

Volume 8, Issue 15 — July — December - 2022

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Journal- Republic of Colombia

ISSN-On line 2539-1372

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**ECORFAN Journal-Republic of Colombia**, Volume 8, Issue 15, July-December 2022, is a journal-edited semestral by ECORFAN. Street 43 # 30-90 B. El Triunfo CP. 50001. Bogota Colombia.

WEB:[www.ecorfan.org/republicofcolombia/](http://www.ecorfan.org/republicofcolombia/), [journal@ecorfan.org](mailto:journal@ecorfan.org). Editor in Chief: FUENTES-RODRÍGUEZ, Germán. MsC. ISSN-2539-1372. Responsible for the latest update of this number ECORFAN Computer Unit. ESCAMILLA-BOUCHÁN, Imelda. PhD, LUNA -SOTO-Vladimir. PhD, Street 43 # 30-90 B. El Triunfo CP. 50001. Bogota Colombia, last updated December 31, 2022.

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# **ECORFAN-Journal Colombia**

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In the first article we present, *Social and university networks. Study on the perception of privacy and its management* by GARIZURIETA-BERNABE, Jessica, GONZÁLEZ-BENÍTEZ, Rubén Álvaro, MORALES-TOXQUI, Jazmin and RAMÍREZ-SÁNCHEZ, Jesús, with adscription in the Universidad Veracruzana, as the next article we present, *Hardiness and coping strategies in nationally selected athletes during COVID -19 pandemic* by PONCE-CARBAJAL, Nancy, with adscription in the Universidad Autónoma de Nuevo León, as the next article we present, *Comprehensive Planning System for Educational Services: Tool for the transition of Academic Corps* by GONZALEZ-IBARRA, Ana María, PALOMARES-RUIZ, María Blanca Elizabeth, TORRES-BUGDUD, Arturo and TREVIÑO-CUBERO, Arnulfo, with adscription in the Universidad Autónoma de Nuevo León, as the last article we present, *Women in STEM, Experiences of Mexican Women Scientists* by SANDOVAL-PALOMARES, Jessica & GARCÍA-RAMÍREZ, Karina Nayeli, with adscription in the Universidad Tecnológica de León.

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## Social and university networks. Study on the perception of privacy and its management

## Redes sociales y universitarias. Estudio sobre la percepción de la privacidad y su gestión

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**DOI:** 10.35429/EJC.2022.15.8.1.14

Received September 08, 2022; Accepted December 30, 2022

### Abstract

Virtual social networks have established themselves as the tool for greater communication between young university students. Through them, they allow the exchange of information, in addition to sharing experiences and creating social relationships quickly. This article determines indices of factors to explain the use of social networks in students; On the other hand, there are bad practices in the use of these, exposing personal information. Some of the main dangers in social networks are identity theft, spam, cyberbullying, defamation, sexting and sextortion, to name a few. The objective of the current work is to analyze the use of social networks by university students, since this can be explained by the factors of integrity, ease of use, attitude, and intention. Likewise, it is directly related to the satisfaction of the needs of inclusion, belonging and social recognition. The study was carried out in the population of four programs belonging to the Universidad Veracruzana (UV), specifically the Faculty of Accounting and Administration (FCA), and although the four programs can be considered as digital natives, the data expose that they require education in terms of digital literacy. It also analyzes how to manage these social networks and know how informed they are about: the privacy notices that social networks handle, with whom they expose personal information and what happens to the information they publish, also, knowledge regarding security measures in social networks

**Social media, University students, Social risks**

### Resumen

Las redes sociales virtuales se han consolidado como la herramienta de mayor comunicación entre jóvenes universitarios, a través de ellas, permiten intercambio de información, además de compartir experiencias y de crear relaciones sociales de forma rápida. Este artículo determina índices de factores para explicar el uso de las redes sociales en estudiantes; por otro lado, existen malas prácticas en el uso de estas, dejando al descubierto información personal. Algunos de los principales peligros en las redes sociales se encuentran: el robo de identidad, spam, ciberacoso, difamación, cyberbullying, sexting y sextorsión, por mencionar algunos. El objetivo del actual trabajo es analizar el uso de las redes sociales por parte de los universitarios, ya que este se puede explicar mediante los factores de integridad, facilidad de uso, actitud e intención; así mismo, está directamente relacionado con la satisfacción de las necesidades de inclusión, pertenencia y reconocimiento social. El estudio se realizó, en la población de cuatro programas pertenecientes a la Universidad Veracruzana (UV), específicamente de la Facultad de Contaduría y Administración (FCA), y aunque los cuatro programas pueden ser considerados como nativos digitales, los datos exponen que requieren educación en términos de alfabetización digital. También se analiza la forma de gestionar estas redes sociales y conocer que tan informados están respecto a: los avisos de privacidad que manejan las redes sociales, con quién exponen la información personal y qué sucede con la información que publican, asimismo, el conocimiento en cuanto a medidas de seguridad en las redes sociales.

**Medios sociales, Estudiantes universitarios, Riesgos sociales**

**Citation:** GARIZURIETA-BERNABE, Jessica, GONZÁLEZ-BENÍTEZ, Rubén Álvaro, MORALES-TOXQUI, Jazmin and RAMÍREZ-SÁNCHEZ, Jesús. Social and university networks. Study on the perception of privacy and its management. ECORFAN Journal-Republic of Colombia. 2022. 8-14: 1-14

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## 1. Introduction

In recent decades, Information and Communication Technologies (ICT, hereinafter) have generated changes and innovations (Jasso, López, & Díaz, 2017). They have spread in almost all aspects of daily activities (Del Barrio & Ruíz, 2016), which has constituted an unprecedented transformation at a dizzying pace and with an uncertain direction (Jordán, Galperin, & Peres, 2010).

Among the most important technological innovation tools are virtual social networks (Castro & Moral, 2017), which have produced new forms of communication and interaction between people (Osorio, Molero, Pérez, & Mercader, 2016). Established as a technology of almost universal character, they exert great influence on people of all ages (Osorio *et al.*, 2016), especially on young people (García & Nazaret, 2017; Jasso *et al.*, 2017), located in the university environment (Domínguez & López, 2015; Garcia, Seco, & Del Hoyo, 2013; Gómez, Roses, & Farias, 2012; Martinez, 2018).

According to Usla (2020), the most widely used virtual social networks are: Google, Instagram, Twitter, Facebook, WhatsApp and YouTube; being the last three applications the fastest growing during the health contingency. The research aims to determine indices of factors that explain the use of social networks. In recent years, the perspective of security has been analyzed, as a phenomenon directly linked to social networks, because they have become indispensable in the family, school and work environment; leading to an overexposure of users. The article is divided into five sections: the first makes an approach to virtual social networks; the second describes the theoretical approach; the third sets out the materials and methods; The fourth shows the main results and the fifth presents the conclusions.

## 2. Social Networks

Virtual social networks are the result of "interpersonal and group communication maintained by a series of individuals over time" (García *et al.*, 2013, p. 96), and therefore meet the criteria of the classic term communication and its postulates, but when including the technological object (Arab & Díaz, 2015), virtuality must be taken into consideration.

Therefore, the word virtual social networks can be defined as "a set of actors (or nodes) that are united by the social relations established between them" (Casaló, Flavián, & Guinalú, 2012, p. 43). The concept of social network, under the approach addressed in this research, has particular qualities and structure. One of the main considerations that must be taken into account is that a social network is shared at the community level and allows remote communication between a set of autonomous teams connected by technical means (Gordona, n.d.). Santos (1989) distinguishes four elements in social networks:

- Network location. Which is determined by some specific actor that refers to the point where it is anchored (for example, the website).
- Accessibility. Which is defined by the number of steps needed to reach another actor to define its magnitude, the proportion of actors that can contact each actor in the network and the number of intermediaries that must be used to connect with another must be considered.
- Density. It refers to the number of links that must be crossed to reach an actor, it will be greater or lesser due to the connections, that is, if some actors are linked with others, but not with all.
- Rank. It is defined as the number of people who are directly linked, without any intermediary.

Currently social networks are part of our interpersonal relationships, most people can not be without communication or even without the use of cell phones, we talk about family, school and work that is why the use of social networks has become indispensable for the human being. Among the social networks with the greatest impact are:

- Facebook. It is one of the most complete networks, since it has functions to be able to interact with new and familiar people, get informed, create business, make interactions with customers or brands in an easy and immediate way.

- Instagram. It is a social network used mainly to upload photos and videos instantly, however, like Facebook it allows you to create online stores and interact with customers.
- Twitter. Virtual communication space where you can express a thought, idea or information in a summarized way, through brief messages.
- WhatsApp. Instant messaging application, allows you to send and receive a variety of types of multimedia files, such as text, photos, videos, documents and location, in addition to being able to make calls and video calls, freely, simply with the use of data or WIFI network.

Based on the above, it is possible to affirm that virtual social networks have been positioning themselves as an ideal space to socialize, share ideas and different sources of information (Caldevilla, 2010; Sánchez & Mestre, 2016), for training and entertainment (Jasso *et al.*, 2017), as well as exchanging information and knowledge in a fast, simple and comfortable way (Gómez *et al.*, 2012).

Given the constant evolution of virtual social networks, their classification is complex and there is no consensus. This is because they have been acquiring features, tasks and options that can include them in more than one category of those that have been proposed so far (Martínez, 2018). For analysis purposes, four types can be identified:

The first category group them into professionals, generalists and specialists (Celaya, 2000). The second category in generalists or leisure and professionals (INTECO-AEPD, 2009). The third category distinguishes between user-centric and content-centric, where what matters is the material that is shared (Aced, 2010). The fourth categorizes by theme, activity and shared content (Ponce, 2012).

The set of opportunities they offer has favored their diffusion in different sectors. Likewise, it is important to indicate that the use of these technological tools "has also spread from the lowering of costs, the use of cell phones and the viral effect of Twitter and Facebook platforms on a global scale" (Sandoval, Romero, & Heredia, 2013, p.1), becoming with the passing of the years a fundamental element (Gómez *et al.*, 2012), in classrooms that concentrate digital natives (Buxarrais, 2016; Gómez *et al.*, 2012; Prensky, 2001).

### 3. Risks and vulnerabilities in social networks

The vulnerability, in terms of computing, is a weakness or failure in an information system that puts information security at risk and may allow an attacker to compromise the integrity, availability or confidentiality of this. (INCIBE, 2017).

Currently social networks are part of our interpersonal relationships, most people can't be without communication or even without the use of cell phones. We talk about family, school, and work that is why the use of social networks has become indispensable for the human being. Although, its use can be beneficial, you are also exposed to different risks through them. For Forbes (2014) and UNAM (2009), the worst threats on social networks are:

- a) Social network viruses: These are carried out through botnets or computer robots, in this way hackers take control of computers by sending them spam emails that clicking on the link could cause damage.
- b) Phishing bait: It is about hacking passwords through the e-mail that leads the user to enter the account of the social network.
- c) Defamation: Users usually share information about projects, companies, and sensitive information on networks; which is infiltrated generating various scandals.
- d) Trojans: Calculates the value of the victim's account through the URL zone.

- e) Abbreviation of links: Services that provide help to abbreviate links to fit in smaller places, hide the malware link allowing victims not to realize that they are clicking to urge it.
- f) Botnets: They are used to direct and control the channels of some botnets.
- g) Advanced Persistent Threats (ATP): Collects data from high-level people for whom social media can be an important source of information.
- h) Cross-linking of web pages for solicitation forgery (CSRF): The moment a user shares an image in a sequence of events, other users can click to spread it.
- i) Identity theft: They are those who pretend to be another person, and ascend to more users than the true profile.
- j) Harassment: such as sexting (sending sexual, erotic or pornographic content), Grooming (messages from an adult with a minor in order to gain trust and thus be able to talk about sex, get sexual content and finally get a meeting to be able to abuse it), Cyberbullying (harassment or threat to a person through social networks through texts, images or videos).

