

Psychological, Emotional, Cognitive and Familiar Factors Associated with Academic Engagement in Students of a Public University in Mexico during the COVID-19 Pandemic

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Research is carried out on factors that influence academic performance in a group of students of Educational Sciences, from a public university in Mexico, after confinement due to COVID-19 pandemics. In a non-experimental, cross-sectional design was used, a Likert scale is used, to analyze mainly variables related to students' mental and emotional health and academic engagement. A sample of 34 students (85% female, 20-25 aged). All participants came from other states or towns near to the city, from medium-low economic resources; some of them had work to continue studying. Students reported that they suffered moments of anxiety, fear, loneliness, depression, claustrophobia, and constant stress. Regarding academic engagement, it was found that they were easily distracted, it was difficult for them to complete their homework on time, to learn and to study, and some of them dropped out of school to work in order to financially help his family. It is suggested that research must be carried out to test interventions aimed at preventing and overcoming emotional and mental problems that may affect students' learning and integral development.

Keywords: *academic engagement, anxiety, depression, stress, undergraduate students, COVID-19 pandemics*

Introduction

Due to COVID-19 pandemic, schools, colleges and universities had to close their doors and they continued their activities through alternative ways. Confinement was the main measure taken by governments all around the world in order to reduce the number of new COVID-19 positive cases. This measure implied also reduced opportunities for students to have face-to-face interactions outside the family life.

The Autonomous University of the State of Hidalgo in Mexico was also affected and had to close its classrooms at the beginning of 2019, so during the confinement students had to receive online education at home. The university authorities, together with professors, administrators and other staff members, reorganized to offer distance education, which generated new needs and the emergence of several problems that affected the entire development of students, from the cognitive, social, academic,

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psychological and emotional, in addition to other related factors, such as family interaction and support.

In 2022 the return to face-to-face classes began at this university. Then, it came the need to know how the students lived through this situation, how they perceived the consequences of the confinement period, what areas of their development were affected. So, we proceeded to carry out research on students of the Bachelor of Science in Education of this public university, based on the next research question:

Is there a relationship between psychological, cognitive, metacognitive, affective and family factors, with the academic engagement of Bachelor of Science in Education students at a public university in Mexico after the COVID-19 pandemic?

The general objective of the research was to analyze how the main psychological, cognitive, metacognitive, affective and family factors are related to the academic engagement of Bachelor of Science in Education students at a public university in Mexico after the COVID-19 pandemic.

It is expected that by conducting this research, the results will help to accurately identify some of the main variables and factors related to academic engagement, through the development of a Likert scale, the use of descriptive and inferential statistics for data analysis, which is further described in the methodological part.

Identifying these variables will help to understand this phenomenon about the serious consequences suffered and experienced by students during this time of the COVID-19 pandemic, with the possibility of generating diagnostic, preventive and remedial programs in similar and emerging cases.

Academic Engagement in University Students

Academic engagement has been studied because of its close relation to academic performance (Heng 2013). There are different definitions of academic engagement. It was first defined as the mental and physical involvement that students show in different academic activities, including class attendance, relations to peers and teachers and extra-curricular activities (Astin 1984). Academic engagement has also been understood as the quality of effort made in three core activities: contact with teachers, cooperation with peers, and active learning (Pace. 1990). Kuh et al. (2008) have a broader perspective on academic engagement, since it includes not only the students' effort, but also the educational institutions' efforts devoted to effective educational practices. A different approach is taken by Schaufeli et al. (2002); they took see academic engagement from the point of view positive psychology applied to organizational settings, where job satisfaction was proposed as the opposite side of burnout. In this sense, academic engagement is defined as a state of mind characterized by vigor, dedication and absorption. However, the most fitting definition of academic engagement comes from Fredricks and McColskey (2012), Eccles and Wang (2012), and Sinatra et al. (2015). They consider academic engagement as made up of behavioral, emotional and cognitive aspects. The behavioral aspect encompasses the participation in academic activities, such as class attendance and homework involvement. The emotional aspect refers to the

relationship the students have to peers, professors and the educational institution. The cognitive aspect is considered as the effort devoted to comprehend complex topics and learn difficult skills (Fredricks & McColskey 2012).

This research draws on the definition of Fredricks and McColskey (2012) referred to academic behavioral engagement, since it is the clearest one in terms of empirical content. Schaufeli et al.'s (2002) view is discarded because it implies considering the educational setting as if it were an organizational one, where profit is the main objective.

Depression, Anxiety and Stress in University Students

University students have been associated to certain mental health problems related to the difficulties and challenges involved in this life stage. For example, before the pandemic in Germany, 36.6% of students reported depressive symptoms, 41.8% high levels of anxiety and mental stress due to excessive demands and the uncertainty in economy, job and social relationships (Herbert et al., 2020). In a study carried out in UK, Germany, Italy and Spain lower levels of mental health were observed during pandemic compared to pre-pandemic normative scores (Allen et al. 2022). This finding was interpreted in the context of temporary or permanent job loss of nearly half of working students. So, the psychological distress experienced by university students was related to the inability to pay de life and study costs during pandemic (Allen et al. 2022).

