) | | | 1 > 2 > 3 > 4 |
| Suicide plan during pandemic | 4 (0.1%) | 3 (4.6%) | 25 (30.4%) | 90 (60.1%) | | | 4 > 3 > 2 > 1 |
| Suicide attempt during pandemic | 3 (0.1%) | 0 (0%) | 2 (2.9%) | 3 (3.2%) | | | 3,4 > 1,2 |
| Sociodemographic and military factors | | | | | | | |
| Age, y | 64.5 (14.3) | 54.2 (13.3) | 57.2 (14.8) | 53.1 (13.9) | 59.20 | <.001 | 1 > 2,3,4 |
| Male sex | 2,397 (92.3%) | 110 (89.5%) | 70 (91.4%) | 119 (83h.9%) | 15.16 | <.001 | 1 > 4 |
| White, non-Hispanic race/ethnicity | 2,207 (79.1%) | 114 (83.0%) | 67 (82.9%) | 122 (79.0%) | 1.87 | 0.60 | – |
| College graduate or higher | 1,213 (33.7%) | 62 (35.9%) | 42 (39.1%) | 69 (37.3%) | 1.86 | 0.60 | – |
| Married/partnered | 1,942 (74.5%) | 86 (67.3%) | 59 (70.0%) | 106 (74.7%) | 4.54 | 0.21 | – |
| Annual household income $60,000+ | 1,612 (60.8%) | 84 (64.1%) | 45 (49.3%) | 82 (58.0%) | 4.96 | 0.17 | – |
| 10+ years of military service | 961 (36.2%) | 58 (49.7%) | 35 (43.5%) | 61 (42.9%) | 14.45 | 0.002 | 2 > 1 |
| Pre-pandemic risk factors | | | | | | | |
| Adverse childhood experiences | 1.2 (1.8) | 2.6 (2.5) | 1.7 (1.9) | 2.9 (2.5) | 66.20 | <.001 | 4,2 > 1,3 |
| Combat exposure | 894 (34.5%) | 45 (37.3%) | 31 (38.6%) | 66 (46.6%) | 10.34 | 0.016 | 4 > 1 |
| Lifetime potentially traumatic events | 8.4 (7.9) | 13.6 (10.8) | 10.3 (8.1) | 11.7 (8.6) | 28.31 | <.001 | 2,4 > 1 |
| Health-related factors | | | | | | | |
| Current MDD, GAD, or PTSD | 178 (7.7%) | 44 (38.2%) | 22 (31.9%) | 70 (43.5%) | 322.67 | <.001 | 2,3,4 > 1 |
| Current AUD or DUD | 330 (14.2%) | 35 (29.5%) | 23 (33.3%) | 43 (34.2%) | 77.94 | <.001 | 2,3,4 > 1 |
| Loneliness | 4.3 (1.6) | 5.9 (1.9) | 5.9 (1.9) | 6.6 (1.9) | 153.50 | <.001 | 4 > 2,3 > 1 |
| Lifetime suicide attempt | 49 (2.3%) | 10 (8.5%) | 14 (22.9%) | 22 (12.3%) | 133.75 | <.001 | 3,4 > 2 > 1 |
| Current mental health treatment | 192 (7.3%) | 39 (32.0%) | 25 (36.2%) | 60 (39.1%) | 278.69 | <.001 | 2,3,4 > 1 |
| Cognitive functioning | 92.3 (12.4) | 80.3 (17.4) | 85.5 (15.4) | 74.5 (25.3) | 118.87 | <.001 | 1 > 2,3 > 4 |
| Trait impulsivity | 14.1 (3.7) | 17.1 (4.8) | 15.9 (3.8) | 17.5 (5.0) | 68.64 | <.001 | 2,3,4 > 1 |
