






Factores predictores de la salud estudiantil: Tecnoestrés, estrés académico y apoyo social

Predictive Factors of Student Health: Technostress, Academic Stress, and Social Support

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Resumen

En los últimos años el tecnoestrés ha sido definido como un estado psicológico negativo que se relaciona con el uso de las Tecnologías de la Información y la Comunicación (TIC). El objetivo de este estudio es analizar los niveles de tecnoestrés y su relación con la salud en estudiantes universitarios. Se ha realizado un estudio descriptivo, cuantitativo y transversal, mediante encuesta autoinformada. Este análisis se realizó mediante un cuestionario online cumplimentado de forma anónima por 389 estudiantes de pregrado, máster y doctorado, pertenecientes en su mayoría a universidades de la Comunidad de Aragón. Además del tecnoestrés, se estudiaron los niveles de estrés académico, el apoyo social y el uso de nuevas tecnologías para explorar su relación con la salud. Los resultados de este estudio demostraron que, aunque la mayoría de los participantes no experimenta altos niveles de tecnoestrés, aquellos que sí lo experimentan muestran que el estrés académico, las conductas y

emociones generadas por el uso de las TIC, el tecnoestrés, el género y la satisfacción con el apoyo social predicen la salud de los estudiantes.

Palabras clave: tecnoestrés; estrés académico; apoyo social; TIC; salud general.

Abstract

In recent years, technostress has been defined as a negative psychological state that is related to the use of Information and Communication Technologies (ICT). The objective of this study is to analyze the levels of technostress and its relationship with health in university students. A descriptive, quantitative cross-sectional study has been carried out through a self-reported survey. This analysis was carried out using an online questionnaire filled out anonymously by 389 undergraduate, master's and doctoral students belonging mostly to universities in the Community of Aragon. In addition to technostress, levels of academic stress, social support and the use of new technologies were studied to explore their relationship with health. The results of this study demonstrated that, although most participants do not experience high levels of technostress, those who do show that academic stress, behaviors and emotions generated by the use of ICT, technostress, gender, and satisfaction with social support predict students' health.

Keywords: technostress; academic stress; social support; ICT; general health.

INTRODUCTION

The situation experienced during the COVID-19 pandemic, along with other phenomena, has made mental health a recurring theme. As a result of the confinement decreed by the Government in Spain (March 14, 2020), the necessity of adopting to online teaching methods and the increase in autonomous work by students became clear, since attendance at universities was cancelled. This period saw a surge in the utilization of Information and Communication Technologies (ICT), both in the work and academic spheres, as well as in the personal sphere, bringing to light the debate on the right. to disconnect digitally and escalating stress levels.

The World Health Organization (WHO) defines stress as “the set of physiological reactions that prepares the body for action”. On the one hand, “distress” occurs when the demands exceed the capacities of the individual to face or control them, with harmful consequences; and on the other hand, “eustress” occurs when activation helps us finish tasks on time, increasing performance (Caldera Montes & Pulido Castro, 2007; Minaya Lozano, 2008).

Stress reactions can arise in various domains such as work, academics, etc., and are influenced by multiple variables including environmental demands, perceived control (or lack thereof), individual coping resources, and social support (Johnson & Hall, 1988; Karasek & Theorell, 1990). It is estimated

that between 15 and 25% of Spanish students suffer from stress, nervousness and anxiety during student life (del Toro Añel et al., 2014).

It would be the mismatch between the demands and the available resources when dealing with ICTs, which leads to a high level of unpleasant psychophysiological activation and the development of negative attitudes towards them, generating a type of stress called technostress (José et al., 2017; Salanova, 2003).

Technostress is defined as a negative psychological state that is related to the use of ICTs, exposure to them or an anticipatory fear or threat of their use in the future (Salanova et al., 2003). Along the same lines as stress, one could differentiate between "techno-distress", when there is a reluctance to accept and use ICT, fear of interacting with ICT and an attitude of rejection, and fatigue, mental and cognitive exhaustion; and "techno-eustress", when the process in which an individual experiment with ICT is interpreted as challenging or exciting, generating positive results (Salanova, 2003; Salanova et al., 2006; Tarafdar et al., 2019).

