



Prevalence and Related Factors of Anxiety Among University Teachers 1 Year After the COVID-19 Pandemic Outbreak in China: A Multicenter Study

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Objectives: This study aimed to evaluate the prevalence of anxiety among university teachers 1 year after the onset of the coronavirus disease 2019 (COVID-19) pandemic and provide empirical evidence of psychological intervention.

Methods: A multicenter study was conducted to examine the prevalence of anxiety among 10,302 teachers in 21 Chinese universities from February 12 to April 23, 2021. The generalized Anxiety Disorder 7-item Scale (GAD-7) was used to assess symptoms of anxiety. Multivariate logistic regression models were used to analyze the relationship between potential influence and anxiety symptoms.

Results: The overall prevalence of anxiety was 40.0% 1 year after the onset of the COVID-19 pandemic, which was found to be higher in women than in men (41.32% vs. 38.22%; $p < 0.0001$). The multivariate logistic regression showed that being the female ($OR = 1.207$; 95%CI: 1.103–1.318), age ≥ 60 years ($OR = 2.004$; 95%CI: 1.128–3.560), being married ($OR = 1.319$; 95%CI: 1.150–1.513), and poor family economic status ($OR = 1.580$; 95%CI: 1.321–1.891) were significantly associated with anxiety. Participants with moderate, slight, or no impact of COVID-19 on life (OR for moderate, 0.557; 95%CI, 0.508–0.611; OR for slight/no, 0.377; 95%CI, 0.323–0.439) showed a reduced risk of anxiety compared to those who reported a significant effect.

Conclusions: Symptoms of anxiety were found in about two-fifths of Chinese university teachers 1 year after the outbreak of the COVID-19 pandemic. Our findings suggest that the government should improve the dynamic tracking of mental health and adopt long-term intervention strategies.

Keywords: COVID-19, university teachers, anxiety, China, mental health

INTRODUCTION

The Coronavirus disease 2019 (COVID-19) was first reported in China, becoming a global pandemic in March 2020 (1). However, it has not yet been completely controlled, even though it has been more than a year since the outbreak. COVID-19 and quarantine policies have spread anxiety throughout the population (2–4). According to the Global Burden of Disease Study (GBD) 2019, anxiety disorder is a disabling mental disorder and the leading cause of death (5). A previous study showed that approximately 34% of the general population reported moderate or above anxiety symptoms at the start of the pandemic in China (6).

Many countries adopted school closures as an effective measure to mitigate the spread of the pandemic (7). This accelerated shifts in educational approaches, leading to adverse effects on the mental health of teachers (8, 9). Prior to the COVID-19 pandemic, the prevalence of anxiety among teachers was only 4.98% in 2013 (10), which reached 13.67% in the first wave of the pandemic (February 4, 2020, to February 12, 2020) (11). As sociocultural populations, university teachers have borne the dual pressure of teaching and research and have been at a higher risk of psychological distress (10, 12). The spread of the pandemic might also change the psychological health status of university teachers. However, to the best of our knowledge, studies have not been conducted on the anxiety status of university teachers 1 year since the outbreak of the pandemic. Hence, this was the first and largest multicenter study to explore the prevalence of anxiety and related factors among teachers at 21 universities 1 year after the onset of the COVID-19 pandemic in China. Considering that humans would have to coexist with viruses for a long time, our study could provide clues for promoting the psychological health of teachers in this context.

METHODS

Sample and Data Collection

This multicenter study was conducted 1 year after the outbreak of the COVID-19 pandemic worldwide (February 12–April 23, 2021). The study was approved by the Haikou Research Ethics Committee of Hainan Medical University. In this study, the structure of the questionnaire included a cover letter, instructions, questions and answers, and coding. Questionnaires for the online survey were sent put anonymously using the Questionnaire Star (<https://www.wjx.cn>). All respondents signed an electronic informed consent form before participating in the study. In addition, logic checks were built into the background system to ensure the quality and integrity of the study. The answers to all valid questionnaires were automatically entered into a data file and then checked by two independent researchers. Participants were not allowed to answer the questionnaire repeatedly, and each device (such as a mobile phone or computer) was only eligible for one response per question. The informed consent page presented two options (yes/no). Only participants who chose “yes” were taken to the questionnaire page. The questionnaire included questions about general demographic characteristics, concerns about COVID-19, the impact of COVID-19 on life, social support, and anxiety symptoms.

