OCCUPATIONAL STRESS OF TEACHERS AT A FEDERAL INSTITUTE DURING THE PANDEMIC

ESTRESSE OCUPACIONAL DE PROFESSORES DE UM INSTITUTO FEDERAL DURANTE A PANDEMIA

ESTRÉS LABORAL DE DOCENTES DE UN INSTITUTO FEDERAL DURANTE LA PANDEMIA

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ABSTRACT: The aim of this study was to investigate the level of stress in the work environment of high school and technical course faculty at the Federal Institute of Brasília (IFB) during the COVID-19 pandemic. This was analytical, quantitative, and transversal research carried out on 250 faculty at 10 campuses. The Google Forms platform was used to collect data, using a sociodemographic and work information questionnaire and the Work Stress Scale (EET). Most faculty presented high or intermediate levels of stress (59.6%). The highest levels of stress were among females, those who had unsatisfactory training for remote teaching, those who presented medical certificates related to stress, and those who worked three shifts (p≤0.05). The dimensions Autonomy and Control, as well as Roles and Work Environment, stood out as those with the highest levels of stress, while Relationship with the Boss was the least affected dimension.

KEYWORDS: Occupational stress. School teachers. Covid-19.

RESUMO: O objetivo deste estudo foi investigar o nível de estresse no ambiente de trabalho dos professores do Ensino Médio e Técnico do Instituto Federal de Brasília (IFB) durante a pandemia. Pesquisa analítica, quantitativa e transversal, realizada em 10 campi da instituição, com a participação de 250 professores. Foi utilizado a plataforma Google Forms contendo perguntas sobre dados sociodemográficos e de trabalho e a Escala de Estresse no Trabalho (EET). A maioria dos professores apresentou níveis elevados e intermediários de estresse (59,6%). Os níveis mais elevados de estresse foram no sexo feminino, aqueles com treinamento insatisfatório para o ensino remoto, que apresentaram atestados médicos relacionados ao estresse e que trabalhavam em três turnos (p≤0,05). As dimensões Autonomia e Controle, Papéis e Ambiente de Trabalho destacaram-se como as que apresentaram maiores níveis de estresse, enquanto Relacionamento com o Chefe foi a menos afetada.

PALAVRAS-CHAVE: Estresse ocupacional. Professores escolares. Covid-19.

RESUMEN: El objetivo de este estudio fue investigar el nivel de estrés en el ambiente de trabajo de profesores de escuelas secundarias y técnicas del Instituto Federal de Brasilia (IFB) durante la pandemia. Investigación analítica, cuantitativa y transversal, realizada en 10 campus de la instituición, con la participación de 250 docentes. Se utilizó la plataforma Google Forms que contiene preguntas sobre datos sociodemográficos, laborales y la Escala de Estrés Laboral (EET). La mayoría de los docentes presentó niveles de estrés altos e intermedios (59,6%). Los mayores niveles de estrés se presentaron entre las mujeres, que tenían formación insatisfactoria para la docencia a distancia, que presentaban certificados médicos relacionados con estrés y que trabajaban en tres turnos (p≤0,05). Las dimensiones Autonomía y Control, Roles y Clima Laboral se destacaron como las de mayor nivel de estrés, mientras que Relación con el Jefe fue la menos afectada.

PALABRAS CLAVE: Estrés laboral. Maestros de escuela. COVID-19.

Introduction

Covid-19 is an acute respiratory infection caused by the SARS-CoV-2 coronavirus, which is potentially serious, highly transmissible and globally distributed. With the Covid-19 pandemic, the Ministry of Education (MEC) ordered the suspension of face-to-face classes in March 2020 until May 2022, in order to reduce the spread of the disease. As a result, teachers began to work from home, with full-time remote teaching, carrying out their professional activities from home. This change required adaptations to the spaces used for teaching, both in synchronous and asynchronous classes, and teachers had to divide their attention between professional and family demands simultaneously (Almeida *et al.*, 2021; Bernardo; Maia; Bridi, 2020; Souza *et al.*, 2021).

Research has shown that teachers in various countries can have high levels of stress, which can lead to psychological and physical problems (Baasch; Trevisan; Cruz, 2017; Macaia; Fischer, 2015; Machado; Limongi, 2019; Luz *et al.*, 2019). However, work is not only a source of illness, but can also provide well-being and pleasure, depending on the conditions in which it is carried out (Dejours, 1992).

People find it difficult to transfer skills from one context to another, they think too much in compartments. Teachers also suffer from this difficulty, and the requirement to teach in a virtual environment, imposed by Covid-19, has made this evident (Parreira; Lehmann; Oliveira, 2021). Reconciling professional activities and the domestic routine presented challenges, while some faced no problems and others faced many difficulties. Despite the advantages of working from home and the need to implement remote teaching as an alternative to maintaining teaching activities, a significant proportion of teachers were symptomatic for anxiety, stress and depression, including at a pathological level (Silva *et al.*, 2023).

