Teachers' emotions, technostress, and burnout in distance learning during the COVID-19 pandemic

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Abstract

During the Covid-19 pandemic, Distance Learning (DL) supported teachers and students, allowing them to have a virtual educational context in which continuing to teach, study, and interact. However, several difficulties were reported by teachers in using Information and Communication Technologies (ICT), which in turn negatively influenced their emotional state and contributed to technological stress (technostress) and burnout onset. In this study, we wanted to investigate whether experiencing negative emotions while using DL, the instruction delivery mode (i.e., online; face-to-face; blended), and the risk of technostress could predict teachers' burnout; whether active technical support from participants' institutions could represent a protective factor against burnout; if there is a difference between female and male participants in experiencing technostress. Results confirmed that negative emotions and technostress, but not the instruction delivery mode, predict burnout; support from institutions may represent a protective factor; there were no differences between male and female teachers in experiencing anxiety linked to technostress. Possible explanation for these results and implications for practice are discussed.

Keywords

Teachers, technostress, distance learning, burnout

1. Introduction

In Italy, once mandatory isolation was declared due to the COVID-19 pandemic, teachers of all educational levels had to substantially modify their way of working, experiencing unprecedented and sudden changes in their practice [1]. In particular, a significant modification in teaching practices in terms of student-teacher relationships occurred. Teachers, students, and families had to restructure their physical interactions changing them into innovative virtual and online ones. Teacher-student relationships at school are an essential component of the educational environment [2]. Physical, spatial, visual, and emotional contact and diversified forms of relationship allow teachers to come into contact with their students, transmitting them not only didactic knowledge but also skills and tools that they can use outside the school while building their own identity in the context of their daily and working life [3].

During the Covid-19 pandemic, Distance Learning (DL) supported teachers and students, allowing them to have a virtual educational context in which continuing to teach, study, and interact. However, several difficulties were reported by teachers in using Information and Communication Technologies (ICT), which in turn negatively influenced their emotional state and contributed to technological stress (technostress) and burnout onset [4].

According to Balboni [5] "emotions influence teachers' motivation, their management of the classroom, but also their cognitive abilities". Specifically, negative emotions can affect all areas of life, including work. According to literature, indeed, emotions such as anxiety and frustration [5] are recurrent in teachers and can impact their motivation, relationship with students [5], and emotional exhaustion.

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Teacher stress, when not managed, can result in numerous negative consequences, including loss of job satisfaction, reduced effectiveness in teaching, and may even result in burnout [6]. In this regard, it has been shown in a group of university teachers [7] that an excessive workload, combined with other factors including responsibility in terms of providing teaching and learning processes of high quality, may trigger negative emotions which, in turn, reduce emotional intelligence. Emotional intelligence allows to consciously distinguish between positive and negative emotions, rationalizing and operationalizing them. Moreover, it favors the increase of empathy, a psychological protective factor for a positive climate in the classroom and among colleagues, increasing teachers' work satisfaction, engagement, and general well-being [7].

An Italian study [8] conducted between May and June 2020 on a sample of 1110 teachers from 3 Italian regions (Emilia-Romagna, Marche and Sardinia) highlighted how the prolonged experience of emotional exhaustion, characterized by negative emotions, could be the cause of burnout onset. In addition to this, difficulties in using technologies and problems related to DL contributed to undermining teachers' psychological well-being. DL implies the use of devices and, more generally, software and technologies with different levels of complexity. In Italy, the change in educational activities for DL has been unexpected. Not all the teachers were ready for a radical transformation of this type, and massive exposure to DL had to deal with both a solution and a problematic issue.

Technostress can be described as a negative attitude towards computers and newly introduced technologies. The main characteristics of technostress symptoms are the inability to concentrate on one problem, tend to be irritable, and the formation of feelings of loss of control when dealing with technology [9].

Precisely concerning the use of technological tools in the school context, the study by Estrada-Muñoz et al. [10], which involved 428 teachers working in both public and private schools, showed that 11.9% of the sample reported high levels of techno-fatigue, 13.1% of techno-anxiety and 10.7% of both dimension of the technostress construct. Their results show how individuals who experience these conditions (techno-anxiety and techno-fatigue) also report high levels of physiological activation, discomfort, and tension about learning technologies' current and future use.

Within the same research, it is also highlighted that males experience higher levels of technostress than females, while no statistically significant differences were found within age groups. Regarding gender, however, there are mixed results in the literature. For example, Salanova and colleagues [11], in a study with a sample of 741 Spanish workers, found higher levels of anxiety in females than in males. Furthermore, in a study on technostress conducted by Salanova and colleagues in 2007, the same construct investigated is considered an antecedent to burnout and a risk factor for the onset of psychosomatic disorders and damage to the organization belongs.

2. Main Objective and Hypothesis

The main objective of this study is to verify whether teachers' negative emotions related to DL and high technostress levels, in terms of anxiety, fatigue, skepticism, and ineffectiveness, may be predictors of burnout in a group of Italian teachers who have used DL during the Covid-19 pandemic

Within the current study, it is hypothesized that:

1. experiencing negative emotions while using DL, and the risk of technostress could predict teachers' burnout;
2. the instruction delivery mode (i.e., online; face-to-face; blended) could also predict burnout;
3. active technical support from participants' institutions may represent a protective factor against burnout (i.e., negative relationship between the two variables);
4. there is a difference between female and male participants in experiencing technostress, specifically in the dimension of anxiety, as reported by previous studies [10; 11].

