Impact of technostress on the mexican population and its relation with sociodemographic and work variables

Tecnoestrés en población mexicana y su relación con variables sociodemográficas y laborales

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RESEARCH ARTICLE

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Resumen

Objetivo: Medir la relación entre variables sociodemográficas, variables laborales y la frecuencia del uso de las tecnologías, con el nivel de tecnoansiedad, tecnofatiga y tecnoadicción como experiencias del tecnoestrés, en una muestra de adolescentes, jóvenes y adultos mexicanos.

Método: Se aplicaron las escalas para medir tecnoestrés y tecnoadicción de Cazares & Villavicencio (2019) y un cuestionario de variables sociodemográficas y laborales de elaboración propia, a un total de 981 participantes mexicanos entre 13 y 69 años, utilizando la herramienta de formularios de *Google*. Los datos obtenidos fueron sometidos a un análisis de nivel descriptivo, correlacional e inferencial (Kerlinger & Lee, 2002), con ayuda del programa estadístico SPSS v.20.

Resultados: Respecto a la tecnofatiga, los resultados arrojaron diferencias significativas por sexo (U = 104026.50, p=.037) y antigüedad en el trabajo [$\chi^{2(3)}$ = 11.213, p = .011] y una significancia marginal por estado civil (U = 78329.00, p=.058). En cuanto a la tecnoadicción, se encontraron diferencias significativas por estado civil (U = 76121.50, p=.012) y ocupación [$\chi^{2(2)}$ = 4.698, p =.008]. Con relación a la tecnoansiedad, fueron arrojadas diferencias significativas por tipo de empresa (U = 61348.00, p=.049). Finalmente, se encontró que las personas con mayor nivel de escolaridad, los directivos y los empresarios independientes, presentaron mayor tecnoansiedad, tecnofatiga y tecnoadicción.

Conclusiones: Los resultados permiten afirmar que en México existe la presencia de tecnoestrés. Además, se demuestra la relación entre las experiencias del tecnoestrés y variables sociodemográficas (sexo, estado civil, ocupación y escolaridad) y laborales (antigüedad laboral, tipo de empresa y nivel de puesto). Los resultados constituyen las primeras aportaciones de la investigación del tecnoestrés en México, país que impulsa el uso de la tecnología.

Palabras clave: tecnoestrés, tecnoansiedad, tecnofatiga, tecnoadicción, TIC, tecnología.

Abstract

Objective: To assess the relation among sociodemographic variables, work variables, the frequency of technology use, and the levels of techno-anxiety, techno-fatigue, and techno-addiction as technostress experiences in a sample of Mexican adolescents, young adults, and adults.

Methodology: The scales to measure technostress and techno-addiction, created by Cazares & Villavicencio (2019), and a self-made questionnaire of sociodemographic and work variables were applied to 981 Mexican participants aged 13– 69 years through the *Google* forms tool. Using the statistical program SPSS v.20, the data obtained were subjected to a descriptive, correlational, and inferential level analysis (Kerlinger & Lee, 2002).

Results: For techno-fatigue, the results revealed significant differences by sex (U = 104026.50, p = .037) and length of service [$\chi_{2(3)}$ = 11.213, p = .011] as well as a marginal significance by marital status (U = 78329.00, p=.058). For techno-addiction, the results indicated significant differences by marital status (U = 76121.50, p = .012) and occupation [$\chi_{2(2)}$ = 4.698, p =.008]. For techno-anxiety, significant differences were observed in terms of type of company (U = 61348.00, p = .049). Finally, people with a higher level of education, managers, and independent entrepreneurs exhibited higher techno-anxiety, techno-fatigue, and techno-addiction.

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Conclusions: Based on these results, we can confirm the presence of technostress in Mexico. In addition, the relation among technostress experiences, sociodemographic variables (sex, marital status, occupation, and education), and work variables (length of service, type of company, and position level) has been presented. The results are the first contributions of the technostress research in Mexico, a country that promotes the use of technology.

Keywords: technostress, techno-anxiety, techno-fatigue, techno-addiction, ICT, technology.

1. INTRODUCTION

Technological progress has impacted organizations at social, economic, and psychological levels (West & Saker, 2012; Sigala, 2018; Yu, Ndumu, Mon & Fan, 2018), thereby altering the dynamics at work centers (Salanova, Cifre & Martin, 2004; Mueller, 2006; Salanova, Llorens, Cifre & Nogareda, 2007; Alfaro de Prado, 2008; Yan, Guo, Lee & Vogel, 2013; Khuntia, Tanniru & Weiner, 2015; De Wet, Koekemoer & Nel, 2016; Haddara & Hetlevik, 2016; Duke & Montag, 2017; Stich, Tarafdar, Stacey & Cooper, 2018; Yin, Ou, Davison & Wu, 2018) and educational spaces (Allan & Lawless, 2003; Abrahams, 2010; Brooks, 2015; Hsiao, Shu & Huang, 2017; Al-Yafi, El-Masri & Tsai, 2018; Khatri, Samuel & Dennis, 2018; Cao, Masood, Luqman & Ali, 2018).

The advantages of technological innovations include the opportunity to perform multiple activities, regardless of time and space (Çoklar & Sahin, 2011); new forms of work, such as e-work (Grant, Wallace, Spurgeon, Tramontano & Charalampous, 2019); the ease of access to documents and systems, improving the exchange of ideas (De Wet et al., 2016; Guillén, 2016; Cao & Yu, 2019); and increased quality and productivity (Alfaro de Prado, 2008). However, "ICTs by themselves are not a guarantee of success" (Alfaro de Prado, 2008, p.18) because users are individuals (Brooks & Califf, 2017; Gaudioso, Turel & Galimberti, 2017).

