# Estudio sobre ciberpatologías en estudiantes universitarios: antes y después de la covid-19

## *Study on Cyberpathologies in University Students: Before and After COVID-19*

## *Estudo sobre ciberpatologias em estudantes universitários: antes e depois do covid-19*

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## Resumen

El uso excesivo de las nuevas tecnologías por los jóvenes universitarios ha ocasionado problemas de salud que potencializan afectaciones biológicas, psicológicas y sociales. Aquí se realiza un análisis comparativo sobre el nivel de afectación antes y después de la pandemia de la covid-19 por el uso excesivo de tecnologías (ciberpatologías) en estudiantes universitarios de la Facultad de Contaduría y Administración de la Universidad Veracruzana campus Coatzacoalcos. Para la recolección de datos, se elaboró una encuesta aplicada a través de Google Forms. Con la información recolectada, se utilizaron técnicas descriptivas con el objetivo de comparar las muestras a partir de la hipótesis de estudio. Los resultados muestran evidencia empírica sobre que los estudiantes son proclives a padecer ciberpatologías. Esto demuestra la necesidad de indagar de manera explicativa los factores que las ocasionan. Las afectaciones demostradas implican la necesidad de generar políticas públicas educativas que busquen atender este problema en las universidades.

**Palabras clave:** ciberpatologías, covid-19, estudiantes, tecnologías, universidad.

## Abstract

The excessive use of new technologies by young university students has caused health problems that potentiate biological, psychological and social affectations. Here, a comparative analysis is made on the level of affectation before and after the covid-19 pandemic due to the excessive use of technologies (cyberpathologies) in university students of the School of Accounting and Administration of the Universidad Veracruzana, Coatzacoalcos campus. For data collection, a survey was elaborated and applied through Google Forms. With the information collected, descriptive techniques were used with the objective of comparing the samples based on the study hypothesis. The results show empirical evidence that students are prone to suffer from cyberpathologies. This demonstrates the need to investigate in an explanatory way the factors that cause them. The affectations demonstrated imply the need to generate educational public policies that seek to address this problem in universities.

**Keywords:** cyberpathologies, COVID-19, students, technologies, university.

**Resumo**

O uso excessivo de novas tecnologias por jovens universitários tem causado problemas de saúde que têm um potencial impacto biológico, psicológico e social. Aqui realizamos uma análise comparativa do nível de afetação antes e depois da pandemia da covid-19 devido ao uso excessivo de tecnologias (ciberpatologias) em estudantes universitários da Faculdade de Contabilidade e Administração da Universidade Veracruzana, campus de Coatzacoalcos. Para a coleta de dados, foi elaborada uma pesquisa utilizando o Google Forms. Com as informações coletadas, foram utilizadas técnicas descritivas a fim de comparar as amostras com base nas hipóteses de estudo. Os resultados mostram evidências empíricas de que os estudantes são propensos a ciberpatologias. Isto demonstra a necessidade de uma pesquisa explicativa sobre os fatores que as causam. As afetações demonstradas implicam na necessidade de gerar políticas públicas educacionais que busquem abordar este problema nas universidades.

**Palavras-chave:** ciberpatologias, covid-19, estudantes, tecnologias, universidade.

## Introduction

Currently, information and communication technologies (ICT) have been adopted as the main educational tool for universities in order to face the challenges of the environment (Aguilar, 2012; Díaz-Barriga, 2013; Granados, 2015; Hernández, 2017; Suárez and Custodio, 2014). In 2020, the 2019 coronavirus disease (covid-19) pandemic forced the education sector to implement educational strategies associated with ICTs (Brítez, 2020; Castellano, Almagro, and Fajardo, 2021; Díaz, Almerich, Suárez, and Orellana, 2020; Flores, Ortega and Sousa, 2021); However, the lack of resources and capacities of the universities in the implementation of an improvised educational model caused problems in the students that led to biological, psychological and social effects (González, Gastélum, Velducea, González & Domínguez, 2021; Sánchez , 2021).

After three decades, ICTs have modified the dynamics of education, research and work in organizations (Mena, 2019). Today, because they are the most popular and used digital media to communicate regardless of the distance, the moment or the individual, they are essential for universities (Morado and Ocampo, 2018). Due to their ease for the transfer, processing and acquisition of information, they are considered a benefit for personal and social development (Echeburúa and Requesens, 2012).

The simplicity and attractiveness of the ICT interface has caused its use to grow rapidly until it blends in with everyday life. Thus, they are no longer considered only as

a support for carrying out activities, but have become essential for the survival or happiness of some. On the other hand, they also affect motivation, more autonomous learning and a more innovative and participative teaching condition; however, it is pertinent to point out that its use should be moderate to seek and maintain social relationships and connection with family and friends (Plaza, 2021).

After becoming catalysts for the acceleration of social transitions (Clemente, August 10, 2018; Grande, Cañón and Cantón, 2016), and being part of the usual, family, academic and leisure life, it is imperative to monitor the development of the habits of almost uninterrupted use of technologies that young university students manifest, because, being the closest to integrating into working life, they can become victims of addictions correlated with excessive and inappropriate use of these. In short, they may spend more time in the virtual world than in the real one (Acier and Kern, 2011), neglecting work or domestic activities. In fact, it is a research topic that, under various labels and approaches, has been studied over many years.

Based on what has been described above, the objective of this research is to compare the level of affectation due to the use of ICTs (cyberpathologies) before and after the pandemic. For this, the following hypothesis has been proposed: there are statistically significant differences in the level of affectation by the use of ICT (cyberpathologies) before and after the covid-19 pandemic in the students of the Faculty of Accounting and Administration ( FCA) of the Universidad Veracruzana (UV) Coatzacoalcos campus.

## Literature review

According to Matute and Vadillo (2012), the psychiatrist Iván Goldberg, in 1995, was the first to use the term internet addiction. In a forum, Goldberg coined what is considered the first definition for the disorder by stating that it is an "adaptive pattern of Internet consumption, leading to clinically significant impairment or distress" (p.21).

