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Prevalence and Factors Associated with Academic Burnout among Surgical Instrumentation Students in the Context of COVID-19

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ABSTRACT

Introduction: The COVID-19 pandemic has had a significant impact not only on the infected population, but also on education, particularly affecting the health of students. Factors such as quarantines, virtual classes, and increased workload may contribute to the onset of academic burnout syndrome.

Objective: The objective of this study was to identify the prevalence of academic burnout syndrome (ABS) and the factors associated with its occurrence among surgical instrumentation students in the context of the COVID-19 pandemic.

Methods: A cross-sectional study was conducted among students enrolled in surgical instrumentation at a private institution in Bogotá. The Maslach Burnout Inventory - Student Survey (MBI-SS) was used alongside other variables of interest. Descriptive statistics, Odds Ratios (OR), and a logistic regression model were computed, and Spearman correlations were also calculated.

Results: A prevalence of ABS of 75.1% was identified. Physical activity was presented as a protective factor, with an OR=0.22 and a 95% CI of 0.064 - 0.784 (p=0.007). Additionally, a negative correlation was also found between exercise and dimensions such as exhaustion (p=-0.294; p<0.001) and cynicism (p=-0.253; p<0.001). A significant limitation was the scarcity of analytical studies literature in the context of surgical instrumentation.

Conclusions: This study presents a relevant finding by demonstrating the influence of physical activity on the occurrence of ABS in a pandemic context.

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ARTÍCULO ORIGINAL

Prevalencia y factores asociados al burnout académico en estudiantes de instrumentación quirúrgica en el contexto de COVID-19

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RESUMEN

Introducción: la pandemia por COVID-19 ha generado un impacto significativo no solo en la población contagiada, sino también en la educación y sobre todo en la salud de los estudiantes. Factores como las cuarentenas, las clases virtuales y la carga de trabajo pueden ser predisponentes para padecer síndrome de *burnout* académico.

Objetivo: identificar la prevalencia de síndrome de *burnout* académico (SBOA) y factores asociados a su ocurrencia en estudiantes de instrumentación quirúrgica en contexto de la pandemia por COVID-19.

Métodos: se realizó un estudio de corte transversal en estudiantes de Instrumentación Quirúrgica de una institución privada de la ciudad de Bogotá. Se empleó el MBI – SS (Maslach Burnout Inventory – Student Survey) y variables de interés. Se calcularon estadísticos descriptivos, OR (Odds Ratio) y se realizó un modelo de regresión logística, también se calcularon correlaciones de Spearman.

Resultados: se identificó una prevalencia de SBOA de 75,1%, la actividad física se presenta como factor protector OR=0,22 IC95% (0,064 – 0,784) p = 0,007, también se encontró una correlación negativa entre el ejercicio y dimensiones como el agotamiento (ρ=-0,294; p<0,001) y el cinismo (ρ=-0,253; p<0,001). Una limitación significativa fue la escasa bibliografía de estudios analíticos en el contexto de instrumentación quirúrgica.

Conclusiones: este estudio presenta un hallazgo relevante puesto que demuestra la influencia de la actividad física en la ocurrencia de SBOA en un contexto de pandemia.

INTRODUCTION

Over the last two years, the world's population has had to face an unprecedented situation that led to a series of changes and adaptations in everyday life: the COVID-19 pandemic. Of these, social, cultural, and economic aspects have been particularly affected by the government measures imposed to contain the spread of the disease. Among these measures, isolation and general quarantine periods were especially important at the beginning of the pandemic.

In Colombia, by means of Decree 457 of 2020, a strategy called "Mandatory preventive isolation of all inhabitants of the Republic of Colombia" was initiated. This isolation began on March 25, 2020, and was initially extended for 19 days. However, it was eventually extended for 5 months and 7 days, until August 31, 2020. On this date, certain sectors were gradually reopened, with sector-specific protocols ordered by local authorities according to the epidemiological situation of the region, department, or municipality (1).

These periods of isolation and health emergencies generated transformations in the dynamics of higher education. This shift occurred following Presidential Directive 02 of March 19, 2020, which ordered the restriction of in-person sessions, consequently emphasizing virtual modalities (2). In this sense, programs of all types and sciences embraced the use of information and communication technology (ICT) tools to provide the continuity of academic processes. Practical components and face-to-face laboratory sessions were suspended, paving the way for technology-mediated training.

