



Medicina clínica y social

ISSN: 2521-2281

ISSN: 2521-2281

Cátedra de Socioantropología, Filial de Santa Rosa  
del Aguaray de la Facultad de Ciencias Médicas de la  
Universidad Nacional de Asunción

Torales, Julio; Barrios, Iván; Barrios, Jazmín; Báez-Osorio, Hernando; Sánchez-Piris, Enrique; Ortigoza-Alves, Edis; Villalba-Arias, Jorge; Ruiz Díaz, Noelia; O'Higgins, Marcelo; Amarilla, Diego; Almirón-Santacruz, José; Caycho-Rodríguez, Tomás; Castaldelli-Maia, João Mauricio; Ventriglio, Antonio; Neurociencias, Red de Estudiantes Investigadores en Medical Students Training and Mental Health: An Exploratory Study  
Medicina clínica y social, vol. 7, no. 2, 2023, May-August, pp. 52-60  
Cátedra de Socioantropología, Filial de Santa Rosa del Aguaray de la  
Facultad de Ciencias Médicas de la Universidad Nacional de Asunción

DOI: <https://doi.org/10.52379/mcs.v7i2.284>

Available in: <https://www.redalyc.org/articulo.oa?id=703775308003>

- How to cite
- Complete issue
- More information about this article
- Journal's webpage in redalyc.org

UNEM  redalyc.org
















Scientific Information System Redalyc

Network of Scientific Journals from Latin America and the Caribbean, Spain and Portugal

Project academic non-profit, developed under the open access initiative

# Medical Students Training and Mental Health: An Exploratory Study

## Formación de los estudiantes de Medicina y Salud Mental: un estudio exploratorio

Julio Torales <sup>1,2,3\*</sup>, Iván Barrios <sup>3\*</sup>, Jazmín Barrios <sup>1</sup>, Hernando Báez-Osorio <sup>1</sup>, Enrique Sánchez-Piris <sup>3</sup>, Edis Ortigoza-Alves <sup>3</sup>, Jorge Villalba-Arias <sup>1,3</sup>, Noelia Ruiz Díaz <sup>1</sup>, Marcelo O'Higgins <sup>1</sup>, Diego Amarilla <sup>1,3</sup>, José Almirón-Santacruz <sup>1</sup>, Tomás Caycho-Rodríguez <sup>4</sup>, João Mauricio Castaldelli-Maia <sup>5,6</sup>, Antonio Ventriglio <sup>7</sup>, Red de Estudiantes Investigadores en Neurociencias <sup>8</sup>

\*Joint first authors



Received: 25/01/2023

Revised: 10/03/2023

Accepted: 02/04/2023

### Corresponding author

Antonio Ventriglio, PhD  
Universidad de Foggia, Italia  
[a.ventriglio@libero.it](mailto:a.ventriglio@libero.it)

### Conflicts of interests

The authors declare that there is no conflict of interest.

### Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

This article is published under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).



<sup>1</sup>Universidad Nacional de Asunción, Facultad de Ciencias Médicas, San Lorenzo, Paraguay

<sup>2</sup>Universidad Nacional de Caaguazú, Instituto Regional en Salud, Coronel Oviedo, Paraguay.

<sup>3</sup>Universidad Nacional de Asunción, Facultad de Ciencias Médicas, Filial Santa Rosa, Santa Rosa del Aguaray, Paraguay.

<sup>4</sup>Universidad Científica del Sur, Facultad de Psicología, Lima, Perú.

<sup>5</sup>Fundación de ABC, Departamento de Neurociencia, Santo André, SP, Brasil.

<sup>6</sup>Universidad de São Paulo, Departamento de Psiquiatria, São Paulo, SP, Brasil.

<sup>7</sup>Universidad de Foggia, Departamento de Medicina Clínica y Experimental, Foggia, Italia.

<sup>8</sup>Universidad Nacional de Asunción, Facultad de Ciencias Médicas, Red de Estudiantes Investigadores en Neurociencias, San Lorenzo, Paraguay

## ABSTRACT

**Introduction:** Medical students are vulnerable to psychological distress and face a number of stressors such as academic pressures, economic concerns, and difficulties in interpersonal relationships. The quality of their educational training may also impact their mental health and subjective well-being. **Objective:** to describe their perception of subjective well-being and the impact of medical training on their own mental health. **Methods:** We surveyed 119 medical students and administered the "Perception survey on vocation, living and recreational habits, training and professional attitudes," the CAGE questionnaire, the Generalized Anxiety Disorder-7 (GAD-7) and the Patient Health Questionnaire-2 (PHQ-2). **Results:** Students' mean age was 22.5±2.28 years old and 59.7 % of participants were women, their lifestyle habits were scored as acceptable, and the employment of cell-phones and social networks ranged 76-99%; 24.1 % recognized a problematic alcohol, 67.2 % reported anxiety according to the GAD-7, and 49.6 % depression according to PHQ-2. Symptoms of anxiety were frequent among females and were higher when the perceived quality of training and student/teacher ratio were lower. **Discussion:** Students' perceptions of lower quality of training and resources seemed to be associated with higher levels of anxiety, which may suggest that educational policies and resources should be carefully revised and implemented to improve students' health and well-being.

