

# Factors associated with the academic performance of Nutrition students at a public university in southern Brazil

## *Fatores associados ao desempenho acadêmico de estudantes de Nutrição de uma universidade pública do sul do Brasil*

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### ABSTRACT

#### Objective

To assess the association of socioeconomic factors, characteristics of the academic trajectory, and curriculum of students of a Nutrition course in the academic performance in the *Exame Nacional de Desempenho dos Estudantes*.

#### Methods

A study of cross-sectional panels with secondary data (*Exame Nacional de Desempenho dos Estudantes* 2004, 2007, 2010, 2013, 2016, and 2019) of 174 graduating students was carried out. Academic performance was classified into two groups, one with a score below the median and another above the median. The differences in median scores according to the variables were tested using the Mann-Whitney, Kruskal-Wallis, or non-parametric trend analysis. Logistic regression analysis was used to assess the association of the score variable with the other variables. The analyses were carried out using the Stata version 13.0 program, using a value of  $p < 0.05$  for the statistical decision.

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## Results

It was observed that the profile of graduating students was composed mainly of female individuals (92.5%), self-declared white (90.8%), and mostly coming from private schools (65.8%). Those who had some type of income obtained a higher score in *Exame Nacional de Desempenho dos Estudantes* compared to those who did not have an income (61.8 vs. 57.4, respectively,  $p=0.010$ ), and the curricular change seems to be the main variable in the chances of obtaining a score above the median of the course (OR: 1.92,  $p=0.046$ ).

## Conclusion

Financial status and curriculum change were associated with the academic performance of the assessed students. These results can be used as a reference for investigations in other institutions, public or private, of different courses and, thus, assist in planning more effective educational policies.

**Keywords:** Academic performance. Educational measurement. Nutrition.

## RESUMO

### Objetivo

Avaliar a associação dos fatores socioeconômicos, características da trajetória acadêmica e currículo de estudantes de um curso de Nutrição com o desempenho acadêmico deles no Exame Nacional de Desempenho de Estudantes.

### Métodos

Realizou-se o estudo de painéis transversais com dados secundários (Exame Nacional de Desempenho de Estudantes 2004, 2007, 2010, 2013, 2016 e 2019) de 174 estudantes concluintes. O desempenho acadêmico foi classificado em dois grupos, um com nota abaixo da mediana e outro acima da mediana. As diferenças de mediana de notas segundo as variáveis foram testadas por meio dos testes de Mann Whitney, Kruskal Wallis ou análise não paramétrica de tendência. A análise de regressão logística foi utilizada para avaliar a associação da variável nota com as demais. Utilizou-se o programa Stata versão 13.0 com valor de  $p<0,05$  para a decisão estatística.

### Resultados

Observou-se que o grupo de estudantes concluintes era composto majoritariamente por indivíduos do sexo feminino (92,5%), autodeclarados brancos (90,8%) e, em sua maioria, oriundos de escolas privadas (65,8%). Os que dispunham de algum tipo de renda obtiveram nota maior no Exame Nacional de Desempenho de Estudantes em relação àqueles que não possuíam renda (nota 61,8 vs 57,4, respectivamente;  $p=0,010$ ), e a mudança curricular parece ser a principal variável nas chances de se obter uma nota acima da mediana do curso (OR: 1,92,  $p=0,046$ ).

### Conclusão

A situação financeira e a mudança curricular foram associadas ao desempenho acadêmico dos estudantes avaliados. Esses resultados podem ser usados como referência para investigações em outras instituições, públicas ou privadas, com estudantes de diferentes cursos, e, assim, auxiliar no planejamento de políticas educacionais mais efetivas.

**Palavras-chave:** Desempenho acadêmico. Avaliação educacional. Nutrição.

## INTRODUCTION

Expanding access to higher education caused a significant growth in the number of Higher Education Institutions (HEIs) and, consequently, in the number of vacancies offered [1].

Undergraduate courses in Nutrition followed the same trend, with intense growth in recent decades and a consequent increase in the number of professionals [2]. Between August 2009 and December 2018, there was an increase of 181.5% in on-site courses, representing a total of 709 courses in 2018 [3].