Although all these decisions were made with the aim of promoting health and preventing disease, this scenario not only generated changes in the academic sphere, but also had an impact on the social, cultural, and biological aspects of the students (3). In this sense, factors contributing to academic burnout syndrome may stem from transcendental decisions, such as the increase in the number of hours of weekly academic dedication, the constant exposure to electronic systems, and the change of healthy habits.

Academic burnout syndrome (ABS) can be defined from two perspectives: a clinical one, which involves a state of health resulting from prolonged stress exposure; and a psychosocial one, which develops within the framework of three dimensions (burnout, cynicism, and low self-fulfillment). However, the outcome in both perspectives is an individual immersed in episodes of demotivation or frustration, derived from academic overload or exposure to formative scenarios (5).

The ABS originated from the need to specifically study populations suspected of suffering from this syndrome. Since 1996, studies applied to a population of health science students began to be published, particularly in medicine, nursing, gynecology, and obstetrics, as well as occupational therapists and even pharmacy (5). Consequently, it was necessary to adapt the burnout syndrome to the academic context. As a result, instruments have been designed to measure ABS in educational contexts, which are based on the premise that students have a physical, psychological, and social burden derived from the academic process (5).

This is where Schaufeli *et al.,* in 2002, designed a questionnaire that had the purpose of measuring the so-called academic burnout syndrome, the Maslach Burnout Inventory - Student Survey (MBI-SS) (6). Currently, this questionnaire is widely used across various professions and countries, despite some criticism regarding its sensitivity to identifying burnout levels. Additionally, there are concerns about potential underestimation of the suffering associated with the dimension of professional efficacy, which is one of the dimensions of the syndrome (7-9). On the other hand, based on the theory of meaningful learning first proposed by Ausubel in 1963 (10,11) and developed in modern times by many scholars, among which Dee Fink stands out, it is emphasized that the

teaching-learning process is much more than just educability, or the educator's ability to impart knowledge. Rather, it involves more sensitive and complex elements, such as the situational factors of students, which are closely related to the learning process. In this new paradigm, the student, and the educator construct knowledge from significant experiences (12).

In this regard, elements such as learning styles, or the socioeconomic and emotional context determine the student's attitude towards their education. This is how the ABS becomes relevant, since a student who is emotionally and physically exhausted and lacks enthusiasm for learning, will probably reflect this in their academic performance.

Regarding this, authors such as Caballero C. *et al.* have investigated potential interactions between academic performance and ABS, shedding light on these correlations (13). However, in the current scenario, with unique challenges and contexts, a deeper investigation is necessary to provide recommendations for the improvement of educational quality. Such recommendations should aim to support students and provide them with tools to have a significant positive experience in their academic process (14).

Thus, the aim of this study was to identify the prevalence of academic burnout syndrome (ABS) and the factors associated with its occurrence among students enrolled in a surgical instrumentation program in the context of virtual training facilitated by the COVID-19 pandemic.

METHODOLOGY

A cross-sectional study with field data sources was conducted. The study population comprised students from the first to eighth semesters of a surgical instrumentation program at a higher education institution in Bogotá in 2021. The population included students who were currently enrolled, while those who did not wish to participate in the study or failed to respond to all the questions in the questionnaire were excluded.

To calculate the sample size, a population size of 271 students was considered, with an anticipated ABS prevalence of 38% based on the study conducted by Amor et al. in 2020 among health science students (9), an absolute precision of 5%, a design effect of 1.0, and a reliability of 95%, resulting in a size of 156 students using OpenEpi web software (15). The sampling method employed was simple random sampling.

The study included variables concerning academic burnout syndrome, based on the three dimensions proposed by Schaufeli *et al.* Additionally, sociodemographic variables such as gender and age were included, as well as other variables of interest such as being in clinical practice, the average time spent daily in academic activities, the number of subjects taken, integration of active breaks, physical exercise, involvement in sports, and participation in relaxation activities (6) (Table 1).

