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## Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1st and 2nd pandemic year

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4 **Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a**  
5 **comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**  
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### Abstract

**Objectives:** Building on a first study at the beginning of the pandemic in March 2020, we aimed to investigate among healthcare professionals (1) how mental health may have changed in professionals over the course of the ongoing pandemic, (2) whether there are differences between different professional groups regarding mental health, (3) which stress factors may explain these mental health outcomes, and (4) whether help-seeking behaviour is related to caretaker self-image or team climate.

**Setting:** Between March and June 2021 an online survey was administered to healthcare professionals in Germany, Austria, and the German speaking regions of Switzerland across a diversity of care settings from all levels of care.

**Participants:** N=639 healthcare professionals completed the survey.

**Outcome measures:** The survey included the ICD-10 Symptom Rating checklist (ISR), event-sampling questions on pandemic-related stressors and self-formulated questions on help-seeking behaviour and team climate. Findings were analysed using t-tests, regressions and comparisons to a sample of healthcare professionals assessed in 2020 as well as to norm samples.

**Results:** Results show that mental health symptoms, particularly for depression and anxiety, persist among healthcare staff in the second pandemic year, that symptom prevalence rates are higher among nursing staff compared to physicians and paramedics, and that team climate is associated with mental health outcomes.

**Conclusions:** Mental health symptoms persist among healthcare staff in the second pandemic year with potentially new stressors becoming relevant. There is a urgent need for a higher level of professional validation in the healthcare sector, in particular for nursing staff, as well as ready access to mental health services and protective services in case of harassment.

**Keywords:** Pandemics; Occupational Stress; Mental Health; Nursing Staff; Help-Seeking Behaviour; COVID-19

### Strengths and limitations of this study

- The first study that compared healthcare professionals' mental health over a longer period of time during the COVID-19-pandemic (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021).
- The study involves and compares between participants from various professions in the healthcare sector.
- The study investigates several potentially relevant factors for mental health of healthcare professionals including help-seeking behaviour and caretaker self-image, as well as team climate.
- Data are cross-sectional which limits the possibility of making causal claims.
- Data may be biased by self-selection: the healthcare workers suffering the most may not have participated and thus the high prevalence rates observed may underestimate the actual psychological strain.

**Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**

It is well established by now that healthcare staff has been seriously affected by the COVID-19-pandemic [1,2]. A series of meta-analyses consistently showed that the prevalence of psychological disorders in health professionals is elevated. In particular, symptoms of depression, anxiety and distress [3], as well as insomnia [4] are significantly higher than before the beginning of the COVID-19 pandemic.

**Unknown factors: long-term consequences and differential effects across professional groups**

As the pandemic and the complex psychological strain accompanying it persist, it is especially worrying that the potential long-term consequences of this situation are unknown. On the individual level, being exposed to extreme psychological strain for a prolonged time may result in lasting negative consequences; acute conditions developed as a response to these stressors can become chronic, and psychological conditions may entail physiological comorbidities [5]. If the affected individuals are healthcare staff, these individual consequences can have further devastating effects on national healthcare systems. Increasing sickness absence rates and a rising number of people resigning and seeking out other careers might ensue. This would further exacerbate existing issues brought on by staff shortage and worsen working conditions, thus creating a vicious cycle for the remaining staff. This as well as increased exhaustion and reduced resilience among the remaining staff would result in decreasing quality of patient care [6,7].

So far, findings on the development of mental health symptoms in healthcare professionals over time during the pandemic have been inconsistent, with some studies showing increasing levels [8] while others find decreasing levels of symptoms [9,10]. However, these studies considered changes in mental health for short periods of time only, and – to our knowledge – there are no studies yet investigating the development of mental health over more than a couple of months. We aimed to close this research gap and examined the competing hypotheses that mental

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3 health symptoms among healthcare staff may have decreased (habituation hypothesis) or increased  
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5 (wear-out hypothesis) from 2020 to 2021. We also aimed to investigate whether the same stress  
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7 factors which were significantly related to psychological strain in 2020 [3] were still the major  
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9 impacting factors for healthcare professionals' mental health in 2021.  
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13 A group that has been investigated more intensively than other professional groups is  
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15 nursing staff, which is known to be exposed to staff shortages and extreme workload [6].  
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17 However, the healthcare sector consists of multiple professional groups whose working conditions  
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19 differ, potentially resulting in differential effects caused by pandemic changes. For example,  
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21 nurses and physicians at the same hospital share their work environment while taking on different  
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23 tasks with distinct responsibilities and demands. By comparison, paramedics are mobile rather  
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25 than stationary. They work under high levels of stress, as the nature of their work consists of  
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27 unpredictable and emergency situations, and they might be at higher risk of contracting COVID-  
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29 19 [11]. While doctors and nurses stay with a patient for a prolonged time and will typically know  
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31 the progression of the illness or condition and the treatment outcome, paramedics respond to  
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33 emergencies and hence have contact with more patients for shorter periods of time, without  
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35 knowing the patients' treatment outcomes. This may be associated with psychological advantages  
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37 and disadvantages [12]. Knowledge about the differential effects of the pandemic on professional  
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39 groups within the healthcare sector is important for identifying the most vulnerable groups and  
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41 tailoring support structures to their particular needs. However, this has not yet been investigated in  
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43 the existing pandemic-related literature. For instance, a rapid review on mental health during the  
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45 COVID-19 pandemic was not able to identify studies comparing nursing staff with primary care  
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47 staff [13]. We aimed to investigate whether there were differences in psychological symptoms  
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49 between different professional groups and expected particularly nursing staff and paramedics to  
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51 have a higher prevalence of mental health symptoms compared to physicians.  
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### 58 **Help-seeking behaviour in the face of mental health problems**

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4 While there are well known and efficient treatments for various mental disorders,  
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6 healthcare professionals hesitate to seek help for psychological suffering. This was evident before  
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8 the pandemic [14] and reconfirmed during the pandemic [3]. Professionals' self-image may play a  
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10 major role in the hesitancy to seek help. If people see themselves as a care giver (Caregiver Role  
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12 Identity Scale, *CRIS*), they might be less likely to seek help for themselves, as they do not identify  
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14 as a person in need of help but rather as one giving help and they may regard these roles as  
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16 mutually exclusive [15].  
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20 Furthermore, all types of stigma negatively influence potential help-seeking [16] and there  
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22 appears to be stigma attached to mental illness within the medical professions [17]. This stigma is  
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24 linked to the social perception of an invincible doctor [18], strength and self-sacrifice. Fear of  
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26 stigmatisation strongly discourages healthcare professionals from help-seeking behaviour despite  
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28 frequently reported mental health problems [16,18]. The fear of stigma in this context includes  
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30 fear of negative career impact, fear of prejudice, lack of confidentiality, and fear of being  
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32 perceived as weak [17]. The idea of not showing weakness, in particular, comes with the ideal of  
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34 self-sacrifice, of putting patients and others before one's own needs and ideally not expressing  
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36 those needs. Not speaking up about suboptimal conditions, problems or mental health issues due to  
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38 these fears may lead to a climate of silence within the team and have detrimental effects that  
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40 extend well beyond the individual [19,20]. A team climate pervaded by a general expectation to  
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42 prioritize patient care before personal well-being and to refrain from acts that could be interpreted  
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44 as displaying weakness, such as seeking professional help [14], could be a crucial factor inhibiting  
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46 help-seeking behaviour.  
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52 Using a comparative investigative approach, we collected new data and compared these to  
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54 a first study [3] in an effort to understand (1) how mental health may have changed in healthcare  
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56 professionals over the course of the pandemic, (2) whether there are differences between different  
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58 professional groups regarding mental health (3) which stress factors are important to explain  
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3 mental health outcomes for healthcare professionals during the pandemic and (4) whether help-  
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5 seeking is related to caretaker self-image and team climate. Specifically, we expected that (H1a)  
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7 mental health problems among healthcare staff would have decreased with the adaptation to the  
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9 pandemic (habituation hypothesis) or that (1b) they would have increased due to exhaustion  
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11 resulting from the persistent stress (wear-out hypothesis). We further expected that (H2) nursing  
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13 staff's mental health would be more affected than that of other professional groups, paralleling the  
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15 results from the first study [3] and that (H3) paramedics' mental health would be more affected  
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17 than physicians'. We also hypothesised that (H4) decreased likelihood to seek help would be  
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19 positively related to stronger caretaker self-image (CRIS) and that (H5) a positive team climate  
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21 would facilitate better mental health outcomes and (H6) increase the likelihood of help-seeking.  
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## 27 **Method**

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29 We conducted a cross-sectional online survey on mental well-being, perceived pandemic-  
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31 related stress factors and help-seeking behaviour among medical professionals.  
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## 33 **Measures**

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36 The survey took about 15 minutes to complete and started with a section on demographics  
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38 followed by basic facts about the features of participants' work, such as whether they had contact  
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40 with COVID-19-patients and whether their working hours had changed during the pandemic.  
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43 In the subsequent section, participants were presented with a list of potential stress factors  
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45 based on the previous study [3]. They were asked to rate the extent to which they were affected by  
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47 each stress factor on a 5-point Likert scale (*not at all to extremely or does not apply*). Following  
48  
49 this, mental well-being was measured with the self-report questionnaire ICD-10 Symptom Rating  
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51 (ISR) [21] including 29 items forming subscales for depression, anxiety, eating disorders,  
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53 obsessive compulsive disorder, and somatoform disorder symptoms as well as an *extra*-subscale  
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55 with various additional symptoms. The item-ratings on a 5-point Likert scale (from 0 - *does not*  
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57 *apply to 4 - extremely*) are averaged to compute subscale scores as well as a total score. The  
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59 internal consistency of the ISR total scores has been demonstrated to be good (Cronbach's  $\alpha =$   
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.92), as has the internal consistency of the subscales (Cronbach's  $\alpha = .78-86$ ) [22]. The individual

scales have been shown to be highly retest-reliable, with coefficient  $\alpha$ 's ranging from .70 to .94 in different clinical and non-clinical samples [22].

We chose the ISR because there is a large non-clinical German norm sample available which was assessed before the pandemic (P-) [21]. We hence refer to it as reference group  $R_{P-}$ . As a second reference group, we included a large sample of the general public assessed at the peak of the first pandemic-wave (P+) in Germany [23]<sup>1</sup>, reference group  $R_{P+}$ . We were also able to compare our data to a sample of healthcare professionals  $R_{HP2020}$  that we assessed at the beginning of the pandemic, i.e., one year before the current sample [3] (see Table 1).

**Table 1**

*IDs and sample sizes of ISR reference groups*

	context	
	before pandemic	during pandemic 2020
non-clinical sample	$R_{P-} N = 2512$	$R_{P+} N = 1744$
healthcare professionals	–	$R_{HP2020} N = 300$

Following the mental health section, we explored help-seeking behaviour and intentions. To this end, we assessed whether participants had sought help for the psychological strain they had experienced and why or, if they had not, whether they would like to do so in the future and why or why not. Moreover, we assessed the extent of participants' self-image as a caregiver, their propensity for prosocial behaviour, as well as perceived team climate and the extent to which the team climate allows or sanctions seeking help and admitting to mental health problems. We measured the first two constructs using German translations of the Caregiver Role Identity Scale (CRIS) [24] and the Prosocialness Scale for Adults (PSA) [25]. We assessed team climate with a set of 17 items that referred to how participants perceived the communication among colleagues (e.g., "My colleagues talk to me about their worries and issues") and social comparisons among

<sup>1</sup> We would like to thank the authors of this study for making some of their data available to us for statistical comparisons.

colleagues regarding strength and resilience in the face of difficulties (e.g., “*My colleagues can deal with issues better than I do*”).

### Sample

Participants were recruited through healthcare providers, unions, a press release and personal contacts between 15 March and 6 June 2021 in Germany, Austria and the German speaking regions of Switzerland. In Austria, safety-measures had been lifted in February, with a new wave of infections starting in March 2021; in April, some Austrian states (Vienna, Lower Austria, Burgenland) introduced a new lockdown which lasted several weeks. During this period, testing capacities were expanded massively across the country and the vaccination campaign was picking up pace, with roughly 40 % of the vaccinable population being vaccinated at least once until mid-May [26]. Similarly, in Germany, safety measures were lifted at the beginning of March, with a new wave of infections and the reintroduction of lockdown measures by the end of the month, in parallel to the roll-out of a national vaccination campaign [27]. The wave peaked mid-April, reaching a new high of ICU cases. In May, case numbers started to drop again, accompanied by an increasing vaccination rate and the reduction of safety measures

Participants gave their informed consent for participation in the study and for electronic storage of their responses. Along with their responses, no personally identifiable information was collected. Ethical approval was granted by the PFH Private University of Applied Sciences Göttingen review board (application: SW\_5\_090920).

In total we recruited 639 participants from Austria (n=476), Germany (n=161) and Switzerland (n=2) working in more than 13 different professions in healthcare (see Table 2).

**Table 2**

*Distribution of participants' professions by gender and by country*

Profession	N	rel	f	m	DE	AT	CH
paramedic	212	33%	64	146	4	207	1
inpatient nursing care	97	15%	71	26	52	45	0
inpatient elder care	81	13%	73	8	36	45	0

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home care	72	11%	65	7	25	47	0
inpatient physician	67	10%	31	35	4	63	0
non-medical health sector	28	4%	19	9	5	23	0
social worker	19	3%	13	5	8	11	0
physical therapist	12	2%	11	1	5	7	0
physician's assistant	6	1%	6	0	4	2	0
psychotherapist	5	1%	3	2	3	2	0
independent physician	4	1%	0	4	0	4	0
midwife	2	0%	2	0	2	0	0
pharmacist	2	0%	0	2	0	2	0
other	32	5%	23	9	13	18	1
total	639	100%	381	254	161	476	2

N=total, rel=relative percentage, f=female, m=male, DE=Germany, AT=Austria, CH=Switzerland; 4 participants identified themselves as diverse

### Analysis

All analyses were conducted using the statistics software R (Version 4.2.0) [28] in RStudio [29] and numerous helper packages. Aside from basic descriptive statistics, ANOVAs, t-tests and chi-square tests were computed to compare groups. After checking for the test prerequisites, multiple linear regressions were conducted to estimate the importance of stress factors, and binary logistic regression was used to estimate odds ratios for help-seeking.

### Patient and Public Involvement

The design of the survey was informed by five semi-structured interviews with nursing staff on the barriers they were facing at their workplace as well as the reasons for seeking or not seeking help. Recruitment took place among healthcare staff, but was not restricted or directed by whether participants had a clinical psychological diagnosis or were in psychological treatment;

hence, there were no patients involved. The participants were provided with the contact information of the leading researcher at the beginning and the end of the survey, where they could request a summary of the study results by sending an email. Moreover, organizations and employers in the healthcare sector who helped with recruitment by disseminating the survey amongst their employees or members received also a summary on completion of the data collection.

## Results

### Mental health

Prior to analysing the ISR scores, we examined their internal consistency. The results were almost identical to previous findings, with Cronbach's  $\alpha$  ranging from  $\alpha = 0.76$  to  $\alpha = 0.87$  for the subscales and  $\alpha = 0.94$  for the total scale.

The observed severity of clinical symptoms was high on all five scales (see Table 3). In particular, depression and anxiety symptoms were reported with unexpectedly high severity, with 6.5% reporting severe depression symptoms and another 55% light to medium symptoms. A total of 29% reported at least light symptoms of anxiety. We observed no systematic differences either by gender (see Table S1 in the Supplement) or by age group (see Table S2 in the Supplement) for any of the scales (gender by severity:  $\chi^2(4, N = 635) \leq 24.39, p > .05$ ; age by severity:  $\chi^2(12, N = 639) \leq 36.17, p > .05$ ).

**Table 3**

*Severity of symptoms in ISR of healthcare professional assessed in 2021 (HP2021) compared to previous year (HP2020) and the three reference groups*

scale	group	none	suspected	light	medium	severe
anxiety	HP2021	61.7%	9.2%	17.9%	8.4%	2.8%
	HP2020	52.3%	6.3%	24.7%	11.7%	5%
	P+	70.7%	5.9%	12.8%	7.4%	3.2%
	P-	71.8%	7.2%	16.1%	4.2%	0.7%
depression	HP2021	28.3%	10%	30%	25.2%	6.5%
	HP2020	18%	7.3%	40%	25.3%	9.3%
	P+	42.3%	10%	29.1%	13.7%	4.8%
	P-	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	HP2021	61.9%	8.1%	20.1%	7.2%	2.8%

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	HP2020	56.7%	9%	22%	9%	3.3%
	P+	67.4%	7.9%	13.8%	6.9%	4%
	P-	75.9%	8%	12.8%	4.2%	0.7%
somatoform	HP2021	56.1%	23.3%	7.8%	10.4%	2.3%
	HP2020	42.3%	30.3%	9%	15.3%	3%
	P+	69.4%	18.9%	4.6%	5.1%	2%
	P-	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	HP2021	41.5%	11.2%	27.4%	16.5%	3.4%
	HP2020	30%	12%	31%	20.3%	6.7%
	P+	43.1%	11.8%	25.1%	13.6%	6.3%
	P-	52.8%	12%	22.6%	11.2%	1.4%
ISR total	HP2021	45.6%	6.1%	17.6%	22.7%	8.1%
	HP2020	30.3%	9%	20%	29.3%	11.3%
	P+	58.7%	6.1%	14.4%	15.7%	5%
	P-	68%	6.8%	11.5%	10.2%	3.5%

For all symptom scales, healthcare professionals scored significantly higher than the reference group  $R_{P-}$  before the pandemic ( $df \geq 797.34$ ,  $t \geq 3.29$ ,  $p < .001$ ). The comparison between the samples of 2020 and 2021 showed a mixed picture. Neither of the competing hypotheses H1a and H1b was fully confirmed, although there is partial support for the habituation hypothesis H1a: While there were no significant changes from 2020 to 2021 on the overall ISR scores ( $F(1, 498) = 2.30$ ,  $p = .130$ , see Table 4) or the depression scores ( $F(1, 498) = 0.14$ ,  $p = .713$ , see Table 5), there was a significant reduction in anxiety ( $F(1, 498) = 4.55$ ,  $p = .033$ , see Table 6(5)).

**Table 4**

*ANOVA for total ISR scores by time (2020 vs 2021) and profession (nursing vs physicians)*

effect	$F$	$df_1$	$df_2$	$MSE$	$p$	$\hat{\eta}_G^2$
time	2.30	1	498	0.36	.130	.005
profession	25.36	1	498	0.36	< .001	.048
time $\times$ profession	0.36	1	498	0.36	.546	.001



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**Table 5***ANOVA on ISR depression scores by time (2020 vs 2021) and profession (nursing vs physicians)*

effect	<i>F</i>	<i>df</i> <sub>1</sub>	<i>df</i> <sub>2</sub>	<i>MSE</i>	<i>p</i>	$\hat{\eta}_G^2$
time	0.14	1	498	0.88	.713	.000
profession	28.89	1	498	0.88	< .001	.055
time × profession	0.91	1	498	0.88	.340	.002

**Table 6***ANOVA on ISR anxiety scores by time (2020 vs 2021) and profession (nursing vs physicians)*

effect	<i>F</i>	<i>df</i> <sub>1</sub>	<i>df</i> <sub>2</sub>	<i>MSE</i>	<i>p</i>	$\hat{\eta}_G^2$
time	4.55	1	498	0.85	.033	.009
profession	8.28	1	498	0.85	.004	.016
time × profession	0.47	1	498	0.85	.495	.001

However, healthcare professionals continued to display significantly more symptoms than the general population reference group during the pandemic ( $R_{p+}$ ) on both the depression scale ( $\Delta M = 0.32$ , 95% CI [0.24, 0.41],  $t(2411) = 7.64$ ,  $p < .001$ ) and the anxiety scale ( $\Delta M = 0.12$ , 95% CI [0.04, 0.2],  $t(1168.2) = 3.06$ ,  $p < .001$ ). Although this comparison is limited by the fact that the general population pandemic reference group was assessed during the first wave of the pandemic while our data were collected during the third wave, this suggests that healthcare professionals' psychological strain cannot be explained by lockdown measures alone. Most notably, their rate of severe symptoms was significantly higher on both the depression scale ( $\chi^2(1, N = 2285) = 520.91$ ,  $p < .001$ ) and the anxiety scale ( $\chi^2(1, N = 2338) = 513.78$ ,  $p < .001$ ).

**Mental health by profession**

We compared mental health scores of the three major professional groups in our sample, i.e., nurses, physicians and paramedics, representing about 78% of all participants (see Table 7).



**Table 7***Severity of symptoms in ISR split by group*

scale	group	N	none	suspected	light	medium	severe
anxiety	nursing	252	50.8%	13.5%	20.6%	11.1%	4%
	physicians	70	72.9%	10%	7.1%	7.1%	2.9%
	paramedics	211	73.9%	3.3%	17.1%	5.2%	0.5%
	Other	106	58.5%	9.4%	18.9%	9.4%	3.8%
	P-	2512	71.8%	7.2%	16.1%	4.2%	0.7%
depression	nursing	252	20.6%	7.9%	28.2%	33.3%	9.9%
	physicians	70	35.7%	17.1%	27.1%	17.1%	2.9%
	paramedics	211	37.9%	11.4%	29.9%	18%	2.8%
	Other	106	22.6%	7.5%	35.8%	26.4%	7.5%
	P-	2512	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	nursing	252	50.8%	9.5%	28.6%	7.5%	3.6%
	physicians	70	71.4%	4.3%	12.9%	8.6%	2.9%
	paramedics	211	73.9%	7.1%	10.4%	7.1%	1.4%
	other	106	59.4%	8.5%	23.6%	4.7%	3.8%
	P-	2552	75.9%	8%	12.8%	4.2%	0.7%
somatoform	nursing	252	45.2%	25.8%	9.9%	15.5%	3.6%
	physicians	70	68.6%	20%	7.1%	2.9%	1.4%
	paramedics	211	64.9%	22.7%	3.8%	7.6%	0.9%
	other	106	56.6%	21.7%	10.4%	8.5%	2.8%
	P-	2512	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	nursing	252	36.9%	10.7%	27.4%	20.2%	4.8%
	physicians	70	54.3%	8.6%	28.6%	8.6%	
	paramedics	211	45.5%	13.3%	26.1%	10.9%	4.3%
	other	106	37.7%	9.4%	28.3%	23.6%	0.9%
	P-	2512	52.8%	12%	22.6%	11.2%	1.4%
ISR total	nursing	252	34.1%	4.4%	18.3%	31%	12.3%
	physicians	70	62.9%	2.9%	15.7%	15.7%	2.9%
	paramedics	211	57.3%	10%	13.7%	15.2%	3.8%
	other	106	39.6%	4.7%	23.6%	21.7%	10.4%
	P-	2512	68%	6.8%	11.5%	10.2%	3.5%

While physicians and paramedics scored similarly regarding anxiety, depression and total ISR scale, nurses scored significantly higher, providing evidence for our H2. This was supported by

three 2-factor ANOVAs considering both profession and time (see Tables 4-6 and Figure 1).

However, contrary to our H3, there was no significant difference between paramedics and physicians.

[Insert Figure 1 here]

### Stress factors

Next, we investigated to what extent the individual stress factors contributed to anxiety and depression. A multiple regression of ISR depression scores on the eight stress factors ( $R^2 = 0.205$ ,  $F(8,616) = 19.83$ ,  $p < .001$ ) showed that *job insecurity* was the most influential but simultaneously rarest predictor of depression symptoms (see Table 8). That is, on average participants felt almost unaffected by job insecurity ( $M = 0.83$ ,  $SD = 1.08$  on scale from 0 to 4), but for those who did experience job insecurity, higher levels of job insecurity were strongly associated with psychological symptoms. *Anxiety about infection of family members* and *protective measures that hinder work processes* also predicted the level of depression symptoms. Regressing ISR anxiety scores on these stress factors ( $R^2 = 0.097$ ,  $F(8,616) = 8.26$ ,  $p < .001$ ) revealed a similar picture, with *job insecurity* and *anxiety about infection of family members* both positively associated with anxiety symptoms (see Table 9).

**Table 8**

*Multiple regression of ISR depression scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.37	[0.12, 0.61]	2.93	.003
changes in work procedures	0.09	[0.02, 0.16]	2.53	.012*
protective measures hinder work processes	0.11	[0.03, 0.18]	2.93	.004**
protective measures hinder patient contact	0.03	[-0.04, 0.09]	0.77	.439
limited contact to colleagues	0.01	[-0.05, 0.07]	0.35	.723
anxiety about self-infection	0.00	[-0.07, 0.07]	0.07	.943
anxiety about infection of family members	0.15	[0.09, 0.22]	4.65	< .001***
job insecurity	0.28	[0.21, 0.36]	7.68	< .001***
increasing number of serious illnesses and deaths	-0.01	[-0.07, 0.05]	-0.42	.673

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ,  $R^2 = 0.204$ , adjusted  $R^2 = 0.194$ ,  $F(8,619) = 19.86$ ,  $p < .001$

**Table 9***Multiple regression of ISR anxiety scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.24	[0.01, 0.46]	2.08	.038
changes in work procedures	0.01	[-0.05, 0.08]	0.33	.743
protective measures hinder work processes	0.05	[-0.02, 0.11]	1.45	.148
protective measures hinder patient contact	0.00	[-0.06, 0.06]	-0.13	.895
limited contact to colleagues	0.00	[-0.05, 0.06]	0.14	.885
anxiety about self-infection	0.03	[-0.03, 0.10]	1.05	.295
anxiety about infection of family members	0.10	[0.04, 0.16]	3.28	.001**
job insecurity	0.17	[0.10, 0.24]	5.01	< .001***
increasing number of serious illnesses and deaths	-0.01	[-0.06, 0.04]	-0.41	.680

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.098$ , adjusted  $R^2 = 0.087$ ,  $F(8,619) = 8.43$ ,  $p < .001$

Professionals with direct patient contact ( $M = 0.71$ ) did not differ from those in administration (categorized based on profession,  $M = 0.8$ ,  $t(74.5) = 1.03$ ,  $p = .848$ ,  $1 - \beta(d = 0.5) = 0.98$ ) in terms of symptom severity. However, people with pre-existing medical conditions were significantly more anxious ( $M_{yes} = 0.9$ ,  $M_{no} = 0.6$ ,  $t(293.3) = 3.85$ ,  $p < .001$ ) and reported more severe symptoms overall ( $M_{yes} = 0.92$ ,  $M_{no} = 0.64$ ,  $t(290.3) = 5.16$ ,  $p < .001$ ) than those without such conditions putting them at heightened risk during the pandemic.

Paralleling our previous results [3], participants reported that they were most affected by the uncertain duration of pandemic-related changes and by protective measures to avoid spreading the virus impeding their contact with the patients and work processes in general. The pandemic also led to various changes in work procedures which persisted one year after its beginning, as did the severe limitations of contact to colleagues. Table 10 provides an overview of the stress factors and their respective mean effects.

**Table 10**

*How strongly are you affected by the following aspect during the COVID-19 pandemic at your workplace? (0=not at all;4=extremely). Comparison between assessments in 2020 and 2021*

	2020 [8]	2021

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Stress Factor	N	M	SD	N	M	SD
uncertainty on duration of pandemic-related changes				632	2.93	1.15
protective measures hinder patient contact	285	2.76	1.03	623	2.69	1.09
limited contact to colleagues	287	2.18	1.13	622	2.55	1.14
protective measures hinder work processes	297	2.58	1.00	631	2.54	1.06
changes in work procedures	298	2.57	1.04	631	2.54	1.03
anxiety about infection of family members	290	2.30	1.25	589	2.17	1.30
need for childcare in own household <sup>a</sup>	091	2.36	1.51	250	1.94	1.49
bad communication of change in work procedures				589	1.84	1.22
worry that protective measures are used inadequately				584	1.76	1.19
increasing number of serious illnesses and deaths	243	1.29	1.18	548	1.76	1.19
anxiety about self-infection	285	1.78	1.18	560	1.53	1.15
fear of insufficient supply of protective measures				540	1.37	1.19
job insecurity	234	1.16	1.25	392	0.83	1.08

N=total, M=mean, SD=std. deviation

<sup>a</sup>this item was presented conditional on the response to a previous question about having children; number of children not assessed.

### Help-Seeking

While the majority of participants described themselves as experiencing symptoms of depression and anxiety, most declined when asked whether they would like to receive psychological support to deal with the crisis (see Table 11). Out of the 639 participants, 348 (54%) scored 0.5 or higher on the ISR total scale, which would give them a *suspected* clinical diagnosis or more severe; and yet only 49 (14%) of these participants said that they would consider seeking psychological support. Participants with higher ISR scores were more likely to seek help ( $b = 1.21$ ,  $OR = 3.35$ ,  $z = 5.41$ ,  $p < .001$ ).

