

Occupational Stress and Cognitive Processes Among Teachers in the COVID-19 Pandemic

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Abstract: Education is an area directly affected by the COVID-19 pandemic. Many teachers started to have new work demands, which can be perceived as stressful variables. This study aimed at analyzing the relationship between cognitive planning and occupational stress among teachers from *Distrito Federal*, in the COVID-19 pandemic context. This is a correlational and quantitative study, whose variables are cognitive planning, occupational stress and cognitive failures. Data collection was performed electronically with 29 adults aged between 30 and 49 years old, by applying the Cognitive Planning Scale, the Work-related Stress Scale and the Cognitive Failures Questionnaire. The analysis was conducted using descriptive statistics, parametric and non-parametric tests and correlations. The results indicated that there was no significant relationship between cognitive planning and occupational stress. In addition, the study contributed to the discussion of the effects of the pandemic on basic education professionals.

Keywords: COVID-19, occupational stress, executive function, cognitive processes, teachers

Estresse Ocupacional e Processos Cognitivos de Professores na Pandemia da COVID-19

Resumo: A educação é uma área diretamente afetada pela pandemia da COVID-19. Muitos professores passaram a ter novas exigências de trabalho, que podem ser percebidas como variáveis estressoras. Este estudo teve por objetivo analisar a relação entre planejamento cognitivo e estresse ocupacional de professores do Distrito Federal no contexto da pandemia da COVID-19. Trata-se de um estudo correlacional, quantitativo, tendo como variáveis planejamento cognitivo, estresse ocupacional e falhas cognitivas. A coleta de dados foi realizada eletronicamente, com 29 adultos entre 30 e 49 anos, por meio da aplicação da Escala de Planejamento Cognitivo, da Escala de Estresse no Trabalho e do Questionário de Falhas Cognitivas. A análise foi conduzida por meio de estatísticas descritivas, testes paramétricos e não paramétricos e correlações. Os resultados indicaram que não houve relação significativa entre planejamento cognitivo e estresse ocupacional. Ademais, o estudo contribui para a discussão dos efeitos da pandemia nos profissionais de Educação Básica.

Palavras-chave: COVID-19, estresse ocupacional, função executiva, processos cognitivos, professores

Estrés Laboral y Procesos Cognitivos en Profesores durante la Pandemia COVID-19

Resumen: La educación es un área directamente afectada por la pandemia COVID-19. Los profesores empezaron a tener nuevas demandas laborales que pueden percibirse como variables estresantes. Este estudio tuvo como objetivo analizar la relación entre planificación cognitiva y estrés ocupacional entre profesores del Distrito Federal, en el contexto de la pandemia COVID-19. Se trata de un estudio cuantitativo y correlacional, cuyas variables son la planificación cognitiva, el estrés laboral y las fallas cognitivas. La recolección de datos se realizó en forma electrónica con 29 adultos de 30 a 49 años de edad, mediante la Escala de Planificación Cognitiva, la Escala de Estrés Laboral y el Cuestionario de Fallas Cognitivas. El análisis se realizó mediante estadística descriptiva, pruebas paramétricas y no paramétricas y correlaciones. Los resultados indican que no hubo relación significativa entre planificación cognitiva y estrés ocupacional. Además, el estudio contribuye a la discusión de los efectos de la pandemia en profesores.

Palabras clave: COVID-19, estrés laboral, función ejecutiva, procesos cognitivos, profesores

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Article derived from the first author's MSc dissertation under supervision of the second author, defended in 2021 at the Postgraduate Program in Behavioral Sciences of Universidade de Brasília.

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The education area has been quite affected by the COVID-19 pandemic. Many institutions suspended their in-person activities and, since then, some of them have implemented remote and online teaching via digital platforms, apps and virtual learning environments. In addition to all the consequences imposed by the pandemic context,

teachers started to have new work requirements, such as use of digital resources, which can be perceived as stressful variables.

