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Research article

Burnout Syndrome is associated with technostress and pedagogical practices during the pandemic confinement by Sars-Cov2/Covid-19 in some academic operation centers of UNIMINUTO[*]

Síndrome de Burnout asociado al Tecnoestrés y las Practicas Pedagógicas durante el confinamiento pandémico por Sars-Cov2/Covid-19 en algunos centros de operaciones académicas de UNIMINUTO

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Abstract
The sanitary emergency declared after the appearance of the SARS-COV2/COVID-19 virus triggered profound changes in the economic, social, and political daily life in Colombia,

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affecting various productive and academic sectors, among them, education and professional training at the primary, secondary, and higher education levels, respectively. Thus, this case study focuses on analyzing the impacts of technostress derived from the pedagogical practices of some Academic Operations Centers of the Corporación Universitaria Minuto de Dios and its relationship with the appearance of Burnout syndrome among the 163 teachers dedicated to the substantive functions of teaching and research in times of pandemic. For this purpose, a Multiple Correspondence Analysis is performed for the sociodemographic variables and the variables associated with technostress and Burnout syndrome, as well as the implementation of the Kuorinka Nordic Questionnaire with the objective of detecting and analyzing musculoskeletal symptoms applicable in the context of ergonomic studies such as in the case of UNIMINUTO, a Multiple Correspondence Analysis with hierarchical clustering is also carried out in order to establish hierarchical associations between musculoskeletal factors and the appearance of warning signs associated with Burnout syndrome. Finally, it is found that variables such as gender and academic training are exclusive to those suffering from burnout syndrome, but not with the seniority of teachers and the practices and postures assumed by teachers during their work practice. This study provides a more detailed view of how technostress and burnout syndrome affect teachers during times of pandemic and how they can be mitigated through stress management strategies and psychological support.

Keywords: SARS-COV2/COVID-19, Burnout Syndrome, Technostress, Work-at-Home, Pandemic

Resumen

La emergencia sanitaria declarada a partir de la aparición del virus SARS-COV2/COVID-19 desencadenó profundos cambios en la cotidianidad económica, social y política en Colombia, afectando diversos sectores productivos y académicos, entre ellos, la educación y formación profesional en los niveles de formación de básica primaria, secundaria y nivel superior respectivamente. Así, el presente caso de estudio se enfoca en analizar los impactos del tecnoestrés derivado de las practicas pedagógicas de algunos Centros de Operaciones Académicas de la Corporación Universitaria Minuto de Dios, y su relación con la aparición del síndrome de Burnout entre los 163 docentes dedicados a las funciones sustantivas de docencia e investigación en tiempos de pandemia. Para ello, se realiza un Análisis de Correspondencias Múltiples para las variables sociodemográficas y las variables asociadas al tecnoestrés y el síndrome de Burnout, así como la implementación del Cuestionario Nórdico de Kuorinka con el objetivo de detectar y analizar síntomas músculo esquelético aplicable en el contexto de estudios ergonómicos tal como es el caso de UNIMINUTO, también se hace un análisis de Correspondencias Múltiples con clúster jerárquico en donde se pretende establecer asociaciones jerárquicas entre los factores osteomusculares y la aparición de señales de alarma asociadas al síndrome de Burnout. Finalmente, se encuentra que variables tales como el género y la formación académica son excluyentes para padecer el síndrome de Burnout, no así con la antigüedad de los docentes y las prácticas y posturas asumidas por los docentes durante su ejercicio laboral. Este estudio proporciona una visión más detallada de cómo el tecnoestrés y el síndrome de Burnout afectan a los docentes en tiempos de pandemia y cómo pueden ser mitigados mediante estrategias de gestión del estrés y apoyo psicológico.

Palabras Clave: SARS-COV2/COVID-19, Síndrome De Burnout, Tecnoestrés, Trabajo en Casa, Pandemia

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SUMMARY

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Introduction

SARS-COV2/COVID-19 is a virus that was initially detected in the Chinese city of Wuhan (Lai et al., 2020) in December 2019 (Chinazzi et al., 2020), presenting an unprecedented rate of spread that forced the World Health Organization to declare a pandemic(Ye et al., 2022) with profound social, economic and political implications globally (Yan et al., 2020) (Gonzalez, Camero-Orive, & Gonzales-Cancelas, 2022).