The formula for estimating the sample size of the survey rate is $n = (Z_{\alpha/2}/\delta)^2 \pi (1 - \pi)$. According to literature reports, the prevalence of anxiety among Chinese adults over the age of 18 is 4.98% (10), that is, $\pi = 0.0498$, $Z_{0.05/2} = 1.96$, $\alpha = 0.05$, $\delta = 0.00498$, then $N = 7,330$. Taking into account the invalid questionnaires, the sample size was set at 10,500. Based on the calculation results of sample size, in this study, the sampling process included two stages. In the first stage, 21 universities in Hainan Province were randomly selected based on a simple random sampling principle. In the second stage, online questionnaires were sent to the faculty and staff of the 21 selected universities through the Department of Academic Affairs and other departments. The inclusion criteria were participants who: (1) aged 18 years and older; (2) university teachers; (3) have provided informed consent electronically prior to registration. Exclusion criteria were participants who: (1) have been suffering from baseline psychological diseases; (2) offered the questionnaire with logical errors. Finally, 10,302 valid questionnaires were collected, with a response rate of 98.11%.

Measurements

The Generalized Anxiety Disorder 7-Item Scale (GAD-7) was used to assess the degree of anxiety symptoms. The GAD-7 scale developed by Spitzer (13) was confirmed to have good factorial validity and reliability for the assessment of anxiety in the Chinese population (14). The scale contained seven items, with each item scored from 0 to 3, and the total scale score ranged from 0 to 21. According to the total score range, 0–4 points, 5–9 points, 10–14 points, and ≥ 15 points were considered as exhibiting no anxiety, mild anxiety, moderate anxiety, and severe anxiety, respectively. In the present study, the GAD-7 demonstrated high internal consistency (Cronbach's $\alpha = 0.94$).

Social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) (15). The scale consisted of 12 items, with response options ranging from 1 (very strongly disagree) to 7 (very strongly agree). The MSPSS is used to assess the quality of social support from family, friends, and significant others in three categories. The scoring rule was as follows: the total scores ranged from 12 to 84, with higher scores representing higher levels of social support. The MSPSS scores of 12–36, 37–60, and 61–84 were considered to be low, medium, and high-level support, respectively. The MSPSS showed good factorial validity and reliability among teachers (16). Cronbach's alpha for the MSPSS was 0.97 in this study.

Statistical Analysis

A descriptive analysis was conducted on the sociodemographic characteristics of teachers using frequency and percentage. The Chi-square test was used to compare demographic data, levels of social support, and prevalence of anxiety among the different groups. Additionally, multivariate logistic regression models were used to explore the influencing anxiety symptoms. All statistical analyses were performed using SPSS (version 21.0; SPSS Inc., Chicago, IL, USA). Furthermore, $p < 0.05$ (double-tailed) was considered statistically significant.

RESULTS

General Sample Characteristics

A total of 10,302 university faculty and staff participated in the survey; of them 4,542 were men (44.09%) and 5,760 were women (55.91%). Most of them were aged 31–60 years (67.79%). In addition, some were aged ≤ 30 years (31.53%) and very few were aged ≥ 60 years (0.68%). In the level of social support, most perceived to have low support (71.11%), moderate support (27.74%), and high support (1.15%).

The Prevalence and Differences of Anxiety Among University Teachers 1 Year After the COVID-19 Outbreak

The prevalence of anxiety was 40.0% 1 year after the COVID-19 pandemic, and it was higher in women than in men (41.32% vs. 38.22%, $p < 0.05$). Additionally, the prevalence of anxiety among those who reported a quite impact of COVID-19 on their lives was 49.16%. The distribution of anxiety symptoms in the population is not random and there are differences. There were statistically significant differences in the prevalence of anxiety among university teachers of different ages, working years, self-perceived family economic status, and social support (all $p < 0.0001$). The prevalence of anxiety among teachers who reported a greater impact of COVID-19 on life was significantly higher ($p < 0.0001$). In addition, marriage and occupation were associated with the prevalence of anxiety ($p < 0.05$) (Table 1).