As the pandemic generated by COVID-19 affects remote management of information, knowledge and solutions, it is possible to reflect on the structure and working conditions of people in this context, especially those who are subjected to an increase in work load and intensity, as warned by Malloy-Diniz et al. (2020). In addition, even though it is not possible to know the exact psychological and neurobiological mechanisms directly associated with this pandemic, it is possible to describe the behavior in the face of the stressful situation and what can be done to mitigate the consequences arising from it.

Stress can be found in any profession: however, some professionals are exposed to more exhausting conditions. Such seems to be the case of teachers, who are among the most affected professionals in their work practice, given the percentage of medical leaves and absenteeism (Cruz et al., 2020; Weber, Leite, Stasiak, Santos, & Forteski, 2015).

Some stress is in fact necessary and useful for professional performance; however, when prolonged in time and in excess, it causes a number of problems in teachers' physical and/or emotional aspects. Eventually, health favors good productivity levels (Sadir, Bignotto, & Lipp, 2010) and quality in the teaching-learning process (Silveira, Enumo, Paula, & Batista, 2014; Weber et al., 2015).

Stress is a pathogenic condition marked by tension in the body. It is also a body response to a threatening situation. The term, which derives from Latin, has been sporadically used in the health area since the 17th century. But it was only from the 20th century onwards that the term began to describe both the stimuli that disrupt the body's internal balance, homeostasis, and the behavioral response generated by this imbalance.

As stress worsens, signs and symptoms appear gradually and sequentially. They can be observed both at physical and psychological levels and, in addition to the impacts on individual health, it also has implications for society's quality of life (Sadir et al., 2010).

The risk of presenting stress symptoms differs from one person to another. Thus, it has been suggested in the literature that stress affects men and women differently. In addition to the differences of a biological nature, men and women also differ in terms of their social roles. There seems to be high incidence of stress and psychological symptoms in the female gender, indicating greater vulnerability in this population towards the phenomenon, although the results are still divergent (Sadir et al., 2010; Weber et al., 2015).

From the historical point of view, Basic Education is essentially comprised by the female gender. In this sense, any intervention to improve teaching quality needs to consider the gender issues involved. In addition, Souza et al. (2021) also state that, as women represent most of the Brazilian population and comprise the largest workforce in health, overcoming the pandemic also involves the same issues.

With regard to work, Paschoal and Tamayo (2004) assert that interest in the area is growing in the literature because stressed workers have their performance reduced

and increase the costs of organizations with health problems. Thus, chronic stress exerts impacts on concentration and memory, and a person's performance ends up slightly or significantly impaired.

Given the diversity in terms of studies on stress, this research focuses on occupational stress among teachers in the COVID-19 pandemic. The theme is necessary, as the focus selected is still not sufficient to minimize its effects.

The most recurrent stressors in the teaching practice involve the working conditions, communication between colleagues, interpersonal factors, negative professional image, the pupils themselves, the pupils' families and administrative factors (Diehl & Marin, 2016; Weber et al., 2015). As some aspects are inherent to the profession and unavoidable, an organizational diagnosis is necessary to understand underlying aspects.

Occupational stress refers to the individual experience in which people perceive that work demands generate negative reactions that exceed their coping capacity (Paschoal & Tamayo, 2004; Silveira et al., 2014). As the individual needs to perceive and evaluate the stimulus as a stressor, this means that cognitive factors play a central role in this process, as well as situational and personal variables that can interfere with the subject's judgment (Paschoal & Tamayo, 2004).

The response to stress can be measured by means of physiological and neuroendocrine tests, as well as through an evaluation of people's emotional and cognitive aspects. According to Diamond (2013), the executive functions and the pre-frontal cortex are the first areas affected when stress, loneliness, sadness, sleep deprivation or physical inability are present. In addition, the harmful effects are similar to the difficulties presented by people with Attention Deficit and/or Hyperactivity Disorder (ADHD).

Therefore, reduced cognitive capacity might indicate high stress levels. This is the case of attention, which was evaluated by Znazen, Slimani, Bragazzi and Tod (2021) before and after the social distancing imposed by the COVID-19 pandemic and was significantly related to the perception of stress and lifestyle.

