

# Psychological variables and their impact on academic achievement in higher education

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## ABSTRACT

Studies emphasize the role of psychological variables as favoring knowledge acquisition and transversal competencies in Higher Education, as well as students' performance and academic success. Among the psychological variables, self-efficacy perception, motivation to learn and learning strategies stand out. This study aimed to evaluate the relationship between these variables and their impact on academic success, as assessed by the performance coefficient. The study enrolled 521 students of both sexes, of different year of study, in the three areas of knowledge. Data indicate a correlation between the studied psychological variables, which explained about 11% of the variation in academic performance, with fluctuations in this percentage explained according to the scientific area of the courses. Strong correlations were observed between self-efficacy and extrinsic motivation with academic performance, highlighting the need for new investigations about learning strategies.

## KEYWORDS

academic achievement; self-efficacy; motivation; learning strategies; higher education.

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## *VARIÁVEIS PSICOLÓGICAS E SEU IMPACTO NO RENDIMENTO ACADÊMICO NO ENSINO SUPERIOR*

### RESUMO

Estudos enfatizam o papel de variáveis psicológicas como favorecedoras da aquisição de conhecimentos e de competências transversais no Ensino Superior, assim como do desempenho e sucesso acadêmico dos estudantes. Entre as variáveis psicológicas, destacam-se a percepção de autoeficácia, a motivação para aprender e as estratégias de aprendizagem. Este estudo objetivou avaliar a relação entre tais variáveis e seu impacto no sucesso acadêmico, avaliado por meio do coeficiente de rendimento. Participaram 521 estudantes de ambos os gêneros, em diferentes anos de formação e de cursos das três áreas de conhecimento. Os dados indicam correlação entre as variáveis psicológicas estudadas, que explicam 11% da variação do rendimento acadêmico, havendo oscilações nessa percentagem em função da área científica dos cursos. Observaram-se fortes correlações da autoeficácia e da motivação extrínseca com o rendimento, e indica-se a necessidade de novas investigações acerca das estratégias de aprendizagem.

### PALAVRAS-CHAVE

rendimento escolar; autoeficácia; motivação; estratégias de aprendizagem; ensino superior.

## *VARIABLES PSICOLÓGICAS Y SU IMPACTO EN EL RENDIMIENTO ACADÉMICO EN LA ENSEÑANZA SUPERIOR*

### RESUMEN

Estudios enfatizan las variables psicológicas como favorecedoras de la adquisición de conocimientos y de competencias transversales en la Enseñanza Superior, así como en el desempeño y éxito académico de los estudiantes. De entre las variables psicológicas, se destaca la percepción de autoeficacia, la motivación por aprender y las estrategias de aprendizaje. Este estudio tenía como objetivo evaluar la relación entre tales variables y su impacto en el éxito académico. Participaron 521 estudiantes de ambos sexos, con diferentes años de formación y cursos de las tres áreas de conocimiento. Los datos indican correlaciones entre las variables psicológicas, explicando en torno al 11% de la varianza del rendimiento académico. Se observaron fuertes correlaciones de la autoeficacia y de la motivación extrínseca con el rendimiento académico, así como la necesidad de nuevas investigaciones acerca de las estrategias de aprendizaje.

### PALABRAS CLAVE

rendimiento escolar; autoeficacia; motivación; estrategias de aprendizaje; enseñanza superior.

## INTRODUCTION

The expansion of higher education (HE) is a global phenomenon, and reflects the concern of societies about increasing the educational levels of their populations, in response to the growing needs for social, economic and technological development and for professionals with improved scientific and technical qualifications. Barakat and Shields (2019) defend universal access to HE and, according to them, there is no limit to the expansion of HE, as was the case with basic education. However, an increase in the number of seats should provide opportunities for the democratization of education (Barbosa, 2019), with strategies to ensure equity in student attendance and the effective, successful completion of this formative stage (Franco, 2008; Almeida *et al.*, 2012).