Technostress affects both workers and students with limited technological resources who tend to be rejected by the use of ICT and perceive it as something negative, as well as people accustomed to the use of new technologies, who due to continuous training, recycling and acquisition of new knowledge without time to assimilate it they feel frustrated (Minaya Lozano, 2008). The digital migration forced by the pandemic caused by COVID-19 produced consequences such as rejection, denial, fear, uncertainty and a series of other problems that affect the mental state and an acceleration in the processes of stress and exhaustion (burnout) (Carvalho et al., 2021; Guerra et al., 2022).

The interaction model of demands, control, and social support by Johnson & Hall, (1988) y Karasek & Theorell (1990), applies to the stress experienced by students. In this model, social support acts as a stress modulator if the individual has the necessary quantity and quality of social support. Conversely, if social support is lacking or if the individual faces discrimination or intimidation, social support can become a new stressor. Furthermore, social support can promote adaptive health behaviors, provide well-being, or inhibit the negative effects of stress (Barra Almagi, 2004).

Technostress presents consequences such as cognitive symptoms of anxiety, irritability, concentration and memory difficulties, and alterations in time perception, especially in artificially lit environments. Physiological symptoms of technostress include muscle pain, headaches, insomnia, and eye fatigue. Additionally, behavioral symptoms may manifest, such as nervous movements, frequent blinking, or talking to the computer (Minaya Lozano, 2008; Salanova et al., 2007). Previous studies confirm that exam taking, academic overload, maintaining or obtaining scholarships, presenting work, lack of time, and completing studies within stipulated deadlines generate academic stress (González, 2017).

Thus, in the world of work, teleworking has been related to certain psychosocial risks such as less work

commitment, less social support, absenteeism, lower performance and burnout (Hung et al., 2015; Kasemy et al., 2022; Sardeshmukh et al., 2012; Tarafdar et al., 2015; Van Steenbergen et al., 2018). Burnout is the result of prolonged exposure to chronic stress factors and can occur, among others, in situations of lack of development, neglect, lack of recognition, lack of control and overload (Montero-Marín et al., 2013). However, it also has advantages, it has been proven that teleworking promotes autonomy, flexibility, speed of work, control, time management, increases productivity and quality of life (Ayyagari et al., 2011; Barrera-Algarín et al., 2013; Tavares, 2017; Van Steenbergen et al., 2018). Despite their familiarity with ICT (Prensky, 2001), the university population may be vulnerable to the effects of ICTs due to frequent and extensive use, both in academic and personal context. The constant digital connection implies spending most of the time using ICT, which causes lower class attendance, a decrease in the quality of study and concentration, and produces a negative impact on the academic performance of the student body (Upadhyaya & Vrinda, 2021). It also has implications for physical health, such as eyestrain, headaches, backaches, digestive problems, and for mental health, such as irritability, frustration, demotivation, anxiety, memory and concentration problems, addiction, burnout and reduced satisfaction (Mahapatra & Pati, 2018; Rodríguez-Vásquez et al., 2021; Samaha & Hawi, 2016; Sánchez-Macías et al., 2021; Tams et al., 2014; Wang et al., 2021).

For all these reasons, it is necessary to deepen the knowledge of the levels of stress produced by ICTs in university students, one of the groups that use ICTs the most during learning, and their relationship with health.

The main objective was to analyse the levels of technostress in university students and their relationship with health. The secondary objectives were to analyse the levels of academic stress and social support in university students and how they are related to health, and to analyse the association of the use of new technologies with health in university students.

METHODS

Desing

A descriptive, quantitative, cross-sectional study was carried out through a self-reported online survey.