Table 1. Variables Included in the Study

Variable	Measuring Scale
Exhaustion Burnout syndrome	
Exhaustion	Ordinal
Cynicism	Ordinal
Professional effectiveness	Ordinal
Prevalence	Values concerning burnout and cynicism categories
Age	Years completed
Gender	Dichotomous: male/female
Semester	Polytomous: I to VIII
Clinical practice	Dichotomous: yes/no Dichotomous: yes/no Polytomous: No physical activity
Weekly physical activity	1 and 10 minutes per week 10 and 20 minutes per week 20 and 30 minutes per week 30 and 45 minutes per week Over 45 minutes per week
Weekly sports practice	Dichotomous: yes/no
Practice of weekly relaxation activities	Dichotomous: yes/no Dichotomous: >15 hours/<15 hours Polytomous:
Time of daily dedication to academic	Between 1 and 5 hours
Activities	Between 5 and 10 hours Between 10 and 15 hours Over 15 hours Dichotomous: >5/<5 Polytomous:
Number of subjects taken	Between 1 and 5 subjects Between 3 and 5 subjects Between 5 and 10 subjects Dichotomous: yes/no Polytomous:
Take active breaks daily	Does not take active breaks daily Between 1 and 5 per day Between 5 and 10 per day

Source: own elaboration

A data collection instrument was used to gather information, comprising two sections. The first one included the Maslach Burnout Inventory - Student Survey, originally proposed by Shaufeli in 2002 and validated with 14 questions for the Colombian context by Hederich – Martínez in 2016. The second section consisted of questions related to the variables of interest mentioned above (6,18).

The scores and categorization of the dimensions were made based on the average points obtained from each of the questions in the instrument, following the score ranges proposed by the NTP 7-32 and evaluated by Hederich - Martinez. These categories include ordinal classifications such as: very low, low, medium-low, medium-high, high, and very high (16).

The prevalence of ABS was obtained by grouping the categories of medium-high, high, and very high. The dimension of professional efficacy was excluded based on the findings of the reviewed literature, which highlighted evidence from studies that suggest the possible underestimation of burnout syndrome, as indicated by various references (6-9).

Microsoft Forms was used for data collection, while Microsoft Excel 365 processing software was used for data tabulation, and SPSS (Statistical Package for the Social Sciences), version 26, was used for data analysis. For univariate analysis, frequencies and percentages were used for qualitative variables, and measures of central tendency and dispersion for quantitative variables. Association was analyzed by calculating Odds ratios and Pearson's chi-square tests. Additionally, correlations between categorical variables of interest and dimension averages were evaluated using Spearman's rho test (17,18).

Finally, binary logistic regression was performed using the intro method (19). The occurrence of ABS was obtained by grouping the categories of medium-high, high, and very high. The confidence intervals were 95%, and the statistical significance level was 0.05. In accordance with the provisions of Resolution 8430 of 1993, this study is considered risk-free. Additionally, the confidentiality and privacy of the participants' identity were safeguarded, and informed consents were obtained.

RESULTS

Characterization of the Study Population

The survey was sent to 271 students enrolled in the program, of whom 201 responded (74.16% response rate). No participants were excluded after the data review and cleaning. The average age of respondents was 20.29 ± 2.67 years (CV = 13.15%), ranging from 16 to 31 years. As for the gender variable, a predominance of the female sex was identified with 86.10% (n = 173). In terms of distribution by semesters, first-semester students accounted for 23.88% (n = 48), while the semester with the lowest representation was the second semester with 4.98% (n = 10) (Figure 1). Regarding clinical practice, 45.77% (n = 92) of respondents reported being involved at some level.

