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Predictors of teachers' mental health – implications for practice

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Abstract

Purpose: To identify teachers' mental health predictors of stress, anxiety and depression within the sociodemographic, health-related, work-related and COVID-19-related factors.

Methods: Between March 3 and April 11, 2021 the cross-sectional national online survey of Polish teachers of all educational levels was conducted. The semi-structured questionnaire used in the study included demographic data (place of residence, gender, age, marital status, education), exposure to people infected with COVID-19, critical life events and pandemic-related stressors, health variables, work-related characteristics (duration of remote teaching), as well as DASS-21.

Results: In 2,757 completed responses, 86% of the respondents were female and the mean age was 46.14 (SD = 9.35); 21.3% had been previously diagnosed with COVID-19; 38.8% of the respondents (n = 1,069) were employed in primary schools (grades 4-8) and 34% worked in the secondary level education. The mean years of work experience in the sample was 20.94 (SD = 10.60). At the moment of completing the survey, most of the respondents (n = 1,488; 54%) were working on-site, 24% were still working remotely and 22.1% were engaged in the hybrid model. Sociodemographic variables, mental and physical illness, fear of the negative consequences of COVID-19, and the deaths of a family member or friend due to COVID-19 were significant predictors of stress, anxiety, and depression. Stress and depression were also predicted by remote working methods and working in a very large city. The cases of COVID-19 in groups of co-workers or students predicted only stress. COVID-19 deaths of co-workers/students/parents of students and COVID-19 diagnosis predicted anxiety.

Conclusions: The most vulnerable group of teachers turned out to consist in young women, working in a big city, mostly teaching remotely. Sustainable support and care systems adapted to the teachers' needs should be developed. Also some essential predictors of mental health deterioration among teachers should be considered when designing long-term prevention strategies.

Key words: teachers, COVID-19, mental health.

INTRODUCTION

The pandemic has caused previously unexperienced necessary changes, such as temporal lockdowns, social distancing and remote learning/working. This huge, long-term challenge for teachers in all stages of education is associated with increased stress levels and lowered well-being, which puts this particular professional group in high-risk of mental health issues [1, 2].

However, projects focusing on teachers' well-being during the pandemic are scarce. The current studies underline the impact of the pandemic on teachers in terms of quality of life, burnout and PTSD [3-5]. In the Spanish study concerning both compulsory and non-compulsory education teachers from the Basque Autonomous Community and Navarre [6], 50.6% of the sample (n = 1,633) indicated that they were suffering from stress, 49.5% – from anxiety, and 32.2% – from depression. Another Spanish study [7] examined 345 teachers, with a mean age of 44.62 years (SD = 9.53; 264 women), teaching in Spanish primary and secondary schools during lockdown. The average GHQ-12 score of the sample (M = 22.05; SD = 5.26) indicates symptoms of emotional problems. These emotional problems are predicted negatively by the time devoted to physical activity weekly and positively by the number of hours spent on teaching activity.

A Greek study concerning mental health of secondary school teachers (N = 226, 63.3% female) was conducted from March 24 to March 29, 2020. Gender seems to be a factor affecting the teachers' fears (p = 0.001). It is noteworthy that women reported 2.5 times greater fear than men. However, the study did not include any specific scale

to measure the mental health impact, and the questionnaire itself included 5 single-answer multiple-choice questions (regarding fear and stress, optimism about the outcome, depression, desire to return to work, concern over the implementation of distance learning) with answers given on a 6-point Likert scale. The results showed a correlation of stress/fear with depression ($p = 0.001$) as well as optimism ($p = 0.001$) [8].

Li *et al.* [9] carried out a study involving a large group of teachers in China ($N = 88,611$). The overall anxiety prevalence during COVID-19 pandemic was 13.67% (SE 0.12%). The prevalence was higher for women than for men (13.89% vs. 12.93%). Mild anxiety was most common (38.73%) in the 30-40 age group. It is worth referring these results to the earlier data. Huang *et al.* [10] reported the prevalence of anxiety to be 4.98% in 2013 according to China Mental Health Survey (CMHS) ($N = 32,552$ participants). The higher prevalence may be associated with threats related to the COVID-19 pandemic.

