Interpersonal relationships among university students: a randomized longitudinal effectiveness evaluation study

Relações interpessoais entre estudantes universitários: um estudo longitudinal randomizado de avaliação da eficácia

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ABSTRACT

Relaxation is a coping mechanism that helps to regulate emotions and is associated with prosocial responses. This paper included two studies: 1) a randomized clinical trial conducted with 139 university students who participated in a relaxation program and were assessed on interpersonal relationships over time; 2) a correlational study that assessed the relationship between emotional regulation, cognitive functioning, the importance attributed to sociability, and interpersonal relationships. Results revealed that interpersonal relationships did not change over time due to the relaxation intervention. The importance attributed to sociability played a moderating role in the relationship between emotional regulations and interpersonal relationships. The results suggest the need for further studies and emphasises the critical role of emotional regulation skills in university students.

Keywords: relaxation, emotional regulation, interpersonal relationships, cognitive functioning, sociability.

RESUMO

O relaxamento é um mecanismo que ajuda a regular as emoções e está associado a respostas prosociais. Este trabalho incluiu dois estudos: 1) um ensaio clínico randomizado realizado com 139 estudantes universitários que participaram de um programa de relaxamento e foram avaliados sobre as relações interpessoais ao longo do tempo; 2) um estudo correlacional que avaliou a relação entre regulação emocional, funcionamento cognitivo, a importância atribuída à sociabilidade e as relações interpessoais. Os resultados revelaram que as relações interpessoais não mudaram ao longo do tempo devido à intervenção de relaxamento. A importância atribuída à sociabilidade desempenhou um papel moderador na relação entre a regulação emocional e as relações interpessoais. Os resultados sugerem a necessidade de mais estudos e enfatizam o papel crucial das habilidades de regulação emocional nos estudantes universitários.

Palavras-chave: relaxamento, regulação emocional, relações interpessoais, funcionamento cognitivo, sociabilidade.

1 INTRODUCTION

Higher education is a demanding challenge that promotes student's individual development, regarding academic, social, and affective integration having a determinant role in the transition from secondary to higher education and the beginning of a professional career (Ferreira et al., 2001). Thereby, the university context is a great opportunity for individual and social development regarding interpersonal relationships (Diniz, 2005). University students face a variety of challenges that make this life stage demanding, being also a period of change and growth (Imaginário & Vieira, 2011). The adaptation to a new educational context may create emotional distress such as anxiety and depression (Atkins & Hayes, 2019), particularly in the absence of adequate coping strategies.

According to Johnson and Johnson (2001), the ability to properly build, maintain, and modify interpersonal relationships is associated with psychological health. When this ability is compromised, individuals tend to experience negative emotional states. Thus, interpersonal relationships appear to be

strongly related to mental health, health behaviours, or quality of life (Diniz, 2005; Teixeira et al., 2007). A recent study found that social isolation and lack of involvement in interpersonal relationships impair cognitive functioning and psychological well-being (Marques et al., 2018).

The development of interpersonal relationships is considered the main task of young adults' development (Diniz, 2005; Ferreira et al., 2001) and the university is a privileged context to establish closer and adaptive interpersonal relationships, contributing to the student's psychological well-being and integration (Teixeira et al., 2007). The need to adapt to the university context may be associated with adverse emotional reactions induced by the stress caused by all the changes involved in the adaptation process. Therefore, the peer group is a source of emotional support that is associated with the perception of greater well-being, particularly when students are displaced from their usual residence (Imaginário & Vieira, 2011). Thus, friendship and social support are key elements in the student's adaptation process and, consequently, an important contributor to remain in college (Teixeira et al., 2007).

In line with Imaginário and Vieira (2011), interpersonal relationships play an important role, particularly in nursing and psychology courses, since interpersonal skills are one of the main tools' students need to acquire. Besides that, greater satisfaction with friendships has been associated with lower student anxiety (Foster et al., 2016). Overall, the impact of these findings is based on the development of intervention programs to help students face social isolation.