3. Materials and Methods

3.1. Procedure

A test battery was disseminated online and administered electronically via the Google Modules platform between February and March 2021. The investigation involved teachers of all levels, who have reached the age of majority, who reside and work on the Italian national territory and who had worked during the pandemic period. All the respondents signed the informed consent after reading the presentation of the study and its aims. The battery consisted of 117 questions and required an average of 15 minutes to complete.

3.2. Participants

One thousand two hundred and ten completed questionnaires were included in the sample. Participants' ages ranged from 20 to 66 years (M = 41.7; SD = ± 8.68 years). The majority of the respondents were female (84.79%; mean age = 41.93; SD= ± 8.40) while 15.21% were male (mean age = 40.42; SD= ± 10.05). Other demographic characteristics of the respondents are reported in Table 1.

Table 1. *Participants' demographic characteristics: Frequencies (%)*

Nationality	Italian	99.92 %
	French	0.08 %
Recidency (Italy)	North	9.83 %
	Centre	4.79 %
	South	77.93 %
	Islands	7.44 %
Education	High school diploma	23.55 %
	Bachelor degree	5.70 %
	Master degree	45.70 %
	Post-graduate training	25.04 %
Marital status	Single	16.86 %
	Engaged	9.92 %
	Cohabitant	5.79 %
	Married	60.91 %
	Separated/Divorced	5.87 %
	Widowed	0.66 %

Participants working at all school levels, except university, took part in the study: 32.2% work in high schools; 28.5% in primary schools; 22.6% in middle schools; 16.6% in nursery schools. Participants were also asked to provide information about the role covered within their institution: 39.65% of the sample is made up of support teachers; 10.07% are trainees; 18.75% are non-permanent secondary school teachers; 13.80% are permanent secondary school teachers; 8.25% are non-permanent primary school teachers; 6.93% are non-permanent kindergarten teachers; 1.4% are permanent primary school teachers; 1.16% are permanent kindergarten teachers. Subjects taught by the participants are grouped into categories and presented in Table 1.

Table 2. *Subjects taught by respondents: frequencies (%)*

Support teachers	40 %
Humanistic, anthropological, psychological disciplines	14 %
Trainee teachers	10 %
Scientific disciplines	9 %
Nursery school teachers	8,6 %

Artistic, creative, sports disciplines	6 %
Foreign languages and literatures	5 %
Technic, technological, laboratorial disciplines	4,8 %
Legal and economic disciplines	2,6 %

The number of years teaching by the participants is grouped into categories and presented in Table 2.
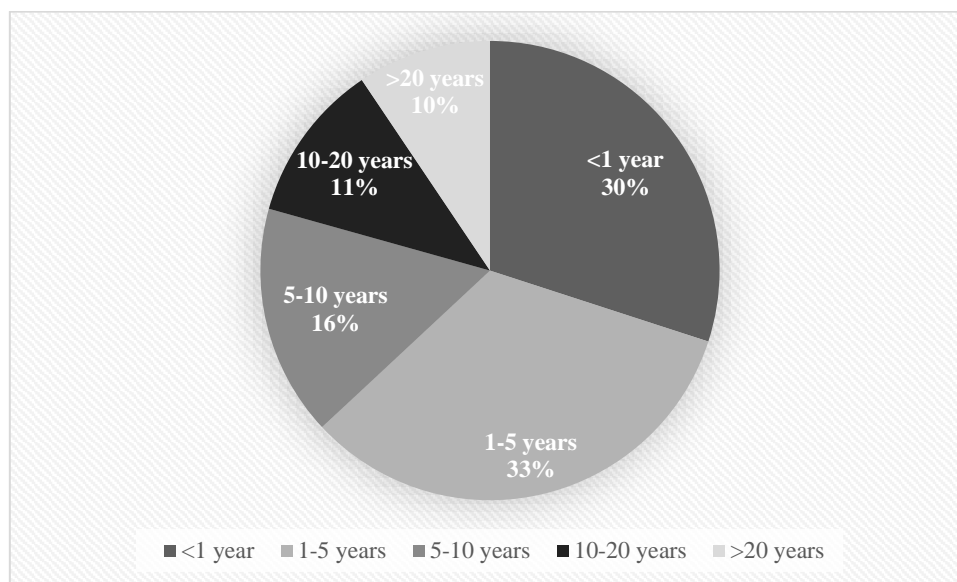

Figure 1. Number of years' teaching: frequencies (%)

3.3. Instruments

The test battery consisted of seven parts, as presented in Figure 1, for 117 items. After demographic items, a series of questions created ad-hoc by the authors investigate participants' work experience in general and during the pandemic period. Items related to teachers' general work experience investigated at which school level they are in, what role, which subject they teach, the number of years teaching, and the frequency of technologies when teaching before the pandemic. Examples of items investigating the teachers' work experience during COVID period are: 'do you think that Distance Learning is an adequate tool to carry out teaching activities?'; 'do you think that the institution you work for could improve the support given to teachers about the use of technologies?'.