Participants

The study has been carried out with a sample of the population of university students, over 18 years of age. According to Government of Spain and Ministry of Universities (Ministerio de Universidades. Gobierno de España, 2021), the total number of students enrolled in the Spanish University System (SUE) in the 2020-2021 academic year is 1,679,518, including Bachelor, Master and Doctorate

students. With a margin of error of 5% and a probability of success of 95%, with a confidence level of 95% and an accuracy of 3%, a sample of at least 213 individuals was needed. After the survey administration period ended (Ministerio de Universidades. Gobierno de España, 2021) a final sample of 389 participants was obtained, predominantly from universities in the Community of Aragon. The inclusion criteria were signing the informed consent and being enrolled in the 2021/2022 academic year in a Bachelor's, Master's or Doctorate at a Spanish University.

Instruments

The dependent variable of the study was health, defined by the WHO as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" (Organización Mundial de la Salud, 1946). It was analysed through the Goldberg General Health Questionnaire (GHQ-28). Which is subdivided into 4 subscales, with 7 questions each, referring to somatic symptoms, anguish/anxiety, social dysfunction and depression (Lobo et al., 1986). Following Godoy-Izquierdo et al. (2002) the questionnaire has been taken as a positive indicator of the current level of health or well-being, and higher scores have better states of general physical and psychological health.

Therefore, obtaining a high score in the subscale of "physical state" or somatic symptoms indicates a good level of physical health, in the subscales of "anxiety" and "depression" indicates the absence of anxious and depressive symptoms and in the subscale of social dysfunction or "everyday well-being" indicates that one has the personal capacity to develop a healthy and functional daily life.

The answers are presented in Likert format with 4 possibilities (from 0 to 3). The individual scores for each item, which were added together from the scores for each subscale (from 0 to 21 points), as well as the total for general health obtained from the sum of the latter, are those that were introduced in the statistical analysis. The original questionnaire in its validation in Spanish presents good psychometric qualities with a Cronbach's Alpha score of 0.97 for the full scale, 0.93 for somatic symptoms, 0.92 for anguish/anxiety, 0.91 for social dysfunction and 0.97 for depression (Godoy-Izquierdo et al., 2002). Similarly, the internal consistency of the GHQ-28 scale in the participating sample was excellent ($\alpha = 0.92$).

The independent variables of the present study are described below.

The sociodemographic variables of sex, age, nationality, marital status, place of residence, work environment, current course enrolled and university of origin, were collected through an 8-item questionnaire developed ad hoc for the study.

Technostress is defined as "a negative psychological state related to the use of ICT or threat of its use in the future, which leads to a high level of unpleasant psychophysiological activation and the development of negative attitudes towards ICT" (Salanova, 2003). It was evaluated through the

Technostress Questionnaire (Techno-anxiety and techno-fatigue) developed by (Salanova et al., 2006) (WoNT Prevenció Psicosocial ©). This questionnaire consists of 26 items, which evaluate technostress as psychosocial damage with three types of dimensions: 1) Affective (anxiety vs. fatigue), 2) Attitudinal (skeptical attitude towards technology) and 3) Cognitive (beliefs of inefficiency in the use of technology). The items are answered through a Likert-type frequency scale that ranges between "0" (nothing/never) and "6" (always/every day).

Obtaining high scores in these three dimensions is an indicator of technostress in its two manifestations: techno-anxiety and techno-fatigue; to present techno-anxiety high scores must be obtained in anxiety, skepticism and inefficiency and for techno-fatigue high scores in fatigue, skepticism and inefficiency.