In general terms, this virus presented symptoms similar to a common cold, being fatal for about 3.00% of the infected population (Buckee et al., 2020), with higher incidence in older adults and children. Due to its rapid spread, the scientific community learned about its propagation and latency in the environment (Ivanov, 2020; Sohrabi et al., 2020; Yan et al., 2020), which is why containment strategies were, in most cases, ineffective (Yan et al., 2020), leading to exponential growth (Bedford et al., 2020). Colombia ranked sixth in Latin America with 6,091,753 confirmed cases, 2,587 of which presented mild clinical symptoms with home care, 28 cases with hospital care, 5,925,390 recovered, and 139,783 deaths (National Institute of Health, 2022).

Regarding the mechanisms of contagion and spread in Colombia, the Ministry of Health confirmed that the main routes were direct contact, respiratory secretions from coughing, sneezing, and yawning (Tafur-Betancourta, Rosero-Cundar, & Remolina-Granados, 2022). Therefore, the Colombian National Government decided to implement the so-called Mandatory Preventive Isolation in Colombia decreed on March 25, 2020, limiting mobility (Henao-Cespedes, Henao-Cespedes, Garcés-Gómez & Ruggeri, 2022) and physical contact between groups of people throughout the national territory (Martínez, Valencia, Trofimoff & Vidal, 2021).

This confinement measure caused significant changes in the national daily life in economic, social, economic and political aspects (Londoño-Díaz & Prado-Mejía, 2021), increasing, among other variables, unemployment, poverty and a sustained deceleration of the economy (Fischer, Peñalosa & Ortega-Vivanco, 2021); In this sense, the education sector was one of the most affected, since with the issuance of Resolution 385 of March 12, 2020 (DNP, 2021), a health emergency was declared on account of SARS-COV2/COVID-19, which included a package of strategies focused on curbing contagion and the mobility of asymptomatic subjects. This resolution caused the educational sector, both at the primary, secondary, and higher education levels, to adapt their pedagogical training practices (teaching and research) to a model mediated by virtual platforms and/or traditional distance learning.

In this context, the Corporación Universitaria Minuto de Dios is a private higher education entity that has eight branches covering approximately 35 cities in Colombia, has ten accredited professional programs, four technological programs and six postgraduate programs, has a praxeological pedagogical model with a Christian humanist approach, whose teaching/learning process is given through face-to-face, blended (traditional distance measured by technological means) and virtualized remote programs (Corporación Universitaria Minuto de Dios, 2021).

Thus, given the conditions derived from the SARS-COV2/COVID-19 health emergency, UNIMINUTO implemented 2020 a plan focused on guaranteeing quality in education under a

virtual scheme, which, among other things, originated diverse physiological conditions (Shiu, Chen, Hung, Pei-Chuan Huang, & Szu-Hsien Lee, 2022)and psychological conditions among collaborators (teachers, administrative and managers) called "technostress" derived from the scheme defined by the National Government known as "telework" (Omidi, Khanjari, Salehi & Haghani, 2022). Considering the scenario and context described, the purpose of this study was to determine the occurrence of Burnout syndrome associated with technostress and pedagogical practices during pandemic confinement by SARS-COV2/COVID-19 in UNIMINUTO- some academic operation centers.

Resolution scheme

1. Research problem

How have burnout syndrome, technostress, and pedagogical practices been associated during the pandemic confinement due to the COVID-19 pandemic in UNIMINUTO university teachers?

2. Methodology

For the project, teachers from UNIMINUTO's academic operational centers (COA) in Buga, Buenaventura, Cali, Pasto, and Pereira were taken into account, distributed in the employment relationship modality as part-time and full-time (Corporación Universitaria Minuto de Dios, 2022). For this study, a sample of 163 teachers was taken.

In this research, the Brief Burnout Questionnaire (CBB) was implemented. The study was cross-sectional and applied to 163 teachers from some UNIMINUTO academic operations centers. Characterize the individuals, and sociodemographic variables such as gender, age, marital status, academic training, seniority at the university, and type of link were used.

In this sense, a univariate analysis was used to determine the trends of the variables. This analysis consisted of describing the most relevant variables of the study and exploring results that are relevant to raising research questions. In addition, the chi-square test was used to identify whether there is a statistical association between two variables. On the other hand, a multiple correspondence analysis (MCA) was performed on the sociodemographic variables and the most important variables of the questionnaire. The MCA allowed a general overview of the existing associations between the variables and individuals, and later, the results of the MCA were complemented with a Ward hierarchical cluster, which managed to identify groups of teachers with similar characteristics and to know within these possible groups which variables were the most relevant using the test values. It is important to mention that the chi-square tests and the tests in the hierarchical cluster were carried out with a statistical significance of 10.00%.

