ORIGINAL ARTICLE

Medical education and poor mental health: A quantitative-qualitative survey study

Vitor Silva Mendonca[1,*], Matheus Vidonscky Soares[2], Danilo Euclides Fernandes[2], Aécio Flávio Teixeira de Gois[3]

[1]Research assistant, Center of the Development of Medical Education, School of Medicine, University of Sao Paulo, São Paulo, Brazil
[2]Undergraduate Office of School of Medicine, Federal University of São Paulo, São Paulo, Brazil
[3]Department of Medicine, Federal University of São Paulo, São Paulo, Brazil

[*]Center of the Development of Medical Education (CEDEM), School of Medicine, University of Sao Paulo,
Dr Arnaldo Av,
455 Sala 2343,
Sao Paulo, SP CEP 01246-903,
Brazil

Tel: +55 (11) 3061-7472
Email: vitor.mendonca@usp.br

Background: Medical students' mental health is currently an issue of concern for medical education worldwide. The aim of this study was to identify the factors affecting mental health of medical students during training.

Method: A cross-sectional study was carried out in 2020 involving medical students enrolled in School of Medicine, University of Sao Paulo, Brazil, collecting sociodemographic information and associating them with scores of Quality of life (VERAS-Q), Beck's Depression Inventory (BDI), State-Trait Anxiety Inventory (STAI), Metacognitive Awareness Inventory (MAI) and Achievement Goals for a Work Domain (AGWD). This study also explored two open-ended questions about motivation to seek mental health service.

Results: Two hundred eighty-two students completed the survey (male = 51.4%). Overall, the perception on quality of life showed significantly higher scores for the learning environment (46.6, SD: 7.4), state-anxiety (87.9%), and trait-anxiety (86.5%) followed by depressive symptoms (17.7%), same results in domains of metacognition (0.63, SD: 0.1), and mastery avoidance for motivation to learn (29.2, SD: 6.8). The present researchers obtained a model with 47% ($R = 0.47$) of variance prediction for medical students' mental health on VERAS-Q learning environment between the quality of life domains. These students perceived curriculum evaluation associated with cognitive overload, lack of innovation in teaching methodology, irregular relation between medical practice and theory, and lack of social and diversity issues.

Conclusion: The learning environment, symptoms of anxiety and depression, and the lack of seeking emotional support were factors that influenced mental health in medical education. This reinforces the need for early intervention to prevent its worsening.

Keywords: Medical education; Mental health; Quantitative research; Qualitative research

التعليم الطبي وسوء الصحة العقلية: دراسة مسحية كمية ونوعية

الخلفية: تعد الصحة العقلية لطلاب الطب في الوقت الحالي قضية تثير اهتمام التعليم الطبي في جميع أنحاء العالم. هدفت هذه الدراسة إلى التعرف على العوامل المؤثرة على الصحة النفسية لطلبة الطب أثناء التدريب.

الطريقة: تم إجراء دراسة مقطعية في عام ٢٠٢٠ شملت طلاب الطب المسجلين في كلية الطب، جامعة ساو باولو، البرازيل، حيث تم جمع المعلومات الاجتماعية والديموغرافية وربطها بنتائج جودة الحياة (VERAS-Q))، وجرد بيك للاكتئاب (BDI)، وجرد سمات الحالة (STAI)، وجرد الوعي ما وراء المعرفي (MAI)، وأهداف الإنجاز لمجال العمل (AGWD). استكشفت هذه الدراسة أيضًا سؤالين مفتوحين حول الدافع لطلب خدمة الصحة العقلية.

النتائج: أكمل الاستطلاع مائتان واثنان وثمانون طالباً (الذكور = ٥١,٤%). بشكل عام، أظهر التصور حول جودة الحياة درجات أعلى بكثير في بيئة التعلم (٤٦,٦، SD: 7.4)، وقلق الحالة (٨٧,٩%)، وقلق السمات (٨٦,٥%)، تليها أعراض الاكتئاب (١٧,٧%)، وهي نفسها. يؤدي إلى مجالات ما وراء المعرفة (٠,٦٣، SD: 0.1)، وتجنب الإتقان للتحفيز على التعلم (٢٩,٢، SD: 6.8). لقد حصلنا على نموذج بنسبة ٤٧% (R2 = 0.47) للتنبؤ بالتباين في الصحة العقلية لطلاب الطب في بيئة التعلم VERAS-Q بين مجالات جودة الحياة. في إجاباتهم على الأسئلة المفتوحة، رأى هؤلاء الطلاب أن تقييم المناهج الدراسية يرتبط بالحمل المعرفي الزائد، ونقص الابتكار في منهجية التدريس، والعلاقة غير المنتظمة بين الممارسة الطبية والنظرية، ونقص القضايا الاجتماعية والتنوع.

