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Emotional regulation strategies of teacher education students: relationships with demographic and academic life variables

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Abstract

Emotion regulation refers to monitoring and modification of emotions and is essential to the learning process. The aim of this article was to identify the emotional regulation strategies of 295 teacher education students and to investigate the relationship between these strategies and demographic variables (gender and age) and academic life of participants (course, time of course and semester). We also sought to examine which sample characteristics would be predictive of the reported use of these strategies. Data was collected using a characterization questionnaire and an emotion regulation strategies scale. Participants reported different strategies to regulate their emotions, such as externalization and isolation. Statistically significant differences emerged among reported emotion regulation strategies and variables of interest. Gender, area of knowledge and semester were predictors of the report of some strategies to regulate sadness, anger, and joy. It is expected that the results contribute to formative actions to improve emotional regulation of preservice teachers.

Keywords: Regulation of emotion. Regulation strategies. Teacher education. Higher education.

As estratégias de regulação emocional de estudantes de licenciatura: relações com variáveis demográficas e de vida acadêmica

Resumo

A regulação emocional refere-se ao monitoramento e à modificação das emoções e é essencial para o processo de aprendizagem. O objetivo do presente

artigo foi identificar as estratégias de regulação emocional de 295 estudantes de licenciaturas e investigar as relações dessas estratégias com as variáveis demográficas (gênero e idade) e de vida acadêmica dos participantes (curso, turno e semestre). Buscou-se ainda examinar quais características da amostra seriam preditoras do relato de uso das estratégias. Os dados foram coletados utilizando um questionário de caracterização e uma escala de estratégias de regulação emocional. Diferentes estratégias foram reportadas, como externalização e isolamento. Emergiram diferenças estatisticamente significativas entre as estratégias relatadas e as variáveis de interesse. O gênero, a área de conhecimento e o semestre foram preditores do relato de algumas estratégias para regular a tristeza, a raiva e a alegria. Espera-se que os resultados contribuam com ações formativas para o aprimoramento da regulação emocional de professores em formação.

Palavras chave: Regulação da emoção. Estratégias de regulação. Formação de professores. Ensino superior.

Estrategias de regulación emocional de estudiantes de licenciatura: relaciones con variables demográficas y de la vida académica

Resumen

La regulación emocional se refiere a la monitorización y modificación de las emociones y es esencial para el proceso de aprendizaje. El objetivo de este artículo fue identificar las estrategias de regulación emocional de 295 estudiantes de licenciaturas e investigar las relaciones entre estas estrategias y las variables demográficas (género y edad) y de vida académica de los participantes (curso, turno y semestre). También se buscó examinar qué características de la muestra serían predictoras del uso informado de estrategias. Los datos se recogieron mediante un cuestionario de caracterización y una escala de estrategias de regulación emocional. Se han reportado diferentes estrategias, como la externalización y el aislamiento. Surgieron diferencias estadísticamente significativas entre las estrategias reportadas y las variables de interés. El género, el área de conocimiento y el semestre fueron predictores del reporte de algunas estrategias para regular la tristeza, la ira y la alegría. Se espera que

los resultados contribuyan a acciones formativas para mejorar la regulación emocional de los docentes en formación.

Palabras clave: Regulación de las emociones. Estrategias de regulación. Formación de profesores. Enseñanza superior.

Introduction

Emotions can be defined as a set of physiological, experiential, cognitive and behavioral responses triggered by events which may be internal or external to the individual (Gross; Richards; John, 2006). They can influence psychological processes, such as students' perception, memory, learning and performance, interfering with their interest, involvement, and motivation (Bzuneck, 2018; Pekrun, 2006). According to Bzuneck (2018) and Pekrun (2006), emotions experienced in the educational context are called academic emotions and can be classified as positive (pleasure of learning, pride, joy, satisfaction, hope, gratitude, relief) or negative (anger, sadness, boredom, anxiety, shame, fear, frustration, hopelessness). These authors state that it is inevitable to experience such emotions and, depending on the situations, it may be necessary for students to regulate them so that their negative effects and impacts are minimized in processing of information and in motivation to learn.

