

IMPACT OF ADDICTION TO SOCIAL NETWORKS ON THE MENTAL HEALTH OF HUMAN MEDICINE STUDENTS, IN TIMES OF COVID-19

IMPACTO DE LA ADICCIÓN A REDES SOCIALES EN LA SALUD MENTAL DE LOS ESTUDIANTES DE MEDICINA HUMANA, EN TIEMPOS DE COVID-19

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ABSTRACT

Objective: To determine the association of addiction to social networks and the consequences in mental health in human medicine students of the Ricardo Palma University, year 2021. **Methods:** Cross-sectional observational study, with the participation of 454 human medicine students from first to fifth year, chosen by stratified random sampling proportional to size. The instrument was validated, obtaining a Cronbach's Alpha ($\alpha=0.90$), the questionnaires used were: Addiction to Social Networks (ARS), Depression, Anxiety, Stress Scale (DASS-21) and Pittsburgh Sleep Quality Index (PSQI). In order to evaluate the association between variables, we used crude and adjusted prevalence ratio (PR), using the Poisson regression model with the logarithmic link and with the 95% confidence interval. **Results:** 65.4% were women, with an average age of 21.2 years. A significant association was found between high social network addiction and mental health (PRc: 2.59; 95% CI: 1.92-3.50; p: 0.000) and, likewise, between high and medium levels of social network addiction. social and with depression, anxiety, stress (p: 0.000) and sleep quality (p<0.010), respectively. 41%, 49.1% and 9.9% of the students presented low, medium and high addiction to social networks, respectively. 57.5% had depression, 56.4% anxiety, 70.5% stress and 77.3% poor sleep quality. **Conclusions:** There was a strong association between ARS and mental health. Therefore, it is recommended that university students visit mental health specialists quarterly for proper identification, evaluation, and management of the problems generated by ARS.

Keywords: Behavior; Addictive; Social networking; Mental health; Students; Medical. (Source: MESH-NLM)

RESUMEN

Objetivo: Determinar la asociación de la adicción a redes sociales y las consecuencias en salud mental en estudiantes de medicina humana de la Universidad Ricardo Palma, año 2021. **Métodos:** Estudio observacional transversal, participaron 454 estudiantes de medicina humana de primero a quinto año, elegidos por muestreo aleatorio estratificado proporcional al tamaño. El instrumento fue validado, obteniendo un Alpha de Cronbach ($\alpha=0,90$), los cuestionarios empleados fueron: Adicción a redes sociales (ARS), escala de depresión, ansiedad, estrés (DASS-21) y índice de la calidad del sueño de Pittsburgh (PSQI). A fin de evaluar la asociación entre variables, utilizamos razón de prevalencia (RP) crudo y ajustado, mediante el modelo de regresiones de Poisson con el enlace logarítmico y con intervalo de confianza del 95%. **Resultados:** El 65,4% eran mujeres, con edad promedio 21,2 años. Se evidenció asociación significativa entre adicción a redes sociales alto y salud mental (RPC: 2,59; IC95%: 1,92-3,50; p: 0,000), así mismo, los niveles alto y medio de adicción a redes sociales con síntomas depresivos, ansiedad, estrés (p: 0,000) y calidad de sueño (p<0,010), respectivamente. El 41%, 49,1% y 9,9% de los estudiantes presentaron adicción a redes sociales bajo, medio y alto respectivamente. Un 57,5% presentaron síntomas depresivos, 56,4% ansiedad, 70,5% estrés y 77,3% mala calidad de sueño. **Conclusiones:** Encontramos una fuerte asociación entre ARS y salud mental. Por lo cual se recomienda a los universitarios que sean evaluados por especialistas de salud mental para una correcta identificación, evaluación y manejo de los problemas de la ARS.