The present study aimed at understanding the nature of factors that protect and deteriorate mental well-being of Polish teachers in the COVID-19 pandemic. We have narrowed down the question of teachers' mental health predictors to a set of sociodemographic, health, work-related and COVID-19-related factors.

Table 1. Socio-demographic characteristics of the study sample ($N = 2,757$)

Socio-demographics/ Category			Number of participants	% of all participants
Gender				
Female			2372	86.0
Male			381	13.8
Other			4	0.1
Education				
Secondary			4	0.1
Post-secondary			3	0.1
Higher vocational/ Bachelor's degree			77	2.8
Master's degree			2628	95.3
Doctorate degree			45	1.6
Marital status[a]				
Single			303	11.0
Informal relationship			289	10.5
Married			1928	69.9
Divorced			179	6.5
Widowed			45	1.6
Separated			10	0.4
Chronic illness[a]				
None			1878	68.1
Physical illness			602	21.8
Mental illness			110	4.0
Both physical and mental illness			49	1.8
Disability			17	0.6
Being diagnosed for physical and/or mental illness			83	3.0
	Mean (SD)	**Mdn**	**Q1; Q3**	**Min-max**
Age	46.14 (9.35)	47.00	40; 53	19-73

[a]*These percentages do not add up to 100, since not all respondents answered the question.*

METHODS

Participants

The study was carried out with a total sample of 2,757 teachers, where 2,372 (86%) were female and 381 (13.8%) were male. The mean age was 46.14 (SD = 9.35). Detailed socio-demographic characteristics of the study sample are presented in Table 1.

Almost 40% of the respondents ($n = 1,069$) were employed in primary schools (grades 4-8) and 34% worked in the secondary level education. The mean years of work experience in the sample was 20.94 (SD = 10.60). At the moment of completing the survey, most of the respondents (n = 1,488; 54%) were working on-site, 24% were still working remotely and 22.1% were engaged in the hybrid model. The mean duration of remote work in the previous 3 months was 7.83 weeks (SD = 4.61) (see Table 2).

Among the participants, 21.3% had been previously diagnosed with COVID-19 ($n = 586$), the majority (80.3%) experienced fears of negative consequences of COVID-19, and knew of cases of COVID-19 among close family members or friends (65.9%) or co-workers or students (89.6%). Nearly one in four respondents (24.9%) experienced death of a family member or friend by COVID-19. Thirteen percent ($n = 359$) reported deaths caused by COVID-19 among co-workers/students/parents of students (see Table 2).

The total score on the DASS-21 scale in the study sample of teachers during the COVID-19 pandemic (M = 15.41; SD = 13.43) does not differ from the results obtained in the validation study of the DASS-21 scale (M = 15.87; SD = 11.78) [13], Welch's t-test: $t(255.0893) = 0.54$; $p = 0.588$. There was also no difference in the results in the Stress subscale, t-test: $t(2967.0000) = -0.05$; $p = 0.958$; Anxiety subscale, t-test: $t(2967.0000) = 0.97$; $p = 0.334$; or Depression subscale, Welch's t-test: $t(255.0506) = 0.32$; $p = 0.751$ (see Table 3).

Procedure

This observational, cross-sectional national study, conducted in Poland from 3 March to 11 April 2021, involved teachers of all educational levels. Invitations to participate in the survey were disseminated through the principals of primary, secondary, vocational and tech-

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Table 2. Work-related and COVID-19 related characteristics of the study sample (*N* = 2757)

Employment characteristics/ Category	Number of participants	% of all participants
Employment status[a]		
Employment contract	2699	97.9
Supply teacher contract	43	1.6
Others	13	0.5
Type of employment		
Pre-school education	234	8.5
Early education (grades 1-3)	355	12.9
Primary school (grades 4-8)	1069	38.8
Grades 1-3 and 4-8	75	2.7
Primary school and nursery unit	66	2.4
Post-gymnasium schools complex	168	6.1
Vocational school	49	1.8
Technical college	370	13.4
Secondary school	350	12.7
Educational centre	88	3.2
Post-secondary school	11	0.4
Boarding school	16	0.6
Psychological-pedagogical counselling centre	29	1.1
Other	134	4.9
Type of institution		
Public	2613	94.8
Non-public	144	5.2
Primary work location		
Village	616	22.3
Small town (up to 20,000 inhabitants)	382	13.9
Medium-sized town (20,000-100,000 inhabitants)	584	21.2
Large city (more than 100,000 inhabitants)	420	15.2
Very large city (more than 350,000 inhabitants)	395	14.3
Capital city	360	13.1
Current working method[a]		
Remote	661	24.0
On-site	1488	54.0
Hybrid	608	22.1
Predominant working method since 01-2021[a]		
Remote	791	28.7
On-site	1569	56.9
Hybrid	393	14.3

Table 2. Cont.