Emotion regulation can be defined as attempts to control how emotions are experienced and expressed (Gross, 2015). This process involves the identification of emotion, as well as the selection and implementation of a strategy to regulate it, aiming at restore or maintenance of a state of emotional well-being (Eldesouky; English, 2019; Eldesouky; gross, 2019; gross, 2015; Mcrae; gross, 2020). What determines whether a strategy is positive or negative is the occasion in which it is used, and may also be considered adaptive or maladaptive (Eldesouky; English, 2019; Schlesier; Roden; Moschner, 2019; Stupnisky; Hall; Pekrun, 2019; Taxer; Gross, 2018; Thompson; Uusberg; Gross; Chakrabarti, 2019).

Gross (2015), Harley, Pekrun, Taxer and Gross (2019) and McRae and Gross (2020) classify emotion regulation strategies into five categories, depending on the stage in which changes in emotional trajectories are made – beginning, middle or end – and the resources involved in the process. More

specifically, *situation selection* strategies consist of deliberate actions to participate or not in events that may provoke emotions. *Situation modification* strategies, in turn, refer to changes in external situations that reduce their emotional impact (Gross, 2015). Another category of strategies is the *attentional deployment*, which corresponds to directing attention to a neutral element in the situation, to reduce the impact of an emotional response (Gross, 2015). *Cognitive change* strategies, on the other hand, refer to a change in the interpretation of a situation. The last category of strategies is *response modulation* that involves direct influences on the experiential, behavioral, or physiological components of an emotional response at the time the person is experiencing or expressing the emotion (gross, 2015; Harley; Pekrun; Taxer; Gross, 2019).

According to Goetz, Frenzel, Pekrun and Hall (2006), teachers can help their students develop regulatory skills, which will favor the emotional development of students, since emotions impact different variables present in the learning process. Students who know, for example, how to regulate negative emotions such as boredom and anxiety will tend to avoid distractions or unfounded concerns, to be more engaged and to engage with more dedication in the proposed activities (Miele; Scholer, 2018). However, to promote students' emotion regulation, teachers need to know and regulate their own emotions (Cruvinel; Boruchovitch, 2019; Pekrun, 2014; Taxer; Gross, 2018).

Studies that investigated strategies for regulating the emotions of future teachers are still incipient and show controversies regarding the impact of variables such as gender, age, semester, time of course, among others, on the use of these strategies (Akfirat, 2020; Alhebaishi, 2019; Bortoletto; Boruchovitch, 2013). According to the literature, age is a key variable for emotion regulation. The strategies used by adults are usually more improved and sophisticated (Kopp, 1989; Mcrae; Gross, 2020; Thompson, 1994). However, few studies have considered whether other demographic and academic characteristics may influence the report of the use of emotion regulation strategies. Such information would certainly be valuable in identifying which groups of individuals need to learn more about how to deal with their emotions. Research shows that higher education students are more predisposed to psychological suffering resulting from negative emotions (Pompilus; Pompilus, 2021; Trigueiro; Caldas; Silva, 2023). However, there are few investigations

that addressed the emotion regulation strategies of university students (Canedo; Andrés; Canet-Juric; Rubiales, 2019; Lasa-Aristu; Delgado-Egido; Holgado-Tello; Amor; Domínguez-Sánchez, 2019; Vally; Ahmed, 2020). In addition, it is noteworthy that the COVID-19 pandemic was a period of great emotional impact for students at different stages of schooling, which made the identification and improvement of students' social and emotional skills even more necessary, especially in higher education (Cristol; Gimbert, 2021; La Fuente; Pachón-Basallo; Santos; Peralta-Sánchez; González-Torres; Artuch-Garde; Paoloni; Gaetha, 2021; Pompilus; Pompilus, 2021).

In this sense, the objective of this research was to identify the emotion regulation strategies of students from teacher education courses at a Brazilian public university and to investigate possible relationships between emotion regulation strategies, demographic variables (gender and age) and academic life (semester, time of course, course, and areas of knowledge of the courses) of these students. We also sought to examine which characteristics of the sample would be predictors of the report of the use of emotion regulation strategies.

Method

Participants

The research included 295 students from various teacher education programs at a public university in an inner city of the state of São Paulo, Brazil. Of these, most were female (n = 191; 64,75%), aged 18 to 49 years (M = 22,83). Participants attended courses in the areas of Human Sciences (n = 116; 39,32%), Exact Sciences (n = 102; 34,58%) and Biological Sciences (n = 77; 26,10%) and the most frequent courses were teacher education programs in Pedagogy (n = 59; 20,00%), Mathematics (n = 44; 14,92%), Biological Sciences (n = 41; 13,90%), Physics (n = 24; 8,14%) and Physical Education (n = 23; 7,80%). Most students were in the 4th semester (n = 51; 17,29%) and in full/day time of course (n = 187; 63,39%).