The latter, and according to Barranco (2014), within cyberbullying are framed:

- Electronic insult: It is the exchange of words between two or more people through some technological device privately or in some public place.
- Harassment: An act that involves different behaviors, words, or frequent actions against a person in order to emotionally alter them. It can be carried out physically or through messages on social networks.
- Denigration: It consists of sending false information about someone and uploading it to a social network, it can be written information, photographs or videos.

- Impersonation: The harasser impersonates another person by posing access codes of the harassed person, using their account or identity with the aim of offending, malice or sending false information

Some methods of manipulation are based on the trust of the user, through which it leads to deception, such as phishing, which is increasingly adapted to social networks because it is a more persuasive environment for users and where they tend to trust so much in what they publish, as in what their friends send them without really knowing if it is true information or a reliable file (Olmo, 2017).

Although, the care of information on social networks depends on users, one of the main reasons why users do not protect their privacy is probably because they are not sufficiently aware of the data they disclose on the social network such as "the connection time, the IP address you use, your geographical location, the profiles visited, the messages received and sent" (Cragno, *et al.*, 2018, p. 2), and therefore, they are not responsible for the value of your information.

In this sense, knowing the conditions on the perception and experience that university students have had in terms of security of personal data information in social networks, is preponderant, to analyze the importance that students themselves contribute to this issue.

#### 4. Theoretical approach

To approach understanding the determinants of acceptance and use of new technologies, various theoretical models have been used (Sternad & Bobek, 2013), which suggests a lack of consensus on which are the ones that best explain the adoption processes (Jones, Motta, & Alderete, 2016; Sternad & Bobek, 2013).

The Technology Acceptance Model (TAM) developed by Davis (1989), is the first and main theory of traditional adoption in the field of Information Technology (Awa *et al.*, 2015; Gangwar *et al.*, 2015). Therefore, the usefulness of TAM for the purposes of the study is pertinent (Lorenzo, Gómez, & Alarcón, 2011; Shin, 2008; Willis, 2008).

TAM is an extension of the Theory of Reasoned Action (TRA) developed by Ajzen & Fishbein (1975), to describe behavior towards information technologies (Blas, Mafé, & Manzano, 2008). Also of new technologies (Rodríguez & Herrero, 2008). It has been validated in a wide range of research in different applications (Ben, 2016), among which are virtual social networks (Lorenzo *et al.*, 2011; Romero, De Amo, & Borja, 2011).

The model assumes that beliefs, i.e., perceived utility (UP, hereinafter) and perceived ease of use (FUP, hereinafter), influence the attitude of use (AU, onwards), which in turn leads the intention to use (IU, hereinafter) and then generates a behavior to use an Information System. Therefore, UP and FUP are the basic determinants of the acceptance of Information Systems (Davis, Bagozzi, & Warshaw, 1989).

Davis (1989) states that UP is the main factor that has a direct effect on UI. It also determines a large proportion of UA, and mediates the effect of FUP on UI. It also points out that the FUP influences the UP. On the other hand, the TAM establishes that AU is a function of the UP and the FUP, while the UI is linked to the UA and the UP. In this line it can be indicated that the TAM reflects the predisposition of an individual to respond favorably or unfavorably to a specific behavior.

The last two decades have provided substantial empirical support for TAM (Venkatesh & Bala, 2008). It is even considered robust, parsimonious, and influential in issues related to the adoption of Information Systems and Information Technologies (Sternad & Bobek, 2013), as well as Information and Communication Technologies (Muñoz, Climent, & Liébana, 2017), however it has its limitations. TAM provides less significant information of user opinions on adoption of specific systems, as it is limited to the constructs of UP and FUP (Awa *et al.*, 2015).

Therefore, some studies have been extended to the examination of the background of the perceived variables, usefulness, and ease of use (Sternad & Bobek, 2013), that is, the two main reasons that determine acceptance according to the TAM (Sánchez, Rondán, & Villarejo, 2007), to adjust to the context of the user in order to achieve a deeper understanding of the variables that have a better predictive power.

In this line, for the purposes of the study, the integrity variable is incorporated, understood as trust in the privacy and security of the information provided in virtual social networks. This responds to the fact that these are an especially vulnerable field for the privacy of the individual (Antón, 2012; Roig, 2009), since they enable the collection of data of all kinds (Díaz, 2013).

On many occasions, virtual social networks favor the making public of data or information that traditionally had a private or reserved nature (Gandasegui, 2011; Osorio *et al.*, 2016), therefore, are an especially vulnerable field for privacy (Osorio *et al.*, 2016; Roig, 2009).

## 5. Material and methods

The research work was developed in the students of the Universidad Veracruzana of the Faculty of Accounting and Administration of the Xalapa region. The study design was non-experimental with correlational scope. This was a quantitative cross-sectional research carried out during the 2021 period. The objective of the study was to determine indices of factors that explain the use of social networks in university students, aimed at students of the 2017, 2018 and 2019 generation of the educational programs of Accounting, Administration, Administrative Computer Systems and, Management and Business Management.

Also with the aim of analyzing the state of knowledge about security vulnerabilities in social networks, a non-experimental descriptive methodological design was proposed since the study focuses on the quantitative analysis of good practices in the issue of security in the use of social networks. Subsequently, based on the results of the pilot test, the survey was validated as an instrument for collecting potential information, considering a population sample calculation. The community that makes up the faculty is 3,262 members, of which 3,024 are students (Ricárdez, 2021). Of the total number of students, only students of the 2017, 2018 and 2019 generations of the four careers offered by the faculty were considered, and from these, a finite population sample calculation was made, based on the population of enrollment registered in the period August 2020 – January 2021 (contingency adjustment September 2020 – February 2021).

For this, the following formula was used:

$$n = \frac{(Z^2 * N * P * Q)}{e^2 (N-1) + Z^2 * P * Q} \quad (1)$$

were:

n=Sample size searched

N=Population size

Z=Statistical parameter depending on confidence level

e=Maximum accepted estimation error

p=Probability of the event studied occurring

q=Probability that the studied event will not occur

Having the finite sample formula and the confidence level, the following calculation is made with the aforementioned data.

$$n = \frac{(Z^2 * N * P * Q)}{e^2 (N-1) + Z^2 * P * Q}$$

$$n = \frac{(1.64^2 * 1982 * 0.5 * 0.5)}{0.05^2 (1982-1) + 1.64^2 * 0.5 * 0.5}$$

$$n = \frac{1332.6968}{5.6249}$$

$$236.92 \approx 237 \pm 240$$

When obtaining the results of the formula, it can be commented that the total of respondents is 240 students of the Faculty of Accounting and Administration, of which 46 were students of the educational program of Administrative Computer Systems, 91 students of Administration, 24 students of Management and Business Management, and finally 79 students of Accounting.

In the same way in which the population sample was carried out, the pilot test was carried out, in this case, 10% of the total respondents were carried out, that is, 24 students of the Faculty of Accounting and Administration must be surveyed, of which 5 students of the educational program of Administrative Computer Systems must be, 9 students of Administration, 8 students of Accounting and finally 2 students of Management and Business Management.

Through surveys applied to students, the necessary questions were asked to analyze the knowledge about the security that users of the university community have in social networks, considering parameters such as:

- a) Use of social networks. In order to determine which is the most used social network and the time spent on social networks by university students.
- b) Knowledge of prevention measures. In order to know if they apply measures to improve the security of their social networks through the password they use, the knowledge they have regarding privacy policies and their application; and if they know the care protocols in case of being in a situation of risk.
- c) Perception of social networks. The main idea is to know if they consider social networks safe or not.
- d) Degree of personal information that the user provides on social networks. The purpose is to be able to evaluate the level of trust that the student has with the users with whom he relates, the type of content he publishes (videos, texts, photographs, among others) and the degree that the content he publishes affects third parties.
- e) Vulnerabilities in social networks. With the intention of being able to establish which are the most present risk situations within social networks.

Based on the defined objective, the data of the eighteen questions with a five-point Likert scale yielded a Cronbach's alpha coefficient ( $\alpha=0.9268$ ) that exposed the existence of a direct and positive dependence between the variables perceived ease of use, perceived utility, attitude of use, intention to use social networks and integrity. On the other hand, Factor Analysis was proposed with the Principal Components method as a multivariate technique to analyze and generate factors that explain the use of social networks since it has been used to know the interdependence of variables that define the uses of social networks (Sánchez & Mestre, 2016).

## 6. Analysis of results

As already mentioned, the form was made to the 240 students of the Faculty of Accounting and Administration of the four educational programs, of which a greater response of the female gender was obtained with 57.9% of responses and 42.1% of the male gender.

91.29% of the students indicated that they had internet at home and only 8.71% indicated that they lacked the service at home. The access points outside the home with the highest use were school (86.41%), followed by the rent plan (48.08%), public networks (27.53%) and work (20.91%).

100% of the students indicated that they were enrolled in a virtual social network. The device par excellence to access was the mobile phone (99.30%), followed by the laptop (68.64%) and, Ipad (21.60%); only 3.48% indicated that they accessed via desktop, Iwatch, PlayStation 4, Wii and Xbox.

As for the popularity of virtual social networks expressed in number of users, the data showed the following: Facebook 238, WhatsApp 237, Instagram 193, YouTube 176, Google + 145, Twitter 110, Snapchat 108, Skype 90, Pinterest 56, Line 26, Telegram 21 and LinkedIn 12. In relation to accesses per day by type of social network, the data indicated that in the category more than 12 accesses, Whatsapp (80.43%) and Facebook (53.02%) were concentrated. Meanwhile, in the category between 1 and 4 accesses were concentrated Google + (68.99%), Snapchat (57.14%), Twitter (54.37%), Skype (80.33%), Pinterest (77.19%), Line (63.16%), Telegram (77.78%) and LinkedIn (76.92%). On Instagram and YouTube, no concentration of data was found in any particular category.

In order to minimize the number of variables with high loads by one factor and thereby improve interpretation, rotation (orthogonal) was performed with the Varimax method (Kaiser, 1958; Sánchez & Mestre, 2016), the results of which are shown in Table 1.

Factor	Variance	Difference	Proportion	Accumulated
1	3.67988	0.33817	0.2044	0.2044
2	3.34172	0.12980	0.1857	0.3901
3	3.21192	0.41126	0.1784	0.5685
4	2.80066	0.00000	0.1556	0.7241

**Table 1** Explained proportion of variance standardized by factor

Source: Own Elaboration

For factor reduction, factor loads were analyzed in terms of absolute values; when its value approached 1, the variable was fully explained and if it approached 0, the factors did not explain the variability (Guerrero, Hernandis, & Agudo, 2018; Rodriguez & Mora, 2001).

The data presented in Table 2 showed that the statistically significant factor loads (greater than 0.50) with positive values of Factor 1 corresponded to the variable Integrity, from Factor 2 to the variable Perceived Ease of Use, from Factor 3 to the variables Perceived Utility and Attitude of Use, while Factor 4 to the variable Intention to Use.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Exclusion
MAGP1		0.8519			0.2259
MAGP2		0.8726			0.2284
MAGP3		0.8713			0.1857
MAGP4		0.8344			0.2429
UP 1			0.6828		0.3816
UP 2			0.7106		0.4136
UP 3			0.7779		0.2787
TO 1			0.7011		0.3275
TO 2			0.5558		0.4731
TO 3			0.6872		0.2891
IT 1	0.8004				0.3213
IT 2	0.8535				0.2453
IT 3	0.8229				0.2625
IT 4	0.8366				0.2643
IT 5	0.8294				0.2784
IU 1				0.8503	0.1979
IU 2				0.8678	0.1536
IU 3				0.8162	0.1960

**Table 2** Factorial loads of rotated (orthogonal) factors with the Varimax method

Source: Own Elaboration

Based on the above results, indices of the four factors were constructed as shown in Table 3. These were scaled between 0 and 100 for greater understanding of these, and were conceptualized as follows: Factor 1 "Integrity", Factor 2 "Ease of Use", Factor 4 "Attitude" and Factor 4 "Intention". The data corresponding to the indices of each of the factors were divided into quartiles for analysis purposes by means of contingency tables with row percentages.