The Influential Factors Associated With Anxiety University Teachers 1 Year After the COVID-19 Outbreak

Screening positive for anxiety among university teachers was associated with being female, age > 60 years, married, bad family economic status, 1–5 years of work, and a quite impact of COVID-19 on life. The multivariate logistic regression analysis showed that female teachers had a higher risk of anxiety symptoms ($OR = 1.207$; 95%CI: 1.106–1.318). Compared with teachers aged ≤ 30 years, those aged ≥ 60 years had a significantly higher risk of anxiety ($OR = 2.004$; 95%CI: 1.128–3.560). Additionally, there was a higher risk of anxiety in married teachers ($OR = 1.319$; 95%CI: 1.150–1.513) than in unmarried teachers. In addition, those who reported poor family economic status were associated with a higher risk of anxiety than those who reported good economic status ($OR = 1.580$; 95%CI: 1.321–1.891). However, teachers who had worked 11–20, 20–30 years, and longer than 30 years showed a lower risk of anxiety than teachers who had worked for 1–5 years. Those who reported a moderate, slight, or no impact of COVID-19 on their lives showed a reduced risk of anxiety compared to those who reported a quite impact (OR for moderate, 0.557; 95%CI, 0.508–0.611; OR for slight/no, 0.377; 95%CI, 0.323–0.439) (Table 2).

DISCUSSION

This multicenter study investigated anxiety symptoms among 10,320 teachers from 21 universities 1 year after the start of the

COVID-19 pandemic. The results indicated that a significant proportion of the university faculty and staff had mental health problems, with 4,542 (40.0%) participants reporting anxiety symptoms. Previous studies confirmed that the prevalence of anxiety increased owing to COVID-19 (17, 18). The percentage of anxiety among university teachers in this study is close to 34.6% of that reported in a survey of university professors when the COVID-19 pandemic outbreak almost 1 year in Brazil (19). That is, anxiety symptoms seem to be very common among university teachers during the COVID-19. University teachers undertake the task of teaching and play the role of researchers (20). Owing to the COVID-19 pandemic, many university teachers could not continue their research projects. A study of teachers from kindergarten to university in China in the same period showed that 17.7% of teachers reported symptoms of anxiety, with a significantly higher percentage of university teachers reporting moderate and severe anxiety than teachers in other types of schools (21). Therefore, we suggest that the COVID-19 is a more significant psychological challenge for university teachers. Studies have shown that negative psychological emotions, such as stress and anxiety, have an impact on teachers' health (11, 22), leading to a decrease in their work enthusiasm and a decline in teaching quality (23). Simultaneously, anxiety is also an important cause of death among teachers (24). Therefore, a comprehensive investigation and intervention should be conducted on the mental health of university teachers in the current pandemic situation.

We also found that gender, age, marriage, economic status, years of work, and the degree of impact of COVID-19 on life were associated with anxiety. As in previous studies, women have been identified to be at a higher risk of mental health problems (11, 25). We believed that the possible mechanisms involved physical and psychological components. Influenced by gender chromosome genes and psychological characteristics, women are found to exhibit more self-blame in stressful events and show a tendency toward avoidance, depression, and other negative coping methods, which are closely related to the increase in anxiety symptoms in women (26). Additionally, we found that participants aged ≥ 60 years were more likely to have anxiety than those aged ≤ 30 years. First, older teachers had a higher risk of infection and poorer prognosis. Consequently, health stress and negative emotions were worse in older than in younger people, as confirmed in other studies (27, 28). Second, a recent study has confirmed that social networks could influence mental health in older adults who have struggled to reap the benefits of electronic social networks. COVID-19 has resulted in prolonged social isolation among older individuals, leading to aggravated anxiety symptoms (29). Interestingly, we found that the risk of anxiety among married university teachers was 1.319 times higher than that of unmarried teachers. Previous research also showed that married teachers appear to be under greater stress. They are required to take on more family responsibilities and worry more about parents and children influence the COVID-19 than unmarried teachers (22, 30). In addition, studies have shown that COVID-19 exacerbates teachers' job instability and increases the rate of layoffs, thus increasing the economic pressure on teachers (25, 31). This phenomenon was also reflected in our

TABLE 1 | The anxiety of university teachers 1 year after COVID-19 pandemic.

