ABSTRACT

Objective: To determine the score in the dimensions of Burnout Syndrome (BS), according to the year of study among medical students from eight Latin American countries.

Methodology: a cross-sectional analytical study, carried out in 2649 medical students from nine universities in eight Latin American countries, during 2016-2017. For the present study, the Maslach Burnout Inventory-Student Survey (MBI-SS) test was applied, from which we obtained three dimensions: exhaustion, self-efficacy, and cynicism, which were crossed in the Stata 11.1 program according to the year of study and adjusted with Generalized Linear Models (GLM, for its acronym in English), for sex, age, type of university and location of the respondent.

Results: In the multivariate analysis, we found that, as the year of study increased, the score in exhaustion increased (third year: +2.6 points, p-value <0.001; fourth year: +1.8 points, p-value = 0.028 and fifth year: +3 points, p-value = 0.007). According to the study year, the scores on self-efficacy and cynicism did not have statistically significant variations. In addition, women had a higher score in exhaustion (+0.7 points, p-value = 0.006) and lower in cynicism (-0.5, p-value <0.001).

Conclusions: The exhaustion score increases as the academic year increases, but the other components did not significantly change. Women obtain a higher score in exhaustion, although lower in cynicism. Educational institutions should generate detection programs for these students, providing them with academic support strategies.

Keywords: Burnout, Professional; Burnout, Psychological; Latin America; Students, Medical; Multicenter Study. (Source: MeSH).

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INTRODUCTION

Medical students are highly affected by academic stress, as determined in multiple studies worldwide (1–3). This stress is mainly due to the levels of continuous intensity that the university career causes, where various responsibilities of high physical or mental costs are imposed continuously (3). This daily living influences the appearance of the Burnout Syndrome (BS) or syndrome of “burn out from work,” being defined under three dimensions that involve: first, emotional exhaustion, which is the progressive loss of energy (including fatigue); secondly, cynicism, distant attitude towards others and, in the case of medical students, towards the utility or importance of what they are studying; and thirdly, low levels of self-efficacy, which is a severe problem, since their sense of self-value is lost due to work carried out academically, and their performance in study decreases (4–6). BS presents insidiously, progressively, and continuously among several periods over time, either in college or elsewhere (4).

Emotional exhaustion, which is one of BS’s main characteristics, is very high in medical students, from around 9.8% (5) to alarming figures of 53% (3). These figures increase as the medical student progresses in his college career. A study reported a frequency of 16% in the third year and 40% in the sixth year (6). This daily stress can affect not only the current academic performance, but it can lead to a future decrease in work performance, avoid working or patient care, and even work absenteeism. Therefore, economic losses, a decrease in work productivity, and an increase
in the number of low-care quality demands are generated (7). For this reason, this can be a severe problem for the health system because health care could decrease in quality (8), whereas medical error in the management/care of the patient could increase (9).

The BS has an increasing trend in most of the studies carried out so far (3,6,10). However, many of these studies are required in populations of professionals (11–13), not in students, so it is essential to generate new knowledge, focused on future Latin American doctors. Since it is a region that has little analytical information in this regard, mostly having descriptive or analytical studies with small samples (1,14,15).

For all the above, the study’s main objective is to determine the BS dimensions score, according to the year of study among medical students from eight Latin American countries.

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For all the above, the study’s main objective is to determine the BS dimensions score, according to the year of study among medical students from eight Latin American countries.

MATERIALS AND METHODS

Design and population: we generate an observational, analytical, cross-sectional multicenter study, in which we applied a data collection survey, in medical students from eight Latin American countries, at a university in each of the following countries: Argentina, Panama, Peru, Bolivia, Chile, Ecuador and Honduras; and two universities in Colombia.

The sampling was non-probabilistic for convenience. We calculate the sample size according to a minimum difference of 0.1 in the values (the values of 8.0 and 8.1 found for the first and second year’s cynicism, respectively) were taken. Furthermore, we use a statistical power of 90% and a standard deviation of 1.0 in each case. With all this, we agreed that a minimum sample size of 1570 respondents was required.

We include medical students enrolled during the 2016 and 2017 academic period, who voluntarily participated in the research. Moreover, we excluded students in the medical internship or students who did not respond to the variables of interest in the questionnaire or who had repetitive patterns (excluding less than 10%).

Procedure: we used a two-part questionnaire: the first part, with socio-educational data, and the second part, which made it possible to measure the dimensions of the BS. We tested this questionnaire using a pilot test (to evaluate the understanding of the questions and their importance).

