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RESEARCH ARTICLE

Academic experience satisfaction of pharmacy and dentistry students

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Abstract

Objective: To assess the psychometric properties of the Academic Experience Satisfaction Scale (ESEA) applied to Pharmacy and Dentistry students and investigate the effect of demographic and course-related characteristics on the ESEA factors. **Methods**: This was a cross-sectional study. Academic satisfaction was assessed by the ESEA. Construct validity was measured by confirmatory factor analysis (CFI, TLI, RMSEA). The composite reliability (CR) and the ordinal α were estimated. Structural model was elaborated considering demographic and course-related characteristics as the independent variable and ESEA factors as the dependent variables. The model fit and path estimates significance (β) were evaluated (z test; α = 5%). **Results**: 544 students participated in the study (70.0% female; mean age: 21.4 ± 2.4 years; 52.4% dental students). ESEA showed adequate fit to the data (CFI = 0.90; TLI = 0.90; RMSEA = 0.064, CR and α ≥ 0.88). In general, students reported being satisfied with their academic experience. Dental students and those from the first and second years of the course showed greater satisfaction with the academic experience. Sex did not have a significant impact on any of the scale's factors. **Conclusion**: ESEA produced valid and reliable data. Course-related characteristics, but not demographic characteristics, significantly affected the academic experience of students.

Introduction

Universities have the role of generating and spreading educational and scientific knowledge, fulfilling the needs of the community. The multidisciplinary approach used by these institutions provide students with skills development, autonomy, and critical-reflective thinking abilities (Imbernón, 2009; Libâneo, 2009; Santos, 2011). In addition to their intellectual contribution, higher education is an important factor in the social skill development of a student, as interpersonal relationships with professors and fellow students help individuals to understand their own role in community and society (Almeida & Soares, 2004; Libâneo, 2009). Furthermore, the educational process has an important emotional and personal effect for all those involved, but especially for students, whose personal identity, self-knowledge, and principles and values are under development (Libâneo, 2009).

Considering the cognitive and affective impact of education, university students can interpret and evaluate their academic experiences as positive or negative (Almeida & Soares, 2004; Bardagi & Hutz, 2012; Bardagi *et al*., 2003; Esperedião & Trad, 2006; Santos *et al*., 2019; Schleich *et al.*, 2006; Soares & Almeida, 2011), resulting in an overall satisfaction level. The level of satisfaction of students can be used for a better understanding of both the educational process and the personality development of students. A high level of satisfaction is a booster for the teaching-learning process (Bardagi & Hutz, 2012; Santos *et al.*, 2019; Schleich *et al.*, 2006), resulting not only in well-trained professionals (Santos *et al.*, 2019) but also generating a sense of belonging and involvement, making the educational process a dynamic and motivating experience (Marôco *et al*., 2020).

The assessment of students' academic experience satisfaction can be used by educators and managers to improve students' well-being, which can result both in higher teaching quality (Schleich *et al*., 2006) and better university environment (Burgess *et al*., 2018). As an abstract concept, academic satisfaction is assessed by psychometric instruments, such as the Academic Satisfaction Questionnaire (QSA) (Soares *et al*., 2002), the College Student Satisfaction Questionnaire (CSSQ) (Betz *et al*., 1971), the Noel-Levitz Student Satisfaction Inventory (SSI) (Noel, 1994), and the Academic Experience Satisfaction Scale (ESEA) (Schleich *et al*., 2006).

The ESEA was developed in Brazilian Portuguese to assess satisfaction with the academic experience in the Brazilian context (Schleich *et al.*, 2006). The scale has three factors that assess satisfaction with the course, opportunity for development, and satisfaction with the institution. Although the ESEA has been used in different samples of university students in Brazil (Aragão *et al*., 2018; Ramos *et al.,* 2015; Santos *et al*., 2013; Santos & Suehiro, 2007; Santos *et al*., 2019; Suehiro & Andrade, 2018), the instrument's construct validity has not been investigated.

There is little evidence about the influence of personal and course-related characteristics on satisfaction with the academic experience. Silva and Figueiredo-Braga (2018) found that students in the initial years of an under-graduate Pharmacy programme show greater academic satisfaction than students from more advanced years, with no effect of sex. Santos and colleagues (2013) reported that psychology students were more satisfied with the course than dental students, while dental students were more satisfied with the institution, indicating that the programme and its specifications also affect academic satisfaction. Understanding how personal and course-related characteristics influence academic satisfaction can allow educational institutions to carry out effective discussions and reflections about the development of strategies to improve the educational process (both cognitive and affective aspects) to make it increasingly more meaningful to students (Santos *et al*., 2019; Schleich *et al.*, 2006).

This study's objectives were: i) to assess the psychometric properties of the ESEA applied to Pharmacy and Dentistry students and ii) to investigate the students' academic experience satisfaction and the effect of demographic and course-related characteristics on the ESEA factors.

Methods

Study design and sampling

This was a cross-sectional study with a non-probability convenience sample. All undergraduate students from the Pharmacy (n = 530) and Dentistry (n = 375) programmes enrolled in 2019 at a public educational institution in the state of São Paulo (Universidade Estadual Paulista - UNESP) were invited to participate in the study.

To calculate the minimum sample size, the Monte-Carlo simulation described by Brown (2015) was used, considering the criteria defined by Muthén and Muthén (1998): i) bias of parameter estimates smaller than 10%; ii) coverage of 95% confidence intervals larger than 91%, and iii) percentage of significant coefficients (power) larger or equal to 80%. The Mplus programme (Muthén & Muthén, Los Angeles, CA) was used to simulate the confirmatory factor analysis model with 1,000 replicates for sample sizes of 150, 200, and 250. The sample size of 250 (for each Test and Validation subsample) was sufficient to have less than 5% of bias for both parameters and their standard errors; 95% confidence interval coverage greater or equal than 93.4%, and all parameter estimates achieving power of 100%.

