Risk Factors for Suicide Attempts and Psychiatric Hospitalization Among Brazilian Health Care Professionals

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Abstract

Background: Health care professionals face elevated suicide risk, yet longitudinal studies during occupational crises are lacking. We investigated factors associated with suicide attempts and psychiatric hospitalizations in health care workers seeking emotional support during COVID-19.

Methods: We prospectively evaluated 3,087 Brazilian health care professionals enrolled in a digital mental health trial (May–July 2020). Participants were recruited nationwide from May 2020 to December 2021. From this cohort, 2,815 with complete baseline data comprised the intention-to-treat (ITT) sample. Outcomes were assessed at 4, 12, and 24 weeks. Baseline predictors included demographics, Patient Health Questionnaire-9 item 9 (suicidal ideation), Patient-Reported Outcomes Measurement Information System T-scores (depression, anxiety, irritability, sleep), life satisfaction, and burnout. Cox models examined associations; inverse probability weighting addressed attrition. Additive interaction was quantified using relative excess risk due to interaction (RERI).

Results: In the total sample, 53 participants (1.59%) attempted suicide. In the ITT sample (86% female, mean age 36.5), 46 (1.63%) attempted suicide (64 events), and 60 (2.22%) required psychiatric hospitalization. Nearly every day ideation (hazard ratio [HR] = 39.58, 95% CI, 14.03–111.64, $P < .001$), severe sleep disturbances (HR = 17.39, 95% CI, 2.05–147.46, $P = .009$), and male sex (HR = 2.08, 95% CI, 1.01–4.26, $P = .046$) independently predicted attempts. The 24-week attempt probability reached 57.1% for individuals with both ideation and sleep problems versus 1.2% with neither, with 40% of the combined risk attributable to synergistic interaction (RERI = 11.51). Notably, 28.3% of attempts occurred among individuals denying baseline ideation. For hospitalizations, only nearly every day ideation remained significant (HR = 8.11, 95% CI, 3.10–21.18, $P < .001$). Results remained robust after weighting.

Conclusions: Daily suicidal ideation and severe sleep disturbances synergistically elevate suicide risk among health care professionals. Findings support a comprehensive assessment incorporating sleep disturbances and multicomponent interventions targeting both domains simultaneously.

Trial Registration: ClinicalTrials.gov identifiers: NCT04635618, NCT04632082.

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Health care workers face disproportionately high risks of adverse mental health outcomes, including suicide.[1,2] Moreover, the COVID-19 pandemic exacerbated these challenges, imposing unprecedented workloads and exposing health care professionals to prolonged stress and grief.[3] This period provided an opportunity to research this vulnerable population, which has long been overlooked.[4] Health care workers facing emotional distress are a crucial group for suicide prevention through targeted risk stratification. Preventive measures are vital for this population; thus, recognizing those at higher risk can help allocate resources to individuals who would benefit most from these interventions.

While associations between suicidal ideation and sleep disturbances with suicide risk are established in general populations, several critical knowledge gaps persist for health care workers. First, no prospective studies have examined whether these established risk factors operate similarly in health care professionals during occupational crises, where unique stressors like moral injury, patient deaths, and infection fears may fundamentally alter risk pathways.[5] Second, the potential synergistic interaction between sleep

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Clinical Points

- While sleep problems and suicidal ideation are established suicide risk factors in general populations, their synergistic interaction in health care workers during occupational crises has not been quantified until now.
- Health care professionals with both daily suicidal ideation and severe sleep disturbances showed 57% attempt probability versus 1.2% with neither factor; the clinical risk score (AUC = 0.83) can help identify highest-risk individuals for resource allocation.

disturbances and suicidal ideation, where their combined effect may exceed additive expectations, remains unexplored in this population.[6] Third, existing suicide risk assessment tools were developed in general psychiatric populations and lack validation in health care settings where burnout, shift work, and chronic sleep deprivation are endemic.[7] Fourth, the temporal dynamics of suicide risk during sustained occupational crises remain uncharacterized, limiting our ability to identify critical intervention windows.

Thus, this study aims to address these gaps by examining longitudinal factors associated with suicide attempts and psychiatric hospitalizations among health care professionals seeking support for emotional distress during the COVID-19 pandemic. By analyzing sociodemographic, clinical, and psychosocial factors, along with workplace stressors and coping strategies, this investigation seeks to (1) identify key risk and protective factors over a 6-month follow-up period; (2) examine potential interactions between established risk factors in this specific occupational context; and (3) develop population-specific risk stratification approaches for health care workers in crisis.

METHODS

This study utilizes data from the TelePSI COVID-19 project, a nationwide, investigator-initiated, single-center, randomized, unblinded, pragmatic controlled trial conducted in Brazil.[8,9] All interventions were delivered remotely through digital platforms, including video conferencing for therapy sessions and web-based psychoeducational materials, ensuring accessibility during pandemic restrictions while maintaining intervention fidelity.

Participants and Recruitment

Participants were recruited nationwide from May 2020 to December 2021 through helplines, social media, emails, and traditional media such as newspapers and television. Eligible participants were health care professionals or trainees seeking psychological support. All participants were evaluated using standardized symptomatic instruments and allocated to one of 3 pathways.[10]

Pathway 1. Participants with no suicidal ideation and with Patient-Reported Outcomes Measurement Information System (PROMIS) T-score below 70 in all of the scales of anxiety, depression, or anger/irritability[11] were eligible for the prevention trial. This trial was a 2-arm randomized controlled trial aimed to prevent the worsening of emotional distress and randomized participants to single-session intervention (SSI) or single-session intervention with enhanced psychoeducation (SSI-ET). The SSI protocol is a single-session intervention where a trained psychologist or psychiatrist creates a welcoming, empathetic, and nonjudgmental environment, reviewing participants' symptom scores through visual feedback. In this session, participants work with the therapist to develop a tailored plan to reduce negative coping strategies and enhance positive ones, fostering autonomy, self-efficacy, and emotional safety. The enhanced version (SSI-ET) adds personalized psychoeducation by sending 2 short videos per week over 4 weeks—covering topics from stress and burnout to healthy habits—and offers ongoing support via phone chat for any follow-up queries. If participants in pathway 1 reported new-onset suicidal risk during therapy, they were referred to pathway 3 (see below).

Pathway 2. Participants with no suicidal ideation and with a PROMIS T-score of 70 or above on any of the scales of anxiety, depression, or anger/irritability[11] were eligible for the treatment trial. This was a 3-arm randomized controlled trial in which individuals were randomized to one of 3 interventions, aiming to evaluate the effectiveness of 3 different remote interventions for transdiagnostic psychiatric symptoms: SSI-ET, brief cognitive behavioral psychotherapy (B-CBT), and brief interpersonal psychotherapy (B-IPT) for those with high levels of emotional distress. If participants presented new-onset suicidal risk during therapy, they were referred to pathway 3 (see below).