الاستنتاج: بيئة التعلم وأعراض القلق والاكتئاب وعدم طلب الدعم العاطفي من العوامل التي أثرت على الصحة النفسية في التعليم الطبي. وهذا يعزز ضرورة التدخل المبكر لمنع تفاقمها.

الكلمات المفتاحية: التعليم الطبي؛ الصحة العقلية؛ البحث الكمي؛ البحث النوعي

طبی تعلیم اور خراب دماغی صحت: ایک مقداری معیار کے سروے کا مطالعہ

پس منظر: طبی طلباء کی ذہنی صحت اس وقت دنیا بھر میں طبی تعلیم کے لیے تشویش کا باعث ہے۔ اس تحقیق کا مقصد تربیت کے دوران طبی طلباء کی ذہنی صحت کو متاثر کرنے والے عوامل کی نشاندہی کرنا تھا۔

طریقہ: ۲۰۲۰ میں ایک کراس سیکشنل مطالعہ کیا گیا تھا جس میں میڈیکل کے طلباء سکول آف میڈیسن، یونیورسٹی آف ساؤ پالو، برازیل میں داخلہ لیا گیا تھا، سماجی آبادیاتی معلومات جمع کرتے تھے اور انہیں معیار زندگی (VERAS-Q) کے اسکور سے منسلک کرتے تھے۔)، بیک کی ڈپریشن انوینٹری (BDI)، اسٹیٹ-ٹریٹ اینگزائٹی انوینٹری ((STAI، MAI (Metacognitive Awareness Inventory) اور ورک ڈومین (AGWD) کے حصول کے اہداف۔ اس مطالعہ نے دماغی صحت کی خدمات حاصل کرنے کی ترغیب کے بارے میں دو کھلے سوالات کی بھی کھوج کی۔

نتائج: دو سو بیاسی طلباء نے سروے مکمل کیا (مرد = ۵۱٫۴%)۔ مجموعی طور پر، معیارِ زندگی کے بارے میں تاثر نے سیکھنے کے ماحول (۴۶٫۶، SD: 7.4)، ریاستی اضطراب (۸۷٫۹%) اور خاصیت-اضطراب (۸۶٫۵%) کے لیے نمایاں طور پر زیادہ اسکور ظاہر کیے، اس کے بعد افسردگی کی علامات (۱۷٫۷%)، اسی طرح میٹاکوگنیشن کے ڈومینز (۰٫۶۳، SD: 0.1)، اور سیکھنے کی ترغیب کے لیے مہارت سے اجتناب کا نتیجہ (۲۹٫۲، SD: 6.8)۔ ہم نے معیار زندگی کے ڈومینز کے درمیان VERAS-Q سیکھنے کے ماحول پر طبی طلباء کی ذہنی صحت کے لیے ۴۷% (R2 = 0.47) تغیر پیشین گوئی کے ساتھ ایک ماڈل حاصل کیا۔ کھلے سوالات کے جوابات میں، ان طلباء نے علمی اوورلوڈ، تدریسی طریقہ کار میں جدت کی کمی، طبی مشق اور تھیوری کے درمیان بے قاعدہ تعلق، اور سماجی اور تنوع کے مسائل سے منسلک نصاب کی تشخیص کو محسوس کیا۔

نتیجہ: سیکھنے کا ماحول، اضطراب اور افسردگی کی علامات اور جذباتی مدد کی تلاش میں کمی وہ عوامل تھے جنہوں نے طبی تعلیم میں ذہنی صحت کو متاثر کیا۔ اس سے اس کی خرابی کو روکنے کے لیے ابتدائی مداخلت کی ضرورت کو تقویت ملتی ہے۔

مطلوبہ الفاظ: طبی تعلیم ذہنی صحت؛ مقداری تحقیق؛ معیار کی تحقیق

آموزش پزشکی و سلامت روان: یک مطالعه پیمایشی کمی - کیفی

زمینه و هدف: سلامت روان دانشجویان پزشکی در حال حاضر یکی از موضوعات مورد توجه آموزش پزشکی در سراسر جهان است. هدف از این مطالعه شناسایی عوامل مؤثر بر سلامت روان دانشجویان پزشکی در حین آموزش بود.

