ORIGINALES

Characteristics associated with depression, anxiety, and stress in university students

Características asociadas a la depresión, ansiedad y estrés en estudiantes universitarios

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ABSTRACT:
Introduction: The present research focused on analyzing the characteristics associated with depression, anxiety and stress in university students in times of COVID-19 pandemic,
Method: The study had a non-experimental, correlational, prospective, cross-sectional design. The data collection technique was the survey, and its instrument was the DASS-21 questionnaire, which has a very good reliability of 0.91. It has been applied virtually to 385 Peruvian university students.
Results: The results show that 12% of the students surveyed presented high stress, 7% severe anxiety and 9% severe depression. Among the factors associated with stress were age, previous major, having a job, having a chronic disease. Anxiety had associated factors such as age, having a previous career, work status and diagnosis of a chronic disease. Depression was associated with factors such as age, having children, having a previous major, internet connection, having a job, having been diagnosed with a chronic disease, having a family member or a close person with COVID-19, and finally having someone close who had passed away.
Conclusion: Three logistic regression models were estimated with 77.3%, 68.2% and 63.3% certainty for stress, anxiety and depression, respectively.

Keywords: Depression, anxiety, stress, Covid-19

RESUMEN:
Introducción: La presente investigación se enfocó en analizar las características asociadas a la depresión, ansiedad y estrés en estudiantes universitarios en tiempos de pandemia COVID-19.

Método: El estudio fue de diseño no experimental, correlacional, prospectivo y de corte transversal. La técnica de recolección de datos fue la encuesta, y su instrumento el cuestionario DASS-21, el cual cuenta con una confiabilidad muy buena de 0.91. Este ha sido aplicado a 385 estudiantes universitarios peruanos, de manera virtual.

Resultados: Los resultados indican que de los estudiantes encuestados, un 12% de ellos presentan estrés alto, 7% ansiedad severa y 9% depresión severa. Dentro de los factores que se asociaron al estrés encontramos la edad, la carrera previa, el contar con trabajo, tener enfermedad crónica; la ansiedad tuvo factores asociados como edad, tener una carrera previa, estado laboral y diagnóstico de una enfermedad crónica; la depresión tuvo factores asociados como edad, el tener hijos, con una carrera previa, conexión de internet, tener trabajo, el haber sido diagnosticado con una enfermedad crónica, el tener un familiar o persona cercana con COVID-19 y finalmente el que alguien cercano haya fallecido.

Conclusión: Se estimaron 3 modelos de regresión logística con 77.3%, 68.2% y 63.3% de certeza para estrés, ansiedad y depresión respectivamente
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Palabras claves: Depresión, ansiedad, estrés, Covid-19.

INTRODUCTION

The World Health Organization declared the outbreak of the SARS COV-2 virus (Covid-19) as a pandemic on March 11, 2020, just a week before it had already reached Peru with its first infection [1]. The whole world was informed about the high potential for contagion and spread of this virus, which quickly spread to 114 countries, with 118,000 infections and 4,291 fatalities [2]. This represented a public health emergency with consequences in all political, social, economic and, above all, health fields, not only because of the human losses [3], but also because of the psychosocial disorders, stress, anxiety, depression, at the individual and collective levels, due to the prolonged quarantines and isolation to which we were subjected.

It has been verified that quarantine greatly reduces the physical activity of individuals even compared to situations of incarceration [4].

In this context, in Peru, educational institutions at all levels decided to suspend classroom activities for a period of 15 days [5]. However, this measure was extended as a result of the increase in the number of infections and mutations of the Covid-19 virus [6]. In the university field, the remote teaching modality implied not only the development of strategies for the implementation of virtual education, but also the adaptation of teachers to this new modality with the objective of achieving quality and continuity in the studies of young people, redesigning and learning to handle new digital platforms and adapting them to the contents [7].

In addition, the students had to face several inconveniences in the economic aspect, their own illness and psychological conditions such as depression and anxiety, which are considered as a psychic discomfort in dangerous situations [8]. Anxiety is known to influence the success or failure of students' actions [9]. Likewise, stress occurs in both positive and negative experiences. Faced with these stressors, the organism can generate two types of reactions, one of which is to avoid the stressful situation both physically and psychologically, and the other reaction is to confront the stressor with the resources one has to overcome it, triggering a whole response that prepares one for a real defense against aggression, either present or future [10].