Currently, a significant number of young people start HE after completing high school or secondary education. However, students have different reasons and expectations when starting this stage (Fleith *et al.*, 2020). When coming from privileged social classes, young people usually seek personal fulfillment; on the other hand, students from less privileged groups are primarily focused on finding a better job (Borges, 2018). An increase in the number of seats and the consequent heterogeneity of students further enhance challenges of adaptation that are widely discussed in HE studies (Cunha, Carrilho and 2005; Almeida, 2007; Araújo *et al.*, 2016; Santos, Ferraz and Inácio, 2019) and highlight the importance of actions from educational institutions favoring the academic success of students (Almeida, 2019). In a time of major development of science, broad knowledge production and dissemination, and constant transformations, the objective of education, and particularly HE, is to develop autonomy of students, allowing them to build knowledge and interpret the world that surrounds them, preparing them to learn over time and properly use such knowledge (Delors, Murad and Rocha, 2005; Herrera-Torres and Lorenzo-Quiles, 2009; Pimenta and Anastasiou, 2010).

Studies in educational psychology emphasize the role of psychological variables as favoring the processes of acquisition of knowledge and transversal skills in HE, as well as academic performance and success (Miranda and Almeida, 2009; Guerreiro-Casanova and Polydoro, 2011; Monteiro, Almeida and Vasconcelos, 2012; Kyndt *et al.*, 2019). Among the different psychological variables studied, three seem determinant for student learning and academic success: perceptions of self-efficacy, motivation to learn, and learning strategies.

Self-efficacy perception is conceived as an individual's belief in his or her own capacity to organize and perform actions to achieve certain goals (Bandura, 1977), constituting a critical factor not only in learning, but also in the way people build and live their lives (Bandura, 2017). According to the Social Cognitive Theory, individuals exercise control over the consequence of their actions from the point of view of human agency (Schunk and Dibenedetto, 2015). In the educational context, self-efficacy beliefs influence the academic goals set by students and their commitment to achieving such goals, affecting their final academic performance (Zimmerman, Bandura and Martinez-Pons, 1992; Bandura, 1993).

Zimmerman (2000) states that self-efficacy is a clear predictor of motivation and learning. Several studies assessing the self-efficacy of students in HE indicate its influence on student efforts, persistence to perform an activity, acquisition of new skills and, consequently, the academic results achieved (Bong, 2001; Jakubowski and Dembo, 2004; Zajacova, Lynch and Espenshade, 2005; Pajares, 2016). Komarraju and Nadler (2013), when evaluating the relationship between the academic performance and self-efficacy of university students, highlight the essential role of the latter as a variable that facilitates the use of learning strategies and other crucial resources for successful academic performance.

In Brazil, a review of articles published between 2002 and 2013 identified 15 papers about self-efficacy, with only four of them addressing HE, with a focus on instrument validation and its correlation with academic experiences (Iaochite *et al.*, 2016). The authors of this review emphasize that the number of Brazilian publications is very low when compared to the international production and stress the need to expand studies about this construct, considering the diversity of Brazilian contexts. Recent articles that analyzed self-efficacy beliefs related to learning strategies (Martins and Santos, 2018) or academic satisfaction (Santos, Ferraz and Inácio, 2019) found positive correlations between such variables and underlined the importance of developing new studies and proposals for intervention based on self-efficacy, given its high potential to improve adaptation processes and the academic success of students.

Besides being strongly related to self-efficacy, motivation is another important variable that helps to understand human behaviors. It can be defined as internal processes that give energy and direction to behavior (Seli and Dembo, 2012), or, in other words, the willingness to make physical or mental efforts focused on a goal or outcome (Rodríguez, 2006; Schunk, Meece and Pintrich, 2012). Theorists in this field — most particularly the authors of the Self-Determination Theory (Deci and Ryan, 2000) — consider it a continuum in which, at one end, there will be demotivation, extrinsic motivation and its forms of regulation (ranging from the most external to integrated regulation), and, at the other, there will be intrinsic motivation. In general terms, extrinsic motivation, in its most extreme characterization, would be associated with engagement in actions due to the need to avoid punishment and the search for reward or recognition, while intrinsic motivation would be inherent to the activity itself and would be related to actions performed by choice, interest or pleasure (Deci and Ryan, 2000; 2002; Reeve, 2002; Boruchovitch, 2008; Sogunro, 2015; Bzuneck and Boruchovitch, 2019; Ryan and Deci, 2017; 2020). In terms of motivation in its various forms, people can act because they value an activity or for personal interest, but they can also engage in it due to coercion or fear, for example.

Academic motivation can be understood as the tendency of a student to engage in meaningful and valuable academic activities in order to obtain the intended benefits (Zeynali, Pishghadam and Hosseini Fatemi, 2019). Thus, motivation is associated with the quality of student involvement in the learning process. Studies in this field indicate higher academic success when students are guided by intrinsic or autonomous motivation, that is, when they learn how to perform curricular activities due to their real desire to learn or when they recognize the importance of

the activity for their own learning (Busato *et al.*, 2000; Sobral, 2009; Kyndt *et al.*, 2019; Zeynali, Pishghadam and Hosseini Fatemi, 2019).

