Consequences of the COVID-19 pandemic on the mental health and work ability of healthcare workers as well as risk and protective factors for mental health – protocol for a living systematic review

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BRIEF SUMMARY

This protocol for a living systematic review is elaborated in view of the current SARS-CoV-2 pandemic. The ongoing pandemic is causing a worldwide burden on the community at large through measures such as testing, tracing, self-isolation, and quarantine measures as well as broader population measures ranging from travel bans, school closures, assembly restrictions, curfews, to full lockdowns. Substantial stressors vary from those for individuals (e.g., social distancing) to socio-economic consequences for the affected countries (e.g., global supply chain disruptions) and overtaxed healthcare systems (e.g., disruption of essential health services). Given the work-related stressors in the context of disease outbreaks (e.g., high workload, risk of infection, triage decisions), healthcare workers may suffer from a particularly high burden. The acute and chronic stress exposure during the pandemic may have a negative short- and long-

term impact on the individual mental health of healthcare professionals (e.g., general psychological distress, increase in psychological symptoms such as anxiety or depressive symptoms). This, in turn, can negatively affect their individual work performance and work ability (e.g., absence from work, job satisfaction), the performance of the healthcare system and the quality of patient care (e.g., absenteeism and resulting staff shortages, medical mistakes made by stressed healthcare staff in stressful situations). Furthermore, overloading the healthcare system might (especially in the short-term) jeopardize a favorable progress in dealing with the current pandemic, resulting in a poorer management of the number of COVID-19 patients in intensive care units and/or more COVID-19 related deaths.
Therefore, we intend to conduct a regularly updated living synthesis to identify and summarize the available literature on the impact of the SARS-CoV-2 pandemic on the mental health and work ability in healthcare workers as well as possible (demographic, psychosocial etc.) risk and protective factors for mental health. The identification of these data may inform researchers and policy makers and might be used to develop official recommendations and psychosocial interventions. The living systematic review will be updated every two months within the duration of the project **CEOsys** (https://www.covid-evidenz.de; https://www.ceosys.de) until March 31, 2020. CEOsys ("Establishment of a COVID-19 evidence ecosystem to improve knowledge management and knowledge translation") is part of the national network of academic medical research into COVID-19, Germany (Nationales Netzwerk Universitätsmedizin, NUM). Any potential changes concerning the update frequency will be subsequently added to this protocol.

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AIM

To assess the consequences of the SARS-CoV-2 pandemic on the mental health and work ability in healthcare workers. To identify risk and protective factors for mental health in this population.

METHODS

PARTICIPANTS/POPULATION

- **Inclusion:** healthcare workers, for example:
  - physicians (irrespective of medical specialty);
  - nursing staff;
  - ambulance personnel, paramedics;
  - allied healthcare professionals*, such as
    - social care professionals or social workers*;
    - psychologists*;
    - any kind of therapists (e.g., physiotherapists, occupational therapists, psychotherapists etc.)*;
  - hospital staff* (e.g., medical-technical staff in laboratories, radiology, pharmacy; cleaning staff; service staff; administrative staff, pastoral/spiritual care staff in hospitals* etc.);
  - healthcare students (e.g., medical students and other fields)*

**** with direct patient contact, contact to patient environment or contact to contaminated material***

- If any of the above-mentioned groups is investigated, the study will be included irrespective of country, age, sex, working experience, health status, or whether the healthcare workers were directly involved in the care of patients with COVID-19 (i.e., healthcare workers do not necessarily have to be "frontline healthcare workers").

- **Exclusion:**
  - other target groups (e.g., general population, patients);
  - allied healthcare professionals, hospital staff or healthcare students not meeting the criterion of direct patient contact, contact to patient environment or contact to contaminated material

INTERVENTION(S), EXPOSURE(S)

- **Inclusion:**
  - exposure to SARS-CoV-2 pandemic (i.e., survey period after the first officially registered SARS-CoV-2 case in the respective country based on national infection dates published by the World Health Organization [WHO][1]);
  - irrespective of medical care for COVID-19 patients (i.e., level of contact)
- **Exclusion:**
  - exposure to other epidemic or pandemic infectious disease outbreaks (e.g., Severe Acute Respiratory Syndrome Coronavirus-1 [SARS-CoV-1], Middle East respiratory syndrome-related Coronavirus [MERS-CoV], Ebola, Human Immunodeficiency Virus [HIV], influenza);
  - chronic infectious diseases (e.g., HIV/Acquired Immune Deficiency Syndrome [AIDS], tuberculosis, hepatitis B and C, malaria)

COMPARATOR(S)/ CONTROL

- **Inclusion:**
  - no exposure to SARS-CoV-2 pandemic (i.e., before first officially registered SARS-CoV-2 case in the respective country based on national infection dates published by the WHO[1])
- **Exclusion:**
  - exposure to any other pandemics, epidemics or other macrostressors (e.g., natural disasters)

