Resilience in the Training of Medical Students in a University With a Hybrid Teaching-Learning System

Resiliencia en la Formación de Estudiantes de Medicina en una Universidad con un Sistema Híbrido de Ensenãnza y Aprendizaje

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ABSTRACT

Background: The exposure of students to stressful events and the association of these events with students' mental health is an important matter in Medical Education. To address this arduous training and solve emerging problems, some students develop methods to help them and, among these, resilience. A hybrid learning system, merging active and traditional learning, can be a supplementary source of stress generation , since it demands the acquisition of knowledge by the students, for summative assessments of traditional teaching as well as for the autonomous search for knowledge, skills, and attitudes required in the problematization. **Purpose:** To determine the degree of resilience throughout the medical course under the hybrid teaching-learning system, identifying underlying mechanisms. **Methods:** This was a cross-sectional study developed from August 2017 to August 2018, at Christus University Center, Brazil, a medical school that uses problem-based learning curricula associated with traditional teaching methodology. Wagnild and Young Resilience Scale was applied to medical students from all semesters. Socioeconomic, emotional and self-reported performance variables were also collected. The association between variables was assessed with minimally adjusted logistic regression models. **Results:** 173 medical students participated in this study, with a mean age of 22.4 years, of which 65.3% were females. 88.1% of the medical students showed high or very high resilience. Receiving support from family and friends was associated with better resilience (p values lower than 0.001), as students who were "very satisfied" or "satisfied" with family support had a greater tendency to develop better degrees of resilience, with results of "very high resilience trends" (82.50%) and "high resilience trends" (71.10%) surpassing the prevalence identified in dissatisfied students. Also, having a religious belief was also associated with higher resilience degrees (p value = 0.02). **Conclusions:** Factors identified in this study, mainly the importance of the support network from family and friends can be stimulated in order to improve students' resilience. There was no direct association between the academic performance self-assessment and the students' resilience and the resilience of medical students tends to remain constant throughout the course.

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PALABRAS CLAVE

– Resiliencia psicológica.

– Aprendizaje con base en los problemas.

– Aprendizaje.

– Estudiantes Medicina.

– Brasil.

– Latinoamérica.

RESUMEN

Introducción: La exposición de estudiantes a eventos que los estresan y la asociación de esos eventos con la salud mental de los alumnos, es una cuestión importante en la Educación Médica. Para andar por el arduo camino del pregrado y resolver problemas emergentes, algunos alumnos desarrollan métodos que los ayuden, entre ellos, la resiliencia. Un sistema de aprendizaje híbrido, con fusión de aprendizaje activo y tradicional, puede ser un sistema complementario que genere estrés, una vez que demanda la adquisición de conocimiento por parte de los alumnos, tanto para evaluaciones de enseñanza tradicional como para la búsqueda autónoma del conocimiento y las habilidades, que son las actitudes exigidas en la problematización. *Objetivo*: Determinar el grado de resiliencia durante el curso de Medicina en un sistema híbrido de enseñanza, identificando mecanismos subyacentes. *Métodos*: Estudio transversal desarrollado entre agosto del 2017 y agosto del 2018, en el centro universitario Christus, Brasil, una escuela de Medicina que utiliza currículos de aprendizaje con base en la problematización y asociados a la metodología tradicional de enseñanza. La escala de resiliencia de Wagnild y Young se aplicó a estudiantes de medicina de todos los semestres. También se compilaron variables socioeconómicas, emocionales e de desempeño académico, auto-referidas. La asociación entre las variables se evaluó con modelos de regresión logística mínimamente ajustados. *Resultados*: 173 estudiantes de medicina participaron en este estudio, con un promedio de edad entre los 22,4 años, siendo que un 65,3% eran mujeres. El 88,1% de los estudiantes de Medicina presentaron alta o muy alta resiliencia. Recibir apoyo de los familiares y amigos, se asoció a una mejor resiliencia (valores de p inferiores a 0,001), los estudiantes que estaban "muy satisfechos" o "satisfechos" con el apoyo familiar tenían una tendencia mayor para desarrollar grados mejores de resiliencia, con resultados de tendencias de resiliencia muy elevadas (82,50%) y altas (71,10%), superando la prevalencia encontrada en estudiantes insatisfechos. Además, tener una creencia religiosa, también se asoció a grados más elevados de resiliencia (valor de p = 0,02). *Conclusiones*: Los factores identificados en este estudio, principalmente la importancia de la red de apoyo de la familia y los amigos, pueden ser estimulados para mejorar la resiliencia de los alumnos. No se registró asociación directa entre la auto evaluación del desempeño académico y la resiliencia de los alumnos, siendo que ella tiende a permanecer constante a lo largo del curso.