Employment characteristics	Mean (SD)	Mdn	Q1; Q3	Min-max
Work experience	20.94 (10.60)	21.00	13; 30	0-66
Remote work in past 3 months (weeks)	7.83 (4.61)	10.00	3; 12	0-12

COVID-related experiences/ Category	Number of participants	%
Diagnosed with COVID-19		
No	2171	78.7
Yes	586	21.3
Fear of negative consequences of COVID-19		
No	544	19.7
Yes	2213	80.3
COVID-19 cases in		
Close family member or a friend	1817	65.9
Co-worker or student	2470	89.6
COVID-19 death of		
Family member or a friend	686	24.9
Co-worker/student/parent of students	359	13.0

[a]*These percentages do not add up to 100, since not all respondents answered the question.*

Table 3. Summary of the results on the DASS-21 scale in study sample (*N* = 2,757)

DASS-21	Stress	Anxiety	Depression	Total		
Mean (SD)	6.91 (5.35)	3.80 (4.22)	4.79 (4.98)	15.41 (13.43)		
Mdn	6.00	2.00	3.00	12.00		
Q1; Q3	3; 10	0; 6	1; 7	5;23		
Min-max	0-21	0-21	0-21	0-63		
	n	%	*n*	%	*n*	%
Normal	2458	89.15	2277	82.59	2288	82.99
Mild	213	7.73	181	6.57	253	9.18
Moderate	86	3.12	219	7.94	194	7.04
Severe	0	0.00	63	2.29	22	0.80
Extremely severe	0	0.00	17	0.62	0	0.00

DASS-21 cut off points according to Lovibond and Lovibond (11).

nical schools, and other educational centres. All procedures were performed in accordance with the guidelines of the Maria Grzegorzewska University Ethics Committee and the 1964 Helsinki declaration as amended. The teachers who participated in the study filled out a semi-structured online questionnaires including their sociodemographic data, critical life events, the pandemic stressors relating to remote teaching. The teachers also

responded to some detailed questions regarding their mental health.

Instruments

Teachers' psychopathological symptoms were measured using the authorized translated Polish version of the screening tool, i.e. the Depression, Anxiety and Stress Scale (DASS-21) [11, 12], which consists in three subscales: depression, anxiety and stress. Each of the three subscales contains 7 items with a score from 0-3 on a Likert scale. The socio-demographic, health- and COVID-related data were collected using the self-administered online questionnaire. In order to collect information on the respondents' general health status, they were asked about their chronic diseases (both mental and somatic), if any. Also, the information related to COVID-19 was sought, including COVID-19 diagnosis, fear of negative health consequences, change of work mode during the pandemic.

Data analysis

A series of stepwise multiple regression analysis were conducted to determine the variables that could predict factors relating to mental well-being. We used the hierarchical multiple regression analysis series to examine the unique contribution of sociodemographic and health status (first block of independent variables), work-related (second block) and COVID-19-related variables (the final model) in severity of depression, anxiety and stress (DASS-21). This sequential order of entry was based on an a priori hypothesis in which the additional variance of anxiety, stress and depression may be explained by the work-related characteristics, and experiences related to COVID-19 measured after accounting for the variance related to the participants' demographics.

RESULTS

The descriptive statistics of the variables investigated are displayed in Tables 1-3.

The results of hierarchical regression analysis for sociodemographic, health, work-related and COVID-19-related factors as predictors of stress (DASS-21)

The analysis indicated that females were more stressed than males, when all variables were included in the model ($\beta = -0.08$, $t = -4.26$; $p < 0.001$). The age was also an important predictor of stress severity: the younger participants reported more stress than the older teachers ($\beta = -0.17$, $t = -3.87$; $p < 0.001$). Suffering from physical illness ($\beta = 0.07$, $t = 3.52$; $p < 0.001$), mental illness ($\beta = 0.14$, $t = 7.67$; $p < 0.001$), both physical and mental illness ($\beta = 0.11$, $t = 6.06$; $p < 0.001$) and being in the diagnostic process ($\beta = 0.13$, $t = 7.14$; $p < 0.001$) were the significant predictors of increased stress when compared to healthy participants (see Table 4).