The psychological problems among university students have been related to loneliness (Allen et al. 2022). Other symptoms observed in university students are sleep problems, short temper, low self-esteem, feelings of helpless, feeling worthless and feeling unhappy (Almonami et al. 2021).

Depression is an important problem among university students. Herbert et al. (2021) found in Germany that 51.82% of university students obtained scores above the cut off for depression, while 19.09% were exactly at the cut off. Besides, there were no differences between men and women. And the same pattern was observed in Egypt, implying that these rates transcend cultural differences. In an Italian sample, moderate levels of depression as measured by the short version of the BDI were observed (Giusti et al. 2021). However, when analyzed by gender, a severe level of depressive symptoms is observed in a high proportion of women. Russell et al. (2023) could document the changes from prepandemic to pandemic times in their longitudinal study that began in April 2019. They found that percentage of probable major depression increased from 21.7% in April 2019 to 36.7% in October 2020. A similar increase was observed in anxiety in the same study. Roche et al. (2022) also had the opportunity to compare results from two different samples of the same university in the United States taken in the 2016 Fall and in the 2020 Fall. Self-reported stress, depressive symptoms and anxiety symptoms were significantly higher in 2020.

Anxiety is repeatedly found among university students in several countries. Allen et al. (2022) found anxiety levels higher than normative scores in UK, Germany, Italy and Spain. This rise in anxiety levels has been associated to concerns

about the future. Since economy has been so affected by pandemic, university students anticipate adverse conditions in the labor market (Mariononi et al., 2020). Russell et al. (2023) also found greater concerns among students regarding future job prospects. Also in a Peruvian sample, results show that a significant percentage of university students presented significant symptoms of anxiety (23%), depression (24%) and insomnia (32%) (Vilca et al. 2021).

Regarding emotions experienced by university students, Herbert et al. (2021) found that feeling not happy, sad, angry, surprised, disgusted and afraid were the most frequent emotions, appearing in 56% to 93% of university students.

During pandemic, university students (65.5%) considered that the worry about their mental health more than before the pandemic, and also they worry more than before about their physical health (71.4%) (Herbert et al. 2021). Russell et al. (2023) found that students consider that their mental health worsened during pandemic.

Rates ranging from 31.8% to 76.4% of university students report to have gained weight, to eat more than before the pandemic. They don't sleep nor exercise more than before the confinement.

Difficulties in learning have also increased due to pandemic. Most university students (76.4%) have trouble in self-regulated learning and are unable of focusing their attention on classes. Moreover, they find difficult to study due to the pandemic situation (Herbert et al. 2021).

A widely found difficulty for university students involves technological devices. In a sample from Italy, Giusti et al. (2021) found that students had connection problems because of sharing their WiFi network with other users. This hinders the academic performance of students.

The confinement brought about changes in the study context. Giusti et al. (2021) found that 80% of university students were used to study in company of classmates in open spaces or in the library at the university facilities. So, they had to change. This factor was the only predictive one of low academic performance, while gender, age, working status and lack of sharing learning experiences did not showed any predictive value. Giusti et al. (2021) explain this relationship between study context and poor academic performance as a consequence of the difficulty for concentration in the home environment. Moreover, this relationship was increased by more than 3 times when students presented COVID-19 contagion anxiety.

A major disadvantage of distance education is the lack of face-to-face interaction between students and teacher. Moreover, the scarce opportunity for pair socialization is also a disadvantage of distance education (Giusti et al. 2021). Russell et al. (2023) also found that students consider that several aspects worsened due to pandemic, such as connection to university peers, connection to the university and connection to friends.

However, the changes introduced by pandemic had also some advantages according to students' perspective. Distance classes allowed students to draw on new academic resources such as video lessons, having the possibility to be more autonomous in their study activities (Giusti et al. 2021). Female students present more psychological symptoms than males (Almonami et al. 2021).

Some correlations have been observed between age and psychological symptoms in university students. Almonami et al. (2021) found that young students, aged 18-20 years, show low self-esteem, hopelessness, helplessness, worthlessness and unhappy

feelings. While students, aged 21-25 years, presented mainly depression, and students older than 30 years experienced anxiety, sleep problems and short temper.

Regarding coping, several strategies have been observed: 1) studying, 2) working, 3) exercising, 4) playing video games, 5) worshipping (meditation), 6) sleeping, 7) watching COVID-19 news and updates, 8) watching entertainment programs like (movies and series), 9) cooking, 10) house chores like cleaning and organizing, 11) helping their siblings or kids in studying and homework, and 12) volunteering in hospitals or seniors' houses (Almonami et al. 2021). Female students draw on strategies 6, 1, 5, 9 and 11, while males draw on 2, 4, 7 and 8.