Practical points

The teaching models based on problematization can generate stress in some students, in addition to those already involved in the teaching of Medicine. Resilience is an important feature for medical students, and most students submitted to a hybrid model have a high degree of resilience. Family and friends' support is associated with a better degree of resilience

INTRODUCTION

The scientific literature has highlighted the exposure of medical students to stressful events and the association of these events with students' mental health in the last decade. Medical students are often exposed to strenuous undergraduate activities on the grounds of developing knowledge and skills that enable them to cope with stressful situations and turbulent environments, as well as aiming to be able to find practical and cohesive solutions for the problems of the medical practice [1, 2, 3]. To address this arduous training and to solve

emerging problems during this time, some students develop methods to help them and, among these, resilience.

The term *resilience* originated from the physical sciences, meaning the capacity of some materials that, even under massive impact, resist and recover their initial shape. Transported to the human sciences, it means the individual's ability to "overcome" stress and adversity [4]. It can also be considered an experience that implies maturity, growth, and development, that is, every individual has a predisposition to resilience that can be extended from the experiences during a lifetime [5, 6].

Resilience is related to the psychosocial processes that favor a healthy development and results from the association of individual and environmental characteristics, which can be modified when facing adverse situations and everyday problems [7, 8].

The practice of medicine provides close proximity to life, pain, human suffering, death and dying. Resilience in this clinical practice is the ability to manage and process experiences,

learning from and transforming them. In traditional undergraduate medical curricula, these events are observed since the fourth year of the course and increase during internship [9].

Active Methodologies prioritize: (a) problematizing education; (b) the centralization of teaching in the student's needs [10]; (c) ensuring the student's contact with the health and socioeconomic realities of the community since the first year of the course; (d) the implementation of an interactive and constructive educational process; (e) the individualization of education and promotion of a differentiated and integral evaluation of the student. [11].

Thus, in the formulation of the Pedagogical Project, Traditional Teaching and Active Methodologies were considered, with an emphasis on Problem-Based Learning (PBL), forming what is called a hybrid learning system. A hybrid curriculum consists of a mix of PBL sessions, traditional classes, laboratory classes, and clinical practices. This pedagogical system provides students with different learning stimuli [12, 13, 14].

Considering that the medical student is faced with situations that generate stress, which challenge these learners to deal with and face adverse situations, and also assuming that the hybrid learning system would be a supplementary system that generates stress, since it demands student knowledge acquisition, both for summative assessments of traditional teaching as well as the autonomous search for knowledge, skills, and attitudes required in PBL, this study aims to determine the degree of resilience throughout the medical course, identifying underlying mechanisms or processes within the broad category of personal protective attributes, and student vulnerabilities, as well as coping strategies that contribute to psychological resources, such as resilience.

MATERIALS AND METHODS

This was a cross-sectional and analytical study, with a quantitative approach to data. The research was developed from August 2017 to August 2018, at Christus University Center, Parque Ecológico Campus, Fortaleza-CE.

The sample consisted of students enrolled in the Medical Course at Christus University Center (Unichristus), from the first semester of the undergraduate course to the last one, which refers to the internship. The participants were those who agreed to take part in the study by signing the Free and Informed Consent Form and who were regularly enrolled in the higher education institution considered for this research. Students who were on special leave or refused to participate were excluded from the study.

The instruments used in the research were:

I – Sociodemographic and emotional questionnaire: Consisting of the variables: gender; age; course semester; sexual orientation; marital status; ethnicity; living with the family or not; family income; degree of schooling of the father and mother; presence of offspring; presence of employment; birthplace; degree of satisfaction with the support given by family, friends and teachers; assessment of how stressful the routine is; self-esteem evaluation; satisfaction with personal relationships; frequency of negative feelings (bad mood, despair, anxiety and depression); satisfaction with access to course-related facilities.