**Keywords:** medical students; mental health; medical training; anxiety; depression; satisfaction; CAGE.

## RESUMEN

**Introducción:** los estudiantes de medicina son vulnerables al malestar psicológico y se enfrentan a una serie de factores estresantes como las presiones académicas, las preocupaciones económicas y las dificultades en las relaciones interpersonales. La calidad de su formación educativa también puede influir en su salud mental y bienestar subjetivo. **Objetivo:** describir su percepción de bienestar subjetivo y el impacto de la formación médica en su propia salud mental. **Metodología:** se encuestó a 119 estudiantes de medicina y se les administró la "Encuesta de percepción sobre vocación, hábitos de vida y recreación, formación y actitudes profesionales", el cuestionario CAGE, el Trastorno de Ansiedad Generalizada-7 (TAG-7) y el Cuestionario de Salud del Paciente-2 (PHQ-2). **Resultados:** la edad media de los estudiantes fue de 22,5±2,28 años y el 59,7 % de los participantes eran mujeres; sus hábitos de vida se calificaron como aceptables, y el empleo de teléfonos móviles y redes sociales osciló entre el 76 y el 99 %; el 24,1 % reconoció un consumo problemático de alcohol, el 67,2 % manifestó ansiedad según el TAG-7, y el 49,6 % depresión según el PHQ-2. Los síntomas de ansiedad eran frecuentes entre las mujeres y eran mayores cuando la calidad percibida de la formación y la proporción alumnos/profesor eran menores. **Discusión:** la percepción por parte de los estudiantes de una menor calidad de la formación y de los recursos parecía estar asociada a mayores niveles de ansiedad, lo que puede sugerir que las políticas y los recursos educativos deberían revisarse y aplicarse cuidadosamente para mejorar la salud y el bienestar de los estudiantes.

**Palabras clave:** estudiantes de medicina; salud mental; formación médica; ansiedad; depresión; satisfacción; CAGE.

**How to cite this article:** Torales J, Barrios I, Barrios J, Báez-Osorio H, Sánchez-Piris E, Ortigoza-Alves E, et al. Medical Students Training and Mental Health: An Exploratory Study. Med. clín. soc. 2023;7(2):52-60

## INTRODUCTION

Students are particularly vulnerable to psychological distress because they are exposed to a number of stressors such as academic pressures, economic concerns, difficulties in interpersonal relationships, and lack of family support (1).

Mental health issues are currently considered one of the major challenges of public health as well as one of the main causes of morbidity among students (2,3). In particular, medical students experience high levels of psychosocial stress because of continuous examinations, a relevant number of study-hours, pressure to succeed, and many other factors leading to higher rates of anxiety, depression, and suicide (4).

Several studies have confirmed a high incidence of anxiety and depression among medical students with academic issues and family problems as the main associated factors (5). A previous study conducted in South America by the Center for Clinical Epidemiology of the National University of Colombia, confirmed a high rate of mental disorders among medical students and a significant association with suicidal behaviors and suicidal ideation (6). Although medical students are usually very proactive after entering their course, half of them may report psychological distress very soon during training, as confirmed by recent evidence (4). In addition, factors that may contribute to psychological distress are mostly related to the medical training itself: fear-based teaching, study overload, old and ineffective teaching methods (such as two-hour lectures), and even cases of sexual harassment or discrimination based on gender, gender identity, or sexual orientation (7-10).

In Paraguay, medical students who report mental disorders frequently avoid reaching out for help. Reasons for this may include their fear of being rejected or treated differently by their peers, perception of being deemed unfit for practice, or rejection from their preferred specialty (4,11). Given the recognized risk of mental disorders among medical students related to their training, we explored the perceptions of medical training and their own mental health among students at the School of Medical Sciences of the National University of Asuncion, Santa Rosa del Aguaray Campus, Paraguay, and described students' reports of their own well-being and the impact of medical training on their mental distress.

## METHODS

This was a descriptive, cross-sectional, observational study that included medical students from the National University of Asuncion, Santa Rosa del Aguaray

Campus, Paraguay, and aimed to describe their perception of subjective well-being and the impact of medical training on their own mental health.

The sample size was calculated using the epidemiological package Epidat. The minimum sample size was set at 113 medical students with a confidence level of 95%, an expected frequency of psychological distress in medical students of 20%, and a precision of 7.4% (11,12). The sample finally consisted of 119 students, who participated freely and voluntarily through an electronic survey: it has been largely recognized that online surveys may provide significative findings as "in person" interviews (13).

An adapted version of the "Perception survey on vocation, living and recreational habits, training and professional attitudes," by Alonso Rodríguez and collaborators, was employed (14). This instrument explores and describes the following dimensions: sociodemographic data (age, sex, year and semester of medical school, address, finances, work, reporting on relatives involved in medical careers), life and recreational habits (eating pattern, time management, physical activity, sleeping pattern, smoking, substance and alcohol use, hobbies, stable relationships, and social networks), perception of medical training (motivation to study medicine), vocation, and teaching resources (quality of teachers, practical training, and vocation for research), perception of professional activities (type of specialty and job opportunities).