| Physical health difficulties | −0.1 (0.9) | 0.5 (1.2) | 0.3 (1.4) | 0.6 (1.4) | 41.13 | <.001 | 1 > 2,3,4 |
| Pre-pandemic protective factors | | | | | | | |
| Adaptive psychosocial traits | 0.2 (0.9) | −0.6 (1.0) | −0.7 (1.2) | −1.0 (1.1) | 132.49 | <.001 | 1 > 2,3 > 4 |
| Social network size | 8.8 (11.4) | 4.5 (5.5) | 4.7 (3.1) | 3.6 (4.6) | 20.56 | <.001 | 1 > 2,3,4 |
| Perceived social support | 19.3 (4.8) | 16.8 (5.8) | 15.3 (5.2) | 15.7 (5.1) | 50.75 | <.001 | 1 > 2,3,4 |
| Religiosity/spirituality | 0.0 (1.0) | −0.3 (0.8) | −0.3 (1.0) | −0.3 (1.0) | 10.73 | <.001 | 1 > 2,3,4 |
| Pandemic-related variables | | | | | | | |
| Infected with COVID-19 | 178 (7.4%) | 18 (13.2%) | 15 (19.4%) | 14 (9.3%) | 18.52 | <.001 | 3 > 1 |
| Household member infected with COVID-19 | 154 (6.9%) | 13 (10.6%) | 6 (6.1%) | 18 (14.2%) | 14.30 | 0.003 | 4 > 1 |
| Non-household member infected with COVID-19 | 1,071 (39.9%) | 71 (51.0%) | 45 (57.4%) | 78 (51.6%) | 22.01 | <.001 | 2,3,4 > 1 |
| Know someone who died of COVID-19 | 153 (5.6%) | 8 (3.9%) | 6 (7.1%) | 6 (4.9%) | 1.27 | 0.74 | – |
| COVID-19–related disease worries | 0 (1.0) | −0.1 (1.0) | 0.2 (1.0) | 0.0 (1.0) | 1.57 | 0.19 | – |
| COVID-19–related social restriction stress | 0 (1.0) | 0 (1.0) | 0.1 (1.3) | 0.2 (1.0) | 4.34 | 0.005 | 4 > 1 |
| COVID-19–related socioeconomic stress | 0 (1.0) | 0 (1.0) | 0.4 (1.6) | 0.4 (1.3) | 12.30 | <.001 | 3,4 > 1,2 |
| COVID-19–related relationship difficulties | 0 (1.0) | 0 (0.7) | 0.5 (1.0) | 0.2 (1.0) | 8.63 | <.001 | 3 > 1 |
| Potentially traumatic events during pandemic | 0.8 (1.7) | 1.3 (2.2) | 1.3 (1.7) | 1.7 (2.0) | 14.95 | <.001 | 2,4 > 1 |
| COVID-19–related PTSD symptoms | 305 (11.7%) | 24 (16.8%) | 20 (20.3%) | 36 (21.1%) | 18.20 | <.001 | 4 > 1 |
| Pre- to peri-pandemic change variables | | | | | | | |
| Increase in psychological distress | 0 (0.6) | −0.3 (1.0) | 0.4 (0.9) | 0 (1.0) | 20.96 | <.001 | 3 > 1,4 > 2 |
| Decrease in loneliness | −0.1 (1.3) | −0.6 (1.6) | 0 (1.7) | −0.2 (1.5) | 9.73 | <.001 | 2 > 1,3 |
| Increase in adaptive psychosocial traits | −0.1 (0.7) | 0.3 (0.8) | 0.1 (1.0) | 0 (0.9) | 14.27 | <.001 | 2 > 1,4 |
| Increase in perceived social support | 0 (1.0) | 0.3 (1.1) | 0.0 (0.9) | 0 (0.8) | 3.84 | 0.009 | 2 > 1 |