II – Academic Performance (AP): Considering the great difficulty in choosing an instrument or questionnaire that could assess Academic Performance as a multifaceted phenomenon, the university's evaluation of student's performance was chosen as a way of approaching the reality of academic achievement. It was assessed through direct questions to the interviewee, and required to be presented as close as perceived by the subject and in a 1 to 10 scale. [15];

III – Adapted Wagnild and Young Resilience Scale: This scale consists of 14 items (in contrast to the original scale, which contains 25 items) described positively, answered on a Likert scale varying from 1 (totally disagree) to 7 (totally agree). The possible scores range from 7 to 98, with higher scores reflecting higher resilience [16, 17].

The medical students were randomly invited to respond anonymously to the Sociodemographic and Emotional Questionnaire, the Self-Assessment of Academic Performance (AP), and the adapted Wagnild and Young Resilience Scale [18]. Data were collected through the application of these questionnaires.

The information collected was stored in a database created with Microsoft Excel 2013® software for subsequent descriptive and comparative statistical analysis of the results.

Categorical quantitative results were presented as percentages and counts, and the numerical results were presented as central trend measures. Kolmogorov-Smirnov normality tests were performed to evaluate the distribution of numerical variables. To verify the association between the variables, regressive logistic models were used. P values < 0.05 were considered significant. The collected data were tabulated and analyzed using the SPSS software, v23, IBM, Inc.

All the principles governing Resolution 466/12 of the National Health Council (NHC), which are based on protecting the privacy of volunteers and not using information to the detriment of others, have been respected, guaranteeing that there will be no risk to the subject of research, nor onus of any kind and the data will be used only for the purposes foreseen in this research.

After clarifying the research purposes, the participants who accepted to participate signed the Free and Informed

Consent Term. Data collection was initiated only after approval by the institutional Ethics and Research Committee.

RESULTS

The total number of students submitted to the study was 174, with students from all semesters of the undergraduate program, 34.7% were males and 65.3% females. Among all the students, the semesters that had the largest and the smallest number of participants in the study were the 8th semester and the 10th semester, respectively. The mean age of participants was 22 years old (Table 1).

TABLE 1. Characteristics of participants who completed the Resilience Questionnaire		
Characteristics		**N (%) or mean ± standard deviation**
Age		22.4 ±3.3
Gender	Male	60 (34.6)
	Female	113 (65.3)
Semester	1	19 (10.9)
	2	11 (6.3)
	3	19 (10.9)
	4	16 (9.1)
	5	20 (11.4)
	6	17 (9.7)
	7	18 (10.3)
	8	30 (17.2)
	9	8 (4.5)
	10	4 (2.2)
	11	5 (2.8)
	12	7 (4)

Table 2 shows that students had the following resilience-related outcomes: 12% had medium/neutral resilience trends; 50% had high resilience trend; 37.8% had very high resilience trends.

TABLE 2. Prevalence of resilience among medical students.			
		N	**(95%CI)**
Resilience	Medium/Neutral	20	12 (7.8-17.6)
	High	84	50.3 (42.8-57.9)
	Very high	63	37.8 (30.7-45.3)

No statistically significant differences were found between the students from different semesters, as shown in Table 3 (p = 0.090).

When sociodemographic and emotional factors were compared with the degree of resilience, it was observed that some factors had a significant influence on the degree of resilience, as follows: religion, satisfaction with the support of family and friends, self-esteem evaluation and frequency of negative feelings. The results for the religion variable, shown in table 3 (p = 0.020), showed that there is a higher percentage of high resilience among Catholics and evangelicals and a lower one among agnostics (79.4% and 31.60%, respectively).

Regarding satisfaction with family support (table 4), it was observed that students who were "very satisfied" or "satisfied" had a greater tendency to develop better degrees of resilience, with results of "very high resilience trends" (82.50%) and "high resilience trends" (71.10%), surpassing the number of students with "medium/neutral resilience trends" (52.70%) among those who were very satisfied with family support. Of the students "satisfied" with family support, the results were similar, showing 25.30% of students with "high resilience trends" and only 15.80% with "medium/neutral resilience trends". On the other hand, of the "indifferent" or "dissatisfied" students, the number of students with "medium/neutral resilience trends" (15% in both) surpasses groups of students with "very high resilience trends" and " high resilience trends" (p <0.001).

Concerning satisfaction with the support received from friends, the results were approximately similar to those related to family support satisfaction, as shown in table 4 (p <0.001). However, the degree of satisfaction with teacher support (table 4) was not a significant factor in resilience determination (p = 0.09).