The executive functions encompass a set of control skills necessary to concentrate, think and act (Diamond, 2012). They are essential to successfully perform various everyday tasks and establish a connection between the individuals and the environment. They are a complex topic for Neuropsychology, especially due to the divergences found in the literature in terms of their components, as well as because they constitute a single construct or several integrated ones.

Based on psychometric data, Miyake et al. (2000) proposed three core executive functions – working memory, inhibitory control and cognitive flexibility, which are the basis for the formation of complex executive functions such as reasoning, problem solving and planning (Diamond, 2012). This is the model with the most reports in the literature, as it has been widely accepted in neuropsychological studies.

As the executive functions play a fundamental role on the everyday activities and tasks, the possibility of investigating them in the COVID-19 pandemic context was surveyed.

As cognitive planning is a complex function that overlaps the very concept of executive functions (Malloy-Diniz et al., 2018), it was chosen research object in this study.

In general terms, cognitive planning is a skill that defines the best strategies to attain a goal. It requires a mental representation of the situation desired by the individual, as well as of the primary and secondary objectives to perform and conclude the task. It is the last executive skill to be developed and, to some extent, it synthesizes the executive functions, as it requires maturation of inhibitory control, cognitive flexibility, attention and working memory (A.P.A. Oliveira & Nascimento, 2014).

Considering the study population, this construct was also chosen as it constitutes part of the teaching dynamics. Among all of the teachers' pedagogical activities, the ability to plan plays an important role in the teaching practice, as teachers need to define and structure actions and resources for future application, so that the learning objectives are achieved. Therefore, didactic planning is a highly necessary skill for teachers' work and, although anchored in mental processes, it is conceptually different from cognitive planning.

Cognitive planning processing can take place according to the progressive development of its components or present problems in its execution. These problems indicate impairments in planning capability, with the possibility of indicating normality or pathology, and are known as cognitive failures (Malloy-Diniz et al., 2018).

Cognitive failures are defined as errors related to memory, perception, planning and performance of tasks in everyday life. They are usual in most people and represent problems applying these functions in everyday situation (Ferreira, Oliveira, & Paula, 2018). They seem harmless, but are strongly associated with mental disorders (Paula, Costa, Miranda, & Romano-Silva, 2018) and possibly indicate stress and other problems, such as personality and sleep factors (Broadbent, Cooper, FitzGerald, & Parkes, 1982). They are expected in a context with too much information and can impair people's social functioning (Ferreira et al., 2018).

According to the review by Santana, Melo and Minervino (2019), research studies on the executive functions are mostly conducted in groups of older adults and adults, followed by children. Generally, the population groups researched present some neurological disorder/impairment and the instruments employed are diverse, encompassing traditional tests and self-reporting scales. No publication which specifically analyzed the relationship between stress and executive functions was cited, as well as no study about teachers and cognitive planning.

Executive functions are fundamental in everyday activities, at work, in relationships, and in personal quality of life. As depression, anxiety and stress symptoms have been identified in the current COVID-19 pandemic context, this research is justified by the need to obtain data on the psychological, cognitive and behavioral implications of the effects of the pandemic on Basic Education professionals who had their work affected during the social distancing period, whether with remote, hybrid or in-person work.

The objective of this study was to analyze the relationship between cognitive planning and occupational stress among teachers from *Distrito Federal* in the COVID-19 pandemic context.

Method

Participants

The study inclusion criteria considered teachers who worked in classrooms and/or administrative areas of the public and private networks from *Distrito Federal*, aged from 30 to 49 years old. The exclusion criteria corresponded to teachers who were on medical leave, diagnosed with a psychiatric and/or neurological disorder, such as Attention Deficit and/or Hyperactivity Disorder (ADHD) and epilepsy, with or without medication use and undergoing psychotherapy monitoring.

The research was voluntarily answered by 85 Basic Education teachers. Of the 85 participants, 65% ($n = 56$) were excluded from the sample for meeting the exclusion criteria for participation in the study. Of those excluded, 15 were outside the intended age group; 25 were undergoing psychotherapy monitoring; 1 was on medical leave; 42 were using controlled medications, mainly to treat depression and/or anxiety, hypertension and Type 2 diabetes; and 4 due to ADHD diagnoses. A total of 19 participants were excluded for meeting at least two of these criteria. These data were obtained by means of the sociodemographic questionnaire prepared by the researcher herself.