For this reason, it is considered that research on anxiety, depression and stress is of utmost importance. Studies conducted in Asian countries, only on anxiety, reported a

prevalence of over 20%, with differences in occupation and gender, being the student population the most affected [11] and having among the main consequences the critical psychological impact that generates uncertainty [12] and which is related to the decrease of interpersonal skills [13].

Regarding the deterioration of mental health, there was evidence of an increase in moderate-severe levels of depression, anxiety and stress, and even, in some cases, there was suicidal ideation as well as suicidal intention [14].

At the international level, several studies have been carried out on university students. In Mexico, 53.2% presented anxiety problems, 47.8% presented stress, and 29% showed some disorder associated with depression, which was reflected in their academic performance [15]. In Cuba, 63.11% of students had excessive stress, 56.8% pathological stress, 54.85% medium depression, and 57.69% of those with excessive stress had medium depression as well. The high levels of stress caused these students to show depressive behaviors. The complex curriculum and, adding to this, the pandemic produced by COVID-19 was what led to a significant presence of stress levels, directly affecting their mood and their desire to be able to continue with their studies [16]. In Turkey, 13.63% of the participants showed anxiety and 52.55% had a medium level of stress; a significant association in gender, loss of a family member and year of study, all related to COVID-19[17]. In Greece, the prevalence of anxiety and depression was found to be 35.8% and 51.2%, respectively. Factors associated with this prevalence were school, financial situation, health status, level of satisfaction with state response, university and daily routine [18]. The correlations among these dimensions were also strong in relation to health, demographics and lifestyle, and for the other variables their values predicted depression, anxiety and stress [19].

In Peru, research on factors associated with depression, anxiety and stress in the context of the Covid-19 pandemic applied to Lima police officers found prevalence of 11.43%, 10% and 7.62%, respectively, where anxiety was associated with the number of children (p:0.032) and comorbidities (p:0.031). Likewise, in the multivariate analysis, depression and age were associated (p:0.044), stress and sentimental situation (p:0.034), diagnosis of Covid-19 (p:0.045) and comorbidities (p:0.022); It was concluded that the risk factors for stress were being single, diagnosed with Covid-19 and comorbidities, while the risk factor for depression was being under 40 years of age[20]. Similarly, another study found that the frequencies of depression, anxiety and stress in human medical students were 24.3%, 28.5% and 13.0%, respectively. Likewise, it was found that the highest frequency of anxiety was associated with being Catholic, having a shorter year of study or having a chronic disease, while the highest frequency of stress was associated with being younger [21].

Based on the aforementioned, the purpose of this research is to analyze the characteristics associated with depression, anxiety and stress in university students during the COVID-19 pandemic.

MATERIAL AND METHOD

A descriptive study, with a quantitative approach, correlational, prospective, cross-sectional scope, in order to analyze the study variables and apply the instrument at a certain point in time [22].

(M------------O); where M is the sample and O, the observation of interest collected from the sample.

The population consisted of all university students in the department of La Libertad with Internet access. The surveys were conducted online because the social isolation decreed by the Peruvian government was still in force. The convenience sampling, selecting a sample of 385 students, was calculated by applying the formula for unknown population, using a prevalence of 50%, confidence level of 95%, and an adjusted error of 5% [23]. The inclusion criteria included students from the first to the tenth cycle who were enrolled and in attendance on a regular basis at the universities in the department of La Libertad and who consented to participate voluntarily in the study.

The technique used for data collection was the survey and as an instrument a questionnaire of closed questions, which was answered virtually, making publications through social networks (WhatsApp, Facebook) and e-mail [23]. The questionnaire was the DASS-21 scale, created by Lovibond and Lovibond in 1995[24] and later adapted by Román *et al*., [25] who determined its psychometric properties and acceptable factorial in almost all indexes [26,27] in order to measure stress, anxiety and depression independently. It is made up of 21 questions: with 7 closed items for each dimension respectively, which will help to measure the variables and satisfactorily resolve the general objective of interest through statistical procedures.