**Table 11**

*Frequency of responses to 'Would you like to receive psychological support to deal with the crisis?' categorized by supposed need for support based on ISR scale*

Would you seek psychological help?	in need		
	no	yes	total
No, I am fine.	184	75	259
No, I get sufficient support.	38	47	85

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No, I prefer to deal with it on my own.	15	57	72
I will consider it.	16	39	55
Yes, but not psychotherapy.	3	5	8
Yes, psychotherapy.	0	5	5
no answer	35	120	155
All	291	348	639

'no' means  $ISR < 0.5$ ; 'yes' means  $ISR \geq 0.5$

Why are healthcare professionals not seeking help in spite of severe psychological symptoms? 142 (41%) of the 348 participants whose symptoms were severe enough to supposedly warrant psychological support claimed that others needed the support more urgently. 86 (25%) did not know any suitable support services. 85 (25%) did not perceive themselves as distressed enough to require support (in spite of their reported symptom severity). Finally, 81 (23%) reported lacking the time to seek help. The majority – 84 % of all participants and 83% of those who supposedly needed help – indicated that they had sufficient social support outside the workplace.

While, contrary to our (H4), the caregiver self-image (CRIS) did not predict whether a person would seek help, those with higher levels of prosocialness were significantly less likely to do so (see Table 12). However, the goodness of fit of this predictive model is low (*McFadden pseudo  $R^2 = 2.2\%$* ), implying that there are better predictors for help-seeking behaviour than those included in our model.

**Table 12**

*Logistic regression of help seeking on Caregiver Role Identity Scale (CRIS) and Prosocialness Scale for Adults (PSA)*

Predictor	<i>B</i>	95% CI	<i>z</i>	<i>p</i>
Intercept	3.75	[-3.50, 10.12]	1.10	.271
CRIS	-1.27	[-3.14, 0.80]	-1.29	.199
PSA	-2.02	[-3.82, -0.04]	-2.13	.033*

CRIS × PSA	0.48	[-0.05, 0.97]	1.89	.059
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\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

### Team Climate

We assessed the quality of all items of the team climate scale and removed four items due to high difficulty or low discrimination. A Kaiser-Meyer-Olkin factor adequacy of  $MSA = .773$  indicated that the scale comprises subscales. Both a scree plot and the Kaiser-Guttman criterion suggested a two-factor solution. A subsequent factor analysis with varimax rotation revealed two clearly distinct components. The first factor (TC1) refers to social comparisons with co-workers in terms of strength and resilience to strain (or the lack thereof), while the second factor (TC2) refers to open communication among colleagues. Both subscales (*Cronbach's*  $\alpha_{TC1} = .80$ ;  $\alpha_{TC2} = .76$ ), as well as the total work culture scale ( $\alpha = .79$ ) had good internal reliability.

Using this scale, team climate was a good predictor of participants' mental well-being. Both a low tendency to evaluate social comparisons of one's own resilience with co-workers negatively (TC1) and open communication among colleagues (TC2) seem to have influence on the reported symptoms (ISR total) as illustrated by a standardised regression (Table 13). Those working in a positive team climate had significantly better mental health, confirming our H5.

Does team climate also predict whether a person is willing to seek help for mental health issues? A logistic regression among those who supposedly need help ( $ISR \geq 0.5$ ) revealed that the TC1 scale (social comparisons) had a slightly negative impact on the likelihood to seek help ( $OR = 0.93$ ,  $p = .027$ ), while subscale TC2 was not significantly related to help seeking ( $p = .234$ ). However, the goodness of fit of this model is low (*McFadden pseudo*  $R^2 = 3.2\%$ ), thus not providing sufficient evidence for our H6.

**Table 13**

*Standardised regression of ISR total score on subscales of Team Climate (TC)*

Predictor	<i>beta</i>	95% CI	<i>t</i>	<i>Df</i>	<i>p</i>
TC1 (not ashamed)	-0.46	[-0.53, -0.40]	-13.58	636	< .001***
TC2 (open communication)	-0.22	[-0.29, -0.15]	-6.51	636	< .001***

*Note.* beta = standardized regression coefficient; CI = confidence interval;  
\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ,  $R^2 = .321$ , adjusted  $R^2 = .319$ ,  $F(2,636) = 150.55$ ,  $p < .001$

## Discussion

Consistent with reports from other countries, healthcare professionals in Germany, Austria and Switzerland reported high levels of depression and anxiety during the continuation of the pandemic. The scores were similar to those reported in another German sample [30] assessed under more severe lockdown conditions. Moreover, comparisons show that mental stress levels of healthcare staff were consistently above those reported by a general population sample during the pandemic; nevertheless, reported help-seeking behaviour and intentions were low.

### Mental health in 2020 and 2021

The high prevalence of psychological disorders among healthcare professionals observed at the beginning of the pandemic [3] continues in our sample one year onwards, even though the prevalence of anxiety symptoms has dropped to some extent. Studies on the mental health effects of the COVID-19 pandemic on healthcare staff from other countries conducted at the beginning of the pandemic in 2020 [32] place the prevalence of severe symptoms between 2.2% and 14.5% [33]. The results of both Weibelzahl et al. [3] and the present study are in line with this. While at the beginning societies across the globe were made aware of the crucial importance of healthcare workers, resulting in abundant expressions of appreciation for *essential workers* – with frontline medical staff representing a key group – this attention slowly dwindled as the pandemic lingered on. The psychological strain, however, persisted. Crucially, we also found that those healthcare workers who suffer from a pre-existing medical condition and are thus at a heightened risk during a pandemic continued to suffer from significantly higher psychological strain than others. Seeing as public concern for “risk groups” also dwindled away as the pandemic continued, this sub-group of healthcare staff is in need of particular attention and support as they are affected by intersecting stressors.

Research findings are inconsistent regarding the development of mental health symptoms over time in healthcare professionals during the pandemic with increases in Argentinian healthcare professionals [8], but declining trends in Belgian frontline healthcare [10] and in healthcare professionals in Spain [9] from spring to summer/autumn 2020. The latter is in line with trends for



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4 the general population – for instance, Wang et al. [31] identified a significant decline of the  
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6 psychological impact four weeks after the beginning of the pandemic. However, all the studies  
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8 indicated high distress scores throughout the study periods. Along with the absence of a significant  
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10 change in most symptoms over time (except for anxiety), the present study found high levels of  
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12 symptoms of depression (with 71.7 % of healthcare professionals fulfilling criteria for at least a  
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14 *suspected diagnosis*), eating disorders (58.9 % at least *suspected*), somatoform disorders (43.9 %  
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16 at least *suspected*), anxiety (38.3 % at least *suspected*) and compulsion (38.1 % at least *suspected*).  
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18 To our knowledge this is the first study that compared healthcare professionals' mental health over  
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20 a longer period (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021).  
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22 While the research design at hand is not a full-fledged within-participant longitudinal study, the  
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24 similarly recruited samples at both time points allow us to draw a more substantial comparison  
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26 than previous literature. In light of this, measures to reduce psychological strain among these  
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28 workers are urgently needed – particularly as the consequences of the psychological distress can  
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30 be expected to outlive the end of the pandemic. In addition to individual suffering, this is also a  
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32 problem for the healthcare system and patients: depression and fatigue have been shown to  
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34 correlate with major medical errors [7] and quality of care [6].  
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### 38 **Differences between nursing staff, physicians and paramedics**

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40 The present study found significant differences in mental health between physicians and  
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42 paramedics on the one hand and nursing staff on the other. This is in line with a rapid review that  
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44 concluded that nursing staff may have a higher risk of mental health problems during the COVID-  
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46 19 pandemic [12]. Furthermore, Cai et al. [34] found that nursing staff felt more anxious and  
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48 nervous compared to other professionals during the pandemic. Lai et al. [35] reported more severe  
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50 levels of mental health symptoms for nursing staff, but also for frontline healthcare workers, those  
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52 working in Wuhan, China, and for women. While excessive workload and inadequate personal  
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54 protective equipment might be factors associated with poorer mental health for all professional  
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56 groups, there are some differential factors between professional groups that may explain different  
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58 outcomes.  
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These differential factors may not be pandemic-specific but rather originating from more permanent aspects, such as difficulties of the nature of the work, nurses feeling inadequately supported, suffering from higher employment insecurity, facing issues with the management, patients and doctors as well as horizontal violence [36]. This is in line with our study that found job insecurity to be the most influential predictor of depression symptoms. For middle-aged and older adults in Europe, perceived insecurity in employment and housing as well as economic problems are significantly associated with participants' mental health and psychological distress [37]. Thereby, the relationship between subjective well-being and perceived adversities is partially mediated by institutional trust. Nursing staff might suffer from greater employment insecurities, economic problems and have less institutional trust – factors that may increase their psychological distress.

Contrary to our expectations, our study could not identify significant differences in mental health outcomes between physicians and paramedics. A tentative explanation for the missing difference may be that the high stress baseline for paramedics is counterbalanced by the fact that they work “outside” the hospital system. In other words, in contrast to nursing staff they are not exposed to hierarchies and issues between professional groups inside the hospital. Other studies have identified high levels of emotional strain and burnout for paramedics during the pandemic [11], but to our knowledge there are no studies yet that have compared the mental health outcomes of paramedics to other professional groups. Future research might help to shed light on relevant protective and risk factors for this group and how these may differ for other groups of healthcare professionals.

### **Help-seeking**

In the present study the reported help-seeking intentions and behaviour were low. Even out of those who reported high levels of psychological strain, many were not seeking help, citing either concerns about the distribution of resources or accessibility issues. That is, they either assumed that resources for psychological support are limited and given this, they described themselves as less in need of these than others, or they did not know of any suitable services that met their needs or did not have free time to access such services. These results paralleled our previous study [3]; we thus sought to explain this behaviour in the present study, hypothesizing

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4 that people who held a strong caregiver self-image would be less likely to seek help for  
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6 themselves. The idea was that being a caregiver would be seen as something exclusive and binary  
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8 – i.e., that people would either view themselves as a giver or a recipient of care. However, we  
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10 were not able to demonstrate this expected relationship. Given that the measurement instruments  
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12 had been validated, it remains unclear why caregiver self-image does not predict help-seeking.  
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14 One possible explanation is that this binary idea is not actually inherent in the caregiver image.  
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16 Rather, those who view giving and receiving care as mutually exclusive might be a subgroup  
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18 which also holds toxic ideas about strength and help-seeking as weakness, while the rest of the  
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20 group might see giving and receiving help as going hand in hand. The instrument might therefore  
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22 not have been specific enough. Future studies should further investigate this relationship.

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24 Furthermore, the large share of our sample stating that (1) they were not in need of support  
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26 despite severely elevated levels of mental strain, that (2) they already had sufficient support and  
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28 that (3) others needed support more urgently, could be indicative of a climate that discourages  
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30 help-seeking behaviour and speaking out about mental health issues in the healthcare community.  
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32 However, contrary to our H6 we could not find a correlation between team climate and help-  
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34 seeking. On the other hand, we could confirm a relationship between team climate and mental  
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36 health (H5). In other words, working in a positive team climate can have significantly positive  
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38 impacts on mental health for professionals in the healthcare sector. This might have led to a  
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40 reduction in actual need for help in those participants who experienced a positive team climate,  
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42 which could explain why they did not display more help-seeking behaviour. It is crucial that future  
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44 research takes a closer look at the team climate and work culture in the healthcare sector and the  
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46 norms they set around mental health – more specifically into how a more positive team climate  
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48 can be fostered where this is necessary. For this reason, in particular exploratory qualitative studies  
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50 seem warranted. While social norms of this kind are complex and slow to change, it is crucial they  
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52 be identified and addressed. If help-seeking behaviour truly is widely stigmatized in the healthcare  
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54 community, improving the accessibility of support services alone is bound to have very limited  
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56 effects on the rates of healthcare workers seeking help.

### 57 **Limitations**

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These findings are subject to certain limitations. Firstly, even though it was the second time we administered the same questionnaire, our data are cross-sectional, as we could not ensure the participation of the same participants. This limits the extent to which causal claims are possible. While it is possible for us to report the extent to which participants themselves think pandemic-related work-specific stressors caused deteriorations in their mental health, a true test of causality over time, both for work-related stressors and help-seeking behaviour, would require true longitudinal data with within-participant observations. Secondly, our data may be biased by self-selection. While the online survey was widely accessible and fairly short, thus lowering the cognitive load required to complete it, it is conceivable that the healthcare workers suffering the most did not participate because they could not muster the time or mental energy. This would imply an underestimation of actual psychological strain among healthcare staff.

### Conclusion

The present study shows that, while anxiety has been somewhat reduced over time, presumably due to some habituation to the pandemic situation and its novelty wearing off, other mental health symptoms persist among healthcare staff in the second pandemic year. Moreover, novel stressors may have become more relevant since the collection of the data presented here, such as psychological violence and harassment of medical staff by COVID-deniers. Since this problem has become dramatically more prevalent, as illustrated by the recent suicide of an Austrian doctor following months of severe harassment by COVID-deniers and anti-vaccinationists<sup>38</sup>, future studies will need to address these novel stressors. Symptom prevalence rates continue to be higher among nursing staff compared to physicians and paramedics as well as among healthcare staff with pre-existing health conditions as opposed to others. Our study furthermore showed that an open and constructive team climate is associated with better mental health. In conclusion, this means that we urgently need a higher level of appreciation, acknowledgement, and professional validation in the healthcare sector, in particular for nursing staff. Furthermore, ready access to mental health services (including mental health screening, screening for suicidality, and subsequent counselling) and protective services in case of harassment will play a pivotal role in reducing the risk of mental distress in this vulnerable group

of healthcare professionals. The long persistence of the psychological strain as well as the continued low willingness to seek out psychological support should ring alarm bells for decision makers in the healthcare sector, as both may be the early signs of severe long-term consequences for the entire sector and, ultimately, patient care. What our research, alongside various other studies, has done is to establish that there is a need to provide mental health support to the healthcare community; the question that research must target next is why and when this need does and does not translate into uptake of support.

### Data Availability Statement

Our anonymized data set and codebook are available for download via the open science framework (OSF) website at:

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<https://osf.io/ehm67/>

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### Competing Interests Statement

The authors declare no competing interests.

### Author Contributions

GD, JR and SW conceived, planned and implemented the study. AP focused on the particular aspect of caretaker self-image and contributed to its theory. SW performed the main calculations, but all authors contributed to the analysis, discussed the results and contributed to the final manuscript.

### Ethics Approval

Ethical approval was granted by the PFH Private University of Applied Sciences Göttingen review board (application: SW\_5\_090920).

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### 10 **Figure Legends**

11  
12 **Figure 1.** *Comparison of mental health scores across professions and years. The subsample of*  
13 *paramedics in 2020 was too small for analysis.*  
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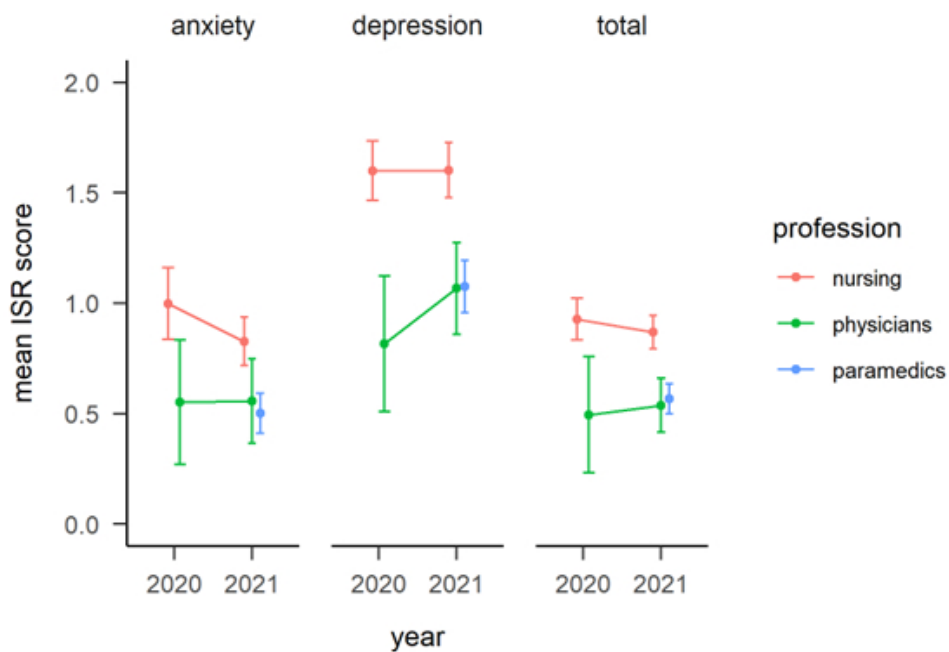


Figure 1. Comparison of mental health scores across professions and years.

385x256mm (38 x 38 DPI)



## Supplementary Materials

Table S1

*Severity of symptoms in ISR split by gender (4 participants did not indicate their gender)*

scale	gend	N	non	suspecte	ligh	mediu	sev
	er		e	d	t	m	ere
anxiety	femal	3	55.4	10.8%	19.7	10.2	3.9
	e	8	%		%	%	%
		1					
	male	2	72%	6.7%	14.6	5.9%	0.8
		5			%		%
		4					
depression	femal	3	24.1	8.4%	29.1	31.2	7.1
	e	8	%		%	%	%
		1					
	male	2	34.6	12.6%	30.3	16.9	5.5
		5	%		%	%	%
		4					
compulsion	femal	3	57.5	8.7%	23.6	7.3%	2.9
	e	8	%		%		%
		1					
	male	2	68.9	7.1%	14.6	6.7%	2.8
		5	%		%		%
		4					

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

2

somatoform	femal	3	53.3	23.1	8.9	11.5	3.1
	e	8	%	%	%	%	%
		1					
	male	2	59.8	24.4%	5.9	8.7%	1.2
		5	%		%		%
		4					
eating	femal	3	36.7	8.9%	30.7	18.6	5
disorder	e	8	%		%	%	%
		1					
	male	2	49.2	14.6%	22%	13%	1.2
		5	%				%
		4					
ISR total	femal	3	38.8	5.8%	18.6	25.7	11
	e	8	%		%	%	%
		1					
	male	2	56.3	6.3%	15.4	18.1	3.9
		5	%		%	%	%
		4					

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

3

**Table S2***Severity of symptoms in ISR split by age*

scale	age	N	non e	suspect ed	light	mediu m	seve re
anxiety	<30	20	57.3	6.3%	19.4	12.1	4.9
		6	%		%	%	%
	30- 41	16	55.6	13%	21%	8%	2.5
		2	%				%
	42- 53	14	62.6	11.6	17.7	6.8	1.4
		7	%	%	%	%	%
depression	>53	12	75.8	6.5%	11.3	4.8	1.6
		4	%		%	%	%
	<30	20	24.3	4.9%	32.5	26.2	12.1
		6	%		%	%	%
	30- 41	16	24.1	12.3	27.8	30.9	4.9
		2	%	%	%	%	%
compulsion	42- 53	14	31.3	12.2	27.2	25.9	3.4
		7	%	%	%	%	%
	>53	12	37.1	12.9	30.6	16.1	3.2
		4	%	%	%	%	%
	<30	20	58.3	9.7%	18.9	8.7	4.4
		6	%		%	%	%
compulsion	30- 41	16	63%	8%	18.5	7.4	3.1
		2			%	%	%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

4

	42-	14	63.3	5.4%	21.8	8.2	1.4
	53	7	%		%	%	%
	>53	12	64.5	8.9%	21.8	3.2	1.6
		4	%		%	%	%
somatoform	<30	20	50.5	25.2	7.3	13.1	3.9
		6	%	%	%	%	%
	30-	16	56.8	27.8	6.8	7.4	1.2
	41	2	%	%	%	%	%
	42-	14	59.2	17%	8.8	12.9	2%
	53	7	%		%	%	
	>53	12	59.7	22.6	8.9	7.3	1.6
		4	%	%	%	%	%
eating	<30	20	43.7	10.2	25.2	18%	2.9
		6	%	%	%		%
disorder	30-	16	35.2	14.8	26.5	17.9	5.6
	41	2	%	%	%	%	%
	42-	14	37.4	12.9	27.9	17.7	4.1
	53	7	%	%	%	%	%
	>53	12	50.8	6.5%	31.5	10.5	0.8
		4	%		%	%	%
ISR total	<30	20	39.3	7.8%	17%	24.3	11.7
		6	%			%	%
	30-	16	40.7	4.9%	21%	25.9	7.4
	41	2	%			%	%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

5

42-	14	51%	4.1%	13.6	23.8	7.5
53	7			%	%	%
>53	12	55.6	6.5%	18.5	15.3	4%
	4	%		%	%	

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**The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.**

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
<b>Title and abstract</b>					
	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	In title and abstract, pp.1-2	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included.  RECORD 1.2: If applicable, the geographic region and time frame within which the study took place should be reported in the title or abstract.  RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	
<b>Introduction</b>					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	pp.4-7		
Objectives	3	State specific objectives, including any prespecified hypotheses	p.7		
<b>Methods</b>					
Study Design	4	Present key elements of study design early in the paper	p.7		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	p.7-10		

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<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27</p> <p>Participants</p>	<p>6</p>	<p>(a) <i>Cohort study</i> - Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  <i>Case-control study</i> - Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  <i>Cross-sectional study</i> - Give the eligibility criteria, and the sources and methods of selection of participants</p> <p>(b) <i>Cohort study</i> - For matched studies, give matching criteria and number of exposed and unexposed  <i>Case-control study</i> - For matched studies, give matching criteria and the number of controls per case</p>	<p>p.9</p>	<p>RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided.</p> <p>RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided.</p> <p>RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.</p>	
<p>28 29 30 31 32 33 34</p> <p>Variables</p>	<p>7</p>	<p>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.</p>	<p>pp.8-10</p>	<p>RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.</p>	
<p>35 36 37 38 39 40 41 42</p> <p>Data sources/ measurement</p>	<p>8</p>	<p>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</p>	<p>pp.8-15</p>		

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	Bias	9	Describe any efforts to address potential sources of bias	p.11		
	Study size	10	Explain how the study size was arrived at	p.9		
	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	pp.10-15		
	Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> - If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> - If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> - If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	pp.10-15		
	Data access and cleaning methods		..		RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	pp.10-15

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				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	
Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	p.10
<b>Results</b>					
Participants	13	(a) Report the numbers of individuals at each stage of the study ( <i>e.g.</i> , numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	pp.10-15	RECORD 13.1: Describe in detail the selection of the persons included in the study ( <i>i.e.</i> , study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	pp.10-15
Descriptive data	14	(a) Give characteristics of study participants ( <i>e.g.</i> , demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) <i>Cohort study</i> - summarise follow-up time ( <i>e.g.</i> , average and total amount)	pp.9-10		
Outcome data	15	<i>Cohort study</i> - Report numbers of outcome events or summary measures over time <i>Case-control study</i> - Report numbers in each exposure	pp.10-15		

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		category, or summary measures of exposure <i>Cross-sectional study</i> - Report numbers of outcome events or summary measures			
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	pp.10-15		
Other analyses	17	Report other analyses done— e.g., analyses of subgroups and interactions, and sensitivity analyses	pp.10-15		
<b>Discussion</b>					
Key results	18	Summarise key results with reference to study objectives	pp.10-19		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	p.19	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	p.19
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	pp.10-19		

		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence			
Generalisability	21	Discuss the generalisability (external validity) of the study results	pp.10-19		
<b>Other Information</b>					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	p.20		
Accessibility of protocol, raw data, and programming code		..	p.20	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data or programming code.	p.20

\*Reference: Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langman SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

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# BMJ Open

## Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1st and 2nd pandemic year

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2022-067244.R1
Article Type:	Original research
Date Submitted by the Author:	03-Nov-2022
Complete List of Authors:	Duden, Gesa; FernUniversität in Hagen, REITER, Julia; University of Vienna, Department of Developmental and Educational Psychology PASWERG, Angela; PFH Private University of Applied Sciences WEIBELZAHN, Stephan; PFH Private University of Applied Sciences
<b>Primary Subject Heading</b>:	Mental health
Secondary Subject Heading:	Health services research, Mental health
Keywords:	MENTAL HEALTH, COVID-19, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Human resource management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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4 **Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a**  
5 **comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**  
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**Abstract**

Healthcare staff have been facing particular mental health challenges during the COVID-19-pandemic. Building on a first study at the beginning of the pandemic in March 2020, we aimed to investigate among healthcare professionals in Germany and Austria (1) how mental health may have changed in professionals over the course of the ongoing pandemic, (2) whether there are differences between different professional groups regarding mental health, (3) which stress factors may explain these mental health outcomes, and (4) whether help-seeking behaviour is related to caretaker self-image or team climate. Between March and June 2021, N=639 healthcare professionals completed an online survey including the ICD-10 Symptom Rating checklist (ISR), event-sampling questions on pandemic-related stressors and self-formulated questions on help-seeking behaviour and team climate. Findings were analysed using t-tests, regressions and comparisons to a sample of healthcare professionals assessed in 2020 as well as to norm samples. Results show that mental health symptoms, particularly for depression and anxiety, persist among healthcare staff in the second pandemic year, that symptom prevalence rates are higher among nursing staff compared to physicians and paramedics, and that team climate is associated with mental health outcomes. Implications of these findings in relation to the persisting pandemic and its aftermath are discussed.

*Keywords:* Pandemics; Frontline and Essential Workers; Healthcare Staff; Mental Health; Nursing Staff; Help-Seeking Behaviour; COVID-19

### Strengths and limitations of this study

- The first study that compared healthcare professionals' mental health over a longer period of time during the COVID-19-pandemic (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021)
- The study involves and compares between participants from various professions in the healthcare sector.
- The study investigates several potentially relevant factors for mental health of healthcare professionals including help-seeking behaviour and caretaker self-image, as well as team climate using established and validated scales such as the ICD-10 Symptom Rating checklist (ISR), the Caregiver Role Identity Scale (CRIS) and the Prosocialness Scale for Adults (PSA)
- Data are cross-sectional which limits the possibility of making causal claims.
- Data may be biased by self-selection: the healthcare workers suffering the most may not have participated and thus the high prevalence rates observed may underestimate the actual psychological strain.



**Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**

It is well established by now that healthcare staff has been seriously affected by the COVID-19-pandemic [1,2]. A series of meta-analyses consistently showed that the prevalence of psychological disorders in health professionals is elevated. In particular, symptoms of depression, anxiety and distress [3], as well as insomnia [4] are significantly higher than before the beginning of the COVID-19 pandemic.

**Unknown factors: long-term consequences and differential effects across professional groups**

As the pandemic and the complex psychological strain accompanying it persist, it is especially worrying that the potential long-term consequences of this situation are unknown. On the individual level, being exposed to extreme psychological strain for a prolonged time may result in lasting negative consequences; acute conditions developed as a response to these stressors can become chronic, and psychological conditions may entail physiological comorbidities [5]. If the affected individuals are healthcare staff, these individual consequences can have further devastating effects on national healthcare systems. Increasing sickness absence rates and a rising number of people resigning and seeking out other careers might ensue. This would further exacerbate existing issues brought on by staff shortage and worsen working conditions, thus creating a vicious cycle for the remaining staff. This as well as increased exhaustion and reduced resilience among the remaining staff would result in decreasing quality of patient care [6,7].

