REVISTA DA ABENO
Associação Brasileira de Ensino Odontológico
https://revabeno.emnuvens.com.br ISSN 2595 027

Factors associated with self-perceived academic performance by dentistry undergraduates during the COVID-19 pandemic

Flavia Rezende de Souza[1]
0009-0004-8857-9308

Laís Renata Almeida Cezário[1]
0000-0002-0737-2857

Fábio Luiz Mialhe[1]
0000-0001-6465-0959

[1]Universidade Estadual de Campinas (Unicamp), Faculdade de Odontologia de Piracicaba, Piracicaba, São Paulo, Brasil.

Correspondence:
Fábio Luiz Mialhe
E-mail:mialhe@unicamp.br

Received: Jun13, 2023
Approved: Sep 13, 2023
Last revision: Nov 28, 2023

Abstract This cross-sectional study investigates associations between self-perceived academic performance by dentistry undergraduates and self-efficacy beliefs, sociodemographic variables and academic life during the remote teaching implemented due to the COVID-19 pandemic. Data collected by means of questionnaires (sociodemographic questions, self-perceived academic performance, learning during the remote teaching period) and the General Self-Efficacy Scale (GSE), answered online. The questionnaires were emailed between September 2020 and April 2021 to students enrolled between the second and fifth year. Associations between predictor variables and the outcome (self-perceived academic performance) were analyzed by regression models. Crude and adjusted odds-ratios were estimated with their respective 95% confidence intervals. A total of 150 undergraduates answered the questionnaires of which, 70.0% were women (n=105) with mean age of 21.7 years. Self-perceived academic performance classified as 'insufficient or insufficient' was associated with students who did not adapt well to the new teaching-learning experience (OR=8.08; 95%CI: 2.02–32.35), who felt that they lacked mastery of the knowledge and skills taught in remote classes (OR=10.74; 95%CI: 2.81–41.02) and who felt that their academic performance had worsened since in-class lessons were suspended (OR=8.19; 95%CI: 1.59–42.12). During the pandemic, low self-perceived academic performance was associated with difficulties in adapting to the new remote teaching model, a sense of non-assimilation of content and worsened academic performance.
Descriptors: Academic Performance. Self-Efficacy. Students, Dental. COVID-19. Education, Dental.

Factores asociados a la autopercepción del desempeño académico de los estudiantes de odontología durante la pandemia de COVID-19

Resumen El estudio tuvo como objetivo investigar asociaciones entre la autopercepción del desempeño académico y las creencias de autoeficacia, variables sociodemográficas y vida académica en estudiantes de Odontología durante el período de enseñanza remota durante la pandemia de COVID-19. Se trata de un estudio transversal que utilizó los siguientes instrumentos en formato virtual: preguntas sociodemográficas, rendimiento académico autopercibido, aprendizaje durante el periodo de docencia remota y Escala de Autoeficacia General Percibida (EAGP). Los cuestionarios estuvieron disponibles entre septiembre de 2020 y abril de 2021 para estudiantes matriculados entre el segundo y quinto año del curso. Se utilizaron modelos de regresión para analizar las asociaciones entre las variables predictivas y la autopercepción de resultados del rendimiento académico. Los odds ratios crudos y ajustados se estimaron con sus respectivos intervalos de confianza del 95%. Respondieron al cuestionario una muestra de 150 estudiantes universitarios, de los cuales el 70,0% eran mujeres (n=105) con una edad promedio de 21,7 años. Se encontró que la autopercepción del rendimiento académico clasificado como 'insuficiente o insuficiente' se asoció con estudiantes que no se adaptaron bien a la nueva experiencia de enseñanza y aprendizaje (OR=8,08; IC 95%: 2,02-32,35), quienes sintieron que no dominaban los conocimientos y habilidades impartidos en las clases remotas (OR=10,74; IC 95%: 2,81-41,02) y que sentían que su desempeño como estudiante había empeorado desde que se suspendieron las clases presenciales (OR=8,19; IC 95%: 1,59-42,12). Se concluye que durante el

período de pandemia la baja autopercepción del rendimiento académico se asoció con la dificultad de adaptación al nuevo modelo de enseñanza a distancia, la sensación de no asimilación de contenidos y el empeoramiento del rendimiento académico.
Descriptores: Rendimiento Académico. Autoeficacia. Estudiantes de Odontología. COVID-19. Educación en Odontología.