Simultaneously, studies have revealed that ICTs increase the demand for work and make it difficult to disconnect from work tasks, even when at home, creating the expectation of being always available (Alfaro de Prado, 2008; De Wet et al., 2016; Seong & Park, 2016; Carlotto, Welter & Jones, 2017; Yao & Cao, 2017). Furthermore, the constant and rapid renewal of technological tools is perceived as a source of stress (Sami & Pangannaiah, 2006; Çoklar & Sahin, 2011; Haddara & Hetlevik, 2016) and distraction (Brooks, 2015; De Wet et al., 2016; Hsiao et al., 2017; Hsiao, 2017).

In connection with these results, Brod (1984, cited in the study by Salanova et al., 2007) was the first to state that there is "an adaptation syndrome caused by the lack of skills to deal with new computer technologies in a healthy way" (p.1), which he referred to as technostress. People talk of technostress to refer to the negative psychological, social, and biological effects of the use of technologies (Agogo & Hess, 2015; Coppari et al., 2018). Likewise, there are three different experiences of technostress: techno-anxiety, techno-fatigue, and techno-addiction (Salanova et al., 2007) (See Table 1).

Table 1
Technostress experiences

TECHNO-ANXIETY	TECHNO-FATIGUE	TECHNO-ADDICTION
The individual experiences high levels of unpleasant physiological activity and feels tension and discomfort due to the present or future use of some type of ICTs. The same anxiety leads to skeptical attitudes regarding the use of technologies, in addition to negative thoughts about one's own ability and competence with ICTs.	The use of technology can lead to feelings of tiredness, mental and cognitive exhaustion, as well as skepticism and beliefs about ineffectiveness with the use of ICT.	It is defined as the uncontrollable compulsion to use ICTs "every time and anywhere" and for long periods of time.

Source: Based on Salanova et al. (2007).

Subsequently, only two types of technostress (technostrain and techno-addiction) have been discussed because anxiety and fatigue are considered components of the *technostrain* experience (Guillén, 2016). Both the rejection and the compulsive use of ICT denote dysfunctional behavior (Alfaro de Prado, 2008; Zhang, Zhao, Lu & Yang, 2016; Hsiao et al., 2017; Luqman, Cao, Ali, Masood & Yu, 2017; Cao et al., 2018; Dhir, Yossatorn, Kaur & Chen, 2018; Stich et al., 2018; Tams, Legoux & Leger, 2018).

Lately, the number of studies on technostress has increased due to the consequences that it entails (Quinn, 2001; Brooks & Califf, 2017; Gaudioso et al., 2017; Hsiao et al., 2017; Krishnan, 2017; Martínez-Corcoles, Teichmann & Murdvee, 2017; Steelman & Soror, 2017; Cao & Sun, 2018; Loderer, Pekrun & Lester, 2018; Loiacono & McCoy, 2018; Yu, Cao, Liu & Wang, 2018).

Physiologically, a person with technostress suffers from anxiety, irritability, headache (Alfaro de Prado, 2008; Khasawneh, 2018a; Khasawneh, 2018b); carpal tunnel syndrome, muscle pain (Llorens, Salanova & Ventura, 2011); sleep problems (Thomee, Eklof, Gustafsson, Nilsson & Hagber, 2007; Çoklar & Sahin, 2011); and an increase in the production of hormones related to

the appearance of stress, adrenaline, and cortisol (McEwen, 2006; Riedl, 2013).

At a psychosocial level, when ICT users value exposure to technology as negative, they may exhibit burnout (Salanova & Schaufeli, 2000). When their assessment is positive, they exhibit greater engagement (Salanova & Llorens, 2009). Moreover, the excessive use of technology, as in any other addiction, creates dependency (Quinn, 2001; Tams et al., 2018; Cao & Yu, 2019). The overstimulation to which one may be exposed produces mental overload; difficulty in remembering, thinking clearly, and resting; and a lower perception of happiness (Brooks, 2015; Picón, Toledo & Navarro, 2017; Hughes & Burke, 2018).

At an individual level, workers socially isolate themselves, become short-tempered, have mood swings, and neglect work as well as family life (Llorens et al., 2011; Duke & Montag, 2017; Jung, Pawlowski & Kim, 2017), thereby having less time and energy to spend on other activities (Yao & Cao, 2017; Cao & Yu, 2019).

Finally, if technostress is experienced in an organization, there is a decrease in workers' performances (Brooks, 2015; Yu et al., 2018; Cao & Yu, 2019), of the hours worked (Duke & Montag, 2017), and of job satisfaction (Ragu-Nathan, Tarafdar, Ragu-Nathan & Tu, 2008; Haddara & Hetlevik, 2016; Seong & Park, 2016; Yin et al., 2018). Furthermore, the rate of absenteeism, turnover, and sick leave increases; productivity declines; and work commitment reduces (Brooks & Califf, 2017; Stich et al., 2018).

Researchers have attempted to determine the characteristics of technology users and their impact on the level of technostress. For this purpose, one of the best-studied variables is age. Numerous studies have indicated a difference between younger and older people in terms of their technostress experiences. For instance, older people are more likely to experience fatigue, anxiety, and feelings of ineffectiveness, greater skepticism, (Salanova et al., 2007; Hill, Davies & Williams, 2008; Çoklar & Sahin, 2011; Zhang et al., 2016; Picón et al., 2017), and reject the idea of using ICT (Mattila, Karjaluoto & Pento, 2003; Alfaro de Prado, 2008). By contrast, other studies have revealed that adult seniors use their experience by facing other stressful situations in their workplace to reduce their levels of technostress (Ragu-Nathan et al., 2008). Furthermore, evidences have revealed that youngsters and adults suffer from technostress, greater fatigue, anxiety, and inefficiency (Carlotto et al., 2017; Picón et al., 2017).