Palabras clave: Conducta adictiva; Red social; Salud mental; Estudiantes de medicina. (Fuente: DeCS- BIREME)

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INTRODUCTION

Social networks are those open platforms and have certain characteristics such as their own profile, a public list of contacts and continuous exchange of content⁽¹⁾, these are divided into different types according to the desired objective of the user, for example we have social networks of relationships. such as Instagram, Twitter, Tinder, Facebook and entertainment social networks, these are YouTube, Pinterest and TikTok⁽²⁾. The adolescents and young adults of this generation were born alongside the rise of technology and are growing with the innovative proposals offered by social networks, and just as this new virtual world can have a positive influence, its inappropriate use can affect mental health⁽³⁾. In Peru, between 2020 and 2021, it was estimated that 78% to 80% of the population between 18 and 70 years old connect to the internet with the main objective of using social networks (77%), followed by conversations through chats (70%) and studying (67%); furthermore, the three platforms most used by Peruvians during the quarantine were WhatsApp, Facebook and YouTube⁽⁴⁻⁶⁾.

In the new era of coronavirus 2019 (COVID-19), the internet and social networks have become an indispensable element for education, work and entertainment, facilitating numerous activities of daily life. The student population being the most exposed group due to the new virtual learning method due to the mandatory isolation and temporary closure of schools and universities as occurs in many countries^(7,8). For medical students, the implications of addiction to social networks can hinder their studies and impact their long-term professional goals, having harmful consequences for society, since excessive use of these can easily distract students, harming memory and making it difficult to remember what they are learning, it also directly affects the mood and quality of sleep, this could influence future health professionals not to provide adequate quality of care to the population^(9,10).

Studies have been carried out in different countries on the effect of social networks, showing that prolonged use of platforms such as Facebook can be related to signs and symptoms of depression, anxiety and stress⁽³⁾. Likewise, an investigation in Peruvian university students determined a significant relationship between addiction to social networks with depressive symptoms

and poor quality of sleep⁽⁹⁾. Hou Y, et al (2019) found that addictive use of social media was common among college students and was associated with poor mental health and poor academic performance⁽¹⁰⁾.

For all these reasons, the objective of this research was to search for the association between addiction to social networks and mental health in human medicine students, such as depressive symptoms, anxiety, stress and sleep quality.

METHODS

Design and type of study

Observational, analytical cross-sectional study.

Population and sample

The total population at the Universidad Ricardo Palma was 1,681 human medicine students from first to fifth year in the 2021 academic period. The sample size was 446 students, to obtain the sample size the EPIDAT software was used, considering a level confidence at 95%, statistical power of 80%, proportion of addiction to social networks with mental health ($P_1 = 55.6\%$)⁽¹¹⁾ and proportion of addiction to social networks without mental health ($P_2 = 41.9\%$)⁽¹³⁾.

In the population we define each academic year as a stratum, with the aim of improving the representativeness of the results. In each stratum, a sample size proportional to the size of the stratum in the population was obtained (first year: 74, second year: 84, third year: 107, fourth year: 111, fifth year: 70 students). For the sample, the list of the 1681 human medicine students at the Universidad Ricardo Palma from first to fifth year was used. Students were selected randomly in each stratum, using the complex samples option of SPSS version 27. Then, to share the questionnaire, the telephone numbers of all the selected students were obtained with the help of the delegates of each academic year.

Inclusion Criteria

Human medicine students from the Ricardo Palma University enrolled in 2021, who studied from first to fifth year and who authorized their participation.



Exclusion Criteria

Students who answered the surveys partially and after the date.

Survey

The instruments were validated by 3 experts, specialists in the subject with a master's degree and research specialists, subsequently a pilot test was carried out with 40 human medicine students distributed from first to fifth year, likewise, the quota by sex and age group; To collect the data during the pilot test, the instruments were systematized in a Google form and sent to the students through WhatsApp. Once the data collection was completed, the database was exported to SPSS version 27 to obtain the results of reliability of the instruments, with Cronbach's Alpha coefficient: for the entire questionnaire ($\alpha = 0.90$). For the ARS survey ($\alpha = 0.94$), DASS-21 (depression: $\alpha = 0.91$; anxiety: $\alpha = 0.88$; stress: $\alpha = 0.89$) and PSQI obtained the expected reliability ($\alpha = 0.94$, .94, .88). To measure reliability, identifying variables such as sex, age and academic year were not considered.

For the final study, the pilot test participants were not considered, subsequently the validated and reliable instruments were sent through a link through WhatsApp to the sample of students chosen randomly in each academic year, the data collection was carried out between on November 12 and December 15, 2021. We obtained the response from 454 human medicine students from first to fifth year.