Variables	Total (n)	Anxiety (%)	F/t value	P-value
Gender				
Male	4,542	1,736 (38.22)	10.1610	0.0014
Female	5,760	2,380 (41.32)		
Age				
18–30	3,248	1,403 (43.20)	34.0309	<0.0001
31–40	3,653	1,473 (40.32)		
41–50	2,301	863 (37.51)		
51–60	1,030	350 (33.98)		
>60	70	27 (38.57)		
Ethnic group				
Ethnic Han	9,379	3,750 (39.98)	0.0381	0.8453
Others	923	366 (39.65)		
Years of work				
1–5	3,853	1,662 (43.14)	47.3024	<0.0001
6–10	1,923	785 (40.82)		
11–20	2,582	1,007 (39.00)		
21–30	1,278	452 (35.37)		
>30	666	210 (31.53)		
Marriage				
Not-married	3,173	1,311 (41.32)	11.0638	0.0114
Married	6,761	2,681 (39.65)		
Widowed	40	9 (22.50)		
Divorced	328	115 (35.06)		
Self-perceived family economic status				
Good	1,053	330 (31.34)	149.1549	<0.0001
Fair	7,544	2,894 (38.36)		
Bad	1,705	892 (52.32)		
Impact of COVID-19 on life				
Quite impacted	5,350	2,630 (49.16)	431.9809	<0.0001
Moderately impacted	3,752	1,218 (32.46)		
Slightly or not impacted	1,200	268 (22.33)		
Concern about COVID-19				
Quite concerned	9,615	3,844 (39.98)	0.0067	0.9347
Moderately concerned	663	261 (39.37)		
Slightly or not concerned	24	11 (45.83)		
Social support				
High	118	59 (50.00)	286.2510	<0.0001
Moderate	2,858	1,511 (52.87)		
Low	7,326	2,546 (34.75)		
Total	10,302	4,116 (39.95)		

study in that teachers with poor economic status had a higher detection rate of anxiety symptoms. Furthermore, the risk of anxiety was higher among teachers with <5 years of experience. The reasons for this may be attributed to the fact that new teachers who graduate from college and enter the workforce with low control over the content of their work (32). According to previous studies, teachers with more years of experience are more capable of solving problems independently in their daily work (33). Therefore, they have a higher ability to cope with the dual stress of the pandemic and the profession. Even though, there were differences in the risk of anxiety among

university teachers in different occupation types, occupation type was not an influential factor in teacher anxiety. Thus, all teachers should be covered, whether they are in teaching positions, management positions, or others, when adopting psychological interventions for university teachers. The results of this study showed that the degree of impact of COVID-19 on life was an important influencing factor for university teachers. This is in line with a study conducted by Fu (4). Evidently, individuals whose lives are severely impacted by COVID-19, especially those who have lost family members, should be the focus of our subsequent intervention.

TABLE 2 | Multivariate logistic regression analysis of factors associated with university anxiety among university teachers.

<i>Variables</i>		<i>SE</i>	<i>Wald</i>	<i>P</i>	<i>OR</i>	<i>95%CI</i>
Gender						
Male	Reference					
Female		0.0447	17.6962	<0.0001	1.207	1.106–1.318
Age						
18–30	Reference					
31–40		0.0790	0.6344	0.4258	0.939	0.804–1.096
41–50		0.0982	0.1142	0.7354	1.034	0.853–1.253
51–60		0.1333	1.1396	0.2857	1.153	0.888–1.497
>60		0.2933	5.6145	0.0178	2.004	1.128–3.560
Years of work						
1–5	Reference					
6–10		0.0723	2.0983	0.1475	0.901	0.782–1.038
11–20		0.0764	3.8941	0.0485	0.860	0.740–0.999
21–30		0.1027	4.0097	0.0452	0.814	0.666–0.996
>30		0.1478	7.5007	0.0062	0.667	0.499–0.891
Marriage						
Not-married	Reference					
Married		0.0699	15.7075	<0.0001	1.319	1.150–1.513
Widowed		0.4025	3.0645	0.0800	0.494	0.225–1.088
Divorced		0.1412	0.0469	0.8286	1.031	0.782–1.360
Self-perceived family economic status						
Good	Reference					
Fair		0.0761	2.9402	0.0864	1.139	0.982–1.323
Bad		0.0915	25.0190	<0.0001	1.580	1.321–1.891
Impact of COVID-19 on life						
Quite impacted	Reference					
Moderately impacted		0.0473	153.0590	<0.0001	0.557	0.508–0.611
Slightly or not impacted		0.0787	154.0149	<0.0001	0.377	0.323–0.439
Social support						
High	Reference					
Moderate		0.1985	3.0424	0.0811	1.414	0.958–2.086
Low		0.1965	2.9217	0.0874	0.715	0.486–1.050