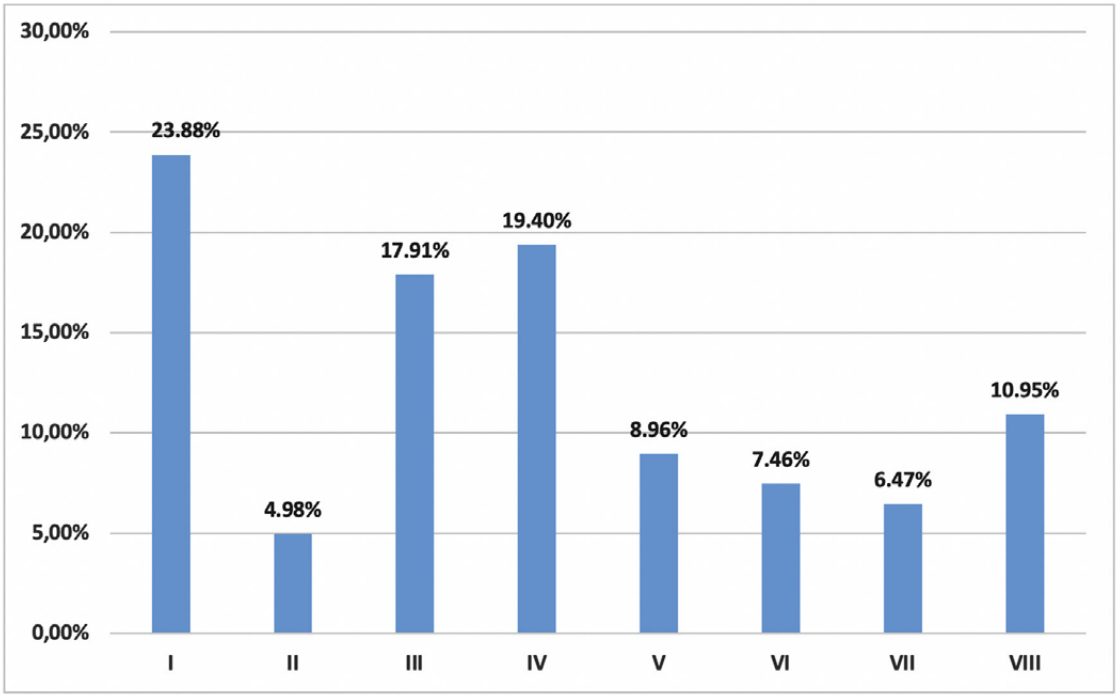

Figure 1. Distribution by Semesters of Surgical Instrumentation Students at a Private University in Bogotá, 2021

Source: own elaboration

Academic Burnout Syndrome

On the one hand, the distribution by subscales for each burnout dimension showed that 56.7% (n = 114) of the students were at high and very high levels of physical exhaustion. On the other hand, 37.8% (n = 76) manifest a high or very high levels of cynicism, with no students identified in the low or very low levels. In terms of professional efficacy, it was found that 73.4% (n = 133) of the students were distributed in the medium and high categories (Table 2).

Table 2. Subscale Distribution in Each Dimension of the Maslach Burnout Inventory-Student Survey Among Surgical Instrumentation Students at a Private University in Bogotá, 2021

Subscales	Surgical Instrumentation Students	
Physical exhaustion	**n**	**%**
Very low	1	0.5
Low	18	9
Medium (low)	31	15.4
Medium (high)	37	18.4
High	75	37.3
Very high	39	19.4
Cynicism		
Medium (low)	1	0.5
Medium (high)	124	61.7
High	62	30.8
Very high	14	7
Professional efficacy		
Very low	13	6.5
Low	55	27.4
Medium(low)	42	20.9
Medium(high)	45	22.4
High	41	20.4
Very high	5	2.5
Students at risk (two-dimensional)[a]	151	75.1

[a] Burnout syndrome based on high scores of physical exhaustion and cynicism

Source: own elaboration

In conclusion, it was found that 75.1% (n = 151) of the students exhibit high and very high levels of both physical exhaustion and cynicism simultaneously. This illustrates the prevalence of burnout syndrome among three-quarters of the surveyed population.

Factors Associated with Academic Burnout Syndrome

Among the factors associated with ABS, it was identified that the only variable presenting a statistically significant association was engaging in weekly physical activity OR=0.27 (CI 95% 0.12 - 0.58, p<0.001). Physical activity was demonstrated to be a strong protective factor in the occurrence of the syndrome in students (Table 3).

Table 3. Descriptive and Bivariate Analysis of the Factors Associated with Academic Burnout Syndrome Among Surgical Instrumentation Students at a Private University in Bogotá, 2021

Variables	(%n)[a]	Yes (%n)	No (%n)	OR	95% CI	P‡
Age						
>20 years	119(59.2)	91(45.3)	28(13.9)	1.19	0.62 – 2.27	0.594
<20 years	82 (40.8)	60(29.9)	22(10.9)			
Gender						
Female	173(86.1)	128(63.7)	45(22.4)	0.61	0.22 – 1.72	0.354
Male	28(13.9)	23(11.4)	5(2.5)			
Semester						
I	48(23.9)	38(18.9)	10(5.0)			
II	10(5.0)	6(3.0)	4(2.0)			
III	36(17.9)	29(14.4)	7(3.5)			
IV	39(19.4)	27(13.4)	12(6.0)	--	....	0.856
V	18(9.0)	13(6.5)	5(2.5)			
VI	15(7.5)	12(6.0)	3(1-5)			
VII	13(6.5)	10(5.0)	3(1-5)			
VIII	22(10.9)	16(8.0)	6(3.0)			
Weekly physical activity						
Yes	119(58.2)	79(39.3)	40(19.9)	0.27	0.12-0.58	<0.001
No	82(40.8)	72(35.8)	10(5.0)			
Weekly sports practice						
Yes	47(23.4)	37(18.4)	10(5.0)	1.29	0.59-2.84	0.514
No	154(76.6)	114(56.7)	40(19.9)			
Weekly relaxation activities						
Yes	22(10.9)	17(8.5)	5(2.5)	1.14	0.39-3.27	0.804
No	179(89.1)	134(66.7)	45(22.4)			
Clinical practice						
Yes	54(26.9)	42(20.9)	12(6.0)	1.22	0.58-2.55	0.597
No	147(147)	109(45.2)	38(18.9)			
Time of daily dedication to academic activities						
Number of subjects taken						
>15h	54(26.9)	41(20.4)	13(6.5)	1.06	0.51-2.19	0.873
<15h	147(73.1)	110(54.7)	37(18.4)			
>5	84(41.8) 117(58.2)	66(32.8) 85(42.3)	18(9.0) 32(15.9)	1.38	0.71-2.67	0.338
Take active breaks daily						
Yes	84(41.8)	65(32.3)	19(9.5)	1.24	0.64 – 2.40	0.508
No	117(58.2)	86(42.8)	31(15.4)			