It was also possible to observe that the better the self-esteem evaluation, the greater the chances of this student having higher degrees of resilience, as shown in table 3 (p <0.001). This was demonstrated by an inversely proportional association between self-esteem evaluation and the number of students with "mean/neutral resilience trends".

When analyzing the association between students' perceptions about their academic achievement and the degree of resilience (table 4), no significant association was observed between the two variables (p = 0,560).

DISCUSSION

This study aimed to evaluate aspects related to resilience that can help medical students to face the situations inherent in the hybrid teaching-learning system, avoiding its negative consequences for academic achievement and health.

Regarding the students' degree of resilience, we observed an average of 88% of students with high and very high resilience trends, an average of 12% of students with neutral trends and 0% with low trends. These same trends were ob-

		TABLE 3. Epidemiological and personal determinants of resilience in medical students.						
		Resilience						Adjusted p-value*
		Medium/Neutral		High		Very high		
		N	N%	N	N%	N	N%	
Which semester are you in?	1	1	5.0%	9	10.7%	8	12.7%	0.090
	2	1	5.0%	6	7.1%	4	6.3%	
	3	1	5.0%	13	15.5%	5	7.9%	
	4	2	10.0%	9	10.7%	4	6.3%	
	5	5	25.0%	9	10.7%	6	9.5%	
	6	1	5.0%	7	8.3%	8	12.7%	
	7	2	10.0%	7	8.3%	9	14.3%	
	8	3	15.0%	12	14.3%	13	20.6%	
	9	4	20.0%	2	2.4%	0	0.0%	
	10	0	0.0%	3	3.6%	1	1.6%	
	11	0	0.0%	3	3.6%	2	3.2%	
	12	0	0.0%	4	4.8%	3	4.8%	
Gender	1	8	40.0%	26	31.3%	23	36.5%	0.687
	2	12	60.0%	57	68.7%	40	63.5%	
Marital status	1	19	95.0%	78	92.9%	59	93.7%	0.706
	2	1	5.0%	4	4.8%	4	6.3%	
	3	0	0.0%	2	2.4%	0	0.0%	
What is your sexual orientation?	1	17	89.5%	83	100.0%	61	96.8%	0.024
	2	0	0.0%	0	0.0%	1	1.6%	
	3	2	10.5%	0	0.0%	1	1.6%	
What is your religion?	1	10	52.6%	59	70.2%	50	79.4%	0.020
	2	1	5.3%	9	10.7%	4	6.3%	
	3	2	10.5%	4	4.8%	1	1.6%	
	4	0	0.0%	4	4.8%	2	3.2%	
	5	6	31.6%	5	6.0%	3	4.8%	
	6	0	0.0%	3	3.6%	3	4.8%	
Housing	1	16	80.0%	63	75.0%	48	76.2%	0.929
	2	1	5.0%	6	7.1%	2	3.2%	
	3	0	0.0%	2	2.4%	1	1.6%	
	5	1	5.0%	3	3.6%	4	6.3%	
	6	2	10.0%	10	11.9%	6	9.5%	
	7	0	0.0%	0	0.0%	1	1.6%	
	8	0	0.0%	0	0.0%	1	1.6%	
What is your father's level of schooling?	2	1	5.0%	1	1.2%	0	0.0%	0.115
	3	0	0.0%	3	3.6%	1	1.6%	
	4	0	0.0%	4	4.8%	0	0.0%	
	5	1	5.0%	11	13.1%	13	20.6%	
	6	4	20.0%	5	6.0%	4	6.3%	
	7	14	70.0%	60	71.4%	45	71.4%	
What is your mother's level of schooling?	2	0	0.0%	1	1.2%	0	0.0%	0.488
	3	1	5.0%	1	1.2%	0	0.0%	
	4	0	0.0%	1	1.2%	2	3.2%	
	5	2	10.0%	10	11.9%	13	20.6%	
	6	2	10.0%	3	3.6%	2	3.2%	
	7	15	75.0%	68	81.0%	45	71.4%	
	8	0	0.0%	0	0.0%	1	1.6%	
Do you have children?	1	0	0.0%	3	3.6%	3	4.8%	0.601
	2	20	100.0%	81	96.4%	59	95.2%	
Do you work?	1	0	0.0%	0	0.0%	10	15.9%	<0.001
	2	20	100.0%	84	100.0%	53	84.1%	
What is your birthplace?	1	16	84.2%	63	75.0%	50	79.4%	0.892
	2	2	10.5%	13	15.5%	9	14.3%	
	3	1	5.3%	8	9.5%	4	6.3%	

*Minimally adjusted for age and gender.