So far, findings on the development of mental health symptoms in healthcare professionals over time during the pandemic have been inconsistent, with some studies showing increasing levels [8] while others find decreasing levels of symptoms [9,10]. However, these studies considered changes in mental health for short periods of time only,

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3 and – to our knowledge – there are no studies yet investigating the development of mental  
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6 health over more than a couple of months  
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8         A group that has been investigated more intensively than other professional groups is  
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10 nursing staff, which is known to be exposed to staff shortages and extreme workload [6].  
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12 Such difficulties resulting in lowered resources regarding time and emotional capacities are  
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14 bound to reduce the quantity and quality of social support due to decreased opportunities to  
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16 offer it; this decrease in social support is, in turn, likely to further worsen capabilities for  
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18 coping with these stressors and other difficulties, creating a downward spiral. However, the  
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20 healthcare sector consists of multiple professional groups whose working conditions differ,  
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22 potentially resulting in differential effects caused by pandemic changes. For example, nurses  
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24 and physicians at the same hospital share their work environment while taking on different  
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26 tasks with distinct responsibilities and demands. By comparison, paramedics are mobile  
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28 rather than stationary. They work under high levels of stress, as the nature of their work  
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30 consists of unpredictable and emergency situations, and they might be at higher risk of  
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32 contracting COVID-19 [11]. While doctors and nurses stay with a patient for a prolonged  
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34 time and will typically know the progression of the illness or condition and the treatment  
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36 outcome, paramedics respond to emergencies and hence have contact with more patients for  
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38 shorter periods of time, without knowing the patients' treatment outcomes. This may be  
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40 associated with psychological advantages and disadvantages [12]. Knowledge about the  
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42 differential effects of the pandemic on professional groups within the healthcare sector is  
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44 important for identifying the most vulnerable groups and tailoring support structures to their  
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46 particular needs. However, this has not yet been investigated in the existing pandemic-related  
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48 literature. For instance, a rapid review on mental health during the COVID-19 pandemic was  
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50 not able to identify studies comparing nursing staff with primary care staff [13].  
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### 58 **Help-seeking behaviour in the face of mental health problems**

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4 While there are well known and efficient treatments for various mental disorders,  
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6 healthcare professionals hesitate to seek help for psychological suffering. This was evident  
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8 before the pandemic [14] and reconfirmed during the pandemic [3]. Professionals' self-image  
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10 may play a major role in the hesitancy to seek help. If people see themselves as a care giver  
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12 (Caregiver Role Identity Scale, *CRIS*), they might be less likely to seek help for themselves,  
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14 as they do not identify as a person in need of help but rather as one giving help and they may  
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16 regard these roles as mutually exclusive [15]. This caregiver self-image can be expected to  
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18 reflect both attitudes – that is, self-concept – as well as behaviour. In other words, people who  
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20 view themselves strongly as caregivers are expected to have a higher propensity to display  
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22 prosocial behaviour.  
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26 Furthermore, all types of stigma negatively influence potential help-seeking [16] and  
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28 there appears to be stigma attached to mental illness within the medical professions [17]. This  
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30 stigma is linked to the social perception of an invincible doctor [18], strength and self-  
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32 sacrifice. Fear of stigmatisation strongly discourages healthcare professionals from help-  
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34 seeking behaviour despite frequently reported mental health problems [16,18]. The fear of  
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36 stigma in this context includes fear of negative career impact, fear of prejudice, lack of  
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38 confidentiality, and fear of being perceived as weak [17]. The idea of not showing weakness,  
39  
40 in particular, comes with the ideal of self-sacrifice, of putting patients and others before one's  
41  
42 own needs and ideally not expressing those needs. Not speaking up about suboptimal  
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44 conditions, problems or mental health issues due to these fears may lead to a climate of  
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46 silence within the team and have detrimental effects that extend well beyond the individual  
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48 [19,20]. A team climate pervaded by a general expectation to prioritize patient care before  
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50 personal well-being and to refrain from acts that could be interpreted as displaying weakness,  
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52 such as seeking professional help [14], could be a crucial factor inhibiting help-seeking  
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54 behaviour.  
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### Study aims

Using a comparative investigative approach, we collected new data and compared these to a first study [3] in an effort to understand (I) how mental health may have changed in healthcare professionals over the course of the pandemic, and (II) whether the same stress factors which were significantly related to psychological strain in 2020 [3] were still the major impacting factors for healthcare professionals' mental health in 2021, (III) whether there are differences between different professional groups regarding mental health, and (IV) whether help-seeking is related to caretaker self-image and team climate. Specifically, we expected that (H1a) mental health problems among healthcare staff would have decreased with the adaptation to the pandemic (habituation hypothesis) or that (1b) they would have increased due to exhaustion resulting from the persistent stress (wear-out hypothesis). We further expected that (H2) nursing staff's mental health would be more affected than that of other professional groups, paralleling the results from the first study [3] and that (H3) paramedics' mental health would be more affected than physicians'. We also hypothesised that (H4) decreased likelihood to seek help would be positively related to stronger caretaker self-image (CRIS) as well as more prosocial behaviour (measured as the behavioural parallel to the purely attitudinal self-image) and that (H5) a positive team climate would facilitate better mental health outcomes and (H6) increase the likelihood of help-seeking.

### Method

We conducted a cross-sectional online survey on mental well-being, perceived pandemic-related stress factors and help-seeking behaviour among medical professionals.

### Measures

The survey took about 15 minutes to complete and started with a section on demographics followed by basic facts about the features of participants' work, such as whether they had contact with COVID-19-patients and whether their working hours had changed during the pandemic.

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4 In the subsequent section, participants were presented with a list of potential stress  
5 factors based on the previous study [3]. They were asked to rate the extent to which they were  
6 affected by each stress factor on a 5-point Likert scale (*not at all* to *extremely* or *does not*  
7 *apply*). Following this, mental well-being was measured with the self-report questionnaire  
8 ICD-10 Symptom Rating (ISR) [21] including 29 items forming subscales for depression,  
9 anxiety, eating disorders, obsessive compulsive disorder, and somatoform disorder symptoms  
10 as well as an *extra*-subscale with various additional symptoms. As the ISR is intended for  
11 clinical diagnostic use, the *extra*-subscale contains miscellaneous individual symptoms and  
12 pieces of information which do not constitute a disorder by themselves but should indicate to  
13 the clinician that further exploration is needed; the items include symptoms of  
14 depersonalisation and derealization, sexual disorders, external stressors and past physical  
15 head traumas. This subscale is part of the standard ISR interpretation. The item-ratings on a  
16 5-point Likert scale (from 0 - *does not apply* to 4 - *extremely*) are averaged to compute  
17 subscale scores as well as a total score. The internal consistency of the ISR total scores has  
18 been demonstrated to be good (Cronbach's  $\alpha = .92$ ), as has the internal consistency of the  
19 subscales (Cronbach's  $\alpha = .78-86$ ) [22]. The individual scales have been shown to be highly  
20 retest-reliable, with coefficient  $\alpha$ 's ranging from .70 to .94 in different clinical and non-  
21 clinical samples [22].  
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39 We chose the ISR because there is a large non-clinical German norm sample available  
40 which was assessed before the pandemic (P-) [21]. We hence refer to it as reference group  
41  $R_{P-}$ . As a second reference group, we included a large sample of the general public assessed  
42 at the peak of the first pandemic-wave (P+) in Germany [23], reference group  $R_{P+}$ . We were  
43 also able to compare our data to a sample of healthcare professionals  $R_{HP2020}$  that we assessed  
44 at the beginning of the pandemic, i.e., one year before the current sample [3] (see Table 1).  
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53 TABLE 1 HERE  
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55 Following the mental health section, we explored help-seeking behaviour and  
56 intentions. To this end, we assessed whether participants had sought help for the  
57 psychological strain they had experienced and why or, if they had not, whether they would  
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4 like to do so in the future and why or why not. Moreover, we assessed the extent of  
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6 participants' self-image as a caregiver, their propensity for prosocial behaviour, as well as  
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8 perceived team climate and the extent to which the team climate allows or sanctions seeking  
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10 help and admitting to mental health problems. We measured the first two constructs using  
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12 German translations of the Caregiver Role Identity Scale (CRIS) [24] and the Prosocialness  
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14 Scale for Adults (PSA) [25]. We assessed team climate with a set of 17 items that referred to  
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16 how participants perceived the communication among colleagues (e.g., "*My colleagues talk to*  
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18 *me about their worries and issues*") and social comparisons among colleagues regarding  
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20 strength and resilience in the face of difficulties (e.g., "*My colleagues can deal with issues*  
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22 *better than I do*").

### 23 24 **Sample**

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27 As we aimed for a large-scale survey and were interested in examining simple  
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29 correlations rather than testing treatment effects or causalities across time, we did not aim for  
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31 a predefined sample size; instead, our goal was maximum recruitment, i.e., finding as many  
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33 participants as possible within our predefined time frame. Participants were recruited through  
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35 healthcare providers, unions, a press release and personal contacts between 15 March and 6  
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37 June 2021 in Germany, Austria and the German speaking regions of Switzerland. In Austria,  
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39 safety-measures had been lifted in February, with a new wave of infections starting in March  
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41 2021; in April, some Austrian states (Vienna, Lower Austria, Burgenland) introduced a new  
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43 lockdown which lasted several weeks. During this period, testing capacities were expanded  
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45 massively across the country and the vaccination campaign was picking up pace, with roughly  
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47 40 % of the vaccinateable population being vaccinated at least once until mid-May [26].  
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49 Similarly, in Germany, safety measures were lifted at the beginning of March, with a new  
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51 wave of infections and the reintroduction of lockdown measures by the end of the month, in  
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53 parallel to the roll-out of a national vaccination campaign [27]. The wave peaked mid-April,  
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55 reaching a new high of intensive care unit (ICU) cases. In May, case numbers started to drop  
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57 again, accompanied by an increasing vaccination rate and the reduction of safety measures

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59 To be included in our study, participants were required to work in one of the areas of  
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the healthcare sector, either in private or in public institutions. This included professional

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3 groups such as medical and nursing staff as well as social workers, midwives, pharmacists,  
4 physical therapists, physiotherapists, psychologists, psychotherapists. If none of these  
5 categories applied, participants had the option “other”, under which they could specify their  
6 profession. Participants were excluded if they did not work in any area of healthcare or if they  
7 did not complete all the required fields. As the invitation to participate was circulated through  
8 various channels, the exact response rate could not be determined. However, out of 993  
9 respondents who answered at least one question we had to remove 354 records (36 %)  
10 because they did not meet all the inclusion criteria.

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Participants gave their informed consent for participation in the study and for  
electronic storage of their responses. Along with their responses, no personally identifiable  
information was collected. Ethical approval was granted by the PFH Private University of  
Applied Sciences Göttingen review board (application: SW\_5\_090920).

#### TABLE 2 HERE

In total we recruited 639 participants from Austria (n=476), Germany (n=161) and  
Switzerland (n=2) working in more than 13 different professions in healthcare (see Table 2).

### **Public Involvement**

The design of the survey was informed by five semi-structured interviews with nursing staff  
on the barriers they were facing at their workplace as well as the reasons for seeking or not  
seeking help. The participants were provided with the contact information of the leading  
researcher at the beginning and the end of the survey, where they could request a summary of  
the study results by sending an email. Moreover, organizations and employers in the  
healthcare sector who helped with recruitment by disseminating the survey amongst their  
employees or members also received a summary on completion of the data collection.

### **Analysis**

All analyses were conducted using the statistics software R (Version 4.2.0) [28] in RStudio  
[29] and numerous helper packages. Aside from basic descriptive statistics, ANOVAs, t-tests



and chi-square tests were computed to compare groups. After checking for the test prerequisites, multiple linear regressions were conducted to estimate the importance of stress factors, and binary logistic regression was used to estimate odds ratios for help-seeking. All the core analyses considered the complete dataset, while participants with missing values in non-essential measures, e.g., barriers to help-seeking, were excluded from analysis where appropriate. We did not rebalance the sample by weighting for membership in professional groups or other characteristics, but report the results as is.

## Results

### Mental health

Prior to analysing the ISR scores, we examined their internal consistency. The results were almost identical to previous findings, with Cronbach's  $\alpha$  ranging from  $\alpha = 0.76$  to  $\alpha = 0.87$  for the subscales and  $\alpha = 0.94$  for the total scale.

The observed severity of clinical symptoms was high on all five scales (see Table 3). In particular, depression and anxiety symptoms were reported with unexpectedly high severity, with 6.5% reporting severe depression symptoms and another 55% light to medium symptoms. A total of 29% reported at least light symptoms of anxiety. We observed no systematic differences either by gender (see Table S1 in the Supplement) or by age group (see Table S2 in the Supplement) for any of the scales (gender by severity:  $\chi^2(4, N = 635) \leq 24.39, p > .05$ ; age by severity:  $\chi^2(12, N = 639) \leq 36.17, p > .05$ ).

TABLE 3 HERE

For all symptom scales, healthcare professionals scored significantly higher than the reference group  $R_{p-}$  before the pandemic ( $df \geq 797.34, t \geq 3.29, p < .001$ ). The comparison between the samples of 2020 and 2021 showed a mixed picture. Neither of the competing hypotheses H1a and H1b was fully confirmed, although there is partial support for the habituation hypothesis H1a: While there were no significant changes from 2020 to 2021 on the overall ISR scores ( $F(1, 498) = 2.30, p = .130$ ) or the depression scores ( $F(1, 498) = 0.14,$



$p = .713$ ), there was a significant reduction in anxiety ( $F(1, 498) = 4.55, p = .033$ , see Table 5 for details). However, healthcare professionals continued to display significantly more symptoms than the general population reference group during the pandemic ( $R_{p+}$ ) on both the depression scale ( $\Delta M = 0.32, 95\% \text{ CI } [0.24, 0.41], t(2411) = 7.64, p < .001$ ) and the anxiety scale ( $\Delta M = 0.12, 95\% \text{ CI } [0.04, 0.2], t(1168.2) = 3.06, p < .001$ ). Although this comparison is limited by the fact that the general population pandemic reference group was assessed during the first wave of the pandemic while our data were collected during the third wave, this suggests that healthcare professionals' psychological strain cannot be explained by lockdown measures alone. Most notably, their rate of severe symptoms was significantly higher on both the depression scale ( $\chi^2(1, N = 2285) = 520.91, p < .001$ ) and the anxiety scale ( $\chi^2(1, N = 2338) = 513.78, p < .001$ ).

### **Mental health by profession**

We compared mental health scores of the three major professional groups in our sample, i.e., nurses, physicians and paramedics, representing about 78% of all participants (see Table 4).

TABLE 4 HERE

While physicians and paramedics scored similarly regarding anxiety, depression and total ISR scale, nurses scored significantly higher, providing evidence for our H2. This was supported by three 2-factor ANOVAs considering both profession and time (see Tables 5 and Figure 1). However, contrary to our H3, there was no significant difference between paramedics and physicians.

TABLES 5 HERE

FIGURE 1 HERE

### **Stress factors**

Next, we investigated to what extent the individual stress factors contributed to anxiety and depression. A multiple regression of ISR depression scores on the eight stress factors ( $R^2 = 0.205, F(8,616) = 19.83, p < .001$ ) showed that *job insecurity* was the most influential but simultaneously rarest predictor of depression symptoms (see Table 8). That is, on average participants felt almost unaffected by job insecurity ( $M = 0.83, SD = 1.08$  on scale

from 0 to 4), but for those who did experience job insecurity, higher levels of job insecurity were strongly associated with psychological symptoms. *Anxiety about infection of family members* and *protective measures that hinder work processes* also predicted the level of depression symptoms. Regressing ISR anxiety scores on these stress factors ( $R^2 = 0.097$ ,  $F(8,616) = 8.26$ ,  $p < .001$ ) revealed a similar picture, with *job insecurity* and *anxiety about infection of family members* both positively associated with anxiety symptoms (see Figure 2 and Tables S3-S4 in the supplement).

[INSERT FIGURE 2]

Professionals with direct patient contact ( $M = 0.71$ ) did not differ from those in administration (categorized based on profession,  $M = 0.8$ ,  $t(74.5) = 1.03$ ,  $p = .848$ ,  $1 - \beta(d = 0.5) = 0.98$ ) in terms of symptom severity. However, people with pre-existing medical conditions were significantly more anxious ( $M_{yes} = 0.9$ ,  $M_{no} = 0.6$ ,  $t(293.3) = 3.85$ ,  $p < .001$ ) and reported more severe symptoms overall ( $M_{yes} = 0.92$ ,  $M_{no} = 0.64$ ,  $t(290.3) = 5.16$ ,  $p < .001$ ) than those without such conditions putting them at heightened risk during the pandemic.

Paralleling our previous results [3], participants reported that they were most affected by the uncertain duration of pandemic-related changes and by protective measures to avoid spreading the virus impeding their contact with the patients and work processes in general. The pandemic also led to various changes in work procedures which persisted one year after its beginning, as did the severe limitations of contact to colleagues. Table 6 provides an overview of the stress factors and their respective mean effects.

TABLE 6 HERE

### Help-Seeking

While the majority of participants described themselves as experiencing symptoms of depression and anxiety, most declined when asked whether they would like to receive psychological support to deal with the crisis (see Table 7). Out of the 639 participants, 348 (54%) scored 0.5 or higher on the ISR total scale, which would give them a *suspected* clinical diagnosis or more severe; and yet only 49 (14%) of these participants said that they would

consider seeking psychological support. Participants with higher ISR scores were more likely to seek help ( $b = 1.21$ ,  $OR = 3.35$ ,  $z = 5.41$ ,  $p < .001$ ).

#### TABLE 7 HERE

Healthcare professionals gave various reasons for not seeking help in spite of severe psychological symptoms. 142 (41%) of the 348 participants whose symptoms were severe enough to supposedly warrant psychological support claimed that others needed the support more urgently. 86 (25%) did not know any suitable support services. 85 (25%) did not perceive themselves as distressed enough to require support (in spite of their reported symptom severity). Finally, 81 (23%) reported lacking the time to seek help. The majority – 84 % of all participants and 83% of those who supposedly needed help – indicated that they had sufficient social support outside the workplace.

While, contrary to our (H4), the caregiver self-image (CRIS) did not predict whether a person would seek help, those with higher levels of prosocialness were significantly less likely to do so (see Table 8). However, the goodness of fit of this predictive model is low (*McFadden pseudo*  $R^2 = 2.2\%$ ), implying that there are better predictors for help-seeking behaviour than those included in our model.

#### TABLE 8 HERE

### Team Climate

We assessed the quality of all items of the team climate scale and removed four items due to high difficulty or low discrimination. A Kaiser-Meyer-Olkin factor adequacy of  $MSA = .773$  indicated that the scale comprises subscales. Both a scree plot and the Kaiser-Guttman criterion suggested a two-factor solution. A subsequent factor analysis with varimax rotation revealed two clearly distinct components. The first factor (TC1) refers to social comparisons with co-workers in terms of strength and resilience to strain (or the lack thereof), while the second factor (TC2) refers to open communication among colleagues. Both subscales (*Cronbach's*  $\alpha_{TC1} = .80$ ;  $\alpha_{TC2} = .76$ ), as well as the total work culture scale ( $\alpha = .79$ ) had good internal reliability.

Using this scale, team climate was a good predictor of participants' mental well-being. Both a low tendency to evaluate social comparisons of one's own resilience with co-

workers negatively (TC1) and open communication among colleagues (TC2) seem to have influence on the reported symptoms (ISR total) as illustrated by a standardised regression (Table 9). Those working in a positive team climate had significantly better mental health, confirming our H5.

Does team climate also predict whether a person is willing to seek help for mental health issues? A logistic regression among those who supposedly need help ( $ISR \geq 0.5$ ) revealed that the TC1 scale (social comparisons) had a slightly negative impact on the likelihood to seek help ( $OR = 0.93, p = .027$ ), while subscale TC2 was not significantly related to help seeking ( $p = .234$ ). However, the goodness of fit of this model is low ( $McFadden \text{ pseudo } R^2 = 3.2\%$ ), thus not providing sufficient evidence for our H6.

TABLE 9 HERE

## Discussion

Consistent with reports from other countries [1, 30, 31, 32, 33, 34], healthcare professionals in Germany, Austria and Switzerland reported high levels of depression and anxiety during the continuation of the pandemic. The scores were similar to those reported in another German sample [35] assessed under more severe lockdown conditions. Moreover, comparisons show that mental stress levels of healthcare staff were consistently above those reported by a general population sample during the pandemic; nevertheless, reported help-seeking behaviour and intentions were low.

### Mental health in 2020 and 2021

The high prevalence of psychological disorders among healthcare professionals observed at the beginning of the pandemic [3] continues in our sample one year onwards, even though the prevalence of anxiety symptoms has dropped to some extent. Studies on the mental health effects of the COVID-19 pandemic on healthcare staff from other countries conducted at the beginning of the pandemic in 2020 [37] place the prevalence of severe symptoms between 2.2% and 14.5% [38]. The results of both Weibelzahl et al. [3] and the present study are in line with this. While at the beginning societies across the globe were made aware of the crucial importance of healthcare workers, resulting in abundant

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3 expressions of appreciation for *essential workers* – with frontline medical staff representing a  
4 key group – this attention slowly dwindled as the pandemic lingered on. The psychological  
5 strain, however, persisted. Crucially, we also found that those healthcare workers who suffer  
6 from a pre-existing medical condition and are thus at a heightened risk during a pandemic  
7 continued to suffer from significantly higher psychological strain than others. Seeing as  
8 public concern for “risk groups” also dwindled away as the pandemic continued, this sub-  
9 group of healthcare staff requires particular attention and support as they are affected by  
10 intersecting stressors.

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Research findings are inconsistent regarding the development of mental health symptoms over time in healthcare professionals during the pandemic with increases in Argentinian healthcare professionals [8], but declining trends in Belgian frontline healthcare [10] and in healthcare professionals in Spain [9] from spring to summer/autumn 2020. The latter is in line with trends for the general population – for instance, Wang et al. [36] identified a significant decline of the psychological impact four weeks after the beginning of the pandemic. However, all the studies indicated high distress scores throughout the study periods. Along with the absence of a significant change in most symptoms over time (except for anxiety), the present study found high levels of symptoms of depression (with 71.7 % of healthcare professionals fulfilling criteria for at least a *suspected diagnosis*), eating disorders (58.9 % at least *suspected*), somatoform disorders (43.9 % at least *suspected*), anxiety (38.3 % at least *suspected*) and compulsion (38.1 % at least *suspected*). To our knowledge this is the first study that compared healthcare professionals’ mental health over a longer period (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021). While the research design at hand is not a full-fledged within-participant longitudinal study, the similarly recruited samples at both time points allow us to draw a more substantial comparison than previous literature. In light of this, measures to reduce psychological strain among these workers are urgently needed – particularly as the consequences of the psychological distress can be expected to outlive the end of the pandemic. In addition to individual suffering, this is also a problem for the healthcare system and patients: depression

and fatigue have been shown to correlate with major medical errors [7] and quality of care [6].

### **Differences between nursing staff, physicians and paramedics**

The present study found significant differences in mental health between physicians and paramedics on the one hand and nursing staff on the other. This is in line with a rapid review that concluded that nursing staff may have a higher risk of mental health problems during the COVID-19 pandemic [12]. Furthermore, Cai et al. [39] found that nursing staff felt more anxious and nervous compared to other professionals during the pandemic. Lai et al. [40] reported more severe levels of mental health symptoms for nursing staff, but also for frontline healthcare workers, those working in Wuhan, China, and for women. While excessive workload and inadequate personal protective equipment might be factors associated with poorer mental health for all professional groups, there are some differential factors between professional groups that may explain different outcomes.

These differential factors may not be pandemic-specific but rather originating from more permanent aspects, such as difficulties of the nature of the work, nurses feeling inadequately supported, suffering from higher employment insecurity, facing issues with the management, patients and doctors as well as horizontal violence [41]. This is in line with our study that found job insecurity to be the most influential predictor of depression symptoms. For middle-aged and older adults in Europe, perceived insecurity in employment and housing as well as economic problems are significantly associated with participants' mental health and psychological distress [42]. Thereby, the relationship between subjective well-being and perceived adversities is partially mediated by institutional trust. Nursing staff might suffer from greater employment insecurities, economic problems and have less institutional trust – factors that may increase their psychological distress.

Contrary to our expectations, our study could not identify significant differences in mental health outcomes between physicians and paramedics. A tentative explanation for the missing difference may be that the high stress baseline for paramedics is counterbalanced by the fact that they work “outside” the hospital system. In other words, in contrast to nursing staff they are not exposed to hierarchies and issues between professional groups inside the

hospital. Other studies have identified high levels of emotional strain and burnout for paramedics during the pandemic [11], but to our knowledge there are no studies yet that have compared the mental health outcomes of paramedics to other professional groups. Future research might help to shed light on relevant protective and risk factors for this group and how these may differ for other groups of healthcare professionals.

### **Help-seeking**

In the present study the reported help-seeking intentions and behaviour were low. Even out of those who reported high levels of psychological strain, many were not seeking help, citing either concerns about the distribution of resources or accessibility issues. That is, they either assumed that resources for psychological support are limited and given this, they described themselves as less in need of these than others, or they did not know of any suitable services that met their needs or did not have free time to access such services. These results paralleled our previous study [3]; we thus sought to explain this behaviour in the present study, hypothesizing that people who held a strong caregiver self-image would be less likely to seek help for themselves. The idea was that being a caregiver would be seen as something exclusive and binary – i.e., that people would either view themselves as a giver or a recipient of care. However, we were not able to demonstrate this expected relationship. Given that the measurement instruments had been validated, it remains unclear why caregiver self-image does not predict help-seeking. One possible explanation is that this binary idea is not actually inherent in the caregiver image. Rather, those who view giving and receiving care as mutually exclusive might be a subgroup which also holds toxic ideas about strength and help-seeking as weakness, while the rest of the group might see giving and receiving help as going hand in hand. The instrument might therefore not have been specific enough. Also, the tests may not have been sensitive enough to detect changes and the sample size may have been too small to identify differences between the groups that were of unequal sizes. Additionally, self-report measures are, of course, subject to social desirability.

Furthermore, the large share of our sample stating that (1) they were not in need of support despite severely elevated levels of mental strain, that (2) they already had sufficient support and that (3) others needed support more urgently, could be indicative of a climate that



discourages help-seeking behaviour and speaking out about mental health issues in the healthcare community. However, contrary to our H6 we could not find a correlation between team climate and help-seeking. On the other hand, we could confirm a relationship between team climate and mental health (H5). In other words, working in a positive team climate can have significantly positive impacts on mental health for professionals in the healthcare sector. This might have led to a reduction in actual need for help in those participants who experienced a positive team climate, which could explain why they did not display more help-seeking behaviour. It is crucial that future research takes a closer look at the team climate and work culture in the healthcare sector and the norms they set around mental health – more specifically into how a more positive team climate can be fostered where this is necessary. Help-seeking is stigmatised, as are mental health problems [16, 17], and participant responses may reflect that. The stigmatization of health-seeking as well as the rejection of people with mental illness is bound to a historical and cultural context. For instance, mental health stigma has decreased considerably in Germany since the 1990s [43]. A study found that Cuban professionals reported stronger mental health stigma and more willingness to seek help than German professionals [44]. For this reason, in particular exploratory qualitative studies seem warranted that take into consideration the cultural context of help seeking and mental health stigma. While social norms of this kind are complex and slow to change, it is crucial they be identified and addressed. If help-seeking behaviour truly is widely stigmatized in the healthcare community, improving the accessibility of support services alone is bound to have very limited effects on the rates of healthcare workers seeking help.

### Limitations

These findings are subject to certain limitations. Firstly, even though it was the second time we administered the same questionnaire, our data are cross-sectional, as we could not ensure the participation of the same participants. This limits the extent to which causal claims are possible. While it is possible for us to report the extent to which participants themselves think pandemic-related work-specific stressors caused deteriorations in their mental health, a true test of causality over time, both for work-related stressors and help-seeking behaviour,



would require true longitudinal data with within-participant observations. Secondly, our data may be biased by self-selection. While the online survey was widely accessible and fairly short, thus lowering the cognitive load required to complete it, it is conceivable that the healthcare workers suffering the most did not participate because they could not muster the time or mental energy. This would imply an underestimation of actual psychological strain among healthcare staff. In relation to this issue, only two participants from Switzerland chose to participate in the study, which means conclusions about the situation in the Swiss healthcare system cannot be drawn from these data. Finally, the healthcare systems of Austria, Germany and Switzerland differ slightly in regard to the insurance system. Nevertheless, they are comparable in regard to high overall costs and above average number of physicians per capita [45]. Future comparisons with additional countries might reveal whether the structure of the healthcare system affects resilience of staff.

### Conclusion

The present study shows that, while anxiety has been somewhat reduced over time, presumably due to some habituation to the pandemic situation and its novelty wearing off, other mental health symptoms persist among healthcare staff in the second pandemic year. As preventative measures to reduce the spread of the virus persisted, so did limitations on opportunities to offer and seek social support, meaning that one key factor in coping with difficulties remained partly unavailable to healthcare staff. Moreover, novel stressors may have become more relevant since the collection of the data presented here, such as psychological violence and harassment of medical staff by COVID-deniers. Since this problem has become dramatically more prevalent, as illustrated by the recent suicide of an Austrian doctor following months of severe harassment by COVID-deniers and anti-vaccinationists [46], future studies will need to address these novel stressors. Symptom prevalence rates continue to be higher among nursing staff compared to physicians and paramedics as well as among healthcare staff with pre-existing health conditions as opposed to others. Our study furthermore showed that an open and constructive team climate is associated with better mental health. Future studies should also look into how this relation

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4 may be mediated by burnout. In conclusion, this means that we urgently need a higher level  
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6 of appreciation, acknowledgement, and professional validation in the healthcare sector, in  
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8 particular for nursing staff. Furthermore, ready access to mental health services (including  
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10 mental health screening, screening for suicidality, and subsequent counselling) and protective  
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12 services in case of harrassment will play a pivotal role in reducing the risk of mental distress  
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14 in this vulnerable group of healthcare professionals. The long persistence of the psychological  
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16 strain as well as the continued low willingness to seek out psychological support should ring  
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18 alarm bells for decision makers in the healthcare sector, as both may be the early signs of  
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20 severe long-term consequences for the entire sector and, ultimately, patient care. What our  
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22 research, alongside various other studies, has done is to establish that there is a need to  
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24 provide mental health support to the healthcare community; the question that research must  
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26 target next is why and when this need does and does not translate into uptake of support.  
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### **Data Availability Statement**

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32 Our anonymized data set and codebook are available for download via the open  
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34 science framework (OSF) website at:

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36 Weibelzahl, Stephan, Gesa Duden, and Julia Reiter. 2022. "Pandemic-Induced Psychological  
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38 Stress in Healthcare Professionals." OSF. July 11. doi:10.17605/OSF.IO/EHM67.