روش: یک مطالعه مقطعی در سال ۲۰۲۰ با مشارکت دانشجویان پزشکی در دانشکده پزشکی دانشگاه سائوپائولو برزیل، با جمع‌آوری اطلاعات جمعیت‌شناختی و ارتباط آن‌ها با نمرات کیفیت زندگی (VERAS-Q)، پرسش‌نامه افسردگی بک (BDI)، پرسش‌نامه اضطراب حالت – صفت اسپیلبرگر (STAI)، پرسشنامه آگاهی فراشناختی اسکرا و دنیسون (MAI) و اهداف دستاوردی برای یک دامنه کاری (AGWD) انجام شد. این مطالعه همچنین دو سؤال باز درباره انگیزه جستجوی خدمات سلامت روان را مورد بررسی قرار داد.

یافته‌ها: دویست و هشتاد و دو دانشجو نظرسنجی را تکمیل کردند (۵۱/۴ درصد مرد). به طور کلی، ادراک از کیفیت زندگی نمرات بیشتری را برای محیط یادگیری (۴۶/۶، SD=۷/۴)، اضطراب حالت (۸۷/۹٪) و اضطراب صفت (۸۶/۵٪) و به دنبال آن علائم افسردگی (۱۷٫۷٪) نشان داد. یافته های مشابهی در حوزه‌های فراشناخت (۰/۶۳، SD=۰/۱)، و اجتناب از تسلط برای انگیزه یادگیری (۲۹/۲، SD=۶/۸) به دست آمد. ما مدلی با ۴۷٪ (R2=۰/۴۷) پیش‌بینی واریانس برای سلامت روانی دانشجویان پزشکی در محیط یادگیری VERAS-Q بین حوزه‌های کیفیت زندگی به‌دست آوردیم. این دانشجویان در پاسخ‌های خود به سؤالات باز، ارزشیابی برنامه درسی را با اضافه بار شناختی، فقدان نوآوری در روش تدریس، رابطه نامنظم بین عمل و نظریه پزشکی و فقدان مسائل اجتماعی و تنوع دریافتند.

نتیجه‌گیری: محیط یادگیری، علائم اضطراب و افسردگی و عدم حمایت عاطفی از عوامل مؤثر بر سلامت روان در آموزش پزشکی بودند. این امر نیاز به مداخله زود هنگام برای جلوگیری از بدتر شدن آن را تقویت می کند.

واژه های کلیدی: آموزش پزشکی سلامت روان؛ تحقیق کمی؛ تحقیق کیفی

INTRODUCTION

Mental health is shown as part of the medical education process and it is seen as a challenge for medical students. Alarming numbers of mental illnesses and community suicides among medical students make mental health a necessity from a care perspective (1-4). Currently, scientific evidence proves that the vulnerability of medical students related to mental health has significant proportions, as they have higher rates of depression, anxiety symptoms, and suicidal ideation than the general population (3, 5-7). They also have a lower quality of life than age-matched population (8, 9).

Medical students were also evaluated and it was found that prevalence of moderate to severe depression symptoms was 14.3%. Among them 7.9% of students reported suicidal ideations more prevalent in third- and fourth-year students during the medical training (9, 10).

Medical students are less likely than the general population to receive appropriate treatment despite seemingly better access to care. They may engage in potentially harmful methods of coping, such as excessive alcohol consumption or self-prescription of medications. Stigma associated with mental health care services may represent a barrier to seeking treatment (9, 11, 12). Not to mention that the educational environment can be a motivator of mental suffering, through competitiveness and social deprivation, with a greater need for emotional support for these students (13, 14).

According to studies presented, factors related to the medical training environment can have an adverse impact on student's mental health, hence the need for a description investigation in this population (1, 6, 7). Thus, this study aimed to identify variables that may interfere with medical students´ mental health, as well as describe how they impact on their medical education routine.

METHODS

Study design and setting

The present study was performed as a cross-sectional study involving medical students enrolled in School of Medicine, University of Sao Paulo, Brazil in 2020. Its aim was to identify factors influencing the medical students' mental health, as well as the relationships among them. The study was conducted according to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) parameters. The protocol was reviewed and approved by Research Ethics Committee in Brazil (Protocol#4,099,787 on June 19, 2020).

Data collection and participants

In Brazil, a medical degree is obtained in a six-year undergraduate program, which is traditionally divided into three periods - basic cycle (1st and 2nd years), clinical cycle (3rd and 4th years) and clerkships (5th and 6th years).