In addition, results with regard to age have indicated that young adults use ICT more frequently. One of the reasons is that ICT allows them to remain anonymous (Gaspar, 2016; Hsiao, 2017). Moreover, they send the most messages (Teo, 2001), with WhatsApp being one of the main applications used by them (Montag et al., 2015). Despite this, another study has affirmed that because technology is already used daily and frequently, no significant differences exist in terms of age in the degree of acceptance of ICT(Khasawneh, 2018b).

The experience of technostress between men and women has also been examined; for instance, some studies have argued that women exhibit higher levels of anxiety and fatigue with the use of ICT, indicating more negative attitudes and feelings of little ability to use them (Salanova et al., 2007; Baloglu & Cevik, 2008; Carlotto et al., 2017; Picón et al., 2017). Moreover, women use technology to socialise or communicate, being the ones who send messages the most (Teo, 2001; Lee, Chang, Lin & Cheng, 2014), those who use the *WhatsApp* application the most (Montag et al., 2015), and those who are most attached to their cell phones (Lee et al., 2014). Other researchers have affirmed that men experience more technostress (Ragu-Nathan et al., 2008) and fatigue (Zhang et al., 2016; Carlotto et al., 2017) than women. This is due to the fact that men exhibit a greater willingness to use ICTs even when they do not need them (Carlotto et al., 2017) or when it comes to personal development (Shao, 2018). In addition, they play on their cell phones more frequently (Hsiao, 2017) as well as download and purchase online (Teo, 2001). Men are reported being more compulsive with the use of technology (Lee et al., 2014).

In the same vein, other studies have revealed no significant differences in the number of purchases made by men and women (Dhanapal, Vashu & Subramaniam, 2015), neither in the degree of acceptance of technology (Khasawneh, 2018a) nor in the level of addiction to cell phones (Duke & Montag, 2017; Hsiao et al., 2017). In this type of research, culture is an important factor to consider, as it can foster or limit access to technology, modulating men's and women's experiences with respect to ICTs (Ahmad, Rafiq & Ahmad, 2018).

Studies on technology use have not examined generational differences. According to the few studies available, Baby boomers and X and Y generations make purchases online, but Baby boomers do so less frequently (Dhanapal et al., 2015). Young adults, also called the *APP generation*, *digital*

natives, *millennials,* and *centennials,* spend the most time using technology. Generation X, constituting the middle-aged adults, suffers the most from technostress since it faces an accelerated development of technology, avoiding being left behind by generation Y, which is better adapted to the changes posed by technology (Coppari et al., 2017).

Regarding the marital status, a study affirmed that married workers exhibit higher levels of skepticism and fatigue, and single workers exhibit high levels of anxiety and inefficiency (Carlotto et al., 2017).

Education is negatively associated with daily cell phone use (Montag et al., 2015). In general, technostress decreases as the educational level increases (Ragu-Nathan et al., 2008). Moreover, young students frequently use technology, thereby becoming addicted to it. A study reported that the normal use of technology is associated with higher school performance compared with those who make a low or high use of it (Al-Yafi et al., 2018).

In general, people dedicated to studying and those younger than 20 suffer less technostress than other people who, for instance, work on the farm, who are already retired, or who are in charge of household chores (Sonya, 2003).

In relation to the use of technology, information about work variables such as position level, company type, or length of service is scarce. Oh & Sungbum (2016) observed that the higher the position held, the lower the perception of workload and that a person working during a vacation has less significance. Furthermore, those with a more operational position are more concerned with the number of hours they work. The length of service can work in favor thanks to the experience acquired to handle stressful situations (Ragu-Nathan et al., 2008).

When a person uses technology more frequently, they have more experience in handling it, decreasing their levels of techno-anxiety (Çoklar & Sahin, 2011; Picón et al., 2017). However, an excessive use of technology leads to high levels of technostress (Brooks, 2015; Carlotto et al., 2017).

In Mexico, the incorporation of technologies into the daily life of its inhabitants has been promoted through different programs whose objective is to eradicate the digital divide, such as *México conectado* (Mexico connected) (Gobierno de la CDMX, 2019), *Programa de Inclusión y Alfabetización Digital PIAD* (PIAD Digital Literacy and Inclusion Program

(México Digital, 2014), and free Internet in the subway (Gobierno de la CDMX, 2018). Despite this, the literature review of technostress fails to reveal studies conducted in Mexico that analyze its prevalence as well as the characteristics of those who suffer from it. Therefore, this study aims to identify the relation among sociodemographic variables (age, generation, sex, marital status, education), work variables (type of position and company, length of service at work), the frequency of use of ICT, and the level of technostress. This study is the first attempt in Mexico on this phenomenon that allows to characterize the people who interact with technology and that serves as a basis for future research.

2. METHODOLOGY

2.1. Design

The study had a nonexperimental and exploratory cross-sectional design, implying no manipulation of the variables or any type of intervention with the participants (Kerlinger & Lee, 2002). In addition, the data collection was performed in a single moment (Hernández, Fernández & Baptista, 2014).

2.2. Participants

A nonprobability sampling was used for convenience, with informed consent and anonymity. The sample of this study comprised 981 participants aged 13-69 years who reported using the technologies every day. The percentage of the sample by category is presented below (See Table 2).

Table 2
Sample

Variable type	Variable	Category	%
Demographics	Sex	Men	37.6%
		Women	62.4%
	*Generation	Babyboomers	7%
		Generation X	25.4%
		Millennial generation	52.4%
		Generation Z	15.2%
	Marital status	Single	61.7%
		Married	28.6%
		Other	9.7%
	Education	Elementary	1.7%
		High School	7.5%
		Technical High School	14.1%
		Bachelor's degree	61%
		Postgraduate	14.6%
		Other	1.1%
Work	Occupation	Worker	88.5%
		Housewife	1.7%
		Student, apprentice, intern, service	9.8%
	Position Held	Operating officer	53.7%
		Coordination	24.2%
		Middle managers	12.9%
		School authorities	3.5%
		Independent entrepreneur	5.8%
	Type of Company	Public	23.4%
		Private	76.6%
	Length of Service	Less than a year	26.6%
		From 1 to 5 years	43.2%
		From 5 to 10 years	12.9%
		More than 10 years	17.3%
Frequency of Use		Never	2.2%
		A couple times a month	1.1%
		Once a week	1.0%
		A couple times a week	5.3%
		Everyday	90.3%

***** Generation: Babyboomers (born between 1946 and 1964); Generation X (born between 1965 and 1981); Millennial Generation (born between 1982 and 1994); and Generation Z (born between 1995 and the present) (Dhanapal et al., 2015).