Independent variable

The independent variable is addiction to social networks. Likewise, the covariates are considered: sex, age, academic year, relationship with parents and relationship with siblings, evaluating them in the following way: The first section of the instrument consists of the general data of the students such as age (in years lived and range for five-year periods), sex (female or male) and academic year (first to fifth year). For the variable relationship with parents and siblings, it was evaluated with the Likert scale from 1 to 5, with bad relationship = 1 and good relationship = 5.

Social media addiction (ARS by its name in Spanish).

This questionnaire seeks to identify and indicate the

degree of attachment to social networks, it is made up of 23 direct items and 1 inverse with a total score according to the Likert scale: Direct scores of item 1 to 12 and 14 to 24 (always = 4, almost always = 3, sometimes = 2, almost never = 1 and never = 0) and reverse scoring of item 13⁽¹⁴⁾. The ranges considered are: low level from 0 to 32, medium level from 33 to 64 and high level from 65 to 96 points. The scores for these three ranges (low, medium and high level) were calculated using Stanones' rule according to their scores obtained in the questionnaire.

Dependent variables

It was made up of 5 dependent variables, which are: depressive symptoms, anxiety, stress, sleep quality and mental health.

Depression, anxiety and stress (DASS-21)

Questionnaire that evaluated depressive symptoms, anxiety and stress. It is made up of three subscales and 21 questions. For depressive symptoms the questions are: 3, 5, 10, 13, 16, 17, 21; for anxiety: 2, 4, 7, 9, 15, 19, 20; and for stress: 1, 6, 8, 11, 12, 14, 18, which were measured with a Likert scale with four alternatives, being never = 0 and almost always = 3. The maximum score for each subscale was 21 points, to consider in two groups, each of the 3 subscales the median was used^(165,16).

Pittsburg sleep quality index (PSQI)

Questionnaire that consisted of questions that evaluated the quality of sleep during the last month. The median was used to group into good and poor quality of sleep⁽¹⁷⁾.

Mental health

It was determined by adding the scores of the variables: depressive symptoms, stress, anxiety and sleep quality. To group into good and bad mental health, the median was used.

Statistical analysis

The database was collected using Google Forms. An internal validation of the database was carried out, assigning labels on a Likert scale to proceed with the analysis. Once the answers were verified, it was exported to the statistical software SPSS version 27, which was downloaded from the IBM SPSS website with the free trial option.





Then, the independent variable, the covariates and the dependent variables were recoded to determine their levels and their presence or absence; Univariate analysis was used for frequencies, percentages, mean and standard deviation. In the bivariate and multivariate analysis, the categories of the independent variable were correlated, and the covariates with the dependent variable using crude RP and adjusted RP, with the Poisson regression model with robust variance and logarithmic link function. A fundamental statistical assumption analyzed was the independence of observations. The results were obtained considering the sample design, for this the complex sample design in SPSS version 27 was used.

Ethical considerations

This research considered the ethical principle of "respect for people" since it had the approval of the

participants through a documented informed consent, detailing the purpose of the study and safeguarding confidentiality;

RESULTS

In total, 454 surveys were analyzed, 65.4% (n=297) were women, the age range 17 to 21 years and third academic year are the most predominant groups. 49.1% (n=223) of students had a medium level of addiction, followed by low addiction with 41% and 9.9% had a high level of addiction. In addition, 40.5% (n=184) have poor mental health, 57.5% presented depression, 56.4% anxiety, 70.5% stress and 77.3% poor sleep quality. Regarding family relationships, 18.5% had a bad relationship with parents and 17.7% had a bad relationship with siblings (Table 1). The most used social networks were WhatsApp (93%), Instagram (70%) and in third place YouTube (64%).

Table 1. Univariate analysis of the general characteristics of human medicine students (N=454).