Index	Stratum	Cuartiles (%)				Total
		1	2	3	4	
Ease of use	TO	27.13	27.91	20.16	24.80	100
	CO	26.74	17.44	24.42	31.40	100
	GD	13.33	30.00	40.00	16.67	100
	SC	23.81	28.57	30.95	16.67	100
Attitude	TO	27.91	21.71	26.36	24.02	100
	CO	22.09	27.91	26.74	23.26	100
	GD	30.00	20.00	23.33	26.67	100
	SC	19.05	33.33	19.05	28.57	100
Integrity	TO	31.78	24.03	21.71	22.48	100
	CO	12.79	30.23	31.40	25.58	100
	GD	26.67	26.67	23.33	23.33	100
	SC	28.57	16.67	23.81	30.95	100
Intention	TO	32.56	27.13	20.93	19.38	100
	CO	24.42	18.60	27.91	29.07	100
	GD	20.00	16.67	33.33	30.00	100
	SC	7.14	38.10	26.19	28.57	100

**Table 3** Distribution of indices by stratum

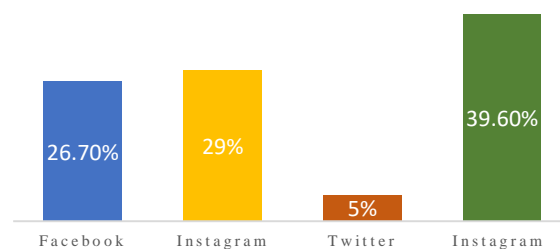
Source: Own Elaboration

With regard to the "Ease of Use" index, only the data corresponding to the students of the Accounting strata, as well as Management and Business Management were concentrated in quartiles 3 and 4.

This suggested that only in the students of these strata the use of virtual social networks was clear and understandable. In addition, only they considered that learning to use them was easy because they have the necessary skills. On the other hand, the results of the "Attitude" index showed that the highest scores of the indices of the four strata are located in quartiles 1 and 2. This suggested that in general terms most students considered the use of virtual social networks not very useful, that it did not improve their productivity and that it was not a pleasant experience and a good idea.

The results of the "Integrity" index showed that students from the strata of Administration, as well as Management and Business Management had less confidence in the information they provide to virtual social networks due to the use they can give to it, also, they do not believe in the security function they have. In general, they considered that virtual social networks are not totally reliable since the data are concentrated in quartiles 1 and 2. This contrasts with the results obtained by students from the Accounting and Administrative Computer Systems strata, since most of the data were located in quartiles 3 and 4.

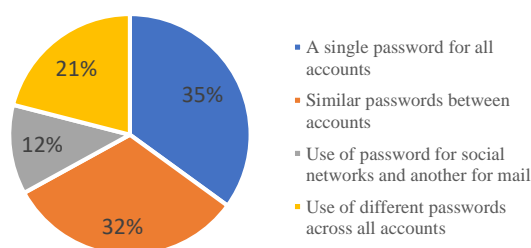
The results of the "Intention" index showed that students from all strata except Administration intended to use virtual social networks in everyday activities. They also indicated that they would use and recommend them for use to the extent possible because the data were concentrated in quartiles 3 and 4. Likewise, it was obtained that the most used social network by students is WhatsApp having a percentage of 39.6%, then 28.8% of use of Instagram, Facebook with 26.7% and finally the least used social network was Twitter with 5% (figure 1).



**Figure 1** Percentage of social media use among university students

WhatsApp is mostly used since, with that social network, students can have greater communication in a more accessible and fast way either with their family or friends.

As a first security measure you have in social networks and email accounts, you have the access password, which is recommended to be different for each account. However, 35% of students use the same password both in their social networks and in their email accounts, so it can be a security problem, it is generally recommended to change the password for greater security at least every 2 months, we have 32% who have some similar passwords, 21% keep the passwords of all their social networks different giving this greater security to their information and thus preventing Any hack, and finally with 12% use a password for social networks and another for email in this way they feel more secure their mail and their social network (Figure 2).



**Figure 2** Using passwords in personal accounts

As noted, there is a risk factor for students, since keeping their same password for all social networks could cause their account to be hacked and their privacy may be compromised. On the other hand, each of the social networks establishes privacy rules in order to ensure that they are a safe space, where users can express themselves with confidence and there is greater control of the data by users.



However, 48.3% of students have not read any privacy rules of their social networks, being an important factor, since there you can see what they do with the data and information that users publish on social networks; At the same time, 40% examine the rules of some social networks, 8.3% analyze them with the aim of making sure they can publish and 3.3% have no idea of the risk of not knowing the rules (Figure 3).

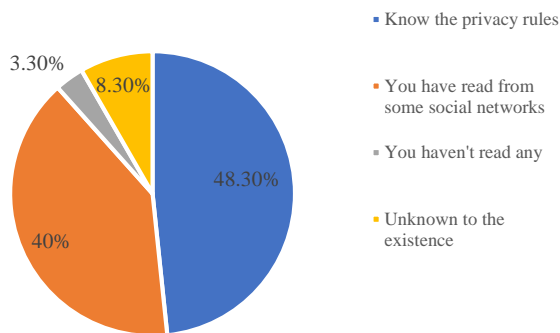


Figure 3 Knowledge of social media privacy rules

Despite the fact that, 85% of students think that social networks are not safe, it can be said that the use of them is extremely inappropriate. Although 53.8% of students have not suffered any risk situation, 46.20% have been faced with any of these situations, being mostly harassment with 44%; which is not only painful and unpleasant for the person who suffers it but also risky. At the same time, other types of situations that were identified were bullying (insults) with 28%, threats with 12% and blackmail with 16%.

Students who saw these situations before comment that they came to feel fear and even hesitated about sharing what they were experiencing at that moment with someone; resulting in great insecurity with their classmates, family and / or teachers.

Figure 4 presents an analysis of the risk situations in which students have been found, by gender. Based on the graph, it can be affirmed that 73% of risk situations occur in women, with harassment prevailing with 37%; while, in the male gender, bullying is higher, with 11.50%. And in a lower percentage in both genders is blackmail with uploading photographs, it could be considered that the latter is due to the recent Olimpia Law which, imposes penalties of up to six years for disseminating images without the consent of the person involved.

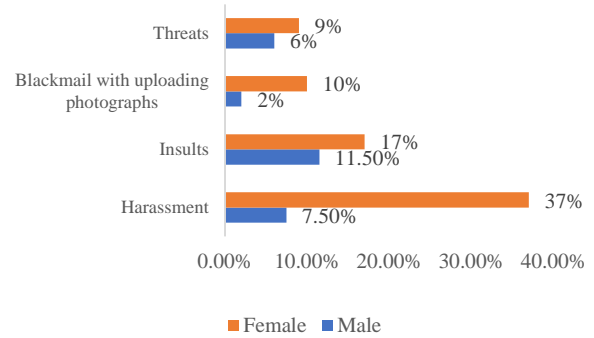


Figure 4 Threat analysis by gender

## 7. Conclusion

Social networks have transformed the way people communicate, being tools that facilitate the exchange of information among their users through publications and text messages, videos, images, among others. However, the large amount of data that is exposed in them, makes them so vulnerable, to the extent that it is not possible to guarantee total security for the user. The findings showed that the use of virtual social networks has a multidimensional behavior composed of the factors called: Integrity, Ease of Use, Attitude and Intention. When scanned and analyzed by quartiles, the four factors showed different behavior in the different strata.

Although the results showed that the highest scores of the Attitude indices of the four strata were located in quartiles 1 and 2, there is a wide use of virtual social networks, especially Facebook and WhatsApp, using the mobile phone as the means of connection par excellence.

The above could indicate that even when each generation uses certain social networks and makes different use of them, according to their interests and tastes; From various angles, its use in the 4 strata could be related to satisfying other needs such as social inclusion, belonging, curiosity or social recognition.

Likewise, the results showed that the strata of Accounting, Management and Business Management, as well as Administrative Computer Systems had high rates of Intention, which is consistent if the age ranges in which they are located are analyzed; These are individuals who can be considered as digital natives.

In contrast, in the Administration program, the low Intention index is not explained by age ranges, that is, they are not digital immigrants, but rather because they have a lower Integrity index, that is, low level of confidence in the information they provide to social networks, due to the use they can give to it and the security function they possess.

Although students from the four strata can be considered as digital natives, the data show that they may require better training in terms of digital literacy regarding the use of social networks, especially those who belong to the layers of Administration and Administrative Computer Systems.

On the other hand, security has become a fundamental issue since, people can not move away from sharing a photo, video or publication on their social networks. While it is true that social networks maintain certain privacy notices, to give some security and confidence to users, this does not entirely guarantee user protection; Because the location, interests and photographs that are shared in them, are analyzed by the same application to show certain advertising of interest to it.

As the main reason why users do not protect their privacy, is because they are not sufficiently aware and responsible of the value of their information. Large companies like Facebook and Instagram are millionaires thanks to the data they know, for example; What you do, you like, who are our friends and our family, where you go on vacation, where you study or work. They may analyze this information so that they can display corresponding advertising for products or services that are of interest, as well as offer notes and other information articles that they know are more interesting. (Pastorino, 2018)

That is why what is published on social networks must be better protected, because, just as it can be something positive, it can attract serious problems with personal and family safety; Being exposed through the information published to different attacks and vulnerabilities such as: blackmail, harassment, impersonations, threats, among others.

In the understanding that, 48.3% of students do not know how to proceed in cases of insecurity in their social networks and 74.2% do not even know who they can go to in case of being in a situation of risk, to grant informative talks about the rules of security and privacy of social networks, It will reduce risks and provide faster care.

Based on surveys, one of the main topics to be discussed with college students should be the handling of data confidentiality, because a high percentage have little knowledge about how to provide greater protection against theft of data found on their networks; The clearest example of this is the fact that they mostly maintain the same password for all their accounts with a basic security level, when on the contrary, it is advisable to change monthly or annually the password that includes letters, numbers, and some allowed symbol.

Although, social networks follow a basic security protocol to prevent people outside the account from entering them; the amount of personal information they allow to enter, makes them vulnerable and less secure; since, if the account is compromised or the information is not properly privatized, the user is exposed and vulnerable before cybercriminals (Cragno, *et al.*, 2018).

Finally, the findings of the study could have implications in various aspects in the field of Social Sciences, especially in the delineation of a profile of Internet users who are digital natives training in business issues in a framework where the evolution of virtual social networks prints an enormous dynamism and whose limits are difficult to estimate.

In this sense, it is also necessary to instruct students on the various measures that exist to prevent social engineering attacks, such as those mentioned by INCIBE (2016) of: not opening emails with unknown users, not answering any suspicious email where they ask for any personal information, not opening links that send to personal email, WhatsApp or social network, have an antivirus and do not connect to open WIFI networks. As well as these measures there are more, which allow to protect against social engineering and thus prevent cybercriminals from stealing confidential data.

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## Hardiness and coping strategies in nationally selected athletes during COVID -19 pandemic

### Personalidad resistente y estrategias de afrontamiento en atletas seleccionados nacionales durante pandemia COVID -19

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DOI: 10.35429/EJC.2022.15.8.15.20

Received September 08, 2022; Accepted December 30, 2022

#### Abstract

The objective of this work is to identify the relationship between the variables of the hardiness and those of approximation of coping in sport. The sample is made up of 42 selected national athletes, with experience in world championships of their sport, 23 men (54.8%) and 19 women (45.2%), the age ranged from 16 to 54 years,  $M = 22.67$  and  $SD = 7.64$ . The methodology used is cross-sectional, empirical, associative and simple correlation, descriptive and reliability analyses, in addition to correlations. The instruments used were the hardiness Questionnaire in Central American and Caribbean Athletes and the Approach to Coping in Sport Questionnaire. The results, adequate reliability in the instruments and a correlation value of  $r = .584$  ( $p < .05$ ). The conclusion confirms the existence of a positive and significant correlation between the variable of hardiness control and mental withdrawal of coping approach in sport.