Fatores associados à autopercepção de desempenho acadêmico por estudantes de Odontologia durante a pandemia da COVID-19

Resumo O estudo objetivou investigar associações entre a autopercepção do desempenho acadêmico e crenças de autoeficácia, variáveis sociodemográficas e vida acadêmica em graduandos em Odontologia no período de ensino remoto durante a pandemia de COVID-19. Trata-se de um estudo transversal que empregou os seguintes instrumentos no formato virtual: questões sociodemográficas, autopercepção do rendimento escolar, aprendizagem durante o período de ensino remoto, e Escala de Autoeficácia Geral Percebida (EAGP). Os questionários foram disponibilizados entre setembro de 2020 e abril de 2021 para os alunos matriculados entre o segundo e o quinto ano do curso. Utilizaram-se modelos de regressão para analisar as associações entre variáveis preditores com o desfecho autopercepção do desempenho acadêmico. Estimou-se *odds-ratios* brutos e ajustados com os respectivos intervalos de 95% de confiança. Uma amostra de 150 graduandos respondeu ao questionário, sendo 70,0% mulheres (n=105) com idade média de 21,7 anos. Verificou-se que a autopercepção do desempenho acadêmico classificada como 'insuficiente ou pouco suficiente' esteve associada aos estudantes que não se adaptaram bem à nova experiência de ensino e aprendizagem (OR=8,08; IC95%: 2,02-32,35), que acharam que não dominavam os conhecimentos e competências ensinados nas aulas remotas (OR=10,74; IC95%: 2,81-41,02) e que achavam que o seu desempenho como estudante havia piorado desde que as aulas presenciais foram suspensas (OR=8,19; IC95%: 1,59-42,12). Conclui-se que durante o período pandêmico, a baixa autopercepção do rendimento acadêmico esteve associada à dificuldade de adaptação ao novo modelo de ensino remoto, ao senso de não assimilação dos conteúdos e de piora do desempenho escolar.
Descritores: Desempenho Acadêmico. Autoeficácia. Estudantes de Odontologia. COVID-19. Educação em Odontologia.

INTRODUCTION

University, in addition to being a moment of intense learning, can often be associated with an increase in symptoms related to mental health issues like stress, anxiety, burnout, and depression[1,2]. Given the challenging and demanding learning environment, the high volume of academic demands and course contents that can affect their capacity to study and execute practical activities, health students are highly affected by these conditions[1], resulting in low academic (AP) and professional performance and in a reduced quality of life and well-being[1-4].

Good AP can result in greater student engagement and motivation, reduce student burnout, and contribute to a successful professional life. AP may consist of knowledge, skills, and experiences gained during the course[6]. In addition to verifying the student's knowledge and ability to solve problems efficiently, measured qualitatively/quantitatively by exam scores, AP can also be evaluated based on homework completion rate, study habits and skills, and the student's conduct[5,7]. As a complex construct, AP can be influenced by several factors such as socioeconomic aspects, related to teaching methodology, family experience, learning style, as well as psychological and cognitive factors such as motivation, adaptive behaviors, ability to cope with pressure and stressful situations, as well as self-efficacy[1,5,7-9].

Studies have pointed to self-efficacy as a predictor of academic performance and success[7-11]. Self-efficacy is a

major component of social cognitive theory, defined as the belief one develops about one's personal capacities and abilities to initiate, execute and successfully perform certain pre-established tasks, requiring effort and perseverance in the face of adversity[11-14]. Personal beliefs in one's own abilities influence the level of stress and anxiety in coping with situations perceived as threatening[12,14]. A greater sense of self-efficacy can therefore determine a greater degree of engagement and persistence in performing some task or activity, for example, greater commitment to studies [7-9]. On the other hand, a perceived aversive situation may not be as stressful as one's belief in personal ineffectiveness to manage it[12,14]. In academia, self-efficacy determines students' perceived competence to perform a given task, as well as their capacity to adapt to new situations. This translates into greater student effort and persistence in the face of obstacles, factors that contribute to learning and interest in meeting academic goals, and studies have investigated associations between the level of general self-efficacy and academic performance[7-11,13,15].

The COVID-19 pandemic brought important changes to the teaching-learning scenario, especially with the remote teaching modality implemented by institutions worldwide as a social distancing measure to contain the virus spread. Maintaining the teaching-learning process despite the pandemic-related obstacles was paramount to avoid setbacks in student educational and learning processes, as well as to avoid school dropout, factors that can contribute to increase social inequality[16,17].