Sample characteristics

Data about sex, age (years), programme, current year of the course, type of course (full-time or evening), having a job (no, yes), using medication for everyday difficulties (no, yes), first-choice course (no, yes), and economic level were collected. The economic level was estimated using the Brazil Criteria (Brazilian Market Research Association, 2020) and students were classified into economic level D - E (mean monthly income: R$813.56, U$154.96), C (R$1,805.91 - R$3,042.47, U$343.98 - U$579.52), B

(R$5,449.60-R$10,427.74, U$1038.02- U$1986.24), and A (R$22,716.99, U$4327.05).

The values were estimated from the Central Bank of Brazil quotation on August 3, 2021- U$1.00 = R$5.25.

Measuring instrument

Satisfaction with academic experience was assessed using the ESEA proposed by Schleich and authors (2006) in the Portuguese language. This instrument consists of 35 items arranged in three factors ('satisfaction with the course (SC)', 'opportunity for development (OD)', and 'satisfaction with the institution (SI)'). The SC factor has 13 items and assesses students' relationship with peers and professors and how specific course contents are administered. The OD factor has ten items and explores how satisfied the student is with course organisation and the support of the institution for professional development. The SI factor has 12 items and explores the infrastructure of the institution and the services and support offered to students.

The original scale uses a 5-point Likert type responses with anchors at the extremes (1 = not at all satisfied and 5 = completely satisfied). However, based on psychometrics and data analysis, a description was given to all response points to facilitate the participant's answer. Also, the response scale was reformulated to identify the valence of satisfaction, that is, from negative to positive with a neutral point (1 = very unsatisfied; 2 = dissatisfied; 3 = neither satisfied nor dissatisfied; 4 = satisfied; 5 = very satisfied).

Ethical aspects and procedures

Data collection was carried out in pencil-and-paper format between the months of October and November 2019. Students were invited to participate in the study during class hours after prior authorisation of the professor responsible for the class. All participants signed the informed consent form. The study was approved by the Research Ethics Committee of the university where the study was conducted (CAAE 11735719.0.0000.5426).

Assessment of Psychometric parameters

To assess the psychometric parameters of the ESEA, the total sample was randomly divided into two independent sub-samples: Test and Validation. The data were summarised using means, medians, standard deviations, skewness, and kurtosis. Absolute values of skewness and kurtosis lower than three and seven, respectively, were indicative of approximation to the normal distribution (Kline, 2016), which shows the psychometric sensitivity of each item.

The internal structure (construct) validity of the ESEA was evaluated by the factorial, convergent, and discriminant validity. Factorial validity was estimated using confirmatory factor analysis (CFA) with the robust weighted least squares means and variance adjusted (WLSMV) estimation. The goodness of fit of the model was calculated by the comparative fit index (CFI), Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). The factor loadings of the items (λ) were also calculated. Values of CFI and TLI ≥ 0.90, RMSEA < 0.10, and λ ≥ 0.40 were indicative of adequate fit of the factorial model (Hu & Bentler, 1999; Marôco, 2014). Modification indices calculated by the Langrange Multipliers method (ML ≥ 11) were inspected to verify the existence of correlation between item errors (Marôco, 2014). Initially, the first-order factorial model (three-factor oblique model) was tested. Then, a second-order hierarchical model (SOHM) was developed, in which a second-order factor called 'Academic Experience Satisfaction' was added, and its fit to the data was tested. To assess the stability of factorial models in independent samples, the fit of the ESEA models were tested in the Test and Validation subsamples and in the Pharmacy and Dentistry subsamples.

Initially, CFA was performed for each sub-sample. Then, the measurement invariance of the factorial model was evaluated using multi-group analysis and CFI difference (ΔCFI). ΔCFI was calculated for the configural and metric models ($\Delta CFI_{M1\text{-}M0}$) and for the metric and scalar models ($\Delta CFI_{M2\text{-}M1}$). Reduction of up to 0.01 in the CFI indicated measure invariance (Cheung & Rensvold, 2002).

The convergent validity was evaluated by the average variance extracted (AVE) and was considered adequate if ≥ 0.50 (Fornell & Larcker, 1981). Discriminant validity was assessed by correlational analysis among factors, being adequate if AVE_i and $AVE_j \geq r_{ij}^2$ (Fornell & Larcker, 1981). Reliability was estimated from the Composite Reliability (CR) (Fornell & Larcker, 1981) and the Ordinal Alpha Coefficient (a) being considered adequate if $\alpha > 0.70$ (Marôco, 2014).

The validity of the ESEA based on relations to other variables was assessed by correlation with the short version of the University Student Engagement Inventory (USEI) (Marôco *et al.*, 2016), consisting of 15 items divided into three factors (behavioural engagement - BE, emotional engagement – EE, and cognitive engagement - CE). The correlation of the polychoric matrix with the WLMSV estimation method was used. A positive correlation

between the ESEA and the USEI factors is expected. The fit of the USEI model to the sample was estimated previously using confirmatory factor analysis as explained above.

Structural model

A structural equation model was developed to estimate the effect of demographic and course-related characteristics on the ESEA factors (satisfaction with the course, opportunity for development, and satisfaction with the institution). The independent variables considered in the model were sex (0 = male, 1 = female), course (0 = Pharmacy, 1 = Dentistry), course year (0 = 1st and 2nd years, 1 = 3rd year and above), and whether the course was the student's first choice (0 = no, 1 = yes). The aforementioned goodness-of-fit assessment indices (CFI, TLI, RMSEA) were used to assess the fit of the structural model to the data (Marôco, 2014). The significance of the hypothetical path estimates (b) (x —> y) was evaluated using the z test and a significance level of 5%. Non-significant path estimates ($p > 0.05$) were removed using the stepwise technique. For the independent variables with significant path estimate, the mean scores of each factor (per point and 95% interval (95% CI)) and the averages of the ESEA responses were calculated.

The analyses were performed using the IBM SPSS Statistics 22 programme (IBM Corp., Armonk, NY, USA) and the 'lavaan' and 'semTools' packages of the R Core Team programme.

Results

A total of 607 students agreed to participate in the survey (adherence rate of 67.1%), but only 544 students answered all the ESEA items (response rate of 89.6%) and were included in the study.

Table I presents the characteristics of the total sample and the independent sub-samples (Test and Validation). Most students were enrolled full-time, did not have a job, were in the course of first choice, and did not use medication for daily difficulties. The characteristics of the independent samples (Test and Validation) did not differ significantly.