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40 <https://osf.io/ehm67/>  
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49 The authors declare no competing interests.  
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55 to us for statistical comparisons.  
56

### **Author Contributions**

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59 GD, JR and SW conceived, planned and implemented the study. AP focused on the particular  
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aspect of caretaker self-image and contributed to its theory. SW performed the main

calculations, but all authors contributed to the analysis, discussed the results and contributed to the final manuscript.

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**Names of Figures**

Figure 1. *Comparison of mental health scores across professions and years. The subsample of paramedics in 2020 was too small for analysis.*

Figure 2. *Results of two multiple regressions on stress factors. b = unstandardized regression coefficient; \*p < .05, \*\*p < .01, \*\*\*p < .001; only significant paths are labeled*

*ISR depression:  $R^2 = 0.204$ , adjusted  $R^2 = 0.194$ ,  $F(8,619) = 19.86$ ,  $p < .001$*

*ISR anxiety:  $R^2 = 0.098$ , adjusted  $R^2 = 0.087$ ,  $F(8,619) = 8.43$ ,  $p < .001$*



## Tables

**Table 1***IDs and sample sizes of ISR reference groups*

	context	
	before pandemic	during pandemic 2020
non-clinical	$R_{P-}$	$R_{P+}$
sample	$N = 2512$	$N = 1744$
healthcare	–	$R_{HP2020}$
professionals		$N = 300$

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**Table 2***Distribution of participants' professions by gender and by country*

Profession	N	rel	f	m	DE	AT	CH
Paramedic	212	33%	64	146	4	207	1
inpatient nursing care	97	15%	71	26	52	45	0
inpatient elder care	81	13%	73	8	36	45	0
home care	72	11%	65	7	25	47	0
inpatient physician	67	10%	31	35	4	63	0
non-medical health sector	28	4%	19	9	5	23	0
social worker	19	3%	13	5	8	11	0
physical therapist	12	2%	11	1	5	7	0
physician's assistant	6	1%	6	0	4	2	0
Psychotherapist	5	1%	3	2	3	2	0
independent physician	4	1%	0	4	0	4	0
Midwife	2	0%	2	0	2	0	0
Pharmacist	2	0%	0	2	0	2	0
Other	32	5%	23	9	13	18	1
Total	639	100%	381	254	161	476	2

N=total, rel=relative percentage, f=female, m=male, DE=Germany, AT=Austria, CH=Switzerland; 4 participants identified themselves as diverse



## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table 3**

*Severity of symptoms in ISR of healthcare professional assessed in 2021 (HP2021) compared to previous year (HP2020) and the three reference groups*

Scale	group	none	suspected	light	medium	severe
Anxiety	HP2021	61.7%	9.2%	17.9%	8.4%	2.8%
	HP2020	52.3%	6.3%	24.7%	11.7%	5%
	P+	70.7%	5.9%	12.8%	7.4%	3.2%
	P-	71.8%	7.2%	16.1%	4.2%	0.7%
depression	HP2021	28.3%	10%	30%	25.2%	6.5%
	HP2020	18%	7.3%	40%	25.3%	9.3%
	P+	42.3%	10%	29.1%	13.7%	4.8%
	P-	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	HP2021	61.9%	8.1%	20.1%	7.2%	2.8%
	HP2020	56.7%	9%	22%	9%	3.3%
	P+	67.4%	7.9%	13.8%	6.9%	4%
	P-	75.9%	8%	12.8%	4.2%	0.7%
somatoform	HP2021	56.1%	23.3%	7.8%	10.4%	2.3%
	HP2020	42.3%	30.3%	9%	15.3%	3%
	P+	69.4%	18.9%	4.6%	5.1%	2%
	P-	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	HP2021	41.5%	11.2%	27.4%	16.5%	3.4%
	HP2020	30%	12%	31%	20.3%	6.7%
	P+	43.1%	11.8%	25.1%	13.6%	6.3%
	P-	52.8%	12%	22.6%	11.2%	1.4%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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ISR total	HP2021	45.6%	6.1%	17.6%	22.7%	8.1%
	HP2020	30.3%	9%	20%	29.3%	11.3%
	P+	58.7%	6.1%	14.4%	15.7%	5%
	P-	68%	6.8%	11.5%	10.2%	3.5%

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For peer review only

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**Table 4***Severity of symptoms in ISR split by group*

scale	group	N	none	suspected	light	medium	severe
Anxiety	nursing	252	50.8%	13.5%	20.6%	11.1%	4%
	physicians	70	72.9%	10%	7.1%	7.1%	2.9%
	paramedics	211	73.9%	3.3%	17.1%	5.2%	0.5%
	Other	106	58.5%	9.4%	18.9%	9.4%	3.8%
	P-	2512	71.8%	7.2%	16.1%	4.2%	0.7%
depression	nursing	252	20.6%	7.9%	28.2%	33.3%	9.9%
	physicians	70	35.7%	17.1%	27.1%	17.1%	2.9%
	paramedics	211	37.9%	11.4%	29.9%	18%	2.8%
	Other	106	22.6%	7.5%	35.8%	26.4%	7.5%
	P-	2512	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	nursing	252	50.8%	9.5%	28.6%	7.5%	3.6%
	physicians	70	71.4%	4.3%	12.9%	8.6%	2.9%
	paramedics	211	73.9%	7.1%	10.4%	7.1%	1.4%
	other	106	59.4%	8.5%	23.6%	4.7%	3.8%
	P-	2552	75.9%	8%	12.8%	4.2%	0.7%
somatoform	nursing	252	45.2%	25.8%	9.9%	15.5%	3.6%
	physicians	70	68.6%	20%	7.1%	2.9%	1.4%
	paramedics	211	64.9%	22.7%	3.8%	7.6%	0.9%
	other	106	56.6%	21.7%	10.4%	8.5%	2.8%
	P-	2512	62.3%	12.1%	22%	3.2%	0.4%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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eating disorder	nursing	252	36.9%	10.7%	27.4%	20.2%	4.8%
	physicians	70	54.3%	8.6%	28.6%	8.6%	
	paramedics	211	45.5%	13.3%	26.1%	10.9%	4.3%
	other	106	37.7%	9.4%	28.3%	23.6%	0.9%
	P-	2512	52.8%	12%	22.6%	11.2%	1.4%
ISR total	nursing	252	34.1%	4.4%	18.3%	31%	12.3%
	physicians	70	62.9%	2.9%	15.7%	15.7%	2.9%
	paramedics	211	57.3%	10%	13.7%	15.2%	3.8%
	other	106	39.6%	4.7%	23.6%	21.7%	10.4%
	P-	2512	68%	6.8%	11.5%	10.2%	3.5%

**Table 5**

*Results of three separate ANOVAs on ISR anxiety, depression respectively total scores by time (2020 vs 2021) and profession (nursing vs physicians)*

Scale	Effect	<i>F</i>	<i>df</i> <sub>1</sub>	<i>df</i> <sub>2</sub>	<i>MSE</i>	<i>p</i>	$\hat{\eta}_G^2$
Anxiety	Time	4.55	1	498	0.85	.033	.009
	Profession	8.28	1	498	0.85	.004	.016
	time × profession	0.47	1	498	0.85	.495	.001
depression	Time	0.14	1	498	0.88	.713	.000
	Profession	28.89	1	498	0.88	< .001	.055
	time × profession	0.91	1	498	0.88	.340	.002
ISR total	Time	2.30	1	498	0.36	.130	.005
	Profession	25.36	1	498	0.36	< .001	.048
	time × profession	0.36	1	498	0.36	.546	.001

**Table 6**

*How strongly are you affected by the following aspect during the COVID-19 pandemic at your workplace? (0=not at all;4=extremely). Comparison between assessments in 2020 and 2021*

Stress Factor	2020 [8]			2021		
	N	M	SD	N	M	SD
uncertainty on duration of pandemic-related changes				632	2.93	1.15
protective measures hinder patient contact	285	2.76	1.03	623	2.69	1.09
limited contact to colleagues	287	2.18	1.13	622	2.55	1.14
protective measures hinder work processes	297	2.58	1.00	631	2.54	1.06
changes in work procedures	298	2.57	1.04	631	2.54	1.03
anxiety about infection of family members	290	2.30	1.25	589	2.17	1.30
need for childcare in own household <sup>a</sup>	091	2.36	1.51	250	1.94	1.49
bad communication of change in work procedures				589	1.84	1.22
worry that protective measures are used inadequately				584	1.76	1.19
increasing number of serious illnesses and deaths	243	1.29	1.18	548	1.76	1.19
anxiety about self-infection	285	1.78	1.18	560	1.53	1.15
fear of insufficient supply of protective measures				540	1.37	1.19
job insecurity	234	1.16	1.25	392	0.83	1.08

N=total, M=mean, SD=std. deviation

<sup>a</sup>this item was presented conditional on the response to a previous question about having children; number of children not assessed.

**Table 7**

*Frequency of responses to 'Would you like to receive psychological support to deal with the crisis?' categorized by supposed need for support based on ISR scale*

Would you seek psychological help?	in need		total
	no	yes	
No, I am fine.	184	75	259
No, I get sufficient support.	38	47	85
No, I prefer to deal with it on my own.	15	57	72
I will consider it.	16	39	55
Yes, but not psychotherapy.	3	5	8
Yes, psychotherapy.	0	5	5
no answer	35	120	155
All	291	348	639

'no' means  $ISR < 0.5$ ; 'yes' means  $ISR \geq 0.5$

**Table 8**

*Logistic regression of help seeking on Caregiver Role Identity Scale (CRIS) and Prosocialness Scale for Adults (PSA)*

Predictor	<i>B</i>	95% CI	<i>z</i>	<i>p</i>
Intercept	3.75	[-3.50, 10.12]	1.10	.271
CRIS	-1.27	[-3.14, 0.80]	-1.29	.199
PSA	-2.02	[-3.82, -0.04]	-2.13	.033*
CRIS × PSA	0.48	[-0.05, 0.97]	1.89	.059

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001



**Table 9***Standardised regression of ISR total score on subscales of Team Climate (TC)*

Predictor	<i>beta</i>	95% CI	<i>t</i>	<i>Df</i>	<i>p</i>
TC1 (not ashamed)	-0.46	[-0.53, -0.40]	-13.58	636	< .001***
TC2 (open communication)	-0.22	[-0.29, -0.15]	-6.51	636	< .001***

*Note.* *beta* = standardized regression coefficient; CI = confidence interval;  
 $*p < .05$ ,  $**p < .01$ ,  $***p < .001$ ,  $R^2 = .321$ , adjusted  $R^2 = .319$ ,  $F(2, 636) = 150.55$ ,  $p < .001$

## Supplementary Materials

**Table S1***Severity of symptoms in ISR split by gender (4 participants did not indicate their gender)*

scale	gender	N	none	suspected	light	medium	severe
anxiety	female	381	55.4%	10.8%	19.7%	10.2%	3.9%
	male	254	72%	6.7%	14.6%	5.9%	0.8%
depression	female	381	24.1%	8.4%	29.1%	31.2%	7.1%
	male	254	34.6%	12.6%	30.3%	16.9%	5.5%
compulsion	female	381	57.5%	8.7%	23.6%	7.3%	2.9%
	male	254	68.9%	7.1%	14.6%	6.7%	2.8%
somatoform	female	381	53.3%	23.1%	8.9%	11.5%	3.1%
	male	254	59.8%	24.4%	5.9%	8.7%	1.2%
eating disorder	female	381	36.7%	8.9%	30.7%	18.6%	5%
	male	254	49.2%	14.6%	22%	13%	1.2%
ISR total	female	381	38.8%	5.8%	18.6%	25.7%	11%
	male	254	56.3%	6.3%	15.4%	18.1%	3.9%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S2***Severity of symptoms in ISR split by age*

scale	age	N	none	suspected	light	medium	severe
anxiety	<30	206	57.3%	6.3%	19.4%	12.1%	4.9%
	30-41	162	55.6%	13%	21%	8%	2.5%
	42-53	147	62.6%	11.6%	17.7%	6.8%	1.4%
	>53	124	75.8%	6.5%	11.3%	4.8%	1.6%
depression	<30	206	24.3%	4.9%	32.5%	26.2%	12.1%
	30-41	162	24.1%	12.3%	27.8%	30.9%	4.9%
	42-53	147	31.3%	12.2%	27.2%	25.9%	3.4%
	>53	124	37.1%	12.9%	30.6%	16.1%	3.2%
compulsion	<30	206	58.3%	9.7%	18.9%	8.7%	4.4%
	30-41	162	63%	8%	18.5%	7.4%	3.1%
	42-53	147	63.3%	5.4%	21.8%	8.2%	1.4%
	>53	124	64.5%	8.9%	21.8%	3.2%	1.6%
somatoform	<30	206	50.5%	25.2%	7.3%	13.1%	3.9%
	30-41	162	56.8%	27.8%	6.8%	7.4%	1.2%
	42-53	147	59.2%	17%	8.8%	12.9%	2%
	>53	124	59.7%	22.6%	8.9%	7.3%	1.6%
eating disorder	<30	206	43.7%	10.2%	25.2%	18%	2.9%
	30-41	162	35.2%	14.8%	26.5%	17.9%	5.6%
	42-53	147	37.4%	12.9%	27.9%	17.7%	4.1%
	>53	124	50.8%	6.5%	31.5%	10.5%	0.8%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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ISR total	<30	206	39.3%	7.8%	17%	24.3%	11.7%
	30-41	162	40.7%	4.9%	21%	25.9%	7.4%
	42-53	147	51%	4.1%	13.6%	23.8%	7.5%
	>53	124	55.6%	6.5%	18.5%	15.3%	4%

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**Table S3***Multiple regression of ISR depression scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.37	[0.12, 0.61]	2.93	.003
changes in work procedures	0.09	[0.02, 0.16]	2.53	.012*
protective measures hinder work processes	0.11	[0.03, 0.18]	2.93	.004**
protective measures hinder patient contact	0.03	[-0.04, 0.09]	0.77	.439
limited contact to colleagues	0.01	[-0.05, 0.07]	0.35	.723
anxiety about self-infection	0.00	[-0.07, 0.07]	0.07	.943
anxiety about infection of family members	0.15	[0.09, 0.22]	4.65	< .001***
job insecurity	0.28	[0.21, 0.36]	7.68	< .001***
increasing number of serious illnesses and deaths	-0.01	[-0.07, 0.05]	-0.42	.673

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.204$ , adjusted  $R^2 = 0.194$ ,  $F(8,619) = 19.86$ , *p* < .001

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S4***Multiple regression of ISR anxiety scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.24	[0.01, 0.46]	2.08	.038
changes in work procedures	0.01	[-0.05, 0.08]	0.33	.743
protective measures hinder work processes	0.05	[-0.02, 0.11]	1.45	.148
protective measures hinder patient contact	0.00	[-0.06, 0.06]	-0.13	.895
limited contact to colleagues	0.00	[-0.05, 0.06]	0.14	.885
anxiety about self-infection	0.03	[-0.03, 0.10]	1.05	.295
anxiety about infection of family members	0.10	[0.04, 0.16]	3.28	.001**
job insecurity	0.17	[0.10, 0.24]	5.01	< .001***
increasing number of serious illnesses and deaths	-0.01	[-0.06, 0.04]	-0.41	.680

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.098$ , adjusted  $R^2 = 0.087$ ,  $F(8,619) = 8.43$ ,  $p < .001$

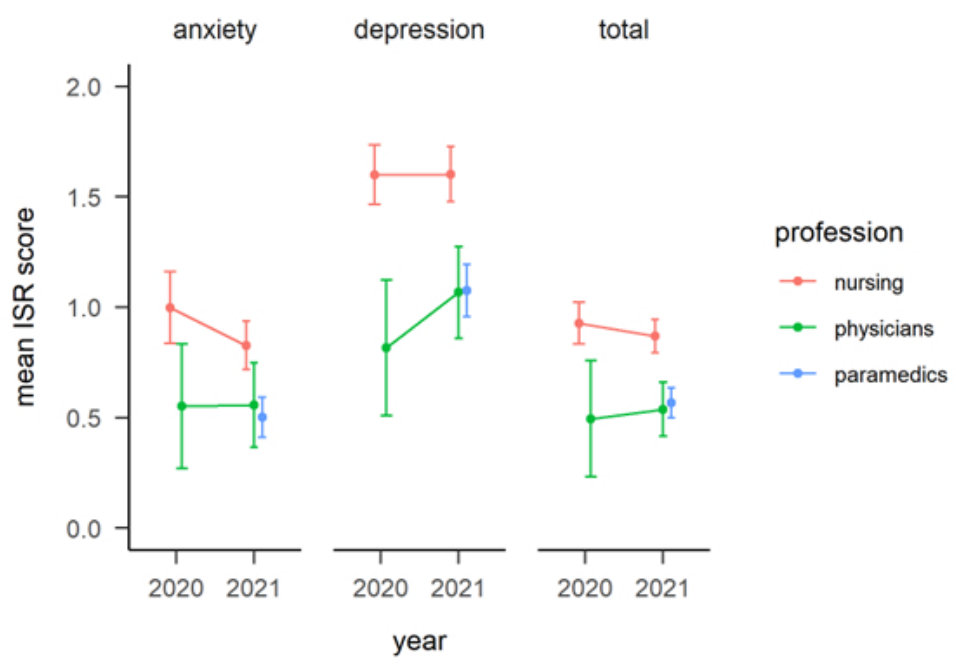


Figure 1. Comparison of mental health scores across professions and years.

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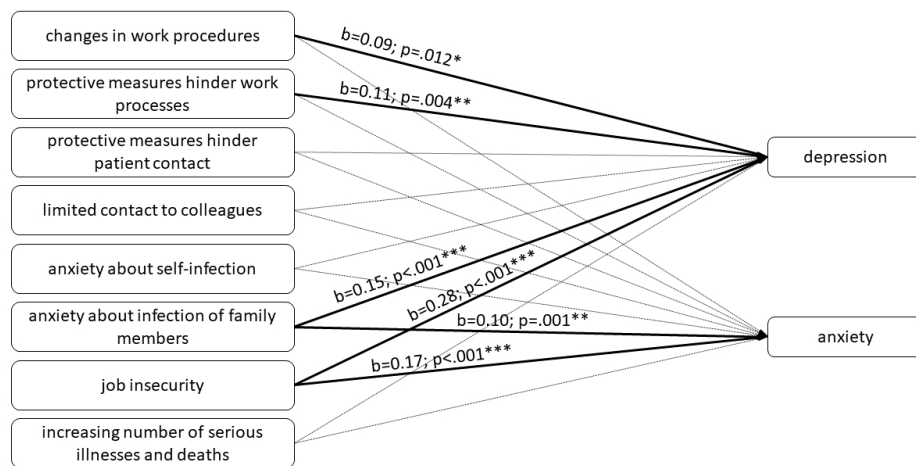


Figure 2. . Results of two multiple regressions on stress factors.

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## Supplementary Materials

Table S1

*Severity of symptoms in ISR split by gender (4 participants did not indicate their gender)*

scale	gender	N	none	suspected	light	medium	severe
anxiety	female	381	55.4%	10.8%	19.7%	10.2%	3.9%
	male	254	72%	6.7%	14.6%	5.9%	0.8%
depression	female	381	24.1%	8.4%	29.1%	31.2%	7.1%
	male	254	34.6%	12.6%	30.3%	16.9%	5.5%
compulsion	female	381	57.5%	8.7%	23.6%	7.3%	2.9%
	male	254	68.9%	7.1%	14.6%	6.7%	2.8%
somatoform	female	381	53.3%	23.1%	8.9%	11.5%	3.1%
	male	254	59.8%	24.4%	5.9%	8.7%	1.2%
eating disorder	female	381	36.7%	8.9%	30.7%	18.6%	5%
	male	254	49.2%	14.6%	22%	13%	1.2%
			%				%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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ISR total	female	381	38.8%	5.8%	18.6%	25.7%	11
							%
	male	254	56.3%	6.3%	15.4%	18.1%	3.9
							%

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## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S2***Severity of symptoms in ISR split by age*

scale	age	N	none	suspecte d	light	mediu m	sever e
anxiety	<30	206	57.3%	6.3%	19.4%	12.1%	4.9%
	30-41	162	55.6%	13%	21%	8%	2.5%
	42-53	147	62.6%	11.6%	17.7%	6.8%	1.4%
	>53	124	75.8%	6.5%	11.3	4.8%	1.6%
					%		
depression	<30	206	24.3%	4.9%	32.5%	26.2%	12.1
							%
	30-41	162	24.1%	12.3%	27.8%	30.9%	4.9%
	42-53	147	31.3%	12.2%	27.2%	25.9%	3.4%
	>53	124	37.1%	12.9%	30.6%	16.1	3.2%
						%	
compulsion	<30	206	58.3%	9.7%	18.9%	8.7%	4.4%
	30-41	162	63%	8%	18.5%	7.4%	3.1%
	42-53	147	63.3%	5.4%	21.8%	8.2%	1.4%
	>53	124	64.5	8.9%	21.8%	3.2%	1.6%
			%				
somatoform	<30	206	50.5%	25.2%	7.3%	13.1	3.9%
						%	
	30-41	162	56.8%	27.8%	6.8%	7.4%	1.2%
	42-53	147	59.2%	17%	8.8%	12.9%	2%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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	>53	124	59.7	22.6%	8.9%	7.3%	1.6%
			%				
eating	<30	206	43.7%	10.2%	25.2%	18%	2.9%
disorder	30-41	162	35.2	14.8%	26.5	17.9%	5.6%
			%		%		
	42-53	147	37.4%	12.9%	27.9%	17.7%	4.1%
	>53	124	50.8%	6.5%	31.5%	10.5%	0.8%
ISR total	<30	206	39.3%	7.8%	17%	24.3%	11.7
							%
	30-41	162	40.7%	4.9%	21%	25.9%	7.4%
	42-53	147	51%	4.1%	13.6%	23.8%	7.5%
	>53	124	55.6%	6.5%	18.5%	15.3%	4%

**Table S3***Multiple regression of ISR depression scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (61 9)	<i>p</i>
Intercept	0.37	[0.12, 0.61]	2.93	.003
changes in work procedures	0.09	[0.02, 0.16]	2.53	.012*
protective measures hinder work processes	0.11	[0.03, 0.18]	2.93	.004**
protective measures hinder patient contact	0.03	[-0.04, 0.09]	0.77	.439
limited contact to colleagues	0.01	[-0.05, 0.07]	0.35	.723
anxiety about self-infection	0.00	[-0.07, 0.07]	0.07	.943
anxiety about infection of family members	0.15	[0.09, 0.22]	4.65	< .001***
job insecurity	0.28	[0.21, 0.36]	7.68	< .001***
increasing number of serious illnesses and deaths	- 0.01	[-0.07, 0.05]	- 0.42	.673

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.204$ , adjusted  $R^2 = 0.194$ ,  $F(8,619) = 19.86$ , *p* < .001

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S4***Multiple regression of ISR anxiety scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.24	[0.01, 0.46]	2.08	.038
changes in work procedures	0.01	[-0.05, 0.08]	0.33	.743
protective measures hinder work processes	0.05	[-0.02, 0.11]	1.45	.148
protective measures hinder patient contact	0.00	[-0.06, 0.06]	-0.13	.895
limited contact to colleagues	0.00	[-0.05, 0.06]	0.14	.885
anxiety about self-infection	0.03	[-0.03, 0.10]	1.05	.295
anxiety about infection of family members	0.10	[0.04, 0.16]	3.28	.001**
job insecurity	0.17	[0.10, 0.24]	5.01	<
				.001***
increasing number of serious illnesses and deaths	-0.01	[-0.06, 0.04]	-0.41	.680

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.098$ , adjusted  $R^2 = 0.087$ ,  $F(8,619) = 8.43$ ,  $p < .001$

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**The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.**

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
<b>Title and abstract</b>					
	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	In title and abstract, pp.1-2	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included.  RECORD 1.2: If applicable, the geographic region and time and place within which the study took place should be reported in the title or abstract.  RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	
<b>Introduction</b>					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	pp.4-7		
Objectives	3	State specific objectives, including any prespecified hypotheses	p.7		
<b>Methods</b>					
Study Design	4	Present key elements of study design early in the paper	p.7		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	p.7-10		

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<p>Participants</p>	<p>6</p>	<p>(a) <i>Cohort study</i> - Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  <i>Case-control study</i> - Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  <i>Cross-sectional study</i> - Give the eligibility criteria, and the sources and methods of selection of participants</p> <p>(b) <i>Cohort study</i> - For matched studies, give matching criteria and number of exposed and unexposed  <i>Case-control study</i> - For matched studies, give matching criteria and the number of controls per case</p>	<p>p.9</p>	<p>RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided.</p> <p>RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided.</p> <p>RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.</p>	
<p>Variables</p>	<p>7</p>	<p>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.</p>	<p>pp.8-10</p>	<p>RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.</p>	
<p>Data sources/ measurement</p>	<p>8</p>	<p>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</p>	<p>pp.8-15</p>		

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	Bias	9	Describe any efforts to address potential sources of bias	p.11	
	Study size	10	Explain how the study size was arrived at	p.9	
	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	pp.10-15	
	Statistical methods	12	<p>(a) Describe all statistical methods, including those used to control for confounding</p> <p>(b) Describe any methods used to examine subgroups and interactions</p> <p>(c) Explain how missing data were addressed</p> <p>(d) <i>Cohort study</i> - If applicable, explain how loss to follow-up was addressed</p> <p><i>Case-control study</i> - If applicable, explain how matching of cases and controls was addressed</p> <p><i>Cross-sectional study</i> - If applicable, describe analytical methods taking account of sampling strategy</p> <p>(e) Describe any sensitivity analyses</p>	pp.10-15	
	Data access and cleaning methods		..	RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	pp.10-15

				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	
Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	p.10
<b>Results</b>					
Participants	13	(a) Report the numbers of individuals at each stage of the study ( <i>e.g.</i> , numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	pp.10-15	RECORD 13.1: Describe in detail the selection of the persons included in the study ( <i>i.e.</i> , study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	pp.10-15
Descriptive data	14	(a) Give characteristics of study participants ( <i>e.g.</i> , demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) <i>Cohort study</i> - summarise follow-up time ( <i>e.g.</i> , average and total amount)	pp.9-10		
Outcome data	15	<i>Cohort study</i> - Report numbers of outcome events or summary measures over time <i>Case-control study</i> - Report numbers in each exposure	pp.10-15		

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		category, or summary measures of exposure <i>Cross-sectional study</i> - Report numbers of outcome events or summary measures			
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	pp.10-15		
Other analyses	17	Report other analyses done— e.g., analyses of subgroups and interactions, and sensitivity analyses	pp.10-15		
<b>Discussion</b>					
Key results	18	Summarise key results with reference to study objectives	pp.10-19		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	p.19	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	p.19
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	pp.10-19		

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		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence			
Generalisability	21	Discuss the generalisability (external validity) of the study results	pp.10-19		
<b>Other Information</b>					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	p.20		
Accessibility of protocol, raw data, and programming code		..	p.20	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data or programming code.	p.20

\*Reference: Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langman SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

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# BMJ Open

## Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1st and 2nd pandemic year

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4 **Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a**  
5 **comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**  
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**Abstract**

Healthcare staff have been facing particular mental health challenges during the COVID-19-pandemic. Building on a first study at the beginning of the pandemic in March 2020, we aimed to investigate among healthcare professionals in Germany and Austria (1) how mental health may have changed in professionals over the course of the ongoing pandemic, (2) whether there are differences between different professional groups regarding mental health, (3) which stress factors may explain these mental health outcomes, and (4) whether help-seeking behaviour is related to caretaker self-image or team climate. Between March and June 2021, N=639 healthcare professionals completed an online survey including the ICD-10 Symptom Rating checklist (ISR), event-sampling questions on pandemic-related stressors and self-formulated questions on help-seeking behaviour and team climate. Findings were analysed using t-tests, regressions and comparisons to a sample of healthcare professionals assessed in 2020 as well as to norm samples. Results show that mental health symptoms, particularly for depression and anxiety, persist among healthcare staff in the second pandemic year, that symptom prevalence rates are higher among nursing staff compared to physicians and paramedics, and that team climate is associated with mental health outcomes. Implications of these findings in relation to the persisting pandemic and its aftermath are discussed.