Instruments

For data collection, two instruments were used and are described next.

Demographic and Academic Life Questionnaire

The questionnaire consisted of six closed questions and was specifically designed for this research to obtain information from students regarding age, gender, time of course, semester, and course they attended.

Emotion Regulation Strategies Scale for Adults (Boruchovitch; Bortoletto, 2010)

The scale aimed to verify the report of the use of emotion regulation strategies and to examine the perception of the participants' emotions in themselves and in others. The scale consists of 89 items, organized into three subscales referring to emotions sadness (34 items), anger (34 items) and joy (21 items) and is Likert-type with four response options ranging from 1, *it has nothing* to do with me, to 4, *it describes me very well*. The total score is between 89 and 356 points – the higher, the more adaptive the participant's emotion regulation skills and strategies are. In the subscales that evaluate the regulation of sadness and anger, eleven items refer to strategies that, according to the literature, are less adaptive to human functioning (Kopp, 1989; Mcrae; Gross, 2020; Thompson, 1994). These items have their score reversed and, as an example of one of them, it is possible to mention: *when I am sad, I cannot do anything to reduce my sadness*. Regarding the subscales of anger and joy emotions, the following item examples can be mentioned: *when I feel angry, I try to think of pleasant experiences* and *when I am happy, I perform pleasant activities to maintain my joy*.

The internal consistency of the scale, measured by Cronbach's alpha, was estimated in two previous studies carried out in university students from different states of Brazil (Bortoletto; Boruchovitch, 2013; Boruchovitch, 2015). There was high internal consistency for the total scale (a = 0,82) and levels ranging from acceptable to high (a = 0,58 to a = 0,77) for the anger, joy, and sadness subscales. Similarly, in the present study, there was high internal

consistency for the total scale (a = 0,78) and for the sadness (a = 0,78) and anger (a = 0,77) subscales, as well as acceptable levels for the joy subscale (a = 0,68), after removing some items that did not work well in the sample. The Cronbach's alpha of the negative emotions' subscales (referring to the total of the sadness and anger subscales, together) was also calculated and high internal consistency was obtained (a = 0,84).

Data collection procedure

The research was approved by the Ethics Committee (CAAE 25584419.6.0000.8142). After approval, the research was presented to the coordination of licentiate courses at a public university in an inner city of the of São Paulo, Brazil, requesting the authorization of the coordinators to carry out the study at that institution. Due to the COVID-19 pandemic, data collections were carried out online, through two different procedures: a) with synchronous presence of the first author in the remote classes of the courses during the second semester of 2020 and the first semester of 2021; b) via institutional email, with invitations sent to students in August 2020 and February 2021. In the first procedure, the teachers of licentiate courses were contacted to request the scheduling of a time to carry out the data collection. The research objectives and the absence of harm, if the students did not want to participate, were explained in both data collection formats. If they agreed, the students received a link to a Google Form. The first page of the form was The Informed Consent Form (TCLE, the acronym in Portuguese), in which participants had to indicate whether they consented to voluntarily participate in the research. If so, they continued to the next pages and answered the other instruments. The instruments were applied collectively and the procedure lasted approximately 20 minutes in data collections in remote classrooms. Most of the sample responded to the instruments in this way (n = 237; 80,33%). Few students participated through the invitations sent to the institutional email (n = 58; 19,66%).

Data analysis

The Statistical Analysis System for Windows (SAS System), version 9,2, software was used for data analysis. The total values, the means by subscales and by items and the standard deviations of the scores of the Emotion