Variables		Frequency	%
	Total	454	100,0
Mental health	Good	270	59,5
	Bad	184	40,5
Depressive symptoms	No	193	42,5
	Yes	261	57,5
Anxiety	No	198	43,6
	Yes	256	56,4
Stress	No	134	29,5
	Yes	320	70,5
Sleep quality	Good	103	22,7
	Bad	351	77,3
Social media addiction	Low	186	41,0
	Medium	223	49,1
	High	45	9,9
Age (years)	(Media ± SD)	21,2	± 3,3
	17-21	292	64,3
	22-26	134	29,5
	27-31	20	4,4
	>31	8	1,8

Sex	Male	157	34,6
	Female	297	65,4
Academic year	First	75	16,5
	Second	85	18,7
	Third	113	24,9
	Fourth	111	24,4
	Fifth	70	15,4
Relationship with parents	Bad	84	18,5
	Good	370	81,5
Relationship with siblings	Bad	76	17,7
	Good	354	82,3

^aSignificant $P < 0,05$

PRc: Crude prevalence ratio; PRa: Adjusted prevalence ratio; 95%CI: 95% confidence interval.

ORIGINAL PAPER

According to the bivariate analysis of mental health, depression, stress, anxiety and sleep quality

In human medicine students, the risk of poor mental health in the group with social media addiction was high (95% CI: 1.92-3.50) and medium (95% CI: 1.26-2.17)

159% and 65% higher compared to the low level of addiction, in addition, poor relationships with parents and siblings were risk factors for mental health; besides, male sex (95% CI: 0.58-0.96) was a protective factor (Table 2).

Table 2. Bivariate and multivariate analysis of the independent variable and covariates associated with mental health in human medicine students, 2021 (N=454).

Variable and covariates		PRc	CI 95%	Mental health p value	PRa	CI 95%	p value ^a
Social media addiction	High	2,59	(1,92-3,50)	0,000 ^a	2,42	(1,78-3,31)	0,000 ^a
	Medium	1,65	(1,26 2,17)	0,000 ^a	1,59	(1,20 2,09)	0,001
	Low	Reference			Reference		
Sex	Male	0,75	(0,58-0,96)	0,024 ^a	0,74	(0,58-0,95)	0,019
	Women	Reference			Reference		
Age (years)	17-21	3,43	(0,54-21,52)	0,189			
	22-26	3,16	(0,50-20,03)	0,221			
	27-31	2,00	(0,27-14,55)	0,494			
	>31	Reference					
Academic year	First	1,03	(0,70-1,53)	0,870			
	Second	1,18	(0,82-1,69)	0,383			
	Third	0,97	(0,67-1,41)	0,886			
	Fourth	0,92	(0,63-1,34)	0,678			
	Fifth	Reference					
Relationship with parents	Bad	1,74	(1,40-2,15)	0,000 ^a	1,58	(1,22-2,04)	0,000 ^a
	Good	Reference			Reference		
Relationship with siblings	Bad	1,32	(1,02-1,72)	0,037 ^a	1,03	(0,77-1,38)	0,837
	Good	Reference			Reference		

^aSignificant $P < 0,05$

PRc: Crude prevalence ratio; PRa: Adjusted prevalence ratio; 95%CI: 95% confidence interval.



The risk of depressive symptoms in human medicine students who have a high (95% CI: 1.69-2.60) and medium (95% CI: 1.35-2.01) addiction to social networks was 109% and 65% higher compared to the low level of addiction, also the poor relationship with

parents (95% CI: 1.17-1.61) and with siblings (95% CI: 1.04-1.49) indicated to be factors of risk; male sex (95% CI: 0.66-0.95) was a protective factor for depressive symptoms (Table 3).

Table 3. Bivariate and multivariate analysis of the independent variable and covariates associated with depressive symptoms in human medicine students, 2021 (N=454).

Variable and covariates		Depressive symptoms					
		PRc	CI 95%	p value	PRa	CI 95%	p value
Social media addiction	High	2,09	(1,69-2,60)	0,000 ^a	1,99	(1,58-2,48)	0,000 ^a
	Medium	1,65	(1,35-2,01)	0,000 ^a	1,59	(1,31-1,94)	0,000 ^a
	Low	Reference			Reference		
Sex	Male	0,80	(0,66-0,95)	0,012 ^a	0,79	(0,67-0,94)	0,009 ^a
	Female	Reference			Reference		
Age (years)	17-21	2,40	(0,72-7,99)	0,155			
	22-26	2,34	(0,69-7,80)	0,171			
	27-31	1,20	(0,30-4,74)	0,795			
	> 31	Reference					
Academic year	First	0,97	(0,72-1,27)	0,754			
	Second	0,98	(0,75-1,29)	0,908			
	Third	1,01	(0,79-1,30)	0,923			
	Fourth	0,95	(0,74-1,23)	0,718			
	Fifth	Reference					
Relationship with parents	Bad	1,37	(1,17-1,61)	0,000 ^a	1,22	(1,02-1,46)	0,031
	Good	Reference			Reference		
Relationship with siblings	Bad	1,24	(1,04-1,49)	0,018 ^a	1,09	(0,90-1,33)	0,377
	Good	Reference			Reference		

^a Significant $P < 0,05$

PRc: Crude prevalence ratio; PRa: Adjusted prevalence ratio; 95%CI: 95% confidence interval.