*Keywords:* Pandemics; Frontline and Essential Workers; Healthcare Staff; Mental Health; Nursing Staff; Help-Seeking Behaviour; COVID-19



### Strengths and limitations of this study

- The first study that compared healthcare professionals' mental health over a longer period of time during the COVID-19-pandemic (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021)
- The study involves and compares between participants from various professions in the healthcare sector.
- The study investigates several potentially relevant factors for mental health of healthcare professionals including help-seeking behaviour and caretaker self-image, as well as team climate using established and validated scales such as the ICD-10 Symptom Rating checklist (ISR), the Caregiver Role Identity Scale (CRIS) and the Prosocialness Scale for Adults (PSA)
- Data are cross-sectional which limits the possibility of making causal claims.
- Data may be biased by self-selection: the healthcare workers suffering the most may not have participated and thus the high prevalence rates observed may underestimate the actual psychological strain.

**Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**

It is well established by now that healthcare staff has been seriously affected by the COVID-19-pandemic [1,2]. A series of meta-analyses consistently showed that the prevalence of psychological disorders in health professionals is elevated. In particular, symptoms of depression, anxiety and distress [3], as well as insomnia [4] are significantly higher than before the beginning of the COVID-19 pandemic.

**Unknown factors: long-term consequences and differential effects across professional groups**

As the pandemic and the complex psychological strain accompanying it persist, it is especially worrying that the potential long-term consequences of this situation are unknown. On the individual level, being exposed to extreme psychological strain for a prolonged time may result in lasting negative consequences; acute conditions developed as a response to these stressors can become chronic, and psychological conditions may entail physiological comorbidities [5]. If the affected individuals are healthcare staff, these individual consequences can have further devastating effects on national healthcare systems. Increasing sickness absence rates and a rising number of people resigning and seeking out other careers might ensue. This would further exacerbate existing issues brought on by staff shortage and worsen working conditions, thus creating a vicious cycle for the remaining staff. This as well as increased exhaustion and reduced resilience among the remaining staff would result in decreasing quality of patient care [6,7].

So far, findings on the development of mental health symptoms in healthcare professionals over time during the pandemic have been inconsistent, with some studies showing increasing levels [8] while others find decreasing levels of symptoms [9,10]. However, these studies considered changes in mental health for short periods of time only,

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3 and – to our knowledge – there are no studies yet investigating the development of mental  
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6 health over more than a couple of months  
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8         A group that has been investigated more intensively than other professional groups is  
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10 nursing staff, which is known to be exposed to staff shortages and extreme workload [6].  
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12 Such difficulties resulting in lowered resources regarding time and emotional capacities are  
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14 bound to reduce the quantity and quality of social support due to decreased opportunities to  
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16 offer it; this decrease in social support is, in turn, likely to further worsen capabilities for  
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18 coping with these stressors and other difficulties, creating a downward spiral. However, the  
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20 healthcare sector consists of multiple professional groups whose working conditions differ,  
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22 potentially resulting in differential effects caused by pandemic changes. For example, nurses  
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24 and physicians at the same hospital share their work environment while taking on different  
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26 tasks with distinct responsibilities and demands. By comparison, paramedics are mobile  
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28 rather than stationary. They work under high levels of stress, as the nature of their work  
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30 consists of unpredictable and emergency situations, and they might be at higher risk of  
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32 contracting COVID-19 [11]. While doctors and nurses stay with a patient for a prolonged  
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34 time and will typically know the progression of the illness or condition and the treatment  
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36 outcome, paramedics respond to emergencies and hence have contact with more patients for  
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38 shorter periods of time, without knowing the patients' treatment outcomes. This may be  
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40 associated with psychological advantages and disadvantages [12]. Knowledge about the  
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42 differential effects of the pandemic on professional groups within the healthcare sector is  
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44 important for identifying the most vulnerable groups and tailoring support structures to their  
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46 particular needs. However, this has not yet been investigated in the existing pandemic-related  
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48 literature. For instance, a rapid review on mental health during the COVID-19 pandemic was  
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50 not able to identify studies comparing nursing staff with primary care staff [13].  
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### 58 **Help-seeking behaviour in the face of mental health problems**

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4 While there are well known and efficient treatments for various mental disorders,  
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6 healthcare professionals hesitate to seek help for psychological suffering. This was evident  
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8 before the pandemic [14] and reconfirmed during the pandemic [3]. Professionals' self-image  
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10 may play a major role in the hesitancy to seek help. If people see themselves as a care giver  
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12 (Caregiver Role Identity Scale, *CRIS*), they might be less likely to seek help for themselves,  
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14 as they do not identify as a person in need of help but rather as one giving help and they may  
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16 regard these roles as mutually exclusive [15]. This caregiver self-image can be expected to  
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18 reflect both attitudes – that is, self-concept – as well as behaviour. In other words, people who  
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20 view themselves strongly as caregivers are expected to have a higher propensity to display  
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22 prosocial behaviour.  
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26 Furthermore, all types of stigma negatively influence potential help-seeking [16] and  
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28 there appears to be stigma attached to mental illness within the medical professions [17]. This  
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30 stigma is linked to the social perception of an invincible doctor [18], strength and self-  
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32 sacrifice. Fear of stigmatisation strongly discourages healthcare professionals from help-  
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34 seeking behaviour despite frequently reported mental health problems [16,18]. The fear of  
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36 stigma in this context includes fear of negative career impact, fear of prejudice, lack of  
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38 confidentiality, and fear of being perceived as weak [17]. The idea of not showing weakness,  
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40 in particular, comes with the ideal of self-sacrifice, of putting patients and others before one's  
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42 own needs and ideally not expressing those needs. Not speaking up about suboptimal  
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44 conditions, problems or mental health issues due to these fears may lead to a climate of  
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46 silence within the team and have detrimental effects that extend well beyond the individual  
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48 [19,20]. A team climate pervaded by a general expectation to prioritize patient care before  
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50 personal well-being and to refrain from acts that could be interpreted as displaying weakness,  
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52 such as seeking professional help [14], could be a crucial factor inhibiting help-seeking  
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60 behaviour.

### Study aims

Using a comparative investigative approach, we collected new data and compared these to a first study [3] in an effort to understand (I) how mental health may have changed in healthcare professionals over the course of the pandemic, and (II) whether the same stress factors which were significantly related to psychological strain in 2020 [3] were still the major impacting factors for healthcare professionals' mental health in 2021, (III) whether there are differences between different professional groups regarding mental health, and (IV) whether help-seeking is related to caretaker self-image and team climate. Specifically, we expected that (H1a) mental health problems among healthcare staff would have decreased with the adaptation to the pandemic (habituation hypothesis) or that (1b) they would have increased due to exhaustion resulting from the persistent stress (wear-out hypothesis). We further expected that (H2) nursing staff's mental health would be more affected than that of other professional groups, paralleling the results from the first study [3] and that (H3) paramedics' mental health would be more affected than physicians'. We also hypothesised that (H4) decreased likelihood to seek help would be positively related to stronger caretaker self-image (CRIS) as well as more prosocial behaviour (measured as the behavioural parallel to the purely attitudinal self-image) and that (H5) a positive team climate would facilitate better mental health outcomes and (H6) increase the likelihood of help-seeking.

### Method

We conducted a cross-sectional online survey on mental well-being, perceived pandemic-related stress factors and help-seeking behaviour among medical professionals.

### Measures

The survey took about 15 minutes to complete and started with a section on demographics followed by basic facts about the features of participants' work, such as whether they had contact with COVID-19-patients and whether their working hours had changed during the pandemic.

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In the subsequent section, participants were presented with a list of potential stress factors based on the previous study [3]. They were asked to rate the extent to which they were affected by each stress factor on a 5-point ordinal scale (*not at all* to *extremely* or *does not apply*). Following this, mental well-being was measured with the self-report questionnaire ICD-10 Symptom Rating (ISR) [21] including 29 items forming subscales for depression, anxiety, eating disorders, obsessive compulsive disorder, and somatoform disorder symptoms as well as an *extra*-subscale with various additional symptoms. As the ISR is intended for clinical diagnostic use, the *extra*-subscale contains miscellaneous individual symptoms and pieces of information which do not constitute a disorder by themselves but should indicate to the clinician that further exploration is needed; the items include symptoms of depersonalisation and derealization, sexual disorders, external stressors and past physical head traumas. This subscale is part of the standard ISR interpretation. The item-ratings on a 5-point ordinal scale (from 0 - *does not apply* to 4 - *extremely*) are averaged to compute subscale scores as well as a total score. The internal consistency and retest reliability of the ISR scales have been demonstrated to be good [22].

We chose the ISR because there is a large non-clinical German norm sample available which was assessed before the pandemic (P-) [21]. We hence refer to it as reference group  $R_{P-}$ . As a second reference group, we included a large sample of the general public assessed at the peak of the first pandemic-wave (P+) in Germany [23], reference group  $R_{P+}$ . We were also able to compare our data to a sample of healthcare professionals  $R_{HP2020}$  that we assessed at the beginning of the pandemic, i.e., one year before the current sample [3].

Following the mental health section, we explored help-seeking behaviour and intentions. To this end, we assessed whether participants had sought help for the psychological strain they had experienced and why or, if they had not, whether they would like to do so in the future and why or why not. Moreover, we assessed the extent of participants' self-image as a caregiver, their propensity for prosocial behaviour, as well as perceived team climate and the extent to which the team climate allows or sanctions seeking help and admitting to mental health problems. We measured the first two constructs using German translations of the Caregiver Role Identity Scale (CRIS) [24] and the Prosocialness

Scale for Adults (PSA) [25]. We assessed team climate with a set of 17 items that referred to how participants perceived the communication among colleagues (e.g., “*My colleagues talk to me about their worries and issues*”) and social comparisons among colleagues regarding strength and resilience in the face of difficulties (e.g., “*My colleagues can deal with issues better than I do*”).

### Sample

As we aimed for a large-scale survey and were interested in examining simple correlations rather than testing treatment effects or causalities across time, we did not aim for a predefined sample size; instead, our goal was maximum recruitment, i.e., finding as many participants as possible within our predefined time frame. Participants were recruited through healthcare providers, unions, a press release and personal contacts between 15 March and 6 June 2021 in Germany, Austria and the German speaking regions of Switzerland. In Austria, safety-measures had been lifted in February, with a new wave of infections starting in March 2021; in April, some Austrian states (Vienna, Lower Austria, Burgenland) introduced a new lockdown which lasted several weeks. During this period, testing capacities were expanded massively across the country and the vaccination campaign was picking up pace, with roughly 40 % of the vaccinateable population being vaccinated at least once until mid-May [26].

Similarly, in Germany, safety measures were lifted at the beginning of March, with a new wave of infections and the reintroduction of lockdown measures by the end of the month, in parallel to the roll-out of a national vaccination campaign [27]. The wave peaked mid-April, reaching a new high of intensive care unit (ICU) cases. In May, case numbers started to drop again, accompanied by an increasing vaccination rate and the reduction of safety measures

To be included in our study, participants were required to work in one of the areas of the healthcare sector, either in private or in public institutions. This included professional groups such as medical and nursing staff as well as social workers, midwives, pharmacists, physical therapists, physiotherapists, psychologists, psychotherapists. If none of these categories applied, participants had the option “other”, under which they could specify their profession. Participants were excluded if they did not work in any area of healthcare or if they did not complete all the required fields. As the invitation to participate was circulated through



various channels, the exact response rate could not be determined. However, out of 993 respondents who answered at least one question we had to remove 354 records (36 %) because they did not meet all the inclusion criteria.

Participants gave their informed consent for participation in the study and for electronic storage of their responses. Along with their responses, no personally identifiable information was collected. Ethical approval was granted by the PFH Private University of Applied Sciences Göttingen review board (application: SW\_5\_090920).

#### TABLE 1 HERE

In total we recruited 639 participants from Austria (n=476), Germany (n=161) and Switzerland (n=2) working in more than 13 different professions in healthcare (see Table 1).

### **Public Involvement**

The design of the survey was informed by five semi-structured interviews with nursing staff on the barriers they were facing at their workplace as well as the reasons for seeking or not seeking help. The participants were provided with the contact information of the leading researcher at the beginning and the end of the survey, where they could request a summary of the study results by sending an email. Moreover, organizations and employers in the healthcare sector who helped with recruitment by disseminating the survey amongst their employees or members also received a summary on completion of the data collection.

### **Analysis**

All analyses were conducted using the statistics software R (Version 4.2.0) [28] in RStudio [29] and numerous helper packages. Aside from basic descriptive statistics, ANOVAs, t-tests and chi-square tests were computed to compare groups. After checking for the test prerequisites, multiple linear regressions were conducted to estimate the importance of stress factors, and binary logistic regression was used to estimate odds ratios for help-seeking. We applied a level of significance of 5% for inferential tests. In order to reduce the risk of alpha



error inflation we corrected all p-values using the Benjamini-Hochberg procedure. All the core analyses considered the complete dataset, while participants with missing values in non-essential measures, e.g., barriers to help-seeking, were excluded from analysis where appropriate. We did not rebalance the sample by weighting for membership in professional groups or other characteristics, but report the results as is. When reporting statistical results we use abbreviations as suggested by the guidelines of the American Psychological Association (APA), e.g., M for mean and SD for standard deviation.

## Results

### Mental health

Prior to analysing the ISR scores, we examined their internal consistency. The results were almost identical to previous findings, with Cronbach's  $\alpha$  ranging from  $\alpha = 0.76$  to  $\alpha = 0.87$  for the subscales and  $\alpha = 0.94$  for the total scale.

The observed severity of clinical symptoms was high on all five scales (see Table 2). In particular, depression and anxiety symptoms were reported with unexpectedly high severity, with 6.5% reporting severe depression symptoms and another 55% light to medium symptoms. A total of 29% reported at least light symptoms of anxiety. A split by gender of these results is shown in Table S1 and S2 in the Supplement.

TABLE 2 HERE

For all symptom scales, healthcare professionals scored significantly higher than the reference group  $R_{P-}$  before the pandemic ( $df \geq 797.34$ ,  $t \geq 3.29$ ,  $p < .001$ ). The comparison between the samples of 2020 and 2021 showed support for the habituation hypothesis H1a: When controlling for profession there were no significant changes from 2020 to 2021 on the overall ISR scores ( $F(1, 496) = 0.003$ ,  $p = .952$ ), nor in the depression scores ( $F(1, 496) = 1.00$ ,  $p = .465$ ), or in the anxiety scores ( $F(1, 496) = 0.40$ ,  $p = .660$ ). However, healthcare professionals continued to display significantly more symptoms than the general population reference group during the pandemic ( $R_{P+}$ ) on both the depression scale ( $\Delta M = 0.32$ , 95% CI

[0.24, 0.41],  $t(2411) = 7.64, p < .001$ ) and the anxiety scale ( $\Delta M = 0.12, 95\% \text{ CI } [0.04, 0.2]$ ,  $t(1168.2) = 3.06, p = .005$ ). Although this comparison is limited by the fact that the general population pandemic reference group was assessed during the first wave of the pandemic while our data were collected during the third wave, this suggests that healthcare professionals' psychological strain cannot be explained by lockdown measures alone. Most notably, their rate of severe symptoms was significantly higher on both the depression scale ( $\chi^2(1, N = 2285) = 520.91, p < .001$ ) and the anxiety scale ( $\chi^2(1, N = 2338) = 513.78, p < .001$ ).

### **Mental health by profession**

We compared mental health scores of the three major professional groups in our sample, i.e., nurses, physicians and paramedics, representing about 78% of all participants (see Table 3).

TABLE 3 HERE

While physicians and paramedics scored similarly regarding anxiety, depression and total ISR scale, nurses scored significantly higher, providing evidence for our H2. This was supported by three 2-factor ANOVAs considering both profession and time (see Tables 4 and Figure 1). However, contrary to our H3, there was no significant difference between paramedics and physicians.

TABLE 4 HERE

FIGURE 1 HERE

### **Stress factors**

Next, we investigated to what extent the individual stress factors contributed to anxiety and depression. A multiple regression of ISR depression scores on the eight stress factors ( $R^2 = 0.205, F(8,616) = 19.83, p < .001$ ) showed that *job insecurity* was the most influential but simultaneously rarest predictor of depression symptoms (see Figure 2). That is, on average participants felt almost unaffected by job insecurity ( $M = 0.83, SD = 1.08$  on scale from 0 to 4), but for those who did experience job insecurity, higher levels of job insecurity were strongly associated with psychological symptoms. *Anxiety about infection of family members* and *protective measures that hinder work processes* also predicted the level of

depression symptoms. Regressing ISR anxiety scores on these stress factors ( $R^2 = 0.097$ ,  $F(8,616) = 8.27$ ,  $p < .001$ ) revealed a similar picture, with *job insecurity* and *anxiety about infection of family members* both positively associated with anxiety symptoms (see Figure 2 and Tables S3-S4 in the supplement).

[INSERT FIGURE 2]

Professionals with direct patient contact ( $M = 0.71$ ) did not differ from those in administration (categorized based on profession,  $M = 0.8$ ,  $t(74.5) = 1.03$ ,  $p = .921$ ,  $1 - \beta(d = 0.5) = 0.98$ ) in terms of symptom severity. However, people with pre-existing medical conditions were significantly more anxious ( $M_{yes} = 0.9$ ,  $M_{no} = 0.6$ ,  $t(293.3) = 3.85$ ,  $p < .001$ ) and reported more severe symptoms overall ( $M_{yes} = 0.92$ ,  $M_{no} = 0.64$ ,  $t(290.3) = 5.16$ ,  $p < .001$ ) than those without such conditions putting them at heightened risk during the pandemic.

Paralleling our previous results [3], participants reported that they were most affected by the uncertain duration of pandemic-related changes and by protective measures to avoid spreading the virus impeding their contact with the patients and work processes in general. The pandemic also led to various changes in work procedures which persisted one year after its beginning, as did the severe limitations of contact to colleagues. Table 5 provides an overview of the stress factors and their respective mean effects.

TABLE 5 HERE

### Help-Seeking

While the majority of participants described themselves as experiencing symptoms of depression and anxiety, most declined when asked whether they would like to receive psychological support to deal with the crisis (see Table 6). Out of the 639 participants, 348 (54%) scored 0.5 or higher on the ISR total scale, which would give them a *suspected* clinical diagnosis or more severe; and yet only 49 (14%) of these participants said that they would consider seeking psychological support. Participants with higher ISR scores were more likely to seek help ( $b = 1.21$ ,  $OR = 3.35$ ,  $z = 5.41$ ,  $p < .001$ ).

TABLE 6 HERE

Healthcare professionals gave various reasons for not seeking help in spite of severe psychological symptoms. 142 (41%) of the 348 participants whose symptoms were severe enough to supposedly warrant psychological support claimed that others needed the support more urgently. 86 (25%) did not know any suitable support services. 85 (25%) did not perceive themselves as distressed enough to require support (in spite of their reported symptom severity). Finally, 81 (23%) reported lacking the time to seek help. The majority – 84 % of all participants and 83% of those who supposedly needed help – indicated that they had sufficient social support outside the workplace.

Contrary to our expectation (H4), neither the caregiver self-image (CRIS) nor the level of prosocialness (PSA) predicted whether a person would seek help. Accordingly, the goodness of fit of this predictive model is low (*McFadden pseudo*  $R^2 = 2.2\%$ ), implying that there are better predictors for help-seeking behaviour than those included in our model.

### Team Climate

We assessed the quality of all items of the team climate scale and removed four items due to high difficulty or low discrimination. A Kaiser-Meyer-Olkin factor adequacy of  $MSA = .773$  indicated that the scale comprises subscales. Both a scree plot and the Kaiser-Guttman criterion suggested a two-factor solution. A subsequent factor analysis with varimax rotation revealed two clearly distinct components. The first factor (TC1) refers to social comparisons with co-workers in terms of strength and resilience to strain (or the lack thereof), while the second factor (TC2) refers to open communication among colleagues. Both subscales (*Cronbach's*  $\alpha_{TC1} = .80$ ;  $\alpha_{TC2} = .76$ ), as well as the total work culture scale ( $\alpha = .79$ ) had good internal reliability.

Using this scale, team climate was a good predictor of participants' mental well-being. Both a low tendency to evaluate social comparisons of one's own resilience with co-workers negatively (TC1) and open communication among colleagues (TC2) seem to have influence on the reported symptoms (ISR total) as illustrated by a standardised regression (Table 7). Those working in a positive team climate had significantly better mental health, confirming our H5.

Does team climate also predict whether a person is willing to seek help for mental health issues? A logistic regression among those who supposedly need help ( $ISR \geq 0.5$ ) revealed that the TC1 scale (social comparisons) had a slightly negative impact on the likelihood to seek help ( $OR = 0.93, p = .048$ ), while subscale TC2 was not significantly related to help seeking ( $p = .354$ ). However, the goodness of fit of this model is low ( $McFadden\ pseudo\ R^2 = 3.2\%$ ), thus not providing sufficient evidence for our H6.

TABLE 7 HERE

### Discussion

Consistent with reports from other countries [1, 30, 31, 32, 33, 34], healthcare professionals in Germany, Austria and Switzerland reported high levels of depression and anxiety during the continuation of the pandemic. The scores were similar to those reported in another German sample [35] assessed under more severe lockdown conditions. Moreover, comparisons show that mental stress levels of healthcare staff were consistently above those reported by a general population sample during the pandemic; nevertheless, reported help-seeking behaviour and intentions were low.

#### Mental health in 2020 and 2021

The high prevalence of psychological disorders among healthcare professionals observed at the beginning of the pandemic [3] continues in our sample one year onwards. Studies on the mental health effects of the COVID-19 pandemic on healthcare staff from other countries conducted at the beginning of the pandemic in 2020 [37] place the prevalence of severe symptoms between 2.2% and 14.5% [38]. The results of both Weibelzahl et al. [3] and the present study are in line with this. While at the beginning societies across the globe were made aware of the crucial importance of healthcare workers, resulting in abundant expressions of appreciation for *essential workers* – with frontline medical staff representing a key group – this attention slowly dwindled as the pandemic lingered on. The psychological strain, however, persisted. Crucially, we also found that those healthcare workers who suffer from a pre-existing medical condition and are thus at a heightened risk during a pandemic continued to suffer from significantly higher psychological strain than others. Seeing as

public concern for “risk groups” also dwindled away as the pandemic continued, this subgroup of healthcare staff requires particular attention and support as they are affected by intersecting stressors.

Research findings are inconsistent regarding the development of mental health symptoms over time in healthcare professionals during the pandemic with increases in Argentinian healthcare professionals [8], but declining trends in Belgian frontline healthcare [10] and in healthcare professionals in Spain [9] from spring to summer/autumn 2020. The latter is in line with trends for the general population – for instance, Wang et al. [36] identified a significant decline of the psychological impact four weeks after the beginning of the pandemic. However, all the studies indicated high distress scores throughout the study periods. Along with the absence of a significant change in most symptoms over time (except for anxiety), the present study found high levels of symptoms of depression (with 71.7 % of healthcare professionals fulfilling criteria for at least a *suspected diagnosis*), eating disorders (58.9 % at least *suspected*), somatoform disorders (43.9 % at least *suspected*), anxiety (38.3 % at least *suspected*) and compulsion (38.1 % at least *suspected*). To our knowledge this is the first study that compared healthcare professionals’ mental health over a longer period (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021). While the research design at hand is not a full-fledged within-participant longitudinal study, the similarly recruited samples at both time points allow us to draw a more substantial comparison than previous literature. In light of this, measures to reduce psychological strain among these workers are urgently needed – particularly as the consequences of the psychological distress can be expected to outlive the end of the pandemic. In addition to individual suffering, this is also a problem for the healthcare system and patients: depression and fatigue have been shown to correlate with major medical errors [7] and quality of care [6].

### **Differences between nursing staff, physicians and paramedics**

The present study found significant differences in mental health between physicians and paramedics on the one hand and nursing staff on the other. This is in line with a rapid review that concluded that nursing staff may have a higher risk of mental health problems

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3 during the COVID-19 pandemic [12]. Furthermore, Cai et al. [39] found that nursing staff felt  
4 more anxious and nervous compared to other professionals during the pandemic. Lai et al.  
5 [40] reported more severe levels of mental health symptoms for nursing staff, but also for  
6 frontline healthcare workers, those working in Wuhan, China, and for women. While  
7 excessive workload and inadequate personal protective equipment might be factors associated  
8 with poorer mental health for all professional groups, there are some differential factors  
9 between professional groups that may explain different outcomes.

10  
11 These differential factors may not be pandemic-specific but rather originating from  
12 more permanent aspects, such as difficulties of the nature of the work, nurses feeling  
13 inadequately supported, suffering from higher employment insecurity, facing issues with the  
14 management, patients and doctors as well as horizontal violence [41]. This is in line with our  
15 study that found job insecurity to be the most influential predictor of depression symptoms.  
16 For middle-aged and older adults in Europe, perceived insecurity in employment and housing  
17 as well as economic problems are significantly associated with participants' mental health and  
18 psychological distress [42]. Thereby, the relationship between subjective well-being and  
19 perceived adversities is partially mediated by institutional trust. Nursing staff might suffer  
20 from greater employment insecurities, economic problems and have less institutional trust –  
21 factors that may increase their psychological distress.

22  
23 Contrary to our expectations, our study could not identify significant differences in  
24 mental health outcomes between physicians and paramedics. A tentative explanation for the  
25 missing difference may be that the high stress baseline for paramedics is counterbalanced by  
26 the fact that they work “outside” the hospital system. In other words, in contrast to nursing  
27 staff they are not exposed to hierarchies and issues between professional groups inside the  
28 hospital. Other studies have identified high levels of emotional strain and burnout for  
29 paramedics during the pandemic [11], but to our knowledge there are no studies yet that have  
30 compared the mental health outcomes of paramedics to other professional groups. Future  
31 research might help to shed light on relevant protective and risk factors for this group and  
32 how these may differ for other groups of healthcare professionals.

### 33 **Help-seeking**



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4 In the present study the reported help-seeking intentions and behaviour were low.  
5  
6 Even out of those who reported high levels of psychological strain, many were not seeking  
7  
8 help, citing either concerns about the distribution of resources or accessibility issues. That is,  
9  
10 they either assumed that resources for psychological support are limited and given this, they  
11  
12 described themselves as less in need of these than others, or they did not know of any suitable  
13  
14 services that met their needs or did not have free time to access such services. These results  
15  
16 paralleled our previous study [3]; we thus sought to explain this behaviour in the present  
17  
18 study, hypothesizing that people who held a strong caregiver self-image would be less likely  
19  
20 to seek help for themselves. The idea was that being a caregiver would be seen as something  
21  
22 exclusive and binary – i.e., that people would either view themselves as a giver or a recipient  
23  
24 of care. However, we were not able to demonstrate this expected relationship. Given that the  
25  
26 measurement instruments had been validated, it remains unclear why caregiver self-image  
27  
28 does not predict help-seeking. One possible explanation is that this binary idea is not actually  
29  
30 inherent in the caregiver image. Rather, those who view giving and receiving care as mutually  
31  
32 exclusive might be a subgroup which also holds toxic ideas about strength and help-seeking  
33  
34 as weakness, while the rest of the group might see giving and receiving help as going hand in  
35  
36 hand. The instrument might therefore not have been specific enough. Also, the tests may not  
37  
38 have been sensitive enough to detect changes and the sample size may have been too small to  
39  
40 identify differences between the groups that were of unequal sizes. Additionally, self-report  
41  
42 measures are, of course, subject to social desirability.