Method

A non-experimental correlational design was used. The use of a correlational approach is quite common in education and psychology because associations among variables are often explored. This approach does not involve an experimental manipulation of treatment variables, and therefore the results should not be used as a proof of cause-and-effect relationship (Mertens 2015).

Participants

A sample of 34 students participated, 8 men and 26 women, with an average age of 22 years, between 20 and 27 years old, who were studying for a Bachelor's degree in Education Sciences, at the Autonomous University of the State of Hidalgo, in the central zone of Mexico.

Instrument

A Likert scale was applied to collect data at a single point in time. The scale was designed in Google forms, with 40 items, divided into five factors.

Procedure

The scale link was sent through e-mail to the students. Once the scale was answered, the database was recovered in Excel and the analysis was done in SPSS 22. software, where first its internal validity and reliability was analyzed, by Cronbach's Alpha test and factor analysis.

Subsequently, a descriptive statistical analysis of the data and a Pearson correlation test among the scale's factors were performed. After applying the scale to the sample and obtaining the average of the total scale, a low group and a high group were formed; in the items that measure an aspect or positive perception, the response values were changed to make the summation logical and avoid adding items that measure a positive aspect or perception.

We proceeded to change their response values so that the summation would be logical and avoid adding positive and negative items. To form the two groups, approximately the mean ($M = 66$) was considered as the division point to make

these groups, with the score of 65 percent below the measure was the low group and a score of 66 percent above the mean was the high group (it is clarified that the higher the percentage obtained in the total scale, the greater the problems or difficulties and vice versa). With these groupings it was possible to differentiate with the t Student test for independent samples.

A last analysis was a multiple linear regression in order to check the influence of independent variables, in the case the five factors of Liker scale about the Scholar average.

The following hypotheses were proposed:

H1 There is a statistically significant correlation between the Factor cognitive and metacognitive problems and the Factor academic performance in Bachelor of Science in Education students.

H2 There is a statistically significant correlation between the Factor psychological and emotional problems and the Factor academic performance in students of the Bachelor of Science in Education.

H3 There is a statistically significant correlation between the Factor psychological and emotional problems and the Factor family in students of the Bachelor of Science in Education.

H4 There is a statistically significant correlation between the Factor psychological and emotional problems and the Factor cognitive problems in students of the Bachelor of Science in Education.

H5 There is a statistically significant correlation between the Academic Performance Factor and the Grade Point Average Factor in Bachelor of Science in Education students.

Results and Discussion

Results are described as follows: scale and sub-scales' reliability, scale's factor analysis, graphs for each of the five factors, correlations among the factors, Student's t test of differences and finally multiple linear regression analysis.

Reliability and Validity Results of the Family, Cognitive, Mental Health, and Academic Engagement Factors Scale in College Students after COVID-2022.

Table 1. Reliability of the Family, Mental Health, and Academic Engagement Scale in College Students after COVID-2022

Factor	p
General Alpha	.91
Family	.73
Resources at home	.21
Academic Engagement	.69
Cognitive and metacognitive problems	.90
Psychological and emotional problems	.91

A Cronbach's Alpha (.91) was obtained, which means that the instrument is highly reliable (Table 1) to evaluate family, academic, cognitive and psychological factors in a sample of 34 students of the Bachelor's Degree in Education Sciences who were in their sixth semester at a public university in the State of Hidalgo in Mexico.

Table 2. Results from a Factor Analysis of the Scale of Psychological, Emotional, Cognitive and Family Factors on Academic Engagement in University Students

Item	Factor loading				
	1	2	3	4	5
Factor 1. Psychological and emotional problems					
1. I wanted to run a way	.56	.27	.25	.23	.48
2. I was invaded by fears for no reason	.51	.41	.45	.00	.38
3. I was short of breath	.60	.45	.35	.06	.21
4. I was easily depressed	.54	.26	.54	.11	.33
5. I felt sad	.51	.00	.52	-.16	.15
6. I felt alone	.44	.51	.28	.20	.16
7. I repeatedly felt stress	.52	-.35	.15	.06	.32
8. My head ached continuously	.33	.56	.49	.13	-.05
9. I felt claustrophobic	.01	.84	.12	.00	.09
10. I got sick continuously	.37	.53	-.05	-.08	.30
11. I received psychological treatment	-.02	.29	.22	-.11	.74
12. I felt emotionally out of control	.51	.13	.51	-.05	.40
13. It was difficult for me to relate to others	.72	.20	-.08	.27	.04
14. I attacked people	-.05	.76	.09	.17	.26
15. I used some drug	-.19	.73	.05	-.34	.26
16. I consumed alcohol to seek relief	-.07	.76	.02	-.15	-.03
17. I was distressed	.70	.21	.22	.37	.08
Factor 2. Cognitive factors					
18. It was difficult for me to learn	.89	-.03	-.05	.01	.17
19. It was difficult for me to understand the topics	.79	.01	-.10	.21	-.04
20. It was worried about not understanding the instructions	.81	-.08	-.07	.10	.16
21. I was easily distracted	.72	-.15	-.25	.39	-.01
22. It was difficult for me to study	.78	.11	.37	-.09	-.02
23. I lost a close relative	-.13	.15	.63	.05	.33
Factor 3. Family					
24. I had problems family	.25	.06	.75	.14	-.13
25. I take care of a sick family member	.06	.22	.70	.12	.03
26. I had a sick family member	-.01	-.09	.59	.38	.36
27. I dropped out of school to support my family financially	-.06	.56	.32	.35	.10
28. I worked to contribute to family expenses	.16	.07	.43	.63	-.21
29. I carried out activities at home	.11	-.58	-.06	.61	.03
Factor 4. Academic Engagement					
30. My school performance lowered	.46	.59	.03	.09	-.01
31. I failed to full fill the task	.54	.62	.10	-.02	-.17
32. I did my homework at the last minute	.74	.11	.16	-.21	-.04
33. Finishing a simple activity took me longer than usual	.77	.00	.30	.03	-.37
34. Did other activities while in class	.76	-.25	.27	-.02	.11
35. I participated during classes	-.16	-.11	-.24	-.78	.02
36. I liked team work	.06	-.01	.26	-.45	-.09
Factor 5. Home resources					
37. I had computer equipment to myself	-.12	.08	-.18	-.51	.02
38. I had a quality internet connection	-.10	-.03	.01	.01	-.57
39. I shared the computer equipment t home for homework	.29	.04	.11	.14	.25
40. My family provided me with the necessary resources to continue studying	-.18	.51	.47	-.04	-.39