Pathway 3. Participants scoring 1 or above on suicidal ideation via the 9-item Patient Health Questionnaire (PHQ-9) were referred to a psychiatrist.[12] The PHQ-9 item 9 asks: "Over the last 2 weeks, how often have you been bothered by any of the following problems?" The specific item is "Thoughts that you would be better off dead, or of hurting yourself." Response options include the following: "Not at all," "Several days," "More than half the days," and "Nearly every day." Participants responding "Not at all" were referred directly to pathways 1 and 2. Those responding "Several days" were initially referred for psychiatric assessment, but after April 2022, when no severe cases were detected, they were also referred directly to pathways 1 and 2. Participants answering "More than half the days" and "Nearly every day" were sent for a specialized psychiatric assessment involving a structured evaluation of 44 risk and protective factors related to suicidal behavior. After this,

participants were again classified into mild, moderate, and severe suicide risk categories.[10] Moderate-risk participants required in-person evaluations by local providers through a transition of care protocol, while severe-risk participants needed assessment of possible psychiatric hospitalization.

Both randomized clinical trials (pathways 1 and 2) were registered in ClinicalTrials.gov (NCT04635618 and NCT04632082). Ethical approval was obtained from Brazil's National Research Ethics Commission (CONEP), and the study adhered to the ethical principles outlined in the Declaration of Helsinki. The trial design and reporting complied with CONSORT 2010 guidelines, and the Ministry of Health of Brazil provided funding.

Outcome Assessment

All participants were assessed through self-report questionnaires at baseline, 4 weeks, 12 weeks, and 24 weeks. Primary outcomes were defined as binary variables indicating whether patients were positive at any time point. Response options were as follows: 1 = yes; 0 = no.

- Psychiatric hospitalizations: "Did you have any hospitalization due to a mental health problem in the last [4, 8, or 12] weeks?"
- Suicide attempts: "Did you have any suicide attempt in the last [4, 8, or 12] weeks?"

Risk Assessment

Demographics. Sex was treated as a binary variable (female or male), while age was analyzed as a continuous variable. Workplace roles were categorized into distinct settings, including family health strategy, basic health units, emergency care units, hospitals (stratified into COVID-19 and non–COVID-19 areas), intensive care units, and other professional environments. Professional categories included administrative staff, community health agents, nurses, physicians, and a broad spectrum of other health care professionals.

Suicidal ideation. Suicidal ideation was assessed using item 9 of the PHQ-9: "Over the last two weeks, how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?" Response options were as follows: 0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day. This item has demonstrated robust predictive validity for suicide attempts and deaths across age groups in large-scale studies. Among 297,290 mental health outpatients, those reporting nearly daily ideation showed 5–8 times higher risk of suicide attempts within 30 days and 3–11 times higher risk of suicide death compared to those without ideation, with predictive validity consistent across all age groups.[13] We employed 2 distinct scoring methodologies to maximize clinical utility. Ordinal scoring was used for Cox regression models: We utilized the full 4-level response scale (none, several days, more than half of the days, nearly every day) as an ordinal predictor to capture dose-response relationships and maximize statistical power for detecting associations across the ideation severity spectrum. Binary scoring was used for survival analyses: For Kaplan-Meier analyses and clinical risk stratification, we dichotomized responses into "nearly every day" vs "less than nearly every day" (combining none, several days, and more than half of the days). This dichotomization was based on prior evidence showing markedly elevated risk at the highest severity level[13] and the need for clear clinical thresholds for intervention decisions.

Burnout. Burnout was assessed utilizing the Burnout Assessment Tool (BAT) 12-item version, which is a self-report questionnaire specifically designed to evaluate burnout and its fundamental dimensions, including exhaustion, impairment in emotional self-regulation, impairment in cognitive self-regulation, and mental detachment. Participants are requested to rate their experiences on a 5-point Likert scale, with options ranging from 1 (never) to 5 (always). Research has demonstrated that the BAT-12 displays adequate validity and measurement invariance alongside robust psychometric properties.[14] We used the total score by summing all items.

Symptoms of depression, anxiety, and irritability. The assessment utilized instruments from the PROMIS, which are self-reported tools developed by the National Institutes of Health to evaluate individuals' perceptions regarding their emotional health and overall quality of life. These instruments concentrate on emotional experiences over the preceding 7 days. The anxiety and depression scales each comprise 8 items, whereas the anger scale consists of 5 items. Responses are gathered utilizing a 5-point Likert scale, with 1 denoting "Never" and 5 signifying "Always," where higher scores indicate greater emotional distress. PROMIS scales were developed based on item banks and item response theory and are lauded for their high reliability and internal consistency.[11] The scores are standardized as T-scores, with a population mean of 50 and a standard deviation of 10. For instance, a T-score of 70 corresponds to 2 standard deviations above the mean, suggesting considerable distress. Due to the low number of events in the "none to slight" and "mild" groups, we merged them into a group called "none to mild."

Sleep problems. Sleep disturbances were assessed using the short form of the PROMIS sleep disturbances instrument.[15] This assessment consists of an 8-item self-report Likert-type scale designed to evaluate individuals' perceptions of sleep quality, insomnia, and sleep agitation over the past 7 days. The initial question assesses the self-perception of sleep quality using a 5-point Likert scale that ranges from "very poor" to "very good." The subsequent 7 questions address various sleep indicators, including insomnia, agitation, worry,

and sleep satisfaction, utilizing a scale that ranges from "never" to "always."

Life satisfaction. The evaluation was conducted utilizing the Satisfaction with Life Scale (SWLS), a validated instrument designed to assess an individual's subjective appraisal of their overall well-being and quality of life.[16] The SWLS comprises 5 items, rated on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), thereby providing a global index of life satisfaction based on the respondent's subjective judgment. This tool has exhibited substantial psychometric properties, characterized by high internal consistency (Cronbach alpha > 0.85) and test-retest reliability over time.[17]

Covariates

Analysis was adjusted by treatment allocation, which reflected the intervention received: SSI, SSI-ET, B-CBT, or B-IPT.

Statistical Analyses

All analyses were performed using R version 4.3.1 (R Core Team, Vienna, Austria) with packages "survival," "survminer," "tidyverse," and "lme4." We employed an intention-to-treat (ITT) approach, analyzing participants according to original randomization regardless of adherence. Cox proportional hazards regression models examined associations between baseline predictors and time to first suicide attempt or psychiatric hospitalization, accounting for right-censored observations. We developed models in 3 stages: (1) univariate analyses examining each predictor separately; (2) multivariate models including all predictors simultaneously to assess independent associations; and (3) inverse probability weighted (IPW) models addressing potential bias from attrition.

For IPW analyses, we modeled the probability of completing follow-up using logistic regression with baseline ideation, sleep problems, depression severity, sex, and age as predictors. Stabilized weights were calculated as the marginal probability divided by the conditional probability of follow-up, truncated at the 1st and 99th percentiles to avoid extreme weights. Covariate balance was assessed using standardized differences, with <0.1 indicating adequate balance.[18] The proportional hazards assumption was verified using Schoenfeld residuals and complementary log-log plots. Where violations occurred, we stratified models by the violating covariate.