Abbreviations: AUD = alcohol use disorder, COVID-19 = coronavirus disease 2019, DUD = drug use disorder, GAD = generalized anxiety disorder, MDD = major depressive disorder, PTSD = posttraumatic stress disorder, SI = suicidal ideation.

variance (OR = 2.28, 95% CI = 1.58–3.29). Purpose in life has been linked to healthy coping behaviors and reduced stress reactivity[18] and may help confer remission of SI by encouraging more adaptive regulation of negative emotions. Lower distress related to social distancing restrictions was also associated with SI remission relative to persistent SI, albeit with a smaller effect (OR = 0.67, 95% CI = 0.50–0.88). Potentially, lower distress may reflect more effective coping, or higher distress tolerance, in the remitted group. Alternatively, veterans with remitted SI may have been better able to maintain interpersonal connections during periods of social distancing. Notably, the aforementioned factors associated with SI remission—social connectedness and purpose in life—have been found to be integral to fostering general psychological well-being, resilience, and adaptability[19] and may be modifiable using psychological interventions and skills-based training.[20,21]

Several prominent risk factors for suicidal thoughts and behaviors were not predictive of a lower likelihood of SI remission, including psychiatric diagnosis (major depressive disorder, generalized anxiety disorder, posttraumatic stress disorder, alcohol/substance use disorders). Null effects for

**Table 3. Results of Multinomial Logistic Regression Analyses of Resilient vs New-Onset and Persistent SI Courses During the COVID-19 Pandemic**

| | Adjusted odds ratio (95% CI)[a] | |
|---|---|---|
| | Remitted SI vs new-onset SI | Remitted SI vs persistent SI |
| Pre-pandemic risk factors | | |
| Adverse childhood experiences | 1.26 (1.02–1.57)* | — |
| Combat exposure | | 0.57 (0.34–0.95)* |
| Lifetime potentially traumatic events | — | 1.04 (1.01–1.07)** |
| Lifetime suicide attempt | 0.11 (0.03–0.43)** | — |
| Pre-pandemic protective factors | | |
| Adaptive psychosocial traits | — | 1.84 (1.41–2.41)*** |
| Perceived social support | 1.11 (1.02–1.21)* | — |
| Pandemic-related variables | | |
| Non-household member infected with COVID-19 | 0.36 (0.16–0.80)* | — |
| COVID-19–related disease worries | 0.64 (0.43–0.96)* | — |
| COVID-19–related social restriction stress | — | 0.67 (0.50–0.88)** |
| Pre- to peri-pandemic change variables | | |
| Increase in psychological distress | 0.41 (0.26–0.63)*** | — |
| Increase in adaptive psychosocial traits | — | 2.28 (1.58–3.29)*** |
| Increase in perceived social support | 1.10 (1.00–1.21)* | — |

[a]Cells with dashes denote variables that did not significantly contribute variance to the model.
* $P < .05$. ** $P < .01$. *** $P < .001$.
Abbreviations: COVID-19 = coronavirus disease 2019, SI = suicidal ideation.

psychopathology may reflect the fact that the 3 SI groups did not differ from each other in their rates of psychiatric diagnoses. Nonetheless, veterans with remitted SI reported less exacerbation of psychological distress during the pandemic relative to veterans who developed SI (OR = 0.41, 95% CI = 0.26–0.63), and this explained the largest proportion of variance in SI remission relative to new-onset SI (RVE 55%). These findings suggest that clinical monitoring and intervention for intensification of distress may help promote SI remission during times of crisis and that worsening of mental health status during this period may be a significant risk factor for SI.

Limitations of this study include the relative homogeneity of the sample with respect to gender, race, ethnicity, and shared military experience, which restricts the degree to which data can be generalized to more diverse samples. Additionally, the limited number of follow-up assessments prevent a more granular depiction of shifts in SI during the COVID-19 pandemic. Nevertheless, our findings highlight the potential clinical utility of monitoring changes in psychological distress during the pandemic, as well as enhancing adaptive characteristics such as purpose in life and perceived resilience to help mitigate SI. Ongoing assessment of pandemic-related mental health sequalae in veterans and other at-risk populations is necessary to understand the continued impact of protective factors on suicide-related outcomes as the COVID-19 pandemic progresses.