In this context, monitoring the quality of professional training is extremely important. Since 2004, the evaluation of higher education has been conducted within the scope of the *Sistema Nacional de Avaliação da Educação Superior* (SINAES, National System for the Evaluation of Higher Education), designated by the *Ministério da Educação* (MEC, Ministry of Education). SINAES has 3 components: the focus element of this research, which is the *Exame Nacional de Desempenho dos Estudantes* (ENADE, National Student Performance Exam); the Course Evaluation; and the Institutional Evaluation [4].

*Exame Nacional de Desempenho dos Estudantes* evaluates the performance of graduates in relation to the syllabus provided for in the curriculum guidelines, the development of skills and abilities necessary for the deepening of general and professional training, and the level of updating of students in relation to the Brazilian and the world reality [5].

The analysis and discussion of ENADE data, especially Nutrition, is still scarce, even identifying that understanding factors associated with student performance may be crucial for planning more effective educational policies [6,7].

Therefore, this study aimed to assess the association of socioeconomic factors, characteristics of the academic trajectory, and curriculum on the performance in ENADE of students of the Nutrition course of the Federal University of *Santa Catarina* (UFSC).

## METHODS

A cross-sectional panel study with secondary data from the ENADE database (2004, 2007, 2010, 2013, 2016, and 2019) of 174 graduating students of the UFSC Nutrition course, provided by the National Institute of Educational Studies and Research Anísio Teixeira (INEP/MEC).

The socioeconomic variables (age, sex, color/ethnicity, mother's education, housing situation, total household income, employment situation, financial status, and the number of books read in the last year), academic trajectory (year of application of ENADE, receipt of grant during the undergraduate course, the form of admission to the university, and type of school that attended in high school) and curriculum studied (old curriculum for 2004, 2007, and 2010; current curriculum for 2013, 2016, and 2019) were described in relative frequencies (%).

The differences in the median scores according to socioeconomic variables, academic trajectory, and curriculum were tested using the Mann-Whitney, Kruskal-Wallis, or non-parametric trend analysis tests.

To verify the factors associated with academic performance, academic performance was considered as the outcome variable, represented by the gross score of the test (ranging from 0-100), which is the weighted average of the general training (25%) and the specific component (75%). The variable was classified into two groups: one with a score below the median and another with a score above the median.

Logistic regression analysis was used to assess the association of the variable score (dependent) with socioeconomic variables, academic trajectory, and curriculum. First, univariate logistic regression was performed, and the variables with a  $p$ -value  $<0.2$  were selected for multiple analyses (models 1 and 2). Model 1 was adjusted for the variables age, self-declared color/ethnicity, mother's education, financial status, and curriculum change. Model 2 was adjusted for the same variables, including the variable "receiving grant during the undergraduate course" and the exclusion of the variable change of curriculum since the grant variable was only incorporated into the ENADE database after 2013.

The analyses were performed using the Stata software, version 13.0. A  $p$ -value  $<0.05$  was used for the statistical decision.

## RESULTS

Table 1 describes the characteristics of the 174 students of the six years assessed. Mostly women, self-declared white, who lived accompanied, with income between 3 and 10 Minimum Wage (MW), who did not work, received grants, were admitted by broad competition, and came from private schools.

**Table 1** – Characteristics of students graduating from the undergraduate course in Nutrition at the Federal University of *Santa Catarina* in 2004, 2007, 2010, 2013, 2016, and 2019. *Florianópolis* (SC), Brazil, 2019.

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Variable	n	%
Age (years old)		
≤23	97	55.8
>23	77	44.2
Sex		
Female	161	92.5
Male	13	7.5
Self-declared color/ethnicity		
White	158	90.8
Non-white	16	9.2
Mother's level of education (years of schooling)		
<9	54	31.0
9 to 11	46	26.4
>11	74	42.5
Living situation		
Alone	17	9.8
With parents, relatives, spouse, children	106	60.9
With other people in shared housing	51	29.3
Total household income (in MW)		
Up to 3	44	25.4
3 to 10	84	48.6
>10	45	26.0
Employment status		
Not employed	100	57.8
< 20 hours per week	32	18.5
≥ 20 hours per week	41	23.7
Financial condition		
I have no income	98	56.3
I have some income	76	43.7
Number of books read in the last year		
0	17	9.8
1-2	63	36.4
3-5	70	40.5
≥6	23	13.3
Year participating in ENADE		
2004	29	16.7
2007	12	6.9
2010	35	20.1
2013	29	16.7
2016	36	20.7
2019	33	18.9
Receiving grant during the undergraduate course		
No grant	15	15.3
SI, monitoring, extension, another grant	68	69.4
PET grant	15	15.3
Form of admission to the university		
Broad competition	69	70.4
Affirmative action policies	29	29.6
Type of school in high school		
Public	54	34.2
Private	104	65.8
Curriculum		
Old	76	43.7
Current	98	56.3