**Stress, Sport, Hardiness, Control**

#### Resumen

El objetivo de este trabajo es identificar la relación existente entre las variables de la personalidad resistente y las de aproximación del afrontamiento en el deporte, La muestra está conformada por 42 atletas seleccionados nacionales, con experiencia en mundiales de su deporte, 23 hombres (54.8%) y 19 mujeres (45.2%), la edad osciló entre 16 y 54 años,  $M = 22.67$  y una  $DT = 7.64$ . La metodología utilizada es transversal, empírica, asociativa y de correlación simple, los análisis descriptivos y de fiabilidad, además de las correlaciones. Los instrumentos utilizados fueron el Cuestionario de Personalidad Resistente en Deportistas Centroamericanos y del Caribe y Cuestionario de Aproximación al Afrontamiento en el Deporte. Los resultados, fiabilidad adecuada en los instrumentos y un valor de correlación de  $r = .584$  ( $p < .05$ ). La conclusión se confirma la existencia de una correlación positiva y significativa entre la variable de control de la personalidad resistente y retraimiento mental de aproximación del afrontamiento en el deporte.

**Estrés, Deporte, Personalidad resistente, Control**

**Citation:** PONCE-CARBAJAL, Nancy. Hardiness and coping strategies in nationally selected athletes during COVID -19 pandemic. ECORFAN Journal-Republic of Colombia. 2022. 8-15: 15-20

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## Introduction

Psychology, at present has gained an imperative importance given the circumstances in the pandemic by Covid-19. Respiratory syndrome (SARS-CoV-2), was identified as COVID-19 in December 2019, this global event affected humanity in the economic, educational (Falasifah, Fitria, & Hakim, 2021) and social (Xing *et al.*, 2020; De La Serna, (2022), therefore, has wreaked havoc on the emotional and psychological health of people (Seale *et al.*, 2020). Without pandemic, the athlete when presented in competitions and in the training itself faces situations that lead him to feel stress, this is where sport psychology in recent decades has had enormous relevance, it is already part of the multidisciplinary team that helps in the development and control of emotions of high-level athletes (Ponce, 2017; Ponce, 2021, Piñeros, 2021). Sports competition represents a confrontation with stress, this emotional state, causes phenomena of lack of concentration, control, confidence, appearance of nervousness and negative thoughts, some researchers have done work where they provide tools such as self-talk, obtaining as a result that anxiety and stress decrease considerably and therefore athletes can get ahead with their competitive commitments (Barahona-Fuentes, Soto, & Huerta, 2019).

Hardiness is defined as an integral concept that measures resistance to stress, if there is a higher hardiness, the subject perceives as opportunities for growth their problems, or their challenges and assumes them with pleasure because they see it as a benefit, and on the contrary someone who has a low hardiness, can even get sick of stress, does not resist being exposed to constant challenges (Ponce, 2017; Ponce-Carbajal, Tristán, Jaenes, Rodenas, & Peñaloza, 2020; Ponce-Carbajal, López-Walle, Jaenes, Peñaloza, & Méndez, 2020). The hardiness is made up of variables that are control, commitment and challenge, a scale with evidence of adequate reliability not only in a trifactorial manner but also in a unifactorial manner, which shows that it is a concept that has the ability to measure in both ways (Jaenes, 2008; Jaenes, Godoy, & Román, 2009; Ponce, 2017; Ponce-Carbajal, Tristán, Jaenes, Rodenas, & Peñaloza, 2020; Ponce-Carbajal, López-Walle, Jaenes, Peñaloza, & Méndez, 2020; Ponce-Carbajal, López-Walle, & Méndez, 2021a; Ponce-Carbajal, López-Walle, & Méndez, 2021b).

The definition of Coping, as those cognitive and behavioral efforts that are performed internally and externally that the individual perceives as a threat or considers that they overcome it, then, coping strategies are those developed by athletes to confront situations or complications, with the conviction to control their emotions, there are two types of coping, the first, The second type is focused on the problem and seeks to generate solutions, taking into consideration the cost-benefit and choosing an alternative and this gives the opportunity to make improvements for subsequent events or competitions with those strategies that have given better results (Lazarus and Folkman, 1984).

Roth and Cohen (1986) presented two different coping styles. The first is the approach style, which refers to the athlete's interest in solving the problem by facing the facts. The second is the avoidance style, in which the athlete avoids the situation that causes him/her discomfort. These researchers propose the analysis of the four relationships and establish a recognition of the way in which the athlete usually acts (Krohne, 1996). Coping in sport is about the athlete choosing an appropriate strategy during his competitions and it is a support for the good management of his negative emotions, having an organized reception of information, planning his responses, according to his resources available and executing with the most accurate actions, giving the opportunity to have control over anxiety, through a good choice of actions to be executed to resolve the conflictive situation (Cantón-Chirivella, Checa-Esquiva and Vellisca-González, 2015).

The approach to coping in sport, is integrated by several variables such as Emotional Calm, Active Planning/Cognitive Restructuring, Mental Withdrawal, Risk behaviors and Search for social support, this questionnaire has been used in several investigations finding adequate values in its internal consistency (Kim, Duda, Tomás, & Balaguer, 2003; Balaguer, Duda, Kim, 2003; Ponce-Carbajal, López-Walle, & Méndez, 2021b).



Therefore, this research aims to identify the existence of a relationship between hardiness variables and coping approach variables in sport, under conditions of confinement in COVID-19 pandemic, in a sample of athletes, who were nationally selected and with experience at world level in competitions in their sport, which makes them a very special group of athletes.

### Description of the method

The design of this research is empirical associative, simple correlation and cross-sectional (Ato, López-García, & Benavente, 2013). The population for this research were 42 participating athletes, all nationally selected, with experience in world championships in their sport, the sample consists of 23 men equivalent to 54.8% and 19 women corresponding to 45.2%, the age of the athletes ranges between 16 and 54 years, with a mean of 22.67 and a standard deviation of 7.64. as inclusion criteria, it was established that those athletes who were once part of the Mexican national team of any sport participated, another selection criterion were those athletes who had participated in at least one world championship in their sport specialty. In the exclusion criteria, those athletes who did not finish the instruments properly, another criterion was those who were currently still contemplated for any competition and finally those who decided to withdraw their participation for some personal reason.

### Instruments

The first evaluation instrument is called hardiness Questionnaire in Central American and Caribbean Athletes (PRDCC; Ponce-Carbajal *et al.* 2015) that measures hardiness, this questionnaire is composed of 18 items, and is integrated by three factors: commitment (6 items), control (6 items) and challenge (6 items). This instrument has been used in a trifactorial manner by some investigations (Kobasa, 1979a; 1982; Jaenes, Godoy-Izquierdo and Román, 2008; Meda-Lara, Yeo-Ayala, Juárez-Rodríguez, Palomera-Chávez, and Moreno-Jiménez, 2021), commonly the properties are adequate obtaining acceptable reliability values for all subscales (Commitment  $\alpha = 0.81$ , Control  $\alpha = 0.79$ , Challenge  $\alpha = 0.75$ ). The response scale is Likert-type from 0 to 3 where 0 is "strongly disagree" and 3 "strongly agree".

The second is the Approach to Coping in Sport Questionnaire (ACSQ-1) in its Spanish version (Kim *et al.*, 2003; Balaguer *et al.*, 2003). The questionnaire has 28 items and 5 variables: Emotional Calmness (7 items), Cognitive Restructuring (6 items), Search for Social Support (5 items), Mental Withdrawal (6 items) and Risky Behaviors (4 items). This questionnaire has been used in several investigations showing appropriate internal consistency values of more than .70 (Kim, Duda, Tomás, & Balaguer, 2003; Ponce-Carbajal, López-Walle, & Méndez, 2021b). The response scale is a 5-point Likert-type scale from 1 "never" to 5 "always".

The psychometric properties of Approaching Coping in Sport, usually present adequate values, however, in the last factor of risk behaviors it is below the  $\alpha = .70$  of Cronbach's alpha, but this could be explained since it only has four items, specifically in the research by Kim *et al.*, 2003, where the values for Emotional Calm ( $\alpha = .71$ ), Active Planning/Cognitive Restructuring ( $\alpha = .74$ ), Seeking Social Support ( $\alpha = .78$ ), Mental Withdrawal ( $\alpha = .78$ ) and Risky Behaviors ( $\alpha = .64$ ) are adequate and the latter moderately acceptable according to researchers (Nunnally & Bernstein, 1994; Hair, Anderson, Tatham, & Black, 1998).

### Procedure

The procedure consisted of making the digital questionnaires in Google Forms and the questionnaire was launched in social networks and by invitation to some coaches, with the purpose that the athletes could respond online, since, due to the confinement, they were not in person at the facilities where they usually trained, however, thanks to the interest of the coaches and the athletes themselves, if participation in this study was possible. It is worth mentioning that in the questionnaire they were informed of the details of their participation such as informed consent, as well as the anonymity of their answers and that they would only be used for scientific research purposes, respecting the moment in which they wished to withdraw from the study. Therefore, they were free to leave the study at any time they wished, and if there were any questions, a WhatsApp number was provided where they could communicate with any questions at any time.

## Data analysis

The data analysis was performed with the statistical package SPSS version 25, the descriptive statistics such as mean, standard deviation and frequencies were calculated, correlation analysis was performed to confirm the existence of Spearman correlations between the variables of the resistant personality and those of the approach to coping in sport.

## Results

Table 1 presents the descriptive statistics of the frequencies of the various sports to which the athletes belong and who participated in this study.

	Sports	Frequencies
1	Swimming	9
2	Taekwondo	8
3	Soccer	6
4	Cheerleading	5
5	Diving	4
6	Field Hockey	3
7	Triathlon	2
8	Modern Pentathlon	1
9	Gymnastics	1
10	Baseball	1
11	Athletics	1
12	Chess	1
	Total	42

**Table 1** Frequencies of the sports participating in this investigation

Table 2 presents the reliability or internal consistency of the components of hardiness and coping approach in sport, showing mostly adequate results above .70, and some evidenced moderately adequate values.

	Variables	Reliability
1	control	0.85
2	commitment	0.6
3	challenge	0.7
4	total PR	0.85
5	Cognitive Restructuring	0.74
6	Mental Withdrawal	0.7
7	Emotional Calming	0.5
8	Seeking Social Support	0.84
9	Risk Behavior	0.6

Note:  $\alpha > .70$

**Table 2** Cronbach's alpha reliability of the variables of the hardiness and Approaching Coping in Sport questionnaires

## Correlations

Presents the results of the Spearman correlation matrices, the relationship between hardiness control and with mental withdrawal approach coping in sport is observed with a value of  $r = .584$  ( $p < .05$ ) only.

The objective of this research was the identification of correlations between the factors of hardiness and coping approach factors in sport, finding a positive and significant relationship in hardiness control and mental withdrawal, in conditions of confinement in the Covid-19 pandemic.

The perception of control lowers stress through the acceptance of the situation, since there is nothing I can do to solve it since it is a global problem, therefore, the acceptance that the plans must stop and therefore the goals and objectives also, without causing emotional imbalance, so it contributes to emotional health.

This result, is unprecedented, since similar conditions had not been presented by the pandemic and being high-level athletes the results are new knowledge, however we can partially find results that share results with our research as is the work of Sepúlveda-Páez, Díaz-Karmelic and Ferrer-Urbina (2019), since in a research with water polo players they found that this variable of mental withdrawal, helps to balance emotions through the decrease of stress and the acceptance of difficult situations.

The COVID-19 pandemic has had a significant adverse impact on the mental health of university students and the main coping strategy adopted by students is problem-focused coping by seeking social support from their friends, family and university unlike our results (Falasifah, Fitria, & Hakim, 2021).

In other research conducted in pandemic times, in athletes of rhythmic gymnastics, athletics, soccer, tennis, taekwondo, basketball, volleyball, they found correlations different from our results since they found correlations in emotional calm, cognitive restructuring and behavioral risk (Iancheva, 2021).