To examine synergistic effects between sleep disturbance and suicidal ideation, we tested multiplicative interaction (product terms in Cox models) and additive interaction using relative excess risk due to interaction (RERI), calculated as follows: hazard ratio (HR) (both) − HR (ideation only) − HR (sleep only) + 1, with bootstrapped confidence intervals (CIs) (1,000 replications). RERI >0 indicates positive additive interaction (synergy), with the attributable proportion representing the percentage of the combined effect due to interaction, and the synergy index >1 confirming synergistic rather than antagonistic effects. We developed a clinical risk score assigning points proportional to regression coefficients: 3 points for ideation frequency, 2 for sleep severity, and 1 for male sex. Discrimination was assessed using time-dependent area under the receiver operating characteristic curve (AUC).

Calibration was evaluated by comparing predicted versus observed probabilities across risk deciles. Kaplan-Meier survival analyses estimated time-to-event probabilities with 95% CIs. Log-rank tests compared survival distributions across risk strata. We evaluated the diagnostic performance of PHQ-9 item 9 by calculating sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for predicting suicide attempts, with 95% CIs using exact binomial methods. Post hoc power calculations used the Schoenfeld method for Cox regression. All tests were 2-sided with $\alpha = .05$. We report hazard ratios with 95% CIs. Missing baseline covariates (<5%) were handled using an ITT approach with N = 2,815 participants having complete baseline data on key variables, with multiple imputation (10 datasets) as sensitivity analysis.

RESULTS

Sample Description

The study comprised a total of 3,329 participants, with a mean age of 36.53 years (SD: 9.56) and an 85.97% female representation; however, 242 participants declined to participate. From the initial 3,087 at baseline, 1,935 were reassessed at 4 weeks, 1,648 at 12 weeks, and 1,360 at 24 weeks. Among these, 53 participants (1.59%) reported at least 1 suicide attempt during the follow-up period, with 72 total events: 24 at 4 weeks, 20 at 12 weeks, and 28 at 24 weeks. Regarding psychiatric hospitalizations, 66 participants (2.14%) were hospitalized with 28 events occurring at 4 weeks, 16 at 12 weeks, and 22 at 24 weeks. As there was more than 1 event for some individuals (11 participants had multiple suicide attempts), we had a total of 72 attempts and 73 hospitalizations during the follow-up. Table 1 illustrates the sample characteristics among sociodemographic variables in the suicide attempt and hospitalization groups.

Among the pathways mentioned above, 1,470 were directed to pathway 1 (4 attempters and 9 individuals were hospitalized in the SSI group, and 8 attempters and 15 individuals were hospitalized in the SSI-ET

group), 1,362 were directed to pathway 2 (14 attempters and 9 individuals were hospitalized in the SSI-ET group, 10 attempters and 14 individuals were hospitalized in the B-IPT group, and 10 attempters and 17 individuals were hospitalized in the B-CBT group), and 460 were referred to pathway 3, resulting in only 1 attempter and 2 individuals hospitalized. Among individuals scoring 1–2 on the PHQ-9 who were nonetheless referred by therapists and seen by a psychiatrist (n = 188), there were 8 suicide attempts (16% of all attempts; 4.3% of that subgroup). In comparison, among those scoring 1–2 on the PHQ-9 who were not referred or not seen by a psychiatrist (n = 2,549), there were 21 attempts (42% of all attempts; 0.82% of that subgroup). Among individuals scoring 3–4 on the PHQ-9 and referred directly to a psychiatrist prior to therapy (n = 265), 21 attempts occurred (42% of all attempts; 7.9% of that subgroup). By contrast, there were no attempts (0% of all attempts; 0% of that subgroup) among those who scored 3–4 on the PHQ-9 but declined to see the psychiatrist (n = 58).

From the initial 3,087 enrolled participants, 2,815 with complete baseline data on key variables comprised the ITT sample. In this ITT sample, 46 participants (1.63%) reported at least 1 suicide attempt, with 64 total events (22 at 4 weeks, 18 at 12 weeks, and 24 at 24 weeks), and 10 participants experienced multiple attempts. Balance diagnostics comparing participants with complete versus incomplete follow-up at the end of 24 weeks revealed minimal systematic differences. Standardized differences for all 16 baseline covariates ranged from 0.002 to 0.317 before weighting, with only age (0.317) and severe anxiety (0.161) exceeding the 0.1 threshold. After IPW, all standardized differences fell below 0.1 (range: 0.001–0.095), confirming successful bias reduction.

Cox Proportional Hazards Models

Table 2 presents the Cox model output for suicide attempts. In univariate analysis, nearly every day suicidal ideation showed the highest risk (HR = 24.32, 95% CI, 12.93–45.74, $P < .001$), with clear dose-response: more than half of the days (HR = 3.83, 95% CI, 1.37–10.70, $P = .010$) and several days (HR = 1.96, 95% CI, 1.04–3.69, $P = .037$). Severe depression (HR = 5.01, 95% CI, 2.70–9.32, $P < .001$), severe anxiety (HR = 3.33, 95% CI, 1.72–6.44, $P < .001$), and severe irritability (HR = 2.72, 95% CI, 1.48–5.01, $P = .001$) were significant predictors. Sleep problems showed increasing risk with severity: moderate (HR = 2.01, 95% CI, 1.11–3.61, $P = .020$) and severe (HR = 3.63, 95% CI, 1.75–7.54, $P < .001$). Life satisfaction appeared protective (HR = 0.88, 95% CI, 0.83–0.93, $P < .001$), while burnout showed a modest association (HR = 1.04, 95% CI, 1.01–1.07, $P = .013$). The SSI-ET treatment group also appeared as a risk factor (HR = 2.38, 95% CI, 1.26–4.46, $P = .01$).

Table 1.

Sociodemographic and Clinical Variables in Suicide Attempts and Hospitalization Compared With Controls[a]

	Suicide attempt		Hospitalization	
	Yes	No	Yes	No
Female gender	76.6%	86.1%	82.8%	85.9%
Age, mean (SD), y	36.4 (9.5)	38.6 (9.8)	37.0 (9.2)	38.6 (9.8)
Workplace				
Primary care	21.3%	30.0%	17.2%	30.4%
Hospital settings	14.9%	23.7%	7.8%	24.3%
Other health care settings	23.4%	27.7%	28.1%	27.3%
Missing	40.4%	18.6%	46.9%	18.0%
Professional category				
Nursing (all levels)	23.4%	32.3%	23.4%	32.2%
Medical/allied health[b]	14.9%	24.5%	15.6%	24.9%
Community health workers	4.3%	7.0%	4.7%	7.0%
Administrative/support	8.5%	8.9%	4.7%	9.0%
Education/students	6.4%	14.6%	10.9%	14.4%
Other	10.6%	4.9%	9.4%	4.9%
Missing	31.9%	7.8%	31.3%	7.6%
Intervention group				
Treatment arms (B-CBT/B-IPT)	42.6%	37.5%	48.4%	37.1%
Prevention arms (SSI/SSI-ET)	25.5%	49.0%	29.7%	48.7%
SSI-ET treatment	29.8%	13.7%	14.1%	14.2%
Psychiatrist only	2.1%	8.1%	3.1%	8.0%
Missing	0.0%	1.8%	4.7%	1.9%

[a]Number of participants: total: 3,328; attempted: 47; hospitalized: 66.
[b]Medical/allied health includes physicians, psychologists, dentists, pharmacists, physiotherapists, nutritionists, social workers, and other health care professionals.
Abbreviations: B-CBT = brief cognitive behavioral therapy, B-IPT = brief interpersonal therapy, SSI = single-session intervention, SSI-ET = single-session intervention with enhanced psychoeducation.

