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ORIGINAL RESEARCH

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Analysis of university professors in economic sciences: PMH scale and technostress as main antecedents of academic self-perception

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Abstract

In order to establish the relationship between the academic self-perception of university professors according to their gender, which takes into account the internal and external factors, such as technostress, the PMH scale (unidimensional Positive Mental Health Scale) and the factors that are related to an organization, which is understood to be a university, are the climate and the commitment of the professor, which are the constructs that were used in our research. The research was conducted by using a sample of 161 active university professors of economics from both sexes. The analysis of the results that were obtained were conducted via a mixed analysis using symmetric methodology (partial least squares structural equation modeling "PLS-SEM"). In addition, a multigroup analysis (Partial Least Squares Multi-Group Analysis "PLS-MGA") was performed according to the sex as well as asymmetric (Fuzzy-set Qualitative Comparative Analysis "fs/QCA"), which is where the different combinations of the antecedents that lead to the common result are established. Technostress is unequally related to the model variables. It is significant with respect to Academic Self-perception (AS), Organizational Climate (OC), and PMH-Scale (PMH), which even results in a positive relationship with OC and PMH This indicates that in academia certain levels of technostress can generate positive results. This fact is also demonstrated by the presence of the variable in the solutions that were generated using the asymmetric method. The demands of the new technological adoptions among university professors are generating the modification of perceptions and therefore behavior. Therefore, it is necessary to control the level of technostress assumed by men from the teaching centers as well as regulating the technological contributions and their introduction in the classrooms. The study proposes a novel approach due to the implementation of a mixed methodology of analyses. Most previous analyses have focused on case studies or students. The conclusions are relevant for the necessary technological implementation in university classrooms.

Keywords

High education; Men; Technostress; PMH scale; Organizational climate; fs/QCA

1. Introduction

The world of education is facing an historic moment, which is where educational practices are being transformed mainly due to an increase in technology as well as its massive use at all levels of society [1]. In addition, there have been different events in recent years that have changed the traditional form of university education, such as the coronavirus pandemic (COVID-19) [2], which is a change from the traditional reality to the digital reality, which is where university professors have had to adapt in a disruptive way to the new digital tools that they had not used thus far [3]. This substantially affected the mental health of the students [4] as well as the teachers themselves [5].

The new social reality provoked that in a very short time, institutions hitherto considered to be teaching by means of a traditional methodology [6] were forced to take on an important and obligatory technological leap. This affected mainly older teachers who were less adapted to new technologies [7], but also other teaching professionals. The situation generated a significant level of technostress, considered as the inability to adapt to or deal with new computer technologies in a healthy way. Therefore, technostress is an epicentric construct in the research.

In this regard, authors such as [8] find a gap in the literature where they state that research on the topic of technostress in higher education has been very limited, affirming the need for future studies to validate the results obtained in more higher

education institutions from different contexts and cultures to achieve a deeper understanding of the topic of technostress. They further state that no gender difference is observed among university professors when it comes to experiencing technostress, however they need to verify these data in other contexts. In the same way, these authors (Wang & Li, [9] 2019) in previous research, suggests future research to validate the influence of technostress in Western universities to gain a more complete understanding of technostress in higher education.

On the other hand and linked to the above, the attitude of the individual is fundamental to the mental health of teachers [10], which is even more so when we refer to university professors who must transmit knowledge in a clear and concise manner. Therefore, taking into account the internal factors of the individual becomes notorious in the research that is related to teaching [11]. This is demonstrated by the research that is based on PMH scale, which is the unidimensional positive mental health scale, at the university student level [12, 13]. However, with an absence in the literature with respect to the teachers [14], the PMH-scale is a construct that needs to be taken into account during the COVID-19 pandemic and be studied with respect to the differences between men and women, since the literature [15] states that this construct has no significant differences between men and women, but it needs to be verified in other environments.

Several researches are found in reference to the above topics, such of the research by Basantes-Andrade *et al*. [16], (2020) which is where the objective was to establish the relationship between the level of digital competencies of university professors in relation to their gender. The purpose of the research is to analyze the presence of technostress among university professors from a dual perspective, encompassing personal and organizational elements. Therefore, our main objective in this research, which is in line with this previous research, will be to extend it by establishing the relationship between the academic self-perception of university teachers in relation to their gender, which takes into account the internal and external factors, such as technostress, the PMH scale, and the factors that are related to an organization, which is understood to be a university. The factors are the climate and commitment of the teacher constructs, which are used in our research [17]. In the same line of research [18], where he states that these constructs still need to be investigated by extending them to other traits or variables, including organizational variables.