A standardized questionnaire designed to analyze musculoskeletal symptoms in the context of ergonomic or occupational health studies was presented. This instrument aims to identify initial symptoms that have not progressed to a disease or led to consultation with a health professional. This questionnaire was used to collect information on pain, fatigue, or discomfort; this allowed us to detect systematic changes in the work environment regarding injuries. The general questionnaire was designed to address whether musculoskeletal

problems occur in a given population and, if so, in which of the nine body regions they are located. Individuals must answer yes/no questions: "Have you ever had pain or discomfort"? If the answer is "no," the researcher moves on to the next body region. If the answer is affirmative, the next series of questions attempted to isolate the degree of difficulty by asking about frequency, duration, or interference with work activities. Thus, it was decided to use the statistical software R with the ggplot2 library for improvements in visualization aspects and the FactoMineR library to carry out the multivariate ACM and hierarchical cluster methods.

3. Writing plan

3.1 Burnout síndrome

It is an occupational disorder characterized by emotional overload, depersonalization, and loss of personal fulfillment. In the context of online work, this syndrome can be exacerbated by the lack of boundaries between work and personal life, which can lead to an increase in work pressure and stress. The theory of stress and burnout, developed by Maslach and Jackson, suggests that burnout occurs when job demands exceed the individual's capabilities, which can lead to a decrease in motivation and job satisfaction. In the educational field, the work environment also plays a crucial role in the appearance of burnout syndrome. An unfavorable work environment can generate conflicts between public officials, which can increase work pressure and stress. (Sarmiento et al., 2023)

3.2 Causes of Technostress

Technostress is a type of stress related to the use of Information and Communication Technologies (ICT) in the university environment. It is described as a phenomenon that arises when there are mismatches between the needs and skills of the teacher and the demands and resources of the university environment, including university management, requirements, and regulations, as well as the resources available to teachers, such as technical support, training, and culture. It can occur due to a mismatch between skills and demands when the teacher's skills are not adequate to meet the demands of the university regarding the use of technology. It can also occur when the teacher's needs are not met by the resources available at the university, such as technical support and training (Wang & Li, 2019).

3.3 Pedagogical practices

Pedagogical practices refer to the actions and approaches that educators employ in the classroom to facilitate student learning. These practices range from selecting teaching methods to creating a stimulating and meaningful learning environment. In the context of science education, pedagogical practices can range from constructivist approaches that encourage students' active exploration and discovery to more traditional approaches focused on the transmission of knowledge. It is important to investigate how educators' pedagogical practices align with contemporary educational theories and how they impact student learning.

Furthermore, effective pedagogical practices in science education can include fostering student curiosity, critical thinking, problem-solving, and the application of scientific concepts in real-world contexts. Educators play a crucial role in leading the teaching process,

implementing research-based practices, and ensuring that all students are engaged and challenged in scientific learning (Adolphus & Otuturu, 2022).

4. Research results

4.1. Descriptive analysis

From the information obtained, it is clear that Participant 94 did not answer any of the questions; that is, 163 responses from the questionnaires were used. Below, we will present a general and individual analysis of the results obtained. Of the 163 participants who answered the questionnaires, 94 were women, and 64 were men. Table 1 shows that 43.00% of respondents are married, followed by 32.00% of people who are currently single, 20.00% said they were living in a free union, and 6.00% in another union.

Table 1. *Marital status of respondents*

MARITAL STATUS	MARRIED	OTHER	SINGLE	COLLECTIVE	TOTAL
f	70	9	52	32	163
%	43.00	6.00	32.00	20.00	100.00

Source: own elaboration.

The 88 respondents were between 26 and 40 years of age, 73 people were between 41 and 65 years old, and only two people were over 65 years old. Table 2 shows that 29.00% of the respondents belong to the headquarters in the city of Pereira, followed by 25.00% who belong to the headquarters in the city of Cali, 16.00% and 17.00% belong respectively to the headquarters in the cities of Pasto and Buga. Finally, 7.00% and 6.00% of the people belong to the headquarters of Chinchiná and Buenaventura, respectively.

Table 2. *Teachers' workplace*

HEADQUARTERS	BUENAVENTURA	BUGA	CALI	CHINCHI	PASTO	PEREIRA	TOTAL
f	10	26	41	12	27	47	163
%	6.13	15.95	25.15	7.36	16.56	28.83	100.00

Source: own elaboration.

The variable "Weight" was answered correctly by 156 people. Of these, 63.00% weigh between 59 Kg and 75 Kg, while 27.00% weigh between 77 Kg and 96 Kg. Only 10.00% of the weight is between 48 kg and 58 kg. On the other hand, of the 163 teachers surveyed who responded, two of them had an "Hourly teaching" contract, 47 had a "Part-time" contract, and 114 had a "Full-time" contract. Of these 163 teachers, 47 belong to the Pereira campus, 41 to the Cali campus, 27 are from the Pasto campus, and 26 from the Buga campus. The rest of the teachers belong to the Buenaventura and Chinchiná campuses.