This definition meant a scientific watershed because, from that moment on, a debate began that has been addressed in the disciplines of psychology, medicine, neurology, anthropology, sociology about the existence of said disorder, without reaching a consensus to date. , to such an extent that in the Supplement to the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2017) it is not yet cataloged and they recommend carrying out more studies to support this mental phenomenon. For this reason, several authors, for 20 years, have been carrying out inquiries in this regard (see table 1).

**Table 1.** Several author's Perceptions of digital media addiction or cyber addiction

| Author | Definition |
|---|---|
| Griffiths (1997) | Non-substance addiction which involve either passive or active man-machine interactions.. |
| Young (2005) | Impulse control disorder caused by abnormal usage non related to substance intoxication.. |
| Ortiz & Muñoz (2005) | Behaviors and cognitions associated with the dysfunctional usage of the Internet whose negative consequences encompass the personal, professional or academic spheres for the user. |
| Navarro & Rueda (2007) | Defined as the state of excitement when people surf the net for too long... |
| Kandell (2009) | Psychological dependence on Internet. |
| Degoy & Luque (2013) | Subtype of behavioral addiction defined as an unadaptive behavioral pattern towards technology mainly, which consists of compulsive and indiscriminate use of it. |
| García (2013) | Behavioral addiction and abuses related to frequency of use, invested money, need or compulsion of Internet, as well as interferences in daily life. |
| Fandiño (2015) | Continuous and uncontrolled usage of Internet, becoming this way essential in life |
| Chóliz, Echeburúa & Ferre (2017) | Rising addictions related to the development of ITC. |
| Savci & Aysan (2017) | When the excessive usage of technologies and the unsatisfied desire of it are present, they generate both an abandonment of activities and an alteration of social relations. Excessive usage of internet becomes a release from negative emotions and the stress of life; it then becomes difficult to quit and reduce Internet usage; the subject becomes nervous and anxious when it is not possible to use it, and he deceives others regarding the duration and amount of usage |
| Malander (2019) | Tech addictions are considered amongst the so-called "non-toxic addictions". They constitute dependance |

| | processes like those caused by other factors, such as sex, gambling, work. |
|---|---|
| Toto & Strazzeri (2019) | In the technological addiction, the individual lives in a split reality, that is experiencing their daily life and virtual situation in which they project their desires and illusions freely.. |
| Roa (2019) | Technological addictions refer to the problematic interactions between a person and the different screens, that is: television, video games, mobiles, tablets, computers devices. |
| Kaypakli *et al.* (2020) | Dysfunctional usage patterns |

Source: Self-developed

What is stipulated by the various writers denotes a concordance in terms such as dysfunctional use, dependency, excitement, denial, isolation, anxiety and reveals the possibility of a pathology hitherto underestimated. And right at this point it is possible to define a definition of the ubiquitous term: cyberpathology: addiction to the excessive use of technology that brings negative consequences in the various contexts (academic, work, family, social) where users work.

Hence, a series of repercussions derived from cyberpathologies emanates. Young (2005) affirms that isolation and inattention to work, academic and social life obligations can originate. The foregoing coincides with what was stated by Ko, Yen, Chen, Chen and Yen (2005), who assert that the consequences materialize in complications in studies, at home, in social relationships and in school rules. While Navarro and Rueda (2007) testify that physical and mental health problems are generated, which leads to living with people for short periods and therefore having difficulties in relating. For their part, Kandell (2009) and Griffiths (1997) reflect on the behavior that prevails in the patient, who manifests discomfort when not online, tolerance and denial of his problem, overvalued importance, altered mood, withdrawal, conflict and relapse. In this same vein, Domínguez et al. (2012) add that he may experience emotional discomfort, psychological dependence, interference in his social relationships, reduction in physical activity or distortion of the user's body image. Roa (2019) completes confirming that they suffer from psychological impoverishment as a consequence of the loss or deterioration of offline activities and socio-family relationships.

Taking into account what was mentioned above, the affectations can be classified into three large groups: biological, psychological and social. The biological affectations

are highly related to the physical health of people, they are perceived in ocular tension, tendinitis, palmar nedrinitis, hearing loss, De Quervain's disease or tenosynovitis, insomnia, electrosensitivity, overweight and obesity (Quintero, Munévar and Munevar, 2017). The psychological ones are pathologies that put men's mental health at risk, such as addiction to social networks, fear of letting go syndrome (FOMO), phubbing, nomophobia, cyberchondria, dissociative identity disorder, whatsappitis, nintendinitis, wiitis and phantom vibration syndrome (Gil, del Valle, Oberst and Chamarro, 2015). The social ones are those in which the individual's relationships with hers with family and friends are diminished: the virtual socialization process is sought more than the real one. According to Ortiz and Muñoz (2005) and Carbonell, Fúster, Chamarro, and Oberst (2012), they can be cyberrelationships, cybersex, cybercompulsion, grooming, cyberbullying, phishing, and addiction to videogames.

Similarly, there are risk factors that can have an impact on reinforcing the vulnerable conditions in which a user of technology finds himself. According to de la Villa and Suárez (2016), these factors can be personality deficits (marked introversion, low self-esteem and high level of sensation seeking), deficits in interpersonal relationships (shyness and social phobia), cognitive deficits ( uncontrolled fantasy, scattered attention and tendency to distraction) and psychopathological alterations (present or past chemical or psychological addictions, depression, etc.).

However, higher education institutions (HEIs), as active organizations, promote changes in their structure and in the way of reacting to internal and external demands from their internal stakeholders (Clark, 1998), and characterized by absorption, adaptation and technological diffusion, act as an important factor of economic development and technological catching up (Pedroza and Silva, 2020). In this sense, the responsibility for the academic training of individuals who are in the university stage, where it is possible for them to reach the bases for a socially responsible autonomy, and who will direct the course of the country, falls on the HEIs, and therefore, These are the ones that must train people capable of solving social, cultural and environmental problems to guarantee a sustainable ecosystem (Martí, Martí and Almerich, 2014; Sainz et al., 2019). And it is precisely through university social responsibility (RSU) that HEIs can manage a social projection with a view to addressing the needs and problems of the community and the university context (Clara, Sainz and Chiñas, 2019). Unfortunately, the adoption of corporate social responsibility (CSR) practices is not mandatory. That is why, according to Londoño (2013), developing a USR model entails having the will of senior management as an essential starting point, and thus beginning the process, analysis

and understanding of the philosophy and policy institutional, because it is not possible for a successful university to exist in failed societies (Sainz, Chiñas y Aguirre, 2021).