In the multivariable model, nearly every day ideation remained strongest (HR = 39.58, 95% CI, 14.03–111.64, $P < .001$), followed by more than half of the days (HR = 7.67, 95% CI, 2.32–25.35, $P < .001$) and several days (HR = 3.17, 95% CI, 1.42–7.07, $P = .005$). Sleep problems demonstrated independent associations: severe (HR = 17.39, 95% CI, 2.05–147.46, $P = .009$), moderate (HR = 12.10, 95% CI, 1.55–94.24, $P = .017$), and mild (HR = 9.96, 95% CI, 1.23–80.43, $P = .031$). Male sex was associated with a higher risk (HR = 2.08, 95% CI, 1.01–4.26, $P = .046$). However, depression, anxiety, irritability, burnout, and life satisfaction lost significance after adjustment. The model C-statistic was 0.847.

Sensitivity analyses using IPW confirmed the robustness of the results despite a 56% attrition rate. Nearly every day ideation remained strongly associated (IPW-adjusted HR = 28.63, 95% CI, 7.62–107.49, $P < .001$), although attenuated compared to unweighted estimates. Male sex showed a stronger association in IPW models (HR = 2.71, 95% CI, 1.27–5.76, $P = .010$).

Table 2.

Univariate and Multiple Models Assessing Baseline Variables Related to New Suicide Attempts

	Univariate model[a] HR (95% CI)	Multiple model[b] HR (95% CI)	IPW model[b] HR (95% CI)
Demographic			
Sex (male)	1.77 (0.88–3.58)	2.08 (1.01–4.26)*	2.71 (1.27–5.76)**
PROMIS depression (ref. none to mild)			
Moderate depression	1.27 (0.70–2.30)	2.03 (0.59–7.01)	2.28 (0.52–9.89)
Severe depression	5.01 (2.70–9.32)***	1.11 (0.23–5.27)	1.76 (0.25–12.29)
PROMIS anxiety (ref. none to mild)			
Moderate anxiety	0.37 (0.19–0.72)**	0.44 (0.05–4.07)	0.54 (0.04–7.04)
Severe anxiety	3.33 (1.72–6.44)***	0.38 (0.03–4.39)	0.45 (0.02–9.96)
PROMIS irritability (ref. none to mild)			
Moderate irritability	0.90 (0.50–1.63)	0.79 (0.34–1.81)	0.76 (0.31–1.85)
Severe irritability	2.72 (1.48–5.01)**	0.80 (0.30–2.13)	0.71 (0.26–1.96)
PROMIS sleep (ref. no problems)			
Mild sleep problems	0.71 (0.35–1.43)	9.96 (1.23–80.43)*	8.39 (0.92–76.92)
Moderate sleep problems	2.01 (1.11–3.61)*	12.10 (1.55–94.24)*	9.63 (1.03–89.69)*
Severe sleep problems	3.63 (1.75–7.54)***	17.39 (2.05–147.46)**	14.83 (1.52–144.62)*
Suicidal ideation (ref. no ideation)			
Several days	1.96 (1.04–3.69)*	3.17 (1.42–7.07)**	3.01 (1.21–7.49)*
More than half of the days	3.83 (1.37–10.70)*	7.67 (2.32–25.35)***	6.13 (1.75–21.45)**
Nearly every day	24.32 (12.93–45.74)***	39.58 (14.03–111.64)***	28.63 (7.62–107.49)***
Burnout and life satisfaction			
Life satisfaction score	0.88 (0.83–0.93)***	0.96 (0.90–1.03)	0.96 (0.89–1.04)
Burnout score			
Covariates	1.04 (1.01–1.07)*	0.98 (0.94–1.02)	0.97 (0.92–1.01)
IG B-CBT			
IG SSI-ET (prevention)	1.49 (0.74–3.00)	2.34 (0.54–10.20)	2.97 (0.67–13.07)
IG SSI-ET (treatment)	0.61 (0.28–1.30)	1.82 (0.54–6.14)	2.01 (0.57–7.08)
IG B-IPT	2.38 (1.26–4.46)**	3.61 (0.86–15.10)	3.14 (0.68–14.53)

[a]n = 2,828.
[b]n = 2,815.
*P < .05; **P < .01; ***P < .001.
Abbreviations: B-CBT = brief cognitive behavioral therapy, B-IPT = brief interpersonal therapy, HR = hazard ratio, IG = intervention group, IPW = inverse probability weighting, PROMIS = Patient-Reported Outcomes Measurement Information System, SSI-ET = single-session intervention with enhanced psychoeducation.

Sleep problems maintained significance, with severe (HR = 14.83, 95% CI, 1.52–144.62, P = .020) and moderate (HR = 9.63, 95% CI, 1.03–89.69, P = .047) levels. The IPW model C-statistic (0.832) remained comparable.

For psychiatric hospitalizations (Table 3), univariate analyses identified nearly every day ideation (HR = 9.88, 95% CI, 5.01–19.48, P < .001) as the strongest predictor. Severe depression (HR = 3.02, 95% CI, 1.66–5.49, P < .001), severe anxiety (HR = 2.09, 95% CI, 1.24–3.53, P = .006), and severe sleep (HR = 2.55, 95% CI, 1.25–5.17, P = .009) were also significant. Life satisfaction was protective (HR = 0.92, 95% CI, 0.88–0.96, P < .001). In multivariable models, only nearly every day ideation retained significance (HR = 8.11, 95% CI, 3.10–21.18, P < .001). All other predictors, including depression, anxiety, sleep, and life satisfaction, lost significance after adjustment. IPW analyses confirmed this finding with slight attenuation (HR = 7.80, 95% CI, 2.60–23.35, P < .001). Model C-statistics were 0.714 (unweighted) and 0.701 (IPW).

Post hoc power analysis demonstrated that the study was well powered for primary outcomes. For suicide attempts, power exceeded 0.999 for detecting the observed effect of nearly every day ideation (HR = 39.58) and severe sleep disturbances (HR = 17.39), while power for male sex was marginal (0.996, HR = 2.08). For psychiatric hospitalizations, power was excellent for nearly every day ideation (1.00, HR = 8.11) but insufficient for severe sleep disturbances (0.956, HR = 2.55). The interaction term analysis showed

Table 3.