Regulation Strategies Scale for Adults were calculated to verify which strategies were more and less reported by participants. The internal consistency of the scale was analyzed using Cronbach's alpha coefficient. The Kolmogorov-Smirnov and Shapiro-Wilk tests revealed a normal distribution of data for sadness and anger subscales and for the total value of the negative emotions' subscales (sadness and anger). Data was analyzed using parametric statistics for these subscales. Data of joy subscale were examined by non-parametric statistical procedures. The t-Student and Mann-Whitney tests were used for the comparative analysis of the scale scores with the students' demographic and academic life variables and for variables with two categories. Analysis of variance (ANOVA) and the Kruskal-Wallis test were applied for variables with three or more categories. Age, semester of course and area of knowledge of the courses were transformed into categorical variables and grouped as follows: students under 20 years old, between 20 and 29 years old and with 30 years or more; attending from the 1st to the 3rd, from the 4th to the 7th and from the 8th to the 10th semesters; and the courses of Humanities, Exact and Biological Sciences or Health Professions. In addition, Spearman's correlation analysis was employed to examine the relationship between the scale score and the numerical variables. Results of the correlations were interpreted according to the criteria proposed by Cohen (1988). Finally, the multiple linear regression analysis was conducted to study the relative importance of demographic and academic life variables in predicting the scores of the of Emotion Regulation Strategies Scale for Adults. The level of significance adopted for the statistical tests was 5%, that is, $p < ,05$.

Results

Table 1 shows the score of the participants on the emotion regulation strategies scale, with the means by subscales and by more and less reported items, as well as the minimum and maximum values, the median (Mdn.) and the standard deviation (SD).

Table 1 – Emotion Regulation Strategies Scale for Adults: descriptive statistics by subscales and by more and less reported items

	Averageee	SD	Min.	Mdn.	Max.
total per subscale					
Sadness	2.63	0.34	1.64	2.64	3.60
Anger	2.60	0.30	1.67	2.60	3.53
Joy	1.68	0.33	1.17	1.67	2.92
Negative Emotions (sadness + anger)	2.61	0.27	1.85	2.62	3.45
most reported item per subscale					
Sadness – item 1	3.38	0.68	1.00	3.00	4.00
Anger – item 1	3.51	0.62	1.00	4.00	4.00
Joy – item 1	3.57	0.63	1.00	4.00	4.00
least reported item per subscale					
Sadness – item 11	1.05	0.26	1.00	1.00	4.00
Anger – item 11	1.14	0.37	1.00	1.00	3.00
Joy – item 10	1.22	0.51	1.00	1.00	4.00

Note: N = 295. Mdn. = median.
Source: authors (2024).

As shown in Table 1, it was found that the highest mean corresponds to the sadness subscale (M = 2,63, SD = 0,34). The joy subscale (M = 1,68, SD = 0,33) had the lowest average when compared to the other subscales. It is possible to observe that students seem to use more strategies to regulate negative emotions (M = 2,61, SD = 0,33) than positive ones, such as joy. In the sadness and anger subscales, the items with the highest means were items 1: *I notice when I am sad* (M = 3,38, SD = 0,68) and *I notice when I am angry* (M = 3,51, SD = 0,62). The item with the lowest average in the two subscales was 11: *When I am sad, I physically attack someone* (M = 1,05, SD = 0,26) and *When I am angry, I physically attack someone* (M = 1,14, SD = 0,37), which refer to the externalization strategy. Other items with high means in these two subscales were 12 and 23, which deal with the harmful nature of these emotions for the studies and the isolation regulation strategy – item 12: B*eing sad hinders me in the concentration for the studies* (M = 3,32, SD = 0,82) =

and *Feeling angry hinders me in the concentration for the studies* (M = 3,18, SD = 0,80); item 23: *I prefer to be alone when I am sad* (M = 3,22, SD = 0,84) and *I prefer to be alone when I am angry* (M = 3,31, SD = 0,80). In the joy subscale, the item with the highest average was 1: *I can notice when I am happy* (M = 3,57, SD = 0,63) and the item with the lowest average was 10: *Joy harms me in social relationships* (M = 1,22, SD = 0,51). In the three subscales, the second item with the lowest average dealt with the strategy of drinking excessively to decrease or maintain emotion (response modulation strategy) – item 29 of the sadness and anger subscales: *I drink excessively to decrease my sadness* (M = 1,39, SD = 0,72) and *I drink excessively to decrease my anger* (M = 1,24, SD = 0,54) and item 20 of the joy subscale: *I drink excessively to maintain my joy* (M = 1,33, SD = 0,60).

Results of comparisons between students' demographic and academic life variables with the scores of the Emotion Regulation Strategies Scale for Adults are shown in Table 2.