The risk of anxiety in students with high (95% CI: 1.95-2.93) and medium (95% CI: 1.37-2.08) addiction levels was 139% and 69% higher than students with low addiction, in addition, the bad relationship with

with parents (95% CI: 1.17-1.62) was 38% higher compared to those who have a good relationship and the male sex turned out to be a protective factor (Table 4).

Table 4. Bivariate and multivariate analysis of the independent variable and covariates associated with anxiety in human medicine students, 2021 (N=454).

Variable and covariates		Anxiety					
		PRc	CI 95%	p value	PRa	CI 95%	p value
Social media addiction	High	2,39	(1,95-2,93)	0,000 ^a	2,29	(1,86-2,82)	0,000 ^a
	Medium	1,69	(1,37-2,08)	0,000 ^a	1,68	(1,37-2,06)	0,000 ^a
	Low	Reference			Reference		
Sex	Male	0,77	(0,64-0,93)	0,006 ^a	0,77	(0,65-0,92)	0,003 ^a
	Female	Reference			Reference		



Age (years)	17-21	2,40	(0,72-7,99)	0,155		
	22-26	2,15	(0,64-7,21)	0,215		
	27-31	1,40	(0,37-5,35)	0,623		
	> 31	Reference				
Academic year	First	1,18	(0,90-1,55)	0,239		
	Second	1,15	(0,88-1,51)	0,317		
	Third	0,98	(0,74-1,29)	0,875		
	Fourth	0,95	(0,71-1,25)	0,698		
	Fifth	Reference				
Relationship with parents	Bad	1,38	(1,17-1,62)	0,000 ^a	1,27	(1,08-1,49) 0,004 ^a
	Good	Reference			Reference	
Relationship with siblings	Bad	1,15	(0,94-1,39)	0,171		
	Good	Reference				

^a Significant $P < 0,05$

PRc: Crude prevalence ratio; PRa: Adjusted prevalence ratio; 95%CI: 95% confidence interval.

The risk of stress in human medicine students due to high (95% CI: 1.39-1.91) and medium (95% CI: 1.21-1.62) social media addiction was 63% and 40% higher than those with a low level of addiction, a poor

relationship with parents and siblings represented a 23% greater risk of stress and male sex was a protective factor (Table 5).

Table 5. Bivariate and multivariate analysis of the independent variable and covariates associated with stress in human medicine students, 2021 (N=454).

Variables and covariates		PRc	CI 95%	Stress			
				p value	PRa	CI 95%	p value
Social media addiction	High	1,63	(1,39-1,91)	0,000 ^a	1,55	(1,32-1,81)	0,000
	Medium	1,40	(1,21-1,62)	0,000 ^a	1,37	(1,18-1,57)	0,000 ^a
	Low	Reference			Reference		
Sex	Male	0,81	(0,70-0,93)	0,003 ^a	0,80	(0,70-0,92)	0,001 ^a
	Female	Reference			Reference		
Age	17-21	1,44	(0,72-2,89)	0,306			
	22-26	1,46	(0,73-2,95)	0,287			
	27-31	0,80	(0,33 1,92)	0,618			
	> 31	Reference					
Academic year	First	0,99	(0,81-1,21)	0,908			
	Second	1,00	(0,83-1,21)	0,991			
	Third	0,93	(0,77-1,13)	0,491			
	Fourth	0,94	(0,78-1,14)	0,523			
	Fifth	Reference					
Relationship with parents	Bad	1,23	(1,09-1,39)	0,001 ^a	1,08	(0,94-1,24)	0,268
	Good	Reference			Reference		
Relationship with siblings	Bad	1,23	(1,09-1,39)	0,001 ^a	1,16	(1,01-1,33)	0,038 ^a
	Good	Reference			Reference		

^a Significant $P < 0,05$

PRc: Crude prevalence ratio; PRa: Adjusted prevalence ratio; 95%CI: 95% confidence interval.