Table II shows the summary of the ESEA responses for the total sample and independent subsamples. All items presented absolute values of skewness and kurtosis below three and seven, indicating an approximation to the normal distribution, which confirms the adequate psychometric sensitivity of the items.

Table I: Sample characteristics reported as means (standard deviations) or n (%).

Characteristics	Test sample (n = 281)	Validation sample (n = 263)	Total sample (n = 544)
Age (years) Mean (SD)	21.3 (2.4)	21.5 (2.4)	21.4 (2.4)
Sex			
Male	88 (31.3)	75 (28.5)	163 (30.0)
Females	193 (68.7)	188 (71.5)	381 (70.0)
Course			
Pharmacy	132 (47.0)	127 (48.3)	259 (47.6)
Dentistry	149 (53.0)	136 (51.7)	285 (52.4)
Course programme			
Full-time	242 (86.1)	225 (85.6)	467 (85.8)
Evening only	39 (13.9)	38 (14.4)	77 (14.2)
Year of the course			
1st	65 (23.1)	58 (22.1)	123 (22.6)
2nd	60 (21.4)	59 (22.4)	119 (21.9)
3rd	50 (17.8)	49 (18.6)	99 (18.2)
4th	61 (21.7)	54 (20.6)	115 (21.1)
5th	43 (15.3)	40 (15.2)	83 (15.3)
6th	2 (0.7)	3 (1.1)	5 (0.9)
Work activity			
Yes	30 (10.7)	29 (11.0)	59 (10.8)
No	251 (89.3)	234 (89.0)	485 (89.2)
First option course?			
Yes	185 (65.8)	170 (64.6)	355 (65.3)
No	96 (34.2)	93 (35.4)	189 (34.7)
Use medication for daily problems?			
Yes	72 (25.6)	64 (24.3)	136 (25.0)
No	209 (74.4)	199 (75.7)	408 (75.0)
Economic level			
A	113 (43.0)	90 (37.8)	203 (40.5)
B	131 (49.7)	118 (49.6)	249 (49.7)
C	17 (6.5)	30 (12.6)	47 (9.4)
D-E	2 (0.8)	-	2 (0.4)

The ESEA factorial model did not show a good fit to the data in the Validation Sample (Table III). A high correlation was found between the error of item 33 ('services offered by the library') with the errors of items 27 ('service and clarity of information provided by the library staff') and 28 ('library collection available to students'), both in the Test sample (ML ≥ 53.6) and in the Validation sample (ML ≥ 28.2), probably explained by the strong similarity among those items. Thus, a refinement of the ESEA factor model was performed by excluding item 33 after discussion with the research team.

After refinement, the first-order three-factor model and the SOHM presented adequate fit to the subsample data. Invariance was observed between the Test and Validation samples ($\Delta CFI_{M1\text{-}M0} = 0.001$; $\Delta CFI_{M2\text{-}M1} = 0.000$) and between Pharmacy and Dentistry samples ($\Delta CFI_{M1\text{-}M0} = 0.000$; $\Delta CFI_{M2\text{-}M1} = -0.009$), which indicated the external validity of the factorial solution. A positive convergent

Table II: Answers to the Academic Experience Satisfaction Scale (ESEA) (Test Sample: n = 281; Validation Sample: n = 263; Total Sample: n = 544).