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## REFERENCES

1. WHO. Statement on the Second Meeting of the International Health Regulations (2005) Emergency Committee Regarding the Outbreak of Novel Coronavirus (2019-nCoV). January 31, 2020. https://www.who.int/news/item/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)
2. Johns Hopkins University & Medicine. Maps and Trends: Mortality Analyses. https://coronavirus.jhu.edu/data/mortality. 2021. Retrieved October 20, 2021.
3. Sher L. The impact of the COVID-19 pandemic on suicide rates. *QJM*. 2020;113(10):707–712.
4. Banerjee D, Kosagisharaf JR, Sathyanarayana Rao TS. The "dual pandemic" of suicide and COVID-19: a biopsychosocial narrative of risks and prevention. *Psychiatry Res*. 2021;295:113577.
5. Serafini G, Parmigiani B, Amerio A, et al. The psychological impact of COVID-19 on the mental health in the general population. *QJM*. 2020;113(8):531–537.
6. Reger MA, Stanley IH, Joiner TE. Suicide mortality and coronavirus disease 2019—a perfect storm? *JAMA Psychiatry*. 2020;77(11):1093–1094.
7. Tanaka T, Okamoto S. Increase in suicide following an initial decline during the COVID-19 pandemic in Japan. *Nat Hum Behav*. 2021;5(2):229–238.
8. Dubé JP, Smith MM, Sherry SB, et al. Suicide behaviors during the COVID-19 pandemic: a meta-analysis of 54 studies. *Psychiatry Res*. 2021;301:113998.
9. Appleby L. What has been the effect of COVID-19 on suicide rates? *BMJ*. 2021;372:n834.
10. Prati G, Mancini AD. The psychological impact of COVID-19 pandemic lockdowns: a review and meta-analysis of longitudinal studies and natural experiments. *Psychol Med*. 2021;51(2):201–211.
11. Pirkis J, John A, Shin S, et al. Suicide trends in the early months of the COVID-19 pandemic: an interrupted time-series analysis of preliminary data from 21 countries. *Lancet Psychiatry*. 2021;8(7):579–588.
12. Morganstein JC, Ursano RJ. Ecological disasters and mental health: causes, consequences, and interventions. *Front Psychiatry*. 2020;11:1.
13. Kessler RC, Galea S, Jones RT, et al; Hurricane Katrina Community Advisory Group. Mental illness and suicidality after Hurricane Katrina. *Bull World Health Organ*. 2006;84(12):930–939.
14. Zortea TC, Brenna CT, Joyce M, et al. The impact of infectious disease-related public health emergencies on suicide, suicidal behavior, and suicidal thoughts. *Crisis*. 2021;42(6):474–487.
15. Nichter B, Hill ML, Na PJ, et al. Prevalence and trends in suicidal behavior among US military veterans during the COVID-19 pandemic. *JAMA Psychiatry*. 2021;78(11):1218–1227.
16. Hill ML, Nichter B, Na PJ, et al. Mental health impact of the COVID-19 pandemic in U.S. military veterans: a population-based,

prospective cohort study. *Psychol Med*. 2021:1–12.
17. US Census Bureau. The American Community Survey. https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2019/quest19.pdf. 2019. Retrieved November 1, 2021.
18. Schaefer SM, Morozink Boylan J, van Reekum CM, et al. Purpose in life predicts better emotional recovery from negative stimuli. *PLoS One*. 2013;8(11):e80329.
19. Dahl CJ, Wilson-Mendenhall CD, Davidson RJ. The plasticity of well-being: a training-based framework for the cultivation of human flourishing. *Proc Natl Acad Sci U S A*. 2020;117(51):32197–32206.
20. Heisel MJ, Flett GL. *Do Meaning in Life and Purpose in Life Protect Against Suicide Ideation Among Community-Residing Older Adults? Meaning in Positive and Existential Psychology*. Springer; 2014:303–324.
21. O'Rourke HM, Collins L, Sidani S. Interventions to address social connectedness and loneliness for older adults: a scoping review. *BMC Geriatr*. 2018;18(1):214.