TABLE 4. Psychosocial determinants of resilience in medical students.							
		Resilience					Adjusted p-value*
		Medium/neutral		High		Very high	
		N	N%	N	N%	N	N%	
How satisfied are you with the support you receive from your family?	1	0	0.0%	1	1.2%	2	3.2%	<0.001
	2	3	15.8%	0	0.0%	1	1.6%	
	3	3	15.8%	2	2.4%	3	4.8%	
	4	3	15.8%	21	25.3%	5	7.9%	
	5	10	52.6%	59	71.1%	52	82.5%	
How satisfied are you with the support you receive from your friends?	1	0	0.0%	1	1.2%	2	3.2%	<0.001
	2	2	10.5%	0	0.0%	0	0.0%	
	3	5	26.3%	5	6.0%	1	1.6%	
	4	4	21.1%	25	30.1%	14	22.2%	
	5	8	42.1%	52	62.7%	46	73.0%	
How satisfied are you with the support you receive from your teachers?	1	2	10.5%	1	1.2%	1	1.6%	0.090
	2	2	10.5%	7	8.4%	5	7.9%	
	3	7	36.8%	29	34.9%	13	20.6%	
	4	6	31.6%	22	26.5%	18	28.6%	
	5	2	10.5%	24	28.9%	26	41.3%	
How stressful do you consider your routine to be?	1	10	50.0%	30	35.7%	18	28.6%	0.222
	2	10	50.0%	47	56.0%	36	57.1%	
	3	0	0.0%	7	8.3%	9	14.3%	
How do you rate your self-esteem?	1	3	15.0%	2	2.4%	0	0.0%	<0.001
	2	6	30.0%	17	20.2%	4	6.3%	
	3	9	45.0%	21	25.0%	10	15.9%	
	4	2	10.0%	41	48.8%	34	54.0%	
	5	0	0.0%	3	3.6%	15	23.8%	
How satisfied are you with your personal relationships?	1	0	0.0%	1	1.2%	0	0.0%	0.062
	2	3	15.0%	9	10.7%	9	14.3%	
	3	3	15.0%	3	3.6%	3	4.8%	
	4	11	55.0%	61	72.6%	32	50.8%	
	5	3	15.0%	10	11.9%	19	30.2%	
How often do you have negative feelings?	1	0	0.0%	0	0.0%	7	11.1%	0.013
	2	4	20.0%	37	44.0%	29	46.0%	
	3	7	35.0%	23	27.4%	12	19.0%	
	4	6	30.0%	19	22.6%	12	19.0%	
	5	3	15.0%	5	6.0%	3	4.8%	
How satisfied are you with your access to course-related facilities?	1	3	15.0%	8	9.5%	7	11.1%	0.845
	2	2	10.0%	16	19.0%	11	17.5%	
	3	3	15.0%	9	10.7%	10	15.9%	
	4	6	30.0%	36	42.9%	24	38.1%	
	5	6	30.0%	15	17.9%	11	17.5%	

*Minimally adjusted for age and gender.

served during undergraduate training, except for the ninth semester. In contrast to these findings [19], the study of resilience in the medical course in Brazil that uses the traditional teaching methodology showed medium and low resilience. On the other hand, when analyzing all undergraduate years, there was a predominance of moderate resilience, but with a high standard deviation.

A study of resilience with 551 students in a medical school in Brazil that used the traditional learning methodology, showed a percentage of 36.9%, 38%, and 23%, respectively, of low, medium and high resilience trend with a general mean of an average resilience tendency [20].

The predominant mean of high and very high tendency resilience in the present study is probably related to the strat-

egies used to face the difficulties inherent to the academic overload of the hybrid teaching-learning system. Corroborating this hypothesis, a study published by a medical student showed that students with greater difficulty in adapting to the educational environment had a higher degree of resilience [21].

Religion and Degree of Resilience

According to the analysis of the association between religion and resilience, it was possible to observe that students who self-declared being Catholic or evangelical tend to have better degrees of resilience when compared, especially, with students who declared themselves to be agnostic. This fact suggests the possibility of religion acting as a protective factor that may positively interfere in the development of resilience in the assessed students, corroborating other studies.