	Test sample/ Validation sample / Total sample						
Item	**Mean**	**Median**	**SD**	**Minimum**	**Maximum**	**Skewness**	**Kurtosis**
ESEA1	3.3/3.1/3.2	3/3/3	0.8/0.9/0.8	1/1/1	5/5/5	-0.3/-0.3/-0.3	-0.1/0.0/-0.1
ESEA2	3.8/3.6/3.7	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.6/-0.9/-0.7	0.2/0.9/0.6
ESEA3	3.3/3.1/3.2	4/3/3	1.0/1.0/1.0	1/1/1	5/5/5	-0.4/-0.4/-0.4	-0.4/-0.7/-0.5
ESEA4	3.4/3.2/3.3	3/3/3	0.8/0.9/0.8	1/1/1	5/5/5	-0.6/-0.4/-0.5	0.4/-0.4/0.0
ESEA5	4.1/4.1/4.1	4/4/4	0.7/0.7/0.7	2/2/2	5/5/5	-0.6/-0.6/-0.6	0.5/0.5/0.5
ESEA6	3.1/2.9/3.0	3/3/3	0.9/0.9/0.9	1/1/1	5/5/5	-0.4/-0.2/-0.3	0.0/0.3/0.1
ESEA7	3.7/3.5/3.6	4/4/4	1.0/1.1/1.1	1/1/1	5/5/5	-0.6/-0.7/-0.6	-0.2/-0.1/-0.2
ESEA8	2.9/2.9/2.9	3/3/3	0.9/1.0/1.0	1/1/1	5/5/5	-0.1/-0.1/-0.1	-0.4/-0.7/-0.6
ESEA9	3.1/3.0/3.1	3/3/3	0.9/0.9/0.9	1/1/1	5/5/5	-0.2/-0.4/-0.3	-0.4/-0.4/-0.4
ESEA10	3.6/3.7/3.6	4/4/4	0.8/0.8/0.8	1/2/1	5/5/5	-0.6/-0.5/-0.5	0.3/-0.2/0.1
ESEA11	3.4/3.3/3.3	3/3/3	0.9/1.0/0.9	1/1/1	5/5/5	-0.4/-0.6/-0.5	0.2/0.1/0.2
ESEA12	3.6/3.5/3.5	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.5/-0.6/-0.6	0.3/0.1/0.2
ESEA13	2.8/2.9/2.9	3/3/3	1.0/1.0/1.0	1/1/1	5/5/5	0.0/-0.2/-0.1	-0.8/-0.8/-0.8
ESEA14	3.7/3.5/3.6	4/4/4	1.1/1.0/1.1	1/1/1	5/5/5	-0.6/-0.7/-0.6	-0.4/-0.1/-0.3
ESEA15	3.9/3.7/3.8	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.7/-0.7/-0.7	0.4/0.3/0.4
ESEA16	3.7/3.6/3.6	4/4/4	1.0/0.9/0.9	1/1/1	5/5/5	-0.5/-0.6/-0.5	-0.2/0.2/0.0
ESEA17	3.6/3.5/3.5	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.5/-0.6/-0.5	0.2/0.2/0.2
ESEA18	3.1/3.0/3.1	3/3/3	1.0/1.1/1.1	1/1/1	5/5/5	-0.1/-0.2/-0.2	-0.5/-0.7/-0.6
ESEA19	3.7/3.5/3.6	4/4/4	0.8/0.9/0.9	1/1/1	5/5/5	-0.7/-0.6/-0.7	0.6/-0.2/0.1
ESEA20	3.6/3.4/3.5	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.5/-0.5/-0.5	0.3/0.1/0.2
ESEA21	3.0/3.0/3.0	3/3/3	1.0/1.0/1.0	1/1/1	5/5/5	-0.2/-0.2-0.2	-0.1/-0.6/-0.3
ESEA22	3.6/3.4/3.5	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.4/-0.6/-0.5	-0.1/0.1/0.0
ESEA23	3.4/3.3/3.4	4/3/3	1.0/1.0/1.0	1/1/1	5/5/5	-0.4/-0.4/-0.4	-0.4/-0.3/-0.3
ESEA24	3.6/3.5/3.6	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.6/-0.6/-0.6	0.1/-0.1/0.0
ESEA25	3.8/3.7/3.8	4/4/4	0.8/0.9/0.9	1/1/1	5/5/5	-0.5/-0.8/-0.7	0.1/0.3/0.3
ESEA26	3.5/3.4/3.4	4/4/4	1.0/1.0/1.0	1/1/1	5/5/5	-0.4/-0.6/-0.5	-0.1/0.0/-0.1
ESEA27	4.0/4.0/4.0	4/4/4	0.8/0.9/0.8	1/1/1	5/5/5	-0.8/-1.0/-0.9	0.8/1.7/1.3
ESEA28	4.2/4.1/4.2	4/4/4	0.7/0.8/0.7	1/1/1	5/5/5	-1.1/-1.1/-1.1	2.4/2.9/2.6
ESEA29	3.7/3.7/3.7	4/4/4	1.1/1.0/1.0	1/1/1	5/5/5	-0.8/-0.8/-0.8	0.0/0.1/0.0
ESEA30	3.6/3.6/3.6	4/4/4	0.9/1.0/0.9	1/1/1	5/5/5	-0.7/-0.6/-0.7	0.1/0.1/0.1
ESEA31	3.8/3.7/3.8	4/4/4	0.8/0.9/0.9	1/1/1	5/5/5	-0.6/-0.7/-0.7	0.4/0.5/0.5
ESEA32	4.2/4.2/4.2	4/4/4	0.7/0.7/0.7	1/1/1	5/5/5	-0.8/-1.0/-0.9	1.8/3.1/2.4
ESEA33	4.2/4.1/4.1	4/4/4	0.7/0.8/0.7	2/1/1	5/5/5	-0.5/-1.2/-1.0	0.3/2.8/2.2
ESEA34	3.7/3.7/3.7	4/4/4	0.9/0.9/0.9	1/1/1	5/5/5	-0.6/-0.5/-0.6	-0.1/0.0/-0.1
ESEA35	3.7/3.7/3.7	4/4/4	0.8/0.9/0.9	1/1/1	5/5/5	-0.5/-0.5/-0.5	0.4/0.4/0.4

validity of the ESEA with the factors of the USEI was also found.

Table IV shows the estimates for the structural model designed to verify the effect of sex, course, course year, and first-choice course on the ESEA factors. The complete model presented a tendency toward a fit to the data (CFI = 0.88; TLI = 0.90; RMSEA = 0.065). Being in the first-choice course showed a non-significant path estimates for the OD and SI factors and borderline significance for the SC factor. Sex did not significantly affect OD and was at the limit of significance for the SC and SI factors. After refinement, sex remained borderline significant and was removed from the final model, considering that the sample size was large, which may increase the probability of a type I error.

The refined model also showed a borderline fit (CFI = 0.90; TLI = 0.90; RMSEA = 0.066) (Figure 1). Dentistry students were more satisfied with the course, with the institution, and with development opportunities ($p < 0.001$) than Pharmacy students. Students who were in more advanced years (3rd year and above) showed lower satisfaction with the academic experience ($p < 0.001$) and students in the course of first option showed greater satisfaction ($p = 0.010$).

Table V shows the mean scores of the ESEA according to the significant variables in the refined structural model. Despite the differences observed between the subgroups, all had mean scores above 3, indicating high student satisfaction in the three ESEA factors.

Figure 2 shows the mean ESEA responses by Pharmacy and Dentistry students. Interestingly, all items of the SI factor had means above the reference value (3.0), which is an indication of satisfaction with the institution. In the SC factor, answers to item five ('professors' level of knowledge about the topic they teach') were high (≥ 4.0)

Table III: Refinement of the factorial model of the Academic Experience Satisfaction Scale (ESEA) for the Test sample (n = 281) and Validation sample (n = 263) and the Pharmacy (n = 259) and Dentistry samples (n = 285).