This paper fills an important gap in the literature by focusing on technostress from a higher education perspective, establishing a model interrelated with institutional and personal variables, and how they ultimately affect the academic perception of university professors. The results show the importance of tackling the situation from an integral perspective, determining the special need to know the university organisational climate as the most determining variable. The analysis shows significant differences between men and women in some of the constructs addressed.

2. Theoretical framework

2.1 PMH-scale

Mental health has traditionally been defined as the absence of psychopathology [19]. The PMH scale, which is the unidimensional Positive Mental Health Scale, was structured in order to measure the internal factors, which include the emotional and psychological, of positive mental health as well as take into account the external factors, such as social support, associations, and other organizational-related factors [20].

It has been increasingly recognized in recent years that the absence of mental disorders is not the same as the presence of positive mental health [21]. Mental health is a global problem, which an estimated 10% of the world's population currently lives with a mental disorder, so it is estimated that almost 50% of the population will experience a mental disorder in their lifetime [22]. Pandemics, such as the current COVID-19 pandemic and other large-scale emergencies have the potential to adversely affect mental health [23] as well as with the way the individual relates to an organization [24]. Employees are undergoing numerous changes in their working conditions [25] that affect the climate of these organizations [26], which reduce the individual's commitment to the organization [27]. Therefore, the following hypotheses are formulated below by taking into account the factors above and by perusing studies that collect the PMH-scale within the academic environment [12, 28].

H1: PMH-scale significantly affects organizational climate.

H2: PMH-scale significantly affects organizational commitment.

Some studies relate PMH-scale in the teaching environment, which is mentioned above, and one of the main objectives that needs to be pointed out is the importance of the mental health of teachers and students [28, 29] in regards to working in an educational environment in accordance with unusual circumstances, such as the COVID-19 pandemic. Some elements to take into account in this sense, which constitute the educational environment, are the tangible substructures, such as classrooms, seminars, and colleagues that promote and may hinder the teacher's learning at the same time [30]. However, these factors are external to the individual, so the mental health of the individual must first be taken into account and then proceed to the external analysis. The positive mental health scale (PMH-scale) is a construct that involves an internal analysis, since it focuses on the hedonic and eudaimonic approaches of the well-being of an individual [31]. This scale has been studied in educational settings along with academic self-perception [28], even though its main subject of study was not the teacher. Therefore, the following hypothesis is proposed, which is in regards to the absence of literature.

H3: PMH-scale significantly affects academic self-perception.

Digital technologies can provide support in regards to meeting people's mental health needs during pandemic times, but recurring evidence shows that people are more likely to be excluded from critical services, activities, and resources in order to support their health concerns and challenges [32]. A UK digital index survey revealed that 78% of people suggested the pandemic increased the need for digital skills [33]. However, some mental health problems may be associated

with conditions or behaviors that involve the excessive or problematic use of the Internet and technology [34], which is what some researchers refer to as technostress [35].

H4: Technostress significantly affects PMH-scale.

2.2 Technostress

The concept of technostress was developed by Craig Brod in 1984 [36], and technostress is broadly understood as the "inability to adapt to or cope with new computer technologies in a healthy way." [36]. Novel intelligent systems require employees to provide efficient services and timely communication with customers in this regard and with the evolution of technology, so the intelligent nature of an organization largely depends on the work involvement of the employees [37].

This work involvement may be imposed due to supervening events, such as COVID-19, which technostress has been studied with university professors in this sense, and it has been determined that high levels of technostress were significantly influenced by age, the female gender, and above all by a poor work environment [38]. the latter translates into a negative organizational climate [39].

H5: Technostress significantly affects organizational commitment.

H6: Technostress significantly affects organizational climate.

COVID-19 caused schools to implement distance learning strategies with little or no prior experience, which is related to the factors above. The result was a substantial change in the way the classes are perceived and with the way they are perceived [40], which pushed the global education system into the mode of unstructured emergency distance education [41].

The student had to adapt to the new technology in order to be able to attend classes, which included the corresponding stress that was involved in order to adapt to the new technology in this sense as well as to the new technologies [42], and the teacher had to adapt as well who was the promoter and moderator of all the sessions without having previous experience in most cases with the use of different software. Therefore, the negative effects of COVID-19 for teachers is demonstrated in the literature that include work overloads, difficulties with changes in routines, and technological adaptations, which the main concerns lead to a lower quality of the teaching-learning process and affect the physical and mental health of the teachers [43],which are the constructs that are closely related to the teachers' own academic self-perception.