After adjusting the criteria, only 29 participants were considered valid, with an age range from 30 to 49 years old ($M = 39.79$, $SD = 5.19$). The participants were predominantly female, married and with children, they earned between 5 and 10 minimum wages, and had no history of the disease. Regarding the professional aspects, the participants were teachers trained in Pedagogy, with at least one specialization, working in the initial grades of Elementary School in the public school system, with more than 15 years in the profession and currently working in teaching.

All 29 valid participants were divided into two groups, according to the current occupation indicated in the sociodemographic questionnaire. The sample had 72% ($n = 21$) grouped in the Teachers Group (TG) and 24% ($n = 7$) in the Management Group (MG). One participant was disregarded from the group analysis for being active in both occupations.

Instruments

Sociodemographic questionnaire. An instrument prepared by the researcher in order to obtain diverse information about the following: gender with which the participant identifies; age; marital status; number of children; number of people who live with the participant; family income; schooling; current occupation; educational network

in which the participant operates; teaching time; number of classes; whether the participant is on sick leave for medical treatment; whether the participant uses any medication, and of what type, as well as whether the participant has a diagnosis of anxiety, depression, ADHD or other disease, with or without psychotherapy monitoring. Based on the diverse information collected in this instrument, the sample was adjusted after excluding participants. The questionnaire has 19 questions, 7 with a single answer, 3 with dichotomous answers (yes/no), 3 with checkbox answers and 6 with answers in short-text format.

Cognitive Planning Scale (CPS). CPS was prepared by A.P.A. Oliveira and Nascimento (2014) based on the Brazilian reality, with the objective of generally assessing cognitive planning. It consists of 65 items on a Likert-type scale and thoroughly explores eight aspects considered important for the characterization of cognitive planning, by means of a list of phrases about when I plan and when I execute. It shows ecological validity because it is a text-based instrument to verify how planning is perceived and reported. It presents satisfactory psychometric qualities, with alpha and Kaiser-Meyer-Olkin indices of .95 and .97, respectively. In order to analyze the answers, generating a global score from 0 to 260 was considered. The higher the value obtained, the better the planning capability (A.P.A. Oliveira & Nascimento, 2014).

Work-Related Stress Scale (WRSS). Created and validated by Paschoal and Tamayo (2004), WRSS consists of an easy-to-apply instrument that can be used in various work environments and occupations. It is a general measure of occupational stress, comprised by a single factor consisting of varied stressors and several emotional reactions. It has 23 items presented in a five-point agreement scale. WRSS has satisfactory psychometric characteristics, with alpha and Kaiser-Meyer-Olkin indices of .91, representing an alternative for empirical research studies (Paschoal & Tamayo, 2004). Data interpretation can be performed using descriptive statistics, in which the mean of the subject, group or groups is calculated for all items on the scale, obtaining an overall indicator that will vary from 1 to 5. The higher the mean, the higher the stress level. When the mean value is equal to or greater than 2.5, it has to be understood as an indicator of considerable stress. The mean for each item can also be calculated, identifying those with the highest score and, therefore, the most incident stressors according to the workers' perception.

Cognitive Failures Questionnaire (CFQ). CFQ is a self-reporting scale that assesses the frequency of cognitive failures in the last six months. It was proposed by Broadbent et al. (1982) and briefly and ecologically verifies cognitive problems in everyday life. It consists of 25 questions that represent cognitive problems or failures, and the answers indicate the frequency with which these failures occur. The higher the score observed, the higher the frequency reported. Each item is scored in a scale from 0 (Never) to 4 (Almost always), and the results vary from 0 to 100. The most commonly adopted value in

interpreting CFQ is the total score, although three scales can be derived from all 25 items.