The stress resulting from the rapid adaptations in the ways of teaching and working in the educational system, in a context of a pandemic, has had an impact on teachers' health, impairing their ability to carry out their work activities (Pedrolo *et al.*, 2021). Changes in work pedagogy require adequate structures and resources for the proper development of activities (Yang *et al.*, 2011). Unfortunately, teachers' emotional health is not prioritized by educational managers, as the risks associated with teachers' well-being are often not recognized (Carlotto *et al.*, 2019). It is essential that managers understand the reasons why their employees are falling ill at work, in order to propose actions that minimize the damage and promote better teacher health.

Given the importance of this topic, this study aims to investigate the level of stress in the work environment of high school and/or technical teachers at a federal institute during the period of remote classes imposed by the Covid-19 pandemic. Knowing the stressors and ways of dealing with them, based on experience and the causes in which they occur, is indispensable knowledge for deepening our understanding of occupational stress and thus proposing effective health promotion alternatives. One of the main contributions of this study was that it was carried out during the Covid-19 pandemic, which made it possible to assess the impact of working from home on teachers' lives.

Method

Analytical, cross-sectional and quantitative research carried out at the Federal Institute of Brasilia (IFB, Portuguese initials). Analytical, cross-sectional and quantitative research is a methodological approach that aims to deepen the understanding of causal relationships between specific variables. In this context, the research is analytical, focusing on identifying patterns and trends underlying the phenomena studied. The cross-sectional nature of the research implies that data collection takes place at a single point in time, providing a snapshot of the characteristics under study. This methodology aims to provide a robust and general understanding through detailed statistical analysis, contributing to the construction of solid knowledge in a given field of study (Gil, 2010; Marconi; Lakatos, 2018).

At the time of the survey, the IFB had 717 teachers who taught in secondary and/or technical education, spread across 10 campuses: Brasília, Ceilândia, Estrutural, Gama, Planaltina, Recanto das Emas, Riacho Fundo, Samambaia, São Sebastião and Taguatinga. For the sample calculation, a precision of 5% and a confidence interval of 95% were considered, resulting in a sample of 250 teachers. The sample was selected by convenience (it involves choosing individuals based on their availability and accessibility), and the inclusion criteria for taking part in the survey were: working as a secondary and/or technical school teacher, having worked exclusively at the IFB for at least one year and not having another paid occupation. The survey was carried out between May and July 2021.

An e-mail inviting all IFB teachers to take part in the research was sent. Those who agreed to take part were asked to sign the Informed Consent Form (ICF), made available on the Google Forms platform. Once they had given their consent, the teachers filled in the data collection instruments using the same platform.

Two instruments were used to collect the data. The first was a sociodemographic questionnaire, which covered issues such as age, gender, marital status, number of children, per capita income, campus of work, length of time teaching, employment, weekly working hours and the level of teaching in which they work. The second instrument was the Work Stress Scale (WSS), a reduced version with 13 questions developed and validated by Paschoal and Tamayo (2004), which addresses both stressors and associated reactions. The answers were categorized on a five-point Likert scale: 1 (totally disagree), 2 (disagree), 3 (partly agree), 4 (agree) and 5 (totally agree). For the analysis of stress levels, score values indicated by the authors of the instrument were used, with values below 2.5 being considered a low level of stress, values equal to 2.5 an intermediate level and values above 2.5 a high level of stress. The internal consistency of the instruments was verified using the Cronbach's alpha coefficient, with all five dimensions analyzed showing values above 0.70, and the overall factor obtaining a value of 0.91. The internal analysis of the instrument was considered satisfactory, as all the items had Cronbach's alpha values above 0.70, which is considered acceptable (Ribas; Vieira, 2011).

The data extracted from Google Forms was tabulated in spreadsheets prepared in Excel version 2019 and then analyzed in the Statistical Package for Social Science For Windows (SPSS), version 23, to carry out descriptive and analytical statistical analysis. The results of the continuous variables were expressed using measures of position (mean and median) and dispersion (standard deviation, minimum, maximum, quartiles) and the results of the categorical variables were expressed using frequency analysis. Fisher's exact test was used to compare the level of stress with the other categorical variables. When the assumptions were not met in relation to the expected frequencies, Fisher's exact test was used according to Mehta and Patel's algorithm. The same tests were used to compare stress levels in each dimension with the other study variables, according to the test assumptions. A significance level of 0.05 was set.

The project was submitted to the Ethics Committee of the Lutheran University of Brazil and approved (CAAE 46759821.80000.5349).

Results

A total of 345 teachers from the Federal Institute took part in the survey. However, data from 95 teachers was excluded because they did not meet the inclusion criteria, which were working in secondary and/or technical education, having at least one year's experience at the institution and not working at another institution. The final sample therefore consisted of 250 teachers. The majority of participants were female, representing 54% of the total. In terms of

age, most of the teachers were between 31 and 40 years old, representing 55.2% of the group. Only two teachers were over 60.