To identify BS, we used the Maslach Burnout Inventory-Student Survey (MBI-SS) (16), an instrument validated in various countries. Furthermore, its Spanish version has been validated through studies such as the carried out in Colombia (17) and applied to Latin American medical students (1,5,6). This instrument has excellent factor validity, with strong construct and content validity as well as good reliability given by internal consistency with Cronbach’s Alpha of 0.77, 0.72, and 0.82, in exhaustion, cynicism, and negative self-efficacy, respectively; which we have found in the literature, even with better results (17). It consists of 15 Likert-type questions with various possible answers, each with an assigned score: Never = 0, Few times a year or less = 1, Once a month or less = 2, Few times a month = 3, Once a week = 4, Few times a week = 5, Always = 6.

With these questions, we evaluated the three subsca-
les, or dimensions of the BS: exhaustion (A = 5 questions), cynicism (C = 4 questions), and self-efficacy (E = 6 questions) (Table 1). The higher the score in the first two and the lower the score in the last one, the more unfavorable it was for the respondent; so that the three dimensions were crossed quantitatively with the independent variables.

Likewise, there were three dimensions of the BS (main variables) and the secondary socio-educational variables: year of study, age, sex, and type of university. In groups, a maximum of two medical students at each campus, previously trained in data collection, typing, and quality control (and continuously, in contact with the principal researcher), we conducted the university surveys during class hours. Then, the data was tabulated in an electronic template of the Microsoft Office Excel version 2016 program for Windows, after which each group generated a quality control. Subsequently, we joined the bases in a single template. We carried out the debugging process and the quality control of the principal researcher’s data employing double typing. Finally, we processed the information in the Stata version 11.1 program.

**Ethics:** the research project was approved by the ethics committee of the “Hospital Nacional Docente Madre Niño San Bartolomé de Lima, Perú” (project number: 16060503-16). The surveys were self-administered and anonymous, guaranteeing the respondents’ privacy through the use of digital codes. We had the teacher in charge’s, the university authorities’, and the students’ permission. Before their participation, we asked them for their verbal consent; We explained the voluntary nature of their participation and the study’s objective.

**Statistical analysis:** first, we performed descriptive statistics for the categorical variables to obtain the frequency distribution and prevalence measures. We also reported the medians and their Interquartile Ranges (IQR) of the interval variables, according to the normality found graphically, with histogram and analytics, compared to mean/median, bias, and kurtosis, as well as the Shapiro-Wilk test.

For analytical statistics, we obtained the p-values with the Spearman test (this complemented the figures generated for the crossover of the quantitative variables). For the multivariate analysis, we used the statistical test of Generalized Linear Models (GLM), with the Identity link function, the Gaussian family, with robust models. Furthermore, we had as an adjustment the headquarters of the respondent (cluster). For this reason, we achieved 95% confidence intervals (95% CI), coefficient values (Coeff.), and p-values. Additionally, p-values less than 0.05 were considered statistically significant. The analysis code and the data set used are available from Mendeley Data (18).

**RESULTS**

Among the 2,649 students who responded to the survey, 1,510 (57%) were female, with a median age of 22 years (IQR 21-24 years). Most were from private college (1895 = 71.5%). Among this students, 541 (20.4%) were in the first year of college; whereas 449 (17.0%) were in the second year, 832 (31.4%) were in the third year; 374 (14.1%) in the fourth year, 344 (13.0%) in the fifth year, and 109 (4.1%) in the sixth year of college. According to the distribution of responses in the MBI-SS, the question with the most unfavorable score for the respondents was the one related to evaluation of exhaustion: “I am physically exhausted at the end of a day at college” (median of 4 points; IQR: 3-5 points).

Figure 1 shows the exhaustion score trend, according to the increase in the year of the degree, in which we can see a clear positive trend. When performing a bivariate statistical test (Spearman), we found a p-value <0.001 (rho = 0.13).

![Figure 1. Correlation between the exhaustion score and the year of study among medical students in eight Latin American countries.](image)
Likewise, Figure 2 shows the negative self-efficacy score trend according to the college career’s progress, showing a slight positive trend in this relationship. When performing a bivariate statistical test (Spearman), a value of \( p = 0.032 \) (\( \rho = 0.04 \)) was found.

Table 2 shows the multivariate analysis, in which we found that, as the college career progressed, the exhaustion’s score increased (third year: +2.6 points, \( p \)-value <0.001; fourth year: + 1.8 points, \( p \)-value = 0.028 and fifth year: +3 points, \( p \)-value = 0.007). According to the study year, the scores for self-efficacy and cynicism did not have statistically significant variations. Besides, women obtained a higher score in exhaustion (+0.7 points, \( p \)-value = 0.006) and lower cynicism (-0.5, \( p \)-value <0.001); we adjusted all these crosses for sex, age, type of university, and the location of the respondent.