The Brazilian version of CFQ was adapted by Paula, Costa et al. (2018) from the Neuropsychology Teaching and Research Laboratory (*Laboratório de Ensino e Pesquisa em Neuropsicologia*, Labep_neuro). The preliminary norms were obtained from the report of 225 adults with no history of mental disorders or scores suggestive of externalizing or internalizing symptoms in screening scales. In the transcultural adaptation study, the mean obtained was 35.65, with a standard deviation of 12.14. A number of studies on the psychometric qualities are still in progress in Brazil, and the preliminary tests indicated internal consistency of .90 and time stability of .81 (Paula, Costa et al., 2018; Paula, Gabrielli, Costa, & Romano-Silva, 2018).

It is reported that use of the Cognitive Planning Scale (CPS), the Work-Related Stress Scale (WRSS) and the Cognitive Failures Questionnaire (QFC) - Brazilian version, in electronic format, was authorized by the authors of the respective instruments.

Procedures

Data collection. As a safety measure used on controlling propagation of the new coronavirus, data collection was not conducted in-person. The instruments were applied electronically and all the participants answered the research in the same sequence presented by the *Google Forms* app. It is estimated that each participant needed up to 20 minutes to answer the research. However, there was no time limit to fill in all the items. The instruments were available for 98 days, and the mean time to return the answers was 34 days.

The participants were recruited by means of an invitation letter sent via email, along with a research disclosure notice. The researcher herself sent at least 191 invitations to the school units from the public network and 22 invitations to the ones from the private network.

Due to the reduced number of answers received during the planned data collection period, the research disclosure notice was also published on the Facebook, Instagram and WhatsApp social networks, and the invitation was also sent to 75 of the researcher's personal contacts, 33 of which were for private school teachers and 42 for public school professionals.

The procedure was organized in five different sections. In Section 1, the participants received the necessary instructions for adherence and engagement, through the invitation letter and the research disclosure notice, as well as the link to access the app with the Free and Informed Consent Form (FICF). After accepting the FICF, the app enabled Section 2, referring to the sociodemographic questionnaire. Subsequently, Section 3 presented the items from the Cognitive Planning Scale, Section 4 presented the items of the Work-Related Stress Scale and, finally, data collection was completed with Section 5, with the items from the Cognitive Flaws Questionnaire.

Data analysis. Microsoft Excel was used to systematize the database. The statistical data analysis was performed

in the *jamovi* software, version 1.6. The mean (M) and standard deviation (SD) statistical measures were used in the descriptive data analysis. A 5% significance level was adopted for the significance probability value (p).

A dispersion diagram was used for the correlation between each instrument, in order to verify the data overall tendency. As the normality and homogeneity of variance assumptions were not satisfied for all the data from the Cognitive Planning Scale and the Work-Related Stress Scale, non-parametric tests were employed. Considering data normality and homogeneity of the Cognitive Failures Questionnaire, only the independent t test was used for the statistical analysis of the mean values corresponding to this instrument. *Spearman's* rank correlation was used to compare the Cognitive Planning Scale and the Work-Related Stress Scale.

Ethical Considerations

This research was submitted to the Research Ethics Committee of the Human and Social Sciences Institute belonging to the Universidade de Brasília, via Plataforma Brasil (CAAE No. 39839720.1.0000.5540), with approval as per Opinion No. 4,424,197. All the participants signed the Free and Informed Consent Form (FICF).

Results

In the Cognitive Planning Scale, the general sample obtained a mean total score of $M = 197$, $SD = 21.8$ and, after dividing the groups, the Teaching Group (TG) obtained $M = 197$, $SD = 21.0$, and the Management Group (MG) reached $M = 195$, $SD = 25.6$. According to the data presented, there is a numerical difference between the mean of the TG ($M = 197$) and the one corresponding to the MG ($M = 195$). This difference seems to indicate that the Teachers Group presents greater planning capability than the Management Group. However, according to the *Mann-Whitney* test, it is not significant ($U = 70.0$, $p > .05$).