Kohsravi et al. describe in their study that spiritual intelligence is an essential personal gift that enables one to maintain inner and outer peace and to demonstrate love, regardless of circumstances, whether in the presence of acute stress or inconsistency [22]. They have shown that spiritual intelligence has a positive association with resilience. It could, therefore, assist in the management of conflicts and a calm coexistence with society. These findings are also consistent with a study[23] that revealed religiosity / spirituality as components of resilience, and with another [24], which showed that religion and spirituality often involve emotional and social experiences, attitudes, affective states (both positive – such as faith, hope, courage, compassion, love, forgiveness - and negative ones - anxiety, anger), beliefs, worldviews, values, life goals and practices that shape the personal identity and existence of many human beings.

Satisfaction with family and friends' support and Degree of Resilience

As expected, our results showed a positive association between the degree of resilience and the degree of satisfaction with family and friends' support. Other studies have shown that social support plays a critical role in the medical student's resilience. There is a strong dose-response association between the level of perceived support, learning environment, and resilience. [25] They have shown that high levels of support from the family, faculty members of the medical school team and their peers, as well as perceptions of the learning environment as a collaborative one (i.e., that student education is a priority for teachers and the global learning environment) were protective against the state of physical and mental exhaustion closely associated to academic life. Thus, it is important to have family and peer counseling in search of resilience

recovery or formation by the student with difficulty to adapt to the new teaching methodologies.

The results obtained in the present study are in contrast with those previously presented [25] regarding the association of the degree of resilience and the degree of satisfaction with the support offered by the teachers. One can explain this fact using studies that showed that many students found it difficult to openly talk with the people who evaluated them, thus avoiding honest discussions. It also reported that students found that some teachers had conflicting interests in interacting with them, including better assessments of their courses, making conversations more difficult, increasing stress, and reducing resilience [26].

Perception of self-esteem and Degree of Resilience

In this study, the findings revealed that students with high resilience trends showed higher degrees of self-esteem. Self-esteem is the representation of an evaluative aspect of self-knowledge, consisting of a set of thoughts and feelings related to the self, whether this is a positive or negative evaluation. Typically, high self-esteem rates are related to the good mood and perception domain of different areas of life relevant to the person. Thus, it is inferred that high self-esteem is associated with good mental health, better social skills, and well-being, whereas low self-esteem can be associated with negative moods, the perception of disability, delinquency, depression, social anxiety and higher levels of stress [27].

Our results are consistent with previously published others, which demonstrate that resilient students tend to have high self-esteem and describes that those who have stronger self-confidence and feel good about themselves are the ones who are generally expected to have better control over their lives and to be more capable of dealing with problems related to a transition process [28]. Other studies have shown that high levels of self-esteem have been associated with greater social adaptation, happiness and less vulnerability to presenting at-risk behaviors [29, 30]. In the university context, it has been related to school permanence, greater emotional well-being and better performance in future jobs [31].

Academic Performance and Degree of Resilience

Academic achievement is an essential tool in student assessment and its association with the university environment and is usually related to the respect and recognition of peers and teachers [32]. In medical school, students with higher academic achievements have personality styles with characteristics related to resilience; conformism (people have the possibility of being honesty and self-domain) and agreement (they tend to

be very friendly in society, being receptive and flexible in their relationships with others, with whom they establish affective bonds) academic performance, innovation styles and discrepancies in general, refusing to abide by traditional norms, manifesting audacity that can be taken as recklessness [33].

However, data obtained in the present study did not show an association between resilience and academic performance. Such a result can be explained by probable incoherent information on the part of the student, since the research related to the academic performance Index (API) was a self-assessment where the student indicated the numerical interval corresponding to their API and not its real value. In addition, the result can be explained by Galdino's considerations [34], arguing that for the evaluation of academic performance, one must consider not only constitutional elements of the university but also external dimensions, i.e., academic performance can be influenced by: 1) issues (intrinsic to the student) that include psychological factors [35], the way through which the student's school progresses, the indices of school performance (grades), family income, personal contacts; 2) pedagogical/didactic issues represented by the association between teachers and students, level of attractiveness of the course, how content is transmitted; 3) institutional issues, such as the student's attendance, degree of integration/participation, equipment and services available in the university, and, finally, 4) environmental factors (external) such as moving to another city, transition to new cultures [36]. Thus, in this context, it is observed that the academic performance evaluated only by the API in the present study may not represent the reality, since it can be influenced by a series of factors and there is a need for new ways to investigate it in undergraduate students[37].