The mental health of medical students was assessed using the CAGE (cut, annoyed, guilty, eye-opener) questionnaire, the Generalized Anxiety Disorder-7 (GAD-7) (15), and the Patient Health Questionnaire-2 (PHQ-2) (16), with versions previously validated in Spanish in Paraguay (11,17).

The CAGE questionnaire is a four-item tool validated as a screening instrument for lifetime alcohol use (18). This screening instrument consists of four dichotomous response items addressing social criticism, feelings of guilt, morning drinking, and perceived need to stop drinking. Responses to the CAGE items are scored 0 for "no" and 1 for "yes" responses, with higher scores indicating alcohol problems. A total score of two or more is considered clinically significant. The normal cutoff for CAGE is two positive responses (18).

The GAD-7 is a unidimensional, self-administered rating scale designed to assess the presence of symptoms of generalized anxiety disorder. Each item is scored from 0 to 3. The full-scale score ranges from 0 to 21. A total score of 10 or higher represents the cut-off for identifying cases of anxiety (15).

The PHQ-2 assesses the presence of depressed mood and anhedonia during the past two weeks. These symptoms are measured on a 4-point Likert-type scale (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = almost every day). The PHQ-2 score ranges from 0 to 6. A total score higher than or equal to 3 indicates a significant level of depression, with a sensitivity of 83% and specificity of 92% (16,19).

Data were analyzed with SPSS (Statistical Package for Social Science) by the International Business Machines Corporation, version 25. Descriptive statistics were used to summarize the findings. Chi-square test, t-test, and ANOVA were used to establish associations. The findings were considered statistically significant with two-tailed  $p \leq 0.05$ .

**Ethical considerations:** This study was approved by the National University of Asuncion's School of Medical Sciences, Department of Medical Psychology

(Paraguay). The data were treated with confidentiality, equality, and justice in accordance with the Helsinki principles. Participants did not receive any fees, and those requiring feedback from the survey were invited to write down their email addresses and receive information or specific helpful suggestions.

## RESULTS

A total of 119 medical students from the National University of Asunción (Paraguay) were surveyed. Their ages ranged from 18 to 29 years, with a mean of  $22.5 \pm 2.28$  years old. The median age of the participants was 22 years and the most frequent age was 21 years. Of the participants, 59.7% were women, 40.3 % were first-year students, 78.2 % lived alone or with friends, 85.7 % financed their studies with family help, 11.8 % worked, and 24.4 % had close relatives who were physicians. Sociodemographic characteristics are summarized in Table 1.

**TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF MEDICAL STUDENTS (N=119).**

Characteristic	n	%
<b>Gender</b>		
Female	71	59,7
Male	48	40,3
<b>Year of studies</b>		
First	48	40,3
Second	14	11,8
Third	27	22,7
Fourth	14	11,8
Fifth	16	13,4
<b>Living arrangements</b>		
Living alone/with friends	93	78,2
Living with family	26	21,8
<b>Financing of studies</b>		
Family aid	102	85,7
Scholarship	9	7,6
Own funds	8	6,7
<b>Employment</b>		
No	105	88,2
Yes	14	11,8
<b>Have relatives who are physicians</b>		
No	90	75,6
Yes	29	24,4

Regarding students' living and recreational habits, 42.9% reported correct breakfast and 28.6 % reported correct diet. Of the participants, 56.3 % dedicated between two and five hours a day to study, 33.6 % dedicated more than five hours, and 10.1 % dedicated less than two hours. 38.7 % spent less than one hour a day on physical exercise, 23.5 % spent between one and two hours, 1.7 % spent more than two hours, and 36.1 % did not engage in any physical activity. Of the participants, 79.8% slept between five and seven hours at night, 13.4% slept less than five hours, and 6.7% slept for more than seven hours. Of the participants,

5.9% were regular smokers, 16.8% had tried cannabis, and 2.5% had used cocaine. In addition, 10.1 % had used stimulant drugs, and 18.5 % had used tranquilizing drugs. In addition, 15.1% consumed stimulant beverages, 58% regularly self-medicated, 65.5% did not have a steady partner, 76.5% studied with their cell phone next to them, and 99.2% regularly used social networks.

Regarding the perception of their medical training, students reported that they decided to study medicine for the related professional image in 47.1%, 26.1% accessed the School of Medical Sciences because of

their life experiences, 11.8% because of doctors' standard of living, and 10.1% because of illnesses in their own family. A total of 84.9 % of the participants reported that they had lost their social lives because of medical training. Among the students, 43.7% had seriously considered dropping out of medical school. When asked about vocation and teaching resources, 53.8% of students reported that the teaching resources

offered by the campus were sufficient, 52.9% thought that the preparation of faculty was adequate, and 50.4% believed that the general commitment of the faculty was high. Regarding student/teacher ratio, 54.6 % reported it was acceptable, 53.8 % thought that practical training was sufficient, and 67.2 % believed that they were prepared for research during their studies. The data are presented in detail in [Table 2](#).