TYPES OF STUDIES TO BE INCLUDED

- **Inclusion:**
  a) For the consequences on mental health and/or work ability:
    - quantitative within-person longitudinal survey studies measuring mental health and/or work ability before and after the pandemic outbreak (i.e., first officially registered SARS-CoV-2 case in respective country[1]) in the same individuals;
    - quantitative longitudinal survey studies measuring mental health and/or work ability before and after the pandemic outbreak (i.e., first officially registered SARS-CoV-2 case in respective country[1]) in different individuals;
    - quantitative repeated cross-sectional survey studies measuring mental health and/or work ability in different individuals with at least one assessment before the pandemic outbreak (i.e., first SARS-CoV-2 case in respective country[1]), with data collected using the same methodology
    - protocols for quantitative (within-person) longitudinal survey studies or repeated cross-sectional survey studies

b) For risk and protective factors for mental health:
   - (non-repeated, repeated) cross-sectional survey studies measuring risk/and or protective factors for mental health;
   - (within-person) longitudinal survey studies measuring risk/and or protective factors for mental health
   - protocols for cross-sectional or longitudinal survey studies

- **Exclusion:**
  - intervention studies;
  - qualitative survey studies;
  - editorials, commentaries, letters to the editor, theoretical/discussion papers;
  - reviews (for systematic reviews: although these will be excluded at the title/abstract screening stage, the reference lists of relevant reviews [i.e., reviews potentially including primary studies of interest] will be hand searched for further relevant studies)

PUBLICATION DATE
No restrictions

PUBLICATION LANGUAGE
No restrictions (translation of non-English articles)

PUBLICATION FORMAT
No restrictions (preprints will be included)

CONTEXT
Studies conducted among healthcare workers in the face of current SARS-CoV-2 pandemic, diverse settings

MAIN OUTCOMES

- **Inclusion:**
  a) Any mental health outcome, for example:
     - anxiety symptoms and/or worrying;
     - depressive symptoms;
     - stress symptoms and/or perceived stress;
     - sleep problems and/or sleep quality;
     - general psychological distress;
     - posttraumatic stress symptoms;
     - substance abuse, substance use disorder;
     - self-harm, suicidal ideation, suicidality;
     - well-being, life satisfaction, quality of life
     - etc.
  b) Any outcome related to work ability, for example:
     - absence (e.g., in days);
     - work performance;
     - job satisfaction;
     - etc.

- **Exclusion:**
  - attitudes of healthcare workers regarding certain topics with no focus on mental health and/or work ability

SEARCH STRATEGY

- **Electronic databases:**
  - MEDLINE Ovid
  - Cochrane Covid-19 Register (CC19R)
  - Cochrane Central Register of Controlled Trials (CENTRAL)
  - PsycINFO Ovid
  - Web Of Science (Core Collection)
- **Additional sources:** In addition to the electronic search, we will inspect the reference lists of all included studies and of relevant systematic reviews. If data are missing or unclear, we will contact the respective author.

The search strategy was developed by an experienced information specialist (Maria-Inti Metzendorf) and underwent a quality assessment by a second information specialist (Robin Featherstone). The strategy comprises three blocks of search terms: 1) terms related to the SARS-CoV-2 pandemic (e.g., "COVID-19", "SARS coronavirus 2"), 2) terms associated with healthcare workers as population of interest (e.g., "health personnel", "medical staff"), and 3) terms related to mental health and work ability (e.g., "mental health", "anxiety", "burnout"). As appropriate for each database, different search terms and synonyms (e.g., MeSH terms, text words) are used. The timespan will be restricted from 2020 to current. Updates will be performed monthly or every two months within the duration of the CEOsys project until March 31, 2020. The final search frequency will be determined as soon as the study selection process of the first search (November 8, 2020) has been completed. The search strategy is detailed for each database in Appendices 1-5.

DATA EXTRACTION (SELECTION AND CODING)

Two reviewers will independently screen the titles and abstracts of identified records to assess eligibility. Irrelevant papers will be excluded immediately. At full text level, the eligibility of relevant papers will also be checked in duplicate. Any disagreement will be resolved by discussion or by consulting a third reviewer. We will use EndNote to collect and de-duplicate studies. The screening will be performed using Covidence online software[2]. Inter-rater reliability for both title/abstract and full text screening will be calculated and the screening process will be reported in a preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram[3].