Note: N=36. A factor analysis was performed with a principal component extraction method; five fixed factors were extracted with a varimax rotation.

Table 2 shows that most of the items are distributed and grouped in the 5 factors. However, in Factor 5 Resources at home, the factor loadings are dispersed.

On the other hand, the results of each factor are presented below, where the arithmetic mean of response for each item is observed for the entire sample (N=34)

of participating students. Here, it is important to consider that the response values correspond to: 4=Always, 3=Frequently, 2=Rarely and 1=Never.

Figure 1. *Family Factors*

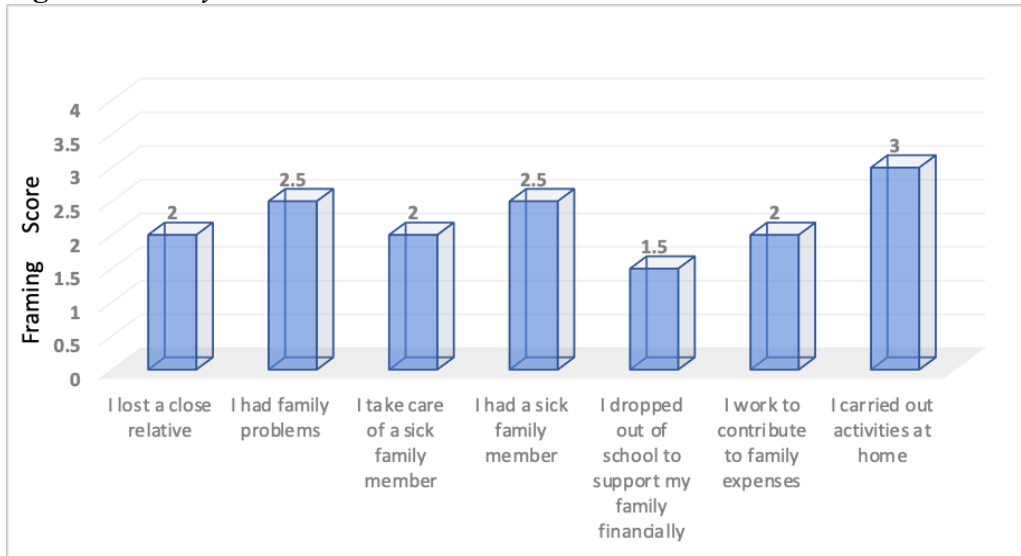
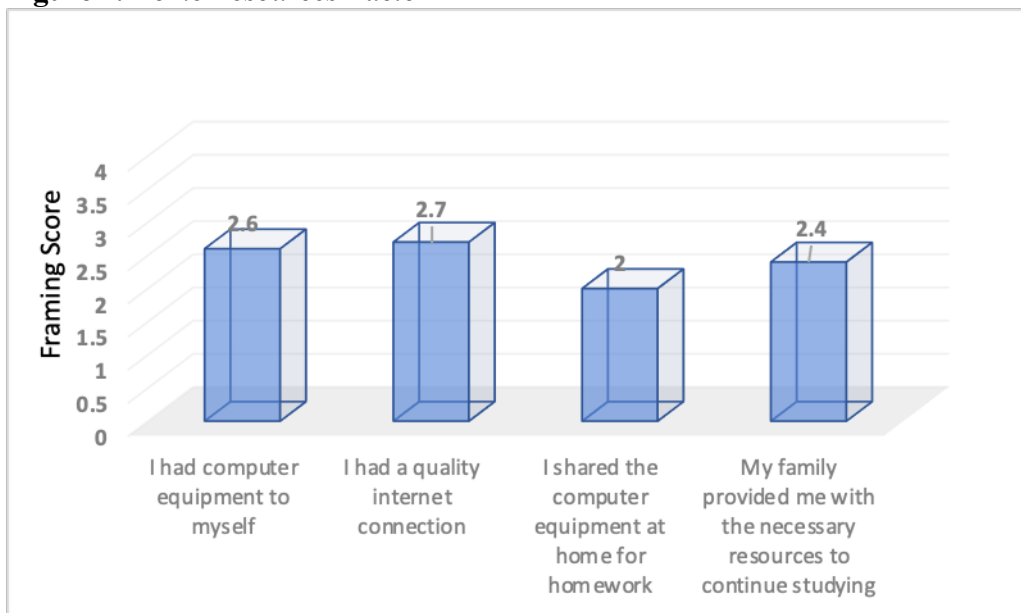