**TABLE 2. OPINIONS ON TEACHING RESOURCES (N=119).**

Characteristic	n	%
<b>Teaching resources</b>		
Scarce	24	20,2
Very sufficient	27	22,7
Very scarce	4	3,4
Sufficient	64	53,8
<b>Faculty's competence</b>		
Adequate	63	52,9
Scarce	2	1,7
Very good	54	45,4
<b>Faculty's commitment</b>		
High	60	50,4
Low	1	0,8
Medium	58	48,7
<b>Student/teacher ratio</b>		
Acceptable	65	54,6
Deficient	9	7,6
Very good	45	37,8
<b>Practical training</b>		
High	28	23,5
Low	27	22,7
Sufficient	64	53,8
<b>Preparing to conduct research</b>		
Deficient	37	31,1
Acceptable	2	1,7
Sufficient	80	67,2

Students' perceptions of their future professional activities were explored; 51.3 % reported being interested in medical-surgical specialization, 28.6 % in medical specialization, 13.4 % in surgical specialization, and 6.7 % in diagnostic/laboratory specialization. In addition, 91.6% were interested in working in both public and private systems, only 5% in the public sector, and 3.4% in the private sector. Regarding the mental health of the surveyed students, 66.4 % reported consuming alcoholic beverages, of which 24.1 % recognized problematic alcohol consumption, according to the CAGE questionnaire. Of all the participants, 67.2 % reported anxiety according to the GAD-7 and 49.6 % reported depression according to the PHQ-2 ([Table 3-A](#)).

Levels of anxiety and depression were significantly higher among female students: 47.1% (n=56) of them reported a mean score of  $13.5 \pm 5.08$  at GAD-7 whereas 35.3% (n=42) reported  $3.24 \pm 1.84$  at PHQ-2 screening for depression (all  $p \leq 0.01$ ; [Table 3-A](#) and [Table 3-B](#)).

The rates of alcohol abuse and misuse did not differ among the sex groups. In addition, a higher number of students reported anxiety during the first year of training (12.6%;  $p=0.05$ ), even if higher scores on the GAD-7 were registered among students in the third and fourth years of medical school ( $12.3 \pm 5.15$  and  $13.6 \pm 4.41$ , respectively;  $p=0,024$ ). The rates and scores for depression were similar across the years of training.

**TABLE 3-A. ASSOCIATION BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS AND MENTAL DISORDERS (N=119).**

Characteristic	Alcohol			Anxiety			Depression		
	n	%	p-value	n	%	p-value	n	%	p-value
Gender			0.17			<b>0.01</b>			<b>0.01</b>
Female	9	11.4		56	47.1		42	35.3	
Male	10	12.7		24	20.2		17	14.3	
Year of studies			0.45			<b>0.05</b>			0.52
First	24	30.4		15	12.6		23	19.3	
Second	8	10.1		5	4.2		6	5.0	
Third	11	13.9		7	5.9		12	10.1	
Fourth	9	11.4		2	1.7		8	6.7	
Fifth	8	10.1		10	8.4		11	9.2	
Living arrangements			0.49			0.48			0.69
Living alone/with friends	16	20.3		64	53.8		47	39.5	
Living with family	3	3.8		16	13.4		12	10.1	
Financing of studies			0.69			0.69			<b>0.004</b>
Family aid	16	20.3		70	58.8		52	43.7	
Scholarship	2	2.5		5	4.2		7	5.9	
Own funds	1	1.3		5	4.2		0	0.0	
Employment			0.13			0.80			0.59
No	15	19.0		71	59.7		53	44.5	
Yes	4	5.1		9	7.6		6	5.0	
Have relatives who are physicians			0.20			0.49			0.79
No	11	13.9		59	49.6		44	37.0	
Yes	8	10.1		21	17.6		15	12.6	

**TABLE 3-B. ASSOCIATION BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS AND MENTAL DISORDERS (N=119).**

Characteristic	Alcohol			Anxiety			Depression		
	M	SD	p-value	M	SD	p-value	M	SD	p-value
Gender			0,273			<b>&lt;0,01</b>			<b>0,001</b>
Female	0,63	1,14		13,58	5,08		3,24	1,84	
Male	0,90	1,01		8,63	5,39		2,10	1,76	
Year of studies			0,606			<b>0,024</b>			0,248
First	0,63	1,13		12,00	5,58		2,94	1,92	
Second	0,60	1,08		11,29	5,63		3,14	1,74	
Third	1,11	1,08		12,37	5,15		3,07	1,77	
Fourth	0,64	1,26		13,64	4,41		2,14	1,83	
Fifth	0,64	0,92		7,44	6,78		2,06	2,04	
Living arrangements			0,538			0,486			0,392
Alone/with friends	0,77	1,11		11,77	5,78		1,89	0,19	
With family	0,59	1,06		10,88	5,56		1,86	0,36	
Financing of studies			0,620			0,583			<b>0,048</b>
Family aid	0,70	1,02		5,68	0,56		2,82	1,86	
Scholarship	1,30	1,78		7,24	2,41		3,56	2,24	
Own funds	0,75	1,50		4,68	1,65		1,38	0,92	
Employment			0,275			0,549			0,771
No	0,69	1,06		11,70	5,92		2,80	1,88	
Yes	1,11	1,36		10,71	4,08		2,64	1,94	
Have relatives who are physicians			0,099			0,232			0,793
No	0,60	0,99		11,22	5,85		2,76	1,82	
Yes	1,04	1,26		12,69	5,27		2,86	2,10	

M: mean, SD: standard deviation

Depression scores were higher among students financed by family or scholarships (ranging from 2.82 to 3.52 on the PHQ-2 scale;  $p=0,048$ ) even if 43.7% of depressed students were in the family financed sub-

group ( $p=0.004$ ). Interestingly, the rates of depression and alcohol abuse were not influenced by the perceived quality of medical training (Table 4-A and Table 4-B).