Regarding family formation, most of the survey participants were married or in a stable union (73.2%), with only one widower (0.4%), and 41.2% had no children. Of those who had children, 28% had only one, while 22.8% had two. The average age of the children was around nine years. As for where they lived, 15.2% of teachers said they lived alone. Of those who did not live alone, the majority shared their home with their spouse or partner (73.6%), and 60.8% had dependents under their care. In terms of individual income, the most frequent range was between 9 and 11 minimum wages (36.8%), followed by 6 to 8 wages (29.2%).

When asked about previous teaching experience in remote education, most teachers said they had such experience (51.2%). In addition, the majority had more than 10 years' teaching experience (60.8%). As for the work shift, the predominance was for those who worked more than one shift, with the afternoon shift being the most prevalent (81.2%). In terms of weekly teaching hours, 41.6% of the teachers taught between 13 and 15 hours, 38% between 8 and 12 hours and 13.2% over 16 hours. In terms of academic background, most of them had a master's degree (46.4%), followed by PhDs (39.6%) and specialists (9.6%). The campus with the highest representation in the survey was Brasília, with 16.8%, followed by Planaltina, with 15.2%. Most participants were employed under the statutory system (95.2%).

The majority of teachers (54%), in addition to teaching in 2020 and 2021, also performed administrative duties at the IFB. In the period between January 2020 and July 2021, 8.8% of teachers had already submitted stress-related medical certificates, and 10 of these teachers were involved in more than one activity at the institution.

With regard to training for remote teaching, 32% of teachers said they had not received any kind of qualification. Of those who had, 44% said that the training related to the use of the digital/interactive tools adopted by the institution did not meet their needs, while 24% said that their needs had been met. As for using these tools to teach remote classes, 41.6% of the participants reported difficulties. In addition, 44.4% of the teachers said they did not have suitable equipment, such as a computer, headset, microphone or other technological devices for remote teaching.

In terms of pedagogical support for remote classes, 28.8% of teachers said they had received support, but indicated that this support did not meet their needs. At the same time, 30% reported not having received any kind of help, while for 41.2% the support offered was sufficient to meet their needs.

More than half of the teachers (50.8%) said they had an adequate workspace at home to prepare materials, attend to students and teach remote classes. Among the difficulties faced in remote teaching, 35.6% of teachers cited noise outside their home environment as bad or terrible. This noise includes issues such as traffic, barking dogs, construction work, loud cars and noise from children's playgrounds, among others. In addition, 58% of the teachers classified the noise inside their homes, from sources such as television, sound and people talking to each other, as bad, poor or fair. Regarding internet access, 56.8% of teachers rated it as good or excellent, 30.8% as fair, and 12.4% as bad or terrible.

Using the EET inventory, it was possible to classify the stress level of teachers who teach secondary and/or technical education at the 10 campuses of the Federal Institute of Brasilia during remote teaching. The analysis revealed that the majority of teachers (53.6%) have a high level of occupational stress, followed by 40.4% with a low level and 6.0% with an intermediate level.

Stress levels were classified based on the overall score and then analyzed in relation to the other study variables, as shown in Table 1. A significant association was observed between some variables and stress levels. The gender of the teachers revealed a significant association (p=0.04), indicating that female teachers had a higher proportion of high stress (57%) compared to male teachers (49.6%). It was also found that professionals who had stress-related medical certificates had higher levels of stress (p=0.02). In addition, more than half of the teachers who had not received any type of training for remote teaching also showed higher levels of stress (p=0.01).

Table 1 - Comparison between the stress level of teachers at the Federal Institute of Brasilia with sociodemographic and occupational variables and the challenges of remote teaching in times of the Covid-19 pandemic (2021)

Variables	Low (n =101) n (%)	Intermediary (n = 15) n (%)	High (n = 134) n (%)	p
Age: [1]				0.39
from 26 to 30 years	8 (57.1)	0 (0)	6 (42.9)	
31 to 40 years	52(37.7)	9 (6.5)	77 (55.8)	
41 to 50 years	24(38.7)	3 (4.8)	35 (35.5)	
51 to 60 years	16(47.1)	2 (5.9)	16 (47.1)	
More than 60 years	1 (50)	1 (50)	0 (0)	
Sex: [1]				0.04**
Feminine	56(41.5)	2 (1.5)	77 (57)	
Masculine	45(39.1)	13 (11.3)	57 (49.6)	
Marital status: [1]				0.38
Single	11(27.5)	2 (5)	27 (67.5)	
Divorced/separated	10(38.5)	1 (3.8)	15 (57.7)	