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# Supplementary Material

**Brief Report Title:** Factors Associated With Remission of Suicidal Ideation During the COVID-19 Pandemic: A Population-Based, Longitudinal Study in US Military Veterans

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## List of Supplementary Material for the brief report



## Disclaimer

This Supplementary Material has been provided by the author(s) as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

Supplementary Table 1. *Study Measures (With Reference List)*

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| **Suicidal behaviors** | |
| Past-year suicidal ideation | Past-year SI was assessed at pre-pandemic and peri-pandemic waves via endorsement of Item 2 of the Suicide Behaviors Questionnaire-Revised (SBQ-R)[1]: "How often have you thought about killing yourself in the past year?" Response options range from 'rarely' (1 time) to 'very often' (5+ times). |
| Past-year suicide plan and attempt | Past-year suicide plan or attempt was assessed at the peri-pandemic assessment via endorsement of Item 1 of the SBQ-R[1]: "In the past year, have you ever thought about or attempted to kill yourself?" Response options indicating suicide plan or attempt included: "I have had a plan at least once to kill myself but did not try to do it," "I have had a plan at least once to kill myself and really wanted to die," "I have attempted to kill myself, but did not want to die," and "I have attempted to kill myself, and really hoped to die." |
| **Sociodemographic characteristics** | The following characteristics were assessed: age (continuous), sex (male/female), race/ethnicity (white/non-white), education (college graduate or higher, up to high school diploma), marital status (married or living with partner/not partnered), household income (less than $60,000/$60,000 or more), combat veteran status, years of military service. |
| **Pre-pandemic risk factors** | |
| Adverse childhood experiences | Adverse Childhood Experiences Questionnaire total score[2]. |
| Number of lifetime potential traumas | Life Events Checklist for DSM-5 total score[3]. |
| Current PTSD and/or MDD | A score of ≥33 on PTSD Checklist for DSM-5[4], which assesses PTSD symptoms in relation to the "worst" Criterion A trauma on the LEC-5, indicated probable present of PTSD. Current MDD was screened for using the Patient Health Questionnaire-2[5]. Veterans who met screening criteria for either disorder were coded positive for current PTSD/MDD. |

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| Current Generalized Anxiety Disorder | Current generalized anxiety was screened for using the Patient Health Questionnaire-4[6]. |
| Current AUD and/or DUD | Current AUD/DUD was assessed using the Alcohol Use Disorders Identification Test (AUDIT)[7] and Screen of Drug Use[8]. A score ≥8 ($\alpha$=0.85) is indicative of probable current AUD[9]. A response of ≥7 days to the question, "how many days in the past 12 months have you used drugs other than alcohol," or ≥2 days to the question, "how many days in the past 12 months have you used drugs more than you meant to," was classified as a positive DUD screen. A positive screen for either disorder was coded positive for current AUD/DUD. |
| Loneliness | UCLA Loneliness Scale total score[10]. |
| Suicide attempt history | Endorsement of either of two responses to Item 2 of the Suicide Behaviors Questionnaire-Revised (SBQ-R)[1]: "I have attempted to kill myself, but did not want to die," or "I have attempted to kill myself, and really hoped to die." |
| Current mental health treatment | Endorsement of current receipt of psychotropic medication and/or psychotherapy or counseling. |
| Cognitive functioning | Medical Outcomes Study Cognitive Functioning Scale[11]. |
| Trait impulsivity | Barratt Impulsiveness Scale-Brief[12] total score. |
| Physical health difficulties | Factor score comprised of 1) the sum of medical conditions in response to the question, "has a doctor or healthcare professional ever told you that you have any of the following medical conditions: arthritis, cancer, etc.," 2) score on Brief Symptom Inventory-Somatization subscale[13], and 3) endorsement of disability with activities of daily living and instrumental activities of daily living. |
| Social network size | Response to the following question: "About how many close friends and relatives do you have (people you feel at ease with and can talk to about what is on your mind)?" |
| Perceived social support | Medical Outcome Study Social Support Scale-5[14]. |