Univariate and Multiple Models Assessing Baseline Variables Related to New Hospitalizations

	Univariate model[a]	Multiple model[b]	IPW model[b]
	HR (95% CI)	HR (95% CI)	HR (95% CI)
Demographic			
Sex (male)	0.82 (0.37–1.80)	0.89 (0.40–1.97)	1.06 (0.46–2.46)
PROMIS depression (ref. none to mild)			
Moderate depression	1.31 (0.78–2.18)	1.56 (0.71–3.40)	1.58 (0.72–3.45)
Severe depression	3.02 (1.66–5.49)***	1.47 (0.47–4.66)	1.68 (0.49–5.83)
PROMIS anxiety (ref. none to mild)			
Moderate anxiety	0.61 (0.36–1.04)	2.48 (0.31–19.52)	3.31 (0.42–25.90)
Severe anxiety	2.09 (1.24–3.53)**	3.29 (0.34–31.63)	4.73 (0.57–38.96)
PROMIS irritability (ref. none to mild)			
Moderate irritability	1.24 (0.75–2.05)	1.06 (0.55–2.03)	1.09 (0.53–2.22)
Severe irritability	1.49 (0.82–2.71)	0.75 (0.31–1.78)	0.72 (0.29–1.77)
PROMIS sleep (ref. no problems)			
Mild sleep problems	0.76 (0.42–1.38)	0.93 (0.42–2.09)	0.83 (0.36–1.92)
Moderate sleep problems	1.22 (0.73–2.04)	0.99 (0.47–2.11)	0.82 (0.37–1.85)
Severe sleep problems	2.55 (1.25–5.17)**	1.64 (0.63–4.30)	1.55 (0.61–3.98)
Suicidal ideation (ref. no Ideation)			
Several days	1.58 (0.89–2.80)	1.47 (0.77–2.82)	1.51 (0.78–2.93)
More than half the days	1.33 (0.33–5.46)	1.21 (0.27–5.38)	1.01 (0.20–5.03)
Nearly every day	9.88 (5.01–19.48)***	8.11 (3.10–21.18)***	7.80 (2.60–23.35)***
Burnout and life satisfaction			
Life satisfaction score	0.92 (0.88–0.96)***	0.97 (0.92–1.02)	0.97 (0.93–1.02)
Burnout score			
Covariates	1.02 (0.99–1.05)	0.99 (0.96–1.02)	0.98 (0.94–1.02)
IG B-CBT			
IG SSI-ET (prevention)	1.73 (0.97–3.11)	1.49 (0.45–4.98)	1.81 (0.75–4.37)
IG SSI-ET (treatment)	0.86 (0.47–1.56)	1.64 (0.69–3.92)	1.96 (0.80–4.81)
IG B-IPT	0.92 (0.45–1.87)	0.95 (0.26–3.40)	0.92 (0.34–2.45)

[a]n = 2,828.
[b]n = 2,815.
**P < .01; ***P < .001.
Abbreviations: B-CBT = brief cognitive behavioral therapy, B-IPT = brief interpersonal therapy, HR = hazard ratio, IG = intervention group, IPW = inverse probability weighting, PROMIS = Patient-Reported Outcomes Measurement Information System, SSI-ET = single-session intervention with enhanced psychoeducation.
95 probability weighting.

limited power (0.779), suggesting that larger samples would be needed to fully characterize synergistic effects.

Interaction and Risk Stratification

Testing for multiplicative interaction between sleep and ideation was nonsignificant ($\chi^2 = 11.34$, $P = .253$). However, additive interaction analysis revealed substantial synergy. Among 2,708 participants analyzed, 2,486 (91.8%) had neither severe sleep nor nearly every day ideation (26 events, 1.0% rate), 45 (1.7%) had ideation only (10 events, 22.2% rate), 165 (6.1%) had severe sleep only (5 events, 3.0% rate), and 12 (0.4%) had both (4 events, 33.3% rate). The RERI was 11.51, with an attributable proportion of 0.40, indicating 40% of the combined effect due to synergy. The synergy index of 1.66 confirmed the presence of synergistic effects.

Kaplan-Meier analyses revealed marked differences in 24-week attempt-free survival: 98.8% for neither risk factor, 87.7% for severe sleep alone, 57.7% for nearly every day ideation alone, and 42.9% for both combined. This translates to 24-week attempt probabilities of 1.2%, 12.3%, 42.3%, and 57.1%, respectively (log-rank $P < .001$).

PHQ-9 Item 9—Diagnostic Performance

Among the 46 participants attempting suicide in the ITT sample, baseline suicidal ideation frequency (PHQ-9 item 9) was distributed as follows: 13 (28.3%) reported "not at all," 14 (30.4%) "several days," 4 (8.7%) "more than half the days," and 15 (32.6%) "nearly every day." Using a cutoff of ideation on "several days" or more frequently (PHQ-9 item 9 ≥2) to define the presence of clinically significant suicidal ideation, diagnostic performance showed sensitivity of 71.7%, specificity of 77.8%, PPV of 12.9%, and NPV of 98.3%. The clinical risk score combining ideation, sleep, and sex achieved AUC = 0.83 (95% CI, 0.77–0.89), with clear risk stratification: low (0–2 points): 0.8% attempt rate; moderate (3–5): 4.2%; high (6–8): 18.7%; and very high (≥9): 45.3%.

Kaplan-Meier Survival Analyses

Over a 24-week period, the highest risk for a suicide attempt was observed among those with nearly every day suicidal ideation (42.31%, 95% CI, 19.82%–58.49%), while those with no ideation had a significantly lower risk (1.13%, 95% CI, 0.39%–1.86%). A clear gradient emerged, with increasing ideation frequency corresponding to higher suicide attempt risk. Severe sleep disturbances were also associated with an increased risk (12.24%, 95% CI, 2.57%–20.96%) compared to those with minimal sleep issues (0.26%, 95% CI, 0.00%–0.77%). Risk probabilities varied across stratifications. The interaction between suicidal ideation and sleep problems shows the importance of both factors. Individuals with low sleep problems and non–every day ideation had a suicide attempt risk of 0.82% (95% CI, 0.25%–1.38%) at 24 weeks. However, the combination of nearly every day ideation and severe sleep problems further increased risk to 57.14% (95% CI, 0.00%–81.78%), indicating a dramatically higher likelihood of an attempt.

Even though not associated with sleep problems, similar patterns of the importance of suicidal ideation were observed for psychiatric hospitalizations. At 24 weeks, risk for hospitalization was highest among individuals with nearly every day ideation (30.77%, 95% CI, 10.55%–46.42%) and lowest among those without ideation (2.76%, 95% CI, 1.61%–3.89%). Figures 1 and 2 present the most important findings.