		CFA§								R (factors)#						
Sample	**Excluded**	**CFI**	**TLI**	**RMSEA**	**λ/γ***	**r²**	**CR¥**	**α†**	**AVE‡**		**ESEA**			**USEI**		
Original model											SC	OD	SI	BE	EE	CE
Test sample	-	0.910	0.904	0.065	0.40–0.85	0.31–0.52	0.88–0.91	0.87–0.90	0.37–0.47	SC	1					
Validation sample	-	0.895	0.887	0.071	0.40–0.88	0.34–0.48	0.89–0.92	0.88–0.91	0.39–0.49	OD	0.70	1				
Refined model										SI	0.57	0.64	1			
Test sample	it33	0.918	0.913	0.063	0.40–0.85	0.32–0.52	0.88–0.90	0.87–0.89	0.37–0.46	BE	0.28	0.24	0.12	1		
Validation sample	it33	0.908	0.902	0.066	0.40–0.88	0.36–0.48	0.89–0.91	0.88–0.90	0.39–0.48	EE	0.54	0.54	0.37	0.59	1	
SOHM*										CE	0.17	0.16	0.16	0.42	0.34	1
Test sample	It33	0.918	0.913	0.063	0.69–0.88	-	-	-	-					***p*-value (r)**		
Validation sample	It33	0.908	0.902	0.066	0.76–0.88	-	-	-	-		SC	OD	SI	BE	EE	CE
Pharmacy										SC	1					
1st order model	It33	0.907	0.900	0.063	0.40–0.86	0.54–0.72	0.87–0.89	0.86–0.88	0.37–0.46	OD	<0.001	1				
SOHM	It33	0.907	0.900	0.063	0.67–0.89	-	-	-	-	SI	<0.001	<0.001	1			
Dentistry										BE	<0.001	<0.001	0.046	1		
1st order model	It33	0.910	0.904	0.070	0.40–0.90	0.57–0.64	0.88–0.93	0.88–0.92	0.39–0.56	EE	<0.001	<0.001	<0.001	<0.001	1	
SOHM	It33	0.910	0.904	0.070	0.73–0.87	-	-	-	-	CE	0.001	0.001	0.001	<0.001	<0.001	1

§CFA: confirmatory factor analysis, CFI: comparative fit index, TLI: Tucker-Lewis index, RMSEA: root mean square error of approximation, *λ: factorial loading – first order models, γ: trajectories between second order factor and first-order factors, r²: square of the correlation coefficient between the factors, ¥CR: Composite Reliability; †α: ordinal alpha coefficient; ‡AVE: average variance extracted; *SOHM: second-order hierarchical model, #ESEA: Academic Experience Satisfaction Scale; SC: satisfaction with the course; OD: opportunity for development; SI: satisfaction with the institution); USEI: University Student Engagement Inventory (BE: behavioural engagement; EE: emotional engagement; CE: cognitive engagement); r (factors): Correlation coefficient between ESEA and USEI factors.

Table IV: Complete structural model of the Academic Experience Satisfaction Scale applied to Pharmacy and Dentistry students.

Independent variables*	**ß**	**$ß_{standardized}$**	**Standard error**	***p***
Satisfaction with course (SC)				
Sex	-0.22	-0.09	0.10	0.034
Course	0.47	0.22	0.10	<0.001
Year of course	-0.62	-0.29	0.10	<0.001
First-choice course	0.23	0.10	0.10	0.019
Opportunity for development (OD)				
Sex	0.03	0.01	0.11	0.803
Course	0.40	0.19	0.09	<0.001
Year of course	-0.60	-0.28	0.10	<0.001
First-choice course	0.04	0.02	0.10	0.671
Satisfaction with institution (SI)				
Sex	-0.21	-0.09	0.10	0.042
Course	0.46	0.22	0.09	<0.001
Year of course	-0.30	-0.14	0.09	0.001
First-choice course	0.01	0.00	0.10	0.962

*sex (0 = male, 1 = female), course (0 = Pharmacy, 1 = Dentistry), year of course (0 = 1st and 2nd years, 1 = 3rd and 4th years), first-choice course (0 = no, 1 = yes).

Table V: Mean (95% CI) scores of the Academic Experience Satisfaction Scale factors according to course, year of the course, and course preference.

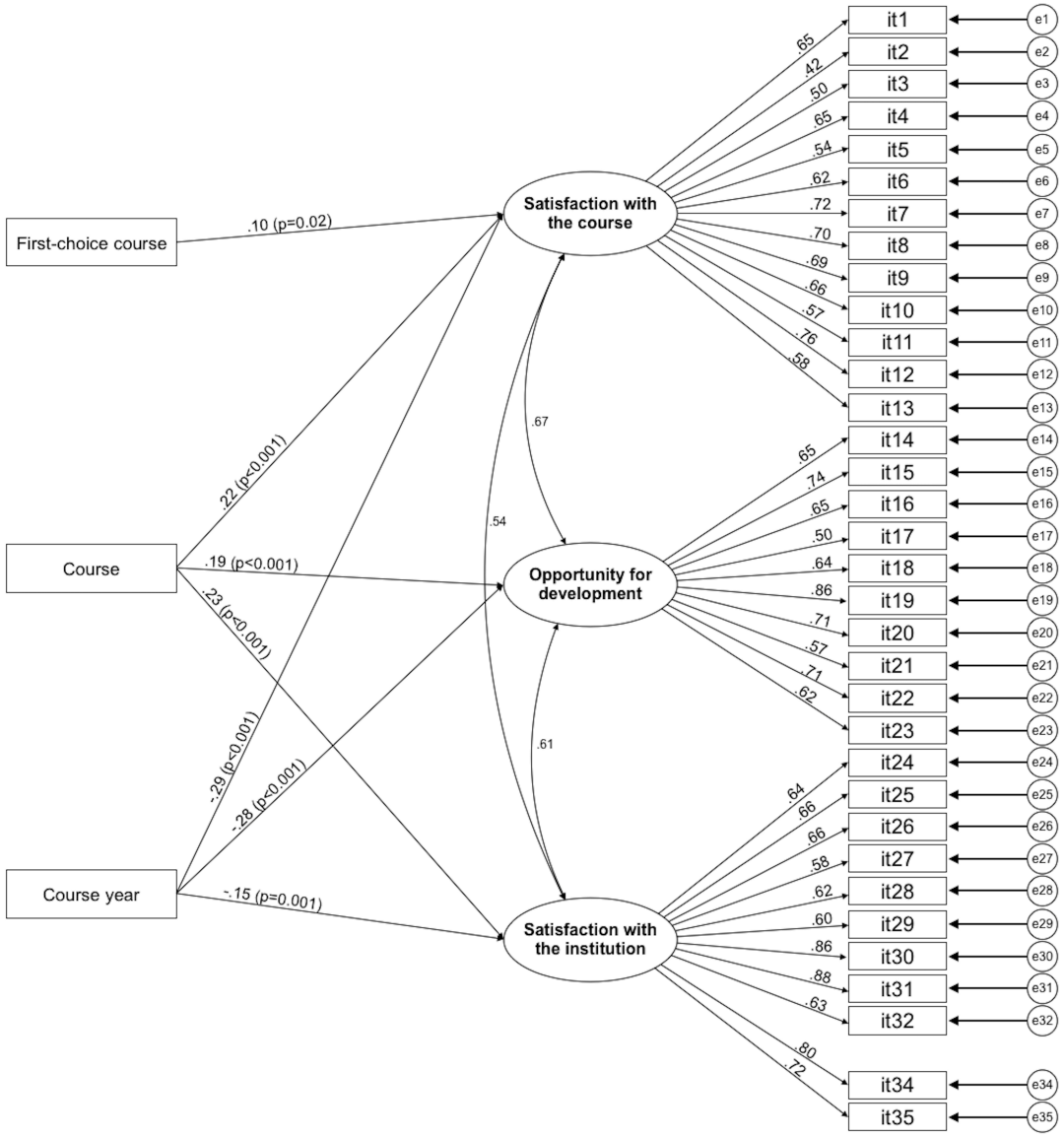
	Factors of the Academic Experience Satisfaction Scale†		
Variable	**SC**	**OD**	**SI**
First-choice course			
No	3.28 (3.20-3.35)	3.45 (3.36-3.54)	3.79 (3.71-3.87)
Yes	3.39 (3.33-3.44)	3.47 (3.40-3.53)	3.78 (3.72-3.84)
Course			
Pharmacy	3.25 (3.19-3.31)	3.36 (3.28-3.44)	3.66 (3.59-3.72)
Dentistry	3.44 (3.38-3.50)	3.56 (3.48-3.62)	3.89 (3.82-3.96)
Year of course			
1st and 2nd year	3.51 (3.45-3.57)	3.64 (3.57-3.72)	3.87 (3.80-3.94)
3rd year and above	3.22 (3.16-3.28)	3.22 (3.16-3.39)	3.71 (3.65-3.78)