In the Work-Related Stress Scale, the general sample obtained $M = 2.37$ and $DP = .79$. This result indicates that there is not a relevant stress level in the population researched. After dividing the groups, the Teachers Group (TG) presented a mean of 2.51 ($SD = .88$), indicating considerable occupational stress (≥ 2.5), whereas the Management Group (MG) obtained a mean of 1.97 ($SD = .31$). The data suggest a difference between the mean obtained in the TG ($M = 2.51$) and the one corresponding to the MG ($M = 1.97$). However, according to the *Mann-Whitney* test, it is not significant ($U = 44.0$, $p > .05$).

A complementary analysis was conducted between the genders in the sample. The female participants presented a higher occupation stress mean value ($M = 2.41$) than their male counterparts ($M = 2.09$) and other ($M = 2.16$). Considering normality ($W = .94$, $p > .05$) and homogeneity ($F(2.26) = 2.21$, $p > .05$) of the data in this group,

an independent ANOVA test was performed, which indicated that this difference is not significant ($F(2.26) = .18$, $p > .05$, two-tailed).

In the Cognitive Failures Questionnaire (CFQ), the general sample obtained $M = 37.9$ and $SD = 14.9$. In comparison with the preliminary normalization data ($M = 35.65$, $SD = 12.14$), this value is within the normality range. After dividing the groups, the Management Group obtained a higher mean of cognitive failures ($M = 45.0$, $SD = 14.6$) than the Teachers Group ($M = 35.7$, $SD = 14.7$). However, according to the independent t test, this difference is not significant ($t(26) = -1.46$, $p > .05$).

The data obtained from the correlation between the Cognitive Planning Scale (CPS) and the Work-Related Stress Scale (WRSS) in the general sample, and without dividing the groups, indicate that there is no significant relationship between the variables ($r_s = .01$, $p > .05$). Table 1 presents the result of the correlations between CPS, WRSS and CFQ after dividing the sample into Teachers Group and Management Group. No correlation was considered significant.

Table 1
Correlation by Spearman's Ranks between the Instruments after Dividing the Groups

Sample	CPS x WRSS		CPS x CFQ		WRSS x CFQ	
	ρ_{xy}	P	ρ_{xy}	P	ρ_{xy}	P
Teachers Group	.08	.71	-.27	.23	.13	.57
Management Group	.72	.06	-.75	.06	-.37	.40

Note. CPS = Cognitive Planning Scale; WRSS = Work-Related Stress Scale; CFQ = Cognitive Failures Questionnaire.

Discussion

The objective of this research was to analyze the relationship between cognitive planning and occupational stress among teachers from *Distrito Federal* in the COVID-19 pandemic context. To such end, the Cognitive Planning Scale, the Work-Related Stress Scale and the Cognitive Failures Questionnaire were applied and a number of correlations and comparisons were performed. Even though the study did not find any statistically significant relationship between occupational stress and cognitive processes, the analyses herein presented can contribute to discussions about the psychological, cognitive and behavioral consequences of the effects of the pandemic on Basic Education professionals.

Analyzing the data obtained in the Cognitive Planning Scale and in the Work-Related Stress Scale, it was observed that the Teaching Group had a higher stress level, as well as greater cognitive planning capability in relation to the Management Group. Given this result, it is therefore considered that it can exert an effect on the need to define strategies for future execution and occupational stress. However, the model of this research was insufficient to

obtain this answer, and it is up to experimental studies to consider manipulation of these variables. As the Cognitive Planning Scale is not yet normalized, the mean obtained indicates the planning capability of the population under study and complements the instrument's validation studies.

It was expected that the relationship between the Cognitive Planning Scale (CPS) data and the Work-Related Stress Scale (WRSS) would be negative, with moderate to strong relationship strength. However, according to the results found in this study, there is no relationship between the data obtained in CPS and WRSS ($r_s = .01, p > .05$). It is probable that the sample size has exerted an influence on this result, as it is intrinsically related to the effect size. It is also considered that other variables that were not researched may affect data correlation. In addition to that, the participants may have used some coping strategies that were so effective that the effects of occupational stress on the cognitive aspect researched were minimized.