TABLE 4-A. ASSOCIATIONS BETWEEN TEACHING RESOURCES AND MENTAL DISORDERS (N=119).

Characteristic	Alcohol			Anxiety			Depression		
	n	%	p-value	n	%	p-value	n	%	p-value
Teaching resources			0.09			0.735			0.378
Scarce	1	1.3		18	15.1		15	12.6	
Very sufficient	6	7.6		18	15.1		14	11.8	
Very scarce	2	2.5		2	1.7		1	0.8	
Sufficient	10	12.7		42	35.3		29	24.4	
Faculty's competence			0.324			0.087			0.069
Adequate	8	10.1		37	31.1		25	21.0	
Scarce	0	0.0		2	1.7		1	0.8	
Very good	11	13.9		41	34.5		33	27.7	
Faculty's commitment			0.819			0.704			0.464
High	11	13.9		39	32.8		28	23.5	
Low	0	0.0		1	0.8		0	0.0	
Medium	8	10.1		40	33.6		31	26.1	
Student/teacher ratio			0.706			0.010			0.455
Acceptable	9	11.4		49	41.2		35	29.4	
Deficient	1	1.3		8	6.7		5	4.2	
Very good	9	11.4		23	19.3		19	16.0	
Practical training			0.101			0.022			0.750
High	8	10.1		18	15.1		14	11.8	
Low	4	5.1		24	20.2		15	12.6	
Sufficient	7	8.9		38	31.9		30	25.2	
Preparing to conduct research			0.719			0.205			0.177
Deficient	6	7.6		29	24.4		21	17.6	
Acceptable	0	0.0		1	0.8		2	1.7	
Sufficient	13	16.5		50	42.0		36	30.3	

TABLE 4-B. ASSOCIATIONS BETWEEN TEACHING RESOURCES AND MENTAL DISORDERS (N=119).

Characteristic	Alcohol			Anxiety			Depression		
	M	SD	p-value	M	SD	p-value	M	SD	p-value
Teaching resources			0,136			0,582			0,499
Scarce	0,44	0,63		12,88	5,71		3,29	2,07	
Very sufficient	0,63	0,95		11,85	6,83		2,70	2,09	
Very scarce	2,00	1,00		11,50	7,50		2,25	0,50	
Sufficient	0,80	1,25		10,98	5,15		2,66	1,77	
Faculty's competence			0,955			0,236			0,095
Adequate	0,74	1,21		10,75	5,85		2,43	1,82	
Scarce	0,50	0,71		13,50	0,71		3,00	2,83	
Very good	0,74	0,98		12,48	5,58		3,19	1,89	
Faculty's commitment			0,784			0,421			0,304
High	0,72	1,14		11,17	5,68		2,53	1,83	
Low	0,00	-----		18,00	-----		2,00	-----	
Medium	0,77	1,06		11,90	5,78		3,05	1,94	
Student/teacher ratio			0,780			0,003			0,192
Acceptable	0,77	1,04		12,52	5,14		3,03	1,85	
Deficient	0,40	,89		15,22	4,82		3,00	1,50	
Very good	0,74	1,21		9,49	6,07		2,38	1,98	
Practical training			0,241			0,043			0,577
High	1,00	1,20		11,29	6,14		2,75	1,96	
Low	0,89	1,10		13,96	3,73		3,11	1,65	
Sufficient	0,54	1,03		10,70	6,03		2,66	1,96	
Preparing to conduct research			0,249			0,443			0,106
Deficient	1,00	1,29		12,57	5,18		2,86	1,78	
Acceptable	0,00	0,00		12,00	5,66		5,50	,71	
Sufficient	0,63	0,99		11,11	5,97		2,68	1,91	

M: mean, SD: standard deviation

Nonetheless, scores of anxiety at GAD-7 were significantly higher among students perceiving students/teacher ratio as deficient or acceptable:

deficient,  $15.2 \pm 4.82 >$  acceptable,  $12.5 \pm 5.14 >$  very good,  $9.49 \pm 6.07$  ( $p=0,003$ ). Most anxiety symptoms were detected among those reporting that the

student/teacher ratio was acceptable (41.2%;  $p=0.010$ ). In addition, anxiety was higher among students reporting sufficient or low practical training during their medical education (31.9% and 20.2%,

## DISCUSSION

This descriptive, cross-sectional, observational study conducted at the National University of Asuncion, Paraguay, aimed to report medical students' perceptions of subjective well-being and the impact of medical training on their own mental health. It has been widely discussed that medical students may experience psychological distress in the course of their training for a number of reasons, including the transition from high school to university, parental expectations, matching personal expectations, financial and housing problems, difficulties in new relationships, amount of pressure, and work due to medical training, among others (20). In addition, medical students are in a vulnerable age range where two-thirds of psychiatric disorders begin (21).