Limitations

Although most of the analyzed variables are proof of a subjective nature, all the data obtained in the research come from a quantitative study and, therefore, the need to continue the investigation of the protective factors and stressors that are determinants for the development of different degrees of resilience is recognized. Because they are subjective variables, they should be approached qualitatively, so that they can be better explored and later worked with the students.

CONCLUSION

It is understood, therefore, that the routine of medical students presents a number of factors, mainly related to social and emotional environments, which work as stressors and are closely related to the degree of resilience. This was made quite clear by analyzing the data that quantitatively demonstrat-

ed how social and emotional factors, such as religious belief, satisfaction with family and friends' support, and self-esteem assessment might interfere in the development of these students' resilience.

On the other hand, it can be verified that there was no direct association between the academic self-assessment and the students' resilience. It is also suggested, as it was initially done, that the resilience of medical students tends to remain constant throughout the course in a college that uses a teaching-learning hybrid system, blending traditional teaching with active teaching methodologies. This may be due to the higher workloads to which the students are submitted since the first semester of the course until the last period, corresponding to the end of the internship. This information is in agreement with the information reported by other previously mentioned authors.

Factors identified in this study, mainly the importance of the family and friends' support network can be stimulated in order to improve students' resilience. These findings are of relevance to society, considering the importance of medical training in the care provided to the entire community and the need for resilience development in medical students and in future physicians, due to the prevalence of stressors during training and during the exercise of medical practice.

REFERENCES

1. Fiedler PT. 2008. Avaliação da qualidade de vida do estudante de medicina e da influência exercida pela formação acadêmica. São Paulo.

2. Amorim AMG, Nations MK, Costa MS. 2009. Sentimientos, sentidos y significados en pacientes de hospitales públicos en el noreste de Brasil. Revista de Salud Pública 11: 754-765.

3. Chazan ACS, Jesus RT, Rocha CR, Yamamoto T, Favoreto CAO. 2013. Recepção aos internos de Medicina–acolhimento, ensino e aprendizagem. ANAIS DO CBMFC: 1177.

4. Maria AF, Monteiro NRO. 2006. Reflexões sobre pró-socialidade, resiliência e psicologia positiva. Revista Brasileira de Terapias Cognitivas 2: 39-46.

5. Rutter M. 1985. Resilience in the face of adversity: Protective factors and resistance to psychiatric disorder. The British Journal of Psychiatry 147: 598-611.

6. Dell'Aglio DD, Koller SH, Yunes MAM. 2011. Resiliência e psicologia positiva: interfaces do risco à proteção. Resiliência e psicologia positiva: interfaces do risco à proteção: Casa do Psicólogo.

7. Bianchini SDC, Dell'Aglio DD. 2006. Processos de resiliência no contexto de hospitalização: um estudo de caso. Paidéia 16.

8. Job J. 2011. Resiliência e ética. Um ethos para a resiliência. Araújo CA, Mello MA, Rios AMG. Resiliência: teorias e práticas de pesquisa em psicologia. São Paulo: Ithaka Books.

9. Pereira DA, Job JRPP. O ser resiliente: notas para o médico e a medicina. Revista da Faculdade de Ciências Médicas de Sorocaba 15: 87-88.

10. Mitre SM, Batista RS, Mendonça JMG, Pinto NMM, Meirelles CAB, Porto CP, et al. 2008. Metodologias ativas de ensino-aprendizagem na formação profissional em saúde: debates atuais. Ciência & saúde coletiva 13: 2133-2144.

11. Mello CCB, Alves RO, Lemos SMA. 2014. Metodologias de ensino e formação na área da saúde: revisão de literatura. Revista CEFAC 16: 2015-2028.

12. Winning T, Townsend G. 2007. Problem-based learning in dental education: what's the evidence for and against… and is it worth the effort? Australian dental journal 52: 2-9.

13. Pereira AMTB, Gonçalves MB. 2009. Transtornos emocionais e a formação em Medicina: um estudo longitudinal. Revista Brasileira de Educação Médica 33: 10-23.

14. Saliba NA, Moimaz SAS, Chiaratto RA, Tiano AVP. 2008. A utilização da metodologia PBL em Odontologia: descortinando novas possibilidades ao processo ensino-aprendizagem. Revista Odonto Ciência 23.