H7: Technostress negatively affects academic self-perception.

2.3 Academic Self-perception

Self-perception is the set of assessments that a person has about himself/herself in a field of action and at a given time [44]. Self-perception in the academic field is defined as the set of evaluations that a professor establishes about his or her teaching ability. Organizations play an important role, since it is studied how the different academic institutions can affect the individual's self-perception throughout the literature [45].

The universities are no longer considered isolated from society and operate only in some specific areas, which is based on the criteria above, but they are global educational institutions that are interconnected that allow the exchange of knowledge, cultural experiences, and social experiences [46], Therefore, it can have a significant effect on the organizational climate within universities depending on the different social situations that occur over time, which affect the teaching staff and their self-perception [47, 48].

On the other hand, organizational commitment within universities has demonstrated to have a strong influence on burnout and its components, which include effectiveness, cynicism, and turnover intention [49], which the latter being the essential component in academic self-perception.

H8: Organizational climate significantly affects academic self-perception.

H9: Organizational commitment significantly affects academic self-perception.

3. Methodology

The research sample is composed of active Spanish university professors in economic sciences, given that the literature states that the technostres as the epicenter of our research, is derived from the use of ICTs [50], where teachers of economics is one of the branches that most use these media [51]. This research includes both sexes, with a homogeneous age distribution in order to make the results more representative (Table 1). Non-probabilistic sampling was used for convenience. This type of sampling implies that all the elements of the population do not have the same probability of being selected, and the reason why is left to the researcher's judgment. It is widely used in the social and business sciences, since the heterogeneity in terms of the possible characteristics of the respondents makes it necessary to establish the research guidelines [52]. The convenience of the non-probabilistic method in our case is based on the need to balance the participation between men and women, so the results can have a more adequate generalization. The questionnaires were distributed online via a special platform, which were self-administered this questionnaire is based on scales validated in the literature, which can be seen in **Supplementary material**. The research was conducted during the month of June 2022. A total of 165 observations were obtained, and 4 were discarded as being incomplete or null.

TABLE 1. Sample distribution.

Gender	
Men	54.66%
Women	45.34%
Age	
30–40	21.12%
41–50	38.51%
51–60	31.06%
More than 60	9.32%