The biological characteristics considered are age and sex; social characteristics: if he/she has a partner, has completed a previous professional career, lives alone, works, marital status, study cycle, and type of religion; characteristics related to health: if he/she has a diagnosis of a chronic disease, has a close friend or relative diagnosed with COVID 19, and if a close relative died in 2021.

For the analysis of the information, the SPSS version 26 statistical package was applied, using descriptive statistics such as percentages, calculation of averages, mode, standard deviation and statistical graphs. Kendal's tau b statistic was also calculated to identify the factors associated with anxiety, depression and stress, as well as the estimation of a logistic regression model [28].

The Helsinki declaration was taken into account, respecting the decision of the students to participate or not in the study by means of the informed consent letter where all of them established and accepted the limits of their participation, complying with the principle of autonomy. The authors maintained the integrity of the participants without jeopardizing the information obtained (confidentiality of the data) in compliance with the principle of maleficence, and the information obtained was distributed equally without any discrimination, in compliance with the principle of justice [29].

RESULTS

Table 1: *Relationship between factors and stress in university students during the COVID-19 pandemic*

Factors		Low	%	Average	%	High	%	Total	%	Sig	Kendal's tau b
					Stress						
Age	16 to 24 years	157	41%	110	29%	42	11%	309	80%	0.043	0.546
	25 to 34 years	38	10%	17	4%	2	1%	57	15%		
	35 years and older	14	4%	4	1%	1	0%	19	5%		
Sex	Female	135	35%	94	24%	34	9%	263	68%	0.184	
	Male	74	19%	36	9%	11	3%	121	31%		
Type of university	Private	198	51%	128	33%	45	12%	371	96%	0.141	
	Public	11	3%	3	1%	0	0%	14	4%		
Cycle	I to IV	161	42%	106	28%	35	9%	302	78%	0.948	
	V to VIII	21	5%	11	3%	4	1%	36	9%		
	IX to XII	27	7%	14	4%	6	2%	47	12%		
With a partner	Yes	68	18%	40	10%	19	5%	127	33%	0.520	
	No	141	37%	90	23%	27	7%	258	67%		
With children	Yes	38	10%	14	4%	5	1%	57	15%	0.088	
	No	171	44%	116	30%	41	11%	328	85%		
With a previous career	Yes	43	11%	16	4%	3	1%	62	16%	0.011	0.46
	No	166	43%	114	30%	43	11%	323	84%		
Internet connection	Steady	76	20%	59	15%	13	3%	148	38%	0.291	
	Varied	105	27%	55	14%	26	7%	186	48%		
	Weak	28	7%	16	4%	7	2%	51	13%		
Religion	Catholic	100	26%	67	17%	24	6%	191	50%	0.842	
	Other	63	16%	36	9%	11	3%	110	29%		
	None	46	12%	27	7%	11	3%	84	22%		
Living alone	Yes	38	10%	13	3%	6	2%	57	15%	0.091	
	No	171	44%	117	30%	40	10%	328	85%		
With a job	Yes	96	25%	41	11%	11	3%	148	38%	0.002	0.74
	No	113	29%	89	23%	35	9%	237	62%		
Diagnosed with chronic disease	Yes	11	3%	10	3%	9	2%	30	8%	0.016	0.616
	No	198	51%	120	31%	37	10%	355	92%		
Relative or close person with COVID-19	Yes	140	36%	82	21%	36	9%	258	67%	0.195	
	No	69	18%	48	12%	10	3%	127	33%		
Death of someone close in 2020-2022	Yes	124	32%	79	21%	34	9%	237	62%	0.212	
	No	85	22%	51	13%	12	3%	148	38%		
TOTAL		209	54%	130	34%	46	12%	385	100%		

Note: Data obtained from the sample

Table 2: Selection of factors associated with stress in university students during the COVID-19 pandemic

	B	Desv. Error	Wald	gl	Sig.	Exp(B)	95% confidence interval for Exp(B)	
							Lower limit	Upper limit
Intersection	16.17	1.889	73.303	1	0			
Age (16 to 24 years)	-0.121	1.262	0.009	1	0.003	0.886	0.075	10.517
Age (25 to 34 years)	0.884	1.384	0.408	1	0.023	2.42	0.161	36.458