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| Religion/spirituality | Factor score containing scores from the Duke University Religion Index[15]. |
| Adaptive psychosocial traits | A composite score of adaptive psychosocial traits [16-17] was used to assess dispositional attitudes and capacities for coping that are associated with more positive mental health outcomes, including qualities such as resilience; a sense of life purpose; dispositional gratitude, optimism, and curiosity/exploration; and perceived community integration. Resilience was measured using the Connor-Davidson Resilience Scale[18], a 10-item scale with items such as "I am able to adapt when changes occur," measured on a scale from 1 ("not at all") to 5 ("nearly true all the time"); The Purpose in Life Test, Short Form[19], a 4-item scale, was used to index sense of meaning and purposefulness in life, assessed on a scale from 1 ("no goals/purpose/progress/meaning") to 7 ("very clear goals/purpose/progress/meaning";). Dispositional gratitude, optimism, and curiosity were each assessed using single 7-point Likert scale items adapted from the Gratitude Questionnaire (GQ-6)[20] the Life Orientation Test-Revised (LOTS-R)[21], and the Curiosity and Exploration Inventory-II (CEI-II0)[22] respectively. Sense of community integration and acceptance was assessed with a single item, "I feel well integrated in my community." |
| **Pandemic-related Factors** | |
| COVID-19 infection stressors | Endorsement of personal prior COVID-19 infection or someone in the household or outside the household who contracted COVID-19 or knowing someone who died of COVID-19, on a COVID-19 exposure measure developed by the National Center for PTSD. |
| COVID-19 pandemic stressors | Coronavirus Health Impact Survey (CRISIS)[23], which assessed for COVID-19-related disease worries, social restriction stress, financial stress, and relationship difficulties during the pandemic. The CRISIS has been psychometrically validated to have high reliability and construct validity. |

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| Potentially traumatic events during pandemic | Count of potentially traumatic events in the past year assessed using the Life Events Checklist for DSM-5[3]. |
| COVID-19 related PTSD symptoms | Score on a 4-item measure of COVID-19 pandemic-related PTSD symptoms. |
| Change in psychosocial risk factors from pre- to peri-pandemic | Pre- to peri-pandemic changes in severity of MDD/GAD/PTSD symptoms, loneliness, adaptive psychosocial traits, and perceived social support. |

Abbreviations: ADL, activities of daily living; AUD, alcohol use disorder; AUDIT, Alcohol Use Disorders Identification Test; COVID-19, coronavirus disease 2019; DUD, drug use disorder; MDD, Major depressive disorder; PTSD, Posttraumatic stress disorder.

*See next page for references.*

References

[1] Osman, A., Bagge, C. L., Gutierrez, P. M., Konick, L. C., Kopper, B. A., & Barrios, F. X. (2001). The Suicidal Behaviors Questionnaire-Revised (SBQ-R): validation with clinical and nonclinical samples. *Assessment, 8*(4), 443-454. doi: 10.1177/107319110100800409

[2] Zarse, E. M., Neff, M. R., Yoder, R., Hulvershorn, L., Chambers, J. E., & Chambers, R. A. (2019). The adverse childhood experiences questionnaire: two decades of research on childhood trauma as a primary cause of adult mental illness, addiction, and medical diseases. *Cogent Medicine, 6*(1), 1581447.

[3] Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the life events checklist. *Assessment, 11*(4), 330-341. doi: 10.1177/1073191104269954

[4] Weathers, F., Litz, B., Keane, T., Palmieri, P., Marx, B., & Schnurr, P. (2013). The PTSD Checklist for DSM-5 (PCL-5). *Scale available at from the National Center for PTSD at http://www.ptsd.va.gov*.