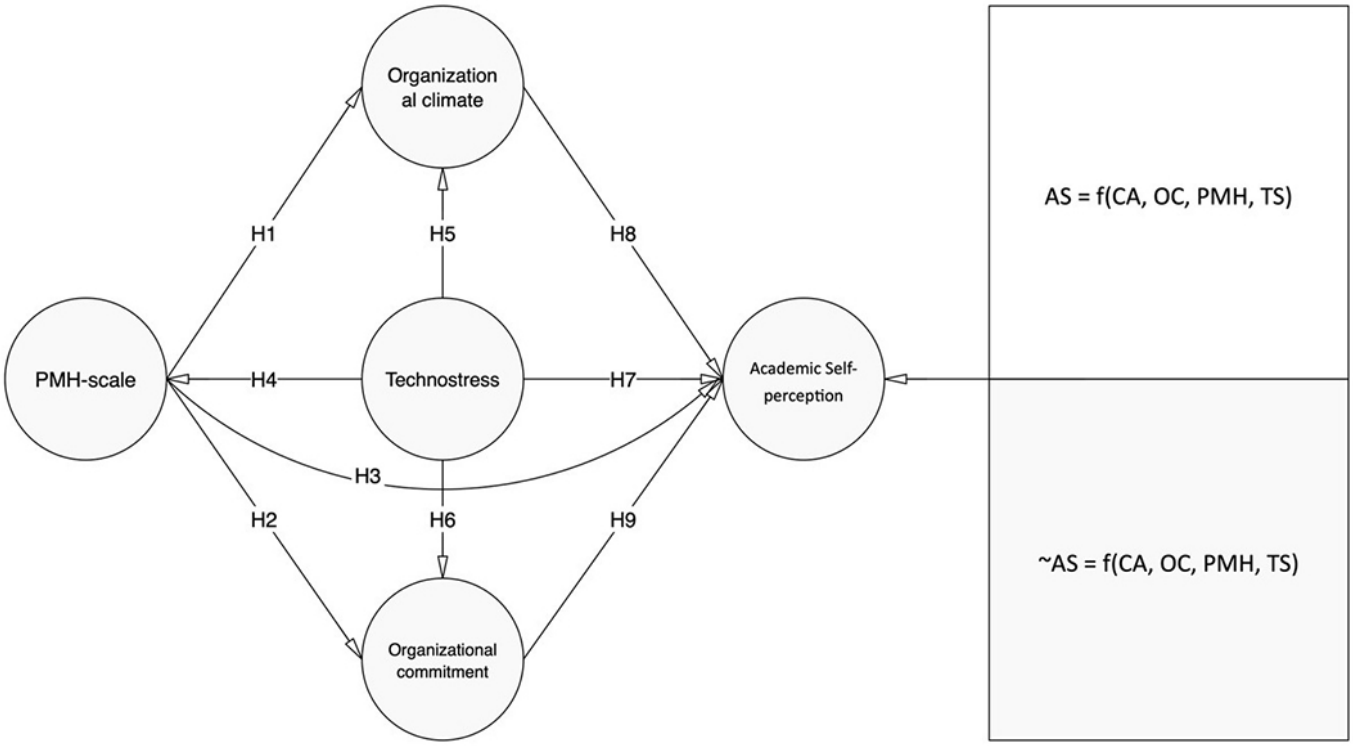

FIGURE 1. Proposed model. AS: Academic Self-perception; CA: Organizational commitment; OC: Organizational Climate; PMH: Positive Mental Health; TS: Technostress.

Smart-PLS 3 software is used analyzing the proposed model (Fig. 1) for data processing [53], and the reliability and validity of the measurement scales and the structural model were evaluated beforehand [54, 55]. In addition, a multi-group analysis is carried out (MGA-PLS) in order to determine whether there are significant differences between men and women with respect to the relationships that are proposed in the model.

Our research considers the intrinsic complexity of human behavior [56] in addition to positing the symmetrical and discrete relationships between the variables via the PLS-SEM analysis. The amount of uncertainty also caused by COVID-19 makes the process dynamic, which is characterized by interdependent, non-proportional, and non-continuous decision-driven choices [57]. This research argues that these factors operate in conjunction with the concept of causal complexity [57].

The Qualitative Comparative Analysis (QCA) provides a tool that aims to support and/or complement the information that is obtained at the aggregate level by adopting symmetrical methods [58], which is due to this causal complexity, since the QCA does not start from the basis of the usual techniques. It considers the causal conditions to be independent variables with linear and additive effects on the outcome. Adding this methodology to the analysis of human behavior is necessary, since the explanation of the complexity of people's behavior is limited when exclusively symmetrical methodologies are used [56].

Therefore, a Qualitative Comparative Analysis (fs/QCA) of fuzzy sets is developed in order to evaluate the proposed approaches in this study. The fs/QCA method has attracted the attention of researchers in various fields of research, and its use has been consistently growing since 2007 [59]. The advantage offered by the method is to be able to find all the possible relationships leading to the established result from the causal point of view [60].

The fs/QCA analysis system will determine which sets of antecedents establish the expected end result , which is the outcome-financial performance, by applying logical inference. Therefore, the study begins by considering all the factors that go into the model to see what possible combinations can lead to Academic Self Perception (AS) for this methodology. Therefore, two models are considered, which are provided below.

Model I: AS = f(CA, OC, PMH, TS)

Model II: ~AS = f(CA, OC, PMH, TS)

4. Results

4.1 PLS-SEM method

The reliability and validity of the measurement model for the analysis of the PLS model is analysed, which we followed the recommendations in the literature [61, 62]. First, the individual reliability of an item is ensured in the case of the reflective variables. The factor loadings on their own latent variables are examined for this purpose. These loadings must be higher than the 0.7 value that is proposed in the literature. All the loadings of our reflective constructs are above this amount.

Second, the reliability of the constructs is analyzed using Cronbach's alpha and the Composite Reliability (CR) indicators. The CR indicators are used due to the limitations of Cronbach's Alpha, which takes into account the different values of the external loadings of the indicator variables [63].

Our indicators for all cases are higher than 0.8. In addition, convergent validity was ensured by analyzing the Average Variance Extracted (AVE). All the indicators similarly offer levels above the minimum set level of 0.5 in our case, which indicates high levels of convergent validity for the constructs (Table 2).

Subsequently, the discriminant validity is ensured according to Fornell & Larcker [61] (Table 3). The square root of the AVE of each latent variable is compared with the correlations of that variable with the rest of the variables. The logic of this method is based on the idea that a construct shares more variance with its indicators than it does with the other constructs [63].

