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Burnout and active teaching-learning methodology among medical students at a university in a triple border region

Burnout e metodologia ativa de ensino-aprendizagem entre estudantes de medicina de universidade em tríplice fronteira

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ABSTRACT

Introduction: The teaching-learning methodology is an important factor in the training of medical students and may also be associated with the exposure to chronic stressors that culminate in mental suffering, as observed in the Burnout Syndrome (BS).

Objective: To determine the prevalence of Burnout Syndrome and analyze its dimensions and the relationship with the active teaching-learning methodology in medical students at university located in a triple-border region.

Method: Cross-sectional study with 279 medical students who answered questionnaires on sociodemographic data, life habits, aspects of the teaching-learning process and the Maslach Burnout Inventory (IBM). There was an association between the BS and sociodemographic variables, life habits and the teaching-learning process, using Pearson's Chi-Square tests, Fisher's exact test and Student's T test. Descriptive data analysis, bivariate analysis and multivariate logistic regression were performed.

Result: The prevalence of Burnout was 4.7%, with 26.2% of high Emotional Exhaustion, 37.6% of high Depersonalization and 20.4% of low Professional Achievement. The medical students evaluated in this study have low or moderate levels of BS. Dissatisfaction with the active methodology learning, the lack of understanding of the foundation of the active methodology and the perception that the minority/none of the teachers apply the active methodology adequately were important predictors associated with Burnout.

Conclusion: This investigation can help medical schools to develop institutional strategies to face this reality aiming to reduce the risk of the development of BS among medical students.

Keywords: Burnout; Active Learning; Medical students; Medical Education; Professional Exhaustion.

RESUMO

Introdução: *A metodologia de ensino-aprendizagem constitui importante fator na formação do estudante de Medicina e pode estar associada também à exposição de fatores estressantes crônicos que culminam em sofrimento mental como é observado na síndrome de burnout (SB).*

Objetivo: *Este estudo teve como objetivos determinar a prevalência da SB e analisar suas dimensões e a relação com a metodologia ativa de ensino-aprendizagem entre estudantes de Medicina de uma universidade de tríplice fronteira.*

Método: *Trata-se de estudo transversal realizado com 279 acadêmicos do curso de Medicina que responderam a questionários sociodemográfico, de hábitos de vida e de aspectos do processo ensino-aprendizagem, e ao Inventário de Burnout de Maslach (IBM). Verificou-se associação entre a SB e as variáveis sociodemográficas, os hábitos de vida e o processo ensino-aprendizagem, por meio do teste de qui-quadrado de Pearson, do teste exato de Fisher e do teste t de Student. Realizaram-se análise descritiva dos dados, análise bivariada e regressão logística multivariada.*

Resultado: *A prevalência de burnout foi de 4,7%, com 26,2% de alta exaustão emocional, 37,6% de alta despersonalização e 20,4% de baixa realização profissional. Os estudantes de Medicina avaliados neste estudo possuem níveis baixos ou moderados de SB. A insatisfação com o aprendizado da metodologia ativa, a falta de compreensão do fundamento da metodologia ativa e a percepção de que a minoria/nenhum docente aplica a metodologia ativa adequadamente foram preditores importantes associados ao burnout.*

Conclusão: *Esta investigação pode servir para que escolas médicas possam desenvolver estratégias institucionais para enfrentamento dessa realidade no sentido de reduzir o risco do desenvolvimento de SB entre os estudantes de Medicina.*

Palavras-chave: *Burnout; Aprendizagem Ativa; Estudantes de Medicina; Educação Médica; Esgotamento Profissional.*

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INTRODUCTION

Medical students are continuously exposed, throughout their training, to psychosocial stressors that, if persistent, can trigger the Burnout Syndrome (BS)[1]. This syndrome started to be noticed in the mid-1970s, with its etiology being understood through the interaction of characteristics of the work environment and individual characteristics, especially in professionals whose practice involved caring for others[2].

The BS develops through an inadequate response to chronic emotional and interpersonal stressors in the workplace. In this sense, students can also develop BS by experiencing activities that are psychologically similar to work; however, the analysis takes place based on the stress induced by the teaching-learning process[3,4].

This syndrome has a multidimensional characteristic, consisting of emotional exhaustion, depersonalization and reduced professional achievement[5]. Regarding the BS dimensions, in the context of students, emotional exhaustion is triggered due to the educational demands. When students feel that their energy resources and enthusiasm to deal with academic demands are exhausted, feelings such as frustration and exhaustion are generated, as a result of the inability to deal with the stressors to which they are subjected at university[5,6].

Depersonalization is triggered by indifference and the apathetic attitude towards the student's academic activities. Through that, the students manifest cynical behaviors and negative attitudes that lead them to affective and personal distancing from their patients, classmates and other professionals in the area[5,7]. Reduced professional achievement occurs when students make a self-assessment that tends to perceive several negative aspects about their academic life, feeling dissatisfied with their performance at the university, causing a decrease in the efficiency and pleasure in the performance of the study routine[5,7].

Among the factors that trigger chronic stress in students, one can consider the employed teaching methodology. Several medical courses in Brazil apply the active teaching-learning methodology. The inclusion of this method was promoted after the incentive to change the curriculum of medical courses, implemented through the National Curriculum Guidelines of 2014, according to article 32 of Resolution N. 3 of July 20, 2014[8]. This teaching model modifies the way students learn and the pedagogical structuring of the medical curriculum. Students develop an active attitude in the process of building their own knowledge, requiring them to be more involved with the topic to be learned, through practices such as talking, illustrating, reproducing, dramatizing and exposing summarized ideas[9].

The curricular organization of the active methodology takes place in longitudinal and sequential modules, seeking the integration between the disciplines in consecutive semesters and between modules[10]. This new learning scenario can trigger significant stress in the students, as a result of the difficulty of adapting to the new teaching format, which requires the development of self-learning skills and greater exposure of the student to other classmates to share the studied content.