This model represents a real challenge because it must be robust enough to incur in a benign way in the appropriate use of technologies through guidance, prevention and effective intervention (Zednik, López, Tarouco & Zunguze, 2015), in such a way that these new whiplashes of digital vices do not represent such a risk that future professionals will contract cyberpathologies.

The National Survey on Availability and Use of Information Technologies in Households (Endutih), carried out by the National Institute of Statistics and Geography [Inegi] (July 4, 2022) in collaboration with the Federal Institute of Telecommunications (IFT), in 2021, in Mexico, approximately 7 out of 10 people are Internet users, above countries such as South Africa and Colombia. Of the population of people aged six years or older, 75.6%, which is equivalent to 88.6 million, were Internet users; the highest percentage was concentrated in the age range of 18 to 24 years, with a participation of 93.4%, followed by individuals between 25 and 34 years, with 90.0%. This behavior was replicated in relation to the average time of Internet use per day and per person, since the group from 18 to 24 years of age heads the list, with an average of 4.8 hours, showing an evident increase of 1.7% since 2017. to 2021, followed by the group made up of individuals from 25 to 34 years old, with 5.6 hours; This fact can be verified with the increase of 19 percentage points in the number of people who connected from their homes, going from 53.0% to 72.0%, from 2017 to 2021. Regarding the frequency of connection, 89.2% all connected the days of the week. Within the main uses of the Internet, it was found that 93.8% did so to communicate, 89.9% to search for information and 89.8% to access social networks. Higher education students are a population vulnerable to mental disorders, even more so during the covid-19 pandemic. His mental health has been affected by the confinement, the difficulties in the development of academic activities and the demands of the new pedagogical modalities (Zapata *et al*., 2021).

The covid-19 pandemic influenced almost all people and in all areas, that is, it can be observed from multidimensional perspectives, since it changed common habits to live, study and work, until it manifested itself in the so-called new normality. In this way, study and work are turned towards remote realization throughout the world, as a condition to continue with the teaching processes and with the productivity of the economic sectors. For two decades, ICTs have been adopted in online learning practices and have become an essential tool in higher education in many countries.

However, despite the introduction of interactive activities and the inclusion of synchronous online sessions, the online learning context offers a distinctive pedagogical approach as opposed to face-to-face learning that involves an adjustment and willingness to participate in a learning experience. effective learning (United Nations Educational, Scientific and Cultural Organization [Unesco], 2020, cited in Shafaq, Asli, Memon, Ahmad and Soomro, 2021). The sudden closure of educational institutions during the pandemic accelerated the transition from the traditional face-to-face learning model to an online learning model, which represented great challenges for both developed and, more notably, developing countries (Shafaq et al.,2021).

On the one hand, it exposed the great digital divide, not only in terms of technological infrastructure, but also in the use of technologies. For developing countries, digitizing education and work represented a great challenge; although, at the macro level, countries with strong distance education structures and institutions with significant advances in virtual learning were able to react more quickly, being able to face and take advantage of the current circumstances derived from the pandemic. On the other hand, covid-19 has forced all institutions and teachers to venture into training in the use of ICT to give continuity to their courses and rescue teaching processes. One positive thing is that this forced incursion will probably attenuate the perception of virtual education and even eliminate fears about the use of ICT in education (Toro, 2020). However, it should be considered that, as a consequence of forced digitization, most universities have had to digitize curricular content quickly and precariously, which has disadvantaged planning capacity and hampered effective communication channels (Inter-American Bank Development [IDB], 2020). In other words, the covid-19 episode represents the opportunity to leap qualitatively into pedagogical innovation and add value to current and future training processes (Toro, 2020); However, although opportunities are opening up for the digital immersion of teachers and students, there is a risk of failure due to the accelerated adoption of technologies, without enough time to train the subjects involved or generate a sustainable technological capacity. (BID, 2020).

In this sense, a new model of university practice emerges that transcends the emergency based on an emerging remote education process, rather than on the implementation of an online education structure. This model has characteristics and pedagogical methodologies different from the face-to-face model, it represents a combination between the face-to-face notion and the virtual notion in a functional way.

Study habits are the regular practices that students adopt to face the demands of the university, they constitute frequent behaviors that ensure and facilitate their

acquisition of knowledge (Peker, 2021). The pandemic forced students to dedicate time and energy to adapt to teaching platforms based on the use of technology, in this way some habits with the use of communication devices and services, as well as literacies, became involuntarily present. and skills related to the use of technology (Cortoni and Perovic, 2020). Although it is true that many young people were already using their technological devices, mainly for entertainment purposes, during the pandemic the challenge was learning to use this technology for educational purposes, which in many cases could have resulted in a situation of frustration, added to the fact that Many had to set up spaces within the home and even share their equipment with other members of the family nucleus, which complicated the adaptation process.

During the covid-19 pandemic, with distance education, students improved their skills in the use of technology, especially in the use of smartphones, computers, and tablets; Similarly, they developed study habits such as self-training and time management, a giant step in digital literacy (George, Glasserman, Ruiz, & Rocha, 2022).

After a little more than two years of academic confinement, the challenge is to rethink the profile of the university, that is, the characteristics that should distinguish the modality or modalities chosen, that will define the university that is going to face the challenges that lie ahead, at least in the short and medium term. Although the arrangements can be diverse, within the modalities known as face-to-face university, virtual university and bimodal university, what will probably have a great impact on the quality of the teaching to be offered, and on the quality of the training to be achieved, is the strategy of hybridization that is adopted, as well as its scope, intensity, pedagogical convenience and moment or phase of the training process in which it is introduced or worked in each of the modalities (Sánchez, 2022; Vázquez, Clara, Céspedes, Ceja y Pacheco, 2022).