All students enrolled in a medical programme (n=120 per year) were invited to participate in the study through an online survey, advertised on social media and e-mail distributed by electronic form. First-year students were not selected to participate, as the length of experience of their medical training was still insufficient to answer the study's questions. Advertisement of the research was performed using good practices guidelines about online survey (15). No calculations of sample size were performed, since a convenience sample was used. There was no compensation of incentives of any kind for the volunteers. The survey was available from August 2020 to December 2020.

Study measures and data analysis

In this study the sociodemographic information was collected about age, gender, gender identity, sexual orientation, family income, who live with, time spent on the route, sports practice, mental health practices and care, family support and sharing difficulties about medical training, and hours of study.

To assess the medical students' mental health, self-reported questionnaires were selected including the VERAS-Q to assess the quality of life of medical students in physical health, time management, learning environment, and psychological health domains (16). The Beck's Depression Inventory (BDI) was used to measure depressive symptoms. The cut-off for the BDI score was defined as 1) no depression (0 to 9 points), 2) mild (10 to 17 points), 3) moderate (18 to 29 points), and 4) severe (30 to 63 points) (17). The State-Trait Anxiety Inventory (STAI) was used to measure anxiety disorder in a two component consisting of state-anxiety and trait-anxiety. State-anxiety refers to a transitory emotional state whose intensity may vary according to the context and over-time. Trait-anxiety refers to the individual tendency to react to perceived situations as threatening with anxiety. STAI scores were defined as 1) low (<33 points), 2) medium (33–49 points), and 3) high (> 49 points) (18).

Also, the Metacognitive Awareness Inventory (MAI) was used for the evaluation of metacognition, clustered in the two domains of knowledge about cognition and regulation of cognition (19) and the Achievement Goals for a Work Domain (AGWD) to measure the motivation to learn with four achievement goals - mastery approach (MAP), mastery avoidance (MAV), performance approach (PAP), and performance avoidance (PAV). The mastery approach is associated with a self-referral improvement pattern; mastery avoidance is associated with a fear of showing weakness and academic difficulties; performance approach is associated with intersubjective improvement patterns; and performance avoidance is associated with a fear of incompetence and the avoidance of failure and negative feedback (20). MAI scores correspond to the mean of points on the Likert scale, attributed to each knowledge about cognition and regulation of cognition domains (19).

All scales were previously adapted and validated for use in Brazilian Portuguese versions. All fields were marked as mandatory, so a participant could move forward only after answering all questions, eliminating missing data.

Data were analyzed using SPSS Statistics® version 26. Descriptive analyses are shown as absolute and relative frequencies (nominal variables) and mean and standard deviation (continuous variables). The categorical variables were compared through Pearson's chi-square (post-hoc analyses were done for contingency tables larger than 3x3) and the numerical variables according to their distribution (normal or non-normal) using Mann-Whitney or not-paired t-Student tests. Inferential analyses were conducted through

multinomial logistic regression using the final categories for VERAS-Q and AGWD. Higher scores mean higher quality of life and motivation to learn, respectively (16, 20). No interaction among the variables included in the final models (absence of collinearity among the independent variables) were confirmed. Since the present researchers did not reach satisfactory models that explained MAI and AGWD properly, they decided not to present those models. They set a p-value of 0.05 for all statistical analyses and also included the *Pseudo-R^2* values (Cox & Snell's and Nagelkerke's) to determine how much of the variation is explained by the model, to a maximum of 1 (21, 22). For each model, the results are presented as odds-ratios (OR) with estimation of 95% confidence intervals (95% CI).

Finally, open-ended questions were intended to assess students' perceptions about their motivation to search the mental health service at the medical school and academic curriculum. These questions attached to questionnaires were – "What motivate you to seek medical school mental health service? What assessment do you make of the medical academic curriculum?" The analysis of the results started with a free reading of the transcribed text by two independent researchers. The first reading aimed at impregnating researchers with the study topic without any intention of categorization. In the second reading, the researchers categorized themes and derived issues independently. Finally, each researcher's products were paired by similarities in meaning and were discussed with the research group. The results were divided into analytical categories, items and examples (23, 24).