2.3. Techniques and instruments for data collection

2.3.1. Questionnaire of sociodemographic and labor variables

A self-made questionnaire comprised 9 items, 1 question with an open response option (age) from which the generation was calculated, as postulated by Dhanapal et al. (2015), and 8 more multiple choice questions.

Items for sociodemographic variables (5): Age (free response), sex (man,

woman), education (elementary, secondary, technical-high school, undergraduate, postgraduate), marital status (single, married, other), and occupation (worker, housewife, student, apprentice or intern, or service provider).

Items for work variables (3): position held (operative, coordination, middle management, directors, independent entrepreneur), type of company (public, private), and length of service in the position (less than 1 year, from 1 to 5 years, from 5 to 10 years, and more than 10 years).

Finally, a question was added to measure the frequency of ICT use:
How often do you use technologies? (never, a couple of times a month, once a week, a couple of times a week, and every day).

2.3.2. Scales to measure technostress and techno-addiction in a Mexican working population (Cazares & Villavicencio, 2019)

This instrument was chosen as it was the only one adapted to the Mexican working population and met the necessary psychometric criteria. That is, it had a reliability of 0.86 and was validated. It comprised 20 items with *Likert*-type response options on a frequency scale (Never = 0, Almost never = 1, Sometimes = 2, Regularly = 3, Quite often = 4, Almost always = 5, and Always = 6). Technostress was measured by two factors: dissatisfaction with ICT use and rejection of ICT. Techno-addiction was measured by two factors: excessive and compulsive use. A Cronbach's alpha of .89 for the technostress scale and of .84 for the techno-addiction scale were obtained. In this study, Cronbach's alpha was .86.

2.4. Procedure

A *Google* form was created, which comprised a brief questionnaire of 9 items whose purpose was to collect sociodemographic and work-related characteristics as well as the frequency of ICT use of the participants, in addition to the technostress and techno-addiction scales. The form was distributed through social networks. The participation of the people was voluntary and anonymous, after signing an informed consent. Subsequently, the responses were recorded and analyzed in the statistical program SPSS v.20. A psychometric analysis of the instrument was conducted to later assess the relation among sociodemographic variables (age, generation, sex, marital status, education, and occupation), work variables (position level held, length of service at work, and type of company), ICT usage frequency, and technostress.

2.5. Data analysis

The data obtained were subject to a descriptive, correlational, and

inferential level analysis (Kerlinger & Lee, 2002). The descriptive methodology was chosen to calculate frequencies, means, and standard deviations. Correlational and inferential analyses were conducted to assess the significance of the relation among sociodemographic and occupational variables, the frequency of ICT use, and the level of technostress. According to the Kolmogorov–Smirnov test, the variables did not indicate a normal distribution ($p < .05$). Accordingly, the nonparametric Mann–Whitney U test (for the comparison of two independent groups), Kruskal–Wallis H test (for the comparison of more than two independent groups), and Spearman's Rho correlation were carried out.

3. RESULTS

3.1. Psychometric analysis of the scales to measure technostress and techno-addiction in a Mexican working population (Cazares & Villavicencio, 2019)

An exploratory factor analysis using varimax rotation of the scales to measure technostress and techno-addiction among Mexican workers revealed three factors that constituted 46.04% of the variance (see Table 3). The first refers to techno-anxiety, defined as discomfort, irritability, and rejection of the present or future use of some type of ICT; the second focuses on technological addiction, characterized by an uncontrollable urge to use ICT at all times and places; and the third refers to techno-fatigue, understood as feelings of fatigue and mental tiredness due to technology use. The average variance extracted (AVE) was .436. Furthermore, Cronbach's alpha reliability coefficient for the total scale was 0.86, whereas it was higher than 0.80 for factors.

A significant correlation was observed between factors. The highest correlation was observed between the techno-anxiety and techno-fatigue factors ($r = .562$, $p < .001$), and the lowest between the techno-anxiety and techno-addiction factors ($r = .142$, $p < .001$). This suggests that people who suffer from techno-anxiety exhibit techno-fatigue but less techno-addiction. Furthermore, a moderate correlation was observed between techno-fatigue and techno-addiction ($r = .431$, $p < .001$), implying that people with techno-fatigue likely suffer from techno-addiction.

Table 3.

Scales to measure technostress and techno-addiction in a Mexican working population
Factors, factor loadings, psychometric indices, and descriptive statistics