Having high scores in any of the dimensions does not indicate technostress, but it means it could develop or appear in the future if the appropriate measures are not taken. The original questionnaire has adequate internal consistency, exceeding in all cases the minimum Cronbach's Alpha score of 0.70, which ensures the validity and reliability of the measures (Salanova et al., 2006); internal consistency increased in the present study, being excellent ($\alpha = 0.93$). Academic stress, defined by the WHO as the "physiological, emotional, behavioral and cognitive activation reaction to academic stimuli and events". Analysed through the Academic Stress Questionnaire at the University (CEAU) (García-Ros et al., 2012), which consists of 21 items grouped into 4 stress-generating factors during the university period: academic obligations (completion of compulsory tasks and assignments, academic overload, activities related to study and completion of evaluation tests), academic record and perspectives of future (future academic situations or problems, getting good grades, keeping or getting a scholarship or choosing subjects during the degree), interpersonal difficulties (conflicts with faculty and students, and competitiveness) and expression and communication of ideas (presentations of work, participation in class activities and discussions, and tutorials). The items are answered through a Likert-type scale with 1 being no stress and 5 being very stressed; thus, the higher the score, the greater the presence of academic stress. The original questionnaire, in its version validated in Spanish, has adequate internal consistency for the four dimensions, with a Cronbach's Alpha value of 0.70 to 0.80 (García-Ros et al., 2012); equating the internal consistency of the CEAU scale in the present study with a Cronbach's Alpha value of 0.70 to 0.86. The Use of ICT, defined as those technologies used for the management and transformation of information, which allow creating, modifying, storing, protecting and recovering that information (Cristóbal & Romaní, 2009), was analysed with the CUTIC-28 Questionnaire, designed to measure the frequency and use in the educational field of ICTs with an Internet connection, evaluating their usefulness and the emotion generated by their use among university students (Jiménez Rodríguez et al., 2017). The questionnaire collects data on digital

behaviors and opinions on the usefulness of ICT in computer support (computer or laptop) or Tablet, and mobile phone (Smartphone-cell phone). It consists of 28 items distributed in two groups of 14 items (the items of both supports are identical) and in three dimensions frequency of use of ICT, usefulness of ICT and behaviour/emotion generated by ICT. The responses are recorded in time frequency intervals (hours per day) and with a Likert scale from 1 to 5 points (from never to always). Following the recommendation of Jiménez Rodríguez et al. (2017), values above 2 in the frequency and behavior dimensions exceed the mean value, in the usefulness dimension the mean is above 3.5. The original questionnaire has good internal consistency with an alpha coefficient of 0.86. Similarly, the internal consistency of the questionnaire in the sample of this study was good ($\alpha = 0.82$).

Finally, perceived social support, understood as the cognitive assessment that there is a relationship of trust with others, who can be counted on in case of need (Martínez-López et al., 2014), was analysed through the Spanish version of the Social Support Questionnaire-Short Form.

This questionnaire is made up of 6 items, which represent moments of tension or need in different situations. For each item, the number of people that everyone perceives as willing to help and support them in a certain situation, and the degree of satisfaction with said support, is evaluated. The items related to the degree of satisfaction are answered through a Likert scale of 1 to 6 points (very dissatisfied to very satisfied) and the number of people with a 9-point scale (from 1 to 9 people). This questionnaire measures two different aspects of perceived social support, availability and the index of satisfaction with perceived availability. To calculate them, the average of the scores obtained is made, with a maximum of 36 for the satisfaction score and 54 for availability. The original questionnaire validated in Spanish has good psychometric properties with Cronbach's Alpha figures of 0.89 and 0.94 (Martínez-López et al., 2014); in addition, the internal consistency of the questionnaire in the sample of this study was very good ($\alpha = 0.89$).

Procedure

Snowball sampling was carried out (Johnson, 2005) through social networks, university bulletin boards and distribution lists. To request participation in the study, the link to the anonymous online survey carried out in Google Forms, was sent. The dissemination period was carried out during March and April 2022. Once this period had passed, an anonymized database was created from all the responses obtained.

Ethical aspects

This project has been approved by the Research Ethics Committee of Aragon (No. PI22-114) and by the Data Protection Office of the University of Zaragoza (No. RAT 2022-49). The participants gave their

informed consent and accepted the privacy policy of Google and the form for the exercise of the right to data protection of the University of Zaragoza. The current regulations regarding data protection were followed (Organic Law 3/2018, of December 5, on the Protection of Personal Data and Guarantee of Digital Rights). All the data was anonymous, and no personal data was recorded that would make it possible to identify who responded.