This new reality has become a challenge for all and has required adaptation strategies from both teachers and students, such as suddenly learning to use new digital communication technologies, which may have influenced personal, emotional and social aspects, as well as student AP [13,16-18].

Thus, this study investigates associations between self-perceived AP, self-efficacy beliefs, sociodemographic variables, and academic life among dentistry undergraduates in the period of remote teaching during the COVID-19 pandemic.

METHOD

Study design

A cross-sectional observational and analytical study was conducted with dentistry undergraduates from the Piracicaba Dental School (FOP-Unicamp).

Sample selection and inclusion and exclusion criteria

All students enrolled in the undergraduate course during September 2020 to April 2021, known as the COVID-19 pandemic period, were invited to participate in the research. The school was closed and all activities were conducted remotely. Students who failed to fully complete the data collection instruments were excluded, as well as first-year students since they lacked previous academic experience for comparison with the pandemic period.

Data collection

An online questionnaire created by the authors using the Google Forms platform was sent to the participants via institutional email. The instrument consisted of three sections, namely: 1) socioeconomic and demographic assessment; 2) teaching-learning with canceled in-class lessons, current course load, and self-perceived academic performance; 3) General Self-Efficacy (GSE) scale.

Section 1 included sociodemographic questions adapted from a validated questionnaire[19] such as age, gender, marital status, city and state of origin, parents' educational background, monthly family income and how many people lived in the household, whether they received any grant or scholarship, course year, whether it was their first time attending higher education and if they intended to continue the current course.

Given the new scenario of remote teaching imposed by the pandemic, section 2 included questions about students' perceived performance and learning under this new reality and their current course load, namely: on average, compared to our course load before in-class lessons were canceled, you would say that your course load these past few weeks has been (answer options: significantly lower, lower, equal, higher, significantly higher); "It is harder to focus during online classes compared to face-to-face classes"; "My academic performance improved since face-to-face classes were canceled"; "I adapted well to the new teaching-learning experience"; 'I have mastered the knowledge and skills taught this year even though in-person classes have been canceled"; "I can understand how to do class exercises since face-to-face classes were canceled"; "My academic performance has worsened since face-to-face classes were canceled," with the following possible answers to all of the above questions: strongly disagree, disagree, neutral, agree, strongly agree.

Our outcome variable—self-perceived academic performance in the last semester—was assessed by the question: How do you classify your AP in this semester? following answer options: insufficient, not quite sufficient, sufficient or more than sufficient[20]. All these questions were extracted and adapted from the global survey "Impacts of the Covid-19 Pandemic on Life of Higher Education Students," which globally investigated how students perceived the impacts of the first wave in early 2020 on various aspects of their lives.[19,20]

Finally, section 3 presented the General Self-Efficacy Scale (GSE), translated and validated in Brazil by Souza and Souza (2004)[21]. It is a self-administered scale with ten questions organized according to one's self-perceptions. Each item is rated by a four-point Likert scale. Total score ranges from 4 to 44. For the dichotomization we considered 25 points as the cut-off reference, with values ≤ 24 points characterized as low level of self-efficacy and values ≥ 25 points characterized as high level of self-efficacy.

Ethical considerations

Study approved by the FOP/UNICAMP Research Ethics Committee under protocol no. 4.317.276 (CAAE: 19111313.9.0000.5418). All research stages were conducted in accordance with the Declaration of Helsinki and followed the ethical principles proposed in Resolutions 466/12 and/or 510/16 of the National Health Council, ensuring data confidentiality. All participants who agreed to participate signed an Informed Consent Form.

Data analysis

Statistical analysis was performed using the R program (R Foundation for Statistical Computing, Vienna, Austria), with significance level of 5%. Categorical variables were described as absolute and relative frequencies, and the remaining variables as mean, standard deviation, median, minimum and maximum values. Associations between variables and the outcome "AP self-perceived as insufficient or not quite sufficient" were analyzed using simple and multiple regression models. All variables with $p<0.20$ in the individual analyses were included in the multiple model, and those with $p\leq0.05$ remained in the final model after adjusting for the other variables. We also estimated a simple logistic regression model between self-perceived AP and predictor variables. Crude and adjusted odds ratios and their respective 95% confidence intervals were estimated by regression models. Model adjustment was assessed by the Akaike Information Criterion (AIC).

RESULTS

Data were collected from 150 students, representing 37.5% of the total population. Of the total sample, 70.0% were women with mean age of 21.7 years (standard deviation=2.0), 89.3% of the students were from the state of São Paulo, and 66.0% received no grant or scholarship to attend university (Table 1).