43  
44 Furthermore, the large share of our sample stating that (1) they were not in need of  
45  
46 support despite severely elevated levels of mental strain, that (2) they already had sufficient  
47  
48 support and that (3) others needed support more urgently, could be indicative of a climate that  
49  
50 discourages help-seeking behaviour and speaking out about mental health issues in the  
51  
52 healthcare community. However, contrary to our H6 we could not find a correlation between  
53  
54 team climate and help-seeking. On the other hand, we could confirm a relationship between  
55  
56 team climate and mental health (H5). In other words, working in a positive team climate can  
57  
58 have significantly positive impacts on mental health for professionals in the healthcare sector.  
59  
60 This might have led to a reduction in actual need for help in those participants who



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3  
4 experienced a positive team climate, which could explain why they did not display more  
5  
6 help-seeking behaviour. It is crucial that future research takes a closer look at the team  
7  
8 climate and work culture in the healthcare sector and the norms they set around mental health  
9  
10 – more specifically into how a more positive team climate can be fostered where this is  
11  
12 necessary. Help-seeking is stigmatised, as are mental health problems [16, 17], and  
13  
14 participant responses may reflect that. The stigmatization of health-seeking as well as the  
15  
16 rejection of people with mental illness is bound to a historical and cultural context. For  
17  
18 instance, mental health stigma has decreased considerably in Germany since the 1990s [43].  
19  
20 A study found that Cuban professionals reported stronger mental health stigma and  
21  
22 more willingness to seek help than German professionals [44]. For this reason, in  
23  
24 particular exploratory qualitative studies seem warranted that take into consideration the  
25  
26 cultural context of help seeking and mental health stigma. While social norms of this kind are  
27  
28 complex and slow to change, it is crucial they be identified and addressed. If help-seeking  
29  
30 behaviour truly is widely stigmatized in the healthcare community, improving the  
31  
32 accessibility of support services alone is bound to have very limited effects on the rates of  
33  
34 healthcare workers seeking help.

### 35 36 **Limitations**

37  
38 These findings are subject to certain limitations. Firstly, even though it was the second  
39  
40 time we administered the same questionnaire, our data are cross-sectional, as we could not  
41  
42 ensure the participation of the same participants. This limits the extent to which causal claims  
43  
44 are possible. While it is possible for us to report the extent to which participants themselves  
45  
46 think pandemic-related work-specific stressors caused deteriorations in their mental health, a  
47  
48 true test of causality over time, both for work-related stressors and help-seeking behaviour,  
49  
50 would require true longitudinal data with within-participant observations. Secondly, our data  
51  
52 may be biased by self-selection. While the online survey was widely accessible and fairly  
53  
54 short, thus lowering the cognitive load required to complete it, it is conceivable that the  
55  
56 healthcare workers suffering the most did not participate because they could not muster the  
57  
58 time or mental energy. This would imply an underestimation of actual psychological strain  
59  
60 among healthcare staff. In relation to this issue, only two participants from Switzerland chose

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3 to participate in the study, which means conclusions about the situation in the Swiss  
4 healthcare system cannot be drawn from these data. Finally, the healthcare systems of  
5 Austria, Germany and Switzerland differ slightly in regard to the insurance system.  
6  
7 Nevertheless, they are comparable in regard to high overall costs and above average number  
8 of physicians per capita [45]. Future comparisons with additional countries might reveal  
9 whether the structure of the healthcare system affects resilience of staff.  
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### 17 **Conclusion**

18  
19 The present study shows that, presumably due to some habituation to the pandemic  
20 situation and its novelty wearing off, other mental health symptoms persist among healthcare  
21 staff in the second pandemic year. As preventative measures to reduce the spread of the virus  
22 persisted, so did limitations on opportunities to offer and seek social support, meaning that  
23 one key factor in coping with difficulties remained partly unavailable to healthcare staff.  
24  
25 Moreover, novel stressors may have become more relevant since the collection of the data  
26 presented here, such as psychological violence and harassment of medical staff by COVID-  
27 deniers. Since this problem has become dramatically more prevalent, as illustrated by the  
28 recent suicide of an Austrian doctor following months of severe harassment by COVID-  
29 deniers and anti-vaccinationists [46], future studies will need to address these novel stressors.  
30  
31 Symptom prevalence rates continue to be higher among nursing staff compared to physicians  
32 and paramedics as well as among healthcare staff with pre-existing health conditions as  
33 opposed to others. Our study furthermore showed that an open and constructive team climate  
34 is associated with better mental health. Future studies should also look into how this relation  
35 may be mediated by burnout. In conclusion, this means that we urgently need a higher level  
36 of appreciation, acknowledgement, and professional validation in the healthcare sector, in  
37 particular for nursing staff. Furthermore, ready access to mental health services (including  
38 mental health screening, screening for suicidality, and subsequent counselling) and protective  
39 services in case of harassment will play a pivotal role in reducing the risk of mental distress in  
40 this vulnerable group of healthcare professionals. The long persistence of the psychological  
41 strain as well as the continued low willingness to seek out psychological support should ring  
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3 alarm bells for decision makers in the healthcare sector, as both may be the early signs of  
4 severe long-term consequences for the entire sector and, ultimately, patient care. What our  
5 research, alongside various other studies, has done is to establish that there is a need to  
6 provide mental health support to the healthcare community; the question that research must  
7 target next is why and when this need does and does not translate into uptake of support.  
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### **Data Availability Statement**

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18 Our anonymized data set and codebook are available for download via the open  
19 science framework (OSF) website at:

20  
21  
22 Weibelzahl, Stephan, Gesa Duden, and Julia Reiter. 2022. "Pandemic-Induced Psychological  
23 Stress in Healthcare Professionals." OSF. July 11. doi:10.17605/OSF.IO/EHM67.

24  
25  
26 <https://osf.io/ehm67/>  
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32  
33  
34 The authors declare no competing interests.

### **Ethics Statement**

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Participants gave their informed consent for participation in the study and for  
electronic storage of their responses. Along with their responses, no personally identifiable  
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### **Author Contributions**

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GD, JR and SW conceived, planned and implemented the study. AP focused on the particular  
aspect of caretaker self-image and contributed to its theory. SW performed the main

calculations, but all authors contributed to the analysis, discussed the results and contributed to the final manuscript.

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**Names of Figures**

Figure 1. *Comparison of mental health scores across professions and years. The subsample of paramedics in 2020 was too small for analysis.*

Figure 2. *Results of two multiple regressions on stress factors. b = unstandardized regression coefficient; only significant paths are labeled*

*ISR depression:  $R^2 = 0.205$ , adjusted  $R^2 = 0.194$ ,  $F(8,616) = 19.83$ ,  $p < .001$*

*ISR anxiety:  $R^2 = 0.097$ , adjusted  $R^2 = 0.085$ ,  $F(8,616) = 8.27$ ,  $p < .001$*

## Tables

**Table 1***Distribution of participants' professions by gender and by country*

profession	sample size		gender		country		
	N	rel	f	m	DE	AT	CH
paramedic	212	33%	64	146	4	207	1
inpatient nursing care	97	15%	71	26	52	45	0
inpatient elder care	81	13%	73	8	36	45	0
home care	72	11%	65	7	25	47	0
inpatient physician	67	10%	31	35	4	63	0
non-medical health sector	28	4%	19	9	5	23	0
social worker	19	3%	13	5	8	11	0
physical therapist	12	2%	11	1	5	7	0
physician's assistant	6	1%	6	0	4	2	0
psychotherapist	5	1%	3	2	3	2	0
independent physician	4	1%	0	4	0	4	0
midwife	2	0%	2	0	2	0	0
pharmacist	2	0%	0	2	0	2	0
other	32	5%	23	9	13	18	1
total	639	100%	381	254	161	476	2

N=total, rel=relative percentage, f=female, m=male, DE=Germany, AT=Austria, CH=Switzerland; 4 participants identified themselves as diverse



## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table 2**

*Severity of symptoms in ISR of healthcare professional assessed in 2021 (HP2021) compared to previous year (HP2020) and the two reference groups of non-clinical sample before (P-) and during (P+) the pandemic*

scale	group	none	suspected	light	medium	severe
anxiety	HP2021	61.7%	9.2%	17.9%	8.4%	2.8%
	HP2020	52.3%	6.3%	24.7%	11.7%	5%
	P+	70.7%	5.9%	12.8%	7.4%	3.2%
	P-	71.8%	7.2%	16.1%	4.2%	0.7%
depression	HP2021	28.3%	10%	30%	25.2%	6.5%
	HP2020	18%	7.3%	40%	25.3%	9.3%
	P+	42.3%	10%	29.1%	13.7%	4.8%
	P-	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	HP2021	61.9%	8.1%	20.1%	7.2%	2.8%
	HP2020	56.7%	9%	22%	9%	3.3%
	P+	67.4%	7.9%	13.8%	6.9%	4%
	P-	75.9%	8%	12.8%	4.2%	0.7%
somatoform	HP2021	56.1%	23.3%	7.8%	10.4%	2.3%
	HP2020	42.3%	30.3%	9%	15.3%	3%
	P+	69.4%	18.9%	4.6%	5.1%	2%
	P-	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	HP2021	41.5%	11.2%	27.4%	16.5%	3.4%
	HP2020	30%	12%	31%	20.3%	6.7%
	P+	43.1%	11.8%	25.1%	13.6%	6.3%
	P-	52.8%	12%	22.6%	11.2%	1.4%
ISR total	HP2021	45.6%	6.1%	17.6%	22.7%	8.1%
	HP2020	30.3%	9%	20%	29.3%	11.3%
	P+	58.7%	6.1%	14.4%	15.7%	5%
	P-	68%	6.8%	11.5%	10.2%	3.5%

**Table 3**

*Severity of symptoms in ISR split by professional group. P– refers to a non-clinical sample assessed before the pandemic.*

scale	group	N	none	suspected	light	medium	severe
anxiety	nursing	252	50.8%	13.5%	20.6%	11.1%	4%
	physicians	70	72.9%	10%	7.1%	7.1%	2.9%
	paramedics	211	73.9%	3.3%	17.1%	5.2%	0.5%
	Other	106	58.5%	9.4%	18.9%	9.4%	3.8%
	P–	2512	71.8%	7.2%	16.1%	4.2%	0.7%
depression	nursing	252	20.6%	7.9%	28.2%	33.3%	9.9%
	physicians	70	35.7%	17.1%	27.1%	17.1%	2.9%
	paramedics	211	37.9%	11.4%	29.9%	18%	2.8%
	Other	106	22.6%	7.5%	35.8%	26.4%	7.5%
	P–	2512	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	nursing	252	50.8%	9.5%	28.6%	7.5%	3.6%
	physicians	70	71.4%	4.3%	12.9%	8.6%	2.9%
	paramedics	211	73.9%	7.1%	10.4%	7.1%	1.4%
	other	106	59.4%	8.5%	23.6%	4.7%	3.8%
	P–	2552	75.9%	8%	12.8%	4.2%	0.7%
somatoform	nursing	252	45.2%	25.8%	9.9%	15.5%	3.6%
	physicians	70	68.6%	20%	7.1%	2.9%	1.4%
	paramedics	211	64.9%	22.7%	3.8%	7.6%	0.9%
	other	106	56.6%	21.7%	10.4%	8.5%	2.8%
	P–	2512	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	nursing	252	36.9%	10.7%	27.4%	20.2%	4.8%
	physicians	70	54.3%	8.6%	28.6%	8.6%	
	paramedics	211	45.5%	13.3%	26.1%	10.9%	4.3%
	other	106	37.7%	9.4%	28.3%	23.6%	0.9%
	P–	2512	52.8%	12%	22.6%	11.2%	1.4%
ISR total	nursing	252	34.1%	4.4%	18.3%	31%	12.3%
	physicians	70	62.9%	2.9%	15.7%	15.7%	2.9%
	paramedics	211	57.3%	10%	13.7%	15.2%	3.8%
	other	106	39.6%	4.7%	23.6%	21.7%	10.4%
	P–	2512	68%	6.8%	11.5%	10.2%	3.5%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table 4**

*Results of three separate ANOVAs on ISR anxiety, depression respectively total scores by time (2020 vs 2021) and profession (nursing vs physicians)*

scale	effect	<i>F</i>	<i>df</i> <sub>1</sub>	<i>df</i> <sub>2</sub>	<i>p</i>	$\hat{\eta}^2_G$
anxiety	time	0.40	1	496	.660	.001
	profession	7.96	1	496	.010	.016
	time × profession	0.44	1	496	.653	.001
depression	time	1.00	1	496	.465	.002
	profession	25.93	1	496	< .001	.050
	time × profession	0.86	1	496	.490	.002
ISR total	time	0.003	1	496	.952	<.001
	profession	21.35	1	496	< .001	.041
	time × profession	0.33	1	496	.557	<.001

**Table 5**

*How strongly are you affected by the following aspect during the COVID-19 pandemic at your workplace? (0=not at all;4=extremely). Comparison between assessments in 2020 and 2021*

stress factor	2020 [8]			2021		
	N	M	SD	N	M	SD
uncertainty on duration of pandemic-related changes				632	2.93	1.15
protective measures hinder patient contact	285	2.76	1.03	623	2.69	1.09
limited contact to colleagues	287	2.18	1.13	622	2.55	1.14
protective measures hinder work processes	297	2.58	1.00	631	2.54	1.06
changes in work procedures	298	2.57	1.04	631	2.54	1.03
anxiety about infection of family members	290	2.30	1.25	589	2.17	1.30
need for childcare in own household <sup>a</sup>	091	2.36	1.51	250	1.94	1.49
bad communication of change in work procedures				589	1.84	1.22
worry that protective measures are used inadequately				584	1.76	1.19
increasing number of serious illnesses and deaths	243	1.29	1.18	548	1.76	1.19
anxiety about self-infection	285	1.78	1.18	560	1.53	1.15
fear of insufficient supply of protective measures				540	1.37	1.19
job insecurity	234	1.16	1.25	392	0.83	1.08

N=total, M=mean, SD=std. deviation

<sup>a</sup>this item was presented conditional on the response to a previous question about having children; number of children not assessed.

**Table 6**

*Frequency of responses to 'Would you like to receive psychological support to deal with the crisis?' categorized by presumed need for support based on ISR scale*

Would you seek psychological help?	in need		total
	no	yes	
No, I am fine.	184	75	259
No, I get sufficient support.	38	47	85
No, I prefer to deal with it on my own.	15	57	72
I will consider it.	16	39	55
Yes, but not psychotherapy.	3	5	8
Yes, psychotherapy.	0	5	5
no answer	35	120	155
All	291	348	639

'no' means  $ISR < 0.5$ ; 'yes' means  $ISR \geq 0.5$

**Table 7***Standardised regression of ISR total score on subscales of Team Climate (TC)*

Predictor	<i>beta</i>	95% CI	<i>t</i>	<i>Df</i>	<i>p</i>
TC1 (not ashamed)	-0.46	[-0.53, -0.40]	-13.58	636	< .001
TC2 (open communication)	-0.22	[-0.29, -0.15]	-6.51	636	< .001

*Note.* *beta* = standardized regression coefficient; CI = confidence interval;  
 $R^2 = .321$ , adjusted  $R^2 = .319$ ,  $F(2,636) = 150.55$ ,  $p < .001$

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## Supplementary Materials

Table S1

*Severity of symptoms in ISR split by gender (4 participants did not indicate their gender)*

scale	gender	N	none	suspected	light	medium	severe
anxiety	female	381	55.4%	10.8%	19.7%	10.2%	3.9%
	male	254	72%	6.7%	14.6%	5.9%	0.8%
depression	female	381	24.1%	8.4%	29.1%	31.2%	7.1%
	male	254	34.6%	12.6%	30.3%	16.9%	5.5%
compulsion	female	381	57.5%	8.7%	23.6%	7.3%	2.9%
	male	254	68.9%	7.1%	14.6%	6.7%	2.8%
somatoform	female	381	53.3%	23.1%	8.9%	11.5%	3.1%
	male	254	59.8%	24.4%	5.9%	8.7%	1.2%
eating disorder	female	381	36.7%	8.9%	30.7%	18.6%	5%
	male	254	49.2%	14.6%	22%	13%	1.2%
ISR total	female	381	38.8%	5.8%	18.6%	25.7%	11%
	male	254	56.3%	6.3%	15.4%	18.1%	3.9%

**Table S2***Severity of symptoms in ISR split by age*

scale	age	N	none	suspected	light	medium	severe
anxiety	<30	206	57.3%	6.3%	19.4%	12.1%	4.9%
	30-41	162	55.6%	13%	21%	8%	2.5%
	42-53	147	62.6%	11.6%	17.7%	6.8%	1.4%
	>53	124	75.8%	6.5%	11.3%	4.8%	1.6%
depression	<30	206	24.3%	4.9%	32.5%	26.2%	12.1%
	30-41	162	24.1%	12.3%	27.8%	30.9%	4.9%
	42-53	147	31.3%	12.2%	27.2%	25.9%	3.4%
	>53	124	37.1%	12.9%	30.6%	16.1%	3.2%
compulsion	<30	206	58.3%	9.7%	18.9%	8.7%	4.4%
	30-41	162	63%	8%	18.5%	7.4%	3.1%
	42-53	147	63.3%	5.4%	21.8%	8.2%	1.4%
	>53	124	64.5%	8.9%	21.8%	3.2%	1.6%
somatoform	<30	206	50.5%	25.2%	7.3%	13.1%	3.9%
	30-41	162	56.8%	27.8%	6.8%	7.4%	1.2%
	42-53	147	59.2%	17%	8.8%	12.9%	2%
	>53	124	59.7%	22.6%	8.9%	7.3%	1.6%
eating disorder	<30	206	43.7%	10.2%	25.2%	18%	2.9%
	30-41	162	35.2%	14.8%	26.5%	17.9%	5.6%
	42-53	147	37.4%	12.9%	27.9%	17.7%	4.1%
	>53	124	50.8%	6.5%	31.5%	10.5%	0.8%
ISR total	<30	206	39.3%	7.8%	17%	24.3%	11.7%
	30-41	162	40.7%	4.9%	21%	25.9%	7.4%
	42-53	147	51%	4.1%	13.6%	23.8%	7.5%
	>53	124	55.6%	6.5%	18.5%	15.3%	4%



**Table S3***Multiple regression of ISR depression scores on stress factors*

predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
intercept	0.37	[0.12, 0.61]	2.93	.003
changes in work procedures	0.09	[0.02, 0.16]	2.53	.022
protective measures hinder work processes	0.11	[0.03, 0.18]	2.93	.006
protective measures hinder patient contact	0.03	[-0.04, 0.09]	0.77	.649
limited contact to colleagues	0.01	[-0.05, 0.07]	0.35	.879
anxiety about self-infection	0.00	[-0.07, 0.07]	0.07	.940
anxiety about infection of family members	0.15	[0.09, 0.22]	4.65	< .001
job insecurity	0.28	[0.21, 0.36]	7.68	< .001
increasing number of serious illnesses and deaths	-0.01	[-0.07, 0.05]	-0.42	.745

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval;  $R^2 = 0.205$ , adjusted  $R^2 = 0.194$ ,  $F(8,616) = 19.83$ ,  $p < .001$

**Table S4***Multiple regression of ISR anxiety scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.24	[0.01, 0.46]	2.08	.038
changes in work procedures	0.01	[-0.05, 0.08]	0.33	.847
protective measures hinder work processes	0.05	[-0.02, 0.11]	1.45	.262
protective measures hinder patient contact	0.00	[-0.06, 0.06]	-0.13	.952
limited contact to colleagues	0.00	[-0.05, 0.06]	0.14	.934
anxiety about self-infection	0.03	[-0.03, 0.10]	1.05	.465
anxiety about infection of family members	0.10	[0.04, 0.16]	3.28	.003
job insecurity	0.17	[0.10, 0.24]	5.01	< .001
increasing number of serious illnesses and deaths	-0.01	[-0.06, 0.04]	-0.41	.847

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval;  $R^2 = 0.097$ , adjusted  $R^2 = 0.085$ ,  $F(8,616) = 8.27$ ,  $p < .001$

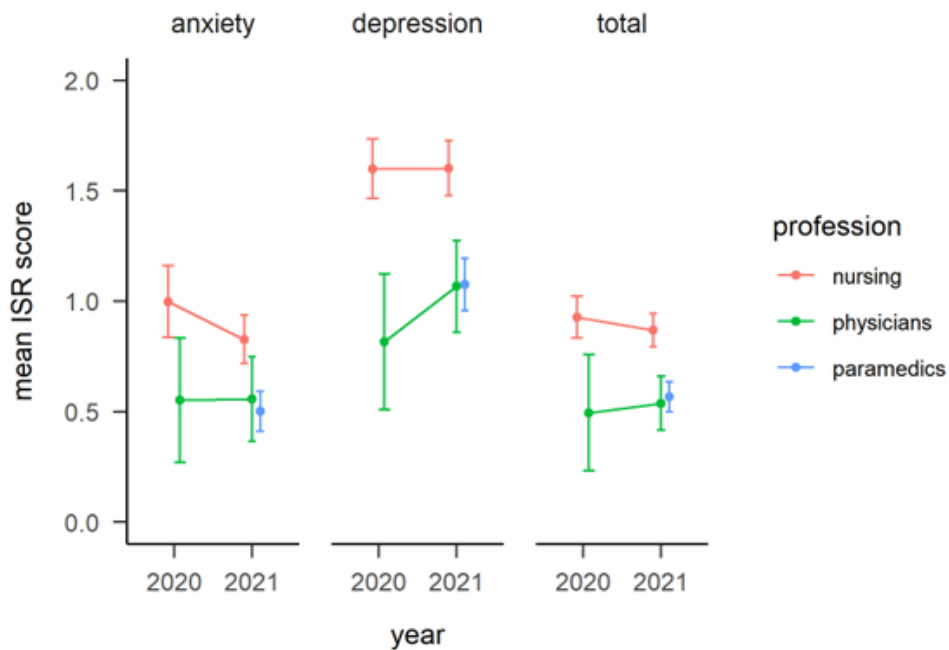


Figure 1. Comparison of mental health scores across professions and years.

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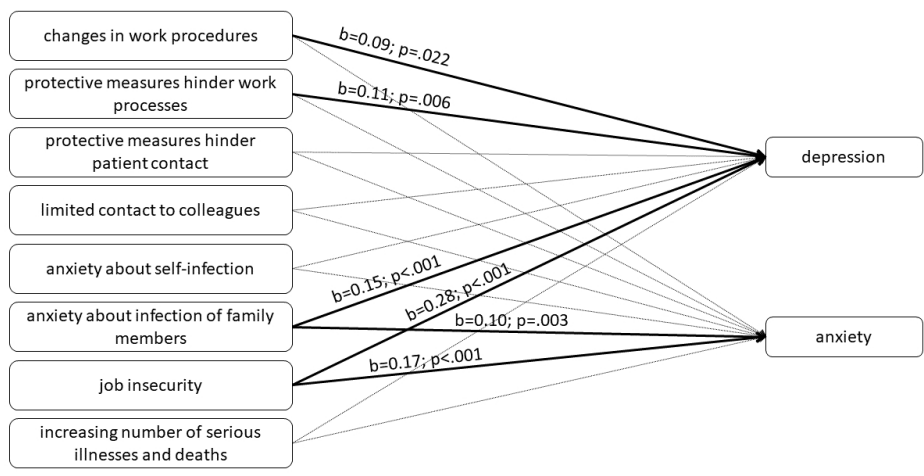


Figure 2. Results of two multiple regressions on stress factors. b = unstandardized regression coefficient; only significant paths are labeled

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## Supplementary Materials

Table S1

Severity of symptoms in ISR split by gender (4 participants did not indicate their gender)

scale	gender	N	none	suspected	light	medium	severe
anxiety	female	381	55.4%	10.8%	19.7%	10.2%	3.9%
	male	254	72%	6.7%	14.6%	5.9%	0.8%
depression	female	381	24.1%	8.4%	29.1%	31.2%	7.1%
	male	254	34.6%	12.6%	30.3%	16.9%	5.5%
compulsion	female	381	57.5%	8.7%	23.6%	7.3%	2.9%
	male	254	68.9%	7.1%	14.6%	6.7%	2.8%
somatoform	female	381	53.3%	23.1%	8.9%	11.5%	3.1%
	male	254	59.8%	24.4%	5.9%	8.7%	1.2%
eating disorder	female	381	36.7%	8.9%	30.7%	18.6%	5%
	male	254	49.2%	14.6%	22%	13%	1.2%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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ISR total	female	381	38.8%	5.8%	18.6%	25.7%	11
							%
	male	254	56.3%	6.3%	15.4%	18.1%	3.9
							%

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## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S2***Severity of symptoms in ISR split by age*

scale	age	N	none	suspecte d	light	mediu m	sever e
anxiety	<30	206	57.3%	6.3%	19.4%	12.1%	4.9%
	30-41	162	55.6%	13%	21%	8%	2.5%
	42-53	147	62.6%	11.6%	17.7%	6.8%	1.4%
	>53	124	75.8%	6.5%	11.3	4.8%	1.6%
					%		
depression	<30	206	24.3%	4.9%	32.5%	26.2%	12.1
							%
	30-41	162	24.1%	12.3%	27.8%	30.9%	4.9%
	42-53	147	31.3%	12.2%	27.2%	25.9%	3.4%
	>53	124	37.1%	12.9%	30.6%	16.1	3.2%
						%	
compulsion	<30	206	58.3%	9.7%	18.9%	8.7%	4.4%
	30-41	162	63%	8%	18.5%	7.4%	3.1%
	42-53	147	63.3%	5.4%	21.8%	8.2%	1.4%
	>53	124	64.5	8.9%	21.8%	3.2%	1.6%
			%				
somatoform	<30	206	50.5%	25.2%	7.3%	13.1	3.9%
						%	
	30-41	162	56.8%	27.8%	6.8%	7.4%	1.2%
	42-53	147	59.2%	17%	8.8%	12.9%	2%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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	>53	124	59.7	22.6%	8.9%	7.3%	1.6%
			%				
eating	<30	206	43.7%	10.2%	25.2%	18%	2.9%
disorder	30-41	162	35.2	14.8%	26.5	17.9%	5.6%
			%		%		
	42-53	147	37.4%	12.9%	27.9%	17.7%	4.1%
	>53	124	50.8%	6.5%	31.5%	10.5%	0.8%
ISR total	<30	206	39.3%	7.8%	17%	24.3%	11.7
							%
	30-41	162	40.7%	4.9%	21%	25.9%	7.4%
	42-53	147	51%	4.1%	13.6%	23.8%	7.5%
	>53	124	55.6%	6.5%	18.5%	15.3%	4%



**Table S3***Multiple regression of ISR depression scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (61 9)	<i>p</i>
Intercept	0.37	[0.12, 0.61]	2.93	.003
changes in work procedures	0.09	[0.02, 0.16]	2.53	.012*
protective measures hinder work processes	0.11	[0.03, 0.18]	2.93	.004**
protective measures hinder patient contact	0.03	[-0.04, 0.09]	0.77	.439
limited contact to colleagues	0.01	[-0.05, 0.07]	0.35	.723
anxiety about self-infection	0.00	[-0.07, 0.07]	0.07	.943
anxiety about infection of family members	0.15	[0.09, 0.22]	4.65	< .001***
job insecurity	0.28	[0.21, 0.36]	7.68	< .001***
increasing number of serious illnesses and deaths	- 0.01	[-0.07, 0.05]	- 0.42	.673

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.204$ , adjusted  $R^2 = 0.194$ ,  $F(8,619) = 19.86$ ,  $p < .001$

**Table S4***Multiple regression of ISR anxiety scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.24	[0.01, 0.46]	2.08	.038
changes in work procedures	0.01	[-0.05, 0.08]	0.33	.743
protective measures hinder work processes	0.05	[-0.02, 0.11]	1.45	.148
protective measures hinder patient contact	0.00	[-0.06, 0.06]	-0.13	.895
limited contact to colleagues	0.00	[-0.05, 0.06]	0.14	.885
anxiety about self-infection	0.03	[-0.03, 0.10]	1.05	.295
anxiety about infection of family members	0.10	[0.04, 0.16]	3.28	.001**
job insecurity	0.17	[0.10, 0.24]	5.01	<
				.001***
increasing number of serious illnesses and deaths	-0.01	[-0.06, 0.04]	-0.41	.680

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval; \**p* < .05, \*\**p* < .01, \*\*\**p* < .001,  $R^2 = 0.098$ , adjusted  $R^2 = 0.087$ ,  $F(8,619) = 8.43$ ,  $p < .001$

**The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.**

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
<b>Title and abstract</b>					
	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	In title and abstract, pp.1-2	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included.  RECORD 1.2: If applicable, the geographic region and time and place within which the study took place should be reported in the title or abstract.  RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	
<b>Introduction</b>					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	pp.4-7		
Objectives	3	State specific objectives, including any prespecified hypotheses	p.7		
<b>Methods</b>					
Study Design	4	Present key elements of study design early in the paper	p.7		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	p.7-10		

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<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27</p> <p>Participants</p>	<p>6</p>	<p>(a) <i>Cohort study</i> - Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  <i>Case-control study</i> - Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  <i>Cross-sectional study</i> - Give the eligibility criteria, and the sources and methods of selection of participants</p> <p>(b) <i>Cohort study</i> - For matched studies, give matching criteria and number of exposed and unexposed  <i>Case-control study</i> - For matched studies, give matching criteria and the number of controls per case</p>	<p>p.9</p>	<p>RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided.</p> <p>RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided.</p> <p>RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.</p>	
<p>28 29 30 31 32 33 34</p> <p>Variables</p>	<p>7</p>	<p>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.</p>	<p>pp.8-10</p>	<p>RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.</p>	
<p>35 36 37 38 39 40 41 42</p> <p>Data sources/ measurement</p>	<p>8</p>	<p>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</p>	<p>pp.8-15</p>		

Bias	9	Describe any efforts to address potential sources of bias	p.11		
Study size	10	Explain how the study size was arrived at	p.9		
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	pp.10-15		
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> - If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> - If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> - If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	pp.10-15		
Data access and cleaning methods		..		RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	pp.10-15

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				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	
Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	p.10
<b>Results</b>					
Participants	13	(a) Report the numbers of individuals at each stage of the study ( <i>e.g.</i> , numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	pp.10-15	RECORD 13.1: Describe in detail the selection of the persons included in the study ( <i>i.e.</i> , study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	pp.10-15
Descriptive data	14	(a) Give characteristics of study participants ( <i>e.g.</i> , demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) <i>Cohort study</i> - summarise follow-up time ( <i>e.g.</i> , average and total amount)	pp.9-10		
Outcome data	15	<i>Cohort study</i> - Report numbers of outcome events or summary measures over time <i>Case-control study</i> - Report numbers in each exposure	pp.10-15		

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		category, or summary measures of exposure <i>Cross-sectional study</i> - Report numbers of outcome events or summary measures			
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	pp.10-15		
Other analyses	17	Report other analyses done— e.g., analyses of subgroups and interactions, and sensitivity analyses	pp.10-15		
<b>Discussion</b>					
Key results	18	Summarise key results with reference to study objectives	pp.10-19		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	p.19	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	p.19
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	pp.10-19		

		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence			
Generalisability	21	Discuss the generalisability (external validity) of the study results	pp.10-19		
<b>Other Information</b>					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	p.20		
Accessibility of protocol, raw data, and programming code		..	p.20	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data or programming code.	p.20

\*Reference: Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langin SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

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# BMJ Open

## Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1st and 2nd pandemic year

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4 **Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a**  
5 **comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**  
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**Abstract**

Healthcare staff have been facing particular mental health challenges during the COVID-19-pandemic. Building on a first study at the beginning of the pandemic in March 2020, we aimed to investigate among healthcare professionals in Germany and Austria (1) how mental health may have changed in professionals over the course of the ongoing pandemic, (2) whether there are differences between different professional groups regarding mental health, (3) which stress factors may explain these mental health outcomes, and (4) whether help-seeking behaviour is related to caretaker self-image or team climate. Between March and June 2021, N=639 healthcare professionals completed an online survey including the ICD-10 Symptom Rating checklist (ISR), event-sampling questions on pandemic-related stressors and self-formulated questions on help-seeking behaviour and team climate. Findings were analysed using t-tests, regressions and comparisons to a sample of healthcare professionals assessed in 2020 as well as to norm samples. Results show that mental health symptoms, particularly for depression and anxiety, persist among healthcare staff in the second pandemic year, that symptom prevalence rates are higher among nursing staff compared to physicians and paramedics, and that team climate is associated with mental health outcomes. Implications of these findings in relation to the persisting pandemic and its aftermath are discussed.