Married/civil union	79(43.2)	12 (6.6)	92 (50.3)	
Widowed	1 (100)	0 (0)	0 (0)	
Live alone: [1]				0.65
No	88(41.5)	13 (6.1)	111 (52.4)	
Yes	13(34.2)	2 (5.3)	23 (60.5)	
Individual income: [1]				0.66
9 to 11 minimum wages	38(41.3)	8 (8.7)	46 (50)	
6 to 8 minimum wages	28(38.4)	6 (8.2)	39 (53.4)	
4 to 5 minimum wages	13(39.4)	1 (3)	19 (57.6)	
12 to 15 minimum wages	17(40.5)	0 (0)	25 (59.5)	
More than 15 minimum wages	5 (50)	0 (0)	5 (50)	
Previous teaching experience in non-face-to-face teaching: [2]				0.89
Yes	50(39.1)	8 (6.3)	70 (54.7)	
No	51(39.8)	7 (5.5)	64 (50)	
Teaching experience: [1]				0.62
5 to 6 years	7 (46.7)	2 (13.3)	6 (40)	
3 to 4 years	12 (48)	2 (8)	11 (44)	
More than 10 years	61(40.1)	8 (5.3)	83 (54.6)	
7 to 8 years	7 (28)	2 (8)	16 (64)	
9 to 10 years	14(42.4)	1 (3)	18 (54.5)	
Shifts worked: [1]				0.68
One	2 (33.3)	0 (0)	4 (66.7)	
Two	51(51.1)	6 (5.3)	56 (49.6)	
Three	48(36.6)	9 (6.9)	74 (56.6)	
In 2020 and 2021 teaches and has held or is holding administrative positions: [2]				0.75
Yes	49(42.6)	6 (5.2)	60 (52.2)	
No	52(38.5)	9 (6.7)	74 (54.8)	
Stress-related medical certificates: [1]				0.02**
2020	4 (22.2)	0 (0)	14 (77.8)	
2021(until July)	0 (0)	0 (0)	4 (100)	
I did not provide a certificate	97(42.5)	15 (6.6)	116 (50.9)	
Training for remote teaching: [1]				0.01**
Yes, but it did not meet my needs	31(28.1)	7 (6.4)	72 (65.5)	
Yes, my needs were met	39 (65)	3 (5)	18 (30)	
I received no training	31(38.7)	5 (6.3)	44 (55)	

Source: Research data (2021)

[1] – Fisher's Exact Test; [2] – Chi Square Test; ** Significant at the 0.05 level.

The levels of stress stratified in relation to the five dimensions of the Work Stress Scale are shown in Figure 1. The highest level of stress was obtained in the Autonomy and Control dimension, followed by Roles and Work Environment.

Figure 1- Stress levels of teachers at the Federal Institute of Brasilia stratified in the five dimensions of the Work Stress Scale in times of the Covid-19 pandemic (2021)
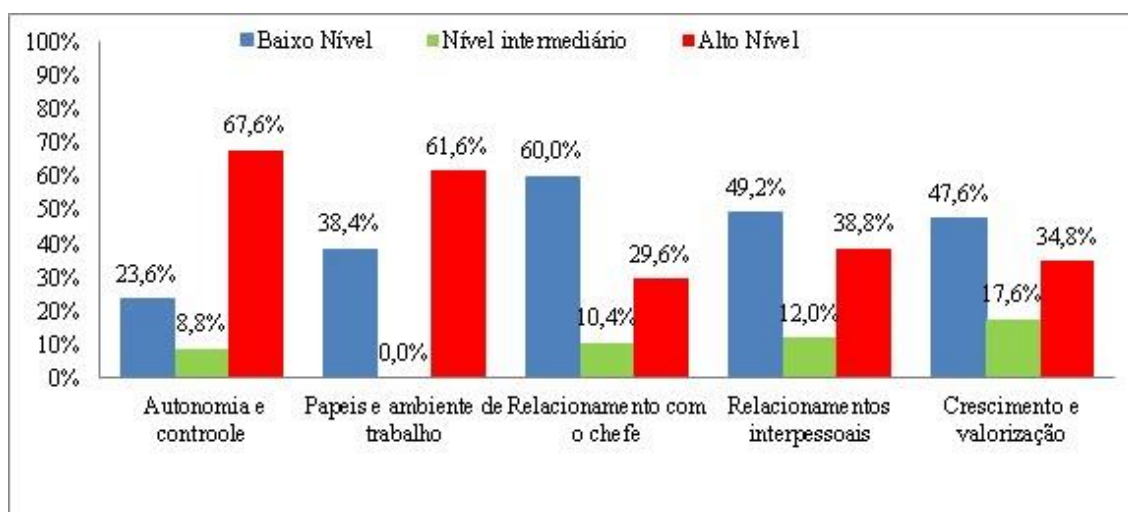
Source: Research data (2021)

Analyses were conducted to investigate associations between stress levels in each dimension and study variables. The variables gender, marital status, living alone, individual income, teaching experience, previous experience in non-face-to-face teaching and performance of administrative duties did not show significant differences ($p>0.05$). Tables 2 and 3 show the variables with significant differences. The variable referring to the training received for remote teaching showed an association with all the dimensions ($p \leq 0.05$). In the Autonomy and Control dimension, stress was correlated with the number of shifts worked ($p=0.04$), age ($p=0.05$) and type of employment ($p=0.02$). In addition, the Growth and Appreciation dimension was associated with marital status ($p=0.04$) and the number of shifts worked ($p=0.04$). Interpersonal Relationships were correlated with the occurrence of stress-related medical certificates ($p=0.05$).