In this context, early detection of factors related to the teaching-learning process that can trigger the BS is important, as it impairs the academic performance and mental health of medical students. Therefore, it is necessary to carry out studies related to this topic to adopt preventive measures, aiming at the quality of the student's physical and psychological health, contributing to their academic performance and the construction of their professional identity. BS in medical students has been reported more frequently in recent years, although few studies have analyzed its relationship with the active methodology. In this sense, the present study was carried out aiming at determining the prevalence of BS and analyzing its dimensions and relationship with the teaching-learning methodology among medical students attending a university located in a triple-border region. For this purpose, the student's satisfaction was verified considering some parameters, such as self-learning, teaching staff and quality of teaching strategies.

METHOD

This is a cross-sectional study carried out with medical students at Federal University of Latin-American Integration (UNILA, *Universidade Federal da Integração Latino Americana*), located in the city of Foz do Iguaçu, state of Paraná, Brazil, from March to June 2019. The city is located in the extreme west of the state of Paraná and borders with Paraguay and Argentina. It has a population of approximately 264,000 inhabitants, being known for its tourist attractions, commerce and high flow of people in the triple-border region.

The university started its academic activities in 2010 and is characterized by being an institution focused on Latin-American integration, consisting of students and teachers from Brazil and several other Latin-American countries. It has an institutional mission to train human resources capable of contributing to regional development and the cultural, scientific and educational exchange in Latin America, especially in the Southern Common Market (Mercosur)[11]. The medical course at the institution was created in 2014 by the Brazilian federal government based on the "More Doctors for Brazil" movement, which, among other actions, called on federal universities to expand medical education in the country[12].

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Firstly, the research proposal was presented to the coordination of the university medical course, and then it was submitted to the course collegiate and the Structuring Teaching Nucleus (NDE, *Núcleo Docente Estruturante*) for consideration and approval. Secondly, it was agreed with the teachers for the data collection instruments to be applied at times so that they did not hinder the progress of academic activities.

Students regularly enrolled in the medical course, who were attending the semester in which they were enrolled, participated in the study. The inclusion criteria comprised: agreeing to participate in the study; being enrolled in the medical course. Students under 18 years of age and those who did not agree to participate in the study were excluded.

The instruments were applied during class hours on pre-established days that were agreed on with the teachers and the course coordination. The students were informed about the research objectives and that the obtained data would be used exclusively for scientific purposes, ensuring the confidentiality, secrecy and anonymity of the participant. Participation took place by signing the Free and Informed Consent Term.

In this study, three instruments were applied for the proposed investigation: sociodemographic, lifestyle, academic profile and teaching-learning methodologies questionnaires and the Maslach Burnout Inventory (MBI).

For the collection of sociodemographic, lifestyle, academic profile and teaching-learning process data, a questionnaire consisting of the variables: sex, age, marital status, religion, origin, income in minimum wages (MW), work, living situation (lives alone/lives with someone), steady partner, use of tobacco, alcohol, physical activity, frequency of physical activity, hours of sleep, weekly hours of leisure, and tiredness was employed. Regarding the academic profile and the teaching-learning process, the following items were evaluated: current year of the course (1st, 2nd, 3rd, 4th or 5th year), satisfaction in studying Medicine, desire to abandon the course, feeling overwhelmed with extracurricular activities, understanding of the foundation of the active teaching-learning methodology, satisfaction with the learning obtained with the active methodology, satisfaction with the learning strategy of the active teaching-learning methodology, whether the teachers know how to apply the active teaching-learning methodology (all/the majority; the minority/none).

The MBI used in the study corresponds to a self-administered questionnaire with 22 statements with a Likert-type scale divided into three domains: Emotional Exhaustion (EE) with 09 items, Depersonalization (DE), with 05 items and Personal Achievement (PA), with 08 items[13]. In the MBI assessment, the score for each domain is the sum of the scores of the items that compose it; EE has a scale ranging from 9 to 45 points; DE ranges from 05 to 25 points, and PA ranges from 08 to 40 points. These scores, according to the authors of the scale, must be evaluated continuously, ranging from low, moderate or high risk of experienced Burnout[14]. The internal consistency of the answers was evaluated by Cronbach's alpha (α) for each domain and for the set of 22 items (global scale), adopting values between 0.70 and 0.80, indicative of good internal consistency of the adopted scale. The prevalence of BS among the students was assessed as a whole (the three dimensions grouped together) according to the criteria presented by Ramirez et al., Grunfeld et al. and Ebisui[15-17]. The first author defines the syndrome when alterations are found in three dimensions: high scores on the EE and DE and low scores on the PA[15] subscale. Grunfeld et al., in turn, consider the diagnosis of Burnout when alterations are found in only one dimension: high scores on EE or DE, or low scores on PA[16]. After determining whether the students had BS, they were classified as being at high risk of Burnout (two altered dimensions), moderate (one altered dimension) or low (no altered dimensions), according to Ebisui[17].

A previous pilot study was carried out with three medical students who participated in the data analysis of this research. The students did not report any difficulties or doubts when filling out the questionnaire, which remained unchanged for the main study.

In the analysis, the data were distributed in tables with frequencies and summary measures (minimum, maximum, mean, standard deviation). In the analysis of the MBI data, it was observed that the alterations in the EE and DE domains occurred when the score was above the 75th percentile, and the change in the PA subscale when the score was below the 25th percentile[18]. In the study, the 75th percentile for the EE and DE domains were 27 and 11, respectively, and the 25th percentile of the PA domain was 27. Thus, the IBM domains were classified as: (1) EE≥27 - high emotional exhaustion and EE<27 -moderate and low emotional exhaustion; (2) DE≥ 11 - high depersonalization and DE<11 -moderate and low depersonalization; (3) PA < 27 – low professional achievement and PA≥27 – moderate and high professional achievement.

A bivariate analysis was performed to verify the association of the dependent variables related to the MBI domains and the independent variables related to sociodemographic, lifestyle characteristics, academic profile and use of active-methodology. Therefore, these associations were evaluated using the chi-square test (χ^2), Fisher's exact test and Student's *t* test for two independent samples. In the latter, the normality of the data was verified using the Kolmogorov-Smirnov test to guide the choice of the most adequate test for the data distribution.