The analysis showed that of the work-related characteristics, location and remote method of teaching were significant predictors of the stress level. Participants who worked in a large city reported a higher level of stress than those who worked in a village ($\beta = 0.12$; $t = 2.50$; $p = 0.012$). Teachers working mostly remotely experienced higher stress level in comparison to those who worked on-site ($\beta = 0.08$; $t = 3.15$; $p = 0.002$).

In the final regression model, fear of negative consequences of COVID-19 was also a significant predictor of stress severity ($\beta = 0.09$, $t = 4.75$, $p < 0.001$). Also, cases of COVID-19 among co-workers and students ($\beta = 0.06$, $t = 2.98$, $p = 0.003$) as well as death of a family member or friend ($\beta = 0.05$, $t = 2.52$, $p = 0.024$) were predictors of increased stress.

The results of hierarchical regression analysis for sociodemographic, health, work-related and COVID-19-related factors as predictors of anxiety (DASS-21)

The analysis indicated that females showed higher anxiety in comparison to males, when all variables were included in the model ($\beta = -0.07$, $t = -3.54$; $p < 0.001$). The younger participants reported a higher level of anxiety ($\beta = -0.14$, $t = -3.12$; $p = 0.002$). Suffering from physical illness ($\beta = 0.11$, $t = 5.62$; $p < 0.001$), mental illness ($\beta = 0.17$, $t = 8.97$; $p < 0.001$), both physical and mental illness ($\beta = 0.11$, $t = 6.05$; $p < 0.001$) and being in diagnosis ($\beta = 0.14$, $t = 7.70$; $p < 0.001$) were significant predictors of an increased anxiety compared to healthy participants (see Table 5).

The analysis indicated that among the work-related characteristics, only working at the primary school level was a significant predictor of lower anxiety ($\beta = -0.10$; $t = -2.31$; $p = 0.021$). Participants who worked at the primary education level had a lower level of anxiety.

When all independent variables were included in the final regression model, diagnosis with COVID-19 and fear of negative consequences of COVID-19 were significant predictors of anxiety (respectively: $\beta = 0.05$, $t = 2.73$, $p = 0.006$; $\beta = 0.11$, $t = 5.81$, $p < 0.001$). Teachers who experienced death of a family member or friend ($\beta = 0.04$, $t = 2.20$, $p = 0.028$) and/or co-workers/students/parents of students ($\beta = 0.04$, $t = 2.16$, $p = 0.031$) experienced higher anxiety in comparison to other teachers.

The results of hierarchical regression analysis for sociodemographic, health, work-related and COVID-19-related factors as predictors of depression (DASS-21)

When all independent variables were included in the regression model, all sociodemographic characteris-

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Table 4. A summary of regression analysis for sample characteristics as predictors of stress (DASS-21) (*N* = 2,757)