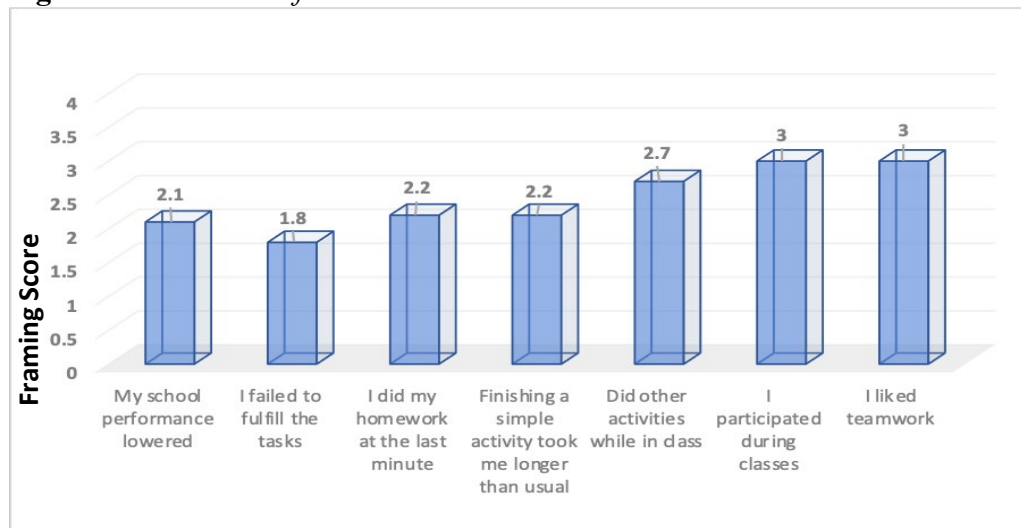
Figure 1 shows that the students reported that they frequently performed different activities at home, such as taking care of a sick family member, preparing food, cleaning the house, and other house tasks, which was also observed by Almonami et al. (2021). Students reported that they rarely worked to contribute to the family's financial expenses. Importantly, they reflect that they sometimes dropped out of school to support family expenses and rarely lost a sick person.

Figure 2. *Home Resources Factor*



Regarding resources at home (Figure 2), students reported that they often had a computer and a quality Internet connection, which may have favored their connection during their online classes. At the same time, students reported that their families supported them with the necessary resources to continue their studies. Family support is fundamental to ensure better school performance, permanence in college and graduation, and continued insertion in the labor market (Shaw 1998).