Section		Description
1	*Presentation*	Presentation of the study aims; Informed consent module
2	*Demographics* *(7 items)*	Age, gender, nationality, residence, education, marital status
3	*Years of teaching and Distance Learning (DL) experience* *(10 items)*	This section investigates teachers' work experience in general (school level, role, subject, numbers of years teaching, use of technologies when teaching) and during the pandemic period (main mode of lesson delivery – i.e., face-to-face, online, blended -, perceived technical support from their institutions when teaching

		online/blended mode, how they feel technical support from their institution can be improved, use of technologies when teaching, how they feel DL as suited to their teaching style).
4	*Job Satisfaction* (5 items)	SOD subscale from MESI, Motivazioni, emozioni, strategie e insegnamento [Motivations, Emotions, Strategies and Teaching] [12].
5	*Emotions when teaching* (30+30 items)	EMOZ subscale (positive and negative emotions) from MESI, Motivazioni, emozioni, strategie e insegnamento [Motivations, Emotions, Strategies and Teaching] [12].
6	*Technostress* (16 items)	Technostress scale RED/TIC [11], Italian version [13].
7	*Burnout* (19 items)	Copenhagen burnout inventory [14], Italian version [15].

Figure 2. *Sections of the test battery*

Participants also completed:

(4) SOD subscale from MESI, Motivazioni, emozioni, strategie e insegnamento [Motivations, Emotions, Strategies and Teaching] [12] evaluates teachers' job satisfaction. This consists of five items (e.g., "my job conditions are excellent") using a Likert-type rating scale with endpoints of one and seven (1 = Strongly disagree, 7 = Strongly agree).

(5) EMOZ subscale from MESI, Motivazioni, emozioni, strategie e insegnamento [Motivations, Emotions, Strategies and Teaching] [12] presents a series of 13 positive emotions (e.g., happiness, enthsiasm, fulfilment) and 17 negative emotions (e.g., anger, sadness, feeling of failure, resignation). The instructions were: 'Thinking about your teaching activity, please, indicate how often you felt the emotions listed below'; 'Thinking about your teaching activity in the last year [i.e., during pandemic], please, indicate how often you felt the emotions listed below. In both cases, respondents have to indicate how much they experience/d the listed emotions using a Likert scale ranging from 1 (at all) to 5 (almost always).

(6) The RED-TIC questionnaire, integrated into the Technical Note of Prevention 730 of the National Institute for Safety and Hygiene at Work of Spain, focuses on intra-labor psychosocial risks as a product of the techno-demands and a lack of techno-resources and personal resources [11] was used for exploring the risk of developing technostress. For this investigation, we utilized the Italian version of the questionnaire by Sulla et al. [13]. The questionnaire comprises 16 items measured using a seven-point scale ranging from 0 (never) to 6 (always/every day). It includes four sub-scales: skepticism, fatigue, anxiety, and inefficiency. The test score is not diagnostic of technostress but may be used as a potential indicator of the risk of occurrence and subsequent development.

(7) Copenhagen Burnout Inventory (CBI) [14] in the Italian version by Fiorilli et al. [15] comprises 19 items evaluating three subdimensions of burnout: personal burnout, work-related burnout, and client-related burnout. The items are rated on a 5-point Likert scale ranging from 1 (never) to 5 (always). The first subscale assesses personal burnout and comprises six items concerning the physical and psychological fatigue and overall exhaustion experienced by an individual. The second subscale contains seven items concerning the physical and psychological fatigue experienced by respondents due to their teaching work. Finally, the third subscale is composed of six items evaluating the physical and psychological fatigue experienced by people who work with clients, specifically with students.

3.4 Data Analysis

Statistical analysis was performed using R Statistical Software (version 4.0.2) [16]. An additive multiple regression model was built to test whether burnout could be predicted by negative emotions while using DL and the risk of technostress. Assumptions were checked: i.e., Shapiro test was used to verify the normality of the residuals of the model; a t-test was used to establish that the mean of the distribution of the residues was equal to 0; Breusch-Pagan test was used to verify homoskedasticity; Durbin-Watson test was used to verify the independence of the residues. Furthermore, the multicollinearity of the model was assessed and did not occur, as there was a low correlation between the variables examined.

A simple linear regression model tested the hypothesis of association between the instruction delivery mode and burnout, whose prerequisites were all met.

A simple linear regression model tested the hypothesis of association between active technical support from participants' institutions and burnout, whose prerequisites were all met.

Wilcoxon-Mann-Whitney U test was used to assess any difference in the anxiety dimension of technostress test between men and women, as normality was not met (W statistic of Shapiro test <.95).