4.2. Univariate analysis brief Burnout questionnaire

Of the 163 teachers who responded to the questionnaire, it was evident, according to the Burnout scale, that 77 teachers were significantly affected by psychosocial factors such as workplace conditions, workload, job demands, social interaction, organizational aspects, job role, and career development, among others. On the other hand, 51.53% of teachers were at a medium level and were a vulnerable population to develop Burnout syndrome according

to some factors (Table 3). Finally, only 1.22% of teachers were found to be at a low level of affectation in their job performance due to Psychosocial Factors.

Table 3. *Classification according to the level recorded by the teachers evaluated in the Burnout factor*

CLASSIFICATION	f	%
High	77	47.23
Medium	84	51.53
Low	2	1.22
Total	163	100.00

Source: own elaboration.

On the other hand, it was assessed which teachers had developed burnout syndrome, and it was found that 16 teachers were at a high level; that is, these people had developed attitudes of pessimism, apathy, little motivation in their work activities, they distanced themselves from work activities, were irritable with the rest of their colleagues or staff at work, among other negative attitudes associated with their work.

Next, 29 teachers were found to have a medium level of burnout syndrome, which indicated that they had developed some negative attitudes or were beginning to develop them. Finally, despite the fact that a high association with psychosocial factors was observed, 118 teachers were still at a low level of burnout syndrome. Although certain factors are important, this has not affected their tranquility and attitudes toward work and activities performed (Table 4).

Table 4. *Classification according to the level recorded by the teachers evaluated in the Burnout Syndrome*

CLASSIFICATION	f	%
High	16	9.81
Medium	29	17.79
Low	118	72.39
Total	163	100.00

Source: own elaboration.

When the consequences of burnout were mentioned, it is understood that people who have developed it already suffer from a higher level of stress, developing physiological alterations. It was evident that 32 people developed, according to Maslach and Jackson, emotional exhaustion or fatigue, depersonalization, and reduced personal fulfillment that can end in an occupational or mental health illness. That is to say; these 32 teachers should receive some specialized medical guidance and attention depending on the consequences developed.

Also, 23 teachers were at a medium level, which meant that they would very likely develop some physical or emotional consequence due to work stress, which could still be avoided if the factors were correctly managed. Finally, 108 people presented a low level of consequences. That is to say, these people had not yet developed conflicts between their work or activities and their expectations or happiness.

4.3. Bivariate analysis (chi-square test)

Chi-square tests were performed between the variables obtained from the score of each evaluated tutor where the following hypotheses were raised for each variable obtained:

H_0= having a Burnout factor is independent of (gender, marital status, among others).
H_1= having a Burnout factor is dependent (gender, marital status, among others).

H_0= having Burnout Syndrome is independent (gender, marital status, among others).
H_1= having Burnout Syndrome is dependent (gender, marital status, among others).

H_0= having Burnout Consequences is independent (gender, marital status, among others).
H_1= having Burnout Consequences is dependent (gender, marital status, among others).

These hypotheses were evaluated under a significance level of 0.1, that is, having a Burnout factor is independent of gender, marital status, academic training, age, seniority, and type of link. Burnout syndrome is related to the seniority of teachers at the university. Developing burnout consequences is related to the gender and age of teachers. These conclusions are based on table 5.

Table 5. *Statistical association tests for sociodemographic variables and Burnout*

	BURNOUT FACTOR		BURNOUT SYNDROME		CONSEQUENCES OF BURNOUT	
	x^2	*p-value*	x^2	*p-value*	x^2	*p-value*
Gender	2.882	0.578	6.293	0.178	8.098	0.088
Marital status	4.043	0.671	2.718	0.843	9.116	0.167
Academic training	8.380	0.518	5.934	0.821	4.362	0.930
Age	2.882	0.578	6.293	0.178	8.098	0.088
Seniority	7.117	0.524	17.614	0.024	8.654	0.372
Type of relationship	2.819	0.589	6.558	0.161	6.472	0.167

Source: own elaboration.

Multiple correspondence analysis with hierarchical clustering

This section presents the results found when analyzing the three questionnaires and the sociodemographic variables together. First, an ACM was performed, and it was found that a percentage of the accumulated variance of 60.21% is equivalent to analyzing 14 factorial axes. Therefore, it was decided to perform an interpretation of the plane with axes 1 and 2 and an interpretation of the plane with axes 1 and 3. Figure 1 presents the factorial plane with axes 1 and 2. In this Figure, it can be seen that in the upper right part, it is observed that individuals 92, 144, 61, and 139 are teachers who presented a higher level of pain in ankles, feet, elbows, knees, hips, and thighs. In particular, there is a large concentration of teachers in the center of the plane, who are considered average individuals.