REACTIVOS		FACTORES		
		TECNOANSIEDAD	TECNOADICCIÓN	TECNOFATIGA
2. Trabajar con tecnologías me hace sentir incómodo, irritable e impaciente.		.540		
3. Dudo del significado de trabajar con tecnologías.		.566		
6. Cada vez me siento menos implicado en el uso de las tecnologías.		.549		
10. Es difícil trabajar con tecnologías.		.702		
13. Las cosas me salen mal cuando utilizo tecnologías.		.631		
14. Cada vez más me molesta usar tecnologías en mi trabajo.		.595		
15. Me siento tenso y ansioso cuando trabajo con tecnologías.		.588		
18. Prefiero no usar las tecnologías porque entorpecen mi trabajo.		.506		
19. Me cuesta trabajo aprender a usar nuevas tecnologías.		.750		
1. Me siento mal si no tengo acceso a las tecnologías (Internet, correo electrónico, teléfono celular, etc.).			.640	
5. Siento que un impulso interno me obliga a utilizar las tecnologías en cualquier momento y lugar.			.726	
8. Me encuentro pensando en tecnologías continuamente (por ejemplo, en revisar el correo electrónico, buscar información en internet, utilizar redes sociales etc.) incluso fuera del horario de trabajo.			.716	
9. Siento una enorme necesidad de utilizar las tecnologías en momentos que no son adecuados (p. ej., al manejar).			.611	
12. Dedico más tiempo a usar las tecnologías que a estar con mis amigos y familiares.			.573	
16. Dedico más tiempo a usar las tecnologías que a practicar algún deporte o actividad al aire libre.			.559	
17. Me gusta pasar largas horas usando tecnologías.			.733	
20. Me siento incómodo cuando no puedo utilizar tecnologías.			.667	
4. Me resulta difícil relajarme después de un día de trabajo utilizando tecnologías.				-.547
7. Es difícil que me concentre después de trabajar con tecnologías.				-.722
11. Después de usar tecnologías me cuesta trabajo prestar atención a otras actividades.				-.577
	Total			
Número de reactivos	20	9	8	3
% de la varianza explicada	46.04	27.40	15.29	3.41
Alfa de Cronbach	.873	.847	.858	.804
Correlaciones inter factor				
Tecnoansiedad		1		
Tecnofatiga		.562*	1	

Tecnoadicción	.142*	.431*	1

*p<.001

Regarding the scores obtained by the sample, the mean in all the factors was below the theoretical mean. The highest mean (2.69 ± 1.41) corresponded to the techno-fatigue factor, and the lowest corresponded to techno-anxiety (0.95 ± 0.88) (see Table 4):

Table 4
Means by factor

	FACTORS		
	TECHNO-ANXIETY	**TECHNO-**	**TECHNO-**
Mean (theoretical mean = 4; range 0-6)	0.95	1.42	2.69
Standard deviation	0.88	1.38	1.41

3.2. Relation of sociodemographic variables with technostress

After contrasting the scores of the technostress factors (techno-anxiety, techno-fatigue, and techno-addiction) by gender, women obtained significantly higher scores compared with men only in the techno-fatigue factor (see Table 5).

Table 5
Relation between the sex of the participants and technostress factors

CATEGORIES	MEANS	MANN-WHITNEY U STATISTICAL TEST
TECHNO-		
Men	0.89 (0.83);	
Women	0.97 (0.90)	*U* = 108207.00, p=.272
TECHNO-FATIGUE		
Men	1.29 (1.30)	
Women	1.50 (1.43)	U = 104026.50, p=.037
TECHNO-ADDICTION		
Men	2.71 (1.39)	
Women	2.70 (1.43)	*U* = 112239.50, p=.875

The Kruskal–Wallis test indicated that the schooling variable significantly affected the techno-anxiety score [$\chi_{23)}$ = 18.504, p < .001], techno-fatigue [$\chi_{23)}$ = 38.311, p < .001], and techno-addiction [$\chi_{23)}$ = 18.348, p < .001]. The higher the level of education, the greater the techno-anxiety, techno-fatigue, and techno-addiction. When making pairwise comparisons of groups using the Mann–Whitney U test, in terms of techno-anxiety, the high school group significantly differed from the undergraduate group (U = 16969.00, p = .001) and the postgraduate group (U = 3584.00, p < .001), and the technical/high school group also differed from the postgraduate one (U = 8042.00, p = .007). Regarding techno-fatigue, the secondary group significantly differed from the technical/high school group (U = 4266, p = .043), the undergraduate group (U = 13770.00, p < .001), and the postgraduate group (U = 3225.50, p < .001). The technical/high school group significantly differed from undergraduate (U = 33412, p < .001) and postgraduate groups (U = 7908.00, p = .004). For techno-addiction, the high school group significantly differed from the undergraduate group (U = 16274.50, p < .001) and the postgraduate group (U = 3879.50, p = .001), as well as the technical/high school group with respect to the undergraduate (U = 35833.50, p = .016) and postgraduate (U = 8528.50, p = .049). The undergraduate and postgraduate groups did not show significant differences for any of the variables (see Figures 1, 2, and 3).