RESULTS

The sample comprised 282 (47%) Brazilian medical students who completed the online survey. Of the participating students, 145 were male (51.4%). The mean age of the sample was of 23.3 years old (SD: 3.0), and 131 lived with their parents (46.4%). The respondents' distribution over the medical school years was majority in the fourth-year 77 (27.3%). Approximately 76.3% of respondents identified themselves only as heterosexual, 12.4% as bisexual, and 99.3% as cisgender. No participants identified as transgender, making it impossible to conduct any analysis of this group. A higher proportion of single (97.1%) medical students responded. The perception on quality of life showed significantly higher scores for the learning environment (46.6, SD: 7.4), followed by state-anxiety (87.9%) and trait-anxiety (86.5%), depressive symptoms (17.7%), equal results in both domains of metacognition (0.63, SD: 0.1), and mastery avoidance for motivation to learn (29.2, SD: 6.8). The difference between students sought or not sought medical school mental health service was significant when analyzing different aspects of general information, leisure environment, non-professional help and support, professional help and support, and mental health questionnaires. There were no significant aspects of the academic environment (Table 1).

A significant difference was found between students who sought mental health service by sexual and gender minority (non-binary, bisexual and homosexual), single respondents, living with their partner, and medical students from the

Table 1. General sociodemographic characteristics of survey respondents according to attendance at mental health service

				Sought mental health service				
		Total n = 282		No n = 223		Yes n = 59		p-value
General information								
Age, years (SD)		23.39	3.01	23.1	2.56	24.6	4.08	0.00
Year in school, no. (%)[a]								
	Second-year	62	21.99	52	23.32	10	16.95	0.27
	Third-year	65	23.05	57	25.56	8	13.56	0.05
	Fourth-year	77	27.3	55	24.66	22	37.29	0.05
	Fifth-year	37	13.12	28	12.56	9	15.25	0.61
	Sixth-year	41	14.54	31	13.90	10	16.95	0.54
Gender, no. (%)								
	Male	145	51.42	120	53.81	25	42.37	0.11
	Female	137	48.58	103	46.19	34	57.63	
Sexual orientation, no. (%)								
	Heterosexual	215	76.24	182	81.61	33	55.93	0.00
	Bisexual	35	12.41	21	9.42	14	23.73	0.00
	Homosexual	28	9.93	17	7.62	11	18.64	0.01
	Asexual	2	0.71	1	0.45	1	1.69	0.31
	Pansexual	2	0.71	2	0.90	0	0	0.48

Table 1. Continued

		Total n = 282		Sought mental health service: No n = 223		Sought mental health service: Yes n = 59		p-value
Quota system, no. (%)		77	27.30	51	22.87	26	44.07	0.00
Leisure environment								
Time spent in all social media apps per week, min (SD)		186.3	131.54	190.5	137.80	170.70	104.90	0.42
Social media disrupts your habits, no. (%)		149	52.84	118	52.91	31	52.54	0.95
Sports practice per week, hours (SD)		7.6	4.39	7.8	4.36	6.9	4.54	0.19
Professional help and support								
Psychology follow-up, no. (%)		73	25.89	47	21.08	26	44,07	0.00
Psychiatry follow-up, no. (%)		62	21.99	40	17.94	22	37.29	0.00
Antidepressant, no. (%)		60	21.28	34	15.25	26	44,07	0.00
Sleeping medication, no. (%)		23	8.16	15	6.73	8	13.56	0.08
Mental health questionnaires								
VERAS-Q, mean (SD)								
	Time management	36.27	8.72	37.3	8.66	32.5	7.94	0.00
	Psychological	32.33	7.42	33.2	7.48	29.1	6.28	0.00
	Physical health	25.07	5.39	26.1	4.85	21.1	5.47	0.00
	Learning environment	46.60	7.46	47.9	6.77	41.6	7.93	0.00
STAI-State, n (%)								
	Low	34	12.06	27	12.11	7	11.86	0.00
	Medium	142	50.35	109	48.88	33	55.93	
	High	106	37.59	87	39.01	19	32.20	
STAI-Trait, no. (%)								
	Low	38	13.48	30	13.45	8	13.56	0.00
	Medium	129	45.74	100	44.84	29	49.15	
	High	115	40.78	93	41.70	22	37.29	
BDI, no. (%)								
	None	147	52.13	113	50.67	34	57.63	0.00
	Mild	85	30.14	69	30.94	16	27.12	
	Moderate/ severe	50	17.73	41	18.39	9	15.25	
MAI, mean (SD)								
	Knowledge about cognition	0.63	0.17	0.64	0.17	0.56	0.17	0.01
	Regulation of cognition	0.63	0.14	0.64	0.14	0.60	0.15	0.01
AGWD Score, mean (SD)								
	MAP (43 individuals)	20.2	5.50	20.6	5.13	18.4	6.45	0.02
	MAV (236 individuals)	29.2	6.89	28.6	6.66	31.3	7.39	0.00
	PAP (13 individuals)	15.1	6.80	15.2	6.71	14.7	7.19	0.58
	PAV (1 individual)	15.2	6.12	14.7	6.05	16.7	6.16	0.03

a: In Brazil, medicine school is organized into a six-year course. As described in the methods section, we included students from second to sixth-year, because they had already experienced at least a year in college at the time we applied all the questionnaires. First-year students were not included.