*Keywords:* Pandemics; Frontline and Essential Workers; Healthcare Staff; Mental Health; Nursing Staff; Help-Seeking Behaviour; COVID-19

### Strengths and limitations of this study

- The first study that compared healthcare professionals' mental health over a longer period of time during the COVID-19-pandemic (i.e., comparison of a sample in May-July 2020 to a sample in March-June 2021)
- The study involves and compares between participants from various professions in the healthcare sector.
- The study investigates several potentially relevant factors for mental health of healthcare professionals including help-seeking behaviour and caretaker self-image, as well as team climate using established and validated scales such as the ICD-10 Symptom Rating checklist (ISR), the Caregiver Role Identity Scale (CRIS) and the Prosocialness Scale for Adults (PSA)
- Data are cross-sectional which limits the possibility of making causal claims.
- Data may be biased by self-selection: the healthcare workers suffering the most may not have participated and thus the high prevalence rates observed may underestimate the actual psychological strain.

**Mental Health of Healthcare Professionals during the ongoing COVID-19 Pandemic – a comparative investigation from the 1<sup>st</sup> and 2<sup>nd</sup> pandemic year**

It is well established by now that healthcare staff has been seriously affected by the COVID-19-pandemic [1,2]. A series of meta-analyses consistently showed that the prevalence of psychological disorders in health professionals is elevated. In particular, symptoms of depression, anxiety and distress [3], as well as insomnia [4] are significantly higher than before the beginning of the COVID-19 pandemic.

**Unknown factors: long-term consequences and differential effects across professional groups**

As the pandemic and the complex psychological strain accompanying it persist, it is especially worrying that the potential long-term consequences of this situation are unknown. On the individual level, being exposed to extreme psychological strain for a prolonged time may result in lasting negative consequences; acute conditions developed as a response to these stressors can become chronic, and psychological conditions may entail physiological comorbidities [5]. If the affected individuals are healthcare staff, these individual consequences can have further devastating effects on national healthcare systems. Increasing sickness absence rates and a rising number of people resigning and seeking out other careers might ensue. This would further exacerbate existing issues brought on by staff shortage and worsen working conditions, thus creating a vicious cycle for the remaining staff. This as well as increased exhaustion and reduced resilience among the remaining staff would result in decreasing quality of patient care [6,7].

So far, findings on the development of mental health symptoms in healthcare professionals over time during the pandemic have been inconsistent, with some studies showing increasing levels [8] while others find decreasing levels of symptoms [9,10]. However, these studies considered changes in mental health for short periods of time only,

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3 and – to our knowledge – there are no studies yet investigating the development of mental  
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6 health over more than a couple of months  
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8         A group that has been investigated more intensively than other professional groups is  
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10 nursing staff, which is known to be exposed to staff shortages and extreme workload [6].  
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12 Such difficulties resulting in lowered resources regarding time and emotional capacities are  
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14 bound to reduce the quantity and quality of social support due to decreased opportunities to  
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16 offer it; this decrease in social support is, in turn, likely to further worsen capabilities for  
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18 coping with these stressors and other difficulties, creating a downward spiral. However, the  
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20 healthcare sector consists of multiple professional groups whose working conditions differ,  
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22 potentially resulting in differential effects caused by pandemic changes. For example, nurses  
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24 and physicians at the same hospital share their work environment while taking on different  
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26 tasks with distinct responsibilities and demands. By comparison, paramedics are mobile  
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28 rather than stationary. They work under high levels of stress, as the nature of their work  
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30 consists of unpredictable and emergency situations, and they might be at higher risk of  
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32 contracting COVID-19 [11]. While doctors and nurses stay with a patient for a prolonged  
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34 time and will typically know the progression of the illness or condition and the treatment  
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36 outcome, paramedics respond to emergencies and hence have contact with more patients for  
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38 shorter periods of time, without knowing the patients' treatment outcomes. This may be  
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40 associated with psychological advantages and disadvantages [12]. Knowledge about the  
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42 differential effects of the pandemic on professional groups within the healthcare sector is  
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44 important for identifying the most vulnerable groups and tailoring support structures to their  
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46 particular needs. However, this has not yet been investigated in the existing pandemic-related  
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48 literature. For instance, a rapid review on mental health during the COVID-19 pandemic was  
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50 not able to identify studies comparing nursing staff with primary care staff [13].  
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### 58 **Help-seeking behaviour in the face of mental health problems**

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While there are well known and efficient treatments for various mental disorders, healthcare professionals hesitate to seek help for psychological suffering. This was evident before the pandemic [14] and reconfirmed during the pandemic [3]. Professionals' self-image may play a major role in the hesitancy to seek help. If people see themselves as a care giver (Caregiver Role Identity Scale, *CRIS*), they might be less likely to seek help for themselves, as they do not identify as a person in need of help but rather as one giving help and they may regard these roles as mutually exclusive [15]. This caregiver self-image can be expected to reflect both attitudes – that is, self-concept – as well as behaviour. In other words, people who view themselves strongly as caregivers are expected to have a higher propensity to display prosocial behaviour.

Furthermore, all types of stigma negatively influence potential help-seeking [16] and there appears to be stigma attached to mental illness within the medical professions [17]. This stigma is linked to the social perception of an invincible doctor [18], strength and self-sacrifice. Fear of stigmatisation strongly discourages healthcare professionals from help-seeking behaviour despite frequently reported mental health problems [16,18]. The fear of stigma in this context includes fear of negative career impact, fear of prejudice, lack of confidentiality, and fear of being perceived as weak [17]. The idea of not showing weakness, in particular, comes with the ideal of self-sacrifice, of putting patients and others before one's own needs and ideally not expressing those needs. Not speaking up about suboptimal conditions, problems or mental health issues due to these fears may lead to a climate of silence within the team and have detrimental effects that extend well beyond the individual [19,20]. A team climate pervaded by a general expectation to prioritize patient care before personal well-being and to refrain from acts that could be interpreted as displaying weakness, such as seeking professional help [14], could be a crucial factor inhibiting help-seeking behaviour.



### Study aims

Using a comparative investigative approach, we collected new data and compared these to a first study [3] in an effort to understand (I) how mental health may have changed in healthcare professionals over the course of the pandemic, and (II) whether the same stress factors which were significantly related to psychological strain in 2020 [3] were still the major impacting factors for healthcare professionals' mental health in 2021, (III) whether there are differences between different professional groups regarding mental health, and (IV) whether help-seeking is related to caretaker self-image and team climate. Specifically, we expected that (H1a) mental health problems among healthcare staff would have decreased with the adaptation to the pandemic (habituation hypothesis) or that (1b) they would have increased due to exhaustion resulting from the persistent stress (wear-out hypothesis). We further expected that (H2) nursing staff's mental health would be more affected than that of other professional groups, paralleling the results from the first study [3] and that (H3) paramedics' mental health would be more affected than physicians'. We also hypothesised that (H4) decreased likelihood to seek help would be positively related to stronger caretaker self-image (CRIS) as well as more prosocial behaviour (measured as the behavioural parallel to the purely attitudinal self-image) and that (H5) a positive team climate would facilitate better mental health outcomes and (H6) increase the likelihood of help-seeking.

### Method

We conducted a cross-sectional online survey on mental well-being, perceived pandemic-related stress factors and help-seeking behaviour among medical professionals.

### Measures

The survey took about 15 minutes to complete and started with a section on demographics followed by basic facts about the features of participants' work, such as whether they had contact with COVID-19-patients and whether their working hours had changed during the pandemic.

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In the subsequent section, participants were presented with a list of potential stress factors based on the previous study [3]. They were asked to rate the extent to which they were affected by each stress factor on a 5-point ordinal scale (*not at all* to *extremely* or *does not apply*). Following this, mental well-being was measured with the self-report questionnaire ICD-10 Symptom Rating (ISR) [21] including 29 items forming subscales for depression, anxiety, eating disorders, obsessive compulsive disorder, and somatoform disorder symptoms as well as an *extra*-subscale with various additional symptoms. As the ISR is intended for clinical diagnostic use, the *extra*-subscale contains miscellaneous individual symptoms and pieces of information which do not constitute a disorder by themselves but should indicate to the clinician that further exploration is needed; the items include symptoms of depersonalisation and derealization, sexual disorders, external stressors and past physical head traumas. This subscale is part of the standard ISR interpretation. The item-ratings on a 5-point ordinal scale (from 0 - *does not apply* to 4 - *extremely*) are averaged to compute subscale scores as well as a total score. The internal consistency and retest reliability of the ISR scales have been demonstrated to be good [22].

We chose the ISR because there is a large non-clinical German norm sample available which was assessed before the pandemic (P-) [21]. We hence refer to it as reference group  $R_{P-}$ . As a second reference group, we included a large sample of the general public assessed at the peak of the first pandemic-wave (P+) in Germany [23], reference group  $R_{P+}$ . We were also able to compare our data to a sample of healthcare professionals  $R_{HP2020}$  that we assessed at the beginning of the pandemic, i.e., one year before the current sample [3].

Following the mental health section, we explored help-seeking behaviour and intentions. To this end, we assessed whether participants had sought help for the psychological strain they had experienced and why or, if they had not, whether they would like to do so in the future and why or why not. Moreover, we assessed the extent of participants' self-image as a caregiver, their propensity for prosocial behaviour, as well as perceived team climate and the extent to which the team climate allows or sanctions seeking help and admitting to mental health problems. We measured the first two constructs using German translations of the Caregiver Role Identity Scale (CRIS) [24] and the Prosocialness

Scale for Adults (PSA) [25]. We assessed team climate with a set of 17 items that referred to how participants perceived the communication among colleagues (e.g., “*My colleagues talk to me about their worries and issues*”) and social comparisons among colleagues regarding strength and resilience in the face of difficulties (e.g., “*My colleagues can deal with issues better than I do*”).

### Sample

As we aimed for a large-scale survey and were interested in examining simple correlations rather than testing treatment effects or causalities across time, we did not aim for a predefined sample size; instead, our goal was maximum recruitment, i.e., finding as many participants as possible within our predefined time frame. Participants were recruited through healthcare providers, unions, a press release and personal contacts between 15 March and 6 June 2021 in Germany, Austria and the German speaking regions of Switzerland. In Austria, safety-measures had been lifted in February, with a new wave of infections starting in March 2021; in April, some Austrian states (Vienna, Lower Austria, Burgenland) introduced a new lockdown which lasted several weeks. During this period, testing capacities were expanded massively across the country and the vaccination campaign was picking up pace, with roughly 40 % of the vaccinateable population being vaccinated at least once until mid-May [26].

Similarly, in Germany, safety measures were lifted at the beginning of March, with a new wave of infections and the reintroduction of lockdown measures by the end of the month, in parallel to the roll-out of a national vaccination campaign [27]. The wave peaked mid-April, reaching a new high of intensive care unit (ICU) cases. In May, case numbers started to drop again, accompanied by an increasing vaccination rate and the reduction of safety measures

To be included in our study, participants were required to work in one of the areas of the healthcare sector, either in private or in public institutions. This included professional groups such as medical and nursing staff as well as social workers, midwives, pharmacists, physical therapists, physiotherapists, psychologists, psychotherapists. If none of these categories applied, participants had the option “other”, under which they could specify their profession. Participants were excluded if they did not work in any area of healthcare or if they did not complete all the required fields. As the invitation to participate was circulated through

various channels, the exact response rate could not be determined. However, out of 993 respondents who answered at least one question we had to remove 354 records (36 %) because they did not meet all the inclusion criteria.

Participants gave their informed consent for participation in the study and for electronic storage of their responses. Along with their responses, no personally identifiable information was collected. Ethical approval was granted by the PFH Private University of Applied Sciences Göttingen review board (application: SW\_5\_090920).

#### TABLE 1 HERE

In total we recruited 639 participants from Austria (n=476), Germany (n=161) and Switzerland (n=2) working in more than 13 different professions in healthcare (see Table 1).

### **Patient and Public Involvement**

The design of the survey was informed by five semi-structured interviews with nursing staff on the barriers they were facing at their workplace as well as the reasons for seeking or not seeking help. The participants were provided with the contact information of the leading researcher at the beginning and the end of the survey, where they could request a summary of the study results by sending an email. Moreover, organizations and employers in the healthcare sector who helped with recruitment by disseminating the survey amongst their employees or members also received a summary on completion of the data collection.

### **Analysis**

All analyses were conducted using the statistics software R (Version 4.2.0) [28] in RStudio [29] and numerous helper packages. Aside from basic descriptive statistics, ANOVAs, t-tests and chi-square tests were computed to compare groups. After checking for the test prerequisites, multiple linear regressions were conducted to estimate the importance of stress factors, and binary logistic regression was used to estimate odds ratios for help-seeking. We applied a level of significance of 5% for inferential tests. In order to reduce the risk of alpha

error inflation we corrected all p-values using the Benjamini-Hochberg procedure. All the core analyses considered the complete dataset, while participants with missing values in non-essential measures, e.g., barriers to help-seeking, were excluded from analysis where appropriate. We did not rebalance the sample by weighting for membership in professional groups or other characteristics, but report the results as is. When reporting statistical results we use abbreviations as suggested by the guidelines of the American Psychological Association (APA), e.g., *M* for mean, *SD* for standard deviation, *df* for degrees of freedom, *b* for regression coefficients,  $R^2$  for the regression determinant,  $1 - \beta$  for test power, *d* for the effect size Cohen's *d*, *OR* for odds ratio. *F*, *t*, *z* and  $\chi^2$  refer to the respective probability distributions. Where appropriate we provide 95% confidence intervals (CI).

## Results

### Mental health

Prior to analysing the ISR scores, we examined their internal consistency. The results were almost identical to previous findings, with Cronbach's  $\alpha$  ranging from  $\alpha = 0.76$  to  $\alpha = 0.87$  for the subscales and  $\alpha = 0.94$  for the total scale.

The observed severity of clinical symptoms was high on all five scales (see Table 2). In particular, depression and anxiety symptoms were reported with unexpectedly high severity, with 6.5% reporting severe depression symptoms and another 55% light to medium symptoms. A total of 29% reported at least light symptoms of anxiety. A split by gender of these results is shown in Table S1 and S2 in the Supplement.

#### TABLE 2 HERE

For all symptom scales, healthcare professionals scored significantly higher than the reference group *R<sub>P-</sub>* before the pandemic ( $df \geq 797.34$ ,  $t \geq 3.29$ ,  $p < .001$ ). The comparison between the samples of 2020 and 2021 showed support for the habituation hypothesis H1a: When controlling for profession there were no significant changes from 2020 to 2021 on the overall ISR scores ( $F(1, 496) = 0.003$ ,  $p = .952$ ), nor in the depression scores ( $F(1, 496) =$

1.00,  $p = .465$ ), or in the anxiety scores ( $F(1, 496) = 0.40$ ,  $p = .660$ ). However, healthcare professionals continued to display significantly more symptoms than the general population reference group during the pandemic ( $R_{P+}$ ) on both the depression scale (difference in means  $\Delta M = 0.32$ , 95% CI [0.24, 0.41],  $t(2411) = 7.64$ ,  $p < .001$ ) and the anxiety scale ( $\Delta M = 0.12$ , 95% CI [0.04, 0.2],  $t(1168.2) = 3.06$ ,  $p = .005$ ). Although this comparison is limited by the fact that the general population pandemic reference group was assessed during the first wave of the pandemic while our data were collected during the third wave, this suggests that healthcare professionals' psychological strain cannot be explained by lockdown measures alone. Most notably, their rate of severe symptoms was significantly higher on both the depression scale ( $\chi^2(1, N = 2285) = 520.91$ ,  $p < .001$ ) and the anxiety scale ( $\chi^2(1, N = 2338) = 513.78$ ,  $p < .001$ ).

### Mental health by profession

We compared mental health scores of the three major professional groups in our sample, i.e., nurses, physicians and paramedics, representing about 78% of all participants (see Table 3).

TABLE 3 HERE

While physicians and paramedics scored similarly regarding anxiety, depression and total ISR scale, nurses scored significantly higher, providing evidence for our H2. This was supported by three 2-factor ANOVAs considering both profession and time (see Tables 4 and Figure 1). However, contrary to our H3, there was no significant difference between paramedics and physicians.

TABLE 4 HERE

FIGURE 1 HERE

### Stress factors

Next, we investigated to what extent the individual stress factors contributed to anxiety and depression. A multiple regression of ISR depression scores on the eight stress factors ( $R^2 = 0.205$ ,  $F(8,616) = 19.83$ ,  $p < .001$ ) showed that *job insecurity* was the most influential but simultaneously rarest predictor of depression symptoms (see Figure 2). That is, on average participants felt almost unaffected by job insecurity ( $M = 0.83$ ,  $SD = 1.08$  on scale

from 0 to 4), but for those who did experience job insecurity, higher levels of job insecurity were strongly associated with psychological symptoms. *Anxiety about infection of family members* and *protective measures that hinder work processes* also predicted the level of depression symptoms. Regressing ISR anxiety scores on these stress factors ( $R^2 = 0.097$ ,  $F(8,616) = 8.27$ ,  $p < .001$ ) revealed a similar picture, with *job insecurity* and *anxiety about infection of family members* both positively associated with anxiety symptoms (see Figure 2 and Tables S3-S4 in the supplement).

[INSERT FIGURE 2]

Professionals with direct patient contact ( $M = 0.71$ ) did not differ from those in administration (categorized based on profession,  $M = 0.8$ ,  $t(74.5) = 1.03$ ,  $p = .921$ ,  $1 - \beta(d = 0.5) = 0.98$ ) in terms of symptom severity. However, people with pre-existing medical conditions were significantly more anxious ( $M_{yes} = 0.9$ ,  $M_{no} = 0.6$ ,  $t(293.3) = 3.85$ ,  $p < .001$ ) and reported more severe symptoms overall ( $M_{yes} = 0.92$ ,  $M_{no} = 0.64$ ,  $t(290.3) = 5.16$ ,  $p < .001$ ) than those without such conditions putting them at heightened risk during the pandemic.

Paralleling our previous results [3], participants reported that they were most affected by the uncertain duration of pandemic-related changes and by protective measures to avoid spreading the virus impeding their contact with the patients and work processes in general. The pandemic also led to various changes in work procedures which persisted one year after its beginning, as did the severe limitations of contact to colleagues. Table 5 provides an overview of the stress factors and their respective mean effects.

TABLE 5 HERE

### Help-Seeking

While the majority of participants described themselves as experiencing symptoms of depression and anxiety, most declined when asked whether they would like to receive psychological support to deal with the crisis (see Table 6). Out of the 639 participants, 348 (54%) scored 0.5 or higher on the ISR total scale, which would give them a *suspected* clinical diagnosis or more severe; and yet only 49 (14%) of these participants said that they would



consider seeking psychological support. Participants with higher ISR scores were more likely to seek help ( $b = 1.21$ ,  $OR = 3.35$ ,  $z = 5.41$ ,  $p < .001$ ).

#### TABLE 6 HERE

Healthcare professionals gave various reasons for not seeking help in spite of severe psychological symptoms. 142 (41%) of the 348 participants whose symptoms were severe enough to supposedly warrant psychological support claimed that others needed the support more urgently. 86 (25%) did not know any suitable support services. 85 (25%) did not perceive themselves as distressed enough to require support (in spite of their reported symptom severity). Finally, 81 (23%) reported lacking the time to seek help. The majority – 84 % of all participants and 83% of those who supposedly needed help – indicated that they had sufficient social support outside the workplace.

Contrary to our expectation (H4), neither the caregiver self-image (CRIS) nor the level of prosocialness (PSA) predicted whether a person would seek help. Accordingly, the goodness of fit of this predictive model is low ( $McFadden\ pseudo\ R^2 = 2.2\%$ ), implying that there are better predictors for help-seeking behaviour than those included in our model.

#### Team Climate

We assessed the quality of all items of the team climate scale and removed four items due to high difficulty or low discrimination. A Kaiser-Meyer-Olkin factor adequacy of  $MSA = .773$  indicated that the scale comprises subscales. Both a scree plot and the Kaiser-Guttman criterion suggested a two-factor solution. A subsequent factor analysis with varimax rotation revealed two clearly distinct components. The first factor (TC1) refers to social comparisons with co-workers in terms of strength and resilience to strain (or the lack thereof), while the second factor (TC2) refers to open communication among colleagues. Both subscales ( $Cronbach's\ \alpha_{TC1} = .80$ ;  $\alpha_{TC2} = .76$ ), as well as the total work culture scale ( $\alpha = .79$ ) had good internal reliability.

Using this scale, team climate was a good predictor of participants' mental well-being. Both a low tendency to evaluate social comparisons of one's own resilience with co-workers negatively (TC1) and open communication among colleagues (TC2) seem to have influence on the reported symptoms (ISR total) as illustrated by a standardised regression



(Table 7). Those working in a positive team climate had significantly better mental health, confirming our H5.

Does team climate also predict whether a person is willing to seek help for mental health issues? A logistic regression among those who supposedly need help ( $ISR \geq 0.5$ ) revealed that the TC1 scale (social comparisons) had a slightly negative impact on the likelihood to seek help ( $OR = 0.93, p = .048$ ), while subscale TC2 was not significantly related to help seeking ( $p = .354$ ). However, the goodness of fit of this model is low ( $McFadden\ pseudo\ R^2 = 3.2\%$ ), thus not providing sufficient evidence for our H6.

TABLE 7 HERE

## Discussion

Consistent with reports from other countries [1, 30, 31, 32, 33, 34], healthcare professionals in Germany, Austria and Switzerland reported high levels of depression and anxiety during the continuation of the pandemic. The scores were similar to those reported in another German sample [35,36] assessed under more severe lockdown conditions. Moreover, comparisons show that mental stress levels of healthcare staff were consistently above those reported by a general population sample during the pandemic; nevertheless, reported help-seeking behaviour and intentions were low.

### Mental health in 2020 and 2021

The high prevalence of psychological disorders among healthcare professionals observed at the beginning of the pandemic [3] continues in our sample one year onwards. Studies on the mental health effects of the COVID-19 pandemic on healthcare staff from other countries conducted at the beginning of the pandemic in 2020 [37] place the prevalence of severe symptoms between 2.2% and 14.5% [38]. The results of both Weibelzahl et al. [3] and the present study are in line with this. While at the beginning societies across the globe were made aware of the crucial importance of healthcare workers, resulting in abundant expressions of appreciation for *essential workers* – with frontline medical staff representing a key group – this attention slowly dwindled as the pandemic lingered on. The psychological strain, however, persisted. Crucially, we also found that those healthcare workers who suffer

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3 from a pre-existing medical condition and are thus at a heightened risk during a pandemic  
4 continued to suffer from significantly higher psychological strain than others. Seeing as  
5 public concern for “risk groups” also dwindled away as the pandemic continued, this sub-  
6 group of healthcare staff requires particular attention and support as they are affected by  
7 intersecting stressors.  
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13 Research findings are inconsistent regarding the development of mental health  
14 symptoms over time in healthcare professionals during the pandemic with increases in  
15 Argentinian healthcare professionals [8], but declining trends in Belgian frontline healthcare  
16 [10] and in healthcare professionals in Spain [9] from spring to summer/autumn 2020. The  
17 latter is in line with trends for the general population – for instance, Wang et al. [36]  
18 identified a significant decline of the psychological impact four weeks after the beginning of  
19 the pandemic. However, all the studies indicated high distress scores throughout the study  
20 periods. Along with the absence of a significant change in most symptoms over time (except  
21 for anxiety), the present study found high levels of symptoms of depression (with 71.7 % of  
22 healthcare professionals fulfilling criteria for at least a *suspected diagnosis*), eating disorders  
23 (58.9 % at least *suspected*), somatoform disorders (43.9 % at least *suspected*), anxiety (38.3  
24 % at least *suspected*) and compulsion (38.1 % at least *suspected*). To our knowledge this is  
25 the first study that compared healthcare professionals’ mental health over a longer period (i.e.,  
26 comparison of a sample in May-July 2020 to a sample in March-June 2021). While the  
27 research design at hand is not a full-fledged within-participant longitudinal study, the  
28 similarly recruited samples at both time points allow us to draw a more substantial  
29 comparison than previous literature. In light of this, measures to reduce psychological strain  
30 among these workers are urgently needed – particularly as the consequences of the  
31 psychological distress can be expected to outlive the end of the pandemic. In addition to  
32 individual suffering, this is also a problem for the healthcare system and patients: depression  
33 and fatigue have been shown to correlate with major medical errors [7] and quality of care  
34 [6].  
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### 57 **Differences between nursing staff, physicians and paramedics**

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The present study found significant differences in mental health between physicians and paramedics on the one hand and nursing staff on the other. This is in line with a rapid review that concluded that nursing staff may have a higher risk of mental health problems during the COVID-19 pandemic [12]. Furthermore, Cai et al. [39] found that nursing staff felt more anxious and nervous compared to other professionals during the pandemic. Lai et al. [40] reported more severe levels of mental health symptoms for nursing staff, but also for frontline healthcare workers, those working in Wuhan, China, and for women. While excessive workload and inadequate personal protective equipment might be factors associated with poorer mental health for all professional groups, there are some differential factors between professional groups that may explain different outcomes.

These differential factors may not be pandemic-specific but rather originating from more permanent aspects, such as difficulties of the nature of the work, nurses feeling inadequately supported, suffering from higher employment insecurity, facing issues with the management, patients and doctors as well as horizontal violence [41]. This is in line with our study that found job insecurity to be the most influential predictor of depression symptoms. For middle-aged and older adults in Europe, perceived insecurity in employment and housing as well as economic problems are significantly associated with participants' mental health and psychological distress [42]. Thereby, the relationship between subjective well-being and perceived adversities is partially mediated by institutional trust. Nursing staff might suffer from greater employment insecurities, economic problems and have less institutional trust – factors that may increase their psychological distress.