DISCUSSION

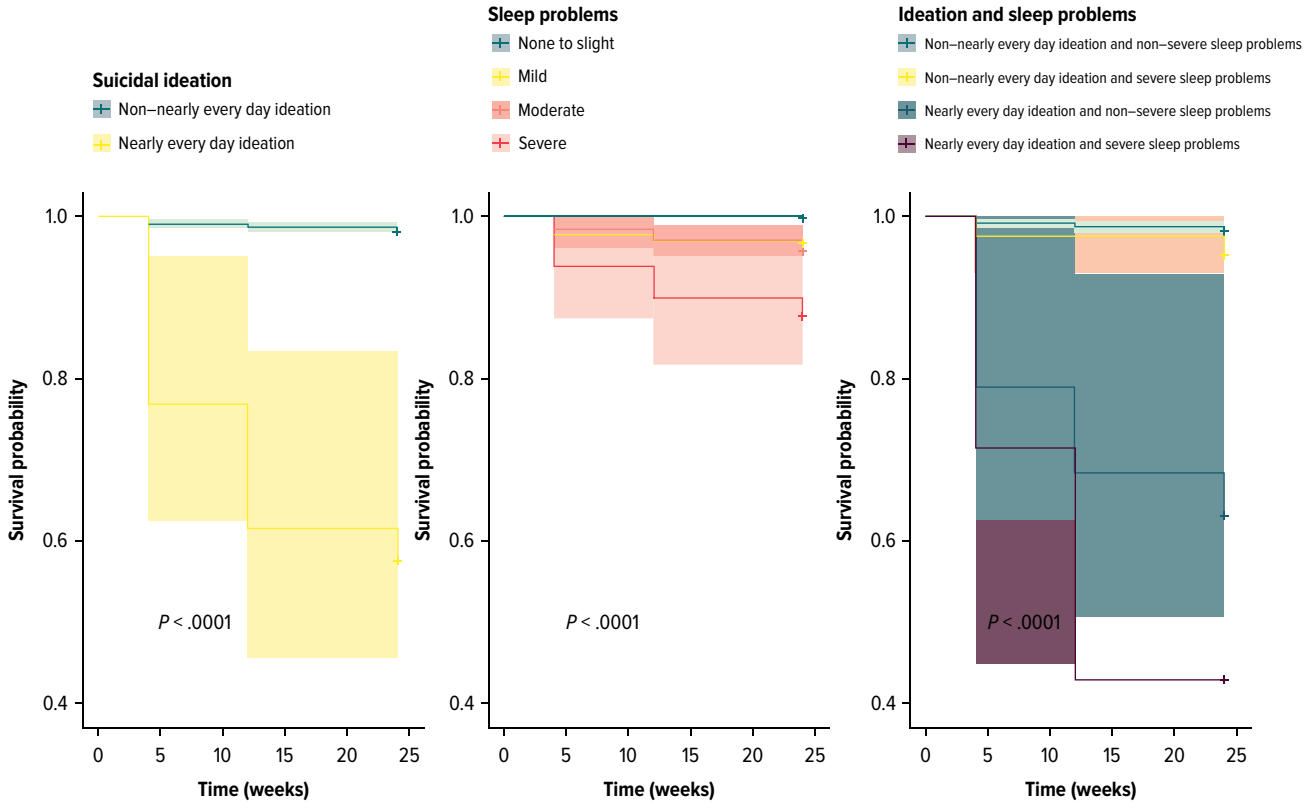
This study presents new insights into the longitudinal factors associated with suicide attempts and hospitalizations among health care professionals facing various mental health challenges exacerbated by the COVID-19 pandemic. First, we found that suicidal ideation was most strongly associated with suicide attempts and hospitalizations, surpassing any other predictors and accounting for most of the shared variance with other clinical and demographic factors. Second, we discovered that for suicide attempts, sleep problems were significantly associated with this outcome independently of suicidal ideation. Finally, we identified a high-risk group combining both suicidal ideation and sleep problems, resulting in a risk exceeding 50%; these individuals need urgent preventive intervention measures.

Suicidal ideation at baseline, as evaluated through the ninth item of the PHQ-9 assessment, emerged as the factor most significantly associated with suicide attempts and psychiatric hospitalizations within this study. This assessment encompasses both passive ideation (eg, thoughts of death) and active ideation (eg, thoughts of self-harm). Research has produced inconclusive results concerning the utility of items associated with suicidal ideation in predicting future suicidal behaviors. Although certain studies emphasize the robust psychometric characteristics of the ninth question of the PHQ-9 for suicide risk screening,[13,19] others do not confirm this finding,[20,21] highlighting the modest sensitivity and low PPV.[22] A research study involving 447,245 PHQ-9 assessments conducted within the Veterans Health Administration revealed that responses indicating suicidal ideation on item 9 considerably elevated the risk of suicide mortality. Nevertheless, 71.6% of suicides transpired among patients who replied "not at all" to item 9 in their most recent assessment.[23] In our ITT sample, 28.3% of attempts occurred without baseline ideation, lower than the VA findings but still representing nearly one-third of at-risk individuals. This highlights the importance of context for administering screening measures. Our study shows that in a sample of acutely distressed professionals seeking support for emotional distress, this item demonstrated a strong association with those who attempted suicide in the sample. Moreover, beyond the aim of this study but important for clinicians, we suggest that when identifying suicide ideation, specific interventions to minimize suicide risk should be instituted, such as crisis response planning,[24] cognitive behavioral therapy for suicide prevention,[25,26] or promising drugs such as ketamine,[27] instead of interventions focused only on depressive symptoms, which can be introduced after the initial crisis.

Baseline disturbances in sleep have been identified as one of the factors most significantly associated with suicide attempts, thereby reinforcing the well-established correlation between sleep-related issues and suicide risk.[28–30] Insomnia and nightmares incur considerable detriment as they disrupt emotional regulation, heighten impulsivity, impair cognitive functioning, and intensify suicide ideation, thus constructing a direct pathway to suicide risk.[31–35] It has been consistently demonstrated, irrespective of age[36] and in different psychiatric diagnoses.[37] Along with insomnia, the presence of nightmares, parasomnias, and sleep-related breathing disorders demonstrated an increased likelihood of multiple suicide attempts, irrespective of the presence of other mental health symptoms, such as depression and posttraumatic stress disorder.[28,37,38] Furthermore, depression does not appear to moderate the relationship between sleep disturbances and suicidality.[29] Sleep deprivation adversely affects neural circuits associated with emotional processing, including the prefrontal cortex and amygdala, which are crucial for regulating impulsivity and sustaining mood stability.[39,40] Given that sleep represents a modifiable risk factor, the early identification and management of sleep deprivation should be prioritized, particularly for health care

Figure 1.

Kaplan-Meier Plots of Survival Analyses of New Suicide Attempts Across 24 Weeks[a]



[a]Shaded areas represent 95% confidence intervals.

professionals who frequently contend with chronic sleep deficiency due to extended working hours, nocturnal shifts, and the considerable stress intrinsic to their roles. Our novel finding of synergistic interaction between sleep and ideation (RERI = 11.51), indicating that 40% of combined risk stems from interaction rather than additive effects, suggests that integrated interventions addressing both domains simultaneously may be more effective than targeting either alone.