A third psychological variable that is essential for academic success is learning strategies, which refer to the techniques, processes, or activities performed by students under a task or to achieve learning objectives (Bembenuddy, Cleary and Kitsantas, 2013; Wang *et al.*, 2013; McCombs, 2017; Oliveira and Caliatto, 2018; Weinstein and Acee, 2018). According to Boruchovitch and Santos (2006), despite the different taxonomies found in the literature, learning strategies can be organized into two major groups: cognitive and metacognitive (Garner and Alexander, 1989; Dembo, 1994; Seli and Dembo, 2012). Cognitive strategies are related to the organization, treatment, and storage of information; metacognitive strategies involve planning, monitoring, and regulation of cognitive, motivational, affective, and behavioral aspects involved in the learning process (Weinstein, Acee and Jung, 2011; Boruchovitch and Santos, 2015; Weinstein and Acee, 2018). The conscious use of learning strategies favors reflection and self-assessment, as well as diversification of study methods, resulting in improved academic performance (Oliveira, Boruchovitch and Santos, 2009; Valadas, Araújo and Almeida, 2014; Weinstein and Acee, 2018).

Studies show a positive relationship between the use of learning strategies and academic success (Zimmerman and Schunk, 2011; Rotgans and Schmidt, 2012; Tinajero *et al.*, 2012; Wang *et al.*, 2013; Weinstein and Acee, 2018). In addition, the correlation between learning strategies, self-efficacy, and motivation ranges from moderate to strong (Yusuf, 2011; Martins and Santos, 2018). It suggests an interdependence of these three variables and their possible joint influence on the learning and academic success of university students. Some studies also report that university students do not always have proper learning strategies, or use them inadequately, which suggests the importance for interventions to promote them (Alcará and Santos, 2013; Lins, 2014).

Taking into account both the relevance of this theme and the importance of the aforementioned variables to help understand academic success in HE, and given the scarcity of studies in Brazil about this topic (Bertolin and Marcon, 2015), this study aimed to analyze how self-efficacy beliefs, motivation to learn, and learning strategies impact the academic performance of students. Moreover, associations with some socioeconomic and family variables of the students were added in our analyses. Of note, in view of the multiplicity of concepts regarding academic success in HE (Sá, Ferreira and Ramos, 2015; Araújo, 2017), we focused on student academic achievement in our study, in line with most other research (Richardson, Abraham and Bond, 2012; Isaza Valencia, 2014; Valadas, Araújo and Almeida, 2014; Zeynali, Pishghadam and Hosseini Fatemi, 2019).

## METHOD

### PARTICIPANTS

In total, 521 students from a private university in the State of Rio de Janeiro, Brazil, participated in this study. They were of both genders, but mostly female ( $n =$

341, 65.5%). Ages ranged from 18 to 62, with a mean of 22.59 (standard deviation — SD = 5.01). The sample consisted of students from all years of the courses, which had different durations: 124 (23.8%) students were from the first year, 126 (24.2%) were from the second, 61 (11.7%) from the third, 125 (24%) from the fourth, 63 (12.1%) from the fifth, and 22 (4.2%) from the sixth (only Medicine is a six-year course). The courses were from three fields of knowledge: 20.7% were humanities courses (law, administration, accounting science, teaching license in biological sciences, journalism, advertising and marketing, and social work); 63.1% were from the health fields (nursing, biological sciences, physical education, medicine, nutrition, and dentistry); and 16.1% were exact sciences courses (design, environmental engineering, civil engineering, production engineering, electrical engineering, mechanical engineering, and information systems). Seven students from the first year who participated in the study stopped or quit the course without completing the first semester and, therefore, did not provide enough data for their academic performance coefficient (APC) to be estimated.

## INSTRUMENTS

Four assessment instruments were used, namely a socioeconomic questionnaire and a scale for each of the three constructs to be assessed (self-efficacy, motivation to learn, and learning strategies). The psychometric characteristics of the three scales were evaluated in a previous study, and the multidimensional models tested were used in this article (Casiraghi, Almeida and Boruchovitch, in press).

*Socioeconomic questionnaire:* developed specifically for this study, it concerned students' personal data: age, sex, level of education of mother and father, whether the chosen course was their first option, whether that institution was their first option, whether they had to leave their parents' house to attend HE, and their perception of academic classifications.