4. Results

Figure 3 shows how many positive emotions the participants declared to feel when teaching face-to-face versus online during the pandemic period. This first data is a vehicle of valuable information: teachers experience a much higher quantity of positive emotions (above average) in presence rather than during DL sessions, which could negatively influence the perception they have of the online mode.
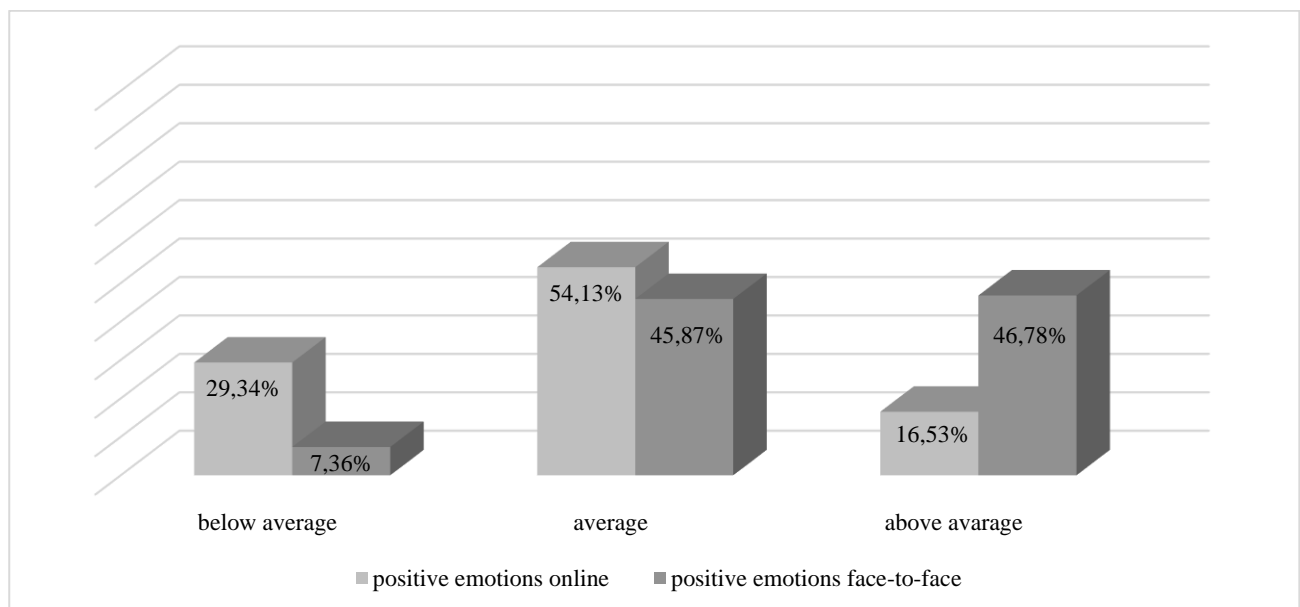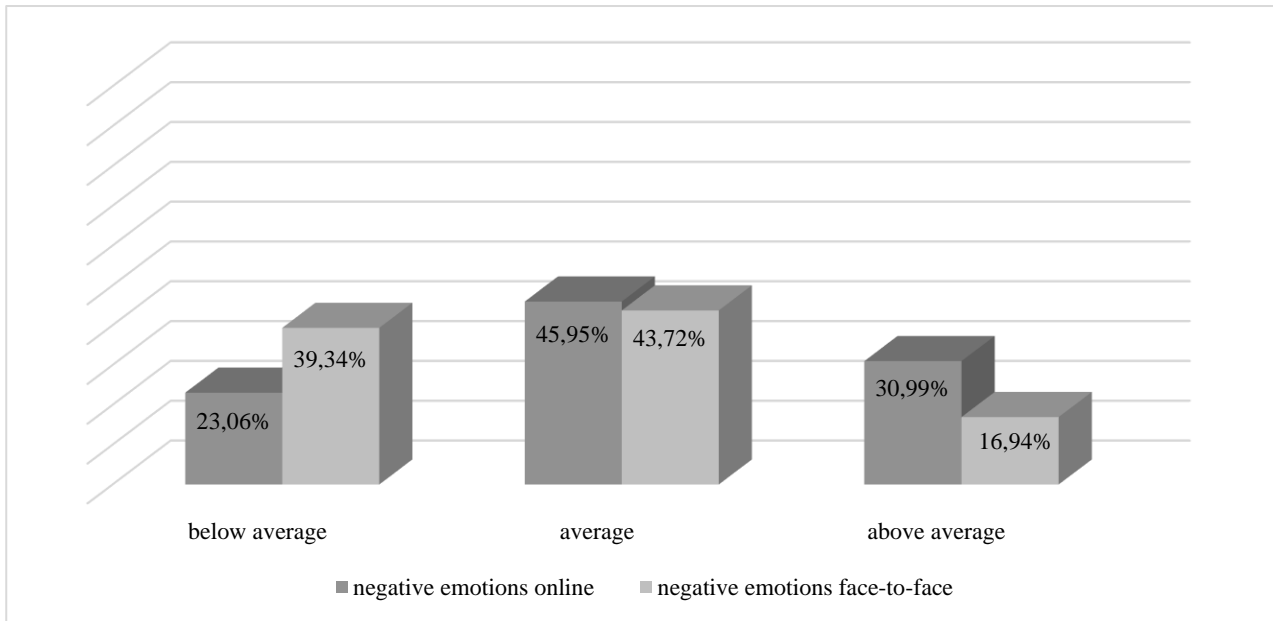
Figure 3. Positive emotions when teaching online vs in person (N = 1210)

On the other hand, for negative emotions (Figure 4) the picture is reversed: in DL there is an almost double increase in above-average negative emotions compared to the same experienced in presence.

Figure 4. Negative emotions when teaching online vs in person (N = 1210)