The Heterotrait-Monotrait (HTMT) ratio of correlations is an estimate of the real correlation between two constructs (Table 4), which indicates if they are perfectly reliable [63, 64]. Also, for all cases that offer levels below 0.9, which are even sometimes below the 0.85 level, are set by some authors as being more recommendable and conservative [64].

The model was subjected to the Standardized Root Mean Square Residual (SRMR) assessment in regards to the assessment of the structural model. Values lower than 0.08 are considered as a good fit. In The SRMR presented a value of 0.078 in our case, which is considered a good fit [65]. Finally, the p-value was analyzed to determine the significance between the constructs (Table 5).

A multi-group analysis (MGA) is developed to differentiate the behaviour between men and women with respect to the central variable of the model, which is technostress. Following the recommendations of Hair *et al*., [65] to detect meaningful differences given the variety of human behaviour, three different approaches are applied, which included the Welch-Satterthwait test, the PLS-MGA test, and the parametric test, in order to obtain extra confidence in the results that were obtained. The results can be seen in Table 6, which show the relationships with significant differences with respect to the different groups of men and women that were analyzed.

4.2 fs/QCA method

Our research takes into account the complexity that exists in reality, which is where the interactions between the people's behavior do not respond in a symmetrical and linear way in regards to what is offered in the results, even though these are very close to the models of real behavior. The statistical information focuses on the identification of the net effect of each independent variable on the dependent variable [66], whereas the development of asymmetric methods, such as fs/QCA can bring to light the combinations between the different variables, which are not contemplated in a discrete way in the quantitative models [67]. Therefore, our research develops a PLS-SEM and fs/QCA multi-method in order to improve the competitive position of the companies by offering them different possible solutions.

The method focuses on explanations based on the different case studies [68] in order to highlight the combined effects as different pathways that can lead to the same end result, which is Academic Self-perception (AS) as opposed to exclusively focusing on the net effects of each of the factors. Multiple pathways are likely to exist, and the recognition of this equifinality is very important [69] in order to understand the true causes and the complexity of a phenomenon.

The data must be converted from the original 7-point Likert's scale into a data set that is suitable for calibration in order to run the fs/QCA. The conversion process included 1) calculating the mean of each construct, which is based on the responses of the people who were analyzed and the corresponding factor loadings, and 2) calibrating the resulting data that was based on the percentile of the mean score for each construct (Ragin *et al*. [70], 2008). The level of membership will be determined both by the cut-off limits and by the chosen function. Both choices will be the determinants of the calibration result. The choice of our cut-off points is based on the 90th, 50th, and 10th percentiles after a careful analysis of the data [71], which is in line with Kraus, Ribeiro-Soriano, and Schüssler [72] (2018). Table 7 shows the descriptive statistics of the results.

The following are the necessary conditions, which are shown in Table 8, in regards to the presence and the denial of AS. According to Schneider [73] (2018), the necessary conditions that the QCA analysis establishes must be analyzed via the view of the empirical consistency, empirical relevance, and conceptual significance. Our analysis of truth tables will contemplate only the presence of the condition.

The creation of the truth table is the next step. During its construction, During its construction, it is established which combinations of antecedents, according to the analysis of the necessary conditions, can determine the possible solutions. The choice is made by choosing two parameters [74], which include the consistency and frequency thresholds.

This research follows the indications of Ragin [68] (2006) and Schneider & Wagemann [74] (2010) for the choice of cut-off points for consistency. However, the recommendations in the study by Greckhamer *et al*. [75] (2013) are used to select the frequency cut-off thresholds. The number of combinations is logically minimised in the last step of the fs/QCA procedure, which each of them leads to a result independently of the others [76].

The fs/QCA method offers four solutions, which include three for the presence and one for the negation of AS. All the general solutions offer consistencies of 0.8 or higher, which is the case for presence, with all the independent solutions having a consistency above 0.95 and a general solution of 0.9699 (Table 9).

5. Discussion

The results that were obtained generally allowed us to achieve the research objectives. This research represents an advance in the study of university lecturers' technostress. A multidimensional analysis of the phenomenon was carried out, constituting one of the first analyses that contemplates Technostress through a double perspective in the same model, these being a personal vision (through PMH and AS) and an institutional one (through OC and CA), analysing the relationships between the different constructs and their incidence on self-perception, highlighting the originality with respect to establishing possible differences by gender. Moreover, the originality lies in the fact that it is the first study on technostress in university

TABLE 2. Cronbach's Alpha and Composite Reliability.