Data analysis

To examine the composition of the sample, a descriptive analysis was performed based on frequencies (categorical variables) and means and standard deviation (continuous variables). The normality or non-normality of the data was verified using the Kolmogorov-Smirnov test with the Lilliefors modification since the sample was greater than 30 cases. Next, to address the main objective and study the relationship between levels of technostress in university students and health, a correlation analysis of the independent variables with the dependent variable of general health (GHQ-28) was performed.

In addition, to analyse which variables predict better levels of general health, a multiple linear regression analysis was performed. The significance level adopted was $p < 0.05$. Statistical analyzes were performed with SPSS software (version 25.0) (IBM Corp., 2017) and the study had no missing data.

RESULTS

A total of 389 subjects participated in the study, all of them signed the informed consent and filled out the survey in its entirety. Of the total participating sample, 116 were men and 273 women. As can be seen in Table 1, the age of the sample ranges between 18 and 60 years, with a mean of 24.93 years. More than half of the sample is "single" (69.4%) and "lives with relatives" (52.4%). Most of the sample resides in the Autonomous Community of Aragon (86.6%) and are enrolled at the University of Zaragoza (91%). 71% of the participating student body is enrolled in a "university degree" and 54.5% of the sample does not work.

Table 1

Descriptive results and correlation of sociodemographic variables and general health

Variables	Values	Pearson's correlation with general health
Gender ^b , Women	273 (70.2)	-.28**
Age ^a	24.93 (7.86)	.09
Place of residence ^b		
Aragón	337 (86.6)	.05
Other autonomous communities	44 (11.3)	
Outside of Spain (Erasmus programme)	8 (2.1)	
Marital status ^b		
Married or not single	114 (29.3)	.01
Single	270 (69.4)	
Divorced	5 (1.3)	
Cohabitation ^b		
Single	26 (6.7)	
With couple	43 (11.1)	
With couple and children	24 (6.2)	-.08
With family	204 (52.4)	
With friends or flatmate	74 (19.0)	
Student residence	18 (4.6)	
Educational level ^b		
University Degree	276 (71.0)	
Master's degree	28 (7.2)	.12*
PhD	83 (21.3)	
Postgraduate studies	2 (0.5)	
University ^b		
Zaragoza University	354 (91.0)	.02
Other universities	35 (9.0)	
Work ^b		
Do not work	212 (54.5)	
Work between 1 and 10 hours	43 (11.1)	
Works between 10 and 20 hours	19 (4.9)	.08
Works between 20 and 30 hours	23 (5.9)	
Works between 30 and 40 hours	49 (12.6)	
Works more than 40 hours	43 (11.1)	

Note. N=389. ^aMean (Standard Deviation). ^bFrequency (percentage). *p<0.05; **p<0.01.

Regarding the remaining study variables, the results presented in Table 2 show that 16.5% of the sample experience techno-fatigue (high scores in fatigue, skepticism and inefficiency) and 17.5% experience techno-anxiety (high scores on anxiety, skepticism, and inefficacy). Thus, a high score in the dimensions measured indicates that 18.3% experience technostress, while 81.7% do not. The factor that causes the most academic stress in the participating university students is "academic obligations" (M=3.31).

Regarding the general health of the sample, taken in a positive sense, the participants present the lowest score in "social dysfunction" (M=9.37), and on the contrary, the highest average is found in the "depression" dimension" (M=17.91). Concerning the frequency of ICT use, the participants spend between an hour and a half and three hours a day using ICT for messaging, games, and social networks (M=1.78). Regarding the behaviour or emotion that ICT generates in the participants, they feel irritable, anxious, or agitated sometimes because they do not use the Internet, sometimes they have stopped doing some activity because they are connected and/or sometimes surfing the Internet gives them relief and peace of mind (M=1.81). The participants consider the use of the Internet with a mobile phone or computer to work in the classroom, in groups, to search for information and to investigate frequently or frequently useful (M=3.5). Finally, 45% of the sample is "very satisfied" with the social support they perceive and on average the sample had the support of 5 people.