Emotional regulation has been linked to the way individuals experience emotions (Veloso et al., 2011), and is a complex process that includes the ability to supervise, evaluate, and modify emotional reactions (Burckhardt et al., 2016). Indeed, emotional regulation influences individuals' cognitive domain and is an essential resource to the environment's adaptation process (Burckhardt et al., 2016; Ziabari & Treur, 2019). Additionally, emotional regulation is a foundational ability to respond with flexibility to multiple demands of daily life, maintaining well-being (Veloso et al., 2011). However, it is important to highlight that maladaptive emotional regulation strategies lead to continued distress (Veloso et al., 2011) and seem to contribute to the development and maintenance of anxious and depressive symptomatology (Burckhardt et al., 2016) and increase the possibility of social, relational, and academic deficits (Veloso et al., 2011). Nonetheless, most students appear not to have adaptative coping strategies to manage the emotional impact of stressors, particularly in the university context (Burckhardt et al., 2016). Emotion-focused coping strategies have been associated with motivation to learn (Goetz & Bieg, 2016). Relaxation can be considered an active strategy to regulate emotional mood (Hashim et al., 2011) and to improve individuals' self-regulation and performance (Goetz & Bieg, 2016). Breathing and general body relaxation together with Autogenous Training (AT) are two self-regulation promoting methods (Shcherbatykh, 2000).

Considering that emotional regulation is important in interpersonal relationships (Burckhardt et al, 2016; Veloso et al., 2011), the importance attributed to sociability may play a moderating role in the relationship between emotional regulation and interpersonal relationships, since the interaction with peers in young adults is an important milestone (Imaginário & Vieira, 2011).

The way individuals perceive the surrounding events is based on the interaction between cognitive functions (Nunes, 2009). Attention is a specific mental process of concentrating on an external stimulus, or internal experience. It is a complex cognitive function essential in the success of memorization and executive function (Fino, 2016). Wadlinger and Isaacowitz (2010) argue that individuals can regulate their emotions focusing for instance on breathing. This strategy helps to increase positive emotions which in turn, increases attention resources concerning their expansion, flexibility, and control.

According to Junior and Melo (2011), working memory (WM) retains information only during the period of performance of a given cognitive task (e.g., learning). Attention is a prerequisite for the success of this cognitive function. Specifically, WM capacity assists individuals in the use of cognitive resources and in improving learning skills (Flor et al., 2013). Adittionaly, Flor et al. (2013) in a study that involved 20 seventh grade students who participated in 12 sessions of relaxation training found that relaxation increased WM capacity and improved students' academic performance. These results may be explained by the evidence that anxiety is negatively associated with WM, due to the attention's focus being on threatening stimuli. Thus, relaxation, by reducing tension and anxiety, allows the focus to be entirely on the task. Finally, the executive function allows individuals to control, organize, direct their behaviours towards their goals and to accomplish voluntary actions, and acquire effective strategies in the resolution of problems. Cognitive flexibility facilitates this function, revealing itself in the ability to change strategies and alter mental scenarios, to solve problems (Fino, 2016). Yurdakul et al. (2009) suggested that practicing AT regularly, improves cognitive flexibility, increasing the range of suggestions for solving daily life problems and helping individuals, who suffer from anxiety, in decreasing worry.

AT was originally developed by Johannes Schultz and, later, was improved with the partnership of Wolfgang Luthe (Naylor & Marshall, 2007). The purpose of this technique is to stimulate and support the individual's self-healing process (Naylor & Marshall, 2007) since it is based on the belief that individuals have the potential to self-healing and mobilize internal resources (Kanji, 2000). Given that, AT proved to be one of the first psychological treatments, carried out in groups, to improve self-regulatory skills. The core of AT is the six standard exercises, which are an easy method to achieve relaxation through passive concentration and self-suggestion, which in turn, allow mental contact with the various parts of the body (Kanji, 2000).

AT is considered a mindfulness therapy that seems to promote the improvement of prosocial responses and the inhibition of rejection's emotional response. These effects seem to be due to the development of an inclusive awareness that reduces the perception of threat. Thus, by focusing attention on themselves, individuals may create a more tolerant and peaceful mental representation of others (Pinazo & Breso, 2015). Also, regular practice makes social interaction less inhibited and more natural, providing more intimate interpersonal relationships (Linden, 2007).