With a partner (Yes)	-0.783	0.392	3.984	1	0.046	0.457	0.212	0.986
With a previous career (yes)	1.254	0.905	1.922	1	0.017	3.505	0.595	20.639
With a job (Yes)	0.741	0.451	2.695	1	0.01	2.097	0.866	5.079
Diagnosed with chronic disease (Yes)	-1.397	0.552	6.393	1	0.011	0.247	0.084	0.731

*77.3% of model accuracy
Note: Data obtained from the sample

Table 3: Relationship between factors and anxiety in university students during the COVID-19 pandemic.

Factors		Anxiety						Total	%	Sig	Kendal's tau b
		Leve	%	Moderado	%	Severo	%				
Age	16 to 24 years	195	51%	87	23%	26	7%	308	80%	0.010	0.676
	25 to 34 years	47	12%	9	2%	2	1%	58	15%		
	35 years and older	17	4%	2	1%	0	0%	19	5%		
Sex	Female	171	44%	72	19%	20	5%	263	68%	0.325	
	Male	88	23%	26	7%	8	2%	122	32%		
Type of university	Private	249	65%	94	24%	28	7%	371	96%	0.574	
	Public	10	3%	4	1%	0	0%	14	4%		
Cycle	I to IV	204	53%	76	20%	21	5%	301	78%	0.941	
	V to VIII	23	6%	11	3%	2	1%	36	9%		
	IX to XII	32	8%	11	3%	5	1%	48	12%		
With a partner	Yes	82	21%	32	8%	12	3%	126	33%	0.404	
	No	177	46%	66	17%	16	4%	259	67%		
With children	Yes	44	11%	9	2%	4	1%	57	15%	0.153	
	No	215	56%	89	23%	24	6%	328	85%		
With a previous career	Yes	49	13%	12	3%	0	0%	61	16%	0.02	0.427
	No	210	55%	86	22%	28	7%	324	84%		
Internet connection	Steady	103	27%	39	10%	6	2%	148	38%	0.224	
	Varied	122	32%	45	12%	19	5%	186	48%		
	Weak	34	9%	14	4%	3	1%	51	13%		
Religion	Catholic	126	33%	51	13%	15	4%	192	50%	0.401	
	Other	81	21%	21	5%	7	2%	109	28%		
	None	52	14%	26	7%	6	2%	84	22%		
Living alone	Yes	44	11%	7	2%	5	1%	56	15%	0.053	
	No	215	56%	91	24%	23	6%	329	85%		
With a job	Yes	112	29%	31	8%	5	1%	148	38%	0.004	0.54
	No	147	38%	67	17%	23	6%	237	62%		
Diagnosed with chronic disease	Yes	12	3%	12	3%	6	2%	30	8%	0.004	0.62
	No	247	64%	86	22%	22	6%	355	92%		
Relative or close person with COVID-19	Yes	175	45%	62	16%	20	5%	257	67%	0.531	
	No	84	22%	36	9%	8	2%	128	33%		
Death of someone close in 2020-2022	S Yes	157	41%	59	15%	20	5%	236	61%	0.376	
	No	102	26%	39	10%	8	2%	149	39%		
TOTAL		259	67%	98	25%	28	7%	385	100%		

Note: Data obtained from the sample

Table 4: Selection of predictors of anxiety in university students during the COVID-19 pandemic

	B	Desv. Error	Wald	gl	Sig.	Exp(B)	95% confidence interval for Exp(B)	
							Lower limit	Upper limit
Intersection	30.291	1096.499	0.001	1	0.978			
Age (16 to 24 years)	-13.7	1096.498	0	1	0.003	1.12E-06	0	.b
Age (25 to 34 years)	-12.629	1096.498	0	1	0.091	3.27E-06	0	.b
With a partner (Yes)	-1.067	0.471	5.13	1	0.024	0.344	0.137	0.866
With a previous career (yes)	14.056	691.596	0	1	0.004	1272224.66	0	.b
With a previous career (no)	14.32	691.596	0	1	0.083	1655367.34	0	.b
With a job	1.24	0.628	3.895	1	0.048	3.455	1.009	11.835
Without a job	0.917	0.657	1.947	1	0.016	2.501	0.69	9.067
Diagnosed with chronic disease (Yes)	-1.622	0.676	5.748	1	0.017	0.198	0.052	0.744