Table 2 - Comparison between stress levels in the Autonomy and Control and Roles and Work Environment dimensions in IFB teachers in times of pandemic associated with sociodemographic and work variables (2021)

Variables	Autonomy and Control				Roles and work environment		
	Low n (%)	Intermediary n (%)	High n (%)	p	Low n (%)	Intermediary n (%)	High n (%)
Age: [1]				0,05**			0.06
26 to 30 years	3 (21.4%)	2 (14.3%)	9 (64.3%)		6 (42.9%)	8 (57.1%)	
31 to 40 years	25 (18.1%)	13 (9.4%)	100 (72.5%)		45 (32.6%)	93 (67.4%)	
41 to 50 years	15 (24.2%)	4 (6.5%)	43 (69.4%)		26 (45.2%)	34 (54.8%)	
51 to 60 years	16 (47.1%)	3 (8.8%)	15 (44.1%)		16 (47.1%)	18 (52.9%)	
More than 60 years	0 (0%)	0 (0%)	2 (100%)		1 (50%)	1 (50%)	

	Low n (%)	Interm n (%)	High n (%)	p		Low n (%)	High n (%)	p
Marital status: [1]								0.21
Single	8 (20.8%)	2 (5%)	30 (75%)			11 (27.5%)	29 (72.5%)	
Divorced/separated	8 (30.8%)	1 (3.8%)	17 (65.4%)			9 (34.6%)	17 (65.4%)	
Married/civil union	42 (23%)	19 (10.4%)	122 (66.7%)			75 (41%)	108 (59%)	
Widowed	1 (100%)	0 (0%)	0 (0%)			1 (100%)	0 (0%)	
Shifts worked: [1]				0.04**				0.36
One	2 (33.3%)	0 (0%)	4 (66.7%)			1 (16.7%)	5 (83.3%)	
Two	36 (31.9%)	8(7.1%)	69 (61.1%)			48 (42.8%)	65 (57.5%)	
Three	21 (16%)	14 (10.7%)	96 (73.3%)			47 (35.9%)	84 (64.1%)	
Employment bond: [1]				0.02**				0.22
Statutory	52 (21.8%)	22(9.2%)	164 (68.9%)			89 (37.4%)	149 (62.6%)	
Temporary contract	7 (58.3%)	0(0%)	5 (41.7%)			7 (58.3%)	5 (41.7%)	
Stress-related medical certificates: [1]				0.08				0.26
2020	1 (5.6%)	0(0%)	17 (94.4%)			4 (22.2%)	14 (77.8%)	
2021	0 (0%)	0 (0%)	4 (100%)			1 (25%)	3 (75%)	
No	58 (25.4%)	22 (9.6%)	148 (64.9%)			91 (39.9%)	137 (60.1%)	
Training for remote teaching: [1]				0.01**				0.01**
Yes, but it did not meet my needs	13 (11.8%)	7 (6.4%)	90 (81.8%)			26 (23.6%)	84 (76.4%)	
Yes, my needs were met	28 (46.7%)	7 (11.7%)	25 (41.7%)			37 (61.7%)	23 (38.3%)	
I received no training	18 (22.5%)	8 (10%)	54 (67.5%)			33 (41.3%	47 (58.8%)	

Source: Research data (2021); [1]– Fischer's Exact Test; [2]– Chi Square Test ** Significant at the 0.05 level.

Table 3 - Comparison between stress levels in the dimensions Relationship with the Boss, Interpersonal Relationships and Growth and Appreciation in IFB teachers in times of pandemic associated with sociodemographic and work variables (2021)

Variables	Relationship with the boss				Interpersonal Relationships				Growth and Appreciation			
	Low n (%)	Intermed iary n (%)	High n (%)	p	Low n (%)	Interme diary n (%)	High n (%)	p	Low n (%)	Interme diary n (%)	High n (%)	p
Age: [1]				0.83				0.43				0.71
26 to 30 years	8 (57.1%)	2 (14.3%)	4 (28.6%)		9 (64.3%)	0(0%)	5 (35.7%)		7(50%)	2(14.3%)	5(35.7)	
31 to 40 years	85 (61.6%)	12 (8.7%)	41 (29.7%)		66 (47.8%)	20 (14.5%)	52 (37.7%)		64 (46.6%)	29 (21%)	45(32.6%)	
41 to 50 years	34 (54.8%)	8 (12.9%)	20 (32.3%)		28 (45.2%)	9 (14.5%)	25 (40.3%)		27 (43.5%)	10 (16.1%)	25 (40.3%)	
51 to 60 years	21 (61.8%)	4 (11.8%)	9 (26.5%)		18 (52.9%)	1 (2.9%)	15 (44.1%)		19 (55.9%)	3 (8.8%)	12(35.3%)	
More than 60 years	2(100%)	0(0%)	0(0%)		2 (100%)	0 (0%)	0 (0%)		2 (100%)	0 (0%)	0 (0%)	
Marital status: [1]				0.07				0.33				0.04**
Single	17 (42.5%)	7 (17.5%)	16 (40%)		13 (32.5%)	6(15%)	21 (52.5%)		13 (32.5%)	12(30%)	15 (37.5%)	
Divorced/separated	13(50%)	2(7.7%)	11 (42.3%)		14 (53.8%)	3 (11.5%)	9 (34.6%)		17 (65.4%)	1(3.8%)	8 (30.8%)	
Married/civil union	119 (65%)	17 (9.3%)	47 (25.7%)		95 (51.9%)	21(11.5%)	67 (36.6%)		88 (48.1%)	31(16.9%)	64 (35%)	
Widowed	1 (100%)	0 (0%)	0(0%)		1(100%)	0 (0%)	0 (0%)		1(100%)	0 (0%)	0(0%)	
Shifts worked: [1]				0.2				0.49				0.04**