Furthermore, the practice of mindfulness seems to have a positive effect in reducing the level of distress (Ziabari & Treur, 2019), improving the ability to differentiate and label emotions, and the mitigation of emotional reactivity. Thus, mindfulness is seen as essential to promote emotional regulation (Carruthers, 1979).

The emotional balance that AT allows users to achieve is reflected in one's ability to focus on intellectual issues (Carruthers, 1979), promoting the individual's performance in terms of attention and memory (Atkins & Hayes, 2019). AT helps to maintain a balance between the activities of the two brain hemispheres, as well as between the sympathetic and parasympathetic branches of the nervous system, which seems to promote information' processing (Klott, 2013). Additionally, regular practice of AT may be effective in increasing intellectual efficiency and cognition (Naylor & Marshall, 2007).

In a study assessing AT, various participants reported greater control of their emotions, through changes in reactivity and emotional consciousness, as well as connecting more with peers (Atkins & Hayes, 2019). Also, relaxation decreases the individual's level of consciousness to move from a beta activity (occurs when individuals are mentally lucid and active) to an alpha activity (altered consciousness state). At this level of consciousness, there is an increase in creativity, memory capacity, and concentration (Kestenberg et al., 2014). Moreover, music also helps to reach consciousness and induces similar benefits (Lufiego et al., 2017).

2 MATERIALS AND METHODS

This research includes two studies. The aim of Study 1 was to evaluate the effectiveness of a relaxation program in university students. The purpose was to test whether relaxation predicted changes in interpersonal relationships over time. We hypothesized that participants in the experimental group improved on interpersonal relationships (10-week period) compared to the two control groups. The aim of Study 2 was to analyze the associations established between emotional regulation, cognitive functioning, interpersonal relationships, and the importance attributed to sociability in the full sample. We hypothesized that the importance of sociability and emotional regulation will contribute most to interpersonal relationships. We also hypothesized the moderating role of the importance of sociability in the relationship between difficulties in emotional regulation and interpersonal relationships.

2.1 STUDY DESIGN

The design of study 1 is quasi-experimental and longitudinal, with three moments of evaluation: pre-test, post-test, and follow-up and a randomized clinical trial (RCT) that took into account the CONSORT guidelines (2010). Participants were randomly assigned to three research groups: Experimental Group (EG) – Relaxation Protocol; Active Control Group (ACG) – Listening to relaxing music; Passive Control Group (PCG) – No intervention.

The design of study 2 is correlational and cross-sectional, and included T1 assessment of study 1 (pre-test with the total sample).

2.2 PARTICIPANTS AND PROCEDURE

This study was approved by the Ethics Committee of a university in the North of Portugal where data collection took place (45/2019). The data collection was conducted in two phases: the first one has been performed between May 2019 and July 2019, and the second one between October 2019 and December 2019. The participants were psychology and nursing students. Participation was voluntary and all students signed an informed consent form. In study 1, randomization was performed manually through the collection and subsequent alphabetical order of the name of each participant placing them sequentially in the EG, ACG, and PCG. Therefore, the probability of any student receiving an intervention or being placed in the control groups was decided solely by chance, making sure that if there were differences between the groups under analysis, these were probably due to the intervention and not to any other factor (Bhide et al., 2018). T1 (pre-test) was carried out before the first relaxation session (EG; ACG). The PCG also responded to the instruments the same day, despite not having undergone any intervention. T2 (post-test) occurred after the end of the sixth and last relaxation session of the EG and ACG, and the PCG also appeared on this day only to carry out the evaluation. In the follow-up, after a month (four weeks), all groups were submitted again for the third and final evaluation. The relaxation program took place over six consecutive weeks, every week, for a total of six sessions.