Table 2 – Comparisons between scores of the Emotion Regulation Strategies Scale for Adults and demographic and academic life variables

	Gender						Area of Knowledge						
	Male n = 104; Female n = 191						Human n = 116; Exact n = 102; Biological n = 77						
Subscale	Male	Female	Z	p*	t	p**	Hum.	Exa.	Bio.	X^2	p***	F	p****
Sadness	2.62	2.64	0.19	.848	0.47	.641	2.63	2.56	2.74	13.46	**.001**	6.67	**.002**
Anger	2.67	2.56	2.46	**.014**	3.11	**.002**	2.54	2.64	2.63	5.15	.076	2.42	.054
Joy	1.75	1.65	2.99	**.003**	2.57	**.011**	1.69	1.73	1.62	5.00	.082	2.44	.089
Negative Emotions	2.65	2.59	1.50	.132	1.59	.114	2.58	2.60	2.68	7.25	**.027**	3.29	**.039**

Note: Z = test Z statistic. *p-value referring to the Mann-Whitney test for comparison of variables between 2 groups. t = t-statistic of the test. **p-value referring to Student's t-test for comparison of variables between 2 groups. X^2 = test x2 statistic. ***p-value referring to the Kruskal-Wallis test for comparison of variables between 3 or more groups. F = test F statistic. ****p-value referring to ANOVA for comparison of variables between 3 or more groups.

Source: authors (2024).

Table 2 – Comparisons between scores of the Emotion Regulation Strategies Scale for Adults and demographic and academic life variables (cont)

Time of Course							Semester						
Day n = 187; Night n = 108							1-3 n = 73; 4-7 n = 132; 8-10 n = 90						
Subscale	Diu.	Not.	Z	p*	t	p**	1-3	4-7	8-10	X^2	p***	F	p****
Sadness	2.66	2.59	1.46	.143	1.61	.108	2.58	2.61	2.71	6.82	**.033**	3.30	**.038**
Anger	2.58	2.62	0.92	.359	1.18	.237	2.58	2.58	2.64	3.32	.190	1.05	.351
Joy	1.65	1.74	2.35	**.019**	2.30	**.022**	1.71	1.68	1.67	0.75	.686	0.31	.730
Negative Emotions	2.61	2.61	0.20	.844	0.15	.881	2.58	2.59	2.67	7.06	**.029**	2.94	**.049**

Course									
Pedagogy n = 59; Mathematics n = 44; Biological Sciences n = 41; Physics n = 24; Physical Education n = 23									
Subscale	Pedag.	Matem.	Ciênc. Bio.	Física	Educ. Física	X^2	p***	F	p****
Sadness	2.60	2.60	2.72	2.49	2.81	15.22	**.004**	3.48	**.009**
Anger	2.50	2.72	2.64	2.60	2.62	10.27	**.036**	3.29	**.013**
Joy	1.67	1.73	1.64	1.82	1.60	5.66	.226	1.71	.149
Negative Emotions	2.55	2.66	2.68	2.55	2.70	10.69	**.030**	2.60	**.038**

Note: Z = test Z statistic. *p-value referring to the Mann-Whitney test for comparison of variables between 2 groups. t = t-statistic of the test. **p-value referring to Student's t-test for comparison of variables between 2 groups. X^2 = test x2 statistic. ***p-value referring to the Kruskal-Wallis test for comparison of variables between 3 or more groups. F = test F statistic. ****p-value referring to ANOVA for comparison of variables between 3 or more groups.

Source: authors (2024).

Table 2 shows statistically significant differences between the scores of the subscales of the Emotion Regulation Strategies Scale for Adults and participants' gender, area of knowledge, time of course, semester, and courses. More specifically, male students seemed to use significantly more strategies to regulate joy (Z = 2,99, p = ,003) and anger (t = 3,11, p = ,002) when compared to female students. Students of Biology and Health Professions and in the final semesters of their courses (8th to 10th) obtained the highest scores in the strategies for regulating sadness (area of knowledge F = 6,67, p = ,002; semester F = 3,30, p = ,038) and negative emotions (area of knowledge F =

3,29, p = ,039; semester F = 2,94, p = ,049). Participants of the night period reported using significantly more joy regulation strategies when compared to students of the daytime courses (Z = 2,35, p = ,019). Students in teacher education programs (licentiate) in Physical Education and Biological Sciences seemed to use significantly more strategies to regulate sadness (F = 3,48, p =,009), participants in the education program in Mathematics mentioned greater use of anger regulation strategies (F = 3,29, p =,013) and Physical Education students reported using significantly more strategies to control negative emotions (F = 2,60, p =,038). Finally, there were no statistically significant differences between the emotion regulation subscales and age, which indicates that students of all age groups reported using emotion regulation strategies in a similar way.