**Table 1** – Characteristics of students graduating from the undergraduate course in Nutrition at the Federal University of *Santa Catarina* in 2004, 2007, 2010, 2013, 2016, and 2019. *Florianópolis* (SC), Brazil, 2019.

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Variable	Median	P25-P75
Score in Enade	59.3	51.5-65.2
Below median	51.4	45.8-55.7
Above median	65.2	61.9-70.3

Note: n=174. ENADE: *Exame Nacional de Desempenho dos Estudantes*; MW: Minimum Wage; PET: *Programa de Educação Tutorial*.

The financial status showed a statistically significant relationship with the median score ( $p=0.010$ ). Those with some type of income performed better in the ENADE than those without (score 61.8 vs. 57.4, respectively). There was no difference in the ENADE score for the other variables studied ( $p>0.05$ ) (Table 2).

In the multiple logistic regression of Model 1, students in the “New Curriculum” group were more likely (OR=1.92) ( $p=0.046$ ) to score above the median compared to students in the old curriculum. In model 2, no statistical significance was observed between the variables and the ENADE score (Table 3).

**Table 2** – Median, 25<sup>th</sup> and 75th percentiles of the score of undergraduate students in Nutrition at the Federal University of *Santa Catarina* in 2004, 2007, 2010, 2013, 2016, and 2019 according to socioeconomic variables, academic trajectory, and curriculum. *Florianópolis* (SC), Brazil, 2019.

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Variable	ENADE Score		p-value
	Median	P25-P75	
Age (years old)			
≤23	60.4	52.9-67.1	0.070*
>23	58	50.6-64.5	
Sex			
Male	58.4	51.2-63.3	0.569*
Female	59.4	52.6-65.2	
Self-declared color/ethnicity			
White	59.55	51.8-65.6	0.405*
Non-white	57.2	47.7-61	
Mother’s level of education (years of schooling)			
<9	58.5	52.0-62.4	0.207**
9 to 11	58.3	52.6-64.5	
>11	60.7	50.6-67.5	
Living situation			
Alone	58.9	49.6-67.7	0.896**
With parents, relatives, spouse, children	59.4	51.0-65.1	
With other people in shared housing	59.3	52.7-66	
Total household income (in MW)			
Up to 3	58.8	50.9-64.2	0.686***
3 to 10	59.1	52.7-65.1	
>10	59.9	50.4-66.4	
Employment status			
Not employed	59.5	50.4-65.1	0.573***
<20 hours per week	59.0	50.5-68.7	
≥20 hours per week	58.0	53.1-67.1	
Financial condition			
I have no income	57.4	49.6-63.8	0.010*
I have some income	61.8	54.6-67.1	

**Table 2** – Median, 25<sup>th</sup> and 75<sup>th</sup> percentiles of the score of undergraduate students in Nutrition at the Federal University of *Santa Catarina* in 2004, 2007, 2010, 2013, 2016, and 2019 according to socioeconomic variables, academic trajectory, and curriculum. *Florianópolis* (SC), Brazil, 2019.

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Variable	ENADE Score		p-value
	Median	P25-P75	
Number of books read in the last year			
0	58.4	53.1-62.7	0.103**
1 or 2	61.3	55.2-67.6	
3 to 5	58.0	49.3-64.9	
≥6	56.6	47.3-62.1	
Receiving grant during the undergraduate course			
No grant	53.8	46.6-66.0	0.210**
Sl, monitoring, extension, another grant	61.0	53.4-67.1	
PET grant	61.5	56.7-72.5	
Form of admission to the university			
Broad competition	60.8	53.4-67.1	0.905*
Affirmative action policies	59.6	51.9-66.9	
Type of high school			
Public	58.9	50.9-62.4	0.274*
Private	60.7	52.7-66.9	
Curriculum			
Old	57.6	50.4-64	0.051*
Current	60.7	52.7-67.1	

Note: \*Mann-Whitney test, \*\*Kruskal-Wallis test, \*\*\*Non-parametric trend test; (n=174). ENADE: *Exame Nacional de Desempenho dos Estudantes*; MW: Minimum Wage; PET: *Programa de Educação Tutorial*; Sl: Scientific initiation.