In the same sense, the great challenges for higher education will be to guarantee pedagogical continuity, evolving and consolidating the reopening from the hybrid model; contribute to educational innovation, incorporating open learning ecologies and new pedagogical models accompanied by emerging technologies such as mediations that allow and guarantee education for inclusion in the digital age and that reduces digital gaps before and during the pandemic (Zamudio, 17 de agosto 2022).

## Methodology

The present study adopts the empirical-analytical paradigm (Ortiz, 2015). Likewise, a quantitative and longitudinal approach with an exploratory-descriptive investigative level, also following the objective of comparing (Delgado and Llorca, 2004; Hernández, Fernández and Baptista, 2014). The treatment of the data implied an analysis of categorical variables of the ordinal type (Cuestas, 2009). The collection of the information was carried out in two moments through the Google Forms tool. Subsequently, the data was processed using the IBM SPSS Statistics version 25 statistical program.

## Collection instrument

In the book by Oliva et al. (2012) establish various questionnaires for the analysis of addictions to the internet; here version C was adapted, which measures addictions to new technologies in Spain, and became the "Diagnostic questionnaire on cyberpathologies in students" (Cudiceu). The adaptation of the questionnaire involved a methodological process: 1) review of the original questionnaire, 2) literature review, 3) analysis of the context of students in Mexico, 4) piloting with confirmatory analysis, and 5) final CUDICEU questionnaire. Table 2 shows the elements of the questionnaire.

**Table 2.** Cudiceu questionnaire elements

| Section | Dimensions | Question Number | Scale |
|---|---|---|---|
| Cyberpathologies * | D1. Damages in the biological factor | 14 | 1 (Never or hardly ever) |
| | D2. Damages in the psychological factor | 18 | 2 (Sometimes) 3 (Frequently) |
| | D3. Damages in the social factor | 13 | 4 (Very frequently) |
| | Total | 45 | 5 (Always) |
| Survey respondents' characteristics | *1)* Gender<br>*2)* Age<br>*3)* Semester | 3 | Categorical |
| | Addiction to new technologies<br>*1)* Internet<br>*2)* Video games<br>*3)* Mobile phone<br>*4)* Laptop | 4 | 1 (Non-existent)<br>2 (Newbie)<br>3 (Average)<br>4 (Advanced)<br>5 (Expert) |
| | Time spent on weekdays<br>*1)* Internet<br>*2)* Video games<br>*3)* Mobile phone<br>*4)* Laptop | 4 | 1 (None)<br>2 (Less than an hour)<br>3 (Between 1-3 hours)<br>4 (Between 4-6 hours)<br>5 (More than 6 hours) |
| | Internet usage in the last year<br>*1)* Social network<br>*2)* E-mail<br>*3)* Document download<br>*4)* School work<br>*5)* Search of different topics | 5 | 1 (Never)<br>2 (Once a month)<br>3 (Once a week)<br>4 (Almost every day)<br>5 (Every day) |
| Total | | 51 variables | |

* For the cyberpatology scales two pilot tests were given, form the result an alpha
Cronbach (Celia and Campos, 2005) was obtained: the first with 0.89 and a second one
with 0.914, the ones chosen were those having a factor load ≥ 0.5 (Ferrando y
Anguiano, 2010)

Source: Self-developed

## Sample

For the analysis of the sample, it is relevant to highlight that the study was applied in 2019 to a total of 492 students from the 2nd and 4th semester. The type of sampling responds to non-probability combined with the convenience technique (Otzen and Manterola, 2017). As mentioned before, the objective of this research is to compare the level of affectation by the use of ICT (cyberpathologies) before and after the pandemic. To do this, in 2021 the same survey was applied to the student population itself (6th and 8th semester); however, due to various situations, only 428 university students participated, the remaining 64 students dropped out during said period. In this sense, the study will be represented by two samples from before (2019) and after (2021) the pandemic, considering then a longitudinal sample (Arnau and Bono, 2008).

Table 3 shows the characteristics of the study sample. In 2019, when the information was collected, the age of the respondents was mostly between 18-20 years (84.1%); later, in 2021, it remained in that interval. For the gender variable of the respondents, in both samples the majority are men. Regarding the career, the majority have been students of the Accounting educational program. According to the semester variable, in the 2019 sample, the students were in the 2nd and 4th semesters and later, in 2021, the students were in the 6th and 8th semesters.

**Table 3**. Characcteristics of the samples

| Variable | Component | Sample 2019* | | Sample 2021** | |
|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % |
| Students' age | 18-20 y. o. | 414 | 84.1 | 282 | 65.9 |
| | 21-23 y. o. | 62 | 12.6 | 127 | 29.7 |
| | Older than 24 | 16 | 3.3 | 19 | 4.4 |
| | Total | 492 | 100 | 428 | 100 |
| Survey respondents' gender | Female | 237 | 48.2 | 191 | 44.6 |
| | Male | 255 | 51.8 | 237 | 45.4 |
| | Total | 492 | 100 | 428 | 100 |
| Major | Administration | 98 | 19.9 | 103 | 24.1 |
| | Accountancy | 190 | 38.6 | 179 | 41.8 |
| | Business direction and management | 103 | 20.9 | 92 | 21.5 |
| | Software Engineering | 101 | 20.5 | 54 | 12.6 |
| | Total | 492 | 100 | 428 | 100 |
| Semester | 2nd-4th | 260 | 52.8 | 147 | 34.3 |
| | 6th-8th | 232 | 47.2 | 281 | 65.7 |
| | Total | 492 | 100 | 428 | 100 |

Source: Self-developed

The samples allow us to observe that there is homogeneity in the data collected. As already mentioned, Table 2 identifies the characteristics of the respondents. An initial question to the sample was "What is the level of use of technologies: Internet, video games, cell phone and laptop?". In 2019 (before the pandemic), regarding the use of the Internet, 33.1% have a medium level, 46.5% advanced and 18.9% expert; in the case of the use of video games, 22.2% is null, 26.8% beginner and 23.2% is medium; regarding the cell phone; 19.1% have a medium level, 52.4% advanced and 28.5% expert; In relation to the level of laptop use, 34.1% is medium, 45.3% advanced and 15.2% is an expert. In 2021 (after the pandemic) an increase in the use of the Internet can be observed: 33.9% have a medium level, 51.6% advanced and 11.9% expert; Regarding the use of video games, the level of use increased to medium (25.7%) and advanced (21.5%); in the case of the level of cell phone use, it was maintained: 24.3% medium, 56.8% advanced and 16.8% expert; Regarding the use at the laptop level, the same thing happened, 39.5% are medium, 44.6% advanced and 9.8% expert.