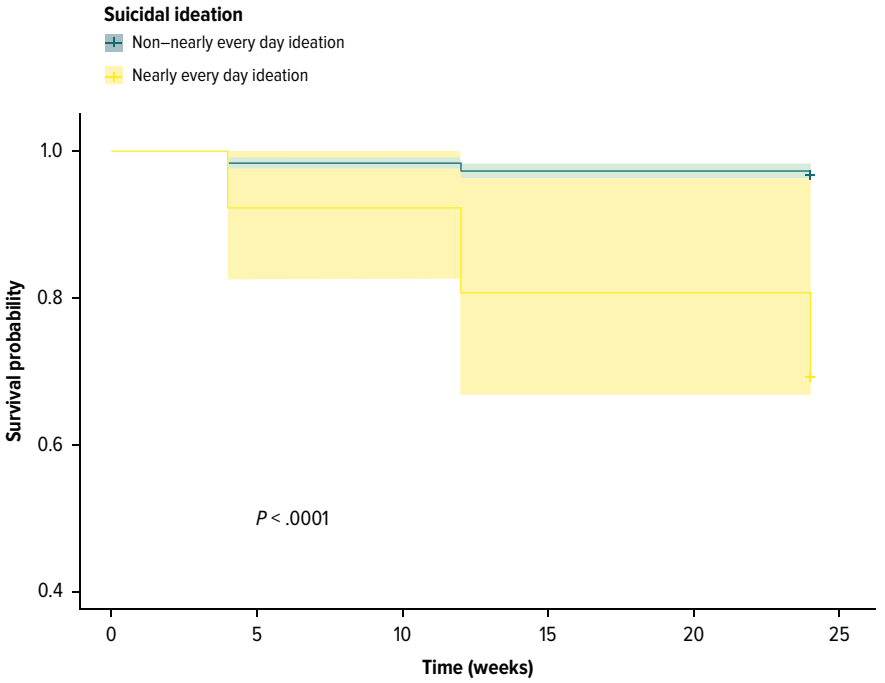
Notwithstanding, the male sex was significantly associated with suicide attempts. This finding contradicts global data suggesting that the male sex is associated with a lower risk of suicide attempts despite being associated with a higher risk of suicide deaths.[41,42] The association with male sex contradicts epidemiological patterns but may reflect selection effects among help-seeking males or pandemic-specific occupational stressors. Given borderline significance ($P = .046$), replication is warranted before influencing clinical practice. This discrepancy may also be attributed to specific population characteristics, sociocultural factors, or the influence of other risk variables such as impulsivity and psychiatric comorbidities.[43]

Critical evaluation of PHQ-9 item 9 reveals significant limitations for suicide prevention. Despite strong associations (HR = 39.58), the tool's clinical utility is constrained by low PPV (12.9% in our ITT sample), meaning that 87% of those with daily ideation did not attempt suicide within 24 weeks. Our diagnostic performance (sensitivity 71.7%, specificity 77.8%, PPV 12.9%, NPV 98.3%) aligns with validation studies against the Columbia-Suicide Severity Rating Scale, which reported sensitivity of 87.6% but PPV of only 28.6%.[20] The discrepancy in sensitivity may reflect our acutely distressed help-seeking sample versus routine screening populations. This poor specificity generates a substantial false-positive burden on mental health systems while missing a significant portion of at-risk individuals. The tool's value lies primarily in its NPV (98.3%), supporting its use for ruling out rather than ruling in risk. These findings underscore that PHQ-9 item 9 cannot serve as a standalone decision tool and must be supplemented with a comprehensive assessment incorporating multiple risk domains.

Despite its merits, this study has several limitations. First, the reliance on self-reported measures may introduce potential biases, including underreporting due to stigma or recall errors. Second, the study's observational nature limits the ability to draw causal inferences about the relationships between baseline predictors and adverse

Figure 2.

Kaplan-Meier Plots of Survival Analyses of New Hospitalizations Across 24 Weeks[a]



[a]Shaded areas represent 95% confidence intervals.

outcomes. Third, the lack of objective measures, such as polysomnography or actigraphy for assessing sleep, weakens the robustness of the findings related to sleep disturbances. Fourth, while the sample is large and diverse, it consists solely of health care professionals in Brazil, which may limit the applicability of the findings to other populations or cultural contexts. Fifth, important unmeasured confounders include prior suicide attempts (the strongest established predictor), trauma history (influencing both sleep and suicidal behavior), and substance use disorders. These omissions may result in residual confounding and limit complete risk characterization. Sixth, time-varying covariates were not modeled, as our focus was on baseline prediction for initial triage rather than dynamic risk monitoring. Seventh, 56% of the sample was lost during follow-up, and we cannot exclude that losses were due to suicide or psychiatric hospitalizations, although IPW analyses showed robust results with all standardized differences <0.1 after weighting, and key associations remained significant in both weighted and unweighted models.

This study underscores the significance of sleep disturbances and suicidal ideation as critical factors associated with suicide attempts. In contrast, nearly every day ideation was the primary factor related to psychiatric hospitalizations among health care professionals. The findings highlight a high-risk demographic characterized by both suicidal ideation and significant sleep issues, emphasizing the necessity for integrated interventions aimed at addressing these factors. The risk stratification observed in our study—with attempt probabilities ranging from 1.2% to 57.1% based on combinations of ideation and sleep problems—provides empirical data that may inform resource allocation and monitoring intensity. The clinical risk score (AUC = 0.83) demonstrated good discrimination, although prospective validation is needed before implementation. Regular assessments of suicide risk, employing instruments such as the PHQ-9, are vital for the early identification and timely intervention of at-risk individuals. It is imperative to address these modifiable risk factors alongside broader initiatives aimed at reducing stigma and enhancing accessibility to mental health services, thereby promoting the mental well-being of health care professionals. Future research should prioritize objective evaluations of sleep and physical health while exploring interventions specifically tailored to the unique challenges faced by health care workers.