An authorized translation of *Self-efficacy for Learning Form* by Barry Zimmerman and Anastasia Kitsantas, 2007 (*Escala de Autoeficácia para a Aprendizagem*, translated by Boruchovitch and Ganda, 2010): with Likert-type items ranging from 0 to 100%, according to the following rates: 0% (definitely not able to do it), 30% (probably not), 50% (perhaps), 70% (probably yes), and 100% (definitely able to do it). The items refer to activities from three academic situations: study, exam preparation, and classroom notes. For example, “*When you miss a class, are you able to find another student who can explain the subject to you as clearly as the teacher?*” High scores on the scale show a tendency towards more positive beliefs of self-efficacy in learning. In terms of construct validity, it is a one-dimensional scale, as indicated by its authors (Zimmerman and Kitsantas, 2007), assessed with a confirmatory factor analysis and a high index of internal consistency (Cronbach's alpha = 0.89) in a previous study (Casiraghi, Almeida and Boruchovitch, in press).

*Motivation to Learn Assessment Scale for University Students* (*Escala de Avaliação da Motivação para Aprender de Alunos Universitários* — EMA-U; Boruchovitch and Neves, 2005; Boruchovitch, 2008): developed based on literature in the field (Amabile *et al.*, 1994), with Likert-type items and four response options ranging from “strongly agree” to “strongly disagree.” The initial scale validation by Borucho-

vitch (2008) revealed a two-factor structure with 26 items: 14 of intrinsic content and 12 of extrinsic content. Our previous study confirmed the two-dimensional structure of the scale, using only 19 items (10 of intrinsic motivation, Cronbach's alpha of 0.82; and 9 of extrinsic motivation, Cronbach's alpha = 0.84) (Casiraghi, Almeida and Boruchovitch, in press).

*Learning Strategies Assessment Scale for University Student (Escala de Avaliação das Estratégias de Aprendizagem para Estudantes Universitários — EEA-U*; Santos and Boruchovitch, 2008): assesses the frequency of using learning strategies by university students. Items were distributed in three factors: cognitive and metacognitive self-regulation, self-regulation of internal and contextual resources, and social self-regulation. The answers are provided as a Likert-type scale with four options, ranging from “never” to “always,” with higher scores indicating more strategic students. A previous study of scale validation used 19 items: 10 of cognitive and metacognitive self-regulation ( $\alpha = 0.83$ ), 5 of self-regulation of internal and contextual resources ( $\alpha = 0.80$ ), and 4 of social self-regulation ( $\alpha = 0.74$ ) (Casiraghi, Almeida and Boruchovitch, in press).

#### DATA COLLECTION PROCEDURE

After project approval by the Research Ethics Committee under nº 96352018.5.0000.5237, data collection was conducted using an electronic form accessed by a link or QR Code. The participants were contacted directly by email or social media. The students were informed of the study objectives and gave their informed consent for their free participation. Their names and registration numbers were requested to enable the collection of academic performance data. Besides, all measures were adopted to ensure data confidentiality and security.

Academic performance data, or the academic performance coefficient (APC), calculated from the average of students from all disciplines attended until the moment of data collection, were obtained from the academic services of the educational institution. The APC at this institution ranges from 0 to 10 and the grade required for approval without final exams is 7.

#### DATA ANALYSIS PROCEDURE

Statistical analysis was performed using IBM SPSS Statistics for Windows software (version 26.0). Scores of studied variables were obtained by adding the responses provided in each dimension and, for self-efficacy, through the arithmetic mean of the responses, as reported by Boruchovitch and Ganda (2010).

First, descriptive analyses and statistical tests were performed to compare mean values. In comparisons of two subgroups, t-test was used for independent samples; when the comparisons involved more than two groups of students, data were submitted to one-way analysis of variance (using the F-test). In this case, when the F value was statistically significant, it was complemented with a contrasts analysis using the Tukey test to identify in which subgroups of students such difference was statistically significant. Then, hierarchical linear regression was performed, assuming APC as the criterion variable and, as explanatory variables, the first group



of personal and socioeconomic variables (group 1: sex, age, education level of the father and mother, whether the course and institution they attend were their first choice, and whether they left their parents' house to attend HE); and the second group of psychological variables (group 2: self-efficacy, intrinsic motivation, extrinsic motivation, cognitive and metacognitive self-regulation, self-regulation of internal and contextual resources, social self-regulation). This hierarchical regression analysis considered the global sample of students and, given the curricular specificity of the courses and potential differences in teaching, learning, and assessment processes, it was repeated, using the scientific fields of the courses the students were enrolled in (exact sciences, humanities, health).