Table 1. Descriptive analysis of the study sample's (n=150) sociodemographic variables.

Parameter	Category	Frequency (%)
Gender	Female	105 (70.0%)
	Male	45 (30.0%)
Marital status	Married	1 (0.7%)
	Single	149 (99.3%)
State of origin	Ceará	1 (0.7%)
	Minas Gerais	12 (8.0%)
	Paraná	1 (0.7%)
	Rio de Janeiro	1 (0.7%)
	São Paulo	134 (89.3%)
	Abroad – Peru	1 (0.7%)
Father's schooling level (n = 124)	Incomplete primary education	11 (7.3%)
	Complete primary education	7 (4.7%)
	Incomplete secondary education	3 (2.0%)
	Complete secondary education	46 (30.7%)
	Incomplete tertiary education	12 (8.0%)
	Complete tertiary education	40 (26.7%)
	Graduate studies	31 (20.7%)
Mother's schooling level	Incomplete primary education	11 (7.3%)
	Complete primary education	6 (4.0%)
	Incomplete secondary education	1 (0.7%)
	Complete secondary education	42 (28.0%)
	Incomplete tertiary education	17 (11.3%)
	Complete tertiary education	45 (30.0%)
	Graduate studies	28 (18.7%)
Receives financial aid or scholarship	No	100 (66.7%)
	Yes	50 (33.0%)
Monthly family income (minimum wage)	Up to 2	10 (6.7%)
	From 3 to 4	39 (26.0%)
	From 5 to 6	39 (26.0%)
	From 7 to 10	31 (20.7%)
	From 11 to 15	14 (9.3%)
	From 16 to 20	9 (6.0%)
	More than 25	8 (5.3%)
Number of people living in the same household	1 or 2	7 (4.7%)
	3	51 (34.0%)
	4	64 (42.7%)
	5	22 (14.7%)
	6	4 (2.7%)
	More than 6	2 (1.3%)
Age (years)	Mean (standard deviation)	Median (minimum and maximum value)
	21.7 (2.0%)	22.0 (18.0–31.0)

Regarding academic life during the pandemic (Table 2), 84% of the participants said that focusing on online classes was more difficult compared with in-person classes. Moreover, 62.7% adapted poorly to the new teaching-learning experience and 66.6% felt that they failed to master the knowledge and skills taught after in-person classes were canceled. When asked about their academic performance, 68.7% believed that it had worsened, and 65.3% classified their AP as insufficient or not quite sufficient. The self-efficacy scores presented a mean value of 28.99±4.55, indicating that students presented self-efficacy values above average.

Table 2. Descriptive analysis of variables related to the academic life of undergraduate dentistry students (n=150).

Parameter	Category	Frequency (%)
Course year	2º	24 (16.0%)
	3º	36 (24.0%)
	4º	50 (33.0%)
	5º	40 (26.7%)
First time attending higher education	No	12 (8.0%)
	Yes	138 (92.0%)
Completed the first course	Took no other course	138 (92.0%)
	No	10 (6.7%)
	Yes	2 (1.3%)
Intends to continue the current program	No	0 (0.0%)
	Yes	150 (100.0%)
Course load in the last week	Equal	16 (10.7%)
	Lower	45 (30.0%)
	Significantly lower	58 (38.7%)
	Higher	16 (10.7%)
	Significantly higher	15 (10.0%)
It is harder to focus on online classes	Neutral	4 (2.7%)
	Agree	40 (26.7%)
	Strongly agree	86 (57.3%)
	Disagree	11 (7.3%)
	Strongly disagree	9 (6.0%)
My performance improved with online classes	Neutral	29 (19.3%)
	Agree	5 (3.3%)
	Strongly agree	0 (0.0%)
	Disagree	48 (32.0%)
	Strongly disagree	68 (45.3%)
I adapted well to the new teaching-learning experience	Neutral	32 (21.3%)
	Agree	21 (14.0%)
	Strongly agree	3 (2.0%)
	Disagree	58 (38.7%)
	Strongly disagree	36 (24.0%)
I mastered the knowledge and skills taught	Neutral	27 (18.0%)
	Agree	23 (15.3%)
	Strongly agree	0 (0.0%)
	Disagree	62 (41.3%)
	Strongly disagree	38 (25.3%)
I can understand how to do the exercises	Neutral	42 (28.0%)
	Agree	37 (24.7%)
	Strongly agree	1 (0.7%)
	Disagree	45 (30.0%)
	Strongly disagree	25 (16.7%)
My performance as a student worsened	Neutral	30 (20.0%)
	Agree	55 (36.7%)
	Strongly agree	48 (32.0%)
	Disagree	13 (8.7%)
	Strongly disagree	4 (2.7%)
How do you rate your academic performance this semester?	Insufficient	29 (19.3%)
	Not quite sufficient	69 (46.0%)
	Sufficient	50 (33.3%)
	More than sufficient	2 (1.3%)