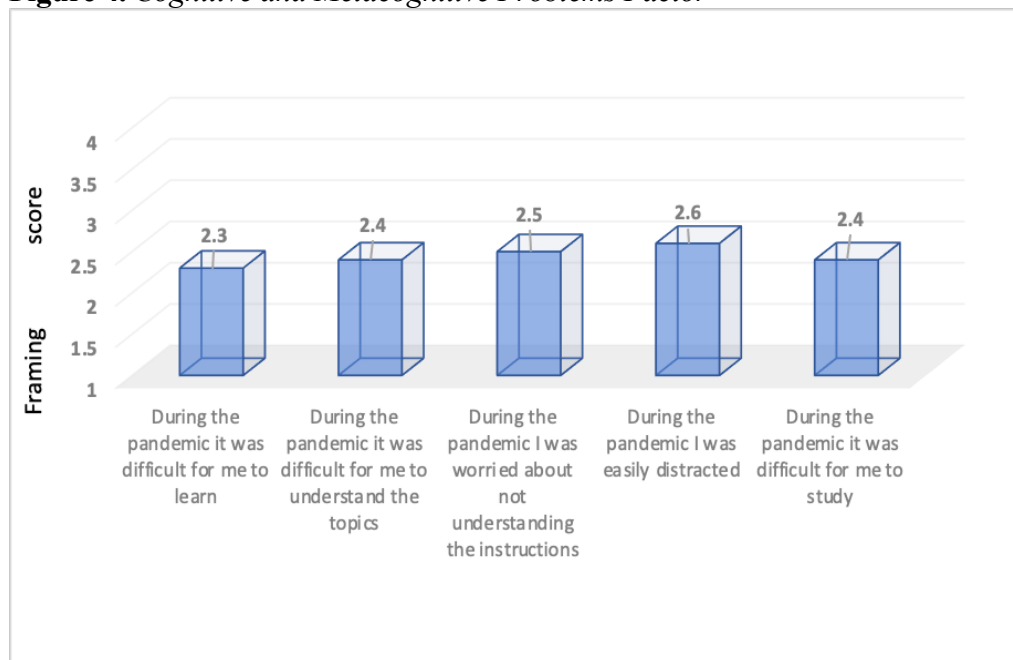
Figure 3. Schoolar Performance Factor



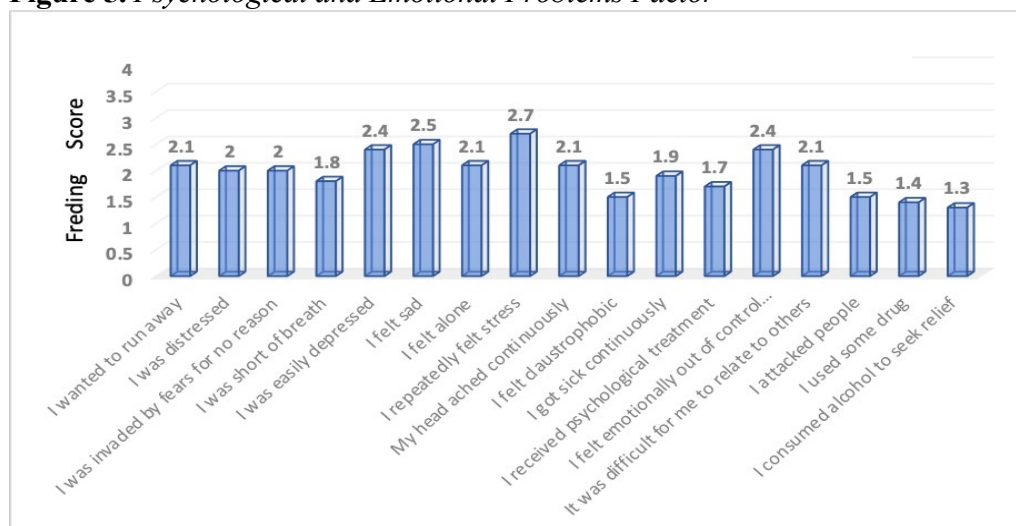
According to Figure 3, students' responses reflect that they often enjoyed teamwork and participation in classes, which probably helped not only to improve their learning but also to develop and test their social skills with their peers and the teacher.

In their school performance, students consider that during the pandemic their academic performance was low, they failed to turn in their homework, were distracted during classes and took longer to finish their homework.

Sheehy et al. (2023), in their work they found that the teacher can help improve and strengthen students' epistemological beliefs about the importance of studying. Therefore, it is important to consider the teacher as a fundamental resource to work on this possibility with their students, helping them to value their efforts to learn.

Figure 4. *Cognitive and Metacognitive Problems Factor*

In Figure 4, according to the students' responses, it is showed that they reported cognitive and metacognitive problems, such as difficulties in studying and paying attention, as well as understanding class topics and learning. These competencies are fundamental for the best professional development of students, as well as key for them to acquire the necessary knowledge during their career or profession.

Figure 5. *Psychological and Emotional Problems Factor*

Regarding psychological and emotional problems, students report in their responses (Figure 5), that they frequently felt stressed, sad, felt emotionally out of control and easily depressed, among other characteristics. These emotional problems have been observed consistently in different studies such as Herbert et al.'s (2021)

and Giusti et al.'s (2021). Similarly, they report that they felt symptoms related to distress, anxiety, such as fear and the feeling of running away. To a lesser extent, the students' responses suggest that they consumed drugs and alcohol, which undoubtedly affected their psychological and emotional health more in those who gave these responses.

Table 3. *Descriptive Statistics and Correlations for Study Variables*

Factor	N	M	SD	1	3	4	5	6
Family	34	56.09	16.60	—				
Schoolar performance	34	62.18	14.01		—			
Cognitive and metacognitive problems	34	61.91	20.11		.66**	—		
Psychological and emotional problems	34	50.34	15.49	.44**	.59**	.50**	—	
Scholar average	34	9	.35		-.51**			—

Note: In Mexico normally the Scholar average is between 0 to 10 points.

According to the results (Table 3), it was found that there is a statistically significant and directly proportional correlation between the Cognitive and metacognitive problems factor in relation to the Academic performance factor.

There is a statistically significant and inversely proportional correlation between the academic performance factor and the general average factor.

The Factor psychological and emotional problems is the one that correlates statistically significantly, and is directly proportional, with the Factors: Family, Academic engagement and Cognitive and metacognitive problems.