## RESULTS

Values of skewness ( $Sk$ ) and kurtosis ( $Ku$ ) were lower than or very close to 1, indicating a normal distribution of the data in the sample. Descriptive results (Table 1) showed high mean values, closer to maximum scores, in APC, intrinsic motivation, cognitive and metacognitive self-regulation, and self-regulation of internal and contextual resources. Self-efficacy, on the other hand, had the lowest mean, when compared to the maximum score, weighting the number of items in each dimension of the scale.

Table 2 shows data related to the means of academic performance of sample students. Given the diversity of students in the sample, the presentation is based on some personal and academic variables, also checking whether the fluctuations in mean values show a statistically significant difference. Then, academic performance is analyzed according to sex, age group (under 20 years old, 20–24 years old, and over 24 years old), the scientific field of the course (exact sciences, humanities, or health), stage of the student training (start, ongoing, end), whether the course and institution they attend are their first choice (yes or no), and whether attending HE forced them to leave their parents' house (yes or no).

The mean value of APC was higher among female students and lower among students from exact sciences (7.49), followed by students from health courses (7.64), and highest among students from humanities (7.81). However, this difference was only statistically significant when students from exact sciences and humanities were compared ( $p < 0.05$ ). Regarding the stage of course, students in the beginning of the course tend to present higher performance, reduced performance during the course, and increased performance as they reach the end of the course. Students who did not have that institution as their first option had significantly higher means than those who wanted to attend it. However, studying their first-choice course, leaving their parents' house, and age were not relevant to score differentiation.

Table 3 shows APC had significant positive correlations with self-efficacy, intrinsic and extrinsic motivation, and self-regulation of internal and contextual resources. Strong and moderate significant correlations ( $p < 0.01$ ) were identified between the psychological variables, except between extrinsic motivation and social self-regulation, which showed significant negative correlation ( $p < 0.05$ ).



**Table 1 – Descriptive results of studied variables.**

	Min.	Max.	<i>M</i>	<i>SD</i>	<i>Sk</i>	<i>Ku</i>	$\alpha$
APC	4.00	9.50	7.65	0.90	-0.81	1.25	-
Self-efficacy	1.17	10.00	6.30	1.60	-0.20	-0.32	0.87
Intrinsic motivation	13.00	40.00	32.89	4.59	-0.72	0.54	0.81
Extrinsic motivation	9.00	36.00	24.88	5.56	-0.40	-0.36	0.84
Cognitive and metacognitive self-regulation	10.00	40.00	32.78	4.79	-0.89	1.02	0.80
Self-regulation of internal and contextual resources	5.00	20.00	16.51	2.99	-0.96	0.91	0.81
Social self-regulation	4.00	16.00	12.11	2.65	-0.53	-0.13	0.76

SD: standard deviation; APC: academic performance coefficient.  
Source: Research database. Developed by the authors.

**Table 2 – Means of academic performance as a function of student variables.**

	N	Mean	SD	
Sex				
Male	176	7.53	0.92	t = -2.24, p = 0.025
Female	338	7.71	0.89	
Age				
<20	127	7.73	0.89	F(2.511) = 1.06, p = 0.346
20–24	284	7.65	0.90	
>24	103	7.55	0.92	
Field				
Exact sciences	79	7.49	1.30	F(2.511) = 3.10, p = 0.046
Humanities	107	7.81	0.85	
Health	328	7.64	0.79	
Stage				
Beginners	100	7.86	0.95	F(2.511) = 3.74, p = 0.024
In the middle	311	7.58	0.86	
In the end	103	7.67	0.96	
Was the chosen course your first option?				
Yes	316	7.67	0.86	t = 0.513, p = 0.609
No	198	7.62	0.96	
Was the institution you attend your first option?				
Yes	216	7.50	0.98	t = -3.159, p = 0.002
No	298	7.76	0.83	
Did you have to leave your parents' house to attend HE?				
Yes	175	7.65	0.79	t = -0.073, p = 0.942
No	339	7.65	0.95	

Source: Research database. Developed by the authors.