**Table 3** – Association between socioeconomic variables, academic trajectory, and curriculum with the ENADE score of undergraduate students finishing the Nutrition course at the Federal University of *Santa Catarina* in 2004, 2007, 2010, 2013, 2016, and 2019. *Florianópolis* (SC), Brazil, 2019. (n=174).

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Variable	Gross model (n=174)		Model 1 (n=174)		Model 2 (n=98)	
	OR	p-value	OR	p-value	OR	p-value
Age (years old)						
≤23	ref.		ref.		ref.	
>23	0.60	0.094	0.70	0.264	0.74	0.511
Sex						
Male	ref.		-		-	
Female	1.66	0.391				
Self-declared color/ethnicity						
White	ref.		ref.		ref.	
Non-white	0.42	0.140	0.43	0.157	0.34	0.174
Mother's education (years of schooling)						
<9	ref.		ref.		ref.	
9 to 11	1.33	0.477	1.07	0.875	0.89	0.846
>11	2.02	0.054	1.77	0.134	0.73	0.593
Living situation						
Alone	ref.		-		-	
With parents, relatives, spouse, children	1.22	0.822				
With other people in shared housing	1.17	0.780				
Total household income (in MW)						
Up to 3	ref.		-		-	
3 to 10	1.04	0.907				
>10	1.25	0.597				

**Table 3** – Association between socioeconomic variables, academic trajectory, and curriculum with the ENADE score of undergraduate students finishing the Nutrition course at the Federal University of Santa Catarina in 2004, 2007, 2010, 2013, 2016, and 2019. Florianópolis (SC), Brazil, 2019. (n=174).

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Variable	Gross model (n=174)		Model 1 (n=174)		Model 2 (n=98)	
	OR	p-value	OR	p-value	OR	p-value
Employment status						
Not employed	ref.		-	-	-	-
<20 hours per week	0.92	0.844				
>20 hours per week	0.72	0.383				
Financial Status						
I have no income	ref.		ref.	-	ref.	-
I have some income	1.60	0.127	1.67	0.107	1.99	0.122
Number of books read in the last year						
None	ref.		-	-	-	-
1 or 2	1.71	0.329				
3 to 5	0.89	0.837				
≥6	0.72	0.616				
Receiving grant during the undergraduate course						
No grant	ref.		*	*	ref.	
SI, monitoring, extension, another grant	3.04	0.065			2.49	0.153
PET grant	4	0.074			2.72	0.227
Form of admission to the university						
Admission by broad competition	ref.		-	-	-	-
Admission through affirmative action policies	0.98	0.798				
Type of high school						
Public	ref.		-	-	-	-
Private	1.31	0.427				
Curriculum						
Old	ref.		ref.		*	*
Current	1.94	0.033	1.92	0.046		

Note: There is no p-value. Model 1: adjusted for the variables age, self-declared color/ethnicity, mother's education, financial status, and curriculum change; Model 2: adjusted for the same variables as Model 1, including the variable "receiving grant during the undergraduate course" and exclusion of the variable change of curriculum since the grant variable was only incorporated into the ENADE database after 2013. The symbol "-" represents no p-value, as the variable did not participate in models 1 and 2 due to the p-value of the gross model being greater than 0.2. MW: Minimum Wage; OR: Odds Ratio; PET: Programa de Educação Tutorial; SI: Scientific initiation.

## DISCUSSION

Although actions to democratize higher education have been taking place, there has been a predominance of self-declared white students from private schools, even with a reserve of 50% for public high school graduates, 16% for black/brown/indigenous, and 25% for per capita family income of 1.5 MW [8]. Another aspect of this field of analysis is the mother's education, with a predominance of education of more than 9 years of schooling, corroborating the understanding that the consolidation of affirmative action policies in the Nutrition course of the studied university is in process.