*68.2% of model accuracy

Table 5: Factors associated with depression in university students during the COVID-19 pandemic

Factors		Depression								Sig	Kendal's tau b
		Mild	%	Moderate	%	Severe	%	Total	%		
Age	16 to 24 years	181	47%	95	25%	32	8%	308	80%		
	25 to 34 years	45	12%	11	3%	2	1%	58	15%	0.014	0.667
	35 years and older	15	4%	4	1%	0	0%	19	5%		
Sex	Female	162	42%	76	20%	25	6%	263	68%	0.605	
	Male	79	21%	34	9%	9	2%	122	32%		
Type of university	Private	232	60%	105	27%	34	9%	371	96%	0.471	
	Public	9	2%	5	1%	0	0%	14	4%		
Cycle	I to IV	189	49%	87	23%	26	7%	302	78%		
	V to VIII	23	6%	9	2%	4	1%	36	9%	0.973	
	IX to XII	29	8%	14	4%	4	1%	47	12%		
With a partner	Yes	85	22%	30	8%	12	3%	127	33%	0.334	
	No	156	41%	80	21%	22	6%	258	67%		
With Children	Yes	45	12%	8	2%	4	1%	57	15%	0.013	0.41
	No	196	51%	102	26%	30	8%	328	85%		
With a previous career	Yes	50	13%	10	3%	2	1%	62	16%	0.002	0.572
	No	191	50%	100	26%	32	8%	323	84%		
Internet connection	Steady	86	22%	53	14%	10	3%	149	39%		
	Varied	124	32%	41	11%	21	5%	186	48%	0.046	0.441
	Weak	31	8%	16	4%	3	1%	50	13%		
Religion	Catholic	116	30%	58	15%	18	5%	192	50%		
	Other	70	18%	32	8%	7	2%	109	28%	0.695	
	None	55	14%	20	5%	9	2%	84	22%		

Living alone	Yes	38	10%	14	4%	5	1%	57	15%	0.692	
	No	203	53%	96	25%	29	8%	328	85%		
With a job	Yes	107	28%	33	9%	8	2%	148	38%	0.004	0.64
	No	134	35%	77	20%	26	7%	237	62%		
Diagnosed with chronic disease	Yes	12	3%	12	3%	6	2%	30	8%	0.034	0.728
	No	229	59%	98	25%	28	7%	355	92%		
Relative or close person with COVID-19	Yes	157	41%	71	18%	29	8%	257	67%	0.028	0.712
	No	84	22%	39	10%	5	1%	128	33%		
Death of someone close in 2020-2022	Yes	139	36%	72	19%	26	7%	237	62%	0.008	0.806
	No	102	26%	38	10%	8	2%	148	38%		
TOTAL		241	63%	110	29%	34	9%	385	100%		

Note: Data obtained from the sample

Table 6: Selection of predictors of depression in university students during the COVID-19 pandemic.

	B	Desv. Error	Wald	gl	Sig.	Exp(B)	95% confidence interval for Exp(B)	
							Lower limit	Upper limit
Intersection	30.281	1243.338	0.001	1	0.981			
Age (16 to 24 years)	-14.162	1243.337	0	1	0.001	7.08E-07	0	.[b]
Age (25 to 34 years)	-12.513	1243.337	0	1	0.002	3.68E-06	0	.[b]
Age (35 years and older)	-12.791	1243.337	0	1	0.002	2.79E-06	0	.[b]
With chidren (Yes)	0.493	0.8	0.379	1	0.038	1.637	0.341	7.849
With a previous career (No)	0.499	1.186	0.177	1	0.004	1.647	0.161	16.843
Internet Connection (Varied)	-0.571	0.687	0.691	1	0.041	0.565	0.147	2.173
Internet Connection (Weak)	0.146	0.765	0.037	1	0.008	1.157	0.258	5.184
With a job (No)	0.486	0.561	0.75	1	0.004	1.626	0.541	4.881
Diagnosed with chronic disease (Yes)	-1.196	0.651	3.373	1	0.006	0.302	0.084	1.084
Relative or close person with COVID-19 (Yes)	0.805	0.835	0.93	1	0.033	2.237	0.435	11.49
Death of someone close in 2020-2022 (Yes)	-0.239	0.489	0.238	1	0.003	0.788	0.302	2.055