**Table 3 – Correlation between studied variables.**

	APC	SE	Int_Mot	Ext_Mot	CM_SR	SR_ICR	S_SR
APC		0.290***	0.182***	0.300***	0.084	0.097*	-0.075
SE			0.489***	0.303***	0.427***	0.493***	0.123**
Int_Mot				0.219**	0.497**	0.449**	0.179**
Ext_Mot					0.137**	0.135**	-0.089*
CM_SR						0.606**	0.293**
SR_ICR							0.239**
S_SR							

APC: academic performance coefficient; SE: self-efficacy; Int\_Mot: intrinsic motivation; Ext\_Mot: extrinsic motivation; CM\_SR: cognitive and metacognitive self-regulation; SR\_ICR: self-regulation of internal and contextual resources; S\_SR: social self-regulation; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Source: Research database. Developed by the authors.

The hierarchical regression model used to explain academic performance (APC), based on socioeconomic and personal variables (group 1) and psychological variables (group 2) assessed in this study was statistically significant:  $F(7.506) = 8.67$ ,  $p < 0.001$ . Among the variables of group 1, sex and whether the student attends first-option institution had a significant contribution to explaining academic performance, although the variables in group 1 explain only 4% of the APC variance. When psychological variables were considered (group 2), the model explained 16% of the APC variance; self-efficacy and extrinsic motivation presented statistical significance (Table 4).

The same set of variables, when considering the students grouped by knowledge field, presents different results in explaining academic performance. For exact sciences, the model was significant:  $F(13.65) = 3.43$ ,  $p < 0.001$ , with group 1 explaining 18% of the APC variance. The only significant variable was age, indicating that younger students presented higher academic performance. With the inclusion of psychological variables, the model explains 29% of the APC variance among students from exact sciences, which was mainly affected by intrinsic motivation. A slightly lower percentage of explained variance was observed in health courses, which also had a strongly significant model:  $F(13.314) = 9.70$ ,  $p < 0.001$ . Group 1 of variables explains 13% of the APC variance and both groups combined explain 26%. In the humanities courses, only the model with the two groups was significant:  $F(13.93) = 1.98$ ,  $p < 0.05$ , explaining 11% of the APC variance among these students (Table 5).

## DISCUSSION

According to the descriptive data, the students had academic performance above the score for being approved, without requiring final exams. Considering that they answered the survey electronically, the sample may have presented some

**Table 4 – Summary of hierarchical regression coefficients.**

Explanatory variables	B	SD (B)	$\beta$	R <sup>2</sup>	$\Delta R^2$	F
Group 1						
Sex	0.19	0.08	0.10*	0.05	0.04	3.83***
Age	0.00	0.01	-0.02			
Education level – mother	0.05	0.03	0.09			
Education level – father	0.04	0.02	0.08			
The chosen course was the first option	-0.04	0.08	-0.02			
The chosen institution was the first option	0.21	0.08	0.12*			
To attend HE, the student had to leave the parents' house	0.11	0.09	0.06			
Group 2						
Self-efficacy	0.15	0.03	0.26*	0.18	0.16	8.67***
Intrinsic motivation	0.02	0.01	0.09			
Extrinsic motivation	0.03	0.01	0.17*			
Cognitive and metacognitive self-regulation	-0.01	0.01	-0.04			
Self-regulation of internal and contextual resources	-0.02	0.02	-0.07			
Social self-regulation	-0.03	0.01	-0.07			

SD: standard deviation; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001.

Source: Research database. Developed by the authors.

bias, i.e., most students who accepted to participate in the study may have been those who were more interested in or more concerned about their learning and their academic performance.

The results indicate a strong positive correlation between the psychological variables, which is in agreement with literature data that reports self-efficacy, motivation, and learning strategies as correlated with each other and with academic performance (Yusuf, 2011; Valadas, Araújo and Almeida, 2014; Martins and Santos, 2018). Only extrinsic motivation had a weak and negative correlation with learning strategies related to social self-regulation, indicating that more extrinsically motivated students employed fewer strategies such as studying in groups or with the help of colleagues. The literature shows that extrinsically motivated students tend to be more concerned about their performance, with doing well, and doing better than their colleagues (Ames, 1992; Deci and Ryan, 2000; Sogunro, 2015; Bzuneck and Boruchovitch, 2019). The result may be related to this fact, so future studies are recommended in order to assess this hypothesis in larger and more representative samples.