Regarding the four dimensions of technostress, used here as indicators of the risk of onset of the pathology, it is possible to observe how the sample has a diversified trend depending on the specific domain (Figures 5-6). For all sub-scales, Cronbach's alpha (tested on the sample examined) is above the conventionally established acceptability threshold (skepticism α = .83, anxiety α = .93, fatigue α = .9, inefficiency α = .88). In particular, in the dimensions of skepticism (S) and ineffectiveness (I) (Figure 5), participants scores follow a decreasing trend, in terms of the severity of the pathological picture: as the classifications approach the risk peak, the percentage of subjects decreases. While 28.4% (I) and 35.29% (S) of the subjects are in the low-end of the distribution, the "Very high" group includes 7.27% (S) and 2.73% (I) of the overall sample size. On the other hand, the other two dimensions, anxiety (A) and fatigue (F) (Figure 6), present a very diversified trend. Analyzing in detail the dimension of anxiety, it is possible to note that the largest percentage of the sample (23.96%) is placed as a whole in the "Medium-high" range, probably pointing out a condition of discomfort experienced by the subjects in relation to the use of ICT (e.g., computer, tablet, smartphone).
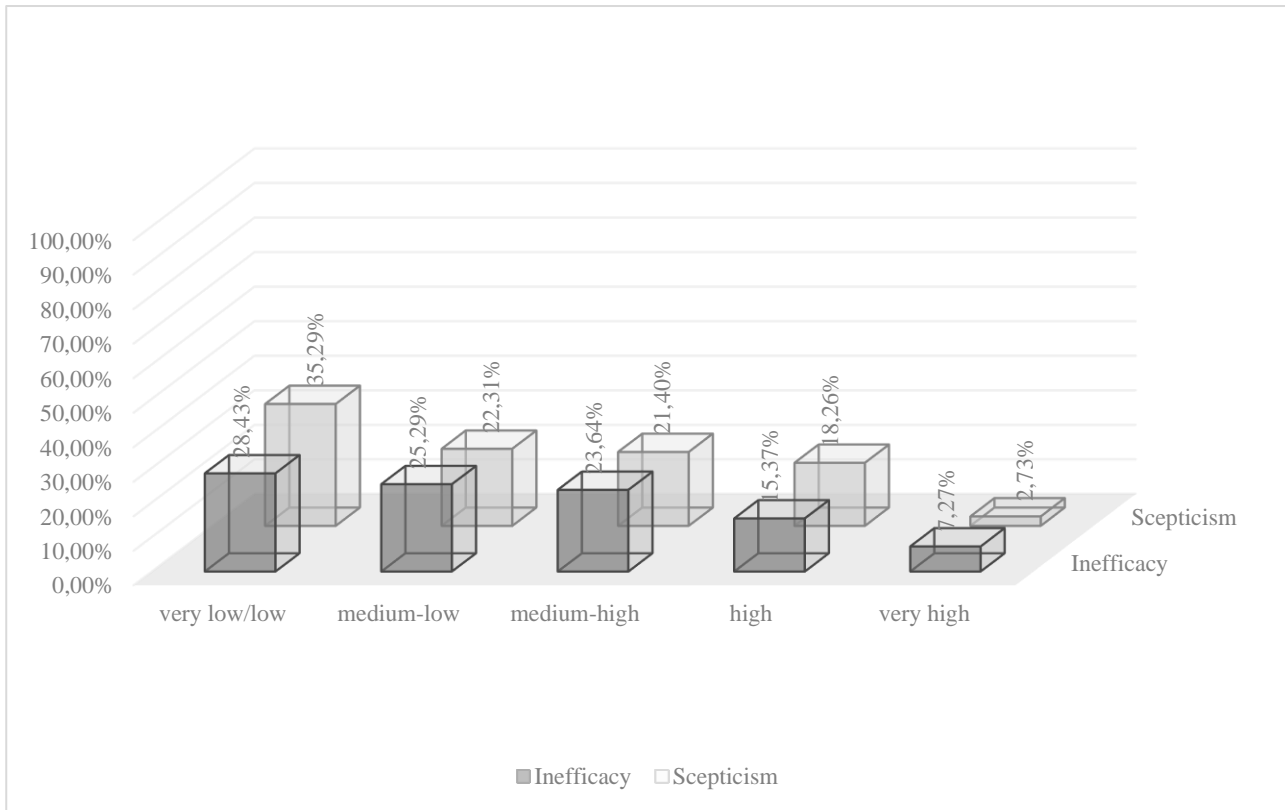
Figure 5. *Scepticism and inefficacy (linked to technostress) in the sample (N = 1210)*
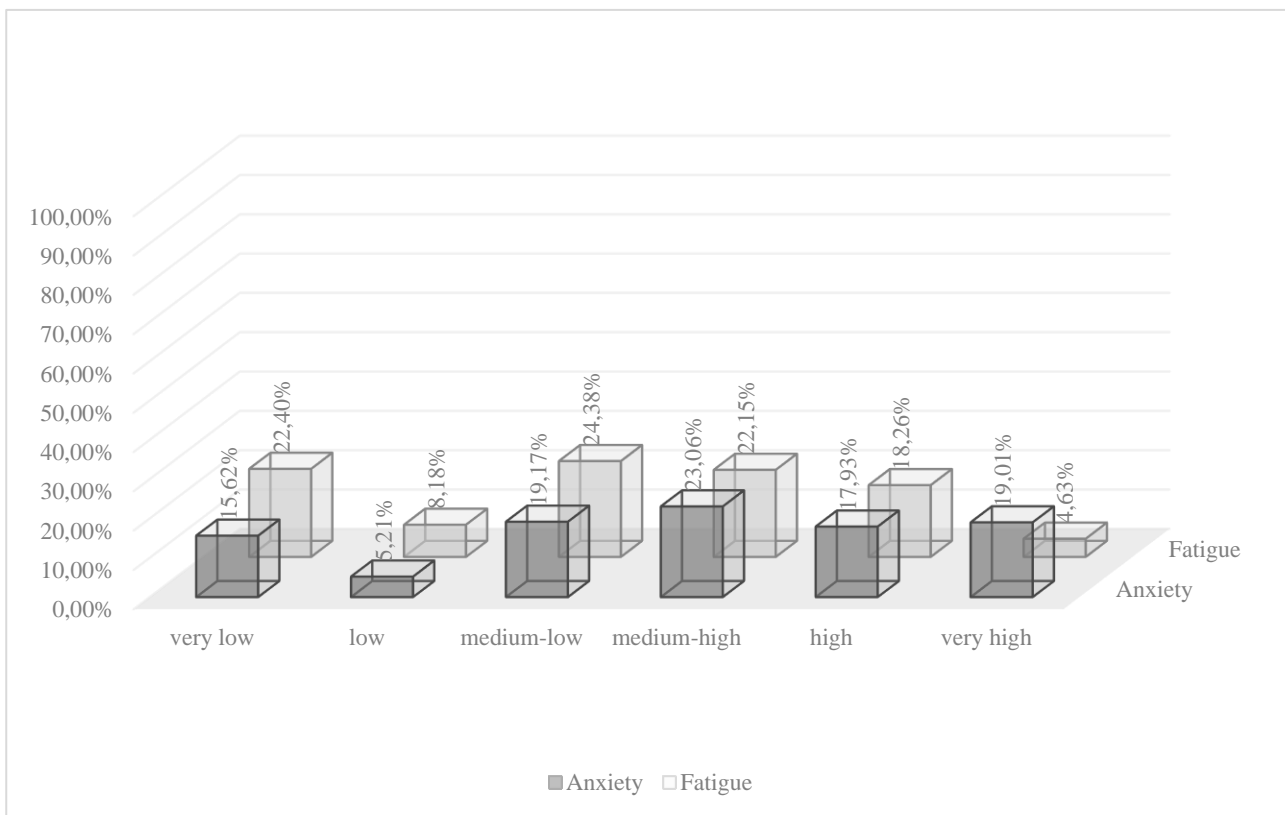
Figure 6. *Anxiety and fatigue (linked to technostress) in the sample (N = 1210)*