	Model 1 (sociodemographic and health variables)				Model 2 (+ work-related characteristics)				Model 3 (+ COVID-19-related variables)			
	B	SE	β	*t*	B	SE	β	*t*	B	SE	β	*t*
Constant	10.07	0.50		20.17***	10.67	0.92		11.58***	8.85	0.98		8.99***
Gender (ref: female)	–1.21	0.287	–0.078	–4.22***	–1.34	0.29	–0.09	–4.57***	–1.24	0.29	–0.08	–4.26***
Age	–0.08	0.011	–0.136	–7.30***	–0.10	0.02	–0.17	–3.84***	–0.10	0.02	–0.17	–3.87***
Physical illness	1.02	0.244	0.079	4.18***	1.01	0.24	0.08	4.13***	0.86	0.24	0.07	3.52***
Mental illness	3.98	0.511	0.145	7.79***	3.94	0.51	0.14	7.70***	3.89	0.51	0.14	7.67***
Both physical and mental illness	4.80	0.755	0.118	6.36***	4.64	0.75	0.11	6.15***	4.53	0.75	0.11	6.06***
Disability	0.44	1.257	0.006	0.35	0.27	1.26	0.00	0.21	0.05	1.25	0.00	0.04
During diagnosis	4.31	0.579	0.138	7.45***	4.22	0.58	0.14	7.31***	4.10	0.57	0.13	7.14***
Primary work location (ref: village)												
Small town (< 20k inh.)					–0.27	0.35	–0.02	–0.78	–0.30	0.34	–0.02	–0.86
Medium-sized town (20-100k inh.)					0.04	0.33	0.00	0.11	–0.04	0.32	0.00	–0.11
Large city (100-350k inh.)					–0.14	0.35	–0.01	–0.39	–0.24	0.35	–0.02	–0.69
Very large city (> 350k inh.)					0.99	0.35	0.07	2.85**	0.87	0.35	0.06	2.50*
Capital of Poland (Warsaw. 1,789,620 inh.)					–0.06	0.36	0.00	–0.17	–0.21	0.36	–0.01	–0.60
Work experience (years)					0.02	0.02	0.04	0.83	0.01	0.02	0.03	0.61
Predominant working method since 01-2021 (ref: on-site)												
Remote					0.82	0.27	0.08	3.07**	0.84	0.27	0.08	3.15**
Hybrid					–0.08	0.34	–0.01	–0.24	–0.06	0.33	0.00	–0.17
Preschool teacher					–0.51	0.47	–0.03	–1.08	–0.64	0.47	–0.04	–1.38
Primary school teacher					–0.63	0.48	–0.06	–1.32	–0.76	0.47	–0.07	–1.61
Secondary school teacher					–0.71	0.49	–0.06	–1.45	–0.77	0.48	–0.07	–1.58
Other					–0.51	0.47	–0.03	–1.08	–0.23	0.50	–0.01	–0.47
Diagnosed with COVID-19									0.32	0.25	0.02	1.28
Fear of the negative consequences of COVID-19									1.20	0.25	0.09	4.75***
COVID-19 cases in:												
Close family member or friend									0.01	0.22	0.00	0.04
Co-worker or student									0.98	0.33	0.06	2.98**
COVID-19 deaths of:												
Family member or friend									0.53	0.23	0.04	2.27*
Co-workers/students/ parents of students									0.57	0.29	0.04	1.92

Model 1: $F(7, 2716) = 31.109$, $p < 0.001$; $R = 0.272$, $R^2 = 0.074$, $R^2_{adj} = 0.072$. Model 2: $F(19, 2704) = 13.329$, $p < 0.001$; $R = 0.293$, $R^2 = 0.086$, $R^2_{adj} = 0.079$, $\Delta F(12, 2704) = 2.812$, $\Delta R^2 = 0.011$, $p < 0.001$. Model 3: $F(25, 2698) = 12.537$, $p < 0.001$; $R = 0.323$, $R^2 = 0.104$, $R^2_{adj} = 0.096$, $\Delta F(6, 2698) = 9.258$, $\Delta R^2 = 0.018$, $p < 0.001$

**p < 0.05; **p < 0.01; ***p < 0.001*

tics (except disability) were significant predictors of depression. Males reported lower severity of depression than females (β = –0.06, t = –3.12, p = 0.002). The age was also a significant predictor of depression severity: the younger participants reported higher depressive symptoms than the older ones (β = –0.15, t = –3.46; p < 0.001). Suffering from physical illness (β = 0.06, t = 3.21; p = 0.001), mental illness (β = 0.17, t = 8.92; p < 0.001), both physical and mental illness (β = 0.12, t = 6.37; p < 0.001) and being in diagnosis (β = 0.13, t = 6.91; p < 0.001) were significant predictors of increased depression in comparison to healthy participants (see Table 6). The analysis showed that of the work-related characteristics, work location and remote method of teaching were significant predictors of depression. Participants who worked in a large city reported higher depressive symptoms

Table 5. A summary of regression analysis for sample characteristics as predictors of anxiety (DASS-21) (*N* = 2757)