In another research, in golfers were studied the coping strategies they use and what they found is that they use the strategy of social support, those amateur athletes who have a better performance (Pinto, and Vázquez, 2013). Unlike our results in a research in skiers, the coping strategy used by athletes is risk behaviors (Sarries and Pinto, 2016).

#### 4. Thanks

To the Facultad de Organización Deportiva, and to the Universidad Autónoma de Nuevo León, CONACYT, which supports this type of research as much as possible. Also, to coaches and athletes, and to all who participated in this project.

#### 5. Conclusions

The existence of a relationship between the control variable of the resistant personality and mental withdrawal of coping approach in sports is confirmed, that is, in a confinement situation they took with acceptance and awareness that all activities directed towards their objectives should wait until the sanitary alert was lifted, taking this control measure with responsibility in favor of a healthy mentality and waiting for sanitary indications, in order to resume their activities gradually. Considering that due to the nature of the pandemic there was not much they could do, although it is an avoidant coping strategy, a strategy that is not usually found in the mental map of the high performance athlete. It is worth mentioning that the coping strategies usually used by athletes are positive, practically to take things and solve the problem, but being this time so different from normal situations, it is considered an atypical result, typical of the consequences and stressful emotional shocks, given the circumstances of confinement and stress in the face of uncertainty and trying to preserve health.

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## Comprehensive Planning System for Educational Services: Tool for the transition of Academic Corps

### Sistema de Planeación Integral para Servicios Educativos: Herramienta para la transición de los Cuerpos Académicos

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DOI: 10.35429/EJC.2022.15.8.21.26

Received September 18, 2022; Accepted December 30, 2022

#### Abstract

In higher education institutions, it is essential to constantly strengthen the academic staff and thereby contribute to raising the quality of all its activities, such as teaching, research, and dissemination of culture, creating the conditions for the staff to collaborate through the Academic Corps have professional growth and in turn contribute to the academic capacity of the institution itself. A methodology with a qualitative descriptive and cross-sectional approach was chosen. Based on the main results, it was proposed to integrate into the Planning System for Educational Services of FIME a module for strategic projects that contributes to the development of the Academic Corps, which favors their strengthening for the transition towards consolidation, with significant results in growth. and improvement of the institution's indicators. With its implementation, it was possible to collect 16% of the plans belonging to the different Academic Corps (CA) of the faculty, in addition, the amount of CA in their different areas of knowledge increased.

**Academic Corps, Planning System, Degree of Consolidation**

#### Resumen

En las instituciones de educación superior es fundamental fortalecer la planta académica en forma constante y con ello coadyuvar a elevar la calidad en todas sus actividades, como la docencia, la investigación y difusión de la cultura, creando las condiciones para que el personal en forma colaborativa a través de los Cuerpos Académicos posea un crecimiento profesional y a su vez contribuya la capacidad académica de la propia institución. Se optó por una metodología con enfoque cualitativo de tipo descriptivo y de corte transversal. A partir de los principales resultados se propuso integrar al Sistema de Planeación para Servicios Educativos de la FIME un módulo para proyectos estratégicos que contribuya al desarrollo de los Cuerpos Académicos, que favorezca su fortalecimiento para la transición hacia la consolidación, con resultados significativos en el crecimiento y mejora de los indicadores de la institución. Con su implementación se logró recabar el 16% de las planeaciones pertenecientes a los diferentes Cuerpos Académicos (CA) de la facultad, además se incrementó la cantidad de CA en sus distintas áreas de conocimiento.

**Cuerpo Académico, Sistema de Planeación, Grado de Consolidación**

**Citation:** GONZALEZ-IBARRA, Ana María, PALOMARES-RUIZ, María Blanca Elizabeth, TORRES-BUGDUD, Arturo and TREVIÑO-CUBERO, Arnulfo. Comprehensive Planning System for Educational Services: Tool for the transition of Academic Corps. ECORFAN Journal-Republic of Colombia. 2022. 8-15: 21-26

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## Introduction

Higher Education Institutions (HEIs) are responsible for creating the foundations of knowledge that contribute to the training of future professionals. To achieve this, HEIs must have teachers sufficiently prepared in their areas of specialisation and at the same time promote the substantive actions of teachers, among which research stands out, in order to meet the needs of today's world.

Based on the above, it is essential that institutions support and promote the strengthening of their academic staff, as this is an important key to the fulfilment of institutional objectives (Dimas, M., Torres, A. & Castillo, J., 2012). According to Torres, A., Castillo, J., Treviño, A., Báez, E., Sordia, C., Palomares, M., Álvarez, N., (2012) consider that one way to raise the quality of activities such as teaching, research and dissemination of culture is to create optimal economic conditions and provide benefits to academic staff who stand out for their permanence, dedication and quality in the academic performance of their assigned functions.

In this respect, technological and scientific development has been promoted through research programmes with the aim of generating new lines of knowledge that can be applied both individually and collectively. For this reason, and in order for HEIs to achieve their objectives, the Ministry of Public Education (SEP), through the Under-Secretariat of Higher Education (SES), promotes the Programme for the Professional Development of Teachers (PRODEP), which seeks to develop research capacities in higher education teaching staff in Mexico through the integration of teachers in Academic Corps (CA), thus supporting the qualification of high quality, committed and competent professionals (SEP, 2019).

PRODEP's task is to promote calls for the creation of ACs, among others, with the aim of raising the educational level of HEIs. The purpose of these CAs is to strengthen the tasks of production and application of knowledge, through the grouping of professors dedicated to research who act on the basis of objectives aimed at the creation and implementation of new knowledge that in turn contributes to a better quality education (SEP, 2019).

In this sense, according to López, S. (2010), the creation of new academic Corps in educational institutions aims to foster cooperation in teams through academic activities. According to PRODEP, the CA are the basis of institutional development, given that they self-regulate the functioning of the institution and in turn originate academic environments with a copious intellectual wealth, as well as participation in the training of human resources of the institution (Ortega, C. & Hernández, A., 2016).

The ACs are divided into three levels: Consolidated (CAC), in consolidation (CAEC), and in formation (CAEF). However, for a CA to move from one level to another, it is necessary for it to comply with a series of requirements proposed by the Programme. In the first phase, its members must be identified, of which half of them are recognised as having a desirable profile, and the lines of generation and application of knowledge are defined.

To move on to the next phase, more than half of the members of the AC must have the highest qualification and have innovative application products, in addition to the majority of the members having recognition of the desirable profile and participating continuously in lines of generation, among other aspects.

In the last phase, the majority of the members have the highest academic qualification, i.e. they have a PhD, have extensive teaching experience, demonstrate intense academic activity and participate in national and international academic exchange networks (PROMEPE, 2022).

Therefore, it is necessary for HEIs' academic staff to have a Development Plan based on the frameworks of reference corresponding to the institutional strengthening programmes. In this way, it is possible to outline the short and medium-term objectives and thus, achieve the transition from one degree to another, and as a consequence, achieve the strengthening of the CA and the institution. In this sense, Dimas, M. Torres, A., Palomares, E. & Sordia, C. (2019) mention that: "if a planning structure oriented to the transition of the academic Corps is designed, it will be possible to contribute to their development and evolution for the benefit of the educational programmes" (P. 26).

For this reason, the objective of this study is to promote the culture of Planning in the ACs in order to meet the requirements established by the PRODEP that contributes to achieving the corresponding indicators for the consolidation of the ACs of the Institution and that in turn has an impact on indicators such as Academic Capacity and Competitiveness. This is intended to be achieved through the creation of a module in the Integral Planning System for Educational Services (SPISE) with the purpose of integrating the Development Plan of the ACs.

On the other hand, the Integral Planning System for Educational Services (SPISE) was developed by the Faculty of Mechanical and Electrical Engineering of the Autonomous University of Nuevo León, located in the Northeast of Mexico. This system is a tool that aims to establish a projection structure that contributes to the achievement of FIME's vision, with the purpose of strengthening the Educational Programmes through an academic-administrative management that favours indicators such as: Academic Capacity and Competitiveness.

Therefore, for this study, the research question is: How to integrate a module in the SPISE to meet the requirements established by PRODEP and achieve the transition of the CA of FIME? In addition, a series of specific questions are established that contribute to fulfilling the objective of this research. These questions are: How to strengthen the Planning Model in terms of the CAs? How to promote the culture of Planning in the CAs of the Institution?

### Methodology to be developed

#### Scope of the research

The present study was developed collaboratively in the areas of Academic Capacity and the Coordination of Strategic Planning belonging to the Subdirection of Planning and Liaison of the Faculty of Mechanical and Electrical Engineering of the Universidad Autónoma de Nuevo León.

### Research design

This research has a qualitative approach which, as explained by Hernández - Sampieri, Fernández Collado & Baptista Lucio (2014), focuses on understanding phenomena from the perspective of the participants in a natural environment and in relation to their context (P. 358). The study is descriptive and cross-sectional.

The technique used was documentary analysis, which is defined by Hernández Sampieri, Fernández & Baptista (2000), as the technique that allows us to investigate, consult and select materials of interest selectively, in order to nurture the purpose of the study (p.50). Among the documents considered for this study are: the reference frameworks established by PRODEP, the UANL Development Plan and the FIME Development Plan.

### Hypothesis

By having a tool that allows the development of the AC Planning project in a more organized and friendly way, there will be a better follow-up of the goals established by its members and, in turn, promote their transit in a degree of consolidation according to with the guidelines established by the corresponding instances.

### Developing

Planning refers to the organization and selection of actions that help to meet certain objectives, through research and use of available resources (Ramírez *et al*, 2019, p. 8). Planning and prospective exercises are basic tools that allow us to chart the path towards the future of education.

In this way, the concept of Planning includes reflecting on the fundamental nature of the organization and deciding how it should be located or positioned in its environment, how its strengths must be developed and used, and how risks and opportunities will be faced. It also includes refining the basic and long-term ambitions, and translating them into more specific and short-term objectives, as well as the methods for their realization (Ramírez *et al*, 2019, p. 14).

With regard to FIME, its mission has as a priority training professionals with ethical principles and values, who are competent, competitive and innovative and are committed to achieving sustainable, scientific, technological and cultural development of society. In addition, it has the purpose of generating timely, relevant and transcendent contributions to the advancement of science, technology, innovation and the humanities, and to improving the level of human development of Nuevo Leon society and the Country. (FIME, 2021)

The academic plant that makes up FIME is made up of: 58 professors who have a bachelor's degree, 393 with a master's degree and 203 with a doctorate degree, which results in a total of 654 professors.

Based on the above, we can emphasize that FIME is a leading Institution concerned with the continuous improvement of its indicators that impact aspects such as Academic Capacity and Competitiveness, which positions it within the most recognized Engineering Schools in the country.

## Results

From the documentary analysis we found that: FIME has a Strategic Planning that is reflected in its Development Plan, which is structured based on its Priority Programs, in which the Priority Program stands out: Generation, application and transfer of knowledge for sustainable development; Among the policies are: "2.3 Full-time professors who are registered in the National System of Researchers will be promoted to form part of an Academic Corps cultivating defined and pertinent lines of generation and application of knowledge. Likewise, that the full-time professors who are part of the Academic Corps are registered in the National System of Researchers, preferably at the highest level". (FIME, 2019) (p. 86)

Other policies related to the Academic Corps that are found in the FIME Development Plan are: "2.13 Full-time professors who currently work in the faculty will be promoted to achieve the maximum academic qualification, as an essential aspect for the development and consolidation of the Academic Corps and of the undergraduate, postgraduate and research, innovation and technological development study systems". (FIME, 2019) (p. 86).

In addition, policy 2.15 states that: "it will ensure that the Academic Corps have a medium-term Development Plan that establishes the strategies that must be implemented to achieve their full evolution.