In the final model (Table 3), the percentage of students with self-perceived insufficient or not quite sufficient AP in the last semester was higher among those who adapted poorly to the new teaching-learning experience (80.8%) (OR=8.08; 95%CI: 2.02–32.35), those who thought they failed to master the knowledge and skills taught after in-person classes were canceled (80.0%) (OR=10.74; 95%CI: 2.81–41.02), and those who thought their academic performance had worsened since in-person classes were canceled (80.6%) (OR=8.19; 95%CI: 1.59–42.12).

Table 3. Logistic regression model of the associations between self-perceived academic performance and predictor variables (n=150).

Parameter	Category	n (%)	Self-perception		crude OR (95%CI)	p-value	adjusted OR (95%CI)	p-value
			$Insufficient or not quite sufficient	Sufficient/more than sufficient				
			n (%)	n (%)				
Gender	Female	105 (70.0%)	69 (65.7%)	36 (34.3%)	Ref.			
	Male	45 (30.0%)	29 (64.4%)	16 (35.6%)	0.94 (0.46–1.96)	0.8806		
Age (years)		103 (68.7%)	67 (65.0%)	36 (35.0%)	Ref.			
	> 22	47 (31.3%)	31 (66.0%)	16 (34.0%)	1.04 (0.50–2.15)	0.9138		
Father's schooling	Up to complete primary education	18 (12.0%)	12 (66.7%)	6 (33.3%)	1.07 (0.38–3.04)	0.8992		
	Above complete primary education	132 (88.0%)	86 (65.2%)	46 (34.8%)	Ref.			
Mother's schooling	Up to complete primary education	17 (11.3%)	12 (70.6%)	5 (29.4%)	1.31 (0.44–3.95)	0.6296		
	Above complete primary education	133 (88.7%)	86 (64.7%)	47 (35.3%)	Ref.			
Receives grant/scholarship	No	100 (66.7%)	65 (65.0%)	35 (35.0%)	0.96 (0.47–1.96)	0.9037		
	Yes	50 (33.3%)	33 (66.0%)	17 (34.0%)	Ref.			
Course load in the last week	Equal or lower	119 (79.3%)	78 (65.6%)	41 (34.4%)	Ref.			
	Higher	31 (20.7%)	20 (64.5%)	11 (35.5%)	0.96 (0.42-2.18)	0.9142		
It is harder to focus on online classes	Disagree	20 (13.3%)	7 (35.0%)	13 (65.0%)	Ref.			
	Neutral	4 (2.7%)	2 (50.0%)	2 (50.0%)	1.86 (0.21–16.18)	0.5751		
	Agree	126 (84.0%)	89 (70.6%)	37 (29.4%)	4.47 (1.65–12.09)	0.0032		
My performance improved with online classes	Disagree	116 (77.3%)	86 (74.1%)	30 (25.9%)	11.47 (1.23–106.68)	0.0321		
	Neutral	29 (19.3%)	11 (37.9%)	18 (62.1%)	2.44 (0.24-24.78)	0.4494		
	Agree	5 (3.3%)	1 (20.0%)	4 (80.0%)	Ref.			