*63.3% of model accuracy
Note: Data obtained from the sample

DISCUSSION

The data collected in the research show that the majority of young university students present low stress. However, there are 12% with high stress, as shown in Table 1. The changes that occurred in the pandemic brought as a consequence alteration in the emotional state of young university students, coinciding with what is indicated by a

study that states that the changes in our organism originate in response to certain factors that may occur in reality [30]. However, the result also presents differences with other investigations in which 52.55% of the students showed a medium level of stress and 63.11% presented an excessive level of stress related to the pandemic [16,17], respectively. However, given that the data collection was conducted in 2022, the fact that the stress was mostly low may be attributed to the omission of certain restrictions established by the national government to curb the pandemic, as compared to 2020 and 2021. On the other hand, our results identified that younger students aged 16 to 24 years showed the highest percentage of stress (11%), which coincides with Sandoval et al where it was found that the highest frequency of stress is associated with being younger [21].

Table 2 showed that the logistic regression model included as associated variables and predictors of stress, being aged between 16 and 34 years, having a partner, previous career, having a job and being diagnosed with a disease, ($p<0.05$), which coincides with a study in Peru where factors such as years of study or chronic diseases presented average levels of stress and anxiety [21].

Table 3 shows that most of them present a slight level of anxiety, but in the analysis of the related factors it was found that age, having a previous career, work status, diagnosis of a chronic disease are significantly related ($p < 0.05$) to anxiety, aspects that coincide with the research of Sasal *et al*. where, in addition, anxiety and stress due to studies were also related [18].

The logistic regression model shown in Table 4 has determined the factors that are related and are predictors for anxiety, and the following were found, being aged between 25 to 34 years, with or without previous career, with job, diagnosed with chronic disease. Likewise, Trunce *et al*., state that the perceived state of health or the presence of a chronic disease in students is among the factors associated with this prevalence, which also triggers low performance [15].

When identifying the factors that are related to depression in Table 5, we found age, having children, having a previous career, internet connection, having a job, having been diagnosed with a chronic disease, having a family member or close person with COVID-19 and, finally, having someone close who had died ($p<0.05$). This affects the normal development of their life, lowers their mood, and gives them a sense of guilt. Sazakli and team also showed risk results for depression [18]. In turn, Cobiellas presented average results in depression generated by high levels of stress [16].

When identifying the predictors of depression in Table 6, it was also determined the categories that are related to this anomaly in university students by obtaining a significance value (p value) of less than 5%; these were: 16 years of age or older, having children, not having a previous career, having a varied to weak Internet connection, not having a current job, having been diagnosed with a chronic disease, having a family member or close person with COVID, and having someone close who had died ($p<0.05$). These aspects coincide with studies where it was found that students who lost a family member had a significant relationship with anxiety and stress [16,17]. Hamaideh *et al.,* mention that during quarantine a high level of depression prevailed and consider that these factors can predict anxiety, depression and stress in students [19].

The main limitation in this study was the access to information by the students, since we are in a state of health emergency, the sampling technique used was by convenience. However, the estimated logistic regression models obtained good prognostic percentages.

The information obtained is of great importance since it helps us to make decisions to avoid mental health diseases in our university students. Therefore, it is recommended to university authorities, the implementation of workshops to master stress, anxiety, depression, as well as consultations by the specialized professional to treat this type of problems.

CONCLUSIONS

The results allow us to conclude that the estimated logistic regression models indicate the characteristics associated with stress, anxiety and depression, which had a good percentage of certainty with 77.35, 68.2% and 63.3% respectively, where the factors of age, having a job and having been diagnosed with a chronic disease are common to the models analyzed. In addition, it can be seen that the majority of university students presented a low level of stress. However, there are still 12% of them with high stress who require support and attention. In addition to the above, the depression variable increases with the factor of having children, not having a previous career and that a relative had passed away.

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