Percentage based on group per column. *Statistically significant, ǂ Pearson's Chi-Square
Source: own elaboration

When examining the relationship between the time spent on physical activity and the occurrence of BS, it was found that among students who engage in physical activity, the prevalence of BS ranged from 62.86% to 70.00%. The lowest prevalence of BS ranged between 62.86% and 70.00% among those spending 20 to 30 minutes, while the highest proportion occurred in those spending 10 to 20 minutes. In contrast, those who do not engage in physical activity have a BS rate of 87.80% (Figure 2).

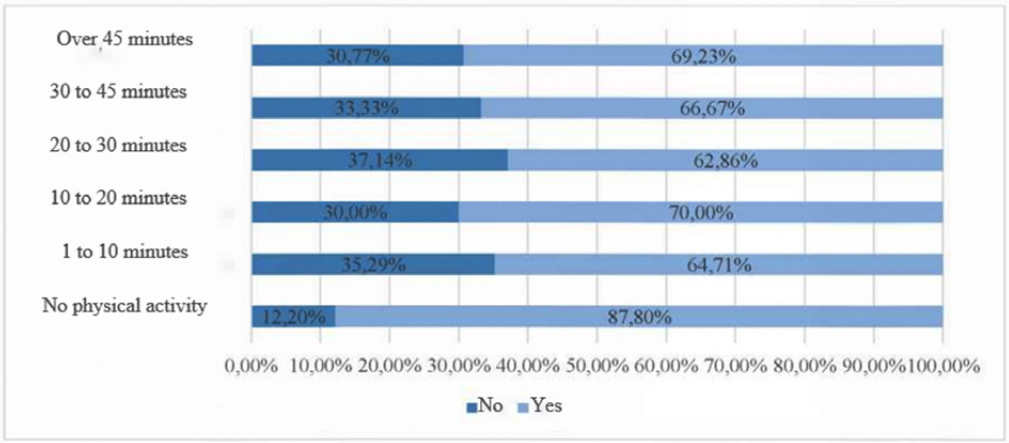

Figure 2. Distribution of the Occurrence of Burnout Syndrome in Relation to Weekly Dedication to Physical Activity Among Surgical Instrumentation Students at a Private University in Bogotá, 2021

Source: own elaboration

When evaluating the correlations between the variables of interest and the averages by dimension, it was found that physical activity was significantly correlated with the dimensions of burnout ($p = -0.294$; $p<0.001$) and cynicism ($p = -0.253$; $p<0.001$).

Finally, when evaluating the regression model, the physical activity variable also presented a statistically significant association in relation to the other variables. Even when evaluating the time spent on this activity ordinally, this association remains consistent. Thus, it was found that the category between 30 and 45 minutes exhibited the highest protective effect with OR (exp β)=0.223 (CI 95% 0.064 - 0.784, $p = 0.007$), while the category of more than 45 minutes showed the least protective effect with an OR (exp β)=0.314 (CI 95% 0.100 - 0.982, $p = 0.046$). In this regard, this finding suggests a potential link to engagement in autonomous and synchronous activities, or practices related to their undergraduate studies (Table 4).