We will develop a customized data extraction sheet including the following information:

- full citation
- country
- participant characteristics (e.g., sociodemographic data, sample size)
- studied subpopulation (e.g., nurses, physicians)
- survey period and assessments
- outcomes assessed and outcome measures used
- results (e.g., means and standard deviations [SD], prevalence rates, mean differences, results of t test, correlation coefficients, regression coefficients)
- miscellaneous aspects (e.g., cut-off values of the outcome measures used).

The data will be extracted by two reviewers, working independently. Any disagreements will be resolved by discussion or by consulting a third reviewer.
The process will adhere to the PRISMA standards[3].

DATA ANALYSIS

Quality (risk of bias) assessment

The quality of the included trials will be assessed independently and in duplicate with a tool based on the National Institute of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies[4], which assesses the following 14 domains:

1. research question
2. definition of the study population
3. participation rate
4. participant selection
5. sample size justification, power description, variance and effect estimates
6. measurement of the exposure prior to measurement of the outcome
7. timeframe
8. assessment of the exposure
9. definition, validity, reliability and consistence of exposure measures across the study
10. number of exposure assessments
11. definition, validity, reliability and consistence of outcome measures across the study
12. blinding of the outcome assessors regarding the exposure status
13. loss to follow-up
14. confounding variables

Due to the particular kind of exposure, some of the items of the original tool will be omitted or modified, other items will be added.

The following items will be omitted:

- Item 6. “For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?”: Since the exposure was not predictable, this question is not applicable.
- Item 7. “Was the time frame sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?”: This question is not applicable as the psychological burden probably varies over time (e.g., by increase or decrease of infection rates, aggravation or relaxation of containment measures et cetera). In any case, it is not known whether a longer exposure leads to greater psychological burden, which is the starting point of the question.
- Item 10. “Was the exposure(s) assessed more than once over time?”: The application of this question to the included studies would require a repeated assessment of the existence of the SARS-CoV-2 pandemic exists. Therefore, a reasonable use of this item is not possible.
- Item 12. “Were the outcome assessors blinded to the exposure status of participants?”: Blinding the studies with the SARS-CoV-2 pandemic (exposure) is not possible, thus, the question is not applicable.

The following items of the NIH tool[4] will be modified:

- Item 8. “For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?”
  This item was modified as it is based on the assumption of a linear relationship between exposure and effect. Usually, a study receives a better evaluation if it is conducted at several points in time or exposure levels because the correlation becomes more visible. However, since in a linear relationship cannot be assumed for studies included in this review, the item will be modified to "Was the exposure (independent variable) clearly specified?".
- Item 9. “Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?”
  This question will be modified in the sense that the heterogeneity of exposure is assessed. In the case of the SARS-CoV-2 pandemic as exposure, significant differences over a longer period might occur, for example, through loosening or tightening of the initial restrictions or if the number of infections increases or decreases. Therefore, a smaller survey period in the sense of a more homogeneous sample is more desirable and the question was changed to: "Was the exposure consistent across all study participants?".

The following items will be added as optional comments:

a) Selection bias/possible selection bias because of insufficient information on the sample recruitment: A selection bias exists, for example, if the recruitment of study participants is carried out using snowball or other convenience sampling methods. In this case, it must be assumed that only particularly stressed persons may have responded.
b) No/insufficient details on survey period: If there are no details on the survey period, this comment will be added.
c) No scale range for the outcome assessment reported: If there are no details on the scale range for the relevant outcome measure, this comment will be added.
d) No validated assessment measure for the outcome/outcome measure not clearly defined: If the used assessment tool for the relevant outcome(s) is not a previously validated assessment tool (i.e., before the current SARS-CoV-2 pandemic), this comment will be added.
e) Insufficient description of the study sample: If there is no or not enough information on the study sample, i.e., on the in- and exclusion criteria or on demographic information (age, gender, region, occupation), this comment will be added.

For some studies, additional comments will be added.

The single items will provide the ranking categories “yes”, “no”, “not reported”, “not applicable”. The overall-assessment will provide three ranking categories (high, fair or poor quality) and will be done by two independent reviewers. Disagreements will be resolved by discussion or by a third reviewer.

Overall Rating	Criteria
HIGH	- no selection bias + validated assessment tool AND - <2 of the original items rated as "not reported" or "no"
FAIR	- selection bias and/or no validated assessment tool AND - <2 of the original items rated as "not reported" AND - <3 of the original items rated as "no" AND - <3 of the original items rated as other than "yes" or "not available"
POOR	- selection bias and/or no validated assessment tool + ≥3 of the original items rated as "not reported"/"no" OR - >1 of the original items rated as "not reported" OR - ≥3 of the original items rated as "no" OR - ≥3 of the original items rated as other than "yes" or "not available"

Assessment of the certainty of evidence

The certainty of evidence will be assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE)[5] by one reviewer; the results will be discussed in the review team.