In our sample, most of the medical students surveyed were female (59.7%), which is in line with trends registered worldwide in the last decade, as confirmed by the Higher Education Funding Council for England (22). In fact, the number of women choosing a career in medicine has recently begun to rise, and 59.0% of students who accepted medical schools in 2017 in the UK were women (22).

After entering school, medical students have to face new relationships and economic issues. In our sample, 78.2% of students lived alone or with new friends, even though 85.7% were financed by their family and had no personal economic resources. Leaving families and parental homes are key steps in the transition to adulthood and are frequently associated with starting university. Students at this stage may experience psychological distress in managing loneliness or new relationships as well as their economic resources, since most of them feel the weight of family support and investment (23). The lifestyle of medical students away from their parental home may also be challenging and lead to unhealthy habits. In fact, Malatskey et al. (24) have reported that medical students showed a significant reduction in quality of their lifestyle over time, with increased stress, weight gain, and fast-food consumption, and less exercise: in our sample 79.8% reported a sufficient amount of sleep (between five and seven hours), 56.3% dedicated between two and five hours to study, and only 36.1% were not engaged in any physical activity. These findings documented the average quality of lifestyle among the students

respectively;  $p=0.022$ ), and students complaining of low practical training reported significantly higher scores on the GAD-7 than others ( $13.9 \pm 3.73$ ;  $p=0.043$ ).

surveyed. Regarding daily alcohol or stimulant consumption, 15.1% consumed stimulant beverages, and 58% regularly self-medicated. These findings may be compared to recent evidence from the international literature: a large study in the US reported that the percentage of medical students misusing stimulants may vary from 5.2% to 47.4%, and in most cases, misuse was due to academic enhancement (50-89%) (25); in Italy, some recent evidence reported that 8.9% of medical students showed problems related to alcohol drinking, and 22.8% were admitted using stimulants (mostly cannabis and cocaine) (26,27).

The use of cellphones and social networks among lifestyle and well-being issues revealed that 76.5% of students surveyed used their cellphones next to them during academic activity, and 99.2% regularly used social networks during the day. This topic may elicit a wider discussion, since the employment of cellphones, technology, and social networks is widespread among students and young adults, even for educational purposes. In 2016, Guraya (28) published a large meta-analysis that concluded that 75% of medical students used social network websites, even if only 20% used these sites for educational activities. Avci et al. (29) reported that 93.4% of medical students used social media and 89.3% used social media for popularity, ethics, barrier, and innovativeness. The rate of social media employment in our study is similar to that reported in other surveys, but its impact on medical education should be further explored and discussed. Recently, Nisar et al. (30) pointed out that social media may play a key role in enhancing educational settings and may negatively impact learning and academic performance because of distracting from the study and medical content. In particular during the COVID 19 pandemic, social networks and media have been useful for effective remote learning. To avoid a negative impact on medical students, criteria for choosing educational platforms, ethical guides, and professional standards should be discussed. For instance, in Paraguay, a previous survey on technostress among medical students reported that 47.4% of the participants perceived a low or moderate level of stress related to the use of technology, and technostress was significantly associated with levels of anxiety and depression (17).

The quality of medical training and students' subjective satisfaction are both relevant factors in terms of well-being and mental health. In our sample, 53.8% of

students judged teaching resources as adequate and around 50% were satisfied with the general commitment of their faculty; 55% reported that the student/teacher ratio was acceptable, and 67% reported perceiving useful training in their educational course. These findings showed a good rate of satisfaction among students surveyed, even though rates of approval and satisfaction among students may greatly vary across different settings and institutions (31). In addition, we explored the relationship between these satisfaction rates and mental health issues.

In our sample, 66.4% of students reported consuming alcoholic beverages, 24.1% reported problematic alcohol consumption, 67.2% reported anxiety, and 49.6% reported depression according to the rating scales employed. These ratings are particularly high when compared to previous reports: in Italy (26), 8.6% of samples reported mental health issues while at medical school (including anxiety disorders > major depression > others) and 8.9% reported problems related to alcohol drinking; in Canada, 26% of students had been diagnosed with a mental health condition prior to medical school and 36% reported a current anxiety disorder, whereas 22% tested positive for CAGE with problematic alcohol misuse (32). Similarly, in a recent report from Paraguay, 14% of students reported being followed by a mental health professional for specific conditions, including anxiety, and 20% tested positive for CAGE for alcohol abuse (11). These comparisons may suggest that alcohol misuse ratings are similar across surveys, since the authors similarly employed the CAGE tool. Higher levels of anxiety and depression in the current study may be due to the subjective reporting of symptoms and interpretation of the instruments (GAD-7 and PHQ-2). Nonetheless, students' perceptions of subjective wellbeing are relevant and should be properly considered. We explored the reasons for mental distress among sociodemographic factors and those related to medical education training. We found that student anxiety was significantly higher among those complaining of poor practical training during the educational course and an unacceptable student/teacher ratio. This evidence may confirm that the quality of training and student satisfaction are relevant factors that impact students' mental health (31). Anxiety scores were higher in the mid-last years of training, which may reflect the impact of students' clinical engagement and their expectations for professional choices at the upcoming end of medical school. Levels of depression were not associated with the characteristics of training, but were significantly higher among students financed by families, probably reflecting students' concern about families' support, efforts, and their sense of

commitment and gratitude (23).