	Model 1 (sociodemographic and health variables)				Model 2 (+ work-related characteristics)				Model 3 (+ COVID-19-related variables)			
	B	SE	β	*T*	B	SE	β	*t*	B	SE	β	*t*
Constant	4.65	0.39		11.78***	6.14	0.73		8.40***	5.00	0.78		6.42***
Gender (ref: female)	–0.90	0.23	–0.07	–3.96***	–0.90	0.23	–0.07	–3.87***	–0.81	0.23	–0.07	–3.54***
Age	–0.03	0.01	–0.06	–3.39***	–0.06	0.02	–0.13	–2.99**	–0.06	0.02	–0.14	–3.12**
Physical illness	1.21	0.19	0.12	6.27***	1.21	0.19	0.12	6.27***	1.08	0.19	0.11	5.62***
Mental illness	3.65	0.40	0.17	9.05***	3.63	0.41	0.17	8.94***	3.60	0.40	0.17	8.97***
Both physical and mental illness	3.73	0.60	0.12	6.25***	3.65	0.60	0.11	6.10***	3.59	0.59	0.11	6.05***
Disability	1.33	0.99	0.02	1.33	1.30	1.00	0.02	1.30	1.13	0.99	0.02	1.14
During diagnosis	3.68	0.46	0.15	8.05***	3.63	0.46	0.15	7.92***	3.50	0.45	0.14	7.70***
Primary work location (ref: village)												
Small town (< 20k inh.)					–0.03	0.28	0.00	–0.12	–0.05	0.27	0.00	–0.17
Medium-sized town (20 -100k inh.)					0.00	0.26	0.00	–0.01	–0.05	0.26	0.00	–0.18
Large city (100-350k inh.)					–0.30	0.28	–0.03	–1.08	–0.36	0.27	–0.03	–1.33
Very large city (> 350k inh.)					0.39	0.28	0.03	1.43	0.33	0.27	0.03	1.20
Capital of Poland (Warsaw. 1,789,620 inh.)					–0.36	0.28	–0.03	–1.27	–0.47	0.28	–0.04	–1.65
Work experience (years)					0.03	0.02	0.08	1.71	0.03	0.02	0.07	1.54
Predominant working method since 01-2021 (ref: on-site)												
Remote					0.10	0.21	0.01	0.45	0.11	0.21	0.01	0.51
Hybrid					–0.01	0.27	–0.00	–0.05	0.02	0.27	0.00	0.07
Preschool teacher					–0.54	0.37	–0.04	–1.45	–0.65	0.37	–0.05	–1.77
Primary school teacher					–0.75	0.38	–0.09	–1.98	–0.87	0.37	–0.10	–2.31*
Secondary school teacher					–0.62	0.39	–0.07	–1.60	–0.67	0.38	–0.07	–1.75
Other					–0.38	0.40	–0.03	–0.96	–0.47	0.39	–0.03	–1.20
Diagnosed with COVID-19									0.53	0.20	0.05	2.73*
Fear of negative consequences of COVID-19									1.16	0.20	0.11	5.81***
COVID-19 cases in:												
Close family member or friend									–0.15	0.17	–0.02	–0.89
Co-worker or student									0.37	0.26	0.03	1.43
COVID-19 deaths of:												
Family member or friend									0.41	0.18	0.04	2.20*
Co-workers/students/ parents of students									0.50	0.23	0.04	2.16*

Model 1: $F(7, 2716) = 31.124$, $p < 0.001$; $R = 0.273$, $R^2 = 0.074$, $R^2_{adj} = 0.072$. Model 2: $F(19, 2704) = 12.315$, $p < 0.001$; $R = 0.282$, $R^2 = 0.080$, $R^2_{adj} = 0.073$, $\Delta F(12, 2704) = 2.812$, $\Delta R^2 = 0.005$, $p = 0.200$. Model 3: $F(25, 2698) = 12.060$, $p < 0.001$; $R = 0.317$, $R^2 = 0.101$, $R^2_{adj} = 0.092$, $\Delta F(6, 2698) = 9.258$, $\Delta R^2 = 0.021$, $p < 0.001$

**p < 0.05; **p < 0.01; ***p < 0.001*

than those who worked in a village (β = 0.06; *t* = 2.46; *p* = 0.014). Teachers working mostly remotely reported higher levels of depression than those who worked on-site (β = 0.07; *t* = 2.79; *p* = 0.005). In the final regression model, fear of negative consequences of COVID-19 was also a significant predictor of the depression severity (β = 0.05, *t* = 2.76, *p* = 0.006). Death of a family member or friend (β = 0.06, *t* = 3.09, *p* = 0.002) was also a significant predictor of increased depression among teachers.