Data synthesis

Based on the extracted data, we will carry out a narrative synthesis of the included studies describing the study characteristics, measured outcomes and risk and protective factors for mental health in text and tabular form. We will summarize the reported outcomes for measures of mental health (e.g., prevalence rates, means and SDs, medians and interquartile ranges, mean differences before and after the SARS-CoV-2 pandemic) and/or work ability (e.g., days of work absence, prevalence rates, means and SDs, medians and interquartile ranges, mean differences), as well as risk and/or protective factors (e.g., results of t test, correlation coefficients, regression coefficients, etc.).

a) For consequences on mental health and/or work ability

If the included studies are sufficiently homogeneous (e.g., study design, outcome measures) and in case of available data (i.e., at least two studies assessing the same mental health or work-related outcome), we will perform pairwise meta-analyses comparing reported measures *during* the SARS-CoV-2 pandemic with data *before* the pandemic to quantify the mental burden attributable to the stressor "SARS-CoV-2 pandemic". Pairwise meta-analyses will be performed for anxiety, depression, sleep quality, stress and/or posttraumatic distress, which are anticipated to be the most frequently reported outcomes[5,6]. Further relevant outcomes for meta-analyses will be added during the review development process.

Primarily, the first assessment of any mental health and/or work ability outcome *after* the first officially registered SARS-CoV-2 case in the respective country (based on national infection dates published by the WHO[1]) will be compared to the last assessment *before* the first officially registered SARS-CoV-2 case. If possible, in a second step, we will compare the respective outcome at the first assessment after the first officially registered case with subsequent assessments, in order to depict the development of mental health status and/or work ability, respectively.

For continuous outcomes, we will calculate standardized mean differences (SMDs, Hedge's g) and their respective 95% confidence intervals (CIs) as pooled effect estimates based on means, SDs and sample sizes (e.g., before and during the SARS-CoV-2 pandemic). If means and SDs are not available, we will contact the study authors to ask for the respective values or use alternative statistical information (e.g., t test, change score).

For studies reporting dichotomous outcomes (e.g., prevalence with number of participants below and above cut-off score for mental health outcome before and after the pandemic), we will contact the study authors to ask for the respective means, SDs and sample sizes in order to eventually calculate SMDs as well. If these values cannot be obtained by the authors, we plan to calculate the prevalence risk ratio (RR) as pooled effect estimate, with uncertainty being expressed using 95% CIs.

Since we anticipate a considerable between-study heterogeneity in the reported assessment tools[5,6], pairwise meta-analyses will be performed based on random-effect models. In addition to the inspection of the clinical and methodological between-study heterogeneity, we will investigate the statistical heterogeneity using different statistical indicators (e.g., I^2, Tau^2, Chi^2 test, prediction intervals).

A sensitivity analysis will be performed based on the quality assessment, by excluding studies judged to be of "poor quality". Depending on the evidence found, further sensitivity analyses will be added during the review development process.

b) For risk and protective factors for mental health:

The summary and analysis of possible risk and protective factors will be performed separately for:

1) factors that were assessed *prior* to the SARS-CoV-2 pandemic (i.e., exposure) or those assessed after the beginning of the exposure, but which were *already present* before (e.g., sociodemographic variables);
2) factors that were measured *synchronously* with the outcome of mental health and may have newly occurred since the exposure started (e.g., media consumption). In this case, the direction of a possible influence cannot be determined with certainty.

If the included studies are sufficiently homogeneous (e.g., study design, outcome measures) and in case of available data, we will also perform meta-analyses for specific risk and protective factors (e.g., using correlation or regression coefficients as pooled effect estimate).

Since we anticipate a considerable between-study heterogeneity in the reported assessment tools[5,6], pairwise meta-analyses will also be performed based on random-effect models. In addition to inspecting the clinical and methodological between-study heterogeneity, we will investigate the statistical heterogeneity using different statistical indicators (e.g., I^2, Tau^2, Chi^2 test, prediction intervals).

A sensitivity analysis will be performed based on the quality assessment, excluding studies judged to be of "poor quality". Depending on the evidence found, further sensitivity analyses will be added during the review development process.

For a) and b), the statistical analyses will be performed using Review Manager 5.4 (RevMan 5.4)[7] or R 4.0.3 (e.g., libraries meta, metafor, metasens)[8-11], if appropriate.

ANALYSIS OF SUBGROUPS OR SUBSETS

Several subgroup analyses will be conducted if the data are available. We plan to analyze the following characteristics:

- *population characteristics*
    - age;
    - geographical location (e.g., country or region);
    - subpopulation (e.g., type of staff);

    - contact with COVID-19 patients (i.e., ≥50% of the sample is reported to have had direct contact with COVID-19 patients);
    - pre-existence of risk and protective factors in relation to the COVID-19 pandemic (i.e., first officially registered case[1])
- *study characteristics*
    - sample size;
    - outcome measure used;
    - survey period

Further potentially relevant subgroup analyses will be added during the review development process.