In the same vein, the sample was questioned about "How many hours a day do you usually spend during the week using technology?" In 2019 (before the pandemic), regarding the Internet, 26.8% used the Internet between 3-6 hours and 54.9% more than six hours; Regarding video games, 40% indicated that none, 24.2% less than one hour and 18.7% between 1-3 hours; in the case of the cell phone, 13.2% use it between 1-3 hours, 31.5% between 3-6 hours and 51.8% more than six hours; Something similar happens with the level of laptop use, 33.5% between 1-3 hours, 27.2% between 3-6 hours and 19.3% more than six hours. After the pandemic (2021) the use of technologies increased: of the internet, 23.1% used it between 3-6 hours and 69% more than six hours; in the case of the cell phone, 14.7% between 1-3 hours, 30.8% between 3-6 hours and 52.1% more than six hours; the same happened with the use of laptops, 30.4% between 3-6 hours and 46.3% more than six hours.

Another item was "How many times have you used the internet to use social networks, email, download media, school work and search for other things in the last year?". In 2019 (before the pandemic), regarding the use of social networks, instant messaging, chats or forums (Facebook, Twitter, Messenger, WhatsApp, etc.), 22.6% used it almost every day and 73.8% every day ; instead, in 2021 (after the pandemic), its use decreased 24.3% almost every day and 49.8% every day. On the other hand, regarding using email, in 2019 44.5% once a week, 27.2% almost every day and 16% every day; On the other hand, in 2021 its use decreased, 31.3% once a week and 40.9% once a month. In the case of use to download programs, movies, videos, music, games and comics in 2019, 26.6% used it once a month, 35.2% once a week and 20.3% almost every day; in 2021 it is maintained, 35.3% once a month, 24.1% once a week and 14.3% almost every day. For the use of school work, in 2019 42.7% almost every day and 40.4% every day; in 2021 (after the pandemic) it increased to 29.4% almost every day and 52.6% every day. Finally, in relation to the search for information about hobbies and things that interest students, in 2019 26% used it once a month, 32.5% almost every day and 37.5% every day; This situation was maintained in 2021, 33.4% once a week, 25.9% almost every day and 26.2% every day.

In this sense, the analysis of the 2019 to 2021 sample shows that, regarding the use of technologies and digital media, students have used them with an increase and decrease in the level of use, which reveals the research hypothesis initially posed. In this sense, although the descriptive analysis denotes differences in the basic statistics, it is necessary to establish a method that allows contrasting the research hypothesis that

determines if there are statistically significant differences in the increase in the affectations that make up cyberpathologies in the samples analyzed.

## Analysis method

The method of analysis of this research is based on four characteristics of the study of cyberpathologies: 1) the study variable is made up of three dimensions and its level of measurement is qualitative-ordinal, 2) it seeks to compare two samples 2019 and 2021 which represent a longitudinal study, 3) the scope of the research is exploratory-descriptive due to the nature of the study variable and 4) the covid-19 pandemic is considered as an element that influenced the increase in the use of technologies . Derived from the aforementioned characteristics, the methodological design of the study was established, which initially implies a descriptive analysis that denotes the comparison between the samples (Fernández, Córdoba and Cordero, 2002; Sidel, Bleibaum and Tao, 2017); Subsequently, a comprehensive analysis of the study dimensions is carried out that allows comparing (Llinás and Rojas, 2005; Rendón, Villasís and Miranda, 2016; Rosiles, Lugo, Clara and Ramírez, 2020) the biological, psychological and social affectations (dimensions) that make up the variable Cyberpathology. Later on, a crossed table is carried out (Abascal and Grande, 2005; Rodríguez and Mora, 2001) with the purpose of contributing with empirical evidence to the increase in the affectations of cyberpathologies in university students. Finally, the Wilcoxon statistical test is calculated (Berlanga and Rubio, 2012; Gamarra, Pujay, and Ventura, 2020; Ríos and Peña, 2020; Turcios, 2015) that allows comparing the two samples, providing evidence for the contrast of the initial hypothesis. of the study (Batanero and Díaz, 2015; Fernández and Fernández, 2009). Figure 1 shows the methodological sequence to compare the level of cyberpathology affectations in the students of the 2019 and 2021 sample in order to find empirical evidence on the objective of this research.