Finally, as regards to burnout (Figure 7), more than half of the participants (52%) are within a low-risk range. In terms of sample size, the remaining percentages are distributed in a decreasing manner as the risk (categorized into different levels) increases (Figure 8).
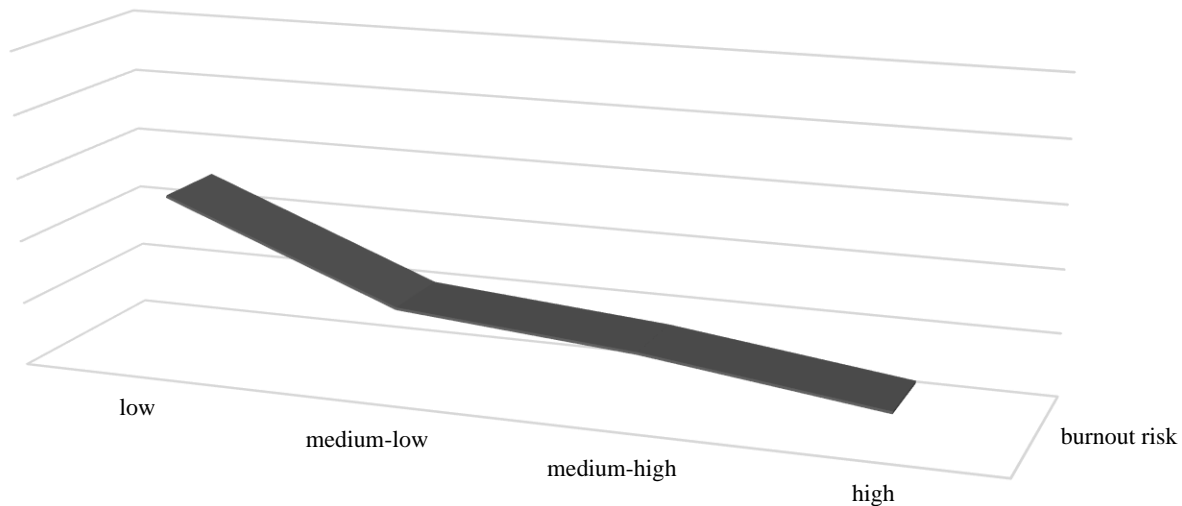
	low	medium-low	medium-high	high
■ burnout risk	52,23%	23,31%	17,11%	7,36%

Figure 7. Burnout risk in the sample (N = 1210)

To test the main hypothesis that burnout has a causal relationship with the negative emotions experienced in DL and with all the domains signaling technostress (anxiety, fatigue, skepticism, inefficacy) a multiple regression model was created.

Within the model created, all predictors entered (via additive procedure) were statistically significant, except for the dimension of skepticism ($p > 0.05$). Specifically, the most important dimensions are those related to anxiety and negative emotions in DL. In general, the model has a good statistical significance ($F_{[1204]} = 149.7$; $p < 0.05$), meaning that negative emotions experienced in DL and most of the dimensions of technostress (3 out of 4) predict teachers burnout.

Overall, the model explains 38% of the variability of the dependent variable ($R^2 = 0.3833$, adjusted $R^2 = 0.3808$). The main results are shown in Table 3.