Based on these results and in its commitment to continuous improvement, a module was developed in the Comprehensive Planning System for Educational Services (SPISE) whose purpose is to be a tool that contributes to carrying out a tactical planning exercise for CAs that make up FIME. This system was developed by the Planning Coordination of FIME's Subdirectorate of Planning and Liaison and in its first phase its objective was to prepare Tactical and Operational Planning exercises for the different areas that make up the faculty, which are aligned to the UANL and FIME Development Plan.

In a second phase, the capture module was integrated into SPISE, which allows CA leaders to prepare a planning exercise in order to establish the guidelines so that they can transition to a degree of consolidation. As it is possible to see in figure 1, the user can select between doing his Operational Planning, or AC Planning in the case of being the leader of one.



Figure 1 User planning access screen

As shown in Figure 2, on the home page the members of the Academic Corps are listed, as well as the parts that make up the Planning: Diagnosis, Philosophy, Project, Timeline and Development in Prosa. In addition to this, it is possible to identify the research area to which it corresponds, as well as its current and expected status.



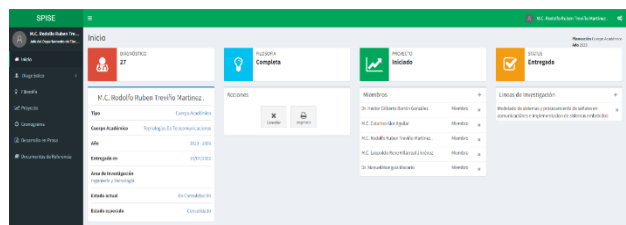


Figure 2 CA Planning Home Page

In figure 3, it is possible to carry out the current diagnosis of the AC by establishing the strengths and weaknesses corresponding to each of its categories. These categories are those established by PRODEP.

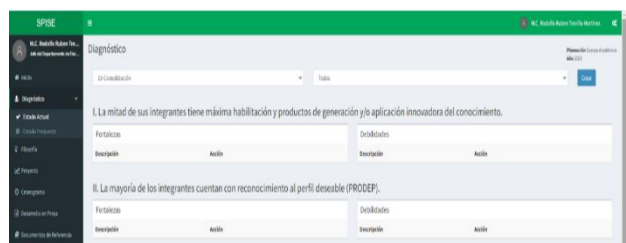


Figure 3 Diagnosis of the CA

It has a section that establishes the philosophy of the AC, i.e. its mission and vision, the purpose of which is to give direction to the work of the AC.

Next, the project is created in which the general objective, specific objectives, goals, strategies, actions and resources with which it is planned to achieve the consolidation of the AC are established (figure 4).

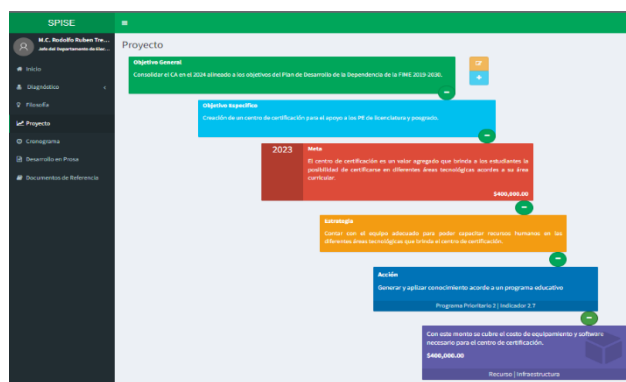


Figure 4 AC Project

Finally, as part of the planning, the project must be developed in prose, which has the following structure: mission and vision of the AC preloaded in the category of philosophy, introduction, justification, methodology and expected results, conclusions and references used.

Since the implementation of the system, 16% of the plans belonging to the different Academic Corps of the faculty have been collected. On the other hand, FIME has managed to increase the number of CA in its different areas of knowledge. The institution has 43 CA, of which 15 are consolidated (CAC), 15 in consolidation (CAEC), and 13 in formation (CAEF).

As can be seen in figure 5 below, the creation and consolidation of ACs has been increasing, which represents an achievement for the institution. And it is thanks to the improvement of substantive actions developed by the PTC, the obtaining of external recognitions, and the entrance to the National System of Researchers (SNI).

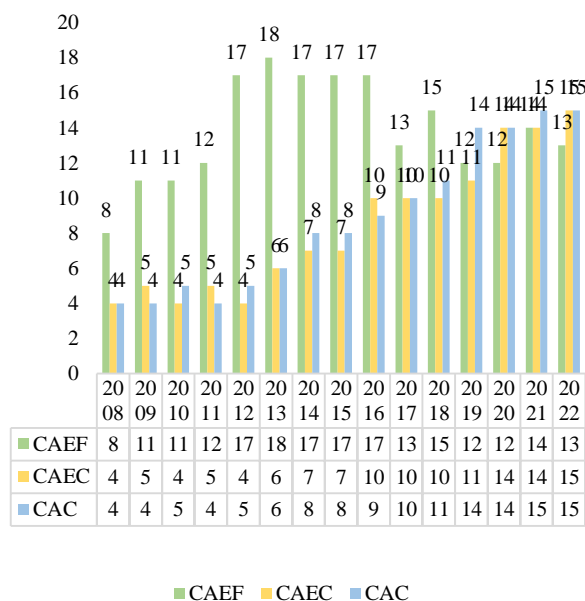


Figure 5 Evolution of the Academic Corps from 2008 to date  
Own Elaboration

Conclusions

Undoubtedly, having an Institutional Development Plan that promotes the strengthening of the Institution's Academic Corps, together with the support of administrative areas such as the Sub-Directorate of Planning and Liaison, which has the Strategic Planning and Academic Capacity Coordination Offices, which have worked constantly to design strategies that facilitate the work of the academic and administrative areas of the faculty, as well as the Academic Corps, has allowed the accompaniment for their transition to be successful.

On the other hand, it is worth mentioning the recent adverse periods such as the COVID-19 pandemic, which resulted in a considerable loss of professors, together with the decision of the members of the AC to retire, the changes in governmental educational policies in terms of restrictions on calls and economic stimuli for research may have repercussions on the reduction of the number of ACs in the faculty. In order to face these challenges, FIME, through various strategies established in its Development Plan, will continue to promote the creation and transition of ACs among its professors for the benefit of the educational programmes, which, in turn, favour university education.

A follow-up of the ACs is recommended in order to visualise the degree of consolidation achieved in subsequent calls for proposals.

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## Women in STEM, Experiences of Mexican Women Scientists

### Mujeres en STEM, experiencias de Científicas Mexicanas

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DOI: 10.35429/EJC.2022.15.8.27.37

Received September 18, 2022; Accepted December 30, 2022

#### Abstract

From a gender perspective, it is important to recognize that sexual differences are distinguished from social constructions based on these differences and, like stereotypes, are learned and transmitted culturally and where, historically, women have gone from exclusion to segregation in the field of science and their contributions to scientific knowledge. Even today, women still constitute a minority in training and professional itineraries in the scientific-technical field. Therefore, a study was oriented to make visible through a transversal analysis, to understand the different forms of discrimination, harassment and violence against women in the scientific field. For this purpose, a data treatment was carried out, such as the self-perception of discrimination and violence, in a measurable way, as well as the domestic chores, where it was observed the tendency of particular tasks such as the support with the children continues to be a task of greater proportion for women, which gives space to the exercise of motherhood and the labor and social discrimination itself. Finally, there were anonymous testimonies of discrimination and violence, from the voice of women scientists. Thus, while recognizing the work of numerous institutions, civil associations, the creation of instruments and departments in universities on gender issues and women's own self-recognition, we know that the task that remains pending is to address from the initial stage of school, the visualization of girls in science, the elimination of barriers that are socially and culturally present, breaking those gender roles and stereotypes that interfere in their training, so that science is neutral, without sex and/or gender, and on equal terms.

STEM, Science, Women Scientists

#### Resumen

Desde la perspectiva de género es importante reconocer que las diferencias sexuales se distinguen de las construcciones sociales basadas en estas y, al igual que los estereotipos, son aprendidos y transmitidos culturalmente y donde, históricamente, las mujeres han pasado de la exclusión a la segregación en el ámbito de la ciencia y sus aportaciones al conocimiento científico. Inclusive, hoy en día, las mujeres, todavía constituyen una minoría en itinerarios formativos y profesionales del ámbito científico-técnico. Por ello, se orientó un estudio para visibilizar mediante un análisis transversal, entender las diferentes formas de discriminación acoso y violencia en el ámbito científico hacia las mujeres. Para ello, se realizó un tratamiento de datos como, la autopercepción de discriminación y violencia, de una forma medible, así también, lo referente a las labores domésticas, donde se observó, la tendencia de tareas particulares como que el apoyo con los hijos sigue siendo una tarea de mayor proporción para la mujer, que da cabida con lo referente al ejercicio de la maternidad y la propia discriminación laboral y social. Finalmente, se contó con testimonios anónimos de discriminación y violencia, de la voz de las científicas. Es así, como sin dejar de reconocer, la labor de numerosas instituciones, asociaciones civiles, creación de instrumentos y departamentos en las universidades en materia de género y el propio auto reconocimiento de las mujeres, sabemos que la tarea que queda pendiente es la de abordar desde la etapa inicial de la escuela, la visualización de las niñas en la ciencia, la eliminación de las barreras que social y culturalmente están presentes, romper esos roles y estereotipos de género que interfieren en su formación, para que la ciencia sea neutra, sin sexo y/o género, y en igualdad de condiciones.

STEM, Ciencia, Científicas

**Citation:** SANDOVAL-PALOMARES, Jessica & GARCÍA-RAMÍREZ, Karina Nayeli. Women in STEM, Experiences of Mexican Women Scientists. ECORFAN Journal-Republic of Colombia. 2022. 8-15: 27-37

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## Introduction

In the 1960s, the concept of gender emerged within the field of psychology in its medical stream, to highlight a hitherto unacknowledged fact: there was something outside biological sex that determined identity and behaviour (1). The term gender contains the social definition of reproductive behaviour, which can be separated from the reproductive role per se (2). Gender therefore constitutes the explanatory category of the social and symbolic historical-cultural construction of men and women on the basis of sexual difference (1). What the concept of gender helps us to understand is that many of the things we think of as "natural" attributes of men or women are in fact socially constructed characteristics that are not determined by biology.

From the distinction between biological sex and the socially constructed, the use of gender began to be generalised to name many situations of discrimination against women, justified by the supposedly different anatomy, when in reality they have social origins. From a gender perspective, it is important to recognise that sexual differences are distinguished from social constructions based on them and, like stereotypes, are learned and transmitted culturally.

A gender perspective implies recognising that sexual difference is one thing and that the social attributions, ideas, representations and prescriptions that are constructed on the basis of sexual difference are another. When we speak of a gender perspective, we are referring to a conceptual tool that seeks to show that the differences between women and men are not only due to their biological determination, but also to the cultural differences assigned to human beings. Looking at or analysing a situation from a gender perspective allows us to understand that the lives of women and men can be modified to the extent that they are not "naturally" determined.

This perspective helps to understand more deeply both women's and men's lives and the relationships between them. This approach questions the stereotypes with which we are brought up and opens up the possibility of developing new content for socialisation and relations between human beings (3).

A more equitable and democratic development of society as a whole requires the elimination of discriminatory treatment against any group. In the specific case of women, half of the population, it has become an urgent necessity to take into account the cultural, economic and socio-political conditioning factors that favour female discrimination. These conditioning factors are not caused by biology, but by social ideas and prejudices, which are interwoven into gender (4).

Since Rossi addressed the question of the absence of women in scientific careers in her study *Women in science: why so few?* in 1965, interest in the relationship between science and gender has been growing. Science is a cumulative, methodical and provisional system of testable knowledge, the product of scientific research and concerning a specific area of objects and phenomena (5). Historically, women have gone from exclusion to segregation in the field of science and their contributions to scientific knowledge were for a long time invisible, forgotten, devalued and, what is worse, even taken away from them. Even today, they still constitute a minority in training and professional itineraries in the scientific-technical field.