Finally, a binary logistic regression analysis was performed using the stepwise forward method, portraying the Odds Ratio (OR) and 95% confidence intervals (95%CI). Independent variables with p<0.20 in the bivariate analysis were included in this analysis. The final model was chosen taking into account the Hosmer-Lemeshow test (HL test), a goodness of fit test, keeping the variables up to a level of 5%. The Statistical Package for Social Sciences (SPSS) version 19.0 and Microsoft Excel 2019 software were used in the statistical calculations.

In this study, all the principles and ethical aspects in research proposed in Resolution n. 466 – Ministry of Health - of 2012 were respected, being approved by the Research Ethics Committee of the Universidade Estadual do Oeste do Paraná (Unioeste), with CAAE n. 07311619.7.0000.0107.

RESULTS

A total of 279 students of a total of 339 active students enrolled in the medical course participated in the research, characterizing a response rate of 82.3%. Of the 60 students who did not participate in the study, 3.3% were younger than 17 years old; 18.3% did not want to participate in the study and 76.6% were not present in the classroom during the application of the questionnaires.

The sociodemographic profile, lifestyle and academic characteristics and questions on the application of the active methodology is shown in Table 1. There were 146 (52.3%) female and 133 (47.7%) male students. The mean age was 24.2 years ±4.7 years (minimum= 18 years; maximum= 48 years). Most of the students did not have a partner (86.4%), professed a religion (62.0%), were Brazilian (59.1%), had a family income between 05 and 10 MW (31.7%), did not work (91.8%), lived with someone (71.7%) and did not have a steady partner (54.1%). Regarding habits and lifestyle, most were able to have less than 06 hours of leisure per week (50.5%), had less than 07 hours of sleep (55.9%), reported feeling tired, despite the amount of hours slept (66.3%), practiced physical activity (59.5%) 01 to 04 times a week (45.8%), did not smoke (94.6%), did not consume alcohol in the last 06 months (55.6%) and did not use illicit drugs (78.1%).

As for the academic profile, most were in the fifth year of the course (25.1%), were satisfied with having chosen a medical career (84.2%), would choose a medical career again (87.1%), did not think about dropping out of the course (58.6%) and felt overwhelmed by the extracurricular activities of the semester (59.0%). Regarding the teaching-learning methodology, most students reported understanding the fundamentals of the active methodology (97.5%), thought it was important to learn its fundamentals and purposes (95.3%) and reported that all or most of the teachers managed to apply the active teaching-learning methodology in the classroom (51.1%). Nevertheless, there was a predominance of students who were not satisfied with the teaching-learning strategy (75.9%) and the fact that they did not feel they were learning with an active teaching-learning methodology (76.5%).

According to Table 2, the prevalence of BS among the students, according to the criterion by Grunfeld et al.[16], was 47.7% and 4.7%, according to Ramirez et al.[15]. Most had a reduced risk of BS (52.3%), according to Ebisui[17]. Regarding the MBI domains, the mean EE (Emotional Exhaustion) score was 22.9±6.1 (minimum= 9; maximum= 45), the mean DE (Depersonalization) score was 8.6±3.4 (minimum= 5; maximum= 22) and the mean PA (Personal Achievement) score was 29.7±4.9 (minimum=8; maximum=40). It was found that 26.2% had high EE, 27.6% had high DE and 20.4% had low or reduced PA.

The bivariate analysis between the MBI dimensions and the socioeconomic, demographic, lifestyle and academic profile variables and the use of the teaching-learning methodology applied in the medical course was performed, as shown in Tables 3 and 4. The analysis was a reference to list the explanatory variables with p<0.20 for adjustment in the final model to explain the changes found in the dimensions of EE, DE and low PA.

Table 5 shows the multivariate logistic regression model for the three assessed domains for sociodemographic variables and those related to the academic profile and active teaching-learning methodology. It was observed that the chance of reaching a high level of EE is 3.28 times higher (95%CI= 1.42; 7.59; p=0.005) in students who would not choose the medical course again; 1.88 times higher (95%CI=1.01; 3.51; p=0.049) in students who thought about dropping out of the course; 2.63 times higher (95%CI= 1.35; 5.11; p=0.004) in students who felt overwhelmed with extracurricular activities; 5.37 times higher (95%CI=1.52; 18.99; p=0.009) in students unsatisfied with the active methodology; and 2.07 times higher (95%CI=1.13; 3.79; p=0.019) in students who thought the minority/none of the teachers knew how to apply the active methodology. Students who felt tired despite the hours of sleep were 2.59 times more likely (95%CI=1.35; 4.97; p=0.004) to have high EE; and those who consumed alcohol and used illicit drugs in the last six months were 1.93 times (95%CI=1.06; 3.38; p=0.029) and 2.51 more likely (95%CI=1.32; 4.76; p=0.005), respectively.

Table 1. Socioeconomic, demographic, lifestyle characteristics, academic profile and application of the teaching-learning methodology in medical students at Unila, Foz do Iguaçu-PR, Brazil, 2019.

Variables	N	%
Socioeconomic and demographic		
Age	Mean 24.2 years ± 4.7	
	Min = 18	Max = 48
Gender		
Female	146	52.3
Male	133	47.7
Marital status		
With partner	38	13.6
Without partner	241	86.4
Do you profess a religion		
Yes	173	62.0
No	106	38.0
Nationality		
Brazilian	165	59.1
Foreigner	114	40.9
*Family income**		
< 2 MW	45	16.2
2 to 4 MW	83	29.8
5 to 10 MW	88	31.7
>10 MW	62	22.3
Are you currently working		
Yes	23	8.2
No	256	91.8
With whom do you live		
With other people	200	71.7
Alone	79	28.3
Do you have a steady partner		
Yes	128	45.9
No	151	54.1
Lifestyle		
Hours of leisure activity		
Less than 6 hours	141	50.5
06 to 10 hours	109	39.1
More than 10 hours	29	10.4
Hours of sleep		
More than 09 hours	39	14.0
07 to 09 hours	84	30.1
Less than 07 hours	156	55.9
Regarding sleep time, most of the time you feel		
Tired	185	66.3
Rested	94	33.7
Do you practice physical activity		
Yes	166	59.5
No	113	40.5

Continues...