15. Monteiro S, Vasconcelos R, Almeida LS. 2005. Rendimento académico: influência dos métodos de estudo.

16. Wagnild G. 2009. A review of the Resilience Scale. Journal of nursing measurement 17: 105-113.

17. Pesce RP, Assis SG, Avanci JQ, Santos NC, Malaquias JV, Carvalhaes R. 2005. Adaptação transcultural, confiabilidade e validade da escala de resiliência. Cadernos de Saúde pública 21: 436-448.

18. Wagnild G, Young H. 1993. Development and psychometric. Journal of nursing measurement 1: 165-178.

19. Martinez JE, Pereira DA, Barril ES, de Matos SF, Santos RM. 2016. Resiliência em estudantes de medicina ao longo do curso de graduação. Revista da Faculdade de Ciências Médicas de Sorocaba 18: 15-18.

20. de Oliveira ACP, Machado APG, Aranha RN. 2017. Identification of factors associated with resilience in medical students through a cross-sectional census. BMJ open 7: e017189.

21. Tempski P, Santos IS, Mayer FB, Enns SC, Perotta B, Paro HB, et al. 2015. Relationship among medical student resilience, educational environment and quality of life. PLoS One 10: e0131535.

22. Khosravi M, Nikmanesh Z. 2014. Relationship of spiritual intelligence with resilience and perceived stress. Iranian journal of psychiatry and behavioral sciences 8: 52.

23. Ong AD, Bergeman C. 2004. Resilience and adaptation to stress in later life: Empirical perspectives and conceptual implications. Ageing International 29: 219-246.

24. Lassi S, Mugnaini D. 2015. Role of religion and spirituality on mental health and resilience: There is enough evidence. International Journal of Emergency Mental Health and Human Resilience 17: 661-663.

25. Dyrbye LN, Power DV, Massie FS, Eacker A, Harper W, Thomas MR, et al. 2010. Factors associated with resilience to and recovery from burnout: a prospective, multi-institutional study of US medical students. Medical education 44: 1016-1026.

26. Farquhar J, Kamei R, Vidyarthi A. 2018. Strategies for enhancing medical student resilience: student and faculty member perspectives. International journal of medical education 9: 1.

27. Hutz CS, Zanon C. 2011. Revisão da adaptação, validação e normatização da escala de autoestima de Rosenberg. Avaliação psicológica 10.

28. Kwek A, Bui HT, Rynne J, So KKF. 2013. The impacts of self-esteem and resilience on academic performance: An investigation of domestic and international hospitality and tourism undergraduate students. Journal of Hospitality & Tourism Education 25: 110-122.

29. Ruiz-González P, Medina-Mesa Y, Zayas A, Gómez-Molinero R. 2018. Relación entre la autoestima y la satisfacción con la vida en una muestra de estudiantes universitarios. International Journal of Developmental and Educational Psychology (Revista INFAD de Psicología). 2: 67-76.

30. Sánchez-Queija I, Delgado AO, Jiménez AP. 2004. Evolución y determinantes de la autoestima durante los años adolecentes. Anuario de psicología 35: 331-346.

31. San Martín JL, Barra E. 2013. Autoestima, apoyo social y satisfacción vital en adolescentes. Terapia psicológica 31: 287-291.

32. Vendramini CMM, Santos AAAd, Polydoro SAJ, Sbardelini ETB, Serpa MNF, Natário EG. 2004. Construção e validação de uma escala sobre avaliação da vida acadêmica (EAVA). Estudos de Psicologia (Natal).

33. Rodrigues CFF. 2010. Rendimento acadêmico e sua relação com os estilos de personalidade de estudantes universitários: Universidade Federal do Rio Grande do Norte.

34. Galdino ZC. A orientação de estudantes na UFAM de Humaitá: desafios e perspectivas na educação superior no interior do Amazonas, 2013: Dissertação (Mestrado em Educação)–Núcleo de Ciências Humanas (NCH)

35. Maudal GR, Butcher JN, Mauger PA. 1974. A multivariate study of personality and academic factors in college attrition. Journal of Counseling Psychology 21: 560.

36. Correia T, Gonçalves I, Pile M. 2005. Insucesso académico no Instituto Superior Técnico. en Desenvolvimento e aprendizagem: do ensino secundário ao ensino superior, Portugal, Direcção Regional da Ciência e Tecnologia, Universidade dos Açores: 207-216.

37. Pessoa RC. 2014. Análise da resiliência, bem-estar subjetivo e rendimento acadêmico de estudantes universitários da Amazônia.

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