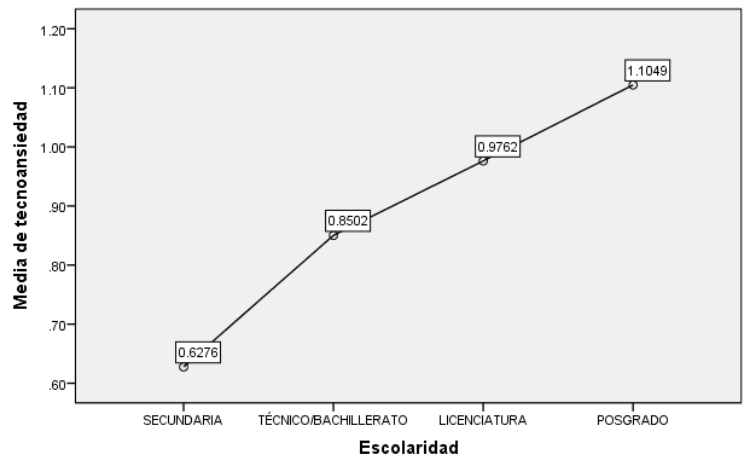

Figure 1. Relation between level of education and techno-anxiety

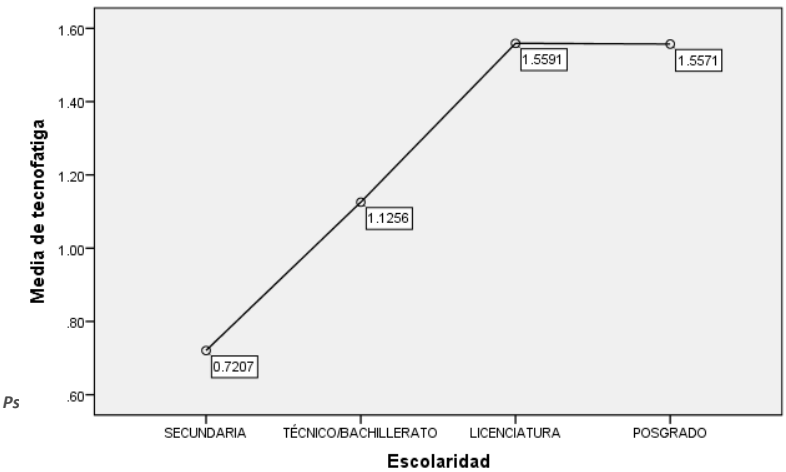

Figure 2. Relation between level of education and techno-fatigue

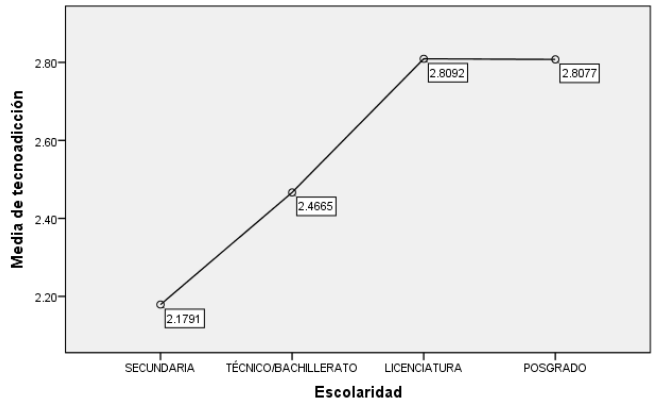

Figure 3. Relation between level of education and techno-addiction

Based on the scores of the technostress factors (techno-anxiety, techno-fatigue, and techno-addiction) compared by marital status, significant differences were observed in the techno-addiction factor. Single individuals obtained significantly higher scores than married people. A marginal significance was observed in techno-fatigue, with single participants presenting higher scores in this factor (see Table 6).

Table 6

Relation between marital status and technostress factors

CATEGORIES	MEANS	MANN-WHITNEY U STATISTICAL TEST
TECHNO-		
Single	0.99 (0.89)	
Married	0.93 (0.86)	*U* = 82348.50, p=.453
TECHNO-FATIGUE		
Single	**1.53** (1.42)	
Married	1.31 (1.29)	*U* = 78329.00, p=.058
TECHNO-ADDICTION		
Single	**2.81** (1.39)	
Married	2.55 (1.48)	*U* = 76121.50, **p=.012**

When comparing the scores of the three technostress factors by occupation (worker, housewife, student, apprentice, intern, and service provider), when applying the Kruskal–Wallis test, significant differences were observed only for techno-addiction [$\chi_{2(2)} = 4.698$, p = .008], with housewives obtaining higher scores (U = 1.80, Sx = 1.33) than workers (U = 1.38, Sx = 1.36) and students (U = 1.70, Sx = 1.57). When making pairwise comparisons with the Mann-Whitney U test, the worker group significantly differed from the student group (U = 34969.00, p = .010).

No significant differences were observed by generation (Baby boomers, Generation X, Millennials, and Generation Z) with respect to technostress. Likewise, the Spearman's Rho correlation indices between age and the scores of the technostress factors were close to 0 and, therefore, not significant (with techno-anxiety, Rho = .013; with techno-fatigue, Rho= -.026, and with techno-addiction, Rho = -.054).

3.3. Relation between work variables and technostress

According to the Kruskal–Wallis test, the variable level of the position held significantly affected the techno-anxiety [$\chi_{2(4)}$ = 18.105, p = .001], techno-fatigue [$\chi_{2(4)}$ = 64.555, p < .001], and techno-addiction scores [$\chi_{23)}$ = 43.5222, p < .001]. Managers and independent entrepreneurs presented greater techno-anxiety, techno-fatigue, and techno-addiction levels. When making pairwise comparisons of groups using the Mann–Whitney test, the operational position level group, which had the lowest scores on all three factors, significantly differed from the rest. With regard to techno-anxiety, this group differed from the coordination group (U = 40499.50, p = <.001), the middle managers (U = 22558.00, p = .025), and the managers (U = 5430.50, p = .040). Regarding techno-fatigue, the group at the operational position level significantly differed from that of coordination (U = 33948.50, p < .001), middle managers (U = 20472.50, p < .001), managers (U = 4567.50, p = .001), and independent entrepreneurs (U = 6671.50, p < .001).

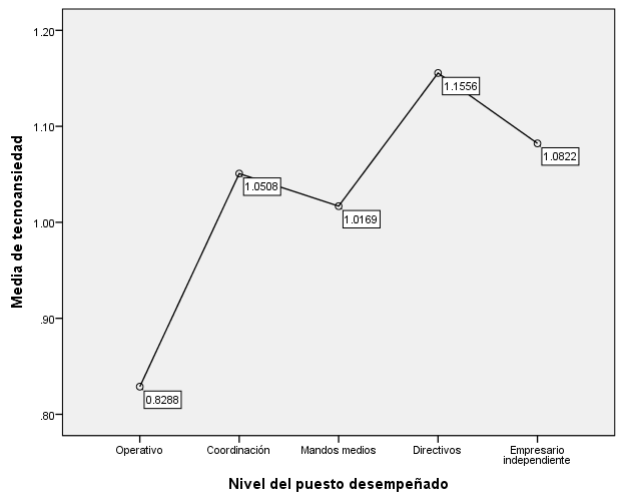

Figure 4 Relation between occupation and techno-anxiety

With regard to techno-addiction, the group at the operational position level significantly differed from that of coordination (U = 38136.50, p < .001), middle managers (U = 19418.50, p < .001), managers (U = 4196.00, p < .001), and independent entrepreneurs (U = 8491.50, p = .002). Nonoperative positions did not significantly differ from

each other (see figures 4, 5, and 6).