TYPE AND METHOD OF REVIEW

Living synthesis; living systematic review; narrative and quantitative synthesis; meta-analysis

KEYWORDS

Mental health, work ability, risk factors, protective factors, pandemic, SARS-CoV-2, COVID-19, surveys, healthcare workers.

GENERAL INFORMATION

START DATE: November 2020

(ANTICIPATED) COMPLETION DATE: April 2021

LANGUAGE: English

COUNTRY: Germany

FUNDING SOURCES: The CEOsys project is funded by the German Federal Ministry for Education and Research (BMBF) as part of the Network for University Medicine *(Grant number* 01KX2021).

CONFLICT OF INTEREST: The authors report grants from the German Federal Ministry of Education and Research (BMBF) during the conduct of the study.

CURRENT REVIEW STATUS

Preliminary searches: completed
Piloting of the study selection process: completed
Screening of search results against eligibility criteria: started
Data extraction: not started
Risk of bias assessment: not started
Data analysis: not started

ACKNOWLEDGEMENTS

We thank information specialist Robin Featherstone (Cochrane, Editorial and Methods Department, London, UK) for her support in the peer review of the search strategy.

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APPENDIX

Appendix 1: MEDLINE Search strategy
MEDLINE Ovid - *Ovid MEDLINE(R) ALL 1946 to November 06, 2020*

1. covid.mp.
2. COVID-19.rs.
3. COVID19.tw,kf.
4. ("SARS-CoV-2" or "SARS-CoV2" or SARSCoV2 or "SARSCoV-2" or "SARS coronavirus 2").mp.
5. (2019 nCoV or 2019nCoV or 2019-novel CoV or nCov 2019 or nCov 19).tw,kf.
6. ("severe acute respiratory syndrome coronavirus 2" or "novel coronavirus disease" or "novel corona virus disease" or "corona virus disease 2019" or "coronavirus disease 2019" or "novel coronavirus pneumonia" or "novel corona virus pneumonia").tw.
7. (severe acute respiratory syndrome coronavirus 2).os,mp.
8. or/1-7
9. exp "Health Personnel"/
10. (health adj (practitioner* or worker* or provider* or staff or profession* or personnel)).tw.
11. (care adj (practitioner* or worker* or provider* or staff or profession* or personnel)).tw.
12. (healthcare adj (practitioner* or worker* or provider* or staff or profession* or personnel)).tw.
13. (hospital adj (worker* or staff or personnel or administrator*)).tw.
14. (medical adj (worker* or staff or profession* or personnel or administrator*)).tw.
15. (care unit? adj (worker* or staff or profession* or personnel)).tw.
16. (icu adj (worker* or staff or profession* or personnel)).tw.
17. (nurs* or physician? or doctor? or paramedic? or emergency medical technician? or emergency medical assistant? or medical student? or resident?).tw.
18. (anesthesist? or anaesthesist? or anesthesiologist? or anaesthesiologist? or cardiologist? or dentist? or dental practitioner? or dental staff or dental assistant? or general practitioner? or geriatrician? or internist? or neurosurgeon? or nephrologist? or neurologist? or ophthalmologist? or neurologist? or pediatrician? or paediatrician? or palliative care specialist? or palliative care staff or pharmacist? or psychiatrist? or pulmologist? or radiologist? or rheumatologist? or surgeon? or surgical staff or urologist?).tw.
19. or/9-18
20. exp "Stress, Psychological"/
21. Resilience, Psychological/
22. Anxiety/
23. Mental Health/
24. Social Support/
25. Depression/
26. Suicide/
27. (mental adj (health or fatigue or illness or disorder?)).tw.
28. (psychological adj (assistance or care or crisis or distress or effect? or factor? or impact? or intervention? or need? or outcomes or pressure or reaction? or status or support)).tw.
29. (stress or stressed).tw.
30. (burnout or burned out or burnt out or burn out).tw.
31. (resilien* or coping).tw.
32. (anxiety or fear).tw.
33. (psychosocial or psycho-social).tw.
34. (depress* or suicid*).tw.
35. (insomnia or sleep).tw.
36. social support.tw.