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References

1. Dutheil F, Aubert C, Pereira B, et al. Suicide among physicians and health-care workers: a systematic review and meta-analysis. *PloS One*. 2019;14(12):e0226361.
2. Olfson M, Cosgrove CM, Wall MM, et al. Suicide risks of health care workers in the US. *JAMA*. 2023;330(12):1161–1166.
3. Vizheh M, Qorbani M, Arzaghi SM, et al. The mental health of healthcare workers in the COVID-19 pandemic: a systematic review. *J Diabetes Metab Disord*. 2020; 19(2):1967–1978.
4. Søvold LE, Naslund JA, Kousoulis AA, et al. Prioritizing the mental health and well-being of healthcare workers: an urgent global public health priority. *Front Public Health*. 2021;9:679397.
5. Shanafelt TD, West CP, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life integration in physicians during the first 2 years of the COVID-19 pandemic. *Mayo Clin Proc*. 2022;97(12):2248–2258.
6. Liu RT, Steele SJ, Hamilton JL, et al. Sleep and suicide: a systematic review and meta-analysis of longitudinal studies. *Clin Psychol Rev*. 2020; 81:101895.
7. Huang J, Huang ZT, Sun XC, et al. Mental health status and related factors influencing healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *PLoS One*. 2024;19(1):e0289454.
8. Salum GA, de Abreu Costa M, Spanemberg L, et al. Brief remote psychological treatments for healthcare workers with emotional distress during the SARS-CoV-2 pandemic: a randomized clinical trial. *medRxiv*. 2024: 2024.2009.2004.24313084.
9. Salum GA, Spanemberg L, Costa MA, et al. Single-session intervention with and without video support to prevent the worsening of emotional distress among healthcare workers during the SARS-CoV-2 pandemic: a randomized clinical trial. *medRxiv*. 2024:2024.2009.2004.24313087.
10. Salum GA, Spanemberg L, Hartmann de Souza L, et al. Letter to the editor: training mental health professionals to provide support in brief telepsychotherapy and telepsychiatry for health workers in the SARS-CoV-2 pandemic. *J Psychiatr Res*. 2020;131:269–270.
11. Schalet BD, Pilkonis PA, Yu L, et al. Clinical validity of PROMIS Depression, Anxiety, and Anger across diverse clinical samples. *J Clin Epidemiol*. 2016;73:119–127.
12. Damiano RF, Hoffmann MS, Gosmann NP, et al. Translating measurement into practice: Brazilian norms for depressive symptom assessment with the Patient Health Questionnaire (PHQ-9). *Braz J Psychiatry*. 2023;45(4):310–317.
13. Rossom RC, Coleman KJ, Ahmedani BK, et al. Suicidal ideation reported on the PHQ9 and risk of suicidal behavior across age groups. *J Affect Disord*. 2017;215: 77–84.
14. Sinval J, Vazquez ACS, Hutz CS, et al. Burnout Assessment Tool (BAT): validity evidence from Brazil and Portugal. *Int J Environ Res Public Health*. 2022;19(3): 1344.
15. Yu L, Buysse DJ, Germain A, et al. Development of short forms from the PROMIS™ sleep disturbance and sleep-related impairment item banks. *Behav Sleep Med*. 2011;10(1):6–24.
16. Diener E, Emmons RA, Larsen RJ, et al. The Satisfaction With Life Scale. *J Pers Assess*. 1985;49(1):71–75.
17. Pavot W, Diener E. Review of the Satisfaction With Life Scale. *Psychol Assess*. 1993;5(2):164–172.
18. Austin PC. Balance diagnostics for comparing the distribution of baseline covariates between treatment groups in propensity-score matched samples. *Stat Med*. 2009;28(25):3083–3107.
19. Simon GE, Rutter CM, Peterson D, et al. Does response on the PHQ-9 Depression Questionnaire predict subsequent suicide attempt or suicide death? *Psychiatr Serv*. 2013;64(12):1195–1202.
20. Na PJ, Yaramala SR, Kim JA, et al. The PHQ-9 Item 9 based screening for suicide risk: a validation study of the Patient Health Questionnaire (PHQ)-9 Item 9 with the Columbia Suicide Severity Rating Scale (C-SSRS). *J Affect Disord*. 2018;232: 34–40.
21. Chung TH, Hanley K, Le Y-C, et al. A validation study of PHQ-9 suicide item with the Columbia Suicide Severity Rating Scale in outpatients with mood disorders at National Network of Depression Centers. *J Affect Disord*. 2023; 320:590–594.
22. McHugh CM, Corderoy A, Ryan CJ, et al. Association between suicidal ideation and suicide: meta-analyses of odds ratios, sensitivity, specificity and positive predictive value. *BJPsych Open*. 2019;5(2):e18.
23. Louzon SA, Bossarte R, McCarthy JF, et al. Does suicidal ideation as measured by the PHQ-9 predict suicide among VA patients? *Psychiatr Serv*. 2016;67(5): 517–522.
24. Bryan CJ, Mintz J, Clemans TA, et al. Effect of crisis response planning vs. contracts for safety on suicide risk in U.S. Army Soldiers: a randomized clinical trial. *J Affect Disord*. 2017;212:64–72.
25. Baker JC, Starkey A, Ammendola E, et al. Telehealth brief cognitive behavioral therapy for suicide prevention: a randomized clinical trial. *JAMA Netw Open*. 2024; 7(11):e2445913–e2445913.
26. Rudd MD, Bryan CJ, Wertenberger EG, et al. Brief cognitive-behavioral therapy effects on post-treatment suicide attempts in a military sample: results of a randomized clinical trial with 2-year follow-up. *Am J Psychiatry*. 2015;172(5): 441–449.
27. Shen Z, Gao D, Lv X, et al. A meta-analysis of the effects of ketamine on suicidal ideation in depression patients. *Transl Psychiatry*. 2024;14(1):248.
28. Harris LM, Huang X, Linthicum KP, et al. Sleep disturbances as risk factors for suicidal thoughts and behaviours: a meta-analysis of longitudinal studies. *Sci Rep*. 2020;10(1):13888.
29. Pigeon WR, Pinquart M, Conner K. Meta-analysis of sleep disturbance and suicidal thoughts and behaviors. *J Clin Psychiatry*. 2012;73(9):e1160–e1167.
30. Yamada K, Kaneko Y, Konno C, et al. Associations between nonrestorative sleep and suicidal ideation: a Japanese general population survey. *Sci Rep*. 2025;15(1): 4582.
31. Jang J, Lee G, Seo J, et al. Suicidal attempts, insomnia, and major depressive disorder among family members of suicide victims in South Korea. *J Affect Disord*. 2020;272:423–431.
32. Bernert RA, Joiner TE. Sleep disturbances and suicide risk: a review of the literature. *Neuropsychiatr Dis Treat*. 2007;3(6):735–743.
33. Bernert RA, Kim JS, Iwata NG, et al. Sleep disturbances as an evidence-based suicide risk factor. *Curr Psychiatry Rep*. 2015;17(3):554.
34. Li SX, Lam SP, Yu MW, et al. Nocturnal sleep disturbances as a predictor of suicide attempts among psychiatric outpatients: a clinical, epidemiologic, prospective study. *J Clin Psychiatry*. 2010;71(11):1440–1446.
35. Sjöström N, Waern M, Hetta J. Nightmares and sleep disturbances in relation to suicidality in suicide attempters. *Sleep*. 2007;30(1):91–95.
36. Liu J-W, Tu Y-K, Lai Y-F, et al. Associations between sleep disturbances and suicidal ideation, plans, and attempts in adolescents: a systematic review and meta-analysis. *Sleep*. 2019;42(6):zsz054.
37. Malik S, Kanwar A, Sim LA, et al. The association between sleep disturbances and suicidal behaviors in patients with psychiatric diagnoses: a systematic review and meta-analysis. *Syst Rev*. 2014;3:18.
38. Speed KJ, Drapeau CW, Nadorff MR. Differentiating single and multiple suicide attempters: what nightmares can tell us that other predictors cannot. *J Clin Sleep Med*. 2018;14(5):829–834.
39. Goldstein AN, Walker MP. The role of sleep in emotional brain function. *Annu Rev Clin Psychol*. 2014;10:679–708.
40. Krause AJ, Simon EB, Mander BA, et al. The sleep-deprived human brain. *Nat Rev Neurosci*. 2017;18(7):404–418.
41. World Health Organization. *Global Health Observatory (GHO) Data: Suicide Rates*. World Health Organization; 2016.
42. Bachmann S. Epidemiology of suicide and the psychiatric perspective. *Int J Environ Res Public Health*. 2018;15(7):1425.
43. Bennett S, Robb KA, Zortea TC, et al. Male suicide risk and recovery factors: a systematic review and qualitative metasynthesis of two decades of research. *Psychol Bull*. 2023;149(7–8):371–417.