Coefficients	*B*	*Standardized coefficients*	*t test (df= 1204)*
Negative emotions in DL	4.81	0.29	*p < 0.0001*
Anxiety	1.94	0.23	*p < 0.0001*
Skepticism	-0.11	-0.010	*p 0.705*
Inefficacy	1.09	0.10	*p 0.007*
Fatigue	1.37	0.14	*p 0.002*

Table 3. Burnout predictors

As regards the instruction delivery mode, 41.57% of the participants declared they had used blended mode during pandemic period; 29.09% used to teach completely online; 29.34% face-to-face. Instruction delivery

mode did not predict burnout in this sample ($F_{[1207]}$= 2.9; p= 0.0549; R^2= 0.004; R^2 *adjusted*= 0.003). Furthermore, as shown in Figure 8, average burnout scores for the different instruction delivery modes are all in the medium-low range (41-50).
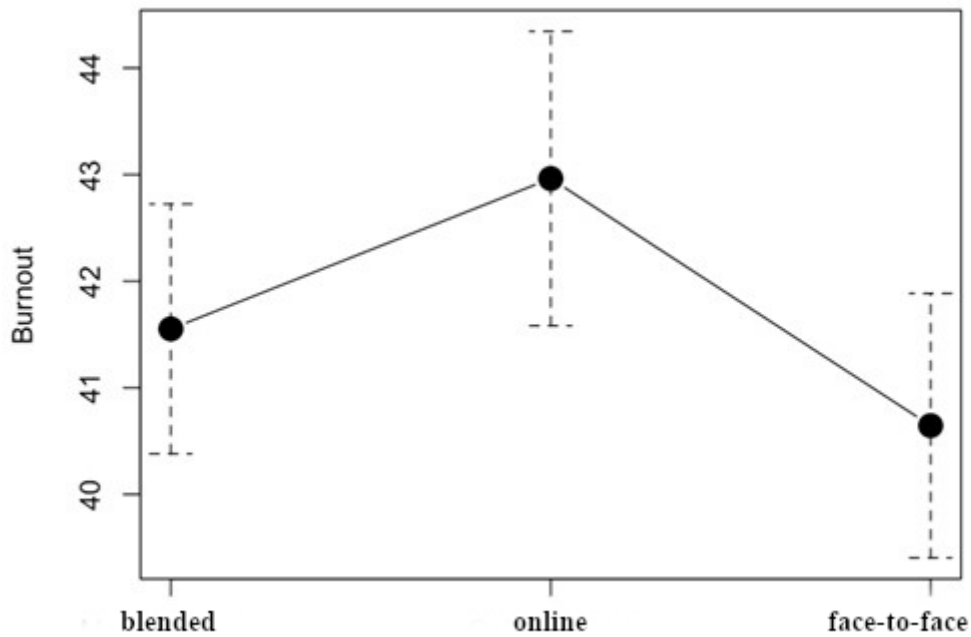

Figure 8. Average burnout scores per instruction delivery mode

As regards their use of ITC before and after pandemic, results are shown in Figure 8.
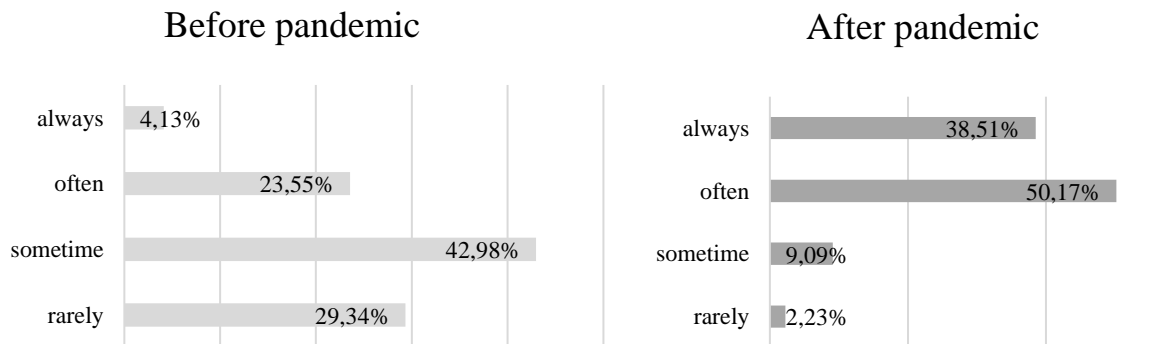

Figure 9. Frequency of use of ITC before and after pandemic

Regarding technical and material support from their institution perceived by teachers, most of the participants (65%) declared to be satisfied with it. On the other hand, 89.5% of the participants think that the level of support could be increased. Furthermore, 55.04% of the sample consider DL as not adequate/ideal for teaching. From the simple linear regression model created, which sees burnout as a function of the support perceived by teachers, a fairly large statistical significance emerges (F $_{[1208]}$ = 29.44 ; p <0.05; R^2 = 0.02; R^2 adjusted = 0.02), as shown in Figure 10.
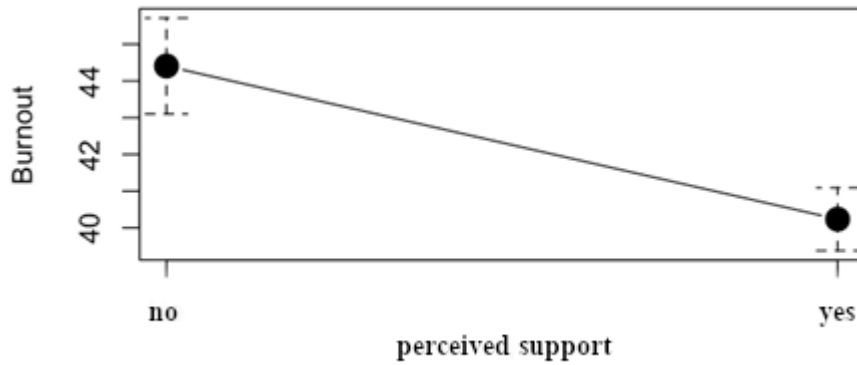
Figure 10. *Average burnout scores vs perceived support from their institution*