†SC: Satisfaction with the course, OD: Opportunities for development, SI: Satisfaction with the institution.

and pharmacy students had a lower score in item seven ('commitment of the institution/university towards the quality of education') compared to Dentistry students.

Discussion

The present study evaluated the validity and reliability of the ESEA applied to a sample of undergraduate Pharmacy



Independent variables: first-choice course (0 = no, 1 = yes), course (0 = Pharmacy, 1 = Dentistry), course year (0 = 1st and 2nd year, 1 = 3rd year and above).

Figure 1: Refined structural model of the Academic Experience Satisfaction Scale (ESEA) considering course-related characteristics

and Dentistry students. Also, course-related factors that affect academic satisfaction were identified. Although the ESEA has been used in several studies (Aragão *et al.*, 2018; Ramos *et al.*, 2015; Santos *et al.*, 2013; Santos & Suehiro, 2007; Santos *et al.*, 2019; Suehiro & Andrade, 2018), its construct validity was never assessed.

For a better fit of the model, item 33 of the ESEA was excluded. The high correlation between the errors of item 33 and items 27 and 28 was probably due to the items' theoretical similarity; the available library collection and the service provided by the library staff could have been interpreted as library services in general, which would explain the collinearity. A positive convergent validity was found between the ESEA and the USEI, and the weak but significant correlations with cognitive and behavioural factors stand out. This may have occurred due to the theoretical divergence between the concepts evaluated, since the ESEA measures satisfaction, an affective aspect related to expectations, while the USEI assesses cognitive and behavioural aspects.

Understanding student academic satisfaction can provide subsidies for the development of strategies to improve the connection between students and the learning process and improve technical skills development needed for their

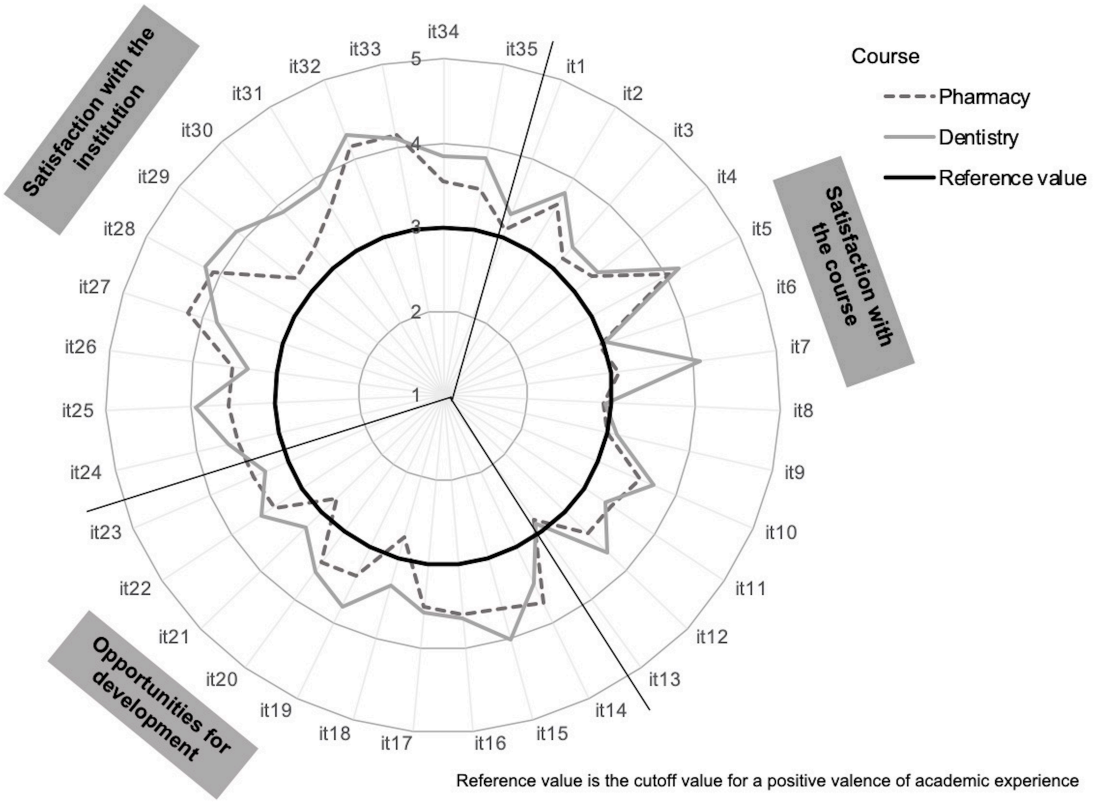


Figure 2: Mean scores of the Academic Experience Satisfaction Scale by course: Pharmacy (n = 259 students) and Dentistry (n = 285 students)