According to figures from the United Nations Educational, Scientific and Cultural Organisation, the proportion of women researchers worldwide is substantially lower than that of men, accounting for only 28.8 % of the total number of women researchers worldwide and 45.4 % in Latin America (6). In the field of technology, the World Economic Forum reports that only 26 % of jobs in the technology sector are held by women (7). Analysis of these percentages shows that the field of science and technology is a masculinised sector in which women find it difficult both to enter and to remain in it, and to turn it into a full-time, long-term career. While specific obstacles for women are evident, the impact is far more wide-ranging, for example when trying to reach and stay in leadership positions in academia, business and/or public administration (8).

In Mexico, although the number of women in science and technology has grown year after year, men continue to outnumber them (9), especially at the higher levels of these professions (10).

Career and professional opportunities for men are also greater than for women (11). This is mainly due to the fact that in Mexico there is currently a significant gender gap in the study of STEM careers (12), which means that there is a smaller proportion of women studying or working in scientific and/or technological careers; it should be noted that in recent years there has been an increase in women's interest in participating in STEM areas (13).

It should be borne in mind that in Mexico, as is probably the case in several countries, women's roles are influenced to a large extent by culture; therefore, access to knowledge and to workplaces where the male sex predominates implies a greater effort to enter the labour market (14). Reducing the gender gap in STEM areas means making a change in the educational system and in the labour market that allows women to overcome social and technological barriers (15). In this regard, gender stereotypes at school age are one of the challenges encountered in getting more girls and young women to study a career in STEM, as they are transmitted in the family, at school and in the community at large, allowing them to remain, influencing scientific vocations and thus career choices (16).

The Freie Universität Berlin (17), proposes that the category of gender should be understood based on sexual difference, eliminating stereotypes or labels in which it was thought that this differentiation was biological, which led to the separation of women in certain areas because it was believed that they were incapable of performing optimally in various spheres, for example in the field of science, technology, engineering or mathematics and they were sent to other disciplinary fields, such as nursing, teaching, social work, among others.

The phenomenon of women in science becomes complex when other factors or roles are included. An example of this is when the scientist must choose between having or caring for children and continuing with a professional career, modifying her dress to avoid comments from her work colleagues, and sometimes feeling undervalued for her professional competence in research (18). It is clear that Mexican women scientists coexist with the machismo often present in academic practices, while trying to achieve recognition built on equity (19).

For this reason, in this chapter we intend to make visible, through a transversal analysis, the different forms of discrimination, harassment and violence against women in the scientific sphere.

## Methodology

### Methodological description

A cross-sectional study was carried out, with a target group of women who reported having scientific activity: work, as postgraduate or second degree students, post-doctoral stays and originating from Mexico.

### Data collection

In order to construct a scale of violence and discrimination in Mexican women scientists, an extensive literature review was carried out, with the aim of understanding the different forms of discrimination, harassment and violence as relevant social problems in the performance of women in the scientific field.

The first step in the construction of the questionnaire was to use the brainstorming technique, from which the first items emerged. The second step was to use the nominal group technique, according to the evaluative judgement of 12 inter-judge participants. This technique allows the selection of the most highly rated items.

Finally, the scale was constructed, the items that make up the questionnaire are a total of 132, with which a first exploratory study was carried out. The items are separated into 5 groups:

- 17 items on general information, area in which he/she works and academic-work situation.
- 15 items on household chores.
- 6 items on the exercise of motherhood.
- 8 items on socio-economic indicators.
- 86 items on self-perception of harassment, violence, discrimination and tolerance.

The responses to the items assess the absence or presence of the behaviours through five Likert response alternatives from 0 to 5 (0= Not at all/Never, 1=Very little/Frequently, 2= A little/Sometimes 3= Moderate/Many times 4= A lot/Almost always 5 Excessive/Always), some dichotomous, others multiple choice, closed; and, some more, open (with the aim of clarifying some situations or experiences). The instrument was applied digitally. An open invitation was made in February 2022, through social networks, establishing as inclusion criteria to be a Mexican woman with scientific activity.

## Results

The sample consisted of 44 people who responded to the questionnaire. Of these responses, only one was excluded because the questionnaire was incomplete, leaving an n=43.

### Socio-demographic data

Of the total number of participants, 95.3% identified as female and 4.7% belonged to the LGBTTTI+ community. Likewise, the participants' ages ranged from 25 to 63 years, with a mean age of 35.6 years. Regarding place of residence, 93% of the participants currently reside in Mexico, while 7% reside abroad. Finally, with regard to marital status, the majority reported being single (44.19%), 39.53% married, 9.30% in a common-law relationship, 4.65% divorced and 2.33% separated.

### Employment data

Regarding the occupation of the respondents, 30.23% are studying a postgraduate degree, 25.58% are engaged in teaching-research and 23.26% are engaged only in research activities. In addition, 6.98% stated that they are completely dedicated to teaching, while the rest (39.53%) carry out combined activities of teaching, research and/or academic or post-doctoral stay.

On the other hand, 67.44% stated that they were engaged in paid activities, while 32.56% stated that they had no employment relationship at the time of the interview. Of those women who are currently working, 30.2% work under a contract for class hours, 20.9% work for 40 hours/week/month and have obtained a permanent job.

Only 2.3% are permanent in positions of more than 40 hours/week/month; while the rest (46.6%) have part-time contracts (part-time, more than 20 hours, but less than 40), with or without permanent status.

### Academic data

Although the questionnaire had a specific question about the area in which they worked (taking as a reference the areas recognised by CONACYT), the results showed that most of the interviewees declared that they worked in more than one area of knowledge, as shown in Table 1.

knowledge areas	Percent
Biology and Chemistry.	25.6
Medicine and Health Sciences.	14
Engineering.	9.3
Physics, Mathematics and Earth Sciences.	9.3
Humanities and Behavioral Sciences.	7
Social Sciences.	7
Biology and Chemistry, Medicine and Health Sciences.	4.7
Biotechnology and Agricultural Sciences.	4.7
Biology and Chemistry, Biotechnology and Agricultural Sciences.	2.3
Biology and Chemistry, Engineering.	2.3
Multidisciplinary.	4.7
Physical Mathematics and Earth Sciences, Biology and Chemistry.	2.3
Physics Mathematics and Earth Sciences, Biotechnology and Agricultural Sciences.	2.3
Physical Mathematics and Earth Sciences, Engineering.	2.3
Humanities and Behavioral Sciences, Social Sciences.	2.3

**Table 1** Distribution of interviewees, by area/s of knowledge

Finally, regarding the recognition and benefits to which the interviewees have access, only 16.27% have the recognition as Desirable Profile (PRODEP), 20.93% are members of the National System of Researchers, 9.30% had access the previous year to Performance Stimulus for Teaching Staff; and only 4.6% participated in the call for Extraordinary Stimuli. Likewise, 27.9% reported having obtained a grant (25.58% from CONACYT for postgraduate studies (SNP), and 2.32% a grant for a research stay (Mexican Council of Science and Technology, COMECYT).

### Domestic work

The following results show how the distribution of household chores is carried out, divided into two sections, married or in union and single, separated or divorced women, in order to give a greater context to the data.

The activities taken into account were six, focused on determining the main items in terms of a contribution to unpaid economic value in households, which are considered by INEGI (Unpaid Work in Households (inegi.org.mx)), Care and support, activities of providing food and activities of maintenance and cleaning of the dwelling.

**Married or cohabiting women**

Specifically for married or cohabiting women, it was observed that participation is divided according to the type of work, that in terms of food preparation and support with children, women are mainly in charge, while the payment of services to the partner.

Activity	Responsible				
	My husband / wife	Other family member*	Me	Me and my husband / wife	Me + Other family member*
Food preparation	9.5	4.8	47.6	33.3	4.8
Washing dishes	23.8	4.8	28.6	33.3	9.6
Laundry	23.8	4.8	28.6	33.3	9.6
Household cleaning	4.8	0	23.8	42.9	4.8
Supporting children with school work	14.3	0	33.3	19	0
Bathing children	4.8	0	28.6	19	0
Pet care	9.5	0	33.3	23.8	19.2
Paying utilities	47.6	0	33.3	19	0

**Table 2** Percentage of respondents declaring their participation, individually or shared with other family members, in household chores. Data are presented as frequencies. \*Other family members=parents, siblings, in-laws, brothers and sisters in law

**Single, separated or divorced women**

The following table shows that the women who are single, separated or divorced are in charge of all the items considered in the analysis, as indicated in table 3.

Activity	Responsible				
	My husband / wife	Other family member*	Me	Me and my husband / wife	Me + Other family member*
Food preparation	0	9.1	77.3	0	13.6
Washing dishes	0	4.5	68.2	4.5	18.1
Laundry	4.5	9.1	77.3	0	4.5
Household cleaning	0	9.1	63.6	0	18.1
Supporting children with school work	4.5	4.5	36.4	0	0
Bathing children	4.5	9	31.8	0	0
Pet care	0	4.5	68.2	0	4.5
Paying utilities	4.5	9.1	68.2	4.5	4.5

**Table 3** Percentage of respondents declaring their participation, individually or shared with other family members, in household chores. Data are presented as frequencies. \*Other family members=parents, siblings, in-laws, brothers and sisters-in-law, brothers and sisters-in-law, sisters and brothers and sisters-in-law.

**Exercise of motherhood**

The results showed that 51.16% have no children, while 48.83% have children (13.95% reported having two children and 34.88% reported having only one child). During

During the gestation period, only 9% had access to paid medical leave, while 32.6% were forced to resign from their jobs or take leave of less than 45 days as stipulated by law.

After the birth of their children, 6.97% of the interviewed women held full responsibility for the care of the baby, while the rest (93.03%) declared to have shared the responsibility with their partner, with other family members or to have hired people and/or services for the care of the child.

With regard to household chores, only 4.65% of women with children reported maintaining their level of responsibility for these tasks after the birth of their children, while the rest (95.35%) reported an increase in the participation of their partner, other family members or hired persons and services for these duties.

**Economic dependency**

46.51% of the women depend exclusively on their income, while the rest (53.49%) share expenses with their partner and/or other family members.

**Self-perception of violence and discrimination**

When respondents were asked about their knowledge of the bodies or institutions in charge of monitoring and addressing situations of violence and discrimination, 41.86% stated that they did not know of any such bodies.

When asked about some acts of violence, the perception of a high level of violence (3= Moderate, 4= A lot or 5= Excessive) stands out for most or all of the interviewees (Table 4).

Action	Level 3	Level 4	Level 5
Undue physical approach	18.6	11.6	55.8
Deliberate physical contact	7	16.3	67.4
Intentional touching	9.3	14	72.1
Receiving obscene comments	23.3	23.3	51.2
Receiving sexual comments	16.3	23.3	60.5
Unwanted looks at the body	20.9	23.3	44.2
Masturbating in public places	0	16.3	81.4
Showing genitals	0	11.6	86
Hitting	0	0	95.3
Verbal aggression	7	16.3	69.8
Invasion of pregnant/elderly/disabled spaces.	20.9	20.90%	44.2
Obscene gestures	16.3	23.3	51.2

**Table 4** Perception of the level of violence in different acts. Data are presented as frequencies

Respondents were also presented with a list of violent or aggressive acts and asked if these had been perpetrated against them. Table 3 shows the percentage of women who stated that they had been victims of such aggression at least once in the last year.