Table 1. Continuation

Variables	N	%
Lifestyle		
Frequency of physical activity		
01 to 02 times a week	64	22.9
03 to 04 times a week	64	22.9
05 to 06 times a week	22	7.9
Daily	17	6.1
Not applicable	112	40.1
Do you currently smoke		
Yes	15	5.4
No	264	94.6
Alcohol consumption		
Yes	124	44.4
No	155	55.6
Do you use illicit drugs		
Yes	61	21.9
No	218	78.1
Academic profile and teaching-learning methodology		
Year of the Course		
1st	46	16.5
2nd	45	16.1
3rd	60	21.5
4th	58	20.8
5th	70	25.1
Are you satisfied with the choice of medical career		
Yes	243	87.1
No	2	0.7
I do not know	34	12.2
*Would you make the same choice for a medical career**		
Yes	234	84.2
No	8	2.9
I do not know	36	12.9
*Have you ever thought about dropping out of medical school**		
Yes	115	41.4
No	163	58.6
*Do you feel overwhelmed by the semester's extracurricular activities**		
Yes	164	59.0
No	79	28.4
I don't do them in this period	35	12.6
*Are you satisfied with the teaching-learning strategy in the course**		
Yes	67	24.1
No	211	75.9

Continues...

Table 1. Continuation

Variables	N	%
Academic profile and teaching-learning methodology		
*Do you understand the fundamentals of the active teaching-learning methodology**		
Yes	271	97.5
No	7	2.5
*Do you find it important to learn the fundamentals of the active methodology before starting it in practice**		
Yes	265	95.3
No	13	4.7
*How do you feel about learning in the context of the active teaching-learning methodology **		
Satisfied	51	18.4
Dissatisfied	212	76.5
I do not know	14	5.1
*In your opinion, are the teachers able to apply the active teaching-learning methodology in practice**		
All/the majority	142	51.1
A minority/none	136	48.9

Abbreviations: MW = Minimum Wage; Min = minimum; Max = Max.
Source: Prepared by the authors.

Table 2. Results of the Maslach Burnout Inventory (MBI) in medical students at Unila, Foz do Iguaçu -PR, Brazil, 2019.

Dimensions/Risk	n	%
Emotional exhaustion (EE)	Mean: 22.9 ± 6.1	
	Min= 9	Max= 45
≥ 27 (High)	73	26.2
< 27 (Moderate/Low)	206	73.8
Depersonalization (DE)	Mean: 8.6 ± 3.4	
	Min= 5	Max= 22
≥ 11 (High)	77	27.6
< 11 (Moderate/Low)	202	72.4
Professional Achievement (PA)	Mean: 29.7 ± 4.9	
	Min= 8	Max= 40
≥ 27 (Moderate/High)	222	79.6
< 27 (Low)	57	20.4
Burnout Risk (Ebisui)		
Reduced	146	52.3
Moderate	85	30.5
Elevated	35	12.5
Burnout		
Grunfeld et al.	133	47.7
Ramirez et al.	13	4.7
Cronbach's alpha for EE: 0.86 Cronbach's Alpha for DE: 0.778 Cronbach's alpha for PA: 0.827 Global Cronbach's Alpha for MBI: 0.742		

Abbreviations: Min= minimum; Max=maximum
Source: Prepared by the authors.

Table 3. Bivariate analysis of Burnout dimensions and socioeconomic, demographic, and lifestyle variables in medical students at Unila, Foz do Iguaçu-PR, 2019.

Variable	Emotional Exhaustion[a]					Depersonalization [b]					Personal Achievement[c]				
	<27		>=27		p	<11		>=11		p	<27		>=27		p
	n	%	n	%		n	%	n	%		n	%	n	%	
Socioeconomic and Demographic															
Age*	204	73.7	73	26.3	0.791	201	72.6	76	27.4	0.638	56	20.2	221	79.8	0.139
Mean ±DP	24.2 ±4.9		24.0 ± 3.9			24.0 ±4.8		24.3 ±4.0			23.4 ±3.7		24.4 ± 4.9		
Gender					0.134					0.003					0.237
Male	102	49.5	44	60.3		117	57.9	29	37.7		34	59.6	112	50.5	
Female	104	50.5	29	39.7		85	42.1	48	62.3		23	40.4	110	49.5	
Marital status					0.553					0.847					0.522
With partner	30	14.6	8	11.0		27	13.4	11	14.3		6	10.5	32	14.4	
Without partner	176	85.4	65	89.0		175	86.6	66	85.7		51	89.5	190	85.6	
Do you profess a religion					0.262					0.001					0.221
Yes	132	64.1	41	56.2		137	67.8	36	46.8		31	54.4	142	64.0	
No	74	35.9	32	43.8		65	32.2	41	53.2		26	45.6	80	36.0	
Nationality					0.685					0.056					0.764
Brazilian	120	58.3	45	61.7		112	55.5	53	68.9		35	61.4	130	58.6	
Foreigner	86	41.7	28	38.4		90	44.6	24	31.2		22	38.6	92	41.4	
Family income					0.544					0.308					0.062
< 2 MW	36	17.6	9	12.3		37	18.4	8	10.4		9	15.8	36	16.3	
2 to 4 MW	61	29.8	22	30.1		61	30.3	22	28.6		15	26.3	68	30.8	
5 to 10 MW	66	32.2	22	30.1		62	30.8	26	33.8		13	22.8	75	33.9	
>10 MW	42	20.5	20	27.4		41	20.4	21	27.3		20	35.1	42	19.0	
Are you currently working					0.144					0.808					1.000
Yes	14	6.8	9	12.3		16	7.9	7	9.1		4	7.0	19	8.6	
No	192	93.2	64	87.7		186	92.1	70	90.9		53	93.0	203	91.4	
With whom do you live					0.546					0.138					0.191
With other people	150	72.8	50	68.5		150	74.3	50	64.9		45	78.9	155	69.8	
Alone	56	27.2	23	31.5		52	25.7	27	35.1		12	21.1	67	30.2	
Do you have a steady partner					0.892					1.000					1.000
Yes	94	45.6	34	46.6		93	46.0	35	45.5		26	45.6	102	45.9	
No	112	54.4	39	53.4		109	54.0	42	54.5		31	54.4	120	54.1	
Lifestyle															
Hours of leisure activity					0.369					0.893					0.845
Less than 6 hours	99	48.1	42	57.5		102	50.5	39	50.6		29	50.9	112	50.5	
06 to 10 hours	84	40.8	25	34.2		80	39.6	29	37.7		21	36.8	88	39.6	
More than 10 hours	23	11.2	6	8.2		20	9.9	9	11.7		7	12.3	22	9.9	
Hours of sleep					0.224					0.831					0.999
More than 09 hours	30	14.6	9	12.3		27	13.4	12	15.6		8	14.1	31	14.0	
07 to 09 hours	67	32.5	17	23.3		60	29.7	24	31.2		17	29.8	67	30.1	
Less than 07 hours	109	52.9	47	64.4		115	56.9	41	53.2		32	56.1	124	55.9	
Regarding sleep time, most of the time do you feel					0.014					0.987					0.875
Tired	128	62.1	57	78.1		134	66.3	51	66.2		37	64.9	148	66.7	
Rested	78	37.9	16	21.9		68	33.7	26	33.8		20	35.1	74	33.3	