quota system of general information ($p<0.05$). Students who had a lot of family support during medical school, and shared difficulties with college and non-college friends were significant for the medical students who responded of non-professional help and support aspects ($p<0.05$). In terms of professional help and support aspects, the findings demonstrated a greater relationship between students who sought mental health service and psychology follow-up, psychiatry follow-up, and antidepressant ($p<0.05$). VERAS-Q learning environment indicated higher significant in booth groups who sought and not sought medical school mental health service; STAI-state in high domain, STAI-trait in high domain, and AGWD mastery avoidance also showed significance for the medical students who sought mental health service ($p<0.05$). The following aspects were related to not sought medical school mental health service: family income at a minimum wage above 15, living with their parents, and athletic association as an extracurricular activity ($p<0.05$) (Table 1).

The outcome of multinomial logistic regression for each medical students' mental health questionnaire confirmed that the variance prediction explained the model of quality of life, state-trait anxiety symptoms and depressive symptoms. A model was obtained with 47% (Cox & Snell's *Pseudo-R^2* = 0.47) of variance prediction for medical students' mental health on VERAS-Q learning environment between the quality of life domains. Social media disrupts your habits (OR = -0.2, -6.11;-1.80, p = 0.00) and inversely significance of sought mental health service at the medical school (OR = -0.3, -7.91;-2.44, p = 0.00) were the most important predictors of this model about quality of life. The logistic regression also showed the most important predictor for VERAS-Q psychological (OR = -0.3, -6.89;-1.89, p = 0.00) and VERAS-Q time management (OR = -0.2, -7.60;-2.06, p = 0.00) of social media disrupts your habits. Finally, VERAS-Q time management was inversely associated with hours of study at the medical school (OR = -0.2, -0.18;-0.04, p = 0.00) (Table 2).

On STAI scores the state anxiety was observed (Cox & Snell's *Pseudo-R^2* = 0.40) with a better model of variance prediction for medical students' mental health. In this questionnaire the trait-anxiety (OR = 0.3, 4.04;12.50, p = 0.00) and state-anxiety (OR = 0.3, 4.35;13.64, p = 0.00) was more pronounced within the gender. The logistic regression confirmed the significance for STAI-trait (OR = 6.4, 1.89;10.91, p = 0.00) and STAI-state (OR = 0.2, 3.10;12.73, p = 0.00) of sought mental health service at the medical school for medical students (Table 2).

In the determination of BDI scores (Cox & Snell's *Pseudo-R^2* = 0.45) the logistic regression confirmed the significance of gender (OR = 0.3, 2.52;7.51, p = 0.00) and time spent in social media (OR = 0.3, 0.01;0.02, p = 0.00) were important predictors (Table 2).

Although multinomial regression for AGWD – for MAV achievement goal, which was the most frequent domain observed – showed a Cox & Snell's *Pseudo-R^2* of 0.61 (p =

Table 2. Multinomial logistic regression model. Dependent variable: final VERAS-Q scores – learning environment –, STAI – state –, and BDI scores. All the analyses were controlled for age, which is not shown