Continues

Continuation

I adapted well to the new teaching-learning experience	Disagree	94 (62.7%)	76 (80.8%)	18 (19.2%)	16.04 (5.28–48.74)	<0.0001	8.08 (2.02–32.35)	0.0031
	Neutral	32 (21.3%)	17 (53.1%)	15 (46.9%)	4.31 (1.29–14.37)	0.0176	2.38 (0.53–10.72)	0.2577
	Agree	24 (16.0%)	5 (20.8%)	19 (79.2%)	Ref.		Ref.	
I mastered the knowledge and skills taught	Disagree	100 (66.7%)	80 (80.0%)	20 (20.0%)	19.00 (5.81–62.10)	<0.0001	10.74 (2.81–41.02)	0.0005
	Neutral	27 (18.0%)	14 (51.8%)	13 (48.2%)	5.12 (1.37–19.08)	0.0151	3.03 (0.68–13.53)	0.1473
	Agree	23 (15.3%)	4 (17.4%)	19 (82.6%)	Ref.		Ref.	
I can understand how to do the exercises	Disagree	70 (46.7%)	58 (82.9%)	12 (17.1%)	5.97 (2.45–14.56)	<0.0001		
	Neutral	42 (28.0%)	23 (54.8%)	19 (45.2%)	1,50 (0.62–3.61)	0.3713		
	Agree	38 (25.3%)	17 (44.7%)	21 (55.3%)	Ref.			
My performance as a student worsened	Disagree	17 (11.3%)	3 (17.6%)	14 (82.4%)	Ref.		Ref.	
	Neutral	30 (20.0%)	12 (40.0%)	18 (60.0%)	3.11 (0.7–13.20)	0.1237	2.23 (0.36–13.60)	0.3859
	Agree	103 (68.7%)	83 (80.6%)	20 (19.4%)	19.37 (5.08–73.90)	<0.0001	8.19 (1.59–42.12)	0.0118
General Self-Efficacy Scale	<25	19 (12.7%)	14 (73.7%)	5 (26.3%)	1.57 (0.53–4.62)	0.4161		
		131 (87.3%)	84 (64.1%)	47 (35.9%)	Ref.			

*Outcome event. Ref.: reference category of independent variables. OR: Odds ratio. CI: Confidence interval. $Median of the sample. ACI (empty model) = 195.61; ACI (final model) =139.51

DISCUSSION

Our analysis showed that self-perceived academic performance by undergraduate dentistry students during the COVID-19 pandemic was associated with personal factors related to students' ability to adapt to the new teaching-learning environment and its challenges. Students who adapted poorly to the new teaching-learning experience, who failed to master the knowledge and skills taught in online classes, as well as those who understood that their student performance had worsened since the interruption of in-class lessons were more likely to self-report worse academic performance during that period.

Our results corroborate other findings in the scientific literature which associate poor academic performance during remote classes with factors such as students and professors' lack of ability to use information and communication technologies (TICs)[16,19,20,22], lack of internet access or technical issues[16,19,20,23], lack of practical activities common to the in-class environment[22], greater difficult in keeping focus[24], lack of an adequate study environment[15,23], and personal and emotional problems[16,19].

Another factor to be considered was how their role changed: students became the main mediator in their learning process during a troubled psychosocial environment which hindered their ability to manage their studies[17]. Moreover, the pandemic generated an increase in mental health problems such as anxiety, stress and depression, resulting from uncertainty regarding course completion, concerns about the quality of training, lack of in-person

interaction with colleagues and professors, difficulty concentrating in the virtual environment, and insecurity related to the conditions for resuming in-class lessons[17,25,26].

Although maintaining the teaching-learning process during the COVID-19 pandemic proved important for the continuity of education and dropout reduction, students perceived remote teaching activities as difficult.

Similar to our study, authors who also investigated how higher education students perceived remote teaching during the pandemic showed that digital illiteracy and the sense of a greater course load negatively influenced students' perception, satisfaction, performance, and adaptation to the new teaching model[19,20].

In addition to these findings, these studies point to associations between poor student performance and sociodemographic factors (gender, income, country of origin); concern about studies and professional future; feelings of anxiety, frustration and boredom; satisfaction with quality of the remote teaching, resulting from the quality of assistance and administrative, technical and learning support provided by tutors, librarians and professors during the pandemic, such as proper infrastructure and their ability to respond and provide feedback to students[19,20]. These associations indicate future possibilities for testing other variables that may interfere with academic performance.

Knowing the factors that influence student AP can help us identify those most vulnerable in order to develop preventive academic interventions to help students develop adaptation and motivation strategies and thus improve their performance. Moreover, learning impairments and shortened educational processes can lead to failures in training and future professional practice[27], and should be considered by educators and administrators when developing teaching programs and strategies aimed at student well-being and, consequently, better academic performance[19,20,23,24,26].

As for study limitations, we can mention the less than 50% response rate of the study population, as well as difficulties in performing data collection online since students were already overloaded with other remote activities. Another limitation is the specificity of results, which may not reflect the impact of remote teaching in other contexts considering the diversity of the Brazilian population. Moreover, results with a p-value close to the 5% threshold should be further investigated in larger samples to confirm possible associations.

CONCLUSION

During the COVID-19 pandemic, students' low self-perceived AP was associated with difficulties in adapting to the new remote teaching model, a sense of non-assimilation of content and worsened academic performance.