Table 2

Descriptive results and correlation of the variables technostress, academic stress, use of ICT and general health.

Variables	Value	Pearson's correlation with general health
Technostress^b		
No	318 (81.7)	-.29**
Yes	71 (18.3)	
Techno-fatigue		
No	325 (83.5)	
Yes	64 (16.5)	
Techno-anxiety		
No	321 (82.5)	
Yes	68 (17.5)	
Academic stress^a		
Academic obligations (OA)	3.31 (.87)	-.47**
Student record and future prospects (EP)	2.79 (.95)	-.41**
Interpersonal difficulties (DI)	2.18 (.97)	-.29**
Expression and communication of own ideas (EC)	2.91 (1.01)	-.33**

General health ^a		
Somatic symptoms (physical status)	13.35 (4.32)	
Anxiety-Insomnia	12.67 (4.94)	
Social dysfunction (everyday well-being)	9.37 (3.67)	
Depression	17.91 (3.95)	
Use of ITC ^a		
Frequency	1.78 (.68)	-.05
Utility	3.50 (.74)	.00
Behaviour/Emotion	1.81 (.53)	-.28**
Social support satisfaction ^b		
Very unsatisfied	10 (2.6)	
Unsatisfied	9 (2.3)	
Somewhat unsatisfied	16 (4.1)	.23**
Somewhat satisfied	40 (10.3)	
Satisfied	139 (35.7)	
Very satisfied	175 (45.0)	
Availability of social support ^a	5.18 (2.02)	.22**

Note. N=389. ^aMean (Standard deviation). ^bFrequency (percentage). * $p < 0.05$. ** $p < 0.01$.

Regarding the correlation between the study variables and general health, Tables 1 and 2 show how general health, with its grouped dimensions, presents a significant correlation with the male gender ($-.28$; $p < 0.01$), which is related to better general health. In addition, both a higher level of education ($.12$; $p < 0.05$) and satisfaction ($.23$; $p < 0.01$) and availability of social support ($.22$; $p < 0.01$) present a statistically significant relationship significant and positive with general health. On the other hand, general health presents a statistically significant and negative relationship with technostress ($-.29$; $p < 0.01$), with all dimensions of academic stress [(OA $-.47$; $p < 0.01$) (EP $-.41$; $p < 0.01$) (DI $-.29$; $p < 0.01$) (EC $-.33$; $p < 0.01$)] and with the behaviour and emotion generated by the use of ICTs ($-.28$; $p < 0.01$); therefore, a lower score in these variables is related to better general health.

Finally, Table 3 presents the results of the multiple linear regression, between the variables that obtained a statistically significant result in the correlation and general health, intending to analyse its predictive capacity on it. In the sample, being male ($\beta = -3.370$; $p = 0.012$), presenting a lower score in total technostress ($\beta = -0.233$; $p = 0.003$), lower score in academic obligations (OA) ($\beta = -4.074$; $p < 0.001$), a higher score in social support satisfaction ($\beta = 1.221$; $p = 0.028$) and a higher score in behaviour and emotion generated by the use of ICTs ($\beta = -3.804$; $p = 0.001$) are predictors of better health. This model explains 31.9% of the global variance [adjusted $R^2 = 0.319$, $F(10,378) = 19.182$, $p < 0.001$].