The limitations of this study include the small number of students surveyed, even if the sampling correctly met the sample size calculated; sampling from a university center only; the self-administered questionnaire and rating scales employed (even if all standardized and validated); levels of morbidity and students' satisfaction may both reflect specific local social, health, and institutional characteristics in public health and university organizations.

In conclusion, our findings indicate that the mental health of medical students is a relevant issue in terms of public health and educational strategies. They face a challenging educational trail, and many factors may impact their subjective well-being, including perceived quality of training and university resources. In particular, students' perceptions of lower quality of training and resources seemed to be associated with higher levels of anxiety in the survey. This suggests that educational policies and resources should be carefully revised and implemented to improve the impact of educational courses on students' health and well-being.

## RED DE ESTUDIANTES INVESTIGADORES EN NEUROCIENCIAS

Anthón Daniel Torres-Romero, Matías Franco Di Giuseppe, Elías René Rolón-Méndez, Patricia Lorena Martínez-López, Katja Victoria Heinichen-Mansfeld.

## AUTHORS CONTRIBUTIONS

JT, IB, JMC-M, and AV participated in the conception and design of the study, data collection, analysis and interpretation of data, drafting of the manuscript, critical revision of the manuscript, and approval of the final version. JB, IB-O, ES-P, EO-A, JV-A, NRD, MO, DA, JA-S, TC-R, and REIN drafted, critically revised, and approved the final version of this manuscript..

## REFERENCIAS

1. Torales-Benítez J, Giralá N, Moreno Giménez M, Arce Ramírez A, Trinidad S, Estigarribia E, et al. Depresión y ansiedad en estudiantes de medicina de la Universidad Nacional de Asunción. *Rev Paraguaya Psiquiatr.* 2013;1(1):7–23. [URL](#).
2. Kastrup MC, Ramos AB. Global mental health. *Dan Med Bull* 2007;54(1):42–3. [URL](#).
3. Bello A, O'Higgins M, Páez L, Torales J, Arce A. Trastorno depresivo y su asociación con la edad en pacientes de la Cátedra y Servicio de Psiquiatría, FCM-UNA. *An Fac Cienc Méd (Asunción).* 2015;48(2):47–58. [https://doi.org/10.18004/anales/2015.048\(02\)47-058](https://doi.org/10.18004/anales/2015.048(02)47-058)
4. González-Urbieta I, Almirón M, Torales J. ¿Estamos haciendo lo suficiente para abordar los problemas de autoestima en los estudiantes de medicina y de otras