	VERAS-Q (learning environment)			STAI (state)			BDI		
Pseudo-R^2 – Cox and Snell	0,47			0,40			0,45		
Pseudo-*R^2 – Nagelkerke*	0,40			0,32			0,38		
	OR	95%IC	p-value	OR	95%IC	p-value	OR	95%IC	p-value
Gender[+]	-0.12	(-3.71;0.47)	0.13	0.38	(4.35;13.64)	0.00	0.37	(2.52;7.51)	0.00
Quota system	-0.09	(-4.05;1.34)	0.32	-0.21	(-12.34;-0.37)	0.04	-0.15	(-5.94;0.90)	0.15
Time spent from housing to medical school	-0.04	(-0.02;0.02)	0.62				0.21	(0.00;0.05)	0.03
Hours of study at medical school	-0.19	(-0.13;-0.01)	0.02	0.13	(-0.05;0.21)	0.20	0.22	(0.01;0.15)	0.02
Time spent in all social media apps	-0.05	(-0.01;0.01)	0.48	0.23	(0.00;0.03)	0.02	0.31	(0.01;0.02)	0.00
Social media disrupts your habits	-0.29	(-6.11;-1.80)	0.00	0.21	(0.42;9.68)	0.03	0.17	(-0.18;4.80)	0.07
Family support during medical school[+]	0.15	(-0.07;3.09)	0.06	-0.23	(-7.63;-0.58)	0.02			
Share difficulties with partner (time)	-0.20	(-0.09;-0.01)	0.01	0.19	(0.00;0.17)	0.05	0.20	(0.01;0.10)	0.03
Antidepressant	-0.07	(-5.31;3.04)	0.59	-0.22	(-18.47;4.03)	0.21			
Psychiatrist	0.02	(-3.95;4.49)	0.90	0.34	(-0.27;21.03)	0.06	0.09	(-1.53;4.74)	0.31
Sought mental health service at medical school	-0.32	(-7.91;-2.44)	0.00	0.29	(3.10;12.73)	0.00			

Abbreviations: OR, odds-ratio; IC, confidence interval;
[+]Gender was coded as: 0 = female; 1 = male; Family support was coded as: 1 = none; 2 = little; 3 = regular; 4 = a lot; 5 = excessive;

0.02), this study did not have enough individuals to determine the weight of each independent variable that were tested. Additionally, the present researchers did not reach a good model for MAI – knowledge about cognition and regulation of cognition – scores.

The results of the qualitative evaluation were divided into two sections – curriculum evaluation and reasons for seeking school mental health service. In these sections, each theme is discussed with pertinent quotes. Firstly, medical students perceived curriculum evaluation divided between adequate and inadequate situations. The inadequate situation was associated with an irregular distribution between courses at the medical school, cognitive overload, time study, lack of innovation in teaching methodology, irregular relation between medical practice and theory, and lack of social and diversity issues (Table 3).

"I feel I have learned a lot with this curriculum structure." [P26]

"Teachers do not use different teaching strategies, they do not care about students' mental health." [P9]

"We learn so much about technical knowledge, but very few about human relationships and diversity." [P114]

Table 3. Qualitative data produced by the open-ended questions

Questions	Category	Issues	Examples
Curriculum Evaluation	Adequate		"Our college can train good professionals." (P6)
			"I feel I have learned a lot with this curriculum structure." (P26)
			"The progressive difficulties of the disciplines are interesting." (P39)
	Inadequate	Irregular distribution of courses	"Some courses do not follow the schedule proposed." (P49)
			"Some courses do not communicate with each other, so they repeat some theoretical content." (P100)
		Cognitive and emotional overload	"The routine is very exhaustive, we feel overloaded all the time." (P74)
			"Teachers do not use different teaching strategies, they do not care about students' mental health." (P9)
			"We spend so much time in college, so when I am finally at home, I feel exhausted." (P256)
		Study time	"We do not have time to study outside classes." (P220)
			"Courses should be more objective, so we could have time to study by ourselves." (P274)
		Lack of innovation in teaching methodology	"I miss an appropriate and smart use of technology for teaching." (P7)
			"Teaching methodology is very passive, we should have more dynamic and active classes." (P85)
		Lack of relation with medical practice	"The schedule should have more practical activities" (P168)
			"Teachers could try to show the relation between theory and medical practice. I feel unmotivated to study without it." (P42)
		Lack of social and diversity issues	"We learn so much about technical knowledge, but very few about human relationships and diversity." (P114)
Reason for seeking school mental health service	Mental support	Depressive symptoms	"Lack of motivation." (P217)
			"Weight loss and grief." (P9)
			"Suicidal symptoms." (P30)
			"Bipolar depression." (P75)
		Anxiety symptoms	"General anxiety disorder" (P159)
			"Social phobia" (P277)
		Stress	"Distress with family relationships." (P213)
	Academic orientation	Study overload	"Stress at the end of my third year of college made me feel suffocated." (P156)
		Disappointment with medical school	"Distress with medical course." (P139)

In the second section, students' reasons for seeking school mental health service referred mostly to anxiety and depressive symptoms, stress, study overload, and disappointment with their medical training (Table 4).