One	3(50%)	0 (0%)	3(50%)		2 (33.3%)	1(16.7%)	3 (50%)		1 (16.7%)	1(16.7%)	4(66.7%)
Two	75 (66.4%)	8 (7.1%)	30 (26.5%)		6 (53.1%)	10(8.8%)	43 (38.1%)		61(54%)	13 (11.5%)	39 (34.5%)
Three	72(55%)	18(13.7%)	41 (31.3%)		61 (46.6%)	19 (14.5%)	51 (38.9%)		57 (43.5%)	30 (22.9%)	44 (33.6%)
Employment bond: [1]				0.62				0.2				0.18
Statutory	141(59.2%)	25(10.5%)	72 (30.3%)		114(47.9%)	30 (12.6%)	94 (39.5%)		110(46.2%)	43(18.1%)	85 (35.7%)
Temporary contract	9 (75%)	1(8.3%)	2 (16.7%)		9(75%)	0(0%)	3 (25%)		9(75%)	1(8.3%)	2(16.7%)
Stress-related medical certificates: [1]				0.68				0.05 **				0.11
2020	9(50%)	2(11.1%)	7 (38.9%)		6 (33.3%)	4 (22.2%)	8 (44.4%)		4 (22.2%)	3 (16.7%)	11 (61.1%)
2021	2(50%)	0 (0%)	2 (50%)		0(0%)	0 (0%)	4(100%)		1(25%)	1 (25%)	2(50%)
No	139 (61%)	24(10.5%)	65 (28.5%)		117(51.3%)	26 (11.4%)	85 (37.3%)		114 (50%)	40(17.5%)	74 (32.5%)
Training for remote teaching: [1]				0.01 **				0.03 **				0.01 **
Yes, but it did not meet my needs	54 (49.1%)	16(14.5%)	40(36.4%)		43(39.1%)	19 (17.3%)	48 (46.6%)		41 (37.3%)	25 (22.7%)	44(40%)
Yes, my needs were met	53 (88.3%)	1(1.7%)	6 (10%)		40(66.7%)	6 (10%)	14 (23.3%)		43 (71.7%)	7(11.7%)	10 (16.7%)
I received no training	43 (53.8%)	9 (11.3%)	28 (34.9%)		40(50%)	5(5.6%)	35 (43.8%)		35 (43.8%)	12 (15%)	33 (41.3%)

Source: Research data (2021); [1] – Fischer's Exact Test; [2] – Chi Square Test ** Significant at the 0.05 level.

Discussion

This study investigated the stress levels of high school and/or technical school teachers at the IFB during the Covid-19 pandemic. The results indicate that the majority of teachers have a high or intermediate level of stress (59.6%). These results are similar to those found in a survey carried out at a Federal Educational Institution in the southern region of Brazil during the Covid-19 pandemic, in which 54.95% of teachers reported feeling stressed due to activities carried out at home during the pandemic (Pedrolo *et al.*, 2021). Stress in the teaching profession can have a significant impact on the health of school teachers, especially during the pandemic, when there was a need to understand and use technological processes to improve educational methodologies. This required significant investment and qualification.

Even before the pandemic, teachers were already experiencing a challenging workload, marked by inadequate pay, long working hours, the need to take tasks home and social factors

that permeated the classroom without proper support for their activities and without the social recognition they deserved (Nascimento; Seixas, 2020). During the Covid-19 pandemic, there was an increase in symptoms of depression, anxiety and stress among teachers (Freitas *et al.*, 2021; Melo *et al.*, 2022; Moraes Cruz *et al.*, 2020). Social distancing has been identified as an important factor contributing to this increase in the prevalence of psychosomatic symptoms among teachers. In the specific context of the IFB, it was found that 8.8% of teachers had medical certificates related to stress-related illness in the period between 2020 and mid-2021. During 2020, there was a transition to remote teaching at the IFB, possibly resulting in significant challenges in adapting to the new teaching model. It is important to note that all the teachers who needed medical certificates had a high level of stress.

In this context, the emergency, imposed and disorganized transition to remote teaching has resulted in a significant increase in working hours, involving not only professional activities, but also domestic, leisure, physical activities and caring for children and/or the elderly (Silva *et al.*, 2023). This situation had a particular impact on female teachers, who showed higher levels of stress compared to male teachers at the IFB (p=0.04). The negative aspects affect both sexes, but in different ways due to inequalities in the social division of labor. This is reflected in women's more frequent responsibility, having to balance multiple roles, such as managing the home, children and household chores (Araujo *et al.*, 2020; Bernardo; Maia; Bridi, 2020; Magalhães *et al.*, 2023; Troitinho *et al.*, 2021). In addition, families who have members who require care have faced additional challenges in reconciling work at home with domestic responsibilities during the pandemic (Oliveira, 2020). This was the reality for more than 60% of the participants in this study who had dependents under their care.