Aggression received	Occurred at least once within the last year
Undue physical approach (distance of less than 10 cm torso to torso).	37.21
Harassment, defamation or persecution on social networks	27.91
Violation of privacy on social networks (publication without permission of photos, videos or private information)	6.98
Receiving intentional touching on private parts (genitals, mouth, waist, legs)	20.93
Receiving obscene comments	51.16
Having obscene gestures or signs made to you	46.51
Being subjected to leering (insistent, suggestive or insulting looks at various parts of the body)	62.79
Seeing/Feeling/Hearing someone masturbate in public places	11.63
Having someone show you their genitals	6.98
Being intentionally hit	4.65
Being verbally assaulted (insults, shouting)	44.19
Being threatened or intimidated	37.21
Being manipulated	46.51
Being humiliated or discredited	55.81
Being isolated or prohibited from visiting or contacting certain people	20.93
Being forced to provide personal information about calls, messages, contacts and other activities you do on your cell phone	9.3
Being restricted from using/spending/ investing your own money or wealth	23.26
Being forced to provide your financial information (income, expenses, assets, wealth) to your partner, family members or friends	6.98
You have been forced to perform household chores under unequal conditions with respect to other family members	39.53
Invasion of spaces for the exclusive use of certain community/s to which you belong (seats for pregnant women or the elderly, bathrooms, smoke-free places, etc.).	34.88

**Table 5** Violent or aggressive acts of which the participants have been victims. The data are presented as frequencies

They were also asked about specific discriminatory acts. They reported having been discriminated against at least once in the last year, according to the following percentage distribution in Table 4.

Discriminatory act	Occurred at least once within the last year
Being discriminated against on the basis of gender (for being a woman or for being from the LGBTTI+ community).	51.16
Being discriminated against for having a disability	9.3
Being discriminated against for having a disease or special health condition (physical or mental)	16.28
Being discriminated against because of your skin color	23.26
Being discriminated against because of your dress	34.88
Being discriminated against for having tattoos, piercings or piercings	6.98
Being discriminated against because of any other physical characteristic (facial features, hair color, height, complexion, etc.)	30.23
Being discriminated against because of your trade or occupation	9.3
Being discriminated against because of your religious beliefs	9.3
Being discriminated against on the basis of political or social ideology	20.93
Being discriminated against because of your age (for being very young or for being an older adult)	30.23
Being discriminated against, excluded or made invisible in the discourse of other people (teachers, colleagues, civil servants, officials, elected officials)	62.79

**Table 6** Discriminatory acts of which the participants have been victims. Data are presented as frequencies

**Conclusions**

Among the data to be highlighted in the research, it stands out that the occupation of the respondents is studying a postgraduate degree or are engaged in teaching-research or research. This gave us a good basis for the specific and potential observations that can be made in this study.

Regarding the participation of married women in domestic chores, it was found that there is a separation of tasks between the couple and her, however, most of them state that their participation in the preparation of food, supporting the children with academic tasks and bathing the children is still greater. The percentages change drastically with single, separated or divorced women, where all domestic activities are theirs.



With regard to the exercise of maternity, it is worth noting that, during the pregnancy period, 32.6% were forced to resign from their jobs or take leave of less than 45 days as stipulated by law, and after the birth of their children, the majority received support, either by sharing responsibility with their partner or with other family members, or even by hiring staff. Similarly with household chores after the birth of their children.

On the other hand, when asked about their knowledge of the bodies or institutions in charge of monitoring and dealing with situations of violence and discrimination, 41.86% stated that they did not know of any such body. It is worth noting that all of them showed that they were involved in or participated in violent acts, highlighting the perception of a high level of violence, ranging from moderate to excessive, including women who stated that they had been victims of these aggressions at least once in the last year.

Among them, being the object of leering at the body, being humiliated or discredited, having exclusive use spaces invaded and being verbally assaulted (insults, shouting), among many others, addressed and detailed in the study. Likewise, regarding specific discriminatory acts, they indicated having been discriminated against, excluded or made invisible at least once in the last year.

The above gives us a sample of what has been made visible and the points to focus on in terms of equity and the creation of programmes and education on the gender perspective, now more than ever, when the participation of Mexican women in science is affected by a phenomenon known as the scissors or pyramid effect (20), in which the number of women is lower as they advance in their professional careers in the scientific field; This phenomenon is also observed in other fields, e.g. the number of female managers in companies is lower than the number of male managers (21).

On the other hand, the trickle-down effect refers to the fact that women are disappearing through the cracks in the system, to the point of disappearing in some areas, which gives continuity to the metaphor of the glass ceiling and glass walls, which is used to explain the difficulties faced by women in different areas (22).

The glass ceiling, according to the above, is the difficulty women face in gaining access to decent working conditions that keep them away from precariousness, informality and poverty; glass walls are those that keep them away from the spaces of change, glass ceilings are the difficulty to occupy and remain in management and decision-making positions; being invisible, transparent, and made of glass, they are not visible, they are fragile, and are the tip of the iceberg of the oversaturation of work, care of the home and family (23).

The role played by various institutions in recognising the activity of Mexican women in science is important. To mention a few, the Group for Women in Science (GPMC) was one of the first to take an interest and create the first programme to promote the participation of women scientists); As a result of these movements, women from other areas of knowledge have joined in, which is why it was necessary to form the Mexican Association of Women in Science (AMMEC) with the aim of encouraging participation in science and promoting the professional development of the country's women scientists.

The task that remains to be done is to address the visualisation of girls in science from the initial stages of school, to eliminate the barriers that are socially and culturally present, to break down the gender roles and stereotypes that interfere in their training, so that science is neutral, without sex and/or gender, and on equal terms.

### Testimonies

Finally, participants had a space where they were free to add comments and experiences of violence, harassment and discrimination, based on the question: In the last year have you been a victim of violence/harassment/discrimination? Describe the situation(s). Responses will be displayed below, while maintaining anonymity.

Violence and harassment
A fellow teacher makes inappropriate comments to me and even forced me into unwanted contact.
A man in the area where I am who has a higher level than me invited me to go out and to pass by me, but he was so insistent that he made me feel uncomfortable, how I did not accept the invitation he began to have acts of sabotage against me.
A co-worker follows me, takes pictures and videos of me, I went to my boss and he never did anything.
Working conditions have been taken away from me, I have been intimidated with taking complaints to higher instances and have been excluded from work activities proper to my category
Patients and colleagues who think it is okay to make comments about how pretty my body is or suggest how I should dress to look better, more feminine
Unwanted stares, obscene and sexual comments, comments that minimize personal feelings and professional knowledge.... Impersonating my identity on networks
I was diagnosed with depression and burnout, when I went to my thesis director to explain the situation and that it was affecting me, he dismissed all of that and reduced it to, the only thing you should worry about is what you will do once the fellowship is over. He has constantly made me feel less academically by displacing me or not considering me.
Gaslighting on a daily basis where I gave my social service and sexual harassment at the last place I work.
At my job I was harassed until I quit because of a mistake made in the past because of a disabling condition due to a depressive illness
In the lab...an acquaintance took pictures of my legs and showed them to everyone, including my thesis advisor...he got a laugh out of it too
My thesis advisor asked me things about my body when I told him I was pregnant...very uncomfortable questions
I have had to do chores (cleaning, tidying up) unequally with other team members, just because I am a woman
In my lab one of my classmates, playing, forcibly kissed me, I reported it and my tutor told me that he would have done the same...now nobody talks to me or takes me into account for articles. I tried to write on my own and asked for support in a facebook group exclusively for Mexican women scientists... the next day my tutor spoke to me to threaten me saying that he was going to get me into legal, academic and ethical problems if I tried to write on my own... to date I have no article.
I sought psychological help for my son with ADHD, the psychologist I found, told me that he was going to make me a dynamic to help me get out all the anger against my son, he ended up touching me.
In the laboratory where I was doing my master's degree I suffered harassment by a colleague and when I commented it, no one in the institution helped me.
Several years ago, a former co-worker (industry) harassed a colleague and me, he made lewd comments, touched us in an unwanted way, he made inappropriate approaches to my colleague several times.
In my job... deliberate physical contact, unwanted looks at the body, receiving sexual comments.

Discrimination
I finished my PhD fellowship... I requested support from my tutors for being SNI3, but I was not a candidate... I was told to tell my parents to support me or to get a husband so he can do it.
Because I am a woman they don't call me to be PI, they call the doctor I share a practice with. They call me Miss, even when they look for me for a consultation and on some occasions I have lost patients because the husband prefers his wife to be treated by a man.
Because I am a woman, I have been deprived of many opportunities to join certain commissions.
I have not been taken into account or taken seriously because I am a woman.
Where I work, I am not allowed to do some activities because I am a woman... I am not allowed to collaborate on articles in my lab
I was discriminated against in a competitive examination because I am a woman, because of my age and my hierarchical level.
I filed a complaint for discrimination... Because of the complaint I filed, my other coworkers stopped talking to me and they talk about me all the time. When I decided to become a mother I was denied rights such as the student exchange, arguing that it was because I decided to become a mother."
I have been treated unequally by coworkers, who believe that because I am a woman they can treat me as if I were their slave
I had a nervous breakdown due to a hormonal imbalance... I told my boss about it and he told me that we were already in bad shape.
I went through a nervous breakdown due to a hormonal imbalance... I told my boss and he told me that we were already in bad shape.
They make me feel different for being a woman in the lab...isolate you from work and leave you without conditions comparable to the rest.
I always have to subtly say that I am doing my PhD and the treatment changes completely.
I have learned that in the work environment preference is not by merit but by compadrazgo and if you are a man, the better.
There was a situation where I was studying Dutch, a professor always scolded me and corrected my pronunciation and in the end he ended up telling me that as a woman I have to try harder because I am intellectually inferior.

Table 7

Conclusions

Among the data to be highlighted in the research, it stands out that the occupation of the respondents is studying a postgraduate degree or are engaged in teaching-research or research. This gave us a good basis for the specific and potential observations that can be made in this study.

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The role played by various institutions in recognising the activity of Mexican women in science is important. To mention just a few, the Group for Women in Science (GPMC) was one of the first to take an interest and create the first programme to promote the participation of women scientists; Later, the Grupo de Mujeres en la Ciencia del área Fisiológica (GMCF) was set up; from these movements, women from other areas of knowledge joined, which is why it was necessary to create the Asociación Mexicana de Mujeres en la Ciencia (AMMEC) with the aim of promoting participation in science and promoting the professional development of the country's women scientists.

The task that remains to be done is to address the visualisation of girls in science from the initial stages of school, to eliminate the barriers that are socially and culturally present, to break down the gender roles and stereotypes that interfere in their training, so that science is neutral, without sex and/or gender, and on equal terms.

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# Instructions for Scientific, Technological and Innovation Publication

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*Institutional Affiliation of Author including Dependency (No.10 Times New Roman and Italic)*

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**Abstract (In English, 150-200 words)**

Objectives  
Methodology  
Contribution

**Keywords (In English)**

Indicate 3 keywords in Times New Roman and Bold No. 10

**Abstract (In Spanish, 150-200 words)**

Objectives  
Methodology  
Contribution

**Keywords (In Spanish)**

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## Introduction

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General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

Explanation of sections Article.

## Development of headings and subheadings of the article with subsequent numbers

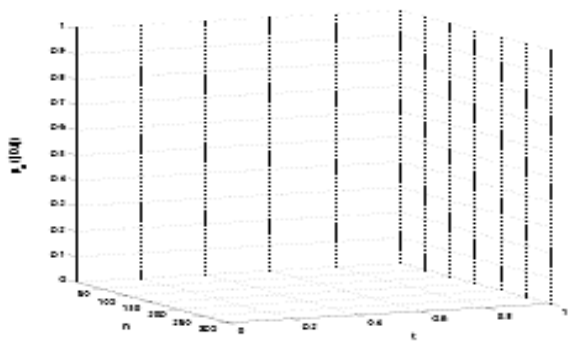
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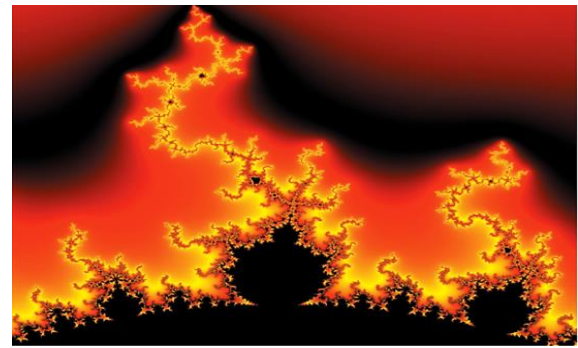
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Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

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