The relationship between social support and mental health was not conclusive for a long time (34, 35). Many scholars generally regarded social support as a protective factor for mental health; a lower level of social support is negatively correlated with anxiety symptoms (34). However, the findings of this study revealed a different viewpoint. This may be attributed to the following reasons: (1) the protective effect of perceived social support on university teachers was weak; and (2) the number of teachers with a high level of perceived social support was very small in this study, and more than half of the teachers had a low level of social support; therefore, the sample size should be increased to confirm the accuracy of the research conclusion. Nevertheless, further expansion of our study is needed to assess the stability and reliability of our results.

Strengths and Limitations

This study had several advantages. First, to the best of our knowledge, this is the first and largest multicenter

survey of anxiety among university teachers conducted 1 year after the outbreak of the COVID-19 pandemic. Second, this study showed that nearly half of the university teachers had psychological problems. Considering the continued spread of the pandemic and the complexity of its psychological impact on teachers, this study could provide a valuable reference for the management of psychological problems among teachers in other regions and countries. However, our study had a limitation, in that it was a cross-sectional study and lacked longitudinal follow-up. Therefore, causality could not be established. Hence, further investigation is required on the long-term psychological effects of the pandemic on teachers. In addition, the universities included in this study were all public institutions, and the data collection did not collect information on teachers' anxiety at different levels, and there were some limitations in extrapolating the research results to different levels of teachers in more public and private universities.

CONCLUSION

About two-fifths of Chinese university teachers experienced anxiety symptoms 1 year after the start of the COVID-19 pandemic. Therefore, the government should focus on the mental health of teachers, particularly female and older teachers. In addition, we believed that dynamic and long-term psychological intervention measures should be taken to reduce the adverse psychological effects of the COVID-19 pandemic on teachers. These findings might be useful for providing a current anxiety profile of university teachers 1 year after the onset of the COVID-19 and pandemic for functioning as a reference point for further studies.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Ethics Committee of Hainan Medical University in Haikou, China. The patients/participants provided their written informed consent to participate in this study.