Continues...

Table 3. Continuation

Variable	Emotional Exhaustion[a]				p	Depersonalization [b]				p	Personal Achievement[c]				p
	<27		>=27			<11		>=11			<27		>=27		
	n	%	n	%		n	%	n	%		n	%	n	%	
Lifestyle															
Do you practice any physical activity					0.492					0.057					1.000
Yes	120	58.3	46	63.0		113	55.9	53	68.8		34	59.6	132	59.5	
No	86	41.7	27	37.0		89	44.1	24	31.2		23	40.4	90	40.5	
Frequency of physical activity					0.943					0.439					0.395
01 to 02 times a week	45	21.8	19	26.0		47	23.3	17	22.1		16	28.1	48	21.6	
03 to 04 times a week	48	23.3	16	21.9		42	20.8	22	28.6		8	14.0	56	25.3	
05 to 06 times a week	17	8.3	5	6.8		15	7.4	7	9.1		6	10.5	16	7.2	
Daily	84	40.8	28	38.4		11	5.4	6	7.8		3	5.3	14	6.3	
Not applicable	84	40.8	28	38.4		87	43.1	25	32.5		24	42.1	88	39.6	
Do you currently smoke					1.000					1.000					0.320
Yes	11	5.3	4	5.5		11	5.4	4	5.2		14	6.3	1	1.8	
No	195	94.7	69	94.5		191	94.6	73	94.8		208	93.7	56	98.2	
Alcohol consumption					0.010					0.001					0.457
Yes	82	39.8	42	57.5		77	38.1	47	61.0		96	43.2	28	49.1	
No	124	60.2	31	42.5		129	61.9	30	39.0		126	56.8	29	50.9	
Do you use illicit drugs					0.002					0.005					0.592
Yes	35	17.0	26	35.6		35	17.3	26	33.8		47	21.2	14	24.6	
No	172	83.0	47	64.4		167	82.7	51	66.2		175	78.8	43	75.4	

[a]Emotional Exhaustion: ≥ 27 (High); < 27 (Moderate/Low)
[b]Depersonalization: ≥ 11 (High); < 11 (Moderate/Low)
[c]Professional Achievement: ≥ 27 (Moderate/High); < 27 (Low)
Source: Prepared by the authors.

Table 4. Bivariate analysis of Burnout dimensions, academic profile and application of the teaching-learning methodology in medical students at Unila, Foz do Iguaçu-PR, Brazil, 2019.

Variable	Emotional Exhaustionl[a]				p	Depersonalization [b]				p	Personal Achievement[c]				p
	<27		>=27			<11		>=11			<27		>=27		
	n	%	n	%		n	%	n	%		n	%	n	%	
Year of the Course					0.036					<0.001					0.796
1st	40	19.4	6	8.2		41	20.3	5	6.5		11	19.3	35	15.8	
2nd	38	18.4	7	9.6		35	17.3	10	13.0		10	17.5	35	15.8	
3rd	42	20.4	18	24.7		44	21.8	16	20.8		9	15.8	51	23.0	
4th	40	19.4	18	24.7		46	22.8	12	15.6		13	22.8	45	20.3	
5th	46	22.3	24	32.9		36	17.8	34	44.2		14	24.6	56	25.1	
Are you satisfied with the choice of the medical career					0.003					0.006					<0.001
Yes	187	90.8	56	76.7		183	90.6	60	77.9		38	66.7	205	92.3	
No	2	1.0	0	0.0		2	1.0	0	0.0		0	0.0	2	0.9	
I do not know	17	8.3	17	23.3		17	8.4	17	22.1		19	33.3	15	6.8	

Continues...