Table 3 shows results of the correlations between the Emotion Regulation Strategies Scale for Adults and numerical variables of the participants.

Table 3 – Correlation rates (r) and significance levels (p) between numerical variables and the scores of the Emotion Regulation Strategies Scale for Adults

	Sadness	Anger	Joy	Negative Emotions
Age	r*= .02189	.00147	-.01040	.01707
	p= .7081	.9799	.8588	.7704
Semester	r= .**14938**	.10348	-.05210	.**15126**
		.0760	.3725	.0093

Note: N = 295. *r = Spearman's correlation coefficient; p = p-value.
Source: authors (2024).

The data in Table 3 reveal significant, positive, and weak correlations between course semester and strategies for regulating sadness (r = ,149, p = ,010) and negative emotions (r = ,152, p = ,009). Students attending the most advanced semesters reported using significantly more strategies to regulate sadness and negative emotions when compared to the other semesters.

To understand the relative importance of demographic and academic life variables in predicting the scores of the subscales of the Emotion Regulation Strategies Scale for Adults, multiple linear regression analyzes were carried

out, considering age, gender, semester, time of course and areas of knowledge of the courses as independent variables. Table 4 shows the results of these analyzes.

Table 4 – Multiple linear regression for the scores of the subscales of the Emotion Regulation Strategies Scale for Adults

		Sadness			Negative Emotions		
Selected variables	Categories	Beta (SE)*	p-value	Partial R2	Beta (SE)*	p-value	Partial R2
Area of Knowledge	Biological Sciences (ref.)	—			—		
	Human Sciences	.10 (.05)	.056		.10 (.04)	**.013**	
	Exact Sciences	-.17 (.05)	**<.001**	.0437	-.08 (.04)	.058	.0221
2. Semester	1-3 (ref.)	–					
	4-7	.04 (.05)	.424				
	8-10	.11 (.05)	**.038**	.0149			
		Joy			Anger		
Selected variables	Categories	Beta (SE)*	p-value	Partial R2	Beta (SE)*	p-value	Partial R2
1. Gender	Male (ref.)	–			–		
	Female	-25.52 (10.27)	**.014**	.0206	-.11 (.04)	**.002**	.0320

Note: N = 295. *Beta: value of the estimate or slope on the regression line. SE: beta standard error. R2: coefficient of determination. Stepwise criterion for variable selection: variables without normal distribution were transformed into ranks. Total R2 Sadness: ,0586; Intercept (SE): 2,68 (,05); p < ,001. Total R2 Negative Emotions: ,0221; Intercept (SE): 2,68 (,03); p < ,001. Total R2 Joy: ,0206; Intercept (SE): 164,52 (8,26); p < ,001. Total R2 Rage: ,0320; Intercept (SE): 2,67 (,03); p < ,001.
Source: authors (2024).

As shown in Table 4, area of knowledge, semester and gender were selected as factors significantly related to the scores of the Emotion Regulation Strategies Scale for Adults. It was found that area of knowledge (β = -,17, R^2 = ,0437, p < ,001) and semester (β = ,11, R^2 = ,0149, p = ,038) seemed to have predictive potential in reported use of strategies to regulate sadness. Students with the highest score in this subscale were from Biological Sciences

and those from the 8th to the 10th semester. Also, the area of knowledge seemed to have predictive potential in reported use of strategies to control negative emotions (β = -,10, R^2 = ,0221, p = ,013). Participants with the highest score in these subscales were from Biological Sciences. It was also observed that gender seemed to have potential to predict scores of joy (β = -25,52, R^2 = ,206, p = ,014) and anger (β = -,11, R^2 = ,0320, p = ,002). Students with the highest score in these two subscales were male.