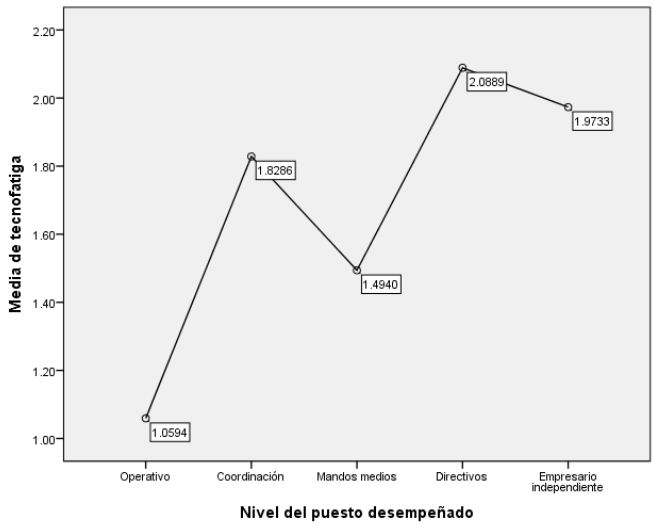

Figure 5. Relation between occupation and techno-fatigue

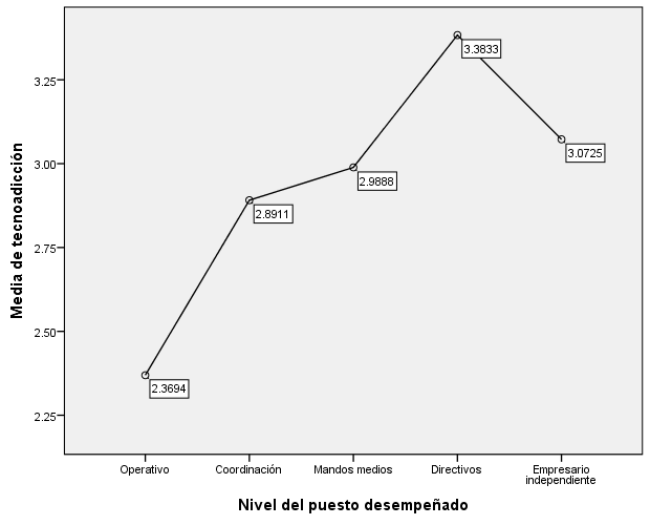

Figure 6 Relation between occupation and techno-addiction

When comparing the scores of technostress factors (techno-anxiety, techno-fatigue, and techno-addiction) by length of service (less than 1 year, from 1 to 5, from 6 to 10, more than 10 years), significant differences were observed only for techno-fatigue, with workers working less than a year obtaining the highest scores. When making comparisons by pairs of groups, in terms of techno-fatigue, the group of workers with less than 1 year of work significantly differed from the group with 6 to 10 years working ($p = .003$). The group who had been working from 1 to 5 years significantly differed from the group with 6 to 10 years of length of service in their job ($p = .006$) (see Table 7).

Table 7.
Relation between length of service at work and techno-fatigue

CATEGORIE	MEANS	KRUSKAL-WALLIS STATISTICAL TEST	MANN-WHITNEY TESTS
	TECHNO-		
Less than a year	1.49 (1.37)	$\chi^2(3) = 11.213$, p = .011	<1 – 1 to 5: n.s. <1 – 6 to 10: U = 10392.00, p = .003 <1 – >10: n.s. 1 to 5 – 6 a 10: U = 17431.50, p = .006 1 to 5 – >10: n.s. 6 and 10 – >10: n.s.
Between 1 and 5	1.46 (1.38)		
Between 6 and 10	1.07 (1.24)		
More than 10	1.28 (1.38)		

ns = not significant.

Regarding the scores obtained for technostress factors (techno-anxiety, techno-fatigue, and techno-addiction) compared by type of company, significant differences were observed for techno-anxiety, with those belonging to the public sector obtaining the highest scores, in contrast with those from the private sector (see Table 8).

Table 8.
Relation between the type of company and technostress factors

CATEGORIE	MEANS	STATISTICAL TEST
	TECHNO-	
Public sector	1.05 (0.97)	U = 61348.00, **p= .049**
Private sector	0.89 (0.84)	
	TECHNO-FATIGUE	
Public sector	1.47 (1.41)	U = 64757.00, p= .376
Private sector	1.36 (1.35)	
	TECHNO-ADDICTION	
Public sector	2.63 (1.33)	U = 67004.00, p= .875
Private sector	2.65 (1.41)	

3.4 Relationship between the frequency of ICT use and technostress

The frequency of ICT use did not significantly affect the techno-anxiety, techno-fatigue, or techno-addiction scores (see Table 9).

Table 9.

Relation between the frequency of ICT use and technostress factors

CATEGORIE	MEANS	KRUSKAL-WALLIS STATISTICAL TEST
TECHNO-		
Never	0.62 (0.53)	
A couple of times a month	1.52 (1.44)	$\chi^2(3) = 1.595$, $p = .660$
Once a week	0.96 (0.80)	
A couple of times a week	0.93 (0.96)	
Every day	0.94 (0.87)	
TECHNO-FATIGUE		
Never	1.15 (0.85)	
A couple of times a month	1.72 (1.74)	$\chi^2(3) = 0.607$, $p = .895$
Once a week	1.33 (0.99)	
A couple of times a week	1.35 (1.38)	
Every day	1.43 (1.40)	
TECHNO-ADDICTION		
Never	[2.59 – 1.26]	
A couple of times a month	2.65 (1.21)	$\chi^2(3) = 0.074$, $p = .995$
Once a week	2.77 (1.21)	
A couple of times a week	2.66 (1.36)	
Every day	2.71 (1.43)	

4. DISCUSSION

Today, we deal with technology anywhere and anytime. The question posed is as follows: how have people reacted to this phenomenon that began only a few years ago? Scientific research in other countries has led to the identification of three different experiences during interaction with technology: anxiety, fatigue, and addiction to ICT, making up what is known as technostress.