**Chart 1**. Methodological sequence to find empirical evidence on the level of affectation that makes up the variable on cyberpathologies
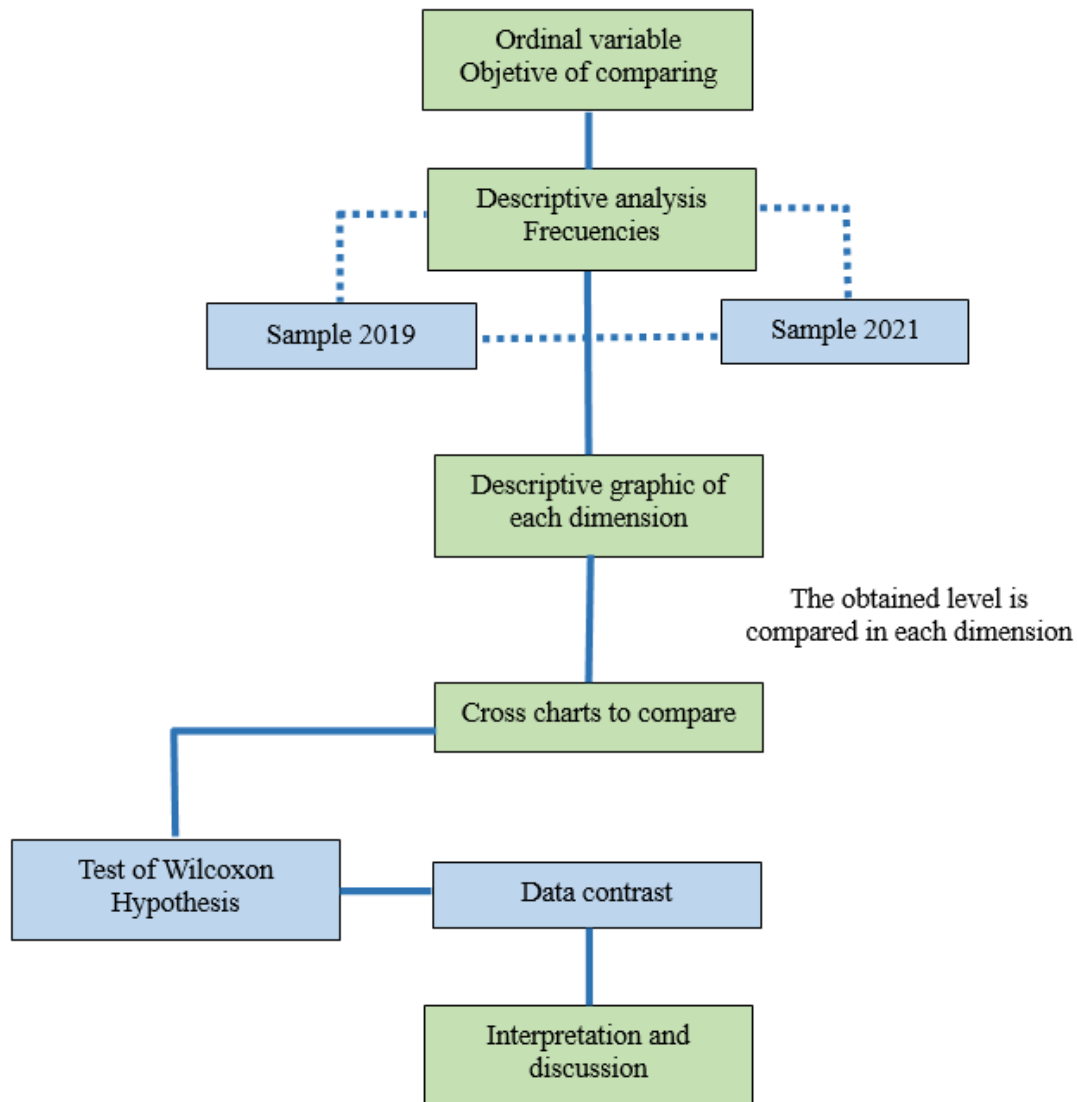


Source: Self-developed

# Results

The results of this research initially consider that university students already used technologies excessively before the pandemic (2019), this caused biological, psychological and social effects, which in turn led to suffering associated with cyberpathologies, and if compared The same sample in 2021 provides information that allows providing empirical evidence that contrasts the objective and hypothesis of this research. As observed in the analysis of the sample, university students use new technologies to a great extent, therefore, the descriptive results are presented in Table 4 below. The variable that obtained the high level in 2019 was: "Cellular for academic

purposes" (4.15), a situation that increased considerably (4.29) in 2021. In short, the increased use of technology implies that students are exposed to acquiring a disease associated with the excessive use of technology (cyberpathologies). .

In each variable, an increase can be seen from 2019 to 2021. This shows that students can generate cyberpathologies. The outstanding variables that increase denote that students use the telephone before going to sleep, they acquired comfortable telephones that they use a lot, they assume that their communication has been through the Internet many times, all the teamwork has been done through the Internet, the place where they live allows easy access to the internet and they frequently listen to music through platforms that use the internet. These results indicate that students are using the technologies and have begun to acquire problems related to cyberpathologies.

The use of technologies is indicative of cyberpathologies. Students have perceived pain due to excessive use of devices, they are predisposed about the phone vibrating, they have felt pain in their fingers, headaches and problems related to vision, which demonstrates the increase in the use of glasses, it has also experienced fatigue and loss of sleep. On the other hand, students have also had thoughts associated with life being boring without the Internet, they are attentive to the phone and feel depressed because they are not connected to the Internet. In this sense, students are experiencing situations that would lead them to acquire a disease related to the excessive use of technology.

**Table 4**. Descriptive analysis of the variable that measures the cyber pathologies of college students: samples 2019 and 2021

| Variable | 2019 | | 2021 | |
|---|---|---|---|---|
| | $\overline{X}$ | σ | $\overline{X}$ | σ |
| 1) Excessive internet usage | 1.40 | 0.83 | 1.65 | 1.18 |
| 2) Energy drinks intake to remain awaken | 1.57 | 1.01 | 1.69 | 1.11 |
| 3) Mobile phone/smartphone usage before bed time | 3.74 | 1.24 | 3.30 | 1.31 |
| 4) Pain caused by overuse of computers | 2.53 | 1.23 | 3.09 | 1.33 |
| 5) Vibranxiety | 2.68 | 1.36 | 2.62 | 1.45 |
| 6) Pain in the fingers after using the mobile | 1.59 | 0.98 | 1.74 | 1.23 |
| 7) Headache due to electronic devices usage | 2.17 | 1.18 | 2.78 | 1.44 |
| 8) Eye discomfort due to mobile usage | 1.58 | 0.98 | 2.17 | 1.42 |
| 9) Purchase of comfortable mobiles | 3.08 | 1.47 | 2.39 | 1.41 |
| 10) Use of eye drops due to computer usage | 1.41 | 0.96 | 1.74 | 1.39 |
| 11) Gastrointestinal disorders | 1.82 | 1.20 | 2.21 | 1.48 |
| 12) Use of computer glasses | 2.34 | 1.60 | 2.63 | 1.72 |
| 13) Fatigue or blurry vision due to computer usage | 2.43 | 1.25 | 2.72 | 1.34 |
| 14) Insomnia because of use of internet | 2.62 | 1.26 | 2.60 | 1.20 |
| 15) Internet helps me calm down | 2.61 | 1.31 | 2.76 | 1.35 |
| 16) Thought: Life without Internet would be boring | 2.34 | 1.21 | 2.42 | 1.23 |
| 17) Thinking about internet when you are offline | 2.27 | 1.09 | 2.29 | 1.11 |
| 18) Hide the connection time | 1.89 | 1.13 | 2.02 | 1.25 |
| 19) Spend online more time than usual | 2.69 | 1.24 | 2.57 | 1.36 |
| 20) Connection time cannot be reduced | 2.45 | 1.17 | 2.59 | 1.31 |
| 21) Feeling depressed for not being connected | 1.72 | 1.00 | 2.06 | 1.43 |
| 22) More time on videogames to feel satisfied | 1.60 | 0.97 | 1.63 | 1.10 |
| 23) Restlessness and irritability for not playing video games | 1.49 | 0.89 | 1.55 | 1.10 |
| 24) Attentive to mobile use | 2.40 | 1.28 | 2.33 | 1.39 |
| 25) Restlessness and irritability due to stop using the mobile | 1.99 | 1.12 | 1.78 | 1.13 |
| 26) Trying to quit using the mobile without succeeding | 2.15 | 1.12 | 2.09 | 1.26 |
| 27) Mobile usage to avoid problems | 2.10 | 1.21 | 2.18 | 1.30 |
| 28) Attentive to video games | 1.60 | 1.02 | 1.58 | 1.06 |
| 29) Extent mobile use to express satisfaction | 1.63 | 0.92 | 1.79 | 1.15 |
| 30) Internet use to avoid problems | 1.92 | 1.22 | 2.11 | 1.27 |