Discussion

The present investigation aimed to identify the strategies for regulating emotions reported by teacher education program students. Participants mentioned knowing and using different strategies for this, as in previous studies carried out with higher education students (Alhebaishi, 2019; Akfirat, 2020; Bortoletto; Boruchovitch, 2013; Canedo; Andrés; Canet-Juric; Rubiales, 2019; Lasa-Aristu; Delgado-Egido; Holgado-Tello; Amor; Domínguez-Sánchez, 2019; Vally; Ahmed, 2020). In general, sadness regulation strategies were more mentioned, followed by anger regulation strategies. It was interesting to note that the least reported strategies were those for regulating joy. According to Harley, Pekrun, Taxer and Gross (2019), positive emotions such as joy and relief also need to be regulated to remain at a moderate level, as happiness in situations of successful or good performance results can provide excess pride and self-confidence, which, in turn, can decrease student engagement in future tasks.

The items that refers to regulation of emotions sadness and anger most pointed out by students were those referring to the perception of these emotions and their damages for studies. These data, described in Table 1, suggest that participants can identify the emotions they feel and, in the case of negative emotions, perceive that they affect their learning. The isolation strategy (preferring to be alone) to deal with sadness and anger was the most mentioned by students. The data obtained in the present study were different from those found in international investigations with university students, in which strategies most reported by the participants were emotional suppression, the search for social support (Alhebaishi, 2019), planning, positive reappraisal, rumination (Akfirat, 2020; Canedo; Andrés; Canet-Juric; Rubiales, 2019) and cognitive

reappraisal (Vally; Ahmed, 2020). As the data of the present study were collected during the COVID-19 pandemic, it is possible to suggest that the report of use of the isolation strategy may have been influenced by the containment measures adopted at the time: quarantine and social isolation. Campos, Campos, Bueno, and Martins (2021) state that, in this period, the absence of socialization opportunities increased the chances of the emergence of avoidance and isolation behaviors. The pandemic also raised stress levels and impacted students' academic performance (La Fuente; Pachón-Basallo; Santos; Peralta-Sánchez; González-Torres; Artuch-Garde; Paoloni; Gaetha, 2021; Pompilus; Pompilus, 2021). Cristol and Gimbert (2021) emphasize that content focused on students' social and emotional skills should be addressed in teacher education courses, aiming at readaptation to academic life after the pandemic period. These authors argue that this theme should be included in the curriculum of teacher education courses, as these skills can not only benefit students during their learning, but can also be taught by them to their future students.

Regarding the least reported strategies, participants reported not using or employing little regulation of sadness and anger through externalization (physical aggression) and response modulation (excessive drinking). This result is quite adequate, as there are more adaptive strategies to deal with these emotions. However, it is possible to hypothesize the influence of social desirability in the report of these responses, in the sense that students do not report behaviors that can be socially disapproved, such as drinking alcohol in excess or using violence. Otherwise, it can be assumed that these actions are not part of the repertoire of participants or that they were influenced by isolation during the pandemic, since some people prefer to drink in situations of social interaction.

In addition, statistically significant differences and relationships were found between emotion regulation strategies reported by participants and some demographic and academic life variables. It was also found that some of these variables had predictive potential in the report of the use of these strategies. However, some findings of the present study diverged from the national and international literature, as is the case of the emotion regulation strategies and students´ gender. In the present study, male participants reported greater use of strategies to regulate anger and joy. However, in the study by Bortoletto

(2011), women obtained higher scores for the regulation of sadness, anger, and joy. In the studies by Lasa-Aristu, Delgado-Egido, Holgado-Tello, Amor and Domínguez-Sánchez (2019) and Vally and Ahmed (2020), no significant differences were found between these two variables. These findings may suggest, in general, that, regardless of gender, Brazilian students can perceive when different emotions interfere in the study situations and feel a greater need to regulate them.

The data of this investigation also differed from those of Bortoletto and Boruchovitch (2013) regarding the semester of the course. In the authors' research, students of the first year of the course claimed to have more control over their sadness. In the present study, it was the students of the final semesters who indicated more strategies to regulate negative emotions (sadness and anger). For Earl, Bishop, Miller, Davison and Pickerell (2024), examining how students of the first semester, or another year of the course, experience positive and negative affective situations can be a valuable practice to understand the involvement and academic performance of these individuals throughout the course.