The assumption was that the occupational stress level and the cognitive planning capability would differ between the Teachers Group and the Management Group. The results of this study indicate that there is no statistical difference between the groups. It was believed that cognitive planning was a skill widely used in teaching work for the preparation of teaching plans, didactic sequences, activities and tests, especially in exceptional working conditions in this pandemic context. However, the result of this study indicates that both the Teachers Group and the Management Group require the same cognitive planning capability and share the same occupational stress level. Thus, a possible explanation for this result is that all education professionals work together to adjust teaching to the learning platforms and/or the COVID-19 control protocols in the school environment.

The Work-Related Stress Scale (WRSS) considers values equal to or greater than 2.5 as relevant occupational stress levels. In this study, the Teachers Group (TG) obtained a higher mean than the overall indicator ($M = 2.51$), whereas the Management Group (MG) reached a lower mean ($M = 1.97$). As there is no statistical difference between these mean values, it is assumed that the value higher than the indicator in the TG is due to the sample's heterogeneous variance. The groups were unequal: the Teachers Group (TG) represented the largest part of the sample, with a total of 21 participants; while the Management Group (MG) only had a total of 7 participants. The non-parametric *Mann-Whitney* test, which was used in the comparison between the TG and the MG, indicated that the group with the lowest mean was the one with the highest number of low ranks, as well as that the group with the highest mean was the one with the higher number of high ranks.

Consequently, it is not possible to assert that there is a significant occupational stress level in this study. This result is incompatible with a number of research studies that identified high stress levels in the profession, even if with considerable methodological differences (Cruz et al., 2020; Diehl & Marin, 2016). However, this result is positive,

as it indicates that the coping mechanisms of this sample were effective, requiring further research studies.

The instruments of this research were chosen because they were elaborated/validated in the Brazilian context, with free and open access, of brief application and for presenting satisfactory psychometric qualities. As no data were significant, it is probable that the number of participants may also explain this discrepancy of the results. It was verified that sample size was a limiting factors, as well as the difference in the number of participants in the group analysis. For being an online task, it was expected that many participants would be able to answer the research. However, the limited availability of voluntary teachers precluded performance of other statistical analyses. Thus, it can be asserted that the sample was constituted by voluntary response and that there was bias of absence of answers that affected external validity of the results.

It is believed that tiredness, limited time availability and work overload have resulted in low adherence of these professionals to the research. These reasons were also observed by Schmidt, Crepaldi, Bolze, Neiva-Silva and Demenech (2020) in a research study on the joint performance of psychologists and health professionals in this pandemic context.

Another analysis possibility is that, as the data collection period for this research was carried out nine months after the suspension of all school activities in *Distrito Federal*, it is plausible that the groups could be adapted to the context of remote work or even in-person/hybrid work in the pandemic scenario.

It is also worth noting that this study mostly comprised healthy adults. More than 50% of the voluntary professors that answered the research were removed from the main analysis for meeting the exclusion criteria. The health conditions indicated in the sociodemographic questionnaire, such as arterial hypertension, diabetes and depression, represent psychophysiological diseases that have stress present in their ontogeny, either as a contributor or as a trigger. This can be another factor for not considering the occupational stress level as relevant.

Regarding the mean values found in the Cognitive Failures Questionnaire, it was noticed that the sample is within normality. Fewer cognitive failures and more occupational stress were also observed in the Teachers Group, as well as more cognitive failures and less occupational stress in the Management Group. This fact is in line with the assertions by Broadbent et al. (1982), who suggest that cognitive failures should be interpreted as a vulnerability factor and not as a response to stress. Thus, a high score in cognitive failures would indicate more exposure to stress.

The correlation between the Cognitive Failures Questionnaire (QFC) and the Cognitive Planning Scale (CPS) was not considered statistically significant neither in the general sample ($r_s = -.23, p > .05$) nor after dividing the groups into the Teachers Group ($r_s = -.27, p > .05$) and the Management Group ($r_s = -.75, p > .05$). However, the indication of a negative relationship between the data,

according to Table 1, reinforces the theoretical framework proposed by Ferreira et al. (2018), which recognizes cognitive failures as planning failures. The better the planning, the lower the incidence of failures. Then, these instruments investigate the same executive function and can be classified as complementary measures. As this is the first time that they have been studied together, they require additional research studies.