future careers (Lozoya *et al*., 2019; Silva & Figueiredo-Braga, 2019). For example, an authoritarian professor-student relationship is detrimental for the educational process and makes students lose interest and withdraw from having learner autonomy. A closer relationship between all involved allows the construction of knowledge to occur collectively, strengthening the bonds and increasing the students' sense of belonging. As reported by Furlani (2012), when the student feels he or she is part of the learning process, personally identifies with the specific teaching content, and feels comfortable to share ideas with professors and peers, their satisfaction with the learning experience increases and the impression towards the acquired knowledge tends to be more positive.

A positive valence of satisfaction (mean score > 3) was found for all factors of the ESEA, which is possibly explained by the sample of students being from a public university recognised in the country for its high quality education, research, and community services. The SI factor presented high values, indicating that students recognised the university's infrastructure and investments in quality education as adequate. However, not all Brazilian higher education institutions have the same conditions, and similar studies in universities with different infrastructures could help to understand the impact of institution facilities on student satisfaction with the academic experience. In contrast, the SC factor measures the students' self-assessment of their development within the course, which is affected by interpersonal relationships, and, as a subjective analysis, it is more likely to be influenced by other aspects of the student's life. Future qualitative investigations are suggested to identify modifiable factors that can strengthen the student's connection with the course. The positive scores in the OD factor indicated the students' recognition of the great professional development opportunities that the university offers, which is due not only to the academic curriculum, but also to the extent and quality of research and community activities available in numerous areas of knowledge in the assessed institution.

Students in more advanced years of the programmes had lower satisfaction compared to students in their early years, which may be related to the high expectations in relation to the university and enthusiasm for new interpersonal relationships and academic experiences of junior students. Throughout the course, familiarity with the academic environment and the difficulties related to planning their future careers and entering the labor market can lead to anxiety and feelings of insecurity, helplessness, and frustration, reflected in a decreased

satisfaction with the academic experience (Santos *et al*., 2013; Silva & Figueiredo-Braga, 2018).

The higher satisfaction of Dentistry students in all the ESEA factors when compared to Pharmacy students may have occurred because of curricular and structural differences between the courses. Dentistry is essentially a clinical profession and students are introduced to clinical practice as early as the 2nd year of the programme, which can contribute to a sense of belonging and higher motivation from actually treating patients under supervision. On the other hand, in the Pharmacy course, the first years are essentially class and/or lab-based, with a high load of basic content in that area. Despite this difference, the satisfaction scores with the academic experience were high for both courses.

Individuals who were in their course of first choice showed greater satisfaction, which was expected as those students had a specific interest and identification with the course they were in even before starting college compared to those who where not in their preferred course (Casanova *et al*., 2018; Santos *et al*., 2019). Satisfaction with the course is directly related to personal involvement and openness to the development of a professional identity, which can be observed throughout the educational process (Furlani, 2012).

In the present study, most of the respondents were women, which is representative of the sex ratio (~7:3) of the students enrolled in the pharmacy and dentistry courses at the participating institution. It is also noteworthy that in the literature investigating the academic satisfaction of students in health-related courses, a higher proportion of women in relation to men is common (Alnajjar & Mohammed, 2020; Santos *et al*., 2013; Silva & Figueiredo-Braga, 2018, 2019; Slimani *et al*., 2021; Soares & Almeida, 2011). In addition, the findings from this study corroborate with previous studies that have found no effect of sex on academic experience satisfaction. Despite this evidence, we emphasise the importance that future research on academic satisfaction obtain samples with a sex ratio representative of the specific study population and conduct analytical strategies that consider a possible effect of this variable on satisfaction, as in the present study.

There are limitations to this study, the cross-sectional design does not allow causal relationship inferences among the investigated variables, and the use of a non-probability sample hinders the generalisability of results to students from other Pharmacy and Dentistry schools. However, this study design has been widely used in the literature.

These results suggest that the ESEA can be a valid and reliable instrument for tracking student satisfaction with the academic experience, which may generate evidence for reflection and discussion about the institutional environment, educational quality, and students' perception of the educational process.

Finally, after the completion of this study and with the start of the Covid-19 pandemic in March 2020, teaching methodologies in higher education institutions were adapted to social distancing requirements, and online or hybrid classes have become a reality for most university students (Carvalho *et al.*, 2020; Gagnon *et al.*, 2020; Sahu, 2020; Singh *et al*., 2020). Although the ESEA was developed to assess satisfaction with in-person education and with the institution facilities, the authors adjusted the scale with the inclusion of items assessing satisfaction with online teaching experience. Despite not being part of the initial objectives of this study, this adaptation may allow the use of the ESEA in diverse contexts including remote and hybrid teaching format providing more comprehensive evidence, in addition to allowing future comparisons between the different teaching formats.

For that purpose, the factor 'Satisfaction with remote education (SRE)' was developed. Initially, eight items were elaborated based on the professors' and students' experiences of remote or hybrid education methods acquired throughout 2020. Then, the content of these items was compared with the other items on the scale to avoid theoretical overlap, and three items were excluded. The proposal for the ESEA with the new five-item factor is presented in Appendix 1. The ESEA can thus be used in its original format with three factors (SC, OD, SI) for institutions with in-person classes, in its new version with the factors SC, OD, and SER for institutions with remote classes, or in the four-factor version for institutions with hybrid teaching format. Further studies should be developed to assess the psychometric properties of this new proposal in different samples and teaching contexts.

Conclusion

The data obtained using ESEA were found to be valid and reliable for measuring students' satisfaction with the academic experience, providing information that can be used for development of effective educational and student support strategies. The characteristics related to the course (course, course year, and first-choice course) were significant factors for student satisfaction. Overall, students were satisfied with their academic experience.