This last factor indicates that the more psychological and emotional problems a student presents in this sample of university students, the greater the academic performance problems will be, as well as family, cognitive and metacognitive problems.

A final statistically significant and inversely proportional correlation was between the school approach factor and the academic performance factor.

Table 4. *Results of Student's t-test for Differences between High Group and Low Group*

Factor	Group1 (N=15)		Group 2(N=17)		t(34)	p
	M	SD	M	SD		
Family	48.9	13.6	63.2	16.5	-2.74	.010
Home resources	60.6	13.9	64.7	15.9	-.788	.437
Schoolar performance	55.2	10.6	69.1	13.7	-3.28	.002
Cognitive and metacognitive problems	52.0	14.9	71.7	20.1	-3.24	.003
Psychological and emotional problems	37.7	8.1	62.9	9.4	-8.33	.000

In these results (Table 4) it was found that there were statistically significant differences in the four of the five factors evaluated, where the arithmetic mean was

higher for Group 2 compared to Group 1. However, there were no significant differences between the two groups in the home resources factor.

Table 5. *Multiple Linear Regression Model of Cognitive and Metacognitive Problems on Academic Engagement*

Predictor variables:	F(1,33)	R ²	B	SEa	p
Model 1					
Constant			33.31	5.9	
Cognitive and metacognitive problems	25.95	.44	.66	.09	<.001
Dependent variable: Academic engagement					
Note: a Standard Error					

Table 5 shows that the Model 1, taking the Cognitive and metacognitive problems as independent variable, can predict significantly 44% of the dependent variable Academic engagement variable.

Table 6. *Multiple Linear Regression Model of Cognitive and Metacognitive Problems and Psychological and Emotional Problems on Academic Engagement*

Predictor variables:	F(2,33)	R ²	B	SEa	p
Model 2					
Constant			25.09	6.4	
Cognitive and metacognitive problems	17.92	.53	.49	.49	<.001
Psychological and emotional problems			.34	.34	
Dependent variable: Academic engagement					
Note: a Standar Error					

Table 6 shows that the Model 2, taking the Cognitive and metacognitive problems and the Psychological and emotional problems as independent variables, can predict significantly 53% of the dependent variable Academic engagement.

Conclusions

According to the descriptive analysis it is concluded that the students of the Bachelor of Science in Education, reported that during the pandemic their academic engagement was affected, which affects directly their academic performance, given that their learning diminished and they were affected by diverse psychological and emotional factors; cognitive and metacognitive and family and resources provided at home during the pandemic COVID-19.

The psychological and emotional state of the students was affected, mainly because they often felt stressed, sad, depressed and anxious, sometimes felt out of control, and sometimes resorted to alcohol and drug use. Although some of them reported having received psychological care, it is important that the university

should try to review these mechanisms and alternatives for remedial care and prevention in the future when students may present these or similar situations, not just pandemics. In countries with scarce resources or in the process of development, this type of psychological care may not exist in this case, which is limited due to the lack of health psychology professionals and other community health disciplines.

Emotional problems are a very serious problem among university students. Therefore, universities should design programs where clinical psychologists, psychiatrists and other mental health professionals participate in order to reduce these problems in university students. Mental health promotion is needed, but also treatments for those who already suffer from an emotional disorder. Mental health is not only important for the students' wellbeing, but also for their cognitive functioning and learning skills.

In daily life in the classrooms, teachers are needed to promote the development of high psychological functions, such as reflective analysis, in order to improve learning and complex thinking. Teachers should also guide their students to acquire the study habits that best fit their characteristics in order to engage them in the academic activities and tasks that will help their academic performance.

In terms of cognitive skills, there were difficulties in learning and understanding certain subjects. In their mathematical and cognitive skills, they had difficulty concentrating, as they were easily distracted. In their tasks they spent more time than necessary, so they were delayed to conclude them. The results of this study reflect the need to develop and test more workshops or programs that encourage and support the development of these cognitive and metacognitive skills and abilities, from the time students enter and remain in college.

Regarding the analysis of differences with Student's t-test, it is concluded that there are statistically significant differences between the results of the applied scale, between a group of students with low scores and another group with high scores, where the arithmetic mean is higher for the group of students who report having greater difficulties. However, there are no statistically significant differences in their academic average, but the arithmetic mean is lower ($M=8$) for the group with high scores than in the group with low scores ($M=9$), both in their answers in the Scale applied. This indicates that the greater the difficulties in these factors, the lower the school average and vice versa. Therefore, it is necessary for universities to guarantee the psychodiagnostic evaluation and its intervention to continue supporting students who may present diverse difficulties, such as those mentioned in this research.

This work provides data for future research, to investigate and test preventive programs to address various pandemic situations in universities and other schools, such as providing emergency care to students who present serious conditions, related to psychological, emotional, cognitive, metacognitive and family problems that affect their school performance and as such their academic average, and their quality of life in general.