| | | | | |
|---|---|---|---|---|
| 31) Restlessness and irritability due to stop using Internet | 1.57 | 0.95 | 1.55 | 1.04 |
| 32) Trying to quit using Internet without succeeding | 1.67 | 1.09 | 1.85 | 1.35 |
| 33) Communication with friends through internet | 4.24 | 0.99 | 3.60 | 1.34 |
| 34) Use of internet to become romantically involved | 2.92 | 1.36 | 2.60 | 1.43 |
| 35) More close families due to connectivity | 2.11 | 1.23 | 2.24 | 1.43 |
| 36) Teamwork through internet | 3.96 | 1.12 | 3.76 | 1.26 |
| 37) Accepting friend requests without getting to know them | 2.11 | 1.18 | 2.21 | 1.35 |
| 38) Family relationship though technology use | 1.91 | 1.08 | 2.32 | 1.44 |
| 39) Technologies are useful to get closer to people | 3.03 | 1.21 | 3.32 | 1.36 |
| 40) Technology is essential to spend time with others | 2.04 | 1.16 | 2.58 | 1.47 |
| 41) Technology is used in your neighborhood | 3.58 | 1.30 | 3.66 | 1.31 |
| 42) Use of mobile to listen to music | 3.86 | 1.19 | 3.99 | 1.18 |
| 43) Technology is essential for interaction | 2.99 | 1.29 | 3.70 | 1.30 |
| 44) Video Game Friends | 1.87 | 1.23 | 2.44 | 1.55 |
| 45) Cell phone for academic purposes | 4.15 | 1.08 | 4.29 | 1.07 |
| Total | 2.35 | | 2.47 | |

Source: Self-developed

In this line, the analysis of each variable provides empirical evidence that the use of technologies has implied certain effects on students. Figure 2 shows a comparison of the levels of affectation in students. In this graph it can be observed that students have received greater social impact, that is, the excessive use of technologies has implied that students have problems to socialize, evidently regarding this problem there was a substantial increase from 2019 to 2021. The biological factor indicates that students are experiencing physical effects such as pain and feelings of tiredness due to the excessive use of technologies, which contributes to suffering from cyberpathologies. The psychological dimension indicates that students have experienced affectations related to their personality and even to imagine situations related to electronic devices and avoid problems, an increase in the level of affectation is also observed from 2019 to 2021, evidence for the hypothesis posed by this study. In general, in 2019 (2.35) and 2021 (2.47) the use of technologies increased, therefore, there is empirical evidence that students suffer from some cyberpathology.

**Chart 2.** Comparative analysis of every study dimension making up the variable.
Cyber pathologies: samples 2019 and 2021
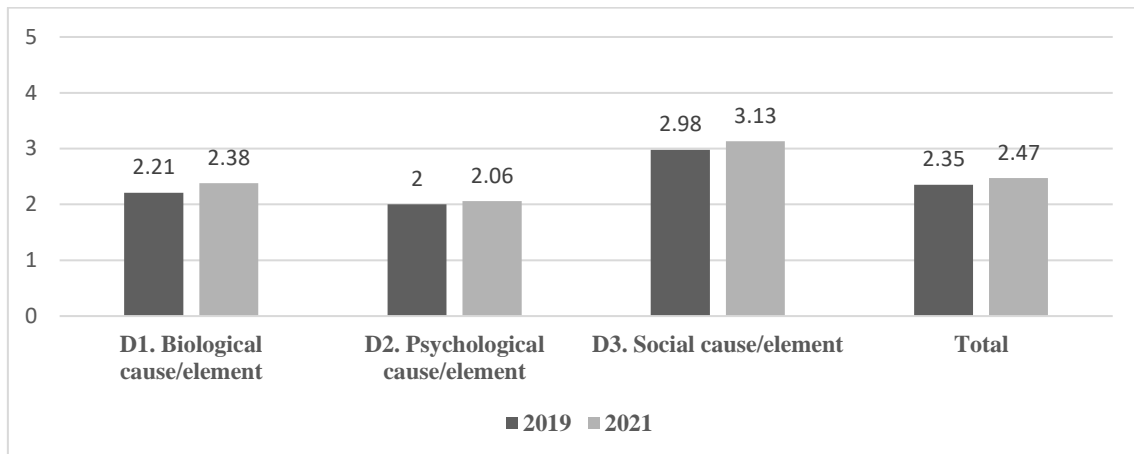


Source: Self-developed

It is worth mentioning that the level of affectation perceived in this study allows us to analyze the level (propensity) of cyberpathologies that students may have. Table 5 shows the level of cyberpathologies of the two study samples. In sample 1, before the pandemic (2019), 66% of students were at the level of little affectation towards suffering from cyberpathologies and 28%, at a somewhat level. However, after the pandemic (2021), a similar level is observed, even lower. In general, the level of cyberpathologies that is observed is low and something about suffering from a type of disease. This shows that there is evidence on the differences between the two samples, however, it is necessary to know if they are significant.