- ciencias de la salud? Med Clin Soc. 2019;3(1):2-3. <https://doi.org/10.52379/mcs.v3i1.73>
5. Arrieta Vergara KM, Díaz Cárdenas S, González Martínez F. Síntomas de depresión y ansiedad en jóvenes universitarios: prevalencia y factores relacionados. Rev Clínica Med Fam. 2014;7(1):14-22. <https://dx.doi.org/10.4321/S1699-695X2014000100003>
6. Sánchez R, Cáceres H, Gómez D. Suicidal ideation among university adolescents: prevalence and associated factors. Biomédica. 2002;22:407-16. [URL](https://doi.org/10.1016%2Fj.banves.2020.08.001)
7. Grández Sayón M, Salazar Chávez VA, Tucto Pérez G, Matute Pnaifo E. Efecto de un programa de habilidades sociales: autoestima, asertividad y resiliencia en los adolescentes del Colegio Secundario San Juan Bautista. Conoc Amaz. 2012;3(1):67-75.
8. Arrarte KMG, Cordero CG. Autoestima en los universitarios ingresantes de la facultad de medicina de la Universidad Nacional Mayor de San Marcos durante el año 2015. Rev Investig Apunt Psicológicos. 2016;1(1):8-20. [URL](https://doi.org/10.18004/anales/2016.049(02)27-032)
9. Barrios I, Piris A, Torales J, Viola L. Autoestima en estudiantes de medicina de la Universidad Nacional de Asunción, Paraguay. An Fac Cienc Médicas. 2016;49(2):27-31. [https://doi.org/10.18004/anales/2016.049\(02\)27-032](https://doi.org/10.18004/anales/2016.049(02)27-032)
10. Camacho Cruz CS, Vera-Ovelar F. Niveles de autoestima en estudiantes de medicina de Santa Rosa del Aguaray. Med Clín Soc. 2019;3(1):5-8. <https://doi.org/10.52379/mcs.v3i1.42>
11. Torales J, Kadhun M, Zárate G, Barrios I, González I, Farrell SM, et al. Wellbeing and mental health among medical students in Paraguay. Int Rev Psychiatry. 2019;31(7-8):598-602. <https://doi.org/10.1080/09540261.2019.1667172>
12. Muñoz S. How many subjects do I need to power my study? Medwave. 2014;14(6):e5995. <https://doi.org/10.5867/medwave.2014.06.5995>
13. Gosling SD, Vazire S, Srivastava S, John OP. Should We Trust Web-Based Studies? A Comparative Analysis of Six Preconceptions About Internet Questionnaires. Am Psychol. 2004;59(2):93-104. <https://psycnet.apa.org/doi/10.1037/0003-066X.59.2.93>
14. Alonso Rodríguez L, Ríaza Ocio C. Encuesta a los alumnos de medicina de la Universidad de Oviedo: percepción sobre vocación, hábitos de vida y recreaciones, formación y actitudes profesionales. Bol Pediatr. 2020;60(251):18-29. [URL](https://doi.org/10.1016/j.amsu.2022.104420)
15. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. Arch Intern Med. 2006;166(10):1092. <https://doi.org/10.1001/archinte.166.10.1092>
16. Kroenke K, Spitzer RL, Williams JBW. The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener. Med Care. 2003;41(11):1284-92. <https://doi.org/10.1097/01.mlr.0000093487.78664.3c>
17. Torales J, Torres-Romero AD, Di Giuseppe MF, Rolón-Méndez ER, Martínez-López PL, Heinichen-Mansfeld KV, et al. Technostress, anxiety, and depression among university students: A report from Paraguay. Int J Soc Psychiatry. 2022;68(5):1063-1070. <https://doi.org/10.1177/00207640221099416>
18. Ewing JA. Detecting alcoholism. The CAGE questionnaire. JAMA J Am Med Assoc. 1984;252(14):1905-1907. <https://doi.org/10.1001/jama.252.14.1905>
19. Caycho-Rodríguez T, Barboza-Palomino M, Ventura-León J, Carbajal-León C, Noé-Grijalva M, Gallegos M, et al. Traducción al español y validación de una medida breve de ansiedad por la COVID-19 en estudiantes de ciencias de la salud. Ansiedad Estrés. 2020;26(2-3):174-80. <https://doi.org/10.1016%2Fj.anves.2020.08.001>
20. Bhugra D, Molodynski A, Ventriglio A. Well-being and burnout in medical students. Ind Psychiatry J. 2021;30(2):193-197. [https://doi.org/10.4103/ipj.ipj\\_224\\_21](https://doi.org/10.4103/ipj.ipj_224_21)
21. Molodynski A, Ventriglio A, Bhugra D. A crisis brewing for the healthcare system and a crisis already happening for our students. Int Rev Psychiatry. 2019;31(7-8):545-547. <https://doi.org/10.1080/09540261.2019.1679491>
22. Moberly T. Number of women entering medical school rises after decade of decline. BMJ. 2018. [URL](https://doi.org/10.1177/00016993211028905)
23. Remes H, Sirniö O, Martikainen P. Early home-leaving (HL) and educational attainment: The moderating role of HL in the intergenerational transmission of education. Acta Sociol. 2022. 65(3), 313-331. <https://doi.org/10.1177/00016993211028905>
24. Malatskey L, Essa-Hadad J, Willis TA, Rudolf MCJ. Leading Healthy Lives: Lifestyle Medicine for Medical Students. Am J Lifestyle Med. 2019;13(2):213-219. <https://doi.org/10.1177/1559827616689041>
25. Edinoff AN, Nix CA, McNeil SE, Wagner SE, Johnson CA, Williams BC, et al. Prescription Stimulants in College and Medical Students: A Narrative Review of Misuse, Cognitive Impact, and Adverse Effects. Psychiatry Int. 2022; 3, 221-235. <https://doi.org/10.3390/psychiatryint3030018>
26. Volpe U, Ventriglio A, Bellomo A, Kadhun M, Lewis T, Molodynski A, et al. Mental health and wellbeing among Italian medical students: a descriptive study. Int Rev Psychiatry. 2019;31(7-8):569-573. <https://doi.org/10.1080/09540261.2019.1654718>
27. Sampogna G, Lovisi GM, Zinno F, Del Vecchio V, Luciano M, Gonçalves Loureiro Sol É, et al. Mental Health Disturbances and Related Problems in Italian University Medical Students from 2000 to 2020: An Integrative Review of Qualitative and Quantitative Studies. Medicina (Kaunas). 2020;57(1):11. <https://doi.org/10.3390/medicina57010011>
28. Guraya SY. The Usage of Social Networking Sites by Medical Students for Educational Purposes: A Meta-analysis and Systematic Review. N Am J Med Sci. 2016;8(7):268-278. <https://doi.org/10.4103/1947-2714.187131>
29. Avci K, Çelikden SG, Eren S, Aydenizöz D. Assessment of medical students' attitudes on social media use in medicine: a cross-sectional study. BMC Med Educ. 2015;15:18. <https://doi.org/10.1186/s12909-015-0300-y>
30. Nisar S, Alshanberi AM, Mousa AH, El Said M, Hassan F, Rehman A, et al. Trend of social media use by undergraduate medical students; a comparison between medical students and educators. Ann Med Surg (Lond). 2022;81:104420. <https://doi.org/10.1016/j.amsu.2022.104420>
31. Yang WW, Wang YX, Tan K. Sichuan Da Xue Xue Bao Yi Xue Ban. 2022;53(3):426-430. <https://doi.org/10.12182/20220560305>
32. Wilkes C, Lewis T, Brager N, et al. Wellbeing and mental health amongst medical students in Canada. Int Rev Psychiatry. 2019;31(7-8):584-587. <https://doi.org/10.1080/09540261.2019.1675927>