REFERENCES

- World Health Organization. *WHO Announces COVID-19 Outbreak a Pandemic*. World Health Organization Regional Office for Europe (2020). Available online at: [https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic#:~:text=\\$The%20meeting%20follows%20the%20announcement,a%20growing%20number%20of%20countries](https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic#:~:text=$The%20meeting%20follows%20the%20announcement,a%20growing%20number%20of%20countries) (accessed May 31, 2021).
- Song X, Fu W, Liu X, Luo Z, Wang R, Zhou N, et al. Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China. *Brain Behav Immun*. (2020) 88:60–65. doi: 10.1016/j.bbi.2020.06.002
- Fu W, Wang C, Zou L, Guo Y, Lu Z, Yan S, et al. Psychological health, sleep quality, and coping styles to stress facing the COVID-19 in Wuhan, China. *Transl Psychiatry*. (2020) 10:225. doi: 10.1038/s41398-020-00913-3
- Fu W, Yan S, Zong Q, Anderson-Luxford D, Song X, Lv Z, et al. Mental health of college students during the COVID-19 epidemic in China. *J Affect Disord*. (2021) 280(Pt. A):7–10. doi: 10.1016/j.jad.2020.11.032
- GBD 2019. Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. (2020) 396:1204–22. doi: 10.1016/S0140-6736(20)30925-9
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health*. (2020) 17:1729. doi: 10.3390/ijerph17051729
- Donohue JM, Miller E. COVID-19 and school closures. *JAMA*. (2020) 324:845–7. doi: 10.1001/jama.2020.13092
- Aperribai L, Cortabarria L, Aguirre T, Verche E, Borges Á. Teacher's physical activity and mental health during lockdown due to the COVID-2019 pandemic. *Front Psychol*. (2020) 11:577886. doi: 10.3389/fpsyg.2020.577886
- Fukuda Y, Fukuda K. Educators' Psychosocial Burdens Due to the COVID-19 Pandemic and Predictive Factors: A Cross-Sectional Survey of the Relationship with Sense of Coherence and Social Capital. *Int J Environ Res Public Health*. (2022) 19:2134. doi: 10.3390/ijerph19042134
- Huang Y, Wang Y, Wang H, Liu Z, Yu X, Yan J, et al. Prevalence of mental disorders in China: a cross-sectional epidemiological study. *Lancet Psychiatry*. (2019) 6:211–24. doi: 10.1016/S2215-0366(18)30511-X
- Li Q, Miao Y, Zeng X, Tarimo CS, Wu C, Wu J. Prevalence and factors for anxiety during the coronavirus disease 2019 (COVID-19) epidemic among the teachers in China. *J Affect Disord*. (2020) 277:153–8. doi: 10.1016/j.jad.2020.08.017
- Talidong, KJB, Toquero, CMD. Philippine teachers' practices to deal with anxiety amid COVID-19. *J Loss Trauma*. (2020) 25:573–9. doi: 10.1080/15325024.2020.1759225
- Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. (2006) 166:1092–7. doi: 10.1001/archinte.166.10.1092
- Wu Q, Luo X, Chen S, Qi C, Yang WFZ, Liao Y, et al. Stigmatizing attitudes towards mental disorders among non-mental health professionals in six general hospitals in Hunan province. *Front Psychiatry*. (2020) 10:946. doi: 10.3389/fpsyg.2019.00946
- Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. *J Pers Assess*. (1990) 55:610–7. doi: 10.1080/00223891.1990.9674095
- Lee SC, Moy FM, Hairi NN. Validity and reliability of the Malay version multidimensional scale of perceived social support (MSPSS-M) among teachers. *Qual Life Res*. (2017) 26:221–7. doi: 10.1007/s11136-016-1348-9
- Tian F, Li H, Tian S, Yang J, Shao J, Tian C. Psychological symptoms of ordinary Chinese citizens based on SCL-90 during the level I emergency response to COVID-19. *Psychiatry Res*. (2020) 288:112992. doi: 10.1016/j.psychres.2020.112992
- Du J, Mayer G, Hummel S, Oetjen N, Gronewold N, Zafar A, et al. Mental health burden in different professions during the final stage of the COVID-19

AUTHOR CONTRIBUTIONS

WF, YL, and CL conceived and designed the study. LZ, SY, JW, XH, and WF participated in the acquisition of data. WF, XH, and SY analyzed the data. YL, XH, and CL gave advice on methodology. WF drafted the manuscript, XH, YL, and CL revised the manuscript. All authors read and approved the final manuscript.