According to literature, technostress has an impact personally (physiological-psychosocial), professionally (students), and at work (workers). Therefore, it is a relevant topic to examine.

This research particularly focused on the relation among sociodemographic and work variables, the frequency of ICT use, and technostress. Our results allow us to approach this phenomenon through its three expressions (techno-anxiety, techno-fatigue, and techno-addiction), recognizing that each of them has own characteristics and that a person may experience more than one at the same time.

In the first place, the data resulting from this analysis coincide with those studies affirming that women exhibit higher levels of fatigue when using ICT (Salanova et al., 2007; Baloglu & Cevik, 2008; Carlotto et al., 2017; Picón et al., 2017). Tentatively, they exhibit more negative attitudes and a sense of low capacity to use them. Despite the fact that it has been reported that men are more compulsive with the use of technologies (Lee et al., 2014), the results on this occasion did not indicate significant differences in terms of to techno-addiction between men and women.

The scores indicated no significant differences in terms of age, a result consistent with the results of Khasawneh (2018), who affirmed that young adults and adults have accepted the daily and frequent use of technology. Regarding the generation variable, Coppari et al. (2017) argued that millennials and centennials have a closer connection with technology, use it more extensively, and are better prepared to deal with the changes that it represents than Generation X. However, no significant differences existed between baby boomers, generations X, Y, and Z. Accordingly, studying the comparison between these four generations could be more beneficial if the baby boomers were included, since this generation did not have much contact with technology in the past.

A study conducted in Brazil revealed that married workers, compared with single ones, suffer more fatigue from the use of technology (Carlotto et al., 2017). This information contradicts what was found in this research, since single individuals

indicated a marginal difference in terms of techno-fatigue. In addition, single people exhibited higher levels of techno-addiction than married ones; this could be due to the greater use of social networks.

The higher the level of education, the higher the techno-anxiety, techno-fatigue, and techno-addiction. Such information is contradictory to what was reported by Ragu-Nathan et al. (2008). The author stated that technostress decreases as the educational level increases. This result can be derived from the fact that a higher level of education implies an increase in tasks and their complexity, which require the use of technology to be carried out.

Furthermore, significant differences were obtained in techno-addiction according to occupation. Housewives obtained higher scores than workers and students, and a significant difference was observed between these last two groups. These results are consistent with the research from Sonya (2003), who concluded that those in charge of the housework have higher levels of technostress compared with students.

In this research, managers and independent entrepreneurs were more susceptible to techno-anxiety, techno-fatigue, and techno-addiction than operatives, coordinators, and middle managers. This data could be the result of the fact that at higher position levels, there is greater interaction with technology. Moreover, the procedures that must be carried out with it are more complex.

Ragu-Nathan et al. (2008) identified that length of service can serve as a protective factor for the worker in stressful situations. A feature that echoes the results of the study is that significant differences were observed between workers with less than 1 year of service and those with more than 1 year in terms of techno-fatigue.

Furthermore, no study reported the relation between the type of company (public or private) and technostress in workers. Therefore, this study focused on carrying out this analysis, from which significant differences were observed only for techno-anxiety, with the group belonging to the public sector obtaining the highest scores.

Finally, a data analysis was performed to identify the relation between the frequency of ICT use and technostress. No significant differences were obtained. This result is added to studies that affirmed that the more the use of technology, the more experience in handling it and less anxiety (Çoklar & Sahin, 2011; Picón et al., 2017). Furthermore, this is in line with studies affirming that when ICT is used for a large part of the workday (more than 75% of the time), technostress appears (Brooks, 2015; Carlotto et al., 2017).

Importantly, certain sociodemographic and employment characteristics, along with how often ICTs are used, affect levels of techno-stress. By doing so, people can identify which groups they belong to and learn how others relate to them. Information related to technology can help them mitigate technostress by reducing anxiety, fatigue, or the addiction caused by technology use. Likewise, it is sought that organizations (educational, labor, etc.) have enough information when making decisions, such as incorporating new technologies into people's daily activities.

The psychometric analysis of the instrument yielded a Cronbach's alpha of 0.86 for the total scale. For factors, it was higher than 0.80, implying that two scales will serve as tools for the study of the phenomenon of technostress and techno-addiction in Mexico.

Notably, there is still not enough theoretical evidence regarding technostress, since the results are still not consistent between them. Particularly in Mexico, there are no research studies on the subject. To gain a better understanding of technology users' experiences and of those suffering from technology stress, it is highly advisable to conduct quantitative and qualitative studies.

This research is of great theoretical importance as it has found results that represent the first contributions on the study of technostress in the Mexican culture, which seek to understand this phenomenon and address the variables related to the different experiences of it.

Limitations of the study include the fact that the study was intended to obtain a diverse sample, which meant that the groups to be compared did not have the same number of people, depending on the variable. A challenge for the near future will be to evaluate the role played by these and other variables in technostress levels, with new inclusion criteria that ensure that the same number of people are included in each group to be compared. Likewise, since the means through which the instrument was applied was the *Google* form, future research could implement a different one.

Finally, we encourage others to create and propose intervention programs that would allow to reduce the maladaptive use that leads to stress caused by technologies.

Conflicts of interest: There are noconflicts of interest in the research that could compromise the results obtained. There was no source of funding to carry it out, and there was no connection whatsoever between the researchers and the participants.

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