Table 4. Continuation

Variable	Emotional Exhaustionl[a]				p	Depersonalization [b]				p	Personal Achievement[c]				p
	<27		>=27			<11		>=11			<27		>=27		
	n	%	n	%		n	%	n	%		n	%	n	%	
*Would you make the same choice for a medical career**					<0.001					0.006					<0.001
Yes	51	69.9	183	89.3		57	74.0	177	88.1		36	63.2	198	89.6	
No	22	30.1	22	10.7		20	26.0	24	11.9		21	36.8	23	10.4	
*Have you ever thought about dropping out of medical school**					<0.001					0.175					0.131
Yes	71	34.6	44	60.3		78	38.8	37	48.1		29	50.9	86	38.9	
No	134	65.4	29	39.7		123	61.2	40	51.9		28	49.1	135	61.1	
Do you feel overwhelmed by the semester's extracurricular activities					0.002					0.128					0.232
Yes	109	53.2	55	75.3		52	75.4	112	64.4		37	75.5	127	65.5	
No	69	33.7	10	13.7		17	24.6	62	35.6		12	24.5	67	34.5	
I don't do them in this period	27	13.2	8	11.0											
*Are you satisfied with the teaching-learning strategy in the course**					0.081					1.000					0.056
Yes	55	26.8	12	16.4		49	24.4	18	23.4		8	14.0	59	26.7	
No	150	73.2	61	83.6		152	75.6	59	76.6		49	86.0	162	73.3	
Do you understand the fundamentals of the active teaching-learning methodology					1.000					0.400					0.635
Yes	200	97.6	71	97.3		197	98.0	74	96.1		55	96.5	216	97.7	
No	5	2.4	2	2.7		4	2.0	3	3.9		2	3.5	5	2.3	
Do you find it important to learn the fundamentals of the active methodology before starting it in practice					0.524					0.526					0.733
Yes	194	94.6	71	97.3		14	18.2	37	18.5		54	94.7	211	95.5	
No	11	5.4	2	2.7		63	81.8	163	81.5		3	5.3	10	4.5	
How do you feel about learning in the context of the active teaching-learning methodology					<0.001					0.502					0.192
Satisfied	48	23.5	3	4.1		37	18.5	14	18.2		6	10.5	45	20.5	
Dissatisfied	143	70.1	69	94.5		151	75.5	61	79.2		47	82.5	165	75.0	
I do not know	13	6.4	1	1.4		12	6.0	2	2.6		4	7.0	10	4.5	
In your opinion, are the teachers able to apply the active teaching-learning methodology in practice					<0.001					<0.001					0.555
All/the majority	118	57.6	24	32.9		116	57.7	26	33.8		27	47.4	115	52.0	
The minority/none	87	42.4	49	67.1		85	42.3	51	66.2		30	52.6	106	48.0	

[a]Emotional Exhaustion: ≥ 27 (High); < 27 (Moderate/Low)
[b]Depersonalization: ≥ 11 (High); < 11 (Moderate/Low)
[c]Professional Achievement: ≥ 27 (Moderate/High); < 27 (Low)
Source: Prepared by the authors.

Table 5. Factors associated with Burnout dimensions in the multivariate logistic regression model.

Variables: academic profile and use of active teaching-learning methodology / Domain	OR[a]	95%CI		p
		Lower Lim.	Upper Lim.	
Emotional Exhaustion				
Would you make the same choice for a medical career				
Yes	1			
No	3.28	1.42	7.59	0.005
Have you ever thought about dropping out of medical school				
Yes	1.88	1.01	3.51	0.049
No	1			
*Do you feel overwhelmed by the semester's extracurricular activities**				
Yes	2.63	1.35	5.11	0.004
No	1			
How do you feel about learning in the context of the active teaching-learning methodology				
Satisfied	1			
Unsatisfied	5.37	1.52	18.99	0.009
*In your opinion, are teachers able to apply the active teaching-learning methodology in practice**				
All/the majority	1			
The minority/none	2.07	1.13	3.79	0.019
Depersonalization				
Year of the Course				
1st	1			
2nd	2.81	0.85	9.23	0.088
3rd	3.08	1.01	9.33	0.047
4th	2.30	0.73	7.23	0.154
5th	8.09	2.80	23.33	<0.001
Are you satisfied with the medical career				
Yes	1			
No	3.15	1.43	6.95	0.004
Professional Achievement				
Are you satisfied with the medical career				
Yes	1			
No	3.88	1.50	10.04	0.005
Would you make the same choice for a medical career				
Yes	1			
No	2.99	1.19	7.48	0.019
Sociodemographic variables and lifestyle/Domain	**OR***	**95%CI**		**p**
		Lower Lim.	**Upper Lim.**	
Emotional Exhaustion				
Regarding sleeping time, most of the time do you feel				
Tired	2.59	1.35	4.97	0.004
Rested	1			
Alcohol consumption				
Yes	1.93	1.06	3.38	0.029
No	1			

Continues...

Table 5. Continuation

Sociodemographic variables and lifestyle/Domain	OR[a]	95%CI		p
		Lower Lim.	Upper Lim.	
Emotional Exhaustion				
Do you use illicit drugs				
Yes	2.51	1.32	4.76	0.005
No	1			
Depersonalization				
Gender				
Male	2.07	1.18	3.62	0.010
Female	1			
Do you profess a religion				0.008
Yes	1			
No	2.12	1.22	3.69	
Alcohol consumption				0.005
Yes	2.21	1.27	3.85	
No	1			

Abbreviations: OR = odds ratio; Lower lim. = Lower Limit; Upper Lim. = Upper Limit; 95%CI= 95% confidence interval
[a] For analysis purposes, the OR is related to the chance of high emotional exhaustion, high depersonalization and low professional achievement in the comparison of the categories of the variables analyzed above.
Source: Prepared by the authors.

Regarding high DE, it was found that students in the fifth year of the course were 8.09 times more likely (95%CI=2.80; 23.33; p<0.001) and among those who were not satisfied with the choice of the medical career this chance was 3.15 times greater (95%CI=1.43; 6.95; p=0.004). Men were 2.07 times more likely (95%CI=1.18; 3.62; p=0.010) to have high DE than women; students who did not profess any religion, were 2.12 times more likely (95%CI=1.22; 3.69; p=0.008) and those who consumed alcohol in the last six months, were 2.21 times more likely (95%CI=1 .27; 3.85; p=0.005).

In relation to low PA, it was observed that the chance is 3.88 times greater (95%CI=1.50; 10.04; p=0.005) in students who were not satisfied with the choice of a medical career and 2.99 times higher (95%CI=1.19; 7.48; p=0.019) among those who would not choose a medical career again.