Contrary to this finding, in a study that analyzed the ENADE results of Nutrition graduates in 2004, 2007, 2010, and 2013, characteristics were identified that lead to reflecting that there is greater access of less favored students to higher education, mainly through affirmative policies or vacancy reservation systems, which have among their criteria having attended a public high school and family income. Importantly, the study included both private and public universities, which may have contributed to such discordant findings [6].

Another interesting result is many students with some type of grant. Considering that “having some type of income” had a positive effect on the ENADE performance and that, in this variable, income from a grant was included, highlighting the institutional effort to promote and maintain grant policies, in addition to several other benefits such as Food, Daycare, Housing, Exemption from the University Restaurant, among others, is relevant.

As of 2014, a counterpart of at least one grant at UFSC was included for every two grants from the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq, National Council for Scientific and Technological Development), which impacted the actual increase in Scientific Initiation activities, in addition to the extension and monitoring grants that also help in this financial support to students [8,9]. Besides the financial issue, grants contribute to the pedagogical processes and intellectual, moral, critical, and creative training of the student [10].

Also noteworthy is the impact of the curriculum on student performance. The curriculum proposed as of 2009 was associated with the highest score in ENADE of the students graduating from the UFSC Nutrition Course, who were more likely to obtain a score above the median.

The current pedagogical project of the UFSC Nutrition Course results from a collective construction that involved professors, students, and professionals and took place amid a debate that pointed to the need for changes in higher education. The courses in the health area were mostly focused on the biological vision of man, with the fragmentation of knowledge, the appreciation of the clinic, and the secondary position of the social sciences [11-13].

Concerning training in Nutrition, a study involving professors from different undergraduate courses in Brazilian Nutrition courses pointed out that approaches based exclusively on biological aspects of nutrition are insufficient to deal with the food complexity. It is necessary to emphasize the appreciation of the social, economic, and cultural aspects involved in the training [14].

Also in a study on the training of nutritionists, the importance of the articulation between theory and practice in approaches within the triad “teaching – research – extension” was highlighted, as they can promote the development of skills and abilities with positive impacts on professional training [15].

Following this path, the current pedagogical project of the UFSC Nutrition Course proposes integration between disciplines and professors from different areas, different practice scenarios, proximity to network professionals, and training based on the transversal axes “Health Promotion – Food and Nutrition Security – Human Right to Adequate Food”, besides health promotion based on the territory [16]. This proposal, which provides for greater emphasis on actions in the community, is also recommended internationally. The group that makes up the World Public Health Nutrition (WPHN) Capacity Building Task Force reinforces the importance of training the nutritionist to work in the community as a strategy to promote Food and Nutrition Security [17].

The update of the pedagogical project seems to have reflected in the students’ learning process and demonstrates the importance of assessments and curricular updates for the best performance and training of professionals.

As limitations of the study, we pointed out the sample size, which resulted from the number of students who performed ENADE and had answered the socioeconomic questionnaire. Furthermore, it is centered on the data of students from a single institution, which may not reflect in the ENADE scores of all students from a public and federal university in the country.

Nevertheless, we emphasize that the study proposed the analysis of a tool with great potential for use to improve the course and training of undergraduate students effectively.

## CONCLUSION

From this study, it was possible to identify the factors associated with the performance in ENADE of students of the Nutrition course of the Federal University of *Santa Catarina*.

As for the results, individuals who have some type of income scored higher in ENADE in relation to those who do not have income. Moreover, the curricular change instituted in the UFSC Nutrition course in 2009 seems to be the main variable increasing the chances of scoring above the median of the course.

This study contributed to identifying the characteristics of students of the Nutrition course of a public university in southern Brazil and can be used as a reference for investigations in other institutions, public or private, of different courses. Its findings can be part of institutional planning and considered by the bodies involved in public policies.

## CONTRIBUTORS

C SOAR contributed to the conception and design of the study, search, collection, data interpretation, writing of the manuscript, and final version approval. VR SALLES, RE FILIPINI, and LS CORRÊA contributed to the search, collection, data interpretation, writing of the manuscript, and final version approval. PF HINNIG contributed to the data analysis and interpretation, review and approval of the final version of the article.

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