Table 4. Findings From the Logistic Regression Model Using the Intro Method

Variables	OR (exp β)	95% CII	P
Age	1.03	0.887- 1.199	0.69
Female gender	0.57	0.179- 1.795	0.335
Weekly physical activity			
No physical activity *			
1 to 10 minutes	0.24	0.065 – 0.847	0.027*
10 to 20 minutes	0.28	0,079 – 0.956	0.042*
20 to 30 minutes	0.24	0.085 – 0.670	0.007+
30 to 45 minutes	0.22	0.064 – 0.784	0.019*
over 45 minutes	0.31	0.100 – 0.982	0.046*
Weekly relaxation activities	1	0.288 – 3.495	0.996
Clinical practice	1.12	0.404 – 3.080	0.832
Dedicated time >15 hours	0.99	0.991 – 0.408	0.984
Number of subjects >5	1.36	0.334 – 5.527	0.669
Daily active breaks	1.11	0.524 – 2.361	0.783

*Statistically significant at 0.05. + Statistically significant at 0.01. * Reference category
Male as reference category
Source: own elaboration

DISCUSSION

For this study, the prevalence of academic burnout syndrome was 75.1%, marking a notable proportion increase compared to previous measurements reported by other authors. In this regard, a literature review conducted in 2016 by Bullock *et al.* found maximum values of 60% and minimum values of 21%. Hence, it is possible to consider that the COVID-19 context experienced at the time of the study may have exerted some influence on this phenomenon. Therefore, it is necessary to evaluate whether there were changes related to the prevalence of this syndrome when compared to studies prior to the occurrence of this epidemiological event within the same population (20).

On the other hand, one of the most relevant findings was the association between physical activity and ABS. This factor was presented as a protective element and confirmed by Spearman's rho. In this regard, no studies published in scientific journals were found that explored factors associated with academic burnout syndrome among surgical instrumentation students. Additionally, no studies related to the context of COVID-19 were found.

Meanwhile, studies like the one conducted by Shadid *et al.* which measured the ABS in a population of medical students in Saudi Arabia in 2018, found that academic GPA was associated with ABS (OR=0.73, 95% CI 0.566 - 0.959, p=0.023) and not engaging in extracurricular activities represents a risk factor, demonstrating a statistically significant association (OR=1.89, 95%vCIv1.22 -2.91, p=0.004) (21).

In contrast, Martínez-Rubio *et al.* affirmed in a study conducted in Spain among nursing and psychology students from two universities that activities such as mindfulness, self-compassion, and psychological flexibility have a significant correlation with burnout syndrome. Additionally, they identified the academic year as a risk factor for burnout syndrome (22).

Regarding the findings outlined in that study, Amor *et al.* in 2020 identified that the course or semester holds a significant correlation with the two dimensions of ABS (Exhaustion and Cynicism) for both cohorts of medical students in Spain they evaluated (2017-18 and 2018-19), with estimators of OR=1.31 (95% CI 1.1 - 1.56) and 1.26 (95% CI l.05 - 1.52) respectively. In contrast, activities such as leisure did not present a significant correlation in any of the cohorts (9).

Consequently, it is important to acknowledge the efforts made by higher education institutions, as well as governmental entities, to promote health initiatives related to physical activity. Given the circumstances of confinement and virtuality, such activities could have been limited, potentially resulting in a negative outcome in the student population.

This reflection is also applicable to educators, since the inclusion of recreational spaces and fostering physical and mental well-being in the classroom can have a positive impact on students, improving learning and educability in their subjects (23). Therefore, it is relevant to study the correlation between the educator's burnout syndrome and that experienced by students, since, in this context, both students and educators were susceptible to the collateral impact of the pandemic.

However, one of the limitations of this research was the low participation among second-semester students. Despite being a course with few students, insufficient responses were received from this group. Additionally, another limitation was the scarce bibliography of analytical studies developed on this topic in the context of surgical instrumentation. Although some undergraduate dissertations and monographs of undergraduate students were identified, they did not have a statistical value that would allow comparisons or provide comparable starting points.

Therefore, a call is extended to higher education institutions, educators, and researchers to explore this type of studies in student populations with similar characteristics. These populations may have some particularities due to the nature of the profession that need to be described and analyzed.

CONCLUSIONS

In conclusion, this study demonstrates the importance of physical exercise, emphasizes the need for searching alternatives to address the high levels of ABS in students, and allows us to reflect on future studies that can compare the data collected previously, enabling us to contrast whether the COVID-19 pandemic had a real estimated impact on the occurrence of ABS.

CONFLICT OF INTERESTS

The authors declare that they have no conflicts of interest.

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