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Conflicts of Interest

The authors declare no conflict of interest.

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Appendix

Appendix 1: Academic Experience Satisfaction Scale (ESEA)[†] adapted to remote/hybrid education[‡].

Academic Experience Satisfaction Scale (ESEA)

Instructions: There are no right or wrong answers. Carefully read each one of the statements and choose the most appropriate option that indicates how satisfied you are with different academic experiences. [#] If your course has exclusively in-person classes, please do not answer statements #36 to 40. If your course has exclusively remote classes, please do not answer statements #24 to 35. If your course has hybrid teaching (both in-person and remote classes), please respond to all statements of the scale.

	Portuguese Version	**English Version**
Factor	**Item**	**Item**
Satisfação com o curso/ Satisfaction with the course – SC	1. Relacionamento com os professores	1. Relationship with professors/teachers
	2. Relacionamento com os colegas de curso	2. Relationship with classmates
	3. Adequação entre o envolvimento pessoal no curso e o desempenho acadêmico obtido	3. Balance between personal involvement in a course and academic performance obtained
	4. Interesse dos professores em atender os estudantes durante as aulas	4. Professors/teachers' interest in helping students during lectures/clinical practice
	5. Conhecimento dos professores sobre o conteúdo das disciplinas que ministram	5. Professors/teachers' level of knowledge about the topic they teach
	6. Reconhecimento por parte dos professores do meu envolvimento com minha formação	6. Professors/teachers' recognition of my involvement towards my studies
	7. Compromisso da instituição com a qualidade de formação	7. Commitment of the institution/university towards the quality of education
	8. Avaliação proposta pelos professores	8. Evaluation methods used by professors/teachers
	9. Estratégia de aula utilizada pelos professores	9. Teaching strategy used by professors/teachers
	10. Relevância do conteúdo das disciplinas	10. Relevance of course content
	11. Disponibilidade dos professores em atender os alunos fora da sala de aula	11. Professors/teachers' availability to assist students outside the classroom
	12. Adequação do conteúdo para formação	12. Suitability of course content for education
	13. Adequação entre as tarefas exigidas no curso e o tempo estabelecido pelos professores para realização	13. Matching of tasks required by the courses and the deadline given by professors/teachers
Oportunidade de desenvolvimento/ Opportunities for development – OD	14. Diversidade das atividades extracurriculares oferecidas pela instituição	14. Diversity of extracurricular activities offered by the institution/university/student union
	15. Currículo do curso	15. Whole curriculum of education
	16. Eventos sociais oferecidos pela instituição	16. Social events offered by the institution/university/ student union
	17. Envolvimento pessoal nas atividades do curso	17. Personal involvement in the activities related to my studies
	18. Programas ou serviços de apoio aos estudantes oferecidos pela instituição	18. Students support programs/services offered by the institution/university/student union
	19. Condições oferecidas para o meu desenvolvimento profissional	19. Conditions offered by the institution/university for my professional development
	20. Condições para ingresso na área profissional de formação	20. Conditions for entering the labor market after my graduation
	21. Programa de apoio financeiro oferecido pela instituição	21. Financial support program offered by the institution/ university/student union
	22. Oportunidade de desenvolvimento pessoal oferecida pela instituição	22. Personal development opportunities offered by the institution/university
	23. Adequação entre o meu investimento financeiro para custear os estudos e a formação recebida	23. Balance between my financial investment to pay for studies and education received
Satisfação com a instituição/ Satisfaction with the institution – SI	24. Recursos e equipamentos audiovisuais disponíveis na instituição	24. Information technology resources and equipment available at the institution/university
	25. Atendimento e clareza das informações oferecidas pelos funcionários da secretaria	25. Service and clarity of the information provided by the university's students office
	26. Equipamentos e softwares oferecidos pelo laboratório de informática	26. Equipment and softwares available in the computer lab or at the institution/university
	27. Atendimento e clareza das informações oferecidas pelos funcionários da biblioteca	27. Service and clarity of the information provided by the library staff
	28. Acervo disponível na biblioteca	28. Library collection available to students
	29. Segurança oferecida pela instituição	29. Security service offered by the institution/university
	30. Infraestrutura física das salas de aula	30. Physical infrastructure of classrooms
	31. Infraestrutura física da instituição	31. Physical infrastructure of the institution/university
	32. Limpeza da instituição	32. Cleanliness of the institution/university
	33. Serviços oferecidos pela biblioteca	33. Services offered by the library
	34. Conforto das instalações da instituição	34. Comfort of the institution/university's facilities
	35. Localização dos diferentes setores que compõem a instituição	35. Location of the different services of the institution/ university
Satisfação com a instituição em relação ao ensino remoto **- SER/ Satisfaction with remote education**- SRE	36. Acervo online disponível na biblioteca (virtual) da instituição	36. Online digital library collection available to students
	37. Auxílio da instituição no fornecimento de dispositivos (notebook, tablets, celulares, ...) ou acesso à internet (chip para conexão móvel)	37. Support of the institution/university with providing electronic devices (notebook, tablets, cell phones, ...) or internet access (mobile connection card)
	38. Meio de comunicação com professores e colegas na plataforma online utilizada pela universidade	38. Means of communication with professors and peers on the online platform used by the institution/university
	39. Facilidade de acesso à plataforma online de aula	39. Ease of access to the online class platform
	40. Atendimento online e clareza das informações oferecidas pelos funcionários da instituição (secretaria, biblioteca, ...)	40. Online service and clarity of the information provided by the school staff (student office, library, etc)

[†]The original version of the instrument proposed by Schleich et al. (2006) was used in the present study and contains the factors "Satisfaction with the course", "Opportunities for development" and "Satisfaction with the institution" (items 1 to 35). The response scale used was: 1 = very dissatisfied; 2 = dissatisfied; 3 = neither satisfied nor dissatisfied; 4 = satisfied; 5 = very satisfied. [‡]The inclusion of the factor "Satisfaction with remote education" (items 36 to 40) was proposed in this study to be used in institutions with remote or hybrid teaching format.