	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted (AVE)
Academic self-perception	0.811	0.822	0.876	0.641
Organizacional commitment	0.838	0.856	0.837	0.562
Organizational climate	0.927	0.946	0.934	0.692
PMH-scale	0.920	0.941	0.935	0.624
Technostress	0.920	0.944	0.935	0.599

PMH: Positive Mental Health.

TABLE 3. Discriminant validity.

	Academic self-perception	Organizacional commitment	Organizational climate	PMH-scale	Technostress
Academic self-perception	0.801				
Organizacional commitment	0.513	0.580			
Organizational climate	0.503	0.465	0.541		
PMH-scale	0.705	0.368	0.446	0.790	
Technostress	0.284	0.170	0.737	0.480	0.774

PMH: Positive Mental Health.

TABLE 4. Heterotrait-monotrait ratio.

	Academic self-perception	Organizacional commitment	Organizational climate	PMH-scale
Organizacional commitment	0.515			
Organizational climate	0.572	0.721		
PMH-scale	0.792	0.394	0.469	
Technostress	0.333	0.412	0.730	0.482

PMH: Positive Mental Health.

TABLE 5. probability value.

	Original sample (O)	Statistics t (|O/STDEV|)	*p* values	
Organizacional commitment → Academic self-perception	0.151	0.792	0.429	NS
Organizational climate → Academic self-perception	0.401	2.133	0.033	S
PMH-scale → Academic self-perception	0.634	5.168	0.000	S
PMH-scale → Organizacional commitment	0.372	1.196	0.232	NS
PMH-scale → Organizational climate	0.120	0.850	0.395	NS
Technostress → Academic self-perception	−0.341	1.968	0.050	S
Technostress → Organizacional commitment	−0.008	0.024	0.981	NS
Technostress → Organizational climate	0.679	5.001	0.000	S
Technostress → PMH-scale	0.480	3.638	0.000	S

PMH: Positive Mental Health. STDEV: Standard Deviation.

TABLE 6. Multigroup analysis.

	p-value		t-value				
	Male	Female	Male	Female	Test de Welch-Satterthwait	PLS-MGA	Parametric test
CA → AS	0.386	0.288	0.867	1.064	0.972	0.947	0.972
OC → AS	0.253	0.000	1.145	7.872	0.000	0.001	0.000
PMH → AS	0.000	0.000	13.739	5.490	0.000	0.000	0.000
PMH → CA	0.998	0.000	0.002	7.320	0.090	0.066	0.085
PMH → OC	0.636	0.000	0.473	4.416	0.004	0.003	0.004
TS→ AS	0.056	0.000	1.917	4.429	0.000	0.002	0.000
TS → CA	0.011	0.087	2.563	1.712	0.003	0.026	0.002
TS → OC	0.000	0.000	36.219	4.476	0.000	0.000	0.000
TS → PMH	0.002	0.000	3.155	7.688	0.090	0.088	0.086

AS: Academic Self-perception; OC: Organizational Climate; PMH: Positive Mental Health; CA: Organizational commitment; TS: Technostress.

TABLE 7. Descriptive statistics.

		Mean	Std. Dev.
CA	Organizational commitment	0.6908696	0.2191964
OC	Organizational climate	0.6484783	0.2155172
PMH	Positive Mental Health Scale	0.8641304	0.1653005
TS	Technostress	0.4880435	0.3216643
AS	Academic Self-perception	0.8845652	0.1058446

CA: Organizational commitment; OC: Organizational Climate; PMH: Positive Mental Health; TS: Technostress; AS: Academic Self-perception.

TABLE 8. Necessary conditions.

Final Variable: AS			Final Variable: ∼AS		
Academic Self-perception (AS)			Academic Self-perception (∼AS)		
Tested conditions	Consistency	Coverage	Tested conditions	Consistency	Coverage
CA	0.764561	0.978918	CA	0.939736	0.157017
∼CA	0.341607	0.977497	∼CA	0.873823	0.326301
OC	0.729172	0.994636	OC	0.945386	0.168287
∼OC	0.390268	0.982066	∼OC	0.969868	0.318491
PMH	0.946670	0.969056	PMH	0.941620	0.125786
∼PMH	0.145982	0.950400	∼PMH	0.768362	0.652800
TS	0.529123	0.959020	TS	0.900188	0.212918
∼TS	0.565741	0.977495	∼TS	0.826742	0.186412

AS: Academic Self-perception; CA: Organizational commitment; OC: Organizational Climate; PMH: Positive Mental Health; TS: Technostress.

TABLE 9. Truth table.