[5] Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals, 32*(9), 509-515.

[6] Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ–4. *Psychosomatics, 50*(6), 613-621. doi: 10.1016/S0033-3182(09)70864-3

[7] Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. *Archives of Internal Medicine, 158*(16), 1789-1795.

[8] Tiet, Q. Q., Leyva, Y. E., Moos, R. H., Frayne, S. M., Osterberg, L., & Smith, B. (2015). Screen of drug use: diagnostic accuracy of a new brief tool for primary care. *JAMA Internal Medicine, 175*(8), 1371-1377.

[9] Saunders, J. B., Aasland, O. G., Babor, T. F., De la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction, 88*(6), 791-804.

[10] Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66*(1), 20-40.

[11] Yarlas, A., White, M., & Bjorner, J. (2013). The development and validation of a revised version of the Medical Outcomes Study Cognitive Functioning Scale (Mos-Cog-R). *Value in Health, 16*(3), A33-A34.

[12] Steinberg, L., Sharp, C., Stanford, M. S., & Tharp, A. T. (2013). New tricks for an old measure: The development of the Barratt Impulsiveness Scale–Brief (BIS-Brief). *Psychological Assessment, 25*(1), 216. doi: 10.1037/a0030550

[13] Derogatis, L. R., & Spencer, P. (1993). *Brief Symptom Inventory: BSI*. Upper Saddle River, NJ, USA: Pearson

[14] Giangrasso, B., & Casale, S. (2014). Psychometric properties of the medical outcome study social support survey with a general population sample of undergraduate students. *Social Indicators Research, 116*(1), 185-197.

[15] Koenig, H. G., & Büssing, A. (2010). The Duke University Religion Index (DUREL): a five-item measure for use in epidemological studies. *Religions, 1*(1), 78-85.

[16] Pietrzak, R. H., & Cook, J. M. (2013). Psychological resilience in older US veterans: results from the national health and resilience in veterans study. *Depression and Anxiety, 30*(5), 432-443. doi: 10.1002/da.22083

[17] Smith, N. B., Mota, N., Tsai, J., Monteith, L., Harpaz-Rotem, I., Southwick, S. M., & Pietrzak, R. H. (2016). Nature and determinants of suicidal ideation among US veterans: Results from the national health and resilience in veterans study. *Journal of Affective Disorders, 197*, 66-73. doi: 10.1016/j.jad.2016.02.069

[18] Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the connor–davidson resilience scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress, 20*(6), 1019-1028. doi: 10.1002/jts.20271

[19] Schulenberg, S. E., Schnetzer, L. W., & Buchanan, E. M. (2011). The purpose in life test-short form: development and psychometric support. *Journal of Happiness Studies, 12*(5), 861-876. doi: 10.1007/s10902-010-9231-9

[20] McCullough, M. E., Emmons, R. A., & Tsang, J.-A. (2001). The gratitude questionnaire-six item form (GQ-6). *Retrieved April, 16*, 2010. doi: 10.13072/midss.561

[21] Glaesmer, H., Rief, W., Martin, A., Mewes, R., Brähler, E., Zenger, M., & Hinz, A. (2012). Psychometric properties and population-based norms of the Life Orientation Test Revised

(LOT-R). *British Journal of Health Psychology 17*(2), 432-445. doi: 10.1111/j.2044-8287.2011.02046.x

[22] Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., & Steger, M. F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. *Journal of Research in Personality, 43*(6), 987-998. doi: 10.1016/j.jrp.2009.04.011

[23] Nikolaidis, A., Paksarian, D., Alexander, L., Derosa, J., Dunn, J., Nielson, D. M., . . . Bromet, E. (2021). The Coronavirus Health and Impact Survey (CRISIS) reveals reproducible correlates of pandemic-related mood states across the Atlantic. *Scientific Reports, 11*(1), 1-13.