Finally, this research contributes methodologically, a highly reliable Likert scale that measures the factors already described, which has possibilities of improvement to evaluate the factors mentioned. This scale can be applied in schools in Mexico and in other schools around the world. It can be used to carry out studies in comparative

education and comparative sociology, on this delicate and complex subject that has affected humanity at all levels and social strata, referring to the COVID-19 Pandemic.

Recommendations

The *Scale of Psychological, Emotional, Cognitive and Family Factors on Academic Engagement in University Students* can be used, since it proved to have reliability and validity. However, the scale might also be improved by removing items with low factor load. The Family factor items show low factor load as well as low reliability. This suggests that the items could belong to a different construct. Therefore, it could be necessary to design another instrument aimed at measuring exclusively the family factor and its relation to the academic engagement.

Moreover, more specialized statistical analysis is needed, such as structural equations models, that allow to predict more exactly the effect of independent variables on dependent variables.

References

- Allen R, Kannangara C, Vyas M, Carson J (2022) European university students' mental health during COVID-19: exploring attitudes towards COVID-19 and governmental responses. *Current Psychology* 42(Feb): 20165–20178.
- Almomani EY, Qablan AM, Almomany AM, Atrooz FY (2021) The coping strategies followed by university students to mitigate the COVID-19 quarantine psychological impact. *Current Psychology* 40: 5772–5781.
- Astin AW (1984) Student involvement: A developmental theory for higher education. *Journal of College Student Development* 25: 297–308.
- Eccles J, Wang MT (2012) Part I commentary: So what is student engagement anyway? In SL Christenson, AL Reschly, C Wylie (eds.), *Handbook of Research on Student Engagement*, 133–145. Springer.
- Fredricks JA, McColskey W (2012) The measurement of student engagement: A comparative analysis of various methods and student self-report instruments. In S Christenson, AL Reschly, C Wylie (eds.), *Handbook of Research on Student Engagement*, 319–339. Springer.
- Giusti L, Mammarella S, Salza A, Del Vecchio S, Ussorio D, Casacchia M, et al. (2021). Predictors of academic performance during the COVID-19 outbreak: impact of distance education on mental health, social cognition and memory abilities in an Italian university student sample. *BMC Psychology* 9(142).
- Heng K (2013) The relationships between Student Engagement and the Academic Achievement of First-Year University Students in Cambodia. *Asia Pacific Education Review*.
- Herbert C, Bolock AE, Abdennadher S (2021) How do you feel during the COVID-19 pandemic? A survey using psychological and linguistic self-report measures, and machine learning to investigate mental health, subjective experience, personality, and behavior during the COVID-19 pandemic among university students. *BMC Psychology* 9(1).
- Herbert C, Meixner F, Wiebking C, Gilg V (2020) Regular physical activity, short-term exercise, mental health, and well-being among university students: the results of an online and a laboratory study. *Frontiers in Psychology* 11.

- Kuh GD, Cruce TM, Shoup R, Kinzie J, Gonyea RM (2008) Unmasking the effects of student engagement on first-year college grades and persistence. *The Journal of Higher Education* 79(5): 540–563.
- Marinoni G, Van't Land H, Jensen T (2020) *The impact of COVID-19 on higher education around the world*. IAU Global Survey Report.
- Mertens D (2015) *Research an Evaluation in Education and Psychology. Integrating Diversity with Quantitative, Qualitative, and Mixed Methods*. USA: Gallaudet University.
- Pace R (1990) *The undergraduates: A report of their activities and progress in college in the 1980s*. Los Angeles: University of California.
- Roche AI, Holdefer PJ, Thomas EBK (2022) College student mental health: Understanding changes in psychological symptoms in the context of the COVID-19 pandemic. *Current Psychology* (May): 1–10.
- Russell MA, Reavley N, Williams I, Li W, Tarzia L, Chondros P, et al. (2023) Changes in mental health across the COVID-19 pandemic for local and international university students in Australia: a cohort study. *BMC Psychology* 11.
- Schaufeli WB, Martinez IM, Pinto AM, Salanova M, Bakker AB (2002) Burnout and engagement in university students: A cross-national study. *Journal of Cross Culture Psychology* 33(5): 464–481.
- Shaw A (1998) Familial Influences and Higher Education, *The Park Place Economist* 6(1).
- Sheehy K, Mclanachan A, Okada A, Tatlow-Golden M, Harrison S (2023) Is Distance Education Fun? The implications of Undergraduates' Epistemological Beliefs for Improving Their Engagement and Satisfaction with Online Learning. *Athens Journal of Education* 10(2): 213–232.
- Sinatra GM, Heddy BC, Lombardi D (2015) The challenges of defining and measuring student engagement in science. *Educational Psychology* 50: 1–13.
- Vilca LW, Chávez BV, Fernández YS, Caycho-Rodríguez T, White M (2021) Impact of the fear of catching COVID-19 on mental health in undergraduate students: A Predictive Model for anxiety, depression, and insomnia. *Current Psychology* (Jan): 1–8.