**Table 5 – Hierarchical regression results according to the scientific fields of student courses.**

Field	Explanatory variables	B	SD (B)	β	R <sup>2</sup>	ΔR <sup>2</sup>	F	
Exact sciences	Group 1	Sex	0.43	0.28	0.17	0.25	0.18	3.44**
		Age	-0.19	0.05	-0.40***			
		Education level of mother	-0.04	0.09	-0.05			
		Education level of father	0.04	0.08	0.06			
		The chosen course was the first option	0.21	0.28	0.08			
		The chosen institution was the first option	0.22	0.29	0.09			
	To attend HE the student had to leave the parents' house	0.13	0.37	0.04				
	Group 2	Self-efficacy	0.12	0.11	0.15	0.41	0.29	3.43***
		Intrinsic motivation	0.08	0.03	0.33*			
		Extrinsic motivation	0.02	0.03	0.09			
		Cognitive and metacognitive self-regulation	-0.03	0.04	-0.14			
		Self-regulation of internal and contextual resources	-0.01	0.06	-0.03			
		Social self-regulation	-0.11	0.07	-0.22			
	Humanities	Group 1	Sex	0.36	0.19	0.21	0.09	0.02
Age			0.00	0.01	-0.03			
Education level of mother			0.06	0.06	0.12			
Education level of father			0.01	0.05	0.01			
The chosen course was the first option			-0.04	0.17	-0.02			
The chosen institution was the first option			-0.32	0.16	-0.19			
To attend HE the student had to leave the parents' house		0.00	0.24	0.00				
Group 2		Self-efficacy	0.15	0.07	0.30*	0.22	0.11	1.98*
		Intrinsic motivation	-0.01	0.02	-0.03			
		Extrinsic motivation	0.04	0.01	0.26*			
		Cognitive and metacognitive self-regulation	-0.01	0.03	-0.08			
		Self-regulation of internal and contextual resources	-0.02	0.04	-0.07			
		Social self-regulation	-0.02	0.03	-0.05			
Health		Group 1	Sex	-0.02	0.09	-0.01	0.15	0.13
	Age		0.01	0.01	0.08			
	Education level of mother		0.08	0.03	0.16*			
	Education level of father		0.05	0.03	0.12			
	The chosen course was the first option		-0.18	0.09	-0.10*			
	The chosen institution was the first option		0.42	0.09	0.26***			
	To attend HE the student had to leave the parents' house	0.12	0.09	0.08				
	Group 2	Self-efficacy	0.13	0.03	0.26***	0.29	0.26	9.70***
		Intrinsic motivation	0.01	0.01	0.03			
		Extrinsic motivation	0.03	0.01	0.21***			
		Cognitive and metacognitive self-regulation	-0.01	0.01	-0.05			
		Self-regulation of internal and contextual resources	-0.01	0.02	-0.05			
		Social self-regulation	-0.02	0.02	-0.06			

SD: standard deviation; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001.  
 Source: Research database. Developed by the authors.

According to the general analysis of factors that influence academic performance, demographic and socioeconomic variables accounted for only 4% of the variance in the global sample of students, with statistically significant coefficients obtained for gender, favorable to female students, and studying at the first-choice institution, favorable to students who were not at the institution of first choice. This result can be explained by the fact that, in the Brazilian context, most students want to study at public institution, but are unable to due to the insufficient number of seats. In Brazil, the differences in supply and quality between public and private institutions influence the selection of a first-choice course or institution, considering it depends on family income, the quality of basic education students had, course availability in their region, or class time allowing students to have a job. Thus, the better results among students who did not intend to study at their particular educational institution can be justified by their preparation for the admission exam to a public institution, which has highly competitive selection process. On the other hand, differences in performance as a function of gender are consistent with several other studies reporting better academic performance among female students (Alemán, Trías and Curione, 2011; Oyarzún Iturra *et al.*, 2012; Barahona, 2014).

In general, the psychological variables affected academic performance by 12%, with particular relevance of self-efficacy and extrinsic motivation. Although the effects of self-efficacy are expected and widely discussed in the literature (Zimmerman, 2000; Jakubowski and Dembo, 2004; Pajares, 2016), data favoring extrinsic motivation, rather than intrinsic motivation, indicate that, in HE, school classifications by students are more related to external support aimed at recognition and classification itself, different from what would be ideally expected (Busato *et al.*, 2000; Sobral, 2009; Zeynali, Pishghadam and Hosseini Fatemi, 2019).