Finally, the risk of poor sleep quality in students with addiction to social networks was found to be high (95% CI: 1.11-1.46) and medium (95% CI: 1.04-1.30) at 27%.

and 16% higher compared to the low level of addiction, also the poor relationship with parents determined 16% higher risk. (Table 6).

Table 6. Bivariate and multivariate analysis of the independent variable and covariates associated with sleep quality in human medicine students, 2021 (N=454).

Variable and covariates		Sleep quality					
		PRc	CI 95%	p value	PRa	CI 95%	p value
Social media addiction	High	1,27	(1,11-1,46)	0,001 ^a	1,25	(1,09-1,44)	0,001 ^a
	Medium	1,16	(1,04-1,30)	0,010 ^a	1,15	(1,03-1,29)	0,015 ^a
	Low	Reference			Reference		
Sex	Male	0,90	(0,80-1,00)	0,062			
	Female	Reference					
Age	17-21	1,24	(0,72-2,13)	0,429			
	22-26	1,25	(0,73-2,16)	0,415			
	27-31	1,12	(0,61-2,06)	0,715			
	> 31	Reference					
Academic year	First	1,04	(0,86-1,26)	0,665			
	Second	1,10	(0,92-1,31)	0,304			
	Third	1,13	(0,96-1,33)	0,152			
	Fourth	1,01	(0,85-1,21)	0,881			
	Fifth	Reference					
Relationship with parents	Bad	1,16	(1,04-1,28)	0,005 ^a	1,13	(1,02-1,25)	0,016 ^a
	Good	Reference			Reference		
Relationship with siblings	Bad	1,05	(0,92-1,19)	0,460			
	Good	Reference					

^a Significant $P < 0,05$

PRc: Crude prevalence ratio; PRa: Adjusted prevalence ratio; 95%CI: 95% confidence interval.

According to the multivariate analysis of mental health, depression, stress, anxiety and sleep quality

This analysis showed that high (95% CI: 1.78-3.31) and medium (95% CI: 1.20-2.09) addiction to social networks determined a 142% and 59% higher risk for poor mental health than students with a low level of addiction. Male sex was statistically significant (Table 2). The high and medium level of addiction to social networks showed a 99% and 59% greater risk of presenting depressive symptoms compared to low levels of addiction; while a poor relationship with parents indicated a 22% risk (95% CI: 1.02-1.46) and male sex (95% CI: 0.67-0.94) was a protective factor for depressive symptoms (Table 3). High and medium social network addiction had a 129% and 68% higher risk of presenting anxiety than in students with a low level of addiction, and male sex (95% CI: 0.65- 0.92) was a protective factor for anxiety (Table 4).

Addiction to high and medium social networks was 55% and 37% higher risk for presenting stress, and poor relationships with siblings represented a 16% risk. Furthermore, male sex was a protective factor (Table 5). High and medium addiction to social networks had a 25% and 15% greater risk of presenting poor sleep quality than in students with a low level of addiction and male sex was a protective factor (Table 6).

DISCUSSION

During recent years, the use of social networks has increased significantly, especially since the beginning of confinement due to the COVID-19 pandemic. This increase was for social reasons such as maintaining contact or establishing new links, also due to the need to regulate humor with the search for entertaining videos or images, the need to be informed, the construction of a personal identity or the expression of



opinions⁽¹⁾. Various investigations, as well as this one, show that its excessive use is correlated with worse mental health outcomes, with the university population being the most affected group, as they face stressors such as the interruption of their education, concern about virtual learning, social isolation, financial worry and uncertainty about their future^(19,20).

Mental health is a topic of global interest. In a multinational literature review, it was found that excessive use of social networks was a significant predictor of acute stress and anxiety symptoms. These results suggest that social networks may have a negative influence on mental health. short- and long-term mental health⁽¹⁹⁾. Our research had similar results, evidencing a significant correlation between these variables. Likewise, a study carried out on university students in Indonesia found that higher social media addiction scores are associated with poor mental health⁽¹⁰⁾. The popularity of networks is growing, but there is still not much research, so despite the known negative effects such as dropping out of studies, insomnia, depression, poor academic performance, among others, we still do not know to what extent it can affect mental health⁽²¹⁾.