Meanwhile, figure 3 shows the cynicism score trend according to the college career’s progress, where we can see an evident positive trend. When performing a bivariate statistical test (Spearman), we found a value of \( p = 0.002 \) (\( \rho = 0.06 \)).

### Table 1. Median and interquartile range of the scores obtained on the MBI-SS by medical students in eight Latin American countries.

<table>
<thead>
<tr>
<th>Questions</th>
<th>( M ) (RIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The academic activities of this career have me emotionally &quot;exhausted&quot; (A)</td>
<td>3 (2-5)</td>
</tr>
<tr>
<td>I find myself physically exhausted, at the end of the day at college (A)</td>
<td>4 (3-5)</td>
</tr>
<tr>
<td>I am tired in the morning when I wake up and have to face another day at college (A)</td>
<td>3 (2-5)</td>
</tr>
<tr>
<td>Studying or going to class all day is a stress for me (A)</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>I can effectively solve problems related to my studies (E)</td>
<td>5 (3-5)</td>
</tr>
<tr>
<td>I’m exhausted from studying so much (A)</td>
<td>3 (2-4)</td>
</tr>
<tr>
<td>I think I contribute effectively to the classes at college (E)</td>
<td>4 (3-5)</td>
</tr>
<tr>
<td>I have lost interest in the career since I started college (C)</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>I have lost enthusiasm for my career (C)</td>
<td>1 (1-3)</td>
</tr>
<tr>
<td>In my opinion I am a good student (E)</td>
<td>4 (3-5)</td>
</tr>
<tr>
<td>It stimulates me to achieve goals in my studies (E)</td>
<td>5 (4-6)</td>
</tr>
<tr>
<td>I consider that I have obtained very good grades during my career (E)</td>
<td>4 (3-5)</td>
</tr>
<tr>
<td>I consider that I have obtained very good grades during my career (E)</td>
<td>0 (0-2)</td>
</tr>
<tr>
<td>I doubt the importance and value of my studies (C).</td>
<td>0 (0-2)</td>
</tr>
<tr>
<td>In college, I am confident that I am effective at doing activities (E)</td>
<td>4 (3-5)</td>
</tr>
</tbody>
</table>

A: Exhaustion  E: Self-efficacy  C: Cynicism  M: Median  RIC: Interquartile range
We found unfavorable scores for those who stated that they were physically exhausted at the end of the day at college, associated with the university year. This results could show a progressive body fatigue throughout the college career, which could be due to multiple reasons such as low grades (19), mental health issues (depression, anxiety, suicidal ideation, low self-image, among others) (21,22), or other social factors. These reasons can influence the individual’s daily living (23), as they are negatively related to family, friends, or other members of society (23), which is even worse when there is a perception of unwanted loneliness (24).

The emotional exhaustion score was higher in the third, fourth, and fifth years of college. This result may reveal that there does exist a problem among students, mainly in college years, where they have hospital practices, which many publications have shown in numerous publications and populations, such as the study carried out by Asencio-López et al. (1), in a private university in Mexico. This study revealed that students reach percentages of severe BS in the last years (8.3%). Furthermore, Alcalá-Pacas A et al. (25) showed that emotional exhaustion prevailed in the fourth and fifth years. Various Peruvian (6) and Colombian (26) faculties have also shown this issue. This result could be due to activities and high-intensity clinical practices, which last many hours without a break. Also, theoretical-academic demands (1), extracurricular tasks (6), and other activities can also increase BS, although they add up to the student (2).

However, some studies report that exhaustion is higher during the first cycles, as shown by the study carried out by Fares et al., in a private college in Lebanon (27), where being in the first year of medicine was associated with high cynicism, high emotional exhaustion and high stress. In a Peruvian university on the central coast, they had the same result (28). This issue can be happening because, in the first study, the population is very different from the one we evaluated. Although the population is very similar in the second, the differences are minimal (29). Something that could also help understand this problem is changing to a more demanding curriculum due to its college career (29). It is a hard blow that mainly occurs when the student uses poorly adaptive processes and has conflictive relationships with his parents, friends, and partner. Thus, each population must be evaluated. We expect that this study can be done by every university institution and by the governing bodies of higher education.