Regarding age, Bortoletto and Boruchovitch (2013) found that older students (aged 30 or more) mentioned greater anger control, while, in the present investigation, no significant differences were found between age and emotion regulation strategies. Results obtained in relation to age were not congruent with the literature that points out that, with the advancement of development, people begin to exercise greater control over their emotions (Kopp, 1989; Mcrae; Gross, 2020; Thompson, 1994). According to researchers in emotion regulation (Bzuneck, 2018; Gross; Richards; John, 2006; Harley; Pekrun; Taxer; Gross, 2019; Pekrun, 2006, 2014; Taxer; Gross, 2018), emotion regulation strategies are learned and improved as individuals experience different situations throughout life, which emphasizes the important role that teachers can play in teaching these regulatory skills to their students.

Other relevant findings of this study not yet identified in the literature were the statistically significant differences that occurred in the emotion regulation strategies due to course, area of knowledge and time of course. It was interesting to note that students in the Physical Education and Biological Sciences courses and in the Biological Sciences and Health Professions area mentioned more the strategies to regulate sadness and negative emotions.

Participants who were studying Mathematics mentioned more strategies to control anger. Also, students on the night period reported more strategies to regulate joy. It can be suggested that negative emotions are experienced quite frequently in the Health Professions, which would explain the greater report of strategies to deal with these emotions. The differences found in relation to courses and areas of knowledge certainly contribute to identifying whether performance in specific subjects causes more positive or negative emotions. In these cases, teachers in these areas of knowledge could teach students to deal with the emotions that arise from the results experienced, whenever necessary. In addition, the lack of studies on the associations between emotion regulation strategies, course variables, area of knowledge and time of course should inspire new investigations that address these relationships.

The present study was valuable as it identified emotion regulation strategies more and less reported by future teachers and explored possible influences between the report of use of these strategies and demographic and academic life variables of these students. However, it also had several limitations which deserve to be overcome by future research. Among them, it is possible to indicate the use of self-report scales, which do not measure whether the reported strategies were in fact used. In addition, the Emotion Regulation Strategies Scale for Adults demanded from the participants a retrospective and not microanalytical assessment of the experience of emotions. When asking participants to respond to items thinking about a previous situation, it was not possible to ascertain whether this situation was concrete or frequent in the student's daily life. In addition, the scale only investigated some of the many emotions that influence learning, not including, for example, boredom, anxiety, frustration, relief, gratitude, pride, among others. Students' responses may also have been impacted by social desirability, in the sense of trying to make a good impression on the researcher rather than answering the instruments according to how they would act. The study was carried out with students from a single and renowned public university in Brazil, which may indicate that the sample can be differentiated, if compared to students from other institutions, thus not allowing the data to be generalized. Moreover, data were collected by different collection procedures and during an atypical moment, the COVID-19 pandemic. Although the internal consistency indexes of the emotion

regulation strategies scale were between high and acceptable in the present sample, factor analyzes of this scale have not yet been performed.

It is suggested, then, that future research uses other research methods in addition to scales, aiming to examine the effective use of emotion regulation strategies, such as observation techniques, behavior registration protocols and interviews. In addition, future studies may investigate other emotions that also impact the learning process such as frustration, boredom, and anxiety (Miele; Scholer, 2018). Future investigations also need to consider other variables that may be associated with the use of emotional regulation strategies such as well-being, quality of life, stress, and mental health of participants (Frenzel; Becker-Kurz; Pekrun; Goetz; Lüdtke, 2018; Lavy; Eshet, 2018). Furthermore, it is expected that this research be extend to students of teacher education programs from different higher education institutions.

Final considerations

It is believed that this article contributed to reinforce the relevance of emotion regulation for learning. It was found that participants perceived that emotions interfere with their studies and that they reported several emotion regulation strategies, especially for negative emotions, which can be even more harmful for learning situations. The most reported emotion regulation strategy was isolation and the least mentioned were externalization and response modulation. Gender, semester, course, area of knowledge and time of course were variables which seem to have an impact on the use of emotional regulation strategies. Some results, found in the present study diverged from those obtained in the literature of the area, which should certainly inspire further investigations.

Moreover, it is expected that the present study contribute to the continuity of research on emotion regulation strategies of future teachers, especially in the national context. Future research is fundamental both for increasing knowledge on this subject and for the design of preventive and formative actions directed to more specific needs of certain target groups of students. It is essential that regulation of emotions be a widespread theme during teacher education so that students of these courses can not only improve their skills to

deal with their emotions as university students, but also be able to stimulate their future students to use emotion regulation strategies.

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