Besides these aspects, an unusual factor was observed in our study: learning strategies were not significant in academic performance and was a negative variable, indicating that cognitive and metacognitive strategies, as reported by the students, did not lead to higher levels of academic performance. The impact of extrinsic motivation and the lack of relevance of different learning strategies indicate that the higher APCs found in our sample are not necessarily linked with attitudes and behaviors associated with deeper and more comprehensive learning. In addition, some authors suggest, contrary to what would be expected, that HE students do not always use or know how to use learning strategies (Bembenuddy, 2011; Biwer *et al.*, 2020).

The analysis of students by field of knowledge showed relevant differences between these groups. Demographic and socioeconomic variables were not significant in APC variance of students from humanities courses, but they explained 18% of the APC variance of students from exact sciences and 13% of that of students from health courses. Among students from exact sciences, age was the main characteristic, with younger students presenting better performance, which can be justified by their easy retention of information, required in disciplines like calculus and physics — more easily handled by students who attended high school more recently; or because of their available time to dedicate to studies, which is more difficult for university students who work and have other activities (Alemán, Trías

and Curione, 2011; Barahona, 2014). Younger students may have more recent study habits and academic knowledge versus older students, who may have been away from school for some years. In addition, older students tend to have other roles or family and social responsibilities, which may be an obstacle to attend classes regularly and/or properly perform school activities.

Among the students from health courses, mother's education level, studying the first-choice course, and not attending the first-choice institution were variables that significantly impacted academic performance. When analyzing the socioeconomic variables of health students, the presence of a significant number of medical students must be considered. Medical courses in private institutions in Brazil require high investments, as monthly fees are equivalent to 5–15 minimum wages and involve more rigorous and disputed selection processes than other courses from different fields.

The influence of mother's education level on these students' performance may be associated with the fact that their families have better financial conditions, allowing investments in education, and their greater exposure to formal knowledge, providing richer cultural capital and more information about their possibilities in HE (Noro and Moya, 2019). Attending the first-choice course, which at first may seem an important factor for performance, is only relevant among health students and not associated with intrinsic motivation — an intriguing result of our study. A possible explanation is that choosing professions of high prestige or easy financial return may be more related to social recognition than personal satisfaction.

Regarding the psychological variables, their impact on performance ranged from 9 to 13%, only for students from exact sciences, with intrinsic motivation as a significant factor, while the effects of self-efficacy and extrinsic motivation were significant for students from humanities and health. Contrary to expectations, in all scientific fields, the use of learning strategies was not significant for APC; in fact, students reporting greater use of cognitive and metacognitive learning strategies seemed to present lower academic performance. This result highlights the limitations of self-report analyses, as the answers and assessments of students do not always reflect their behaviors. Even so, these data also question how the students of our sample are being evaluated and how their classifications are obtained. This justifies further studies, as these data contradict the idea that more and better learning strategies lead to better academic performance (Oliveira, Boruchovitch and Santos, 2009; Valadas, Araújo and Almeida, 2014; Araújo, 2017; Weinstein and Acee, 2018).

## FINAL REMARKS

Academic success in higher education is a complex and multifaceted phenomenon, involving student-related factors and variables associated with courses, teaching methodologies, and teacher assessment, or characteristics of the educational institutions themselves (Almeida, 2007; Araújo, 2017). Even though some studies, such as ours, analyze student variables, it is important to recognize such complexity when developing measures or interventions to promote academic success in HE. In addition, measurements of academic success is a topic of discussion, as

academic performance becomes a reference in most studies, but does not always explain, for example, student satisfaction with their results or the quality of the skills or learning acquired.

Also, the scarcity of studies assessing psychological variables as predictors of academic success in the Brazilian educational scenario shows the importance of conducting research to explain significant portions of this phenomenon. Thus, by investigating the impact of selected psychological, personal, and sociodemographic variables on academic performance, our study results show a moderate explanatory power.

The impact of this group of variables on academic performance has a relation with the scientific field of the courses. In exact sciences and health, these variables have a stronger impact than in humanities. This situation once again highlights the complexity of the academic performance phenomenon in HE and the relevance of the curricular structure and teaching-learning-assessment methodologies in the different HE courses.

Despite the limitations resulting from sample characteristics and self-report analysis, the results related to the positive impact of extrinsic motivation and the negative correlation of learning strategies with academic performance certainly indicate further studies must be conducted to identify the specificities of these variables and correlate academic performance with teaching and assessment strategies adopted by professors and institutions, considering the specificities of each field of knowledge or course.

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