As regards the dimension of anxiety linked to technostress, there were no significant differences between female and male subjects in this sample ($F_{[1208]}= 2.33$; $p= 0.127$; $R^2= 0.001$; R^2 *adjusted*$= 0.001$) (Figure 11). However, the sample was unbalanced in terms of gender representativity.
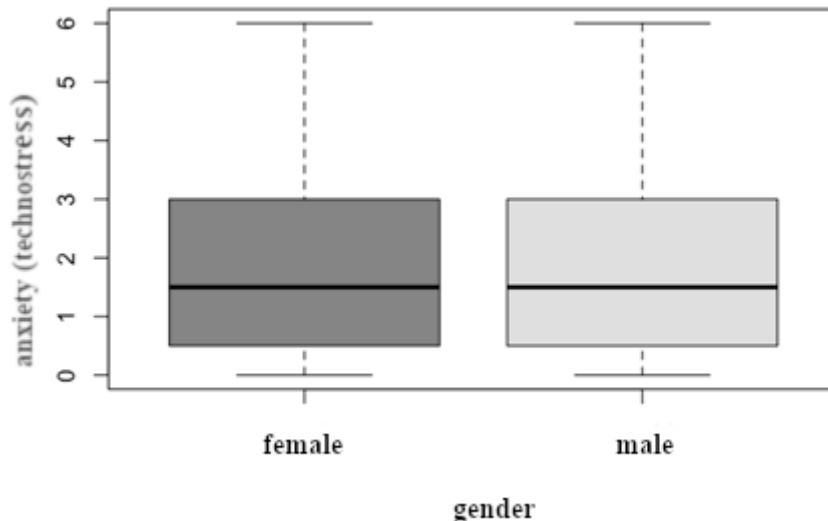

Figure 11. *Differences in anxiety linked to technostress between female and male subjects*

5. Discussions

The current study wanted to investigate the role of negative emotions linked to distance learning (DL) and technostress in the risk of burnout of Italian teachers during the pandemic period. Indeed, during this period, teachers at all school levels had to substantially modify their way of working, experiencing unprecedented and sudden changes in their practice: above all, the use of technologies for delivering their lessons, to which they had to adapt without any preparatory phase. Specific hypotheses were that: experiencing negative emotions while using DL, and the risk of technostress could predict burnout; the instruction delivery mode (i.e., online; face-to-face; blended) could also predict burnout; active technical support from participants' institutions could represent a protective factor against burnout; there is a difference between female and male participants in experiencing technostress, specifically in the dimension of anxiety.

It emerged from the analysis that teacher's burnout may be predicted by the negative emotions linked to DL, and with three domains of technostress: anxiety, fatigue and ineffectiveness. If in fact, experiencing positive emotionality can increase teacher's *epithymia* (i.e., the desire to immerse oneself in new challenges by looking for the new and the unexplored), experiencing negative emotions may block such enthusiasm, leading to a form of 'a-motivation', characterised by feelings of lethargy that affect the normal performance of one's work.

Within such a framework, the teacher risks experiencing burnout, which in addition to affecting the personal and professional sphere, might also cause cognitive decline [5]. Together with negative emotions, the sudden introduction and massive use of technologies, in the face of a lack of training, results in anxiety, fatigue and a sense of inefficacy, which are linked to technostress. Technostress is a specific form of work-related stress, the onset and development of which depend on the relationship with ICT: within the current pandemic context may be framed as a derivative of the excessive technological exposure and the high speed of change to which teachers are subjected, especially when they feel unskilled in the use of them, as for the teachers in our sample. As emerged from the results, and in accordance with the literature [17], anxiety and fatigue are the most influential dimensions in terms of technostress. Specifically, anxiety is expressed in the subject as fear, apprehension and agitation, while fatigue finds the form of cognitive difficulties, including reduced ability to pay attention, memorize and implement a decision-making process [17].

Despite these results, the sample examined did not report high levels of burnout. This might be due to the support perceived from their institutions (e.g., webinars, dedicated web pages, Internet connection, tablets, computers), as resulted in this study, but also to variables not included in the current investigation, and that the literature found to be effective protective factors: such as, positive relationships with colleagues, students, parents [18]. Furthermore, the form of support conceptualised here can be conceived, in global terms, as a particular representation of the more generic 'identification with the organization', which in previous studies [19] has been positively correlated with the well-being of teachers, and negatively correlated with burnout.

However, although the majority of the participants expressed a positive opinion about the support from their institution, an even higher quantity felt that this same support could be improved. According to the literature, school support offered to teachers predicts the technostress levels of teachers in a meaningful and negative way [20]. In particular it has been found that school support reduces teacher's stress levels caused by technology use [21; 22]. On the contrary, results from previous studies showed that lower levels of support from school may lead to an increase in technostress levels of teachers [23].

A gender-related debate also emerges from the literature on technostress: if indeed some studies indicate an absence in terms of statistically significant differences between males and females, others instead emphasize its importance [10; 11]. On the basis of these data, a hypothesis of difference between males and females was formulated in relation to the specific dimension of anxiety linked to technostress. However, no differences emerged in our sample. This might also be due to the fact that the sample was heavily unbalanced in terms of gender.

5.1. Limitations and future studies

The data presented were collected as self-report and within a convenience sample, which makes it necessary to proceed with caution in terms of a generalisation of the results. Furthermore, the sample appears to be poorly balanced in terms of gender and subjects taught. Future research should focus not only on the support provided by the institution, as done here, but also, if not above all, on the individual's support and social network, which includes colleagues, students and families. The present study can therefore be considered a contribution from which to start to improve the understanding of the phenomena examined.

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