	Presence AS			Denial AS
	Sol. 1	Sol. 2	Sol. 3	Sol. 1
	PMH	CA	CA	CA
		*	*	*
		OC	OC	OC
		*	*	*
		TS	TS	PMH
				*
				TS
	↓	↓	↓	↓
		AS		AS
Raw Coverage	0.94667	0.218235	0.410912	0.745763
Unique Coverage	0.515851	0.0108135	0.0054068	0.745763
Consistency	0.969056	0.99994	0.998805	0.8
Solution coverage		0.966331		0.745763
Solution consistency		0.9699428		0.8

AS: Academic Self-perception; PMH: Positive Mental Health; OC: Organizational Climate; CA: Organizational commitment; TS: Technostress.

teaching staff to be carried out in a post-pandemic moment, when university teaching was forced to develop completely online, apart from direct teacher-student contact. In the case of the study, the possibility of resuming direct contact is full and the relationship with technology for teaching does not constitute an imposed element.

The men's health within the work climate was analyzed here as a means of a comparative study of the sex differences between men and women. The central axis of the study is technostress, which is interconnected with the rest of the variables in the model. PMH is significant in the overall model with respect to AS, and it is also the strongest of the relationships that were analyzed. This analysis is in line with other studies, such as that of Cruz *et al*. [77] (2021), which is where the benefit of mental perception with respect to the development of the tasks in the teaching environment is mentioned. In addition, the relationship is also significant for both sexes, which presents significant differences between them according to the multigroup analysis. Velten, Brailovskaia, & Margraf [15] (2022) concluded in their study that men, which are compared to women, present higher levels in the PMH scales. Our study corroborates the relationship and the importance of this relationship for both sexes, but it coincides with higher values for men. Therefore, the PMH of university professors conditions their academic perception.

However, contradictory values were obtained with respect to the analysis of the PMH with respect to the organizational commitment and the organizational climate. Neither is significant in the general model. The multigroup yields a surprising result, since it is not significant for men. However, it is significant for women, which obtained significant differences in the relationship between the PMH and OC. This fact is related to the study that was conducted by Budhiraja & Rathi [25] (2022), which is where changes in the organizational environments and the PMH are related. Its relationship with the PMH is again not significant for men with respect to CA. This fact may be in line with the analysis by Akin [78] (2021), which is where the organizational commitment is seen as a precursor to the teacher commitment and well-being as opposed to being a consequence.

Technostress finds significance in the general model with respect to OC, PMH, and AS in regards to the central variable of the model. This relationship has an inverse direction, which means that the higher the technostress, the lower the levels of the other variables. It is not significant with respect to CA, which is a result that is in line with studies, such as Hassan *et al*. [79] (2019). Other studies, such as Magistra *et al*. [80] (2021) did find a significance, which was also positive in the academic setting in terms of this relationship. The OC variable shows the strongest relationship, which is followed by the PMH. Some of the previous studies indicated relationships between these variables. For example, an inverse relationship between the PMH and stress was found in one case study [81]. Our analysis presents an important contribution here, since the studies on these variables have been mostly limited so far as some authors point out. The studies are based on very small samples or lack a qualitative analysis [82]. The PMH does not differ between them, even though it is significant for both

sexes. It also establishes a positive relationship.

Some of the previous studies in a university setting indicated results that are similar to ours for OC [83], which indicates that the existence of a positive relationship is due to the demand and the use of new technologies by teachers. This study also presents an analysis of significant differences between the sexes, even though they are not found, which is something that does occur in our case. Moreover, it is the relationship that is strongest with respect to the differentiated analysis in the male case. In the general model, the relationship for AS appears to be positive but inverse. it is not significant for men in the differentiated model, but it is significant for women. However, there are significant differences between the two. Our results are similar to the results that were obtained by Yao & Wang [84] (2022) in the technological area. This is a study that was conducted on university students that obtained a poor academic self-perception, which is something that also appears in the study by Upadhyaya [85] (2021), even though none had been conducted on teachers.

A complementary analysis using a non-symmetric method, such as fs/QCA yields interesting results, which is in line with the six principles of the complexity theory [86]. It yields an overall coverage of 0.966 for presence (AS), which is above the explanatory power of PLS-SEM (R^2 = 0.629). Solution 1 indicates that the presence of the PMH alone, which is understood to be a positive assessment, leads to the AS result. This situation corroborates the results that were obtained by the PLS-SEM method, which is where the hypothesis was found to be significant. Therefore, the importance of this construct is once again emphasized. In both solution 2 and solution 3, the same constructs are discovered, but oriented differently. CA and OC are negated in solution 2, they appear as present in solution 3, and TS appears in both. Therefore, these results imply that more than one solution brings us closer to AS. The complexity of university teachers' behavior is best captured in this way with respect to technostress and the relationship with the other variables. The results show that all factors play an important role in AS, which occur in different circumstances. Moreover, they present high consistency data for the three alternatives.