DISCUSSION

The results of this study indicated significant associations between the active teaching-learning methodology and BS. A systematic review that analyzed the prevalence of Burnout in medical students found that 44.2% of the students, regardless of the teaching method, developed the syndrome and, when the prevalence of each dimension was estimated, elevated values were also found[19]. In the present study, the prevalence of BS was 47.7%, according to Grunfeld et al. and 4.7%, according to Ramirez et al.[15]; however, when analyzed through the three dimensions, it was considered low, showing similar results to other studies in medical schools with an active methodology[1,20]. On the other hand, Burnout frequencies in other studies are higher than those found in the present sample. Investigations with similar teaching methods found high levels for Burnout of 38.3% and 56.2% of the total number of participants in a Brazilian study and another one carried out in Saudi Arabia, respectively[21,22].

Some of these studies, however, used other questionnaires, rather than the MBI, to analyze BS, such as the specific version for students, the MBI Student Survey (MBI-SS), which has fifteen questions, or the Copenhagen Burnout Inventory (CBI), which consists of nineteen questions [1,20-22]. These investigations used different forms of data analysis for the Burnout dimensions, such as the arithmetic sum of the scores in each subscale, unlike this research, which used, in addition to the sum of the scores, the percentile method to analyze the results of the MBI[1,20,21]. It should also be noted that the primary outcome of these investigations was to verify the prevalence of BS and associated factors, analyzing sociodemographic, lifestyle and academic profile variables that could be associated with Burnout[1,20,22]. A similar analysis was used in this study, but with an interface of the syndrome and its dimensions with the teaching-learning methodology.

Regarding the teaching-learning process, the present study found that emotional exhaustion and dissatisfaction

with learning were associated in the context of the active methodology. The risk of developing a high degree of emotional exhaustion was higher in students who felt dissatisfied with learning conducted by the active methodology and among those who evaluated that the minority/none of the teachers knew how to apply such methodology. A similar result was found in a medical school in the interior of the state of São Paulo, where feeling exhausted with the study routine and having no motivation for academic activities was associated with Burnout[23].

Another aspect that involves the use of the active methodology consists in the transition from the traditional method, in which there is an increase in students' stress levels due to the change into an active curriculum, predisposing to the appearance of BS, as verified in a study carried out in Kuwait[24]. Difficulties in communicating with the faculty and the presence of personal conflicts between student and teacher were significantly associated with increased levels of stress[20]. In this context, the chance of developing BS becomes greater in students who consider the faculty to be inflexible and unsupportive, and greater among students who had private problems with faculty members[22].

The adoption of the active methodology requires changes in the teacher's role, who ceases to be the priority figure in the transmission of knowledge and starts to contribute for the student to think critically. The teacher helps with information in an interdisciplinary way that creates a bridge between the student's previous knowledge and the new content to be learned[25]. This new format allows a greater student-teacher closeness, which contributes to the improvement of learning. However, this closeness can also destabilize conservative teaching groups under this new training modality, which may be associated to the development of BS to the detriment of the student-teacher relationship.

The medical curriculum and the teaching methodology used in the course are contributing factors for BS in medical students, as they correspond to important pillars for the construction of medical education[9,19]. In the case of active methodologies, they are part of a broad context of changes in the learning scenario and pedagogical strategies, focused on bringing medical education closer to the population's needs and the organization of health systems[26]. When considering these issues in this investigation, few studies were found that demonstrated an association between Burnout and variables related to the active teaching method, impacting the dimension of these indicators. It was found, however, that some of them found associations between BS and the student's academic profile, which could indirectly represent the influence of the teaching method.

This study showed the association between Burnout and not feeling accomplished as a medical student or feeling tired/dissatisfied, even when using the active methodology, as shown in a previous study[23]. This fact may be a reflection of how the teaching method impacts the student's experience of the profession from the perspective of the curricular structuring of the course and the way it is applied in daily life. When the disarticulation between curricular contents and reality accompanies this situation, the situation becomes more severe. The structuring of the curriculum with irrelevant content makes room for overloading the student, predisposing them to BS, especially to emotional exhaustion. The student starts to perceive the curricular subjects as uninteresting and to see teaching as an obligation that lacks sense, which one seeks to get rid of as soon as possible[27]. In this sense, it is necessary that the contents taught be relevant to student learning, being articulated with the social reality of the profession.

The training of professionals with a more critical view from the biopsychosocial perspective of the health-disease process increases the student's responsibility towards this construction, which may imply in the unpreparedness to deal with new academic demands, which may reflect on the results found between Burnout and the student's academic profile. This new learning paradigm becomes a challenge for the student body and the faculty in the face of the complex change of pedagogical-political nature, as it involves the medical institution, health services and the community[26,28].

Regarding feeling overloaded with extracurricular activities, this study found that the chance of developing BS is greater in those who reported this overload. The risk for BS was higher in students who had already thought about dropping out of the course and among those who would not choose a medical career again. When evaluating these questions, a study carried out in the state of Goiás found that students who were undertaking undergraduate research activities had higher scores in the depersonalization dimension[29]. However, other extracurricular activities portrayed in the same study, such as extended education and internship, were not associated with the Burnout dimensions.

Among recent studies on BS in Brazilian medical schools with active methodology, it was found that most of them were from private universities, contrasting with the scenario of this study [20,21,23,29]. These data show that BS in public universities with an active methodology has been little investigated, which requires further studies on the subject in this type of institution aiming to compare the two realities.

Another relevant aspect is the need for research involving the investigation of the teaching-learning method and BS in medical institutions created from the "More Doctors

Program" (PMM, *Programa Mais Médicos*)[30] approved in the country in 2013. There is also a scarcity of investigations in this aspect, with only one study that evaluated a medical course created in 2012 under the active method model at a university in the interior of the state of Sergipe[31]. In this sense, it is important to highlight the axis of medical training provided by the PMM, having as one of its proposals the learning based on the teaching-service integration since the beginning of undergraduate school, when the students are already inserted in the health services and in the community as a way of allow the application of active methodologies[26,32]. As the schools instituted in the PMM are recent ones, it is clear that there are still gaps in the teaching-service-community dialogue, which can have a negative impact, predisposing the students to BS.