Among the most common comorbid disorders is depression. Research carried out in Paraguay and Peru on university students shows a statistically significant relationship between addiction and depressive symptoms^(11,22). The present research shows that students with high levels of addiction to social networks are more likely to present depressive symptoms than those with low levels of addiction, similar to the study by Sujarwoto et al.⁽²³⁾ where students with higher social media addiction scores were more likely to experience depression. This result is probably because the majority of information and publications observed on social networks contribute to egocentrism and consumerism, influencing unrealistic living standards or physical aspects of people; In addition, we have the famous fake news, that is, false news that seeks to generate a strong emotional response⁽²⁴⁾. Greater use of social networks is directly linked to anxiety because

students have persistent thoughts about their use and at the same time they waste time being connected in the virtual world. The results obtained by Verónica P. et al (2020), as in our research, determined that students with a greater addiction to social networks presented a higher level of anxiety⁽²⁵⁾. In times of COVID 19, it is understandable that university students increase their use of time on social networks, causing a possible increase in the risk of presenting anxiety, which is why students must strictly control the time they dedicate to the use of social networks⁽²⁶⁾.

Since the beginning of the pandemic, students have faced new stressors such as the restriction of outdoor physical activities and the change from in-person to virtual learning, impacting their psychological well-being⁽²⁰⁾. Our study detects around 70% of students presented stress during their virtual learning in 2021. Regarding addiction to social networks and stress, a study carried out in China (2021) shortly after the start of the pandemic found that excessive use of social networks >3 hours a day is significantly associated with acute stress⁽¹⁹⁾. Likewise, our study shows a greater risk of presenting stress the higher the level of addiction to social networks. The stress experienced by students can affect their learning results, therefore we must achieve its reduction through the selection of effective coping strategies, both mental and behavioral, to control, tolerate or reduce stressful events⁽²⁰⁾.

Excessive use of the Internet could significantly influence the sleep and wake schedule, causing insomnia and other sleep disorders⁽²⁷⁾. In this study, 77.1% presented poor quality sleep. This result is similar to previously developed research. in medical students in Saudi Arabia where the prevalence was 76%⁽²⁸⁾ and in a private university in Peru it was 72.4%⁽¹²⁾, these high percentages may be due to the excess of courses, extracurricular activities, the demand for high performance and long study time that the career demands. Likewise, a significant association was found between addiction to social networks and poor quality of sleep. This result supports previous research such as that of Zaheer H. and Mark D. (2021). In a study with 638 participants, positive correlations were obtained with poor quality. of sleep $p < 0.01$ ⁽²⁹⁾. Wong et al.⁽³⁰⁾ in their research carried out on undergraduate and graduate student's states that there is a significant association between the social media addiction scale and poorer





sleep quality. Some mechanisms described to disrupt sleep are psychological stimulation (excited mood due to the use of social networks), light-emitting screens (light can suppress hormones that promote sleep, such as melatonin), and reduction in duration of sleep⁽³⁰⁾. One of the limitations of the research was the impossible identification of a causal relationship between the variables of interest due to their transversal characteristic. Another limitation was not obtaining a large amount of background information because the majority of studies were based on Internet addiction. Differences between gender were examined because our female population was older than males, in addition, students were not evaluated for previous mental illnesses before conducting the survey and we also faced a possible bias in the procedure during the resolution of the instruments since they had many questions. Likewise, we have the opportunity to conduct new research and learn more about the consequences of social media addiction when in-

person classes resume in order to compare with those who were in virtual classes. It is recommended for future research to conduct a prospective multicenter study. In addition, it is suggested that universities schedule virtual conferences on the topic of addiction to social networks, with qualified specialists (psychiatrists and/or psychologists) who teach and raise awareness among students about the harmful consequences that this can have on their health and well-being. academic life, in addition to providing a support plan.

Finally, we conclude that there is a statistically significant association between addiction to social networks and mental health (depressive symptoms, anxiety, stress and sleep quality) in human medicine students. Likewise, individual characteristics such as male sex and poor relationships with parents and siblings are significant and are associated with mental health.

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