DISCUSSION

The most important mental health predictors are: (1) demographic and health-related: gender, age, place of work, somatic and mental illnesses; (2) work-related: remote teaching and school type; (3) COVID-19-related: COVID-19 case among co-workers and students, the experience of death among family or friends and anxiety of negative consequences of COVID-19.

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Table 6. A summary of regression analysis for sample characteristics as predictors of depression (DASS-21) (*N* = 2757)

	Model 1 (sociodemographic and health variables)				Model 2 (+ work-related characteristics)				Model 3 (+ COVID-19-related variables)			
	B	SE	β	*t*	B	SE	β	*t*	B	SE	β	*t*
Constant	6.38	0.47		13.65***	7.25	0.86		8.41***	6.32	0.92		6.84***
Gender (ref: female)	–0.75	0.27	–0.05	–2.78*	–0.91	0.27	–0.06	–3.31***	–0.85	0.27	–0.06	–3.12**
Age	–0.04	0.01	–0.08	–4.45***	–0.08	0.02	–0.15	–3.35***	–0.08	0.02	–0.15	–3.46***
Physical illness	0.85	0.23	0.07	3.71***	0.84	0.23	0.07	3.66***	0.74	0.23	0.06	3.21**
Mental illness	4.32	0.48	0.17	9.03***	4.28	0.48	0.17	8.94***	4.26	0.48	0.17	8.92***
Both physical and mental illness	4.68	0.71	0.12	6.62***	4.54	0.71	0.12	6.42***	4.49	0.70	0.12	6.37***
Disability	0.94	1.18	0.01	0.80	0.73	1.18	0.01	0.62	0.60	1.18	0.01	0.51
During diagnosis	3.91	0.54	0.13	7.21***	3.81	0.54	0.13	7.04***	3.72	0.54	0.13	6.91***
Primary work location (ref: village)												
Small town (< 20k inh.)					–0.08	0.33	–0.01	–0.23	–0.11	0.32	–0.01	–0.33
Medium-sized town (20 -100k inh.)					–0.01	0.30	0.00	–0.05	–0.05	0.30	0.00	–0.18
Large city (100-350k inh.)					–0.25	0.33	–0.02	–0.76	–0.32	0.33	–0.02	–0.98
Very large city (> 350k inh.)					0.89	0.33	0.06	2.73*	0.80	0.33	0.06	2.46*
Capital of Poland (Warsaw. 1,789,620 inh.)					0.13	0.34	0.01	0.39	0.03	0.34	0.00	0.10
Work experience (years)					0.03	0.02	0.07	1.59	0.03	0.02	0.07	1.52
Predominant working method since 01-2021 (ref: on-site)												
Remote					0.68	0.25	0.07	2.72*	0.70	0.25	0.07	2.79*
Hybrid					0.05	0.32	0.00	0.17	0.07	0.31	0.00	0.21
Preschool teacher					–0.52	0.44	–0.03	–1.19	–0.62	0.44	–0.04	–1.42
Primary school teacher					–0.50	0.45	–0.05	–1.13	–0.61	0.44	–0.06	–1.38
Secondary school teacher					–0.27	0.46	–0.03	–0.60	–0.34	0.46	–0.03	–0.74
Other					–0.32	0.47	–0.02	–0.69	–0.42	0.47	–0.02	–0.91
Diagnosed with COVID-19									0.24	0.23	0.02	1.03
Fear of negative consequences of COVID-19									0.66	0.24	0.05	2.76*
COVID-19 cases in:												
Close family member or friend									–0.17	0.21	–0.02	–0.81
Co-worker or student									0.60	0.31	0.04	1.92
COVID-19 deaths of:												
Family member or friend									0.68	0.22	0.06	3.09*
Co-workers/students/ parents of students									0.45	0.28	0.03	1.62

Model 1: $F(7, 2716) = 27.641$, $p < 0.001$; $R = 0.258$, $R^2 = 0.067$, $R^2_{adj} = 0.064$. Model 2: $F(19, 2704) = 11.991$, $p < 0.001$; $R = 0.279$, $R^2 = 0.078$, $R^2_{adj} = 0.071$, $\Delta F(12, 2704) = 2.737$, $\Delta R^2 = 0.011$, $p = 0.001$. Model 3: $F(25, 2698) = 10.435$, $p < 0.001$; $R = 0.297$, $R^2 = 0.088$, $R^2_{adj} = 0.080$, $\Delta F(6, 2698) = 5.157$, $\Delta R^2 = 0.010$, $p < 0.001$