Contrary to our expectations, our study could not identify significant differences in mental health outcomes between physicians and paramedics. A tentative explanation for the missing difference may be that the high stress baseline for paramedics is counterbalanced by the fact that they work “outside” the hospital system. In other words, in contrast to nursing staff they are not exposed to hierarchies and issues between professional groups inside the hospital. Other studies have identified high levels of emotional strain and burnout for paramedics during the pandemic [11], but to our knowledge there are no studies yet that have compared the mental health outcomes of paramedics to other professional groups. Future

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3 research might help to shed light on relevant protective and risk factors for this group and  
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5 how these may differ for other groups of healthcare professionals.  
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### 7 **Help-seeking**

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9 In the present study the reported help-seeking intentions and behaviour were low.  
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11 Even out of those who reported high levels of psychological strain, many were not seeking  
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13 help, citing either concerns about the distribution of resources or accessibility issues. That is,  
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15 they either assumed that resources for psychological support are limited and given this, they  
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17 described themselves as less in need of these than others, or they did not know of any suitable  
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19 services that met their needs or did not have free time to access such services. These results  
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21 paralleled our previous study [3]; we thus sought to explain this behaviour in the present  
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23 study, hypothesizing that people who held a strong caregiver self-image would be less likely  
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25 to seek help for themselves. The idea was that being a caregiver would be seen as something  
26  
27 exclusive and binary – i.e., that people would either view themselves as a giver or a recipient  
28  
29 of care. However, we were not able to demonstrate this expected relationship. Given that the  
30  
31 measurement instruments had been validated, it remains unclear why caregiver self-image  
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33 does not predict help-seeking. One possible explanation is that this binary idea is not actually  
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35 inherent in the caregiver image. Rather, those who view giving and receiving care as mutually  
36  
37 exclusive might be a subgroup which also holds toxic ideas about strength and help-seeking  
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39 as weakness, while the rest of the group might see giving and receiving help as going hand in  
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41 hand. The instrument might therefore not have been specific enough. Also, the tests may not  
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43 have been sensitive enough to detect changes and the sample size may have been too small to  
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45 identify differences between the groups that were of unequal sizes. Additionally, self-report  
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47 measures are, of course, subject to social desirability.  
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49  
50 Furthermore, the large share of our sample stating that (1) they were not in need of  
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52 support despite severely elevated levels of mental strain, that (2) they already had sufficient  
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54 support and that (3) others needed support more urgently, could be indicative of a climate that  
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56 discourages help-seeking behaviour and speaking out about mental health issues in the  
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58 healthcare community. However, contrary to our H6 we could not find a correlation between  
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60 team climate and help-seeking. On the other hand, we could confirm a relationship between

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team climate and mental health (H5). In other words, working in a positive team climate can have significantly positive impacts on mental health for professionals in the healthcare sector. This might have led to a reduction in actual need for help in those participants who experienced a positive team climate, which could explain why they did not display more help-seeking behaviour. It is crucial that future research takes a closer look at the team climate and work culture in the healthcare sector and the norms they set around mental health – more specifically into how a more positive team climate can be fostered where this is necessary. Help-seeking is stigmatised, as are mental health problems [16, 17], and participant responses may reflect that. The stigmatization of health-seeking as well as the rejection of people with mental illness is bound to a historical and cultural context. For instance, mental health stigma has decreased considerably in Germany since the 1990s [43]. A study found that Cuban professionals reported stronger mental health stigma and more willingness to seek help than German professionals [44]. For this reason, in particular exploratory qualitative studies seem warranted that take into consideration the cultural context of help seeking and mental health stigma. While social norms of this kind are complex and slow to change, it is crucial they be identified and addressed. If help-seeking behaviour truly is widely stigmatized in the healthcare community, improving the accessibility of support services alone is bound to have very limited effects on the rates of healthcare workers seeking help.

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**Limitations**

These findings are subject to certain limitations. Firstly, even though it was the second time we administered the same questionnaire, our data are cross-sectional, as we could not ensure the participation of the same participants. This limits the extent to which causal claims are possible. While it is possible for us to report the extent to which participants themselves think pandemic-related work-specific stressors caused deteriorations in their mental health, a true test of causality over time, both for work-related stressors and help-seeking behaviour, would require true longitudinal data with within-participant observations. Secondly, our data may be biased by self-selection. While the online survey was widely accessible and fairly short, thus lowering the cognitive load required to complete it, it is conceivable that the

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4 healthcare workers suffering the most did not participate because they could not muster the  
5 time or mental energy. This would imply an underestimation of actual psychological strain  
6 among healthcare staff. In relation to this issue, only two participants from Switzerland chose  
7 to participate in the study, which means conclusions about the situation in the Swiss  
8 healthcare system cannot be drawn from these data. Finally, the healthcare systems of  
9 Austria, Germany and Switzerland differ slightly in regard to the insurance system.  
10 Nevertheless, they are comparable in regard to high overall costs and above average number  
11 of physicians per capita [45]. Future comparisons with additional countries might reveal  
12 whether the structure of the healthcare system affects resilience of staff.  
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### 23 **Conclusion**

24  
25 The present study shows that, presumably due to some habituation to the pandemic  
26 situation and its novelty wearing off, other mental health symptoms persist among healthcare  
27 staff in the second pandemic year. As preventative measures to reduce the spread of the virus  
28 persisted, so did limitations on opportunities to offer and seek social support, meaning that  
29 one key factor in coping with difficulties remained partly unavailable to healthcare staff.  
30 Moreover, novel stressors may have become more relevant since the collection of the data  
31 presented here, such as psychological violence and harassment of medical staff by COVID-  
32 deniers. Since this problem has become dramatically more prevalent, as illustrated by the  
33 recent suicide of an Austrian doctor following months of severe harassment by COVID-  
34 deniers and anti-vaccinationists [46], future studies will need to address these novel stressors.  
35 Symptom prevalence rates continue to be higher among nursing staff compared to physicians  
36 and paramedics as well as among healthcare staff with pre-existing health conditions as  
37 opposed to others. Our study furthermore showed that an open and constructive team climate  
38 is associated with better mental health. Future studies should also look into how this relation  
39 may be mediated by burnout. In conclusion, this means that we urgently need a higher level  
40 of appreciation, acknowledgement, and professional validation in the healthcare sector, in  
41 particular for nursing staff. Furthermore, ready access to mental health services (including  
42 mental health screening, screening for suicidality, and subsequent counselling) and protective  
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services in case of harassment will play a pivotal role in reducing the risk of mental distress in this vulnerable group of healthcare professionals. The long persistence of the psychological strain as well as the continued low willingness to seek out psychological support should ring alarm bells for decision makers in the healthcare sector, as both may be the early signs of severe long-term consequences for the entire sector and, ultimately, patient care. What our research, alongside various other studies, has done is to establish that there is a need to provide mental health support to the healthcare community; the question that research must target next is why and when this need does and does not translate into uptake of support.

### **Data Availability Statement**

Our anonymized data set and codebook are available for download via the open science framework (OSF) website at:

Weibelzahl, Stephan, Gesa Duden, and Julia Reiter. 2022. "Pandemic-Induced Psychological Stress in Healthcare Professionals." OSF. July 11. doi:10.17605/OSF.IO/EHM67.

<https://osf.io/ehm67/>

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### **Competing Interests Statement**

The authors declare no competing interests.

### **Ethics Statement**

Participants gave their informed consent for participation in the study and for electronic storage of their responses. Along with their responses, no personally identifiable information was collected. Ethical approval was granted by the PFH Private University of Applied Sciences Göttingen review board (application: SW\_5\_090920).

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### Author Contributions

GD, JR and SW conceived, planned and implemented the study. AP focused on the particular aspect of caretaker self-image and contributed to its theory. SW performed the main calculations, but all authors contributed to the analysis, discussed the results and contributed to the final manuscript.

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**Names of Figures**

Figure 1. *Comparison of mental health scores across professions and years. The subsample of paramedics in 2020 was too small for analysis.*

Figure 2. *Results of two multiple regressions on stress factors. b = unstandardized regression coefficient; only significant paths are labeled*

*ISR depression:  $R^2 = 0.205$ , adjusted  $R^2 = 0.194$ ,  $F(8,616) = 19.83$ ,  $p < .001$*

*ISR anxiety:  $R^2 = 0.097$ , adjusted  $R^2 = 0.085$ ,  $F(8,616) = 8.27$ ,  $p < .001$*

## Tables

**Table 1***Distribution of participants' professions by gender and by country*

profession	sample size		gender		country		
	N	rel	f	m	DE	AT	CH
paramedic	212	33%	64	146	4	207	1
inpatient nursing care	97	15%	71	26	52	45	0
inpatient elder care	81	13%	73	8	36	45	0
home care	72	11%	65	7	25	47	0
inpatient physician	67	10%	31	35	4	63	0
non-medical health sector	28	4%	19	9	5	23	0
social worker	19	3%	13	5	8	11	0
physical therapist	12	2%	11	1	5	7	0
physician's assistant	6	1%	6	0	4	2	0
psychotherapist	5	1%	3	2	3	2	0
independent physician	4	1%	0	4	0	4	0
midwife	2	0%	2	0	2	0	0
pharmacist	2	0%	0	2	0	2	0
other	32	5%	23	9	13	18	1
total	639	100%	381	254	161	476	2

N=total, rel=relative percentage, f=female, m=male, DE=Germany, AT=Austria, CH=Switzerland; 4 participants identified themselves as diverse

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table 2**

*Severity of symptoms in ISR of healthcare professional assessed in 2021 (HP2021) compared to previous year (HP2020) and the two reference groups of non-clinical sample before (P-) and during (P+) the pandemic*

scale	group	none	suspected	light	medium	severe
anxiety	HP2021	61.7%	9.2%	17.9%	8.4%	2.8%
	HP2020	52.3%	6.3%	24.7%	11.7%	5%
	P+	70.7%	5.9%	12.8%	7.4%	3.2%
	P-	71.8%	7.2%	16.1%	4.2%	0.7%
depression	HP2021	28.3%	10%	30%	25.2%	6.5%
	HP2020	18%	7.3%	40%	25.3%	9.3%
	P+	42.3%	10%	29.1%	13.7%	4.8%
	P-	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	HP2021	61.9%	8.1%	20.1%	7.2%	2.8%
	HP2020	56.7%	9%	22%	9%	3.3%
	P+	67.4%	7.9%	13.8%	6.9%	4%
	P-	75.9%	8%	12.8%	4.2%	0.7%
somatoform	HP2021	56.1%	23.3%	7.8%	10.4%	2.3%
	HP2020	42.3%	30.3%	9%	15.3%	3%
	P+	69.4%	18.9%	4.6%	5.1%	2%
	P-	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	HP2021	41.5%	11.2%	27.4%	16.5%	3.4%
	HP2020	30%	12%	31%	20.3%	6.7%
	P+	43.1%	11.8%	25.1%	13.6%	6.3%
	P-	52.8%	12%	22.6%	11.2%	1.4%
ISR total	HP2021	45.6%	6.1%	17.6%	22.7%	8.1%
	HP2020	30.3%	9%	20%	29.3%	11.3%
	P+	58.7%	6.1%	14.4%	15.7%	5%
	P-	68%	6.8%	11.5%	10.2%	3.5%

**Table 3**

*Severity of symptoms in ISR split by professional group. P– refers to a non-clinical sample assessed before the pandemic.*

scale	group	N	none	suspected	light	medium	severe
anxiety	nursing	252	50.8%	13.5%	20.6%	11.1%	4%
	physicians	70	72.9%	10%	7.1%	7.1%	2.9%
	paramedics	211	73.9%	3.3%	17.1%	5.2%	0.5%
	Other	106	58.5%	9.4%	18.9%	9.4%	3.8%
	P–	2512	71.8%	7.2%	16.1%	4.2%	0.7%
depression	nursing	252	20.6%	7.9%	28.2%	33.3%	9.9%
	physicians	70	35.7%	17.1%	27.1%	17.1%	2.9%
	paramedics	211	37.9%	11.4%	29.9%	18%	2.8%
	Other	106	22.6%	7.5%	35.8%	26.4%	7.5%
	P–	2512	68.1%	8.9%	17.1%	4.8%	1.1%
compulsion	nursing	252	50.8%	9.5%	28.6%	7.5%	3.6%
	physicians	70	71.4%	4.3%	12.9%	8.6%	2.9%
	paramedics	211	73.9%	7.1%	10.4%	7.1%	1.4%
	other	106	59.4%	8.5%	23.6%	4.7%	3.8%
	P–	2552	75.9%	8%	12.8%	4.2%	0.7%
somatoform	nursing	252	45.2%	25.8%	9.9%	15.5%	3.6%
	physicians	70	68.6%	20%	7.1%	2.9%	1.4%
	paramedics	211	64.9%	22.7%	3.8%	7.6%	0.9%
	other	106	56.6%	21.7%	10.4%	8.5%	2.8%
	P–	2512	62.3%	12.1%	22%	3.2%	0.4%
eating disorder	nursing	252	36.9%	10.7%	27.4%	20.2%	4.8%
	physicians	70	54.3%	8.6%	28.6%	8.6%	
	paramedics	211	45.5%	13.3%	26.1%	10.9%	4.3%
	other	106	37.7%	9.4%	28.3%	23.6%	0.9%
	P–	2512	52.8%	12%	22.6%	11.2%	1.4%
ISR total	nursing	252	34.1%	4.4%	18.3%	31%	12.3%
	physicians	70	62.9%	2.9%	15.7%	15.7%	2.9%
	paramedics	211	57.3%	10%	13.7%	15.2%	3.8%
	other	106	39.6%	4.7%	23.6%	21.7%	10.4%
	P–	2512	68%	6.8%	11.5%	10.2%	3.5%

**Table 4**

Results of three separate ANOVAs on ISR anxiety, depression respectively total scores by time (2020 vs 2021) and profession (nursing vs physicians).  $\hat{\eta}_G^2$  refers to the effect size.

scale	effect	<i>F</i>	<i>df</i> <sub>1</sub>	<i>df</i> <sub>2</sub>	<i>p</i>	$\hat{\eta}_G^2$
anxiety	time	0.40	1	496	.660	.001
	profession	7.96	1	496	.010	.016
	time × profession	0.44	1	496	.653	.001
depression	time	1.00	1	496	.465	.002
	profession	25.93	1	496	< .001	.050
	time × profession	0.86	1	496	.490	.002
ISR total	time	0.003	1	496	.952	<.001
	profession	21.35	1	496	< .001	.041
	time × profession	0.33	1	496	.557	<.001



**Table 5**

*How strongly are you affected by the following aspect during the COVID-19 pandemic at your workplace? (0=not at all;4=extremely). Comparison between assessments in 2020 and 2021*

stress factor	2020 [8]			2021		
	N	M	SD	N	M	SD
uncertainty on duration of pandemic-related changes				632	2.93	1.15
protective measures hinder patient contact	285	2.76	1.03	623	2.69	1.09
limited contact to colleagues	287	2.18	1.13	622	2.55	1.14
protective measures hinder work processes	297	2.58	1.00	631	2.54	1.06
changes in work procedures	298	2.57	1.04	631	2.54	1.03
anxiety about infection of family members	290	2.30	1.25	589	2.17	1.30
need for childcare in own household <sup>a</sup>	091	2.36	1.51	250	1.94	1.49
bad communication of change in work procedures				589	1.84	1.22
worry that protective measures are used inadequately				584	1.76	1.19
increasing number of serious illnesses and deaths	243	1.29	1.18	548	1.76	1.19
anxiety about self-infection	285	1.78	1.18	560	1.53	1.15
fear of insufficient supply of protective measures				540	1.37	1.19
job insecurity	234	1.16	1.25	392	0.83	1.08

N=total, M=mean, SD=std. deviation

<sup>a</sup>this item was presented conditional on the response to a previous question about having children; number of children not assessed.



**Table 6**

*Frequency of responses to 'Would you like to receive psychological support to deal with the crisis?' categorized by presumed need for support based on ISR scale*

Would you seek psychological help?	in need		total
	no	yes	
No, I am fine.	184	75	259
No, I get sufficient support.	38	47	85
No, I prefer to deal with it on my own.	15	57	72
I will consider it.	16	39	55
Yes, but not psychotherapy.	3	5	8
Yes, psychotherapy.	0	5	5
no answer	35	120	155
All	291	348	639

'no' means  $ISR < 0.5$ ; 'yes' means  $ISR \geq 0.5$

**Table 7***Standardised regression of ISR total score on subscales of Team Climate (TC)*

Predictor	<i>beta</i>	95% CI	<i>t</i>	<i>df</i>	<i>p</i>
TC1 (not ashamed)	-0.46	[-0.53, -0.40]	-13.58	636	< .001
TC2 (open communication)	-0.22	[-0.29, -0.15]	-6.51	636	< .001

*Note.* *beta* = standardized regression coefficient; CI = confidence interval;  
 $R^2 = .321$ , adjusted  $R^2 = .319$ ,  $F(2,636) = 150.55$ ,  $p < .001$

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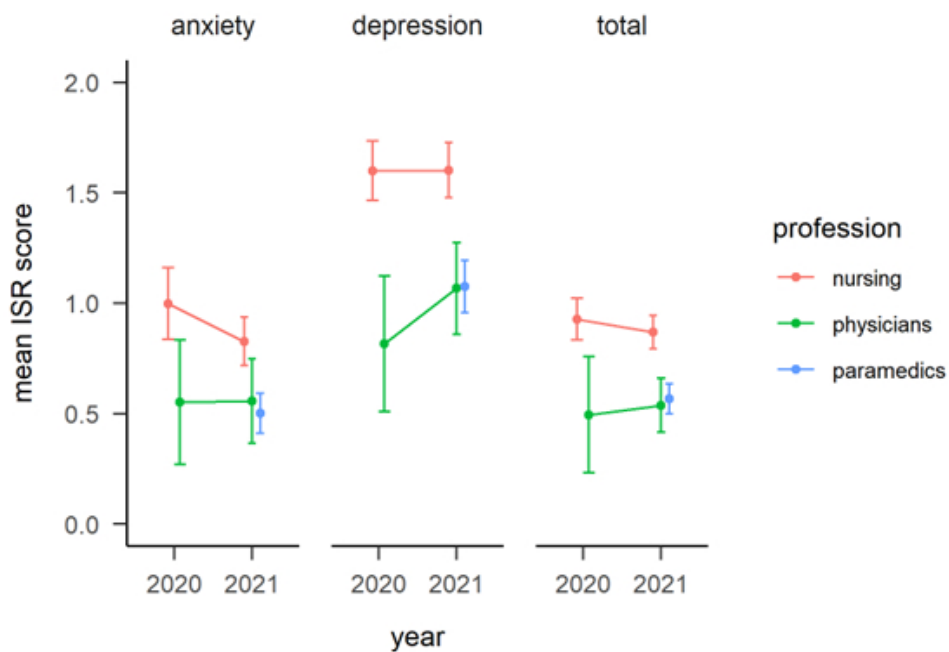


Figure 1. Comparison of mental health scores across professions and years.

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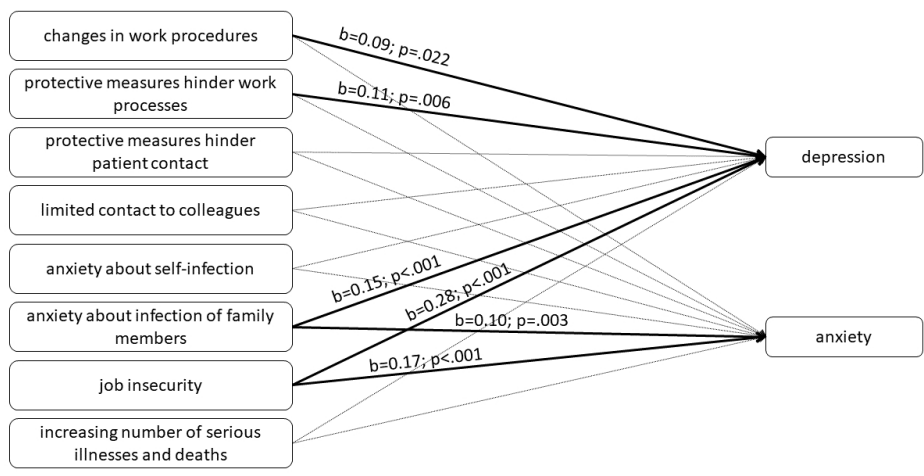


Figure 2. Results of two multiple regressions on stress factors. b = unstandardized regression coefficient; only significant paths are labeled

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## Supplementary Materials

**Table S1***Severity of symptoms in ISR split by gender (4 participants did not indicate their gender)*

scale	gender	N	none	suspected	light	medium	severe
anxiety	female	381	55.4%	10.8%	19.7%	10.2%	3.9%
	male	254	72%	6.7%	14.6%	5.9%	0.8%
depression	female	381	24.1%	8.4%	29.1%	31.2%	7.1%
	male	254	34.6%	12.6%	30.3%	16.9%	5.5%
compulsion	female	381	57.5%	8.7%	23.6%	7.3%	2.9%
	male	254	68.9%	7.1%	14.6%	6.7%	2.8%
somatoform	female	381	53.3%	23.1%	8.9%	11.5%	3.1%
	male	254	59.8%	24.4%	5.9%	8.7%	1.2%
eating disorder	female	381	36.7%	8.9%	30.7%	18.6%	5%
	male	254	49.2%	14.6%	22%	13%	1.2%
ISR total	female	381	38.8%	5.8%	18.6%	25.7%	11%
	male	254	56.3%	6.3%	15.4%	18.1%	3.9%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S2***Severity of symptoms in ISR split by age*

scale	age	N	none	suspected	light	medium	severe
anxiety	<30	206	57.3%	6.3%	19.4%	12.1%	4.9%
	30-41	162	55.6%	13%	21%	8%	2.5%
	42-53	147	62.6%	11.6%	17.7%	6.8%	1.4%
	>53	124	75.8%	6.5%	11.3%	4.8%	1.6%
depression	<30	206	24.3%	4.9%	32.5%	26.2%	12.1%
	30-41	162	24.1%	12.3%	27.8%	30.9%	4.9%
	42-53	147	31.3%	12.2%	27.2%	25.9%	3.4%
	>53	124	37.1%	12.9%	30.6%	16.1%	3.2%
compulsion	<30	206	58.3%	9.7%	18.9%	8.7%	4.4%
	30-41	162	63%	8%	18.5%	7.4%	3.1%
	42-53	147	63.3%	5.4%	21.8%	8.2%	1.4%
	>53	124	64.5%	8.9%	21.8%	3.2%	1.6%
somatoform	<30	206	50.5%	25.2%	7.3%	13.1%	3.9%
	30-41	162	56.8%	27.8%	6.8%	7.4%	1.2%
	42-53	147	59.2%	17%	8.8%	12.9%	2%
	>53	124	59.7%	22.6%	8.9%	7.3%	1.6%
eating disorder	<30	206	43.7%	10.2%	25.2%	18%	2.9%
	30-41	162	35.2%	14.8%	26.5%	17.9%	5.6%
	42-53	147	37.4%	12.9%	27.9%	17.7%	4.1%
	>53	124	50.8%	6.5%	31.5%	10.5%	0.8%
ISR total	<30	206	39.3%	7.8%	17%	24.3%	11.7%
	30-41	162	40.7%	4.9%	21%	25.9%	7.4%
	42-53	147	51%	4.1%	13.6%	23.8%	7.5%
	>53	124	55.6%	6.5%	18.5%	15.3%	4%

## MENTAL HEALTH OF HEALTHCARE PROFESSIONALS

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**Table S3***Multiple regression of ISR depression scores on stress factors*

predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
intercept	0.37	[0.12, 0.61]	2.93	.003
changes in work procedures	0.09	[0.02, 0.16]	2.53	.022
protective measures hinder work processes	0.11	[0.03, 0.18]	2.93	.006
protective measures hinder patient contact	0.03	[-0.04, 0.09]	0.77	.649
limited contact to colleagues	0.01	[-0.05, 0.07]	0.35	.879
anxiety about self-infection	0.00	[-0.07, 0.07]	0.07	.940
anxiety about infection of family members	0.15	[0.09, 0.22]	4.65	< .001
job insecurity	0.28	[0.21, 0.36]	7.68	< .001
increasing number of serious illnesses and deaths	-0.01	[-0.07, 0.05]	-0.42	.745

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval;  $R^2 = 0.205$ , adjusted  $R^2 = 0.194$ ,  $F(8,616) = 19.83$ ,  $p < .001$

**Table S4***Multiple regression of ISR anxiety scores on stress factors*

Predictor	<i>b</i>	95% CI	<i>t</i> (619)	<i>p</i>
Intercept	0.24	[0.01, 0.46]	2.08	.038
changes in work procedures	0.01	[-0.05, 0.08]	0.33	.847
protective measures hinder work processes	0.05	[-0.02, 0.11]	1.45	.262
protective measures hinder patient contact	0.00	[-0.06, 0.06]	-0.13	.952
limited contact to colleagues	0.00	[-0.05, 0.06]	0.14	.934
anxiety about self-infection	0.03	[-0.03, 0.10]	1.05	.465
anxiety about infection of family members	0.10	[0.04, 0.16]	3.28	.003
job insecurity	0.17	[0.10, 0.24]	5.01	< .001
increasing number of serious illnesses and deaths	-0.01	[-0.06, 0.04]	-0.41	.847

*Note.* *b* = unstandardized regression coefficient; CI = confidence interval;  $R^2 = 0.097$ , adjusted  $R^2 = 0.085$ ,  $F(8,616) = 8.27$ ,  $p < .001$



**The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.**

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
<b>Title and abstract</b>					
	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	In title and abstract, pp.1-2	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included.  RECORD 1.2: If applicable, the geographic region and time frame within which the study took place should be reported in the title or abstract.  RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	
<b>Introduction</b>					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	pp.4-7		
Objectives	3	State specific objectives, including any prespecified hypotheses	p.7		
<b>Methods</b>					
Study Design	4	Present key elements of study design early in the paper	p.7		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	p.7-10		

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<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27</p> <p>Participants</p>	<p>6</p>	<p>(a) <i>Cohort study</i> - Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  <i>Case-control study</i> - Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  <i>Cross-sectional study</i> - Give the eligibility criteria, and the sources and methods of selection of participants</p> <p>(b) <i>Cohort study</i> - For matched studies, give matching criteria and number of exposed and unexposed  <i>Case-control study</i> - For matched studies, give matching criteria and the number of controls per case</p>	<p>p.9</p>	<p>RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided.</p> <p>RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided.</p> <p>RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.</p>	
<p>28 29 30 31 32 33 34</p> <p>Variables</p>	<p>7</p>	<p>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.</p>	<p>pp.8-10</p>	<p>RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.</p>	
<p>35 36 37 38 39 40 41 42</p> <p>Data sources/ measurement</p>	<p>8</p>	<p>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</p>	<p>pp.8-15</p>		

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Bias	9	Describe any efforts to address potential sources of bias	p.11		
Study size	10	Explain how the study size was arrived at	p.9		
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	pp.10-15		
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> - If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> - If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> - If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	pp.10-15		
Data access and cleaning methods		..		RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	pp.10-15

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				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	
Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	p.10
<b>Results</b>					
Participants	13	(a) Report the numbers of individuals at each stage of the study ( <i>e.g.</i> , numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	pp.10-15	RECORD 13.1: Describe in detail the selection of the persons included in the study ( <i>i.e.</i> , study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	pp.10-15
Descriptive data	14	(a) Give characteristics of study participants ( <i>e.g.</i> , demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) <i>Cohort study</i> - summarise follow-up time ( <i>e.g.</i> , average and total amount)	pp.9-10		
Outcome data	15	<i>Cohort study</i> - Report numbers of outcome events or summary measures over time <i>Case-control study</i> - Report numbers in each exposure	pp.10-15		

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		category, or summary measures of exposure <i>Cross-sectional study</i> - Report numbers of outcome events or summary measures			
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	pp.10-15		
Other analyses	17	Report other analyses done— e.g., analyses of subgroups and interactions, and sensitivity analyses	pp.10-15		
<b>Discussion</b>					
Key results	18	Summarise key results with reference to study objectives	pp.10-19		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	p.19	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	p.19
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	pp.10-19		

		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence			
Generalisability	21	Discuss the generalisability (external validity) of the study results	pp.10-19		
<b>Other Information</b>					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	p.20		
Accessibility of protocol, raw data, and programming code		..	p.20	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data or programming code.	p.20

\*Reference: Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langin SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

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