REFERENCES

1. Chattu VK, Sahu PK, Seedial N, Seecharan G, Seepersad A, Seunarine M, et al. An Exploratory Study of Quality of Life and Its Relationship with Academic Performance among Students in Medical and other Health Professions. Med Sci [Internet]. 2020;8(2):23. https://doi.org/10.3390/medsci8020023
2. Aloufi MA, Jarden RJ, Gerdtz MF, Kapp S. Reducing stress, anxiety and depression in undergraduate nursing students: Systematic review. Nurse Educ Today [Internet]. 2021;102:104877. doi: https://doi.org/10.1016/j.nedt.2021.104877
3. McConville J, McAleer R, Hahne A. Mindfulness Training for Health Profession Students-The Effect of Mindfulness Training on Psychological Well-Being, Learning and Clinical Performance of Health Professional Students: A Systematic Review of Randomized and Non-randomized Controlled Trials. Explore (NY) [Internet]. 2017;13(1):26-45. doi: https://doi.org/10.1016/j.explore.2016.10.002
4. Wunsch K, Fiedler J, Bachert P, Woll A. The Tridirectional Relationship among Physical Activity, Stress, and Academic Performance in University Students: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health [Internet]. 2021;18(2):739. doi: https://doi.org/10.3390/ijerph18020739

5. Paloș R, Maricuţoiu LP, Costea I. Relations between academic performance, student engagement and student burnout: A cross-lagged analysis of a two-wave study, Stud Educ Evaluation [Internet]. 2019;60:199-204. https://doi.org/10.1016/j.stueduc.2019.01.005
6. Ari R, Sri A. Learning motivation and student achievement: descriptive analysis and relationships both. Couns-Edu [Internet]. 2017;2(1):42-47. doi: https://doi.org/10.23916/002017026010
7. Usán P, Salavera C, Quílez-Robres A. Self-Efficacy, Optimism, and Academic Performance as Psychoeducational Variables: Mediation Approach in Students. Children [Internet]. 2022:15;9(3):420. doi: https://doi.org/10.3390/children9030420
8. Talsma K, Robertson K, Thomas C, Norris K. COVID-19 Beliefs, Self-Efficacy and Academic Performance in First-year University Students: Cohort Comparison and Mediation Analysis. Front Psychol [Internet]. 2021:12:643408. doi: https://doi.org/10.3389/fpsyg.2021.643408
9. Huang C, Zeng X. Social and emotional development of disadvantaged students and its relationship with academic performance: evidence from China. Front Psychol [Internet]. 2023;14:1170656. doi: https://doi.org/10.3389/fpsyg.2023.1170656
10. Beltrán-Velasco AI, Donoso-González M, Clemente-Suárez VJ. Analysis of perceptual, psychological, and behavioral factors that affect the academic performance of education university students. Physiol Behav [Internet]. 2021;238:113497. doi: https://doi.org/10.1016/j.physbeh.2021.113497
11. Zeinalipour H. School Connectedness, Academic Self-Efficacy, and Academic Performance: Mediating Role of Hope. Psychol Rep [Internet]. 2022;125(4):2052-2068. doi: https://doi.org/10.1177/00332941211006926
12. Bandura A. Self-efficacy: the exercise of control. New York: W. H. Freeman and Company; 1997 [cited 2023 June 07]. Available from: https://www.academia.edu/28274869/Albert_Bandura_Self_Efficacy_The_Exercise_of_Control_W_H_Freeman_and_Co_1997_pdf
13. Meguid EMA, Smith CF, Meyer AJ. Examining the Motivation of Health Profession Students to Study Human Anatomy. Anat Sci Educ [Internet]. 2020;13(3):343-352. doi: https://doi.org/10.1002/ase.1919
14. Ma K, Chutiyami M, Zhang Y, Nicoll S. Online teaching self-efficacy during COVID-19: Changes, its associated factors and moderators. Educ Inf Technol [Internet]. 2021;26(6):6675-6697. doi: https://doi.org/10.1007/s10639-021-10486-3
15. Escobar M, Majewski HM, Qazi M, Rawajfih Y. Self-efficacy in STEM. In: Tierney RJ, Rizvi F, Ercikan K. International Encyclopedia of Education. 4th. Elsevier; 2023:388-394. doi: https://doi.org/10.1016/B978-0-12-818630-5.13049-0
16. Enny WE, Pujar LATA. Influence of self-efficacy on academic achievement of school children. Int J Res Appl Nat Soc Sci [Internet]. 2017;5(8):2321-8851. Available from: https://paper.researchbib.com/view/paper/129382
17. Miranda KKCO, Lima AS, Oliveira VCM, Telles CBS. Aulas remotas em tempo de pandemia: desafios e percepções de professores e alunos. Educação como reexistência: mudança, conscientização e conhecimentos. In: VII Congresso Nacional de Educação, Maceió; 2020. Available from: https://editorarealize.com.br/artigo/visualizar/68086
18. Andreza RS, Alves EJS, Martins LH, Silva RH, Silva SDA, Nogueira TL, et al. Os impactos da COVID-19 na educação por meio do ensino remoto. Rev Interfaces [Internet]. 2020;8(3):630-635. doi: https://doi.org/10.16891/840
19. Amaral E, Polydoro SAJ. Os desafios da mudança para o ensino remoto emergencial na graduação na Unicamp - Brasil. Linha Mestra [Internet]. 2020;14(41a):52-62. doi: https://doi.org/10.34112/1980-9026A2020N41AP52-62
20. Aristovnik A, Keržič D, Ravšelj D, Tomaževič N, Umek L. Impacts of the Covid-19 Pandemic on Life of Higher Education Students: Global Survey Dataset from the First Wave. Data Brief [Internet]. 2021;39:107659. doi: https://doi.org/10.1016/j.dib.2021.107659
21. Keržič D, Alex JK, Pamela BAR, Bezerra DDS, Cheraghi M, Dobrowolska B, et al. Academic student satisfaction and perceived performance in the e-learning environment during the COVID-19 pandemic: Evidence across ten countries. PLoS One [Internet]. 2021;16(10):e0258807. doi: https://doi.org/10.1371/journal.pone.0258807