37. (well being or wellness).tw.
38. or/20-37
39. exp Health Personnel/px [psychology]
40. 8 and 19 and 38
41. 8 and 39
42. 40 or 41
43. "2020*".dt.
44. 42 and 43

Appendix 2: Cochrane Covid-19 Register Search strategy
Cochrane Covid-19 Register (CC19R)

"health personnel" or "health practitioner" or "health practitioners" or "health worker" or "health workers" or "health provider" or "health providers" or "health staff" or "health professional" or "health professionals" or "healthcare personnel" or "healthcare practitioner" or "healthcare practitioners" or "healthcare worker" or "healthcare workers" or "healthcare provider" or "healthcare providers" or "healthcare staff" or "healthcare professional" or "healthcare professionals" or "care personnel" or "care practitioner" or "care practitioners" or "care worker" or "care workers" or "care provider" or "care providers" or "care staff" or "care professional" or "care professionals" or "hospital worker" or "hospital workers" or "hospital staff" or "hospital personnel" or "hospital administrator" or "hospital administrators" or "medical worker" or "medical workers" or "medical staff" or "medical professional" or "medical professionals" or "medical personnel" or "medical administrator" or "medical administrators" or "care unit worker" or "care unit workers" or "care unit staff" or "care unit professional" or "care unit professionals" or "care unit personnel" or "icu worker" or "icu workers" or "icu staff" or "icu professional" or "icu professionals" or "icu personnel" or nurs* or physician* or doctor* or paramedic* or "emergency medical technician" or "emergency medical technicians" or "emergency medical assistant" or "emergency medical assistants" or "medical student" or "medical students" or resident* or anesthesist* or anaesthesist* or anesthesiologist* or anaesthesiologist* or cardiologist* or dentist* or "dental practitioner" or "dental practitioners" or "dental staff" or "dental assistant" or "dental assistants" or "general practitioner" or "general practitioners" or geriatrician* or internist* or neurosurgeon* or nephrologist* or neurologist* or ophthalmologist* or neurologist* or pediatrician* or paediatrician* or "palliative care specialist" or "palliative care specialists" or "palliative care staff" or pharmacist* or psychiatrist* or pulmologist* or radiologist* or rheumatologist* or surgeon* or "surgical staff" or urologist*

AND

"mental health" or "mental fatigue" or "mental illness" or "mental disorders" or "psychological assistance" or "psychological care" or "psychological crisis" or "psychological distress" or "psychological effect" or "psychological effects" or "psychological factor" or "psychological factors" or "psychological impact" or "psychological impacts" or "psychological intervention" or "psychological interventions" or "psychological need" or "psychological needs" or "psychological outcomes" or "psychological pressure" or "psychological reaction" or "psychological reactions" or "psychological status" or "psychological support" or stress or stressed or burnout or "burned out" or "burnt out" or "burn out" or resilien* or coping or anxiety or fear or psychosocial or "psycho social" or depress* or suicid* or insomnia or sleep or "social support" or "well being" or wellness

Appendix 3: CENTRAL Search strategy
Cochrane Central Register of Controlled Trials [CENTRAL] (Cochrane Register of Studies Online)

1. (COVID OR COVID-19 OR COVID19):TI,AB,KY
2. ("SARS-CoV-2" OR "SARS-CoV2" OR SARSCoV2 OR "SARSCoV-2" OR "SARS coronavirus 2"):TI,AB,KY
3. (2019 nCoV OR 2019nCoV OR 2019-novel CoV OR nCov 2019 OR nCov 19):TI,AB,KY ("severe acute respiratory syndrome coronavirus 2" OR "novel coronavirus disease" OR "novel corona virus disease" OR "corona virus disease 2019" OR "coronavirus disease 2019" OR "novel coronavirus pneumonia" OR "novel corona virus pneumonia"):TI,AB,KY
4. (severe acute respiratory syndrome coronavirus 2):TI,AB,KY
5. #1 OR #2 OR #3 OR #4 OR #5
6. (health ADJ (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)):TI,AB,KY
7. (care ADJ (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)):TI,AB,KY
8. (healthcare ADJ (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)):TI,AB,KY
9. (hospital ADJ (worker* OR staff OR personnel OR administrator*)):TI,AB,KY
10. (medical ADJ (worker* OR staff OR profession* OR personnel OR administrator*)):TI,AB,KY
11. (care unit? ADJ (worker* OR staff OR profession* OR personnel)):TI,AB,KY
12. (icu ADJ (worker* OR staff OR profession* OR personnel)):TI,AB,KY
13. (nurs* OR physician* OR doctor* OR paramedic* OR "emergency medical technician*" OR "emergency medical assistant*" OR medical student* OR resident?):TI,AB,KY
14. (an?esthesist? OR an?esthesiologist? OR cardiologist? OR dentist? OR dental practitioner? OR dental staff OR dental assistant? OR general practitioner? OR geriatrician? OR internist? OR neurosurgeon? OR nephrologist? OR neurologist? OR ophthalmologist? OR neurologist? OR p?ediatrician? OR palliative care specialist? OR palliative care staff OR pharmacist? OR psychiatrist? OR pulmologist? OR radiologist? OR rheumatologist? OR surgeon? OR surgical staff OR urologist?):TI,AB,KY
15. #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15
16. (mental ADJ (health OR fatigue OR illness OR disorder?)):TI,AB,KY
17. (psychological ADJ (assistance OR care OR crisis OR distress OR effect? OR factor? OR impact? OR intervention? OR need? OR outcomes OR pressure OR reaction? OR status OR support)):TI,AB,KY
18. (stress OR stressed):TI,AB,KY
19. (burnout OR burned out OR burnt out OR burn out):TI,AB,KY
20. (resilien* OR coping):TI,AB,KY
21. (anxiety OR fear):TI,AB,KY
22. (psychosocial OR psycho-social):TI,AB,KY
23. (depress* OR suicid*):TI,AB,KY
24. (insomnia OR sleep):TI,AB,KY
25. social support:TI,AB,KY
26. (well being OR wellness):TI,AB,KY
27. #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27
28. #6 AND #16 AND #28
29. 2020 TO 2020:YR
30. #29 AND #30