Table 3

Multiple linear regression between general health and sex, educational level, technostress, academic stress, social support and behaviour in the use of ICT

Model	Non-standardized coefficients		Standardized coefficients			95% CI for B		Collinearity statistics	
	B	Dev. Error	Beta	t	p	Lower Limit	Upper Limit	Tolerance	VIF
(Constant)	82.75**	4.85		17.05	.00	73.21	92.29		
Gender	-3.37**	1.33	-.11	-2.53	.01	-5.98	-.75	.84	1.19
Studies	-.27	.69	-.01	-.39	.69	-1.64	1.09	.90	1.10
Technostress	-.23**	.07	-.13	-2.94	.00	-.38	-.07	.87	1.13
Academic stress									
OA	-4.07**	.91	-.26	-4.47	.00	-5.86	-2.28	.49	2.02
EP	-1.19	.78	-.08	-1.52	.12	-2.74	.34	.54	1.82
DI	-.31	.68	-.02	-.46	.64	-1.65	1.02	.71	1.40
EC	-.61	.65	-.04	-.92	.35	-1.90	.68	.69	1.43
Social support									
Availability	.40	.31	.06	1.27	.20	-.22	1.03	.74	1.34
Satisfaction	1.22*	.55	.10	2.20	.02	.13	2.31	.76	1.31
Use of ICT									
Behaviour/Emotion	-3.80**	1.10	-.15	-3.43	.00	-5.97	-1.62	.87	1.13

Note. CI: confidence interval. Dependent variable: General Health. *p<0.05. **p<0.01.

DISCUSSION

The main objective of this study was to analyse the levels of technostress in university students and their relationship with health, for which a sample of 389 students was obtained, exceeding the necessary sample size of 203 individuals. Regarding the representativeness of the sample, it presents an adequate number. In addition, the sample is made up of a higher percentage of women than men. This aspect coincides with the greater presence of women within the university student body, which, according to the Government of Spain and the Ministry of Universities (2021), the percentage of university women is higher than that of men.

In terms of general health, the participants exhibited poorer social functioning and lower daily well-being, although they reported adequate levels of depression. These findings align with the 2020 European Health Survey in Spain, where a significant proportion of young people rated their health as very good (54%) or good (48%) (Gobierno de España & Ministerio de Sanidad, 2020). Based on the results, the majority of participants (81.7%) do not experience technostress, including its two manifestations, techno-anxiety and techno-fatigue, and exhibit moderate levels of academic stress.

However, in the few previous studies, in general, a presence of a moderate to high level is observed in Spanish-speaking university students, both of technostress (Arredondo-Hidalgo & Caldera-González, 2022; Guerra et al., 2022) as well as of academic stress (Estrada et al., 2021; Rivas et al., 2014). In addition, the participants present adequate values in the frequency, usefulness behavior and emotion generated by the use of ICTs and are satisfied with the perceived social support.

Regarding the relationship of the study variables with general health, technostress, academic stress in all its dimensions (academic obligations, records and prospects, interpersonal difficulties, and expression and communication of one's ideas), and behavior or emotions produced using ICTs present a statistically significant and negative correlation with general health. This indicates that students who experience more technostress, more academic stress, and behaviors such as irritability or anxiety regarding the use of ICTs will have poorer general health. Additionally, being male, the level of education, and the availability and satisfaction with social support are statistically significantly and positively related to the health of the students. Following Borrel et al. (2004), social class, the territory in which one lives, and the level of education influence mortality and perceived health.

Regarding the predictive model of general health, it is observed how the "academic obligations" dimension of academic stress is the one with the greatest predictive power on health, followed by behavior and emotion generated by the use of ICT, satisfaction with social support and technostress. Academic obligations include carrying out mandatory tasks and assignments, academic overload, activities related to study, and taking assessment tests such as exams, which, as pointed out by Martín Monzón (2007), they are "one of the fundamental academic stressors in student life, with sensitive effects at the behavioral, cognitive and physiological-emotional levels". Likewise, various studies conclude that exams, time distribution, meeting stipulated deadlines and academic overload are the situations that cause the greatest academic stress (Feldman et al., 2008; Fin, Para, & AI, 2019; González, 2017). All of this, together with techno-stress, generated by the use of ICT, can lead to health consequences similar to those of psychosocial stress, such as cognitive symptoms (difficulties with concentration and memory, mental fatigue, cognitive overload), emotional symptoms (anxiety, irritability, nervousness, burnout), and physiological (muscle pain, headaches, insomnia, eye fatigue) (Galvin et al., 2021; Kasemy et al., 2022; Martín Rodríguez, 2020; Tams et al., 2014).