The results provided for men indicated that CA and OC were not significant for AS compared to the PLS. However, fs/QCA indicates that the combination of antecedents is more useful in regards to obtaining a good assessment, because this combination allows for the development of different and tailored strategies by the institution in order to minimize the impact of TS. The presence of TS in two of the solutions highlights what has been analyzed in some of the previous studies in the field of teachers, which is where it is indicated that a certain level of technostress does not negatively affect it [79].

6. Conclusions

The present work has significant implications for different stakeholders involved in the study. For university teachers, their view on the academic perception of their university is especially related to the perception they have of their lives and their physical and emotional conditions. Therefore, a personal balance is important for the correct academic perception of man. University professionals must be aware that certain levels of technostress associated with their activity are beneficial for their proper development. For this reason, an awareness of these levels through private or corporate professional mechanisms will positively affect both their mental health and their perception.

In the case of universities, It is important for the institution, which is for its own sake, in order to establish mechanisms for the conscientious awareness of the faculty member's well-being especially when the perceptions have changed in the wake of the COVID-19 pandemic. The demands of the new technological adoptions among the university professors are generating a modification of the perceptions and behavior. In this sense, it is necessary to control the level of technostress that is assumed by men as well as regulating the technological contributions and their introduction into the classroom. However, these controls should not lead to total elimination. The research indicates that certain levels of technostress can positively affect the academic perception of the teachers especially if they are involved in an active search for solutions for its implementation in the classroom, which generates a positive climate. Moreover, these controlled levels of technostress can also benefit the positive mental perception of a university professor. Thus, a university professor achieves levels of balance and satisfaction with respect to the use of technology in the classroom.

However, support from the institution in regards to the use of new technological models is necessary, since the academic perception is negatively affected if this is not the case. A university professor will not be fully confident and will not have the perception that things are fine and the situation is under control. In addition, the speed of technological adoption will be slower as well as the perceived success, which will be slower as well. This fact, which is without clear support, will affect their capabilities and the teaching development. Technological development programs within the university environment must achieve an adequate balance between the traditional model and the technological introduction in order to avoid the techno-invasion of the university space, which is in addition to considering certain differences with the technological adoption in terms of men and women.

Certain public education institutions have professionals dedicated to the mental health care and psychological conditions of their teachers. For them, this work represents a starting point for managing the post-pandemic technostress situation. The need for an analysis of the teacher-institution binomial and the contribution that each of them makes on the teacher. The research focuses on the factors of organisational climate (from an institutional point of view) and Academic self-perception (from a personal perspective) as the most important in the relationship with others. Therefore, the institutional programmes developed by these professionals are likely to be based on them and their values, considering also the differences in the treatment of men and women that the research shows.

Technostress among university teachers in the aftermath of the pandemic needs to be addressed from a multidisciplinary perspective, encompassing personal and institution-related factors, in order to establish a balance between the

needs of both in order to regulate acceptable levels of technostress that allow for the proper development of university work.

7. Limitations and future lines of research

The present study is not without limitations. It is possible that a proper measurement of the impact on academic self-perception would require a longitudinal study, which should be conducted both before and after the adoption of the technology. This would allow a better measurement of the variation in the technostress levels. In addition, other segmentation variables within the university environment could be introduced and not only the distinction between sexes, such as a professional category or the different teaching fields.

The COVID-19 pandemic is still in its late stages, and it is still affecting this study. Many university professors were forced into a rapid and unprepared technological adoption, which activated defense mechanisms that were derived from frustration and a lack of knowledge. Therefore, implementation of a study once the situation has normalized could generate alternative results.

AVAILABILITY OF DATA AND MATERIALS

The data are not available due to the data protection law of the participants.

AUTHOR CONTRIBUTIONS

EGC, PLC and HH—designed the research study. EGC, PLC and AAM—performed the research. EGC, PLC and HH—analyzed the data. EGC, PLC and AAM—wrote the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study has been approved by the Ethics Committee of the University of Seville. The participants provided informed consent and agreed to publication of this study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jomh.org/files/article/1627954472282931200/attachment/Supplementary%20material.docx.

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