"Suicidal symptoms." [P30]

"General anxiety disorder" [P159]

"Distress with family relationships." [P213]

DISCUSSION

In this study, the results confirmed that mental health problems amongst medical students continue to pose a challenge. Previous studies have consistently demonstrated an important impact of personal, social and environmental aspects on students' mental health. They suggested these students' transitions from parents' home to new city, social isolation, academic responsibilities, stress, workload, sleep deprivation, and financial concerns had an adverse effect on students' mental health (4, 5, 9, 13, 25, 26). These students had high rates of state-trait anxiety symptoms but they were reluctant for search professional help or support from the mental health service. This study can also associate the mastery avoidance achievement goal to explain this situation with a fear of showing weakness.

Hope and Henderson reported in a systematic review the prevalence of anxiety symptoms among medical students was 65.5% (27). In Brazil, the prevalence rates for anxiety were 32.9% among Brazilian students by a systematic review (28). Therefore, the current results also contributed to the literature by identifying maladaptive consequences of high anxiety score with medical students' mental health. A multicenter study investigated the sleep, depressive symptoms, and anxiety of medical students from 22 medical schools in Brazil, and revealed 41% of participants had depressive symptoms and 85.6%, anxiety trait (29).

According to an international review, medical students presented higher levels of anxiety compared to depression after they get in college, while the opposite happens anteriorly. Besides, the prescribed use of stimulants and benzodiazepines was higher before than during college, while quetiapine prescription increased during college (30, 31).

Quality of life, depression and anxiety symptoms carry impairment to medical students, including poorer in academic performance, drop out, substance abuse and suicide (2, 5, 9, 32). Likewise, the findings of this study reinforced the dilemma reported by these studies. The emotional problems among college students were not just a theoretical or clinical problem but also an educational problem. Thus, the medical school context can be a step to improve the educational environment, change habits and help the development of the new generation of physicians. Quota system and gender minority students, hours of study, not sought mental health service and social media usage were indicated as a predictor to students' mental health because these students were more likely to be exposed to negative interaction, including discrimination, isolation, harassment and low social support (33, 34). The medical school and faculty context must consider how their interpersonal interactions with students could negatively affect in the learning environment. This context contributed to a positive mental health and quality of life, in addition to an inclusive environment among medical teachers and students (2, 6, 7, 35). In agreement, this study revealed that 25.8% of the participants had psychological support, 21.9% psychiatric support, while 93.2% shared their difficulties with college friends.

Heinen and colleagues stated that stressful environment could lead to a worse academic performance, enabling a cycle in which this drop in performance induces even more stress (36). In this context, the relationship found in this study between professional, family and friends' support with the search for mental health services reinforced the importance of external assistance in the construction of a healthier environment for the medical students. Therefore, students openly responded that family distress was one of the reasons students seek school mental health service.

Meaningful relationships with other students favor not only mental health but also academic performance. Some students arrive from different cities and cultures, so they need an academic and personal transition before trying to establish intense connections with peers (37). In this study, 93.2% of the participants shared difficulties with college friends during medical school, showing that they tend to know the importance of this kind of relationships.

In several medical schools around the world, updating the curriculum was much discussed: sex and gender-based differences have posed as a challenge in medical schools, for example (38, 39). Also, internet brought students the possibility to watch online classes from every country, raising the number of preclinical online lectures (40). In the present study, most students considered the curriculum at the college in question to be inadequate. The main reasons pointed out were irregular distribution of courses, cognitive and emotional overload, study time, lack of innovation in teaching methodology, lack of relation with medical practice, and lack of social and diversity issues.

There is a lack of central regulations for medical students' support (1, 2, 7, 14, 41). Therefore, individual approaches were the procedure found to access mental health care. Institutional help could be a new possibility to design structural support in this area (7, 41). A comprehensive approach, including a well-being curriculum, student-led support and faculty services were pointed as a model in a medicine school in Tennessee, United States (42).

There are several limitations in the present study. The study was based on students' self-reporting of influencing factors during medical training, therefore, there is potential reporting bias because of their interpretation of the items included in the survey questionnaire or their desire to report their emotions in a favorable way. All of the students involved in this study were enrolled in a single university, which may limit the generalizability of findings to their peers at other medical schools. Also, the survey was conducted in the midst of the COVID-19 pandemic, which may be representative of that period and its influence on mental health globally.

CONCLUSION

These results suggest that those factors impact on higher numbers of medical students who did not seek for mental

health service and little encouragement from the academic and non-academic environments. These data show that specific actions need to be directed by medical schools as a conduct to abandon the perpetuation of historical patterns of not seeking emotional support by medical students and encourage discussions about mental health.

Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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