Appendix 4. PsycINFO Search strategy

PsycINFO Ovid *APA PsycINFO 1806 to October Week 4 2020*

1. covid.mp.
2. COVID-19.mp.
3. COVID19.mp.
4. ("SARS-CoV-2" or "SARS-CoV2" or SARSCoV2 or "SARSCoV-2" or "SARS coronavirus 2").mp.
5. (2019 nCoV or 2019nCoV or 2019-novel CoV or nCov 2019 or nCov 19).mp.
6. ("severe acute respiratory syndrome coronavirus 2" or "novel coronavirus disease" or "novel corona virus disease" or "corona virus disease 2019" or "coronavirus disease 2019" or "novel coronavirus pneumonia" or "novel corona virus pneumonia").mp.
7. (severe acute respiratory syndrome coronavirus 2).mp.
8. or/1-7
9. exp "Health Personnel"/
10. (health adj (practitioner* or worker* or provider* or staff or profession* or personnel)).tw.
11. (care adj (practitioner* or worker* or provider* or staff or profession* or personnel)).tw.
12. (healthcare adj (practitioner* or worker* or provider* or staff or profession* or personnel)).tw.
13. (hospital adj (worker* or staff or personnel or administrator*)).tw.
14. (medical adj (worker* or staff or profession* or personnel or administrator*)).tw.
15. (care unit? adj (worker* or staff or profession* or personnel)).tw.
16. (icu adj (worker* or staff or profession* or personnel)).tw.
17. (nurs* or physician* or doctor* or paramedic* or "emergency medical technician*" or "emergency medical assistant*" or medical student* or resident?).tw.
18. (an?esthesist? or an?esthesiologist? or cardiologist? or dentist? or dental practitioner? or dental staff or dental assistant? or general practitioner? or geriatrician? or internist? or neurosurgeon? or nephrologist? or neurologist? or ophthalmologist? or neurologist? or p?ediatrician? or palliative care specialist? or palliative care staff or pharmacist? or psychiatrist? or pulmologist? or radiologist? or rheumatologist? or surgeon? or surgical staff or urologist?).tw.
19. or/9-18
20. exp Stress/
21. Resilience, Psychological/
22. Anxiety/
23. Mental Health/
24. Social Support/
25. Depression/
26. Suicide/
27. (mental adj (health or fatigue or illness or disorder?)).tw.
28. (psychological adj (assistance or care or crisis or distress or effect? or factor? or impact? or intervention? or need? or outcomes or pressure or reaction? or status or support)).tw.
29. (stress or stressed).tw.
30. (burnout or burned out or burnt out or burn out).tw.
31. (resilien* or coping).tw.
32. (anxiety or fear).tw.
33. (psychosocial or psycho-social).tw.
34. (depress* or suicid*).tw.
35. (insomnia or sleep).tw.
36. social support.tw.
37. (well being or wellness).tw.
38. or/20-37