**Table 5**. Damage levels perceived/considered for cyber pathology diagnosis

| Variable | Level | Sample 1 (2019) | | Sample 2 (2021) | | Total | |
|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % |
| Cyber pathology level | None | 9 | 2 | 28 | 6 | 37 | 4 |
| | Little | 326 | 66 | 264 | 62 | 590 | 64 |
| | Some | 140 | 28 | 110 | 26 | 250 | 27 |
| | Quite | 16 | 3 | 26 | 6 | 42 | 4 |
| | A lot | 1 | 1 | 0 | 0 | 1 | 1 |
| Total | | 492 | 100 | 428 | 428 | 920 | 920 |

Source: Self-developed

In general, affectations can be seen that indicate that students begin to suffer from some cyberpathologies caused by the excessive use of technologies. Tables 4 and 5 allow us to observe that there are statistical differences between the sample before and after the

covid-19 pandemic, including a considerable increase. In this sense, Table 6 shows the Wilcoxon hypothesis test, which allows comparing whether there are changes in a sample, a significance level of 0.05 was considered, and a calculated Z value of -0.959 and a significance level of -0.959 were obtained. asymptotic value of 0.337. The p-value level is greater than significance, which indicates that there are no statistically significant differences in the level of affectation due to the use of ICT (cyberpathologies) before and after the covid-19 pandemic. in the students of the FCA of the UV Campus Coatzacoalcos.

**Table 6**. Test of Wilcoxon Hypothesis

| Test statistics * | |
|---|---|
| | Samples 1 y 2 |
| Z | -0.959** |
| Asymptotic significance (bilateral) | 0.337 |

* Wilcoxon signed rank test

** Based on negative ranks.

Source: Self-developed

In short, comparing the levels obtained in table 4 on cyberpathological affectations and the hypothesis test through Wilcoxon in table 6, it can be seen then that the alternate hypothesis is rejected, in such a way that there are no statistically significant differences between the two. samples.

In short, the results empirically demonstrate the absence of evidence on an increase before and after the pandemic (figure 2) in effects on the excessive use of technology (cyberpathologies). However, the basic statistics show a considerable increase that denotes attention from the university to meet the needs of a problem that was potentiated by the covid-19 pandemic.

# Discussion

Technologies in teaching-learning processes have been adopted as an effect of globalization (Clara and Vega, 2020, 2021). The objective of this research was to contribute empirical evidence to the assumption that the excessive use of technology by university students before and after the pandemic causes health problems. It is necessary to remember that the covid-19 pandemic involved drastic changes in various areas. In the context of education, the strategy led to the adoption of a virtual model that evidently increased the use of technologies and virtual environments by university students. The

studies by Carissoli, Redaelli, Bernardelli, Negri and Delle (2022), Liu, Zhao and Su (2022), Chandrasiri and Weerakoon (2022) and García and García (2022) corroborate the experiences of students before the virtuality derived from the strategy education caused by covid-19. As a result, the use of technological tools (platforms such as Zoom, Skype, Meet, etc.) increased, which caused health problems in students derived from the excessive use of this, some studies show this situation (Chiza, Vásquez and Vega, 2021; Reyes, Amaya and Capps, 2021; Rodado, Jurado and Giraldo, 2021). In this sense, the empirical results demonstrate evidence on the phenomenon of cyberpathologies. Although the term is unknown, this research studied it under the premise that the excessive use of technologies causes health problems that lead to biological, psychological and social effects (together cyberpathologies) in university students.

Regarding the affectations of a biological nature, there is evidence of an increase from 2019 to 2021 in students. For Lawal, Omiyi, York and Akudjedu (2022), the virtual experience for students meant a challenge and even caused health problems for them. In the case of the psychological factor, it was found that the students have experienced affectations of this type, for example, depression symptoms derived from the anguish caused by the pandemic and by the virtual teaching-learning processes. Hensel (2022) showed that stress, environmental problems and the use of technology beyond the recommended time have led to psychological effects, hence the need to address this problem. (Becerra, Roland, Avina y Becerra, 2022; Hotez *et al*., 2022; Zhang, 2020).

The evidence on the social factor shows that students from 2019 (before the pandemic) to 2021 (after the pandemic) have increased affectations such as socializing and having fun only through electronic devices. The study by Saha, Dutta and Sifat (2021) indicates that, as a result of the mental health problems caused by the pandemic in students, the social factor has been one of the most affected, although it is complex to measure because humans have caused them. normalized. In general, it was shown that students have adopted actions and activities that indicate that they are experiencing situations that can lead to suffering from some cyberpathology. Chacín, González and Peñaloza (2020) show that these affectations happen and that, in addition, since the pandemic they have increased.

The excessive use of technologies, coupled with causing diseases in people, also affects their intellectual capacity. Students are currently less creative and with little critical-reflexive thinking, therefore, it is a problem that must be addressed both from within the universities and from outside (Hernández, Vargas, González and Sánchez, 2020). However, technology also represents an opportunity to develop skills and training

through digital media (Torres, 2020) as long as its use is regular (moderate) and that people have infrastructure and training conditions.

# Conclusions

In this research, it was possible to apply a survey to a longitudinal sample to undergraduate students at the FCA of the UV Coatzacoalcos on the level of affectation by the use of ICT (cyberpathologies) before and after the pandemic. The research objective was achieved: empirical evidence was obtained that students have experienced biological, psychological and social effects derived from the excessive use of technology (suffering from some cyberpathologies). Although there is evidence that the degree of involvement increased, it is not statistically significant. The topic of excessive use of technology and the suffering derived from it denote attention from academia, governments and the market as a concern.

## Future lines of research

It is relevant to carry out an investigation that allows to argue what are the sufferings on the excessive use of technology, therefore, it is necessary to know the perception of specialists in the medical area that contribute with concrete knowledge on the subject and how they could be attended from the universities. On the other hand, it is necessary to carry out research that contributes with theoretical knowledge about the concept of cyberpathologies that allows it to be measured.

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