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- lockdown in China: cross-sectional survey study. *J Med Internet Res.* (2020) 22:e24240. doi: 10.2196/24240
19. Freitas RF, Ramos DS, Freitas TF, Souza GR, Pereria EG, Lessa AC et al. Prevalência e fatores associados aos sintomas de depressão, ansiedade e estresse em professores universitários durante a pandemia da COVID-19. *J Brasil Psiquiatr.* (2021) 70:283–92. doi: 10.1590/0047-2085000000348
 20. Ozamiz-Etxebarria N, Berasategi Santxo N, Idoiaga Mondragon N, Dosil Santamaria M. The psychological state of teachers during the COVID-19 crisis: the challenge of returning to face-to-face teaching. *Front Psychol.* (2021) 11:620718. doi: 10.3389/fpsyg.2020.620718
 21. Lizhi X, Peng C, Wanhong Z, Shengmei X, Lingjiang L, Li Z, et al. Factors associated with preference of psychological intervention and mental status among Chinese teachers during coronavirus disease 2019: a large cross-sectional survey. *Front Psychiatry.* (2021) 12:704010. doi: 10.3389/fpsyg.2021.704010
 22. Santamaria MD, Mondragon NI, Santxo NB, Ozamiz-Etxebarria N. Teacher stress, anxiety and depression at the beginning of the academic year during the COVID-19 pandemic. *Glob Ment Health.* (2021) 8:e14. doi: 10.1017/gmh.2021.14
 23. Naghieh A, Montgomery P, Bonell CP, Thompson M, Aber JL. Organisational interventions for improving wellbeing and reducing work-related stress in teachers. *Cochrane Database Syst Rev.* (2015) 4:CD010306. doi: 10.1002/14651858.CD010306.pub2
 24. Ryan SV, von der Embse NP, Pendergast LL, Saeki E, Segool N, Schwing S. Leaving the teaching profession: the role of teacher stress and educational accountability policies on turnover intent. *Teach Teacher Educ.* (2017) 66:1–11. doi: 10.1016/j.tate.2017.03.016
 25. Liu S, Yang L, Zhang C, Xu Y, Cai L, Ma S, et al. Gender differences in mental health problems of healthcare workers during the coronavirus disease 2019 outbreak. *J Psychiatr Res.* (2021) 137:393–400. doi: 10.1016/j.jpsychires.2021.03.014
 26. Altemus M, Sarvaiya N, Neill Epperson C. Sex differences in anxiety and depression clinical perspectives. *Front Neuroendocrinol.* (2014) 35:320–30. doi: 10.1016/j.yfrne.2014.05.004
 27. CDC COVID-19 Response Team. Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) - United States, February 12–March 16, 2020. *MMWR Morb Mortal Wkly Rep.* (2020) 69:343–6. doi: 10.15585/mmwr.mm6912e2
 28. Briggs R, McDowell CP, De Looze C, Kenny RA, Ward M. Depressive symptoms among older adults pre- and post-COVID-19 pandemic. *J Am Med Dir Assoc.* (2021) 22:2251–57. doi: 10.1016/j.jamda.2021.09.003
 29. Litwin H, Levinsky M. Social networks and mental health change in older adults after the Covid-19 outbreak. *Aging Ment Health.* (2022) 26:925–31. doi: 10.1080/13607863.2021.1902468
 30. Ali MF, Kundra S, Alam MA, Alam M. Investigating stress, anxiety, social support and sex satisfaction on physical education and sports teachers during the COVID-19 pandemic. *Heliyon.* (2021) 7:e07860. doi: 10.1016/j.heliyon.2021.e07860
 31. Ganson KT, Tsai AC, Weiser SD, Benabou SE, Nagata JM. Job insecurity and symptoms of anxiety and depression among U.S. young adults during COVID-19. *J Adolesc Health.* (2021) 68:53–6. doi: 10.1016/j.jadohealth.2020.10.008
 32. Cohen-Fraade S, Donahue M. The impact of COVID-19 on teachers' mental health. *J Multicult Educ.* (2022) 16:18–29. doi: 10.1108/JME-08-2021-0131
 33. Lizana PA, Vega-Fernandez G, Gomez-Bruton A, Leyton B, Lera L. Impact of the COVID-19 pandemic on teacher quality of life: a longitudinal study from before and during the health crisis. *Int J Environ Res Public Health.* (2021) 18:3764. doi: 10.3390/ijerph18073764
 34. Sommerlad A, Marston L, Huntley J, Livingston G, Lewis G, Steptoe A, et al. Social relationships and depression during the COVID-19 lockdown: longitudinal analysis of the COVID-19 Social Study. *Psychol Med.* (2021) 13:1–10. doi: 10.1017/S0033291721000039
 35. Lu B, Zeng W, Li Z, Wen J. Risk factors of post-traumatic stress disorder 10 years after Wenchuan earthquake: a population-based case-control study. *Epidemiol Psychiatr Sci.* (2021) 30:e25. doi: 10.1017/S2045796021000123

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