39. 8 and 19 and 38
40. (2020*).up.
41. 39 and 40

Appendix 5. Web of Science Search strategy

Web of Science (WOS) *Web of Science Core Collection (1945-present)*

1. AB=((COVID OR "COVID-19" OR COVID19) OR ("SARS-CoV-2" OR "SARS-CoV2" OR SARSCoV2 OR "SARSCoV-2" OR "SARS coronavirus 2") OR ("2019 nCoV" OR "2019nCoV" OR "2019-novel CoV" OR "nCov 2019" OR "nCov 19") OR ("severe acute respiratory syndrome coronavirus 2" OR "novel coronavirus disease" OR "novel corona virus disease" OR "corona virus disease 2019" OR "coronavirus disease 2019" OR "novel coronavirus pneumonia" OR "novel corona virus pneumonia") OR ("severe acute respiratory syndrome coronavirus 2")) OR TI=((COVID OR "COVID-19" OR COVID19) OR ("SARS-CoV-2" OR "SARS-CoV2" OR SARSCoV2 OR "SARSCoV-2" OR "SARS coronavirus 2") OR ("2019 nCoV" OR 2019nCoV OR "2019-novel CoV" OR "nCov 2019" OR "nCov 19") OR ("severe acute respiratory syndrome coronavirus 2" OR "novel coronavirus disease" OR "novel corona virus disease" OR "corona virus disease 2019" OR "coronavirus disease 2019" OR "novel coronavirus pneumonia" OR "novel corona virus pneumonia") OR ("severe acute respiratory syndrome coronavirus 2"))

2. AB=((health NEAR/1 (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)) OR (care NEAR/1 (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)) OR (healthcare NEAR/1 (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)) OR (hospital NEAR/1 (worker* OR staff OR personnel OR administrator*)) OR (medical NEAR/1 (worker* OR staff OR profession* OR personnel OR administrator*)) OR ("care unit*" NEAR/1 (worker* OR staff OR profession* OR personnel)) OR (icu NEAR/1 (worker* OR staff OR profession* OR personnel)) OR (nurs* OR physician* OR doctor* OR paramedic* OR "emergency medical technician*" OR "emergency medical assistant*" OR "medical student*" OR resident*) OR (anesthesist* OR anaesthesist* OR anesthesiologist* OR anaesthesiologist* OR cardiologist* OR dentist* OR "dental practitioner*" OR "dental staff" OR "dental assistant*" OR "general practitioner*" OR geriatrician* OR internist* OR neurosurgeon* OR nephrologist* OR neurologist* OR ophthalmologist* OR neurologist* OR pediatrician* OR paediatrician* OR "palliative care specialist*" OR "palliative care staff" OR pharmacist* OR psychiatrist* OR pulmologist* OR radiologist* OR rheumatologist* OR surgeon* OR "surgical staff" OR urologist*)) OR TI=((health NEAR/1 (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)) OR (care NEAR/1 (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)) OR (healthcare NEAR/1 (practitioner* OR worker* OR provider* OR staff OR profession* OR personnel)) OR (hospital NEAR/1 (worker* OR staff OR personnel OR administrator*)) OR (medical NEAR/1 (worker* OR staff OR profession* OR personnel OR administrator*)) OR ("care unit*" NEAR/1 (worker* OR staff OR profession* OR personnel)) OR (icu NEAR/1 (worker* OR staff OR profession* OR personnel)) OR (nurs* OR physician* OR doctor* OR paramedic* OR "emergency medical technician*" OR "emergency medical assistant*" OR "medical student*" OR resident*) OR (anesthesist* OR anaesthesist* OR anesthesiologist* OR anaesthesiologist* OR cardiologist* OR dentist* OR "dental practitioner*" OR "dental staff" OR "dental assistant*" OR "general practitioner*" OR geriatrician* OR internist* OR neurosurgeon* OR nephrologist* OR neurologist* OR ophthalmologist* OR neurologist* OR pediatrician* OR paediatrician* OR "palliative care specialist*" OR "palliative care staff" OR pharmacist* OR psychiatrist* OR pulmologist* OR radiologist* OR rheumatologist* OR surgeon* OR "surgical staff" OR urologist*))

3. AB=((mental NEAR/1 (health OR fatigue OR illness OR disorder*)) OR (psychological NEAR/1 (assistance OR care OR crisis OR distress OR effect* OR factor* OR impact* OR intervention* OR need* OR outcomes OR pressure OR reaction* OR status OR support)) OR (stress OR stressed) OR (burnout OR "burned out" OR "burnt out" OR "burn out") OR (resilien* OR

coping) OR (anxiety OR fear) OR (psychosocial OR "psycho-social") OR (depress* OR suicid*) OR (insomnia OR sleep) OR "social support" OR ("well being" OR wellness)) OR TI=((mental NEAR/1 (health OR fatigue OR illness OR disorder*)) OR (psychological NEAR/1 (assistance OR care OR crisis OR distress OR effect* OR factor* OR impact* OR intervention* OR need* OR outcomes OR pressure OR reaction* OR status OR support)) OR (stress OR stressed) OR (burnout OR "burned out" OR "burnt out" OR "burn out") OR (resilien* OR coping) OR (anxiety OR fear) OR (psychosocial OR "psycho-social") OR (depress* OR suicid*) OR (insomnia OR sleep) OR "social support" OR ("well being" OR wellness))

4. #1 AND #2 AND #3
   Indexes=SCI-EXPANDED, SSCI, A&HCI, ESCI Timespan=2020