Teachers are exposed to various stressful situations, which can negatively affect their health and well-being (Diehl; Marin, 2016; Santos; Fernandes Neto, 2021). In this study, the length of time teaching and having previous experience in non-face-to-face teaching had no effect on the level of stress perceived by IFB teachers (p>0.05). Similar results were observed in a study carried out in Brazil during the pandemic, involving 456 teachers, in which no significant difference in stress was identified between those who received training in the use of digital technologies before or during the Covid-19 pandemic (Araujo *et al.*, 2020). One hypothesis to justify these results is that teaching practices and the educational environment are constantly evolving. Teachers realize that flexibility and adaptability are at the heart of responding to the challenges of the future (Parreira; Lehmann; Oliveira, 2021). Therefore, previous experience may not be a direct indicator of perceived stress in contemporary teaching

contexts. Teachers may have adapted to non-face-to-face teaching, regardless of previous experience, mitigating perceived stress.

One factor that contributed to stress in this study was the training received for remote teaching, which showed an association with stress levels in all dimensions of the TSE ($p \leq 0.05$). Teachers who mentioned the lack or ineffectiveness of training for remote teaching had high levels of stress ($p=0.01$). This finding is in line with several studies that have explored the relationship between teacher illness and stress resulting from a lack of training (Canova; Porto, 2010; Pedrolo *et al.*, 2021; Santos; Fernandes Neto, 2021; Yang *et al.*, 2011). These studies highlight that resources such as appropriate and effective training have the potential to mitigate and reduce work-related stress. Another study conducted with university professors from all regions of Brazil between June and September 2021, on remote teaching, revealed that even after receiving continuing training, more than 70% still perceived themselves to be in the early stages of developing skills and competencies for using digital technologies. In addition, the majority associated increased stress with the intensive use of Digital Information and Communication Technologies during remote teaching (Jesus; Rebolo, 2023). Investment in training is essential at all hierarchical levels to improve people's knowledge and skills in public and private organizations (Manas; Justo; Martinez, 2011).

In addition, it is important to consider that the predominant pedagogical practice in most Federal Institutes was face-to-face, possibly not providing sufficient stimulus for teachers to become familiar with digital literacy, master techniques, as well as teaching technologies, methodologies and strategies (Castaman; Rodrigues, 2020). The lack of support to deal with the transition from the "analog" face-to-face teaching model to a totally remote one may be related to the lack of skills for didactic transposition, considering the resources available. In this study, more than half of the IFB teachers did not receive adequate support or were dissatisfied with the support offered by the pedagogical sector to conduct remote classes.

In addition, it is important to note that the predominant pedagogical practice in most Federal Institutes was face-to-face, possibly not providing sufficient stimulus for teachers to become familiar with digital literacy, mastering techniques as well as technologies, methodologies and teaching strategies.

Teachers can experience anxiety or stress as a result of using educational technology in the classroom. Perfectionism can lead people to become overly stressed. High levels of demand in mastering technology can have a negative impact on teachers' mental health, resulting in issues such as stress and/or anxiety (Gonçalves *et al.*, 2022). It is important to train workers

adequately to carry out their tasks, which helps to reduce stressful situations. From this perspective, organizations can have a positive or negative influence on teachers' occupational stress levels (Santos; Fernandes Neto, 2021; Yang *et al.*, 2011). New educational demands have resulted in an involuntary increase in online workload for teachers. This means that teachers are dedicating significantly more time to their activities, without receiving adequate remuneration for this additional work (Santos; Silva; Belmonte, 2021).

Using the EET instrument, IFB teachers showed the highest levels of stress in the dimension associated with Autonomy and Control. Teachers who face restrictions on their autonomy to conduct their teaching activities experience impaired well-being, contributing to an increase in sick leave associated with occupational stress. Therefore, autonomy plays a favorable role in the mental health of education professionals (Canova; Porto, 2010; Macaia; Fischer, 2015; Machado; Limongi, 2019; Moreira; Rodrigues, 2018; Oliveira *et al.*, 2020). In this sense, organizations can have a positive impact on teachers' health, reducing pressure at work and providing greater autonomy in the construction of knowledge and in the teaching-learning process (Tabeleao; Tomasi; Neves, 2011).

In the Autonomy and Control dimension, statutory teachers who work three shifts are more prone to stress factors, probably due to the degree of responsibility and the demands of the institution (p=0.02; p=0.04). Because they are exclusively dedicated, they are available to the institution on all three shifts, as long as they keep to the established workload. A similar finding was observed in a study carried out with primary school teachers in a Brazilian municipality, indicating that those who were recruited and had a more extensive workload had a higher prevalence of stress (Magalhães *et al.*,2023). In addition, it is worth considering that, during the pandemic, this condition has become more pronounced, as teachers have had to adjust their teaching practices, including the recording of video classes, as well as remote classes held live, often with limited student participation. In this scenario, teachers often feel pressured and forced to adopt strategies to attract students' attention (Freitas *et al.* 2021).