The cluster analysis in Figure 2 shows the groups found using the hierarchical cluster. In particular, 4 clusters of teachers were found based on the optimal cut-off criterion, according to Ward. Cluster 1 presented the highest frequency of teachers without discomfort in different parts of the body and showed low levels of Burnout; in general, healthy characteristics were observed. High frequencies in General, Extrinsic, and Intrinsic Job Satisfaction characterized cluster 2. Cluster 3 is made up of female teachers, who mostly presented medium and high pain in different parts of the body and also showed a medium level of general, extrinsic, and intrinsic job satisfaction. In addition, they mostly had High Burnout levels. In general, cluster 3 is a group where intervention should be made in burnout management because it causes musculoskeletal symptoms that are not favorable for teachers. Cluster 4 was characterized by the categories of very severe pain in feet, knees, hips-thighs, ankles, elbows, middle back, and wrists. This group is considered at risk and requires prompt attention.
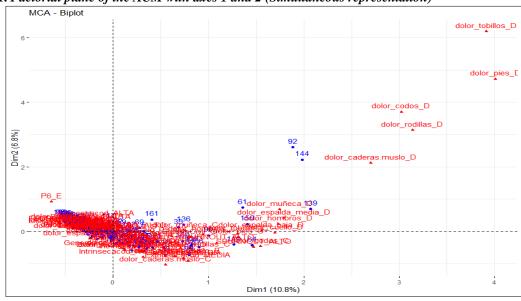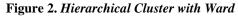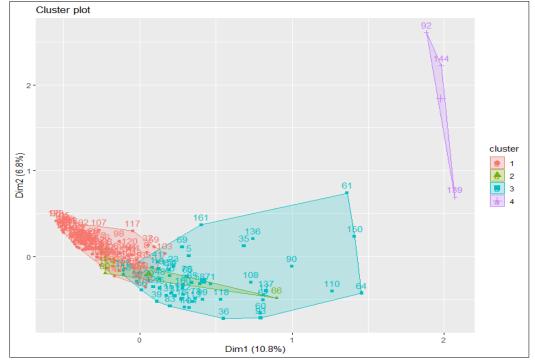
Figure 1. *Factorial plane of the ACM with axes 1 and 2 (Simultaneous representation)*

Source: own elaboration.

Figure 2. *Hierarchical Cluster with Ward*

Source: own elaboration.

Conclusions

Teleworking resulting from the declaration of a health emergency in Colombia due to the SARS-COV2/COVID-19 virus caused significant changes in the daily pedagogical practices of some UNIMINUTO Academic Operations Centers, the most representative being work isolation and decreased social interaction among employees, which led to increases in virtual synchronous socialization and overexposure to technological media. These conditions implied

longer periods assuming the same posture, which promoted greater musculoskeletal disorders in the long term.

Technostress, as an emerging concept in the context of the fourth industrial revolution and especially during the pandemic lockdown, is a factor that lacks standardized methodological instruments accepted by most health entities and is not included in the considerations of occupational risks in the exercise of substantive functions (teaching and research) of teachers at the higher education level. In this sense, this study found that there is a direct relationship between technostress and the appearance of Burnout syndrome in the exercise of the substantive functions of teachers assigned to pedagogical models that involve technological means as facilitators of the teaching-learning process.

Variables such as gender, age, and academic training are not significantly representative to analyze the relationship between technostress and the appearance of Burnout syndrome, but not with variables such as tutorial experience in the context of virtuality, body hygiene, physical condition, and physiological aspects associated with comprehensive health schemes. Therefore, it is necessary to establish strong labor policies in the context of virtual or traditional distance education mediated by technological platforms, with the purpose of regulating the exposure times of teachers to technological devices and clearly defining the synchronous and asynchronous attention schedules to attend to the substantive functions. It should be considered that these labor policies must include several aspects associated with the conditions of educational quality defined by the Ministry of Education of Colombia.

It is necessary to simultaneously implement psychosocial assessments and establish the emotional factors that are concomitant to technostress, thereby comprehensively determining the working conditions of teachers in times of pandemic or the context of teleworking. In addition, rapid detection strategies must be designed to detect the warning signs that may lead to the appearance of burnout syndrome among teachers at some of UNIMINUTO's academic operations centers.

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