Likewise, to explain the consequences that the use of ICTs has on a person, it is necessary to take into account the training they have, how often they use them and for how long, since behavior and emotion (irritability, relaxation and addiction) generated by the use of ICT will be determined by the demands and the lack of resources generated after its implementation (Salanova, 2003).

In a university context, in which the use of ICT has been consolidated and increased, in the vast majority of students use a laptop, tablet or mobile phone (Smartphone) in the classroom (González

Elices, 2021), It is important to keep in mind the explanatory capacity of the health of ICT use reflected in this study, since there is a significant impact on academic performance, motivation, fatigue and life satisfaction of students (Guerra et al., 2022; Samaha & Hawi, 2016).

According to the results, being a man is related to having better health, but this data should be taken with caution, since the sample is mostly made up of women (70.2%). There are numerous studies on the relationship between gender and health, however studying this relationship is complex since it can come from behavioral, attitudinal and structural factors related to gender (Matud, 2017). There is evidence that women are more likely to be affected by the stress of the people around them and more academic stress (García, 2019; García-Ros et al., 2012; Matud, 2017).

Finally, point out how satisfaction with social support is what provides predictive capacity for health, being more relevant than its availability (quality vs. quantity). Due to the new forms of social interaction based on social networks, social ties are weaker and more immediate, easy to create but with low commitment, generating a high availability of social support but with little satisfaction (Roger García & Durán Heras, 2009). Furthermore, according to (Barra Almagi, 2004) social support can promote adaptive health behaviors, provide well-being, or inhibit the negative effects of stress.

Regarding the limitations of the study, most of the respondents belong to one of the four university campuses of the University of Zaragoza, distributed throughout the three provinces of the Autonomous Community of Aragon. It is recommended to carry out a study with a sample that includes other universities with a greater offer of online degrees, since the University of Zaragoza, except the period of confinement due to the pandemic, is a face-to-face university. Likewise, the average age is 25 years old, since it is relatively high, the age at which the studies started should be analysed. In addition, as it is an online questionnaire whose sampling has been carried out by the snowball method and not randomly among the university population, subjects interested in obtaining a specific result or more interested in the study could have completed the survey; and being online automatically excludes people without internet access (Arroyo Menéndez & Finkel, 2019).

CONCLUSIONS

This study has identified factors that could be targeted for interventions to help students maintain or improve their health. Academic obligations, behaviors or emotions caused by ICTs, gender, technostress, and satisfaction with social support all predict students' overall health.

Although the study participants do not present high levels of technostress, they do experience moderate levels of academic stress. Therefore, it would be advisable to establish achievable deadlines for academic work and activities, regulate students' workload, and implement time optimization programs, as stress caused by academic obligations is a strong predictor of their health. Additionally,

establishing programs related to the learning and correct use of ICTs and improving the digital skills environment is recommended, especially given its association with irritability, addiction to technologies, or technostress among students. These programs could also apply to other areas, generating strategies to improve technological skills and coping mechanisms that could aid students in integrating into the highly digitized labor market.

Finally, it is recommended to replicate this study among working individuals to identify which variables are related to technostress and its consequences on workers' health, thus allowing the implementation of prevention and intervention strategies in the field of occupational health hazard prevention.

AVAILABILITY OF DATA AND MATERIALS

Data generated or analyzed during this study are available from the corresponding author upon reasonable request.

CONFLICT OF INTERESTS

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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AUTHORS' CONTRIBUTIONS

AAM, and AMV conceived and planned the experiments. AMV carried out the experiments. AAM, and AMV, and AAL contributed to the interpretation of the results. AAM, and AMV, and AAL took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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