On the other hand, in this dimension, teachers aged between 51 and 60 showed a lower level of stress (p=0.05). More experienced teachers tend to have an extensive background in education, which can give them greater ability to manage challenging situations, such as the transition to remote teaching. They also have a more solid understanding of their own teaching practice, which can contribute to greater autonomy and control over the work environment, minimizing stress. Possibly, over time, they have progressively acquired decision-making skills, autonomy, discernment and self-regulation of behavior, resolving these issues internally

(Machado; Alves; Caetano, 2020).

IFB teachers also revealed high levels of stress in the Roles and Work Environment dimension. During remote teaching, IFB teachers faced a number of challenges related to the workplace, significantly impacting the exercise of their activities. Many teachers had to share domestic space with their families in order to work from home (49.2%), which probably increased stress levels. The abrupt transition to the virtual environment brought logistical difficulties, such as adapting to home spaces that are not always suitable for educational purposes. These teachers faced a lack of structure, such as the absence of a suitable location and equipment for teaching classes, an unstable internet connection, as well as internal noise (television, conversations, sound) and external noise (traffic, barking, construction work). Remote teaching has offered teachers the opportunity to carry out their professional tasks with greater flexibility, but on the other hand it has had a negative impact on integrating work into the family context (Silva *et al.*, 2023). Studies have shown that teachers report exhaustion, difficulty reconciling family and work, tiring work routines and lack of concentration (Almeida *et al.*, 2021; Troitinho *et al.*, 2021). Workplace-related problems highlighted the importance of providing adequate support to teachers, addressing both practical and emotional needs to ensure a healthier and more effective working environment.

In relation to the Growth and Appreciation dimension, it was observed that teachers who were single had higher levels of stress (p=0.04). These results corroborate what was mentioned by Pedrolo *et al.* (2021), highlighting that having a partner to share concerns with proved to be a positive factor in improving teachers' quality of life, helping them to face the challenges in the context of the pandemic. It is possible that IFB teachers who had emotional support and a family bond showed less stress, which contributes to health and prevents illness. Most teachers were married or in a stable union and had children.

Teachers at the IFB showed lower levels of stress in the Relationship with the Boss and Interpersonal dimensions. This result can be attributed to several factors, including effective communication and support from superiors, effective collaboration between colleagues and the promotion of positive interpersonal relationships. Clear expectations and efficient management may also have contributed to a healthier working environment, reflecting lower levels of stress in these specific dimensions.

Despite the pandemic scenario, teachers have shown the ability to adapt, reinvent themselves and develop methodologies that enable learning to continue (Alves *et al.*, 2021). The period of working from home during the Covid-19 pandemic was challenging from both a

professional and family perspective, requiring reorganization, planning and adaptation to the new online routine, which proved to be complex. The need to receive adequate training to use technological tools, combined with pedagogical support tailored to real needs, were pointed out as crucial by teachers, and were also considered sources of stress in this study. Although there was the opportunity to spend more time at home and interact more with their children, the convenience of remote working also brought with it a significant occupation of the routine, without a clear distinction between the work and home environment. This has often resulted in a more intense workload (Waltermann, Martins, Gedrat, 2022). The transition to remote teaching not only requires training strategies, but also a reconfiguration of work to mitigate the effects of telepresence, competition with domestic responsibilities and teachers' disidentification with their own profession (Troitinho *et al.*, 2021).

Final considerations

The results of this study show that the majority of secondary and/or technical school teachers who taught remotely had high and intermediate levels of stress. In the dimensions of the Work Stress Scale, various factors, such as the number of shifts worked, employment status, training received, marital status and the occurrence of stress-related medical certificates, influenced the health of teachers during the Covid-19 pandemic.

Given these results, it is important for managers to give teachers autonomy, allowing them to carry out their teaching activities in a more creative way. In addition, it is recommended that teachers adjust their work schedules, since working from home has resulted in overlapping professional and domestic activities, requiring reorganization so as not to compromise the quality of work in both areas.

The study also pointed to the need to offer more comprehensive, quality training for teachers in order to meet their real pedagogical needs. Pedagogical support strategies should be considered as an essential part of work planning for remote teaching, with the aim of mitigating possible mental health problems related to occupational stress.

This study contributes to understanding the causes of stress associated with school activities. Based on these results, health promotion actions can be proposed and implemented for this group of professionals. It is suggested that teachers and managers work together to develop strategies aimed at reducing stress levels and improving teachers' quality of life in the workplace. Finally, it is recommended that more research be carried out to assess the

psychological impact of occupational stress on teachers in the educational field after the pandemic, in different regions of Brazil. These studies will help to identify effective and targeted interventions aimed at the mental health and well-being of these professionals.

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