**p < 0.05; **p < 0.01; ***p < 0.001*

The results showed that the mental health of the younger, female teachers working in the cities are in danger. In general, women and younger population appeared to be more affected by negative mental consequences of the pandemic than men [14-18]. Teachers, comparably to medical frontline workers, can be at a higher risk of experiencing symptoms of depression, anxiety, insomnia and stress [19]. The work location also proved to be an important predictor of severity of symptoms of stress and depression. Teachers who worked in a village had a lower severity of stress and depression compared to teachers who worked in a city. Indeed, most Polish cases were recorded in cities, particularly in the large ones, hence work in a large city may be associated with a greater risk of a COVID-19 infection.

Remote teaching is the next important predictor of stress and depression. In many countries, including

Poland, teachers had no previous experience of remote teaching. They faced various technical problems related to the quality of the Internet connection and new tools they were forced to use. Another problem was the children's access to the Internet and lack of their own computers. Online lessons require self-studying, often without teachers' support, which may deteriorate the learning performance and increase anxiety levels of the students, and, secondarily, impair the well-being of teachers.

It should be noted, a number of domestic violence emergency calls received by child abuse helplines increased, not only in Poland but also worldwide [20, 21]. During online lessons, teachers may have considerable difficulty assessing students' domestic problems, including material difficulties, parental addiction to psychoactive substances or domestic violence. At the same time Polish national reports indicate that teachers still need support conducting online classes. They have been experiencing difficulties expanding the repertoire of methods, tools and material used during classes. With regards to the didactic process, teachers mostly use informal, easily-accessible sources of digital materials and tools, for example those found on social media groups [22, 23].

Polish researchers indicated that the level of depression and anxiety experienced by adolescents increased during the pandemic [24]. The teachers in our sample noted significant risks for pupils related to distance learning, such as: risk of exclusion (in terms of technical, equipment and school competence), decline in students' physical activity, and general overload related to long hours of work in the technological environment. The teachers observed severed relationships, isolation and apathy among students. Their awareness of the distance learning effects on the students' mental health, such as depression and anxiety, may have caused feelings of helplessness.

Furthermore, teachers working remotely have to solve various educational and technical problems on their own without their colleagues' support and principals' supervision. As indicated in our study, remote work was associated with higher levels of stress and depression than classroom teaching in the COVID-19 pandemic. The mental well-being of teachers should be taken into account when planning a long-term strategy regarding reopening schools [25-27].

Until now, very few studies in Europe have analyzed the psychological impact of the pandemic and remote teaching on teachers, which is the main strength of this study. The results of other Polish and European studies are convergent to the study presented in this paper [28-31]. However, these findings need to be interpreted in the context of some limitations: (1) the consequences of cross-sectional study design (2) the sampling technique which relies on digital infrastructure and voluntary participation could increase selection bias. Although the sample size is large, the generalizability of our results is limited, since we used a non-probabilistic sample. In particular, the only teachers that had the opportunity to participate were the ones who had internet access. Replications should be conducted in different countries and regions, as the socioeconomic factors, availability of local mental health service, the stage of the pandemic and culture can play an important role in mental health during the pandemic.

CONCLUSIONS AND PRACTICAL IMPLICATIONS

Our results have several practical implications. Teachers' support programs should be implemented on the basis of several pillars. First of all, mental health screening and interventions should be focused on specific groups of teachers. In particular, the focus should be on young women who work remotely. It would be useful to implement simple but empirically validated interventions for the whole teacher population. Finally, the offer of psychological support for teachers should be expanded, e.g., through support groups or at least regular supervision.

Overall, the COVID-19 pandemic has a significant impact on the psychological well-being of teachers. The deterioration of their mental well-being may have an impact on students, therefore prevention programs for teachers should be implemented [25-27]. In this way, further negative consequences of the pandemic can be limited, not only for the teachers, but also for the students' population and the education system as well.

Conflict of interest

Absent.

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