Regarding the results, the negative self-efficacy and cynicism scores did not obtain a significant level, according to the increase of the years, finding studies with similar reports, such as the one carried out by Serrano FT, in six colleges in Colombia (26). This study evidences that, although the BS increases with the progress of the college career, it is also true that cynicism and negative self-efficacy are diminished as

### DISCUSSION

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### Table 2. Multivariate statistics of the dimensions of the Burnout Syndrome, according to the year of study among medical students from eight Latin American countries.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exhaustion</th>
<th>Self-efficacy</th>
<th>Cynicism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef (95%CI)</td>
<td>p-value</td>
<td>Coef (95%CI)</td>
</tr>
<tr>
<td>First year</td>
<td>17,5 (13,2-21,8)</td>
<td>comprar</td>
<td>24,4 (19,7-29,1)</td>
</tr>
<tr>
<td>Second year</td>
<td>18,5 (12,6-24,3)</td>
<td>0,211</td>
<td>20,0 (17,9-30,0)</td>
</tr>
<tr>
<td>Third year</td>
<td>20,1 (14,6-25,5)</td>
<td>&lt;0,001</td>
<td>25,0 (19,3-30,7)</td>
</tr>
<tr>
<td>Fourth year</td>
<td>19,3 (13,4-25,3)</td>
<td>0,028</td>
<td>25,4 (19,1-31,7)</td>
</tr>
<tr>
<td>Fifth year</td>
<td>20,5 (14,0-26,9)</td>
<td>0,007</td>
<td>24,2 (17,0-31,5)</td>
</tr>
<tr>
<td>Sixth year</td>
<td>18,7 (9,5-28,0)</td>
<td>0,647</td>
<td>25,1 (19,6-30,7)</td>
</tr>
<tr>
<td>Woman</td>
<td>18,2 (13,4-22,9)</td>
<td>0,006</td>
<td>24,2 (18,8-28,7)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>17,4 (12,9-21,9)</td>
<td>0,259</td>
<td>24,4 (19,5-29,3)</td>
</tr>
<tr>
<td>Private University</td>
<td>16,8 (12,8-23,0)</td>
<td>0,458</td>
<td>25,0 (18,0-31,9)</td>
</tr>
</tbody>
</table>

The values of the coefficients (Coef.), The 95% confidence intervals (95% CI) and the p-values were obtained with Generalized Linear Models, with Gaussian family, identity link function, robust models and respondent headquarters as a cluster.
One advances in the career. Similarly, other research showed that cynicism and negative self-efficacy were more frequent during the first academic years (3). This lack of significant association with increasing age could be because, over time, the student achieves greater academic self-efficacy. Besides, the last years of the academic medicine program are, in general, those with the most prolonged hours of study, which generates that the more hours the student invests in studying, the greater satisfaction and security with the exams he will present (7), that is, a lower negative self-efficacy. On the other hand, for cynicism to develop appropriately, a longer exposure time and a more significant associated load are needed, which will not be reflected during university life since there is still no medical-legal responsibility. For this reason, the results show a non-significant association in students, while in graduate professionals, a more significant number of people present this aspect (30–32).

Finally, we found that women scored higher in emotional exhaustion, but lower in cynicism. This result has been shown in other research (6,33,34). It could explain women’s ability to perform multiple tasks and that they spend less time on leisure, and, compared to men, they have a higher perception of stressors, which leads to greater anxiety and burnout (34). However, they are much more involved with their study, with better professional and academic relationships - in front of their teachers, colleagues, and patients. Likewise, they are more emotionally open and have a better administration of their time, which significantly reduces frustration and avoid feelings of emotional detachment, disconnection with other people, and perception of uselessness, that is, obtaining less cynicism (33,35). Several studies support these findings. It has been found that cynicism in women does not act as a coping strategy, but instead has a significantly positive direct effect on exhaustion. On the other hand, high cynicism acts as a protective effect in men, causing lower emotional exhaustion levels (36).

There was a limitation of selection bias, since a random sampling was not carried out to choose medical students. However, according to the academic year, this issue was not significant since the objective was to show the BS components’ difference. There was no information bias since the instrument used to measure the outcome variable has overall validity and reliability in this population. Similarly, doubts were always answered to the respondents as they answered the survey and the entire questionnaire was submitted piloted previously.

Likewise, we recommend to carry out more multicenter investigations focused on BS in the student population of future Latin American doctors, mainly in measuring its associated factors and possible interventions, focused on its prevention and management.

We conclude that the emotional exhaustion score increases with the college career’s progress, and the increase is predominantly in the third, fourth, and fifth years. Likewise, neither the score for self-efficacy nor cynicism had a statistically significant difference according to the year of study. Besides, women scored higher on exhaustion and scored lower on cynicism. All of this highlights the importance of educational institutions generating BS detection programs in their students to provide them with academic support strategies.

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**Conflict of interest:** The authors declare that they have no conflict of academic, economic, personal, or social interests, according to section B of “Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals” of the “International Committee of Medical Journal Editors” (ICMJE).

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