22. Souza I, Souza MA. Validação da Escala de Autoeficácia Geral Percebida. Rev Univ Rural [Internet].2004;26(2):12-17. Available from: https://www.researchgate.net/publication/260338439_Validacao_da_Escala_de_Autoeficacia_Geral_Percebida
23. Freitas EO, Silva NRD, Silva RMD, Souto VT, Pinno C, Siqueira DF. Self-evaluation of nursing students about their academic performance during the COVID-19 pandemic. Rev Gaucha Enferm [Internet]. 2022;43:e20210088. doi: https://doi.org/10.1590/1983-1447.2022.20210088.en
24. Dosea GS, Rosário RWS, Silva EA, Reis Firmino L, Oliveira AMS. Métodos ativos de aprendizagem no ensino online: a opinião de universitários durante a pandemia de COVID-19. Educação [Internet]. 2020;10(1):137-148. doi: https://doi.org/10.17564/2316-3828.2020v10n1p137-148
25. Ferreira Neto B, Silva JC, Santos MC, Santos CEC, Teixeira Neto G, Nogueira MS, et al. A percepção dos discentes em relação aos processos de ensino e aprendizagem no período remoto em meio a pandemia. Braz J Dev [Internet]. 2021;7(5):53013-53031. doi: https://doi.org/10.34117/bjdv7n5-547
26. Andersson C, Bendtsen M, Molander O, Lindner P, Granlund L, Topooco N, et al. Academic self-efficacy: Associations with self-reported COVID-19 symptoms, mental health, and trust in universities' management of the pandemic-induced university lockdown. J Am Coll Health [Internet]. 2022;17:1-6. doi: https://doi.org/10.1080/07448481.2022.2145893
27. Hayes C, Mears M, Rowan S, Dong F, Andrews E. Academic performance and attitudes of dental students impacted by COVID-19. J Dent Educ [Internet]. 2022;86(7):874-882. doi: https://doi.org/10.1080/10.1002/jdd.12897
28. Martins YVM, Padilha WWN. Estratégias pedagógicas de inclusão e retenção de estudantes em tempos de pandemia: relato de experiência. Rev ABENO [Internet]. 2021;21(1):1263. Available from: https://revabeno.emnuvens.com.br/revabeno/article/view/1263

Conflict of Interest: The authors declare no conflict of interest.

Funding: No funding to declare.

Acknowledgements: We would like to thank the study participants.

Authors' contributions: Study design and planning: FRZ, FLM. Data collection: FRZ. Data analysis and interpretation: FRZ, LRAC, FLM. Manuscript drafting or review: FRZ, LRAC, FLM. Final version approval: FRZ, LRAC, FLM. Public responsibility for the study content: FRZ, LRAC, FLM.