Investigating differences between genders was not included in the research script. However, as the female gender is the main reference of teaching in Basic Education in the country (Weber et al., 2015), it was a necessary additional analysis. 25 of all 29 participants were female. This fact corroborates previous studies about the predominance of the female gender in the education area (Hanzelmann et al., 2020; Silva, Sadoyama, Sousa, & Leal, 2020; Weber et al., 2015).

The comparative analysis was only performed with the data from the Work-Related Stress Scale. No significant difference between the genders of the sample was identified in the statistical test. This result diverges from studies that verified the relationship between stress and gender, in which women generally present higher stress levels (Sadir et al., 2010).

As the study was structured in an atypical research context, some important issues were not tracked, such as data on contamination by COVID-19, both in the participants and in their family members, as well as strategies for coping with stress in the face of the implications of the pandemic. Although it was not the focus of the research, future studies should take this aspect into account, as knowledge about coping strategies can foster preventive actions in relation to the quality of teachers' work, especially because the coping style is considered the main individual variable, being pointed out according to Paschoal and Tamayo (2004) as a central aspect of many studies, capable of influencing the entire stress process.

In the sociodemographic questionnaire, this study also contemplated questions that identified the participants' race/ethnicity. Considering that women and black-skinned individuals correspond to 70% of the economically active population in Brazil (Antloga & Maia, 2014) and that the absence of these data masks differences between black-skinned women and the rest of the population, future studies should consider surveying this data, as it is a structuring dimension of inequalities in Latin American society, alongside sex/gender and social class. It is fundamental that these categories be analyzed together, as the topic is limited in social studies and can contribute to deepening on the issues related to the black-skinned population (F. Oliveira, Nunes, & Antloga, 2019).

Given the gender problem pointed out in the study, it was not possible to deepen on the profile of the participants who answered the Work-Related Stress Scale. It is suggested that future studies consider the recommendation made by the authors of the scale to interview part of the sample, both to explore stress-related aspects and to map the profile of the women who were willing to answer the research and track

the complex engendering that exists in women's reality, as indicated by Antloga and Maia (2014). As the concept of work is much broader than the aspects related to working hours, the scale items are not able to measure all work situations experienced by women, which correspond both to the hours worked in the work context and to the period devoted to personal care, house chores, care of children and love relationships, for example. This fact can considerably contribute to the discussions on gender and female work.

Another limitation of this study refers to its design. As no variable was manipulated, the results obtained cannot be interpreted as causal relationships between the variables and should be analyzed with caution. It was only possible to describe the extent to which the statistical elements vary and if there is coherence between the data.

As cognitive planning, the occupational stress level and the frequency of cognitive failures were considered similar between the Teaching Group and the Management Group, it is concluded that the pandemic context is the regulator of this result, as it modified the work routine and organization, whether administrative or teaching. This issue can be clarified by means of research studies that compare groups of teachers with professionals from other areas.

Although there are many challenges related to conducting a research study in the school setting, the positive factor of this research was the use of instruments that were prepared and/or validated in the Brazilian context. Furthermore, the topic is of public interest, as education is an essential basic service for society. Future research studies may consider whether the education professionals' health in this pandemic context exerts any effects on the learning processes and on the teacher-pupil relationship.

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Authors' Contributions:

All the authors made substantial contributions to the conception and design of this study, to data analysis and interpretation, and to the manuscript review and approval of the final version. All the authors assume public responsibility for the content of the manuscript.

Associate editor:

Luciana Carla dos Santos Elias

Received: Nov. 12, 2021

1st Revision: Jun. 11, 2022

2nd Revision: Jul. 21, 2022

3rd Revision: Jul. 29, 2022

Approved: Aug. 03, 2022

How to cite this article:

Korb, S. M. B., & De Souza, W. C. (2022). Occupational stress and cognitive processes among teachers in the COVID-19 pandemic. *Paidéia (Ribeirão Preto)*, 32, e3237. doi: <https://doi.org/10.1590/1982-4327e3237>