Another point is when analyzing data stratified by sex, there is a significant association between the depersonalization dimension and the female sex, finding similar results to the other studies[3,21]. This study, however, did not find a significant association between the gender variable and the emotional exhaustion and professional achievement dimensions, unlike other investigations[3,21].

Regarding the year of the course, this study found an association between the dimensions emotional exhaustion and depersonalization in 5th-year students, unlike the results found in a medical school in the interior of the state of Goiás, which found a significant association between depersonalization with 3rd-year students and low professional achievement with 1st-year students[20]. A study carried out in Saudi Arabia, comparing students in the first years of the course with the active methodology and students in the last years with the traditional method, did not show an association between the teaching strategies and BS; however, the high degree of the emotional exhaustion dimension was associated with the active teaching methodology[22]. This same study also showed that when the curriculum instruction is unclear, whether active or traditional, it has a significant association with BS.

This study showed that not being satisfied with the choice of a medical career is related to high degrees of depersonalization and emotional exhaustion and a low degree of professional achievement, with a similar result being verified in another Brazilian study[23]. This fact corroborates the hypothesis that the development of BS has a great influence on the occupational sphere, since medical students experience, throughout the course, what the journey of the profession they have chosen will be like[7].

Regarding predictors for the BS dimensions, which involves emotional exhaustion and depersonalization, alcohol consumption and illicit drug use were highlighted. Studies have shown that having at least one altered BS dimension can have negative effects on students, interfering with the teaching-learning process and increasing drug use and alcohol abuse[3,23]. The consumption of these substances may be related to the feeling of being worn out caused by the medical course and shows that students with high levels of stress and exhaustion can more often abuse these substances[29].

Another aspect that differentiates this research from the others is because this is a Brazilian public university with a proposal to integrate Latin American countries, offering undergraduate and graduate courses to students from all Latin American countries. The admission of students occurs annually on a regular basis for both Brazilians and foreigners. In our research, the nationality variable did not show a significant association with the BS dimensions. One of the greatest challenges for foreign students is the distance from their families, the necessity to adapt to a new condition of having less contact with them. An investigation carried out in a private Brazilian medical school found that not having frequent family meetings was associated with BS[23]. This research, however, did not delve into other possible variables that could influence the risk of the syndrome among foreign students, such as the issue of being apart from their families.

Regarding the interventions to prevent BS, a Brazilian study[33] analyzed the prevention of the syndrome in medical internship students through the "Balint Group". This method consists of strengthening the understanding of the doctor-patient relationship and improving the communication skills of healthcare professionals and students. This tool can contribute to work/study satisfaction, as students use frustrating experiences to reflect on and develop alternatives to deal with stressful situations. The group of students with the highest prevalence of BS was the one with the lowest attendance and interest in participating in the Balint Group[33].

A qualitative study carried out in Singapore evaluated the perspectives of students and teachers regarding strategies to improve student resilience[34]. The teachers participating in the study were part of a group that provided counseling to students, individually and in groups, aiming to help them to enter a good-quality residency program. The study found that both groups emphasized the importance of counseling and guidance in building resilience over time and reducing stress. The students would rather listen to older students or medical advisors with similar personalities and backgrounds. The counselors, on the other hand, suggested counseling activities that would reach more students, through "open-door" policies, such as lectures and meetings. A systematic review that analyzed interventions to prevent BS in medical students and residents found that there are no studies focused exclusively on preventing the syndrome and

there is a lack of strictly designed and high-quality studies to analyze the topic[35].

It is considered as a limitation of this study the different interpretations in the literature for the diagnosis of BS, making comparisons between investigations difficult and influencing the range of heterogeneity of reported results between the studies. The use of a self-applied instrument, containing a questionnaire prepared by the researchers themselves, may be a limitation due to the risk of bias and the possibility of not meeting the study objectives. As this is a cross-sectional study, it has limitations, as it reflects the academic and personal routine of students only at a given moment, not allowing us to establish a cause and effect relationship. Longitudinal studies can be useful to expand this topic to establish a relationship of causality.

CONCLUSION

Based on the results obtained, we can conclude that the prevalence of BS was considered low when analyzed from the three assessed dimensions. However, in the one-dimensional model, the prevalence was high. As for the risk, most students had a reduced risk for developing the syndrome.

The study allowed us to identify important predictors of BS related to the active methodology, one of them being the students' perception that teachers do not adequately apply this teaching method. Dissatisfaction with learning in the context of active teaching was also a predictor for BS. These results indicate the need for the university to seek ways to prevent the development of the syndrome, considering the damage it brings to the cognitive process necessary for the acquisition of knowledge, skills, attitudes, values and experiences for students in training and future graduates.

The results also indicate the need for more adequate instruction during student insertion in the active method of teaching, taking into account that most students experienced the traditional model throughout their academic trajectory, in elementary school, high school. and pre-university courses. The students' own perception that teachers do not know how to adequately apply the active methodology may be, in part, related to the lack of instruction they receive from the teaching staff when they start the course.

The medical school should seek strategies to adapt the student to this teaching-learning format, offering training on the method to the student body that has just entered the university. In addition, it must offer support throughout the course for the maintenance of mental health. The Balint Group or counseling to improve student resilience are examples of positive institutional tools that can contribute to this process.

AUTHORS' CONTRIBUTION

Laís Carneiro Rezende Lima was responsible for the study concept, data curation, formal analysis, investigation, methodology and writing of the manuscript (original draft, review and editing). Tiago Silva Araújo and Luciano Francisco Tesche were responsible for data curation, formal analysis and writing of the manuscript (original draft). Thiago Luis de Andrade Barbosa was responsible for the study concept, data curation, formal analysis, methodology, writing of the manuscript (original draft, review and support editing of the article), statistical analysis and project administration. Ludmila Mourão Xavier Gomes Andrade was responsible for the study concept, data curation, formal analysis, investigation, methodology, writing of the manuscript (original draft, review and support editing of the article), administration and project supervision.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest related to this study.

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