2.2.1 Experimental group

The protocol includes four stages, and the first is called *Beginning of Relaxation. Students*, in a comfortable position, started by diverting their attention from external stimuli to focus internally through abdominal breathing and guided imagination. In the next stage, Body Consciousness, the six standard exercises of the AT were carried out, where the main objective is muscular relaxation, the calming consciousness of the heart rhythm, and respiratory control. The third stage named *Guided Imagination of Health Promotion and Personal Power*, aimed at developing individual resources to

increase positivity and, consequently, well-being. In the last stage, feelings of gratitude for the moment of self-care were inspired, followed by the slow and gradual withdrawal of the relaxed state through the awakening of the five senses.

2.2.2 Active group

This group was exposed to relaxing music that was characterized by its slow pace, few rhythmic variations, calm melody, harmonious combination of instruments, and sounds of nature. All these features are considered stimuli to achieve relaxation, by reducing stress and increasing feelings of well-being (Nunes-Silva et al., 2016). Participants were instructed to close their eyes and practice abdominal breathing while listening to relaxing music.

2.3 MEASURES

2.3.1 Sociodemographic questionnaire

This questionnaire collects information regarding sex, age, scientific area, academic year and the importance students attribute to sociability (on a seven-point Likert scale).

2.3.2 The academic experiences questionnaire (QVA-R; Portuguese version by Almeida et al., 1999)

This scale consists of 60 items distributed across five dimensions. In this study, only the interpersonal dimension was evaluated, and it consists of 13 items that assessed the relationship with peers, the establishment of more intimate relationships, and the involvement in extracurricular activities. The Cronbach's alpha of this dimension was .86. In the present study, the α was .883.

2.3.3 The emotional regulation difficulties scales (DERS; Gratz & Roemer, 2004; Portuguese version by Coutinho et al., 2010)

This scale assesses typical levels of deregulation in six domains: non-acceptance of negative emotions; inability to engage in goal-driven behaviour when experiencing negative emotions; difficulties in controlling impulsive behaviour when experiencing negative emotions; limited access to emotional regulation strategies, which are perceived as effective; lack of emotional clarity. The scale includes 36 items of Likert-type answers, ranging from 1("it rarely applies to me") to 5 ("it almost always applies to me") (Coutinho et al., 2010). Higher values represent greater difficulties in emotional regulation (Gratz & Roemer, 2004). The psychometric properties of the scale validated for the Portuguese population showed a Cronbach's alpha of .924 (Coutinho et al., 2010). In the present study,

the scale also had a robust internal consistency (α = .937).

2.3.4 The Trail Making Test (TMT; Portuguese version by Cavaco et al., 2013)

This measure includes two parts (A and B). Part A measures attention, visual scanning, the speed of coordination between the hand and the eye, and information processing, while part B measures WM and executive functions, particularly the ability to switch between stimulus sets. Both consist of 25 circles. In part A, the circles are numbered from 1 to 25 and the participant must connect the numbers in ascending order, while in part B the circles include numbers and letters, and the respondent has to connect the circles in an ascending pattern with the additional task of alternating the numbers and letters. The results are reported considering the number of seconds required to complete the task, so higher scores indicate greater compromise.

2.4 DATA ANALYSIS

In study 1, statistical analysis was performed using software IBM SPSS Statistics (*Statistical Package for Social Sciences*) – version 27.0. To assess the differences over time, between the three research groups, Multilevel Modelling (MLM) was used, with PCG the reference group.

In study 2, Pearson correlations were performed to explore the associations between the variables. Cohen's criteria (1988) were used to classify the magnitude of the association: values between .5 and 1 indicate a strong relationship, between .30 and .49 a moderate ratio, and between .29 and .10 a weak ratio. To assess the contribution of the variables to interpersonal relationships, a regression analysis was carried out. Finally, moderation analysis was performed, using the command *PROCESS v3.4.1* (Hayes, 2013), to assess the importance attributed to sociability in the relationship between difficulties in emotional regulation and interpersonal relationships.

3 RESULTS

3.1 SAMPLE CHARACTERISTICS

Students from a public university in the north of Portugal were invited to participate in this study. The criteria for their inclusion were: i) being university students; ii) agree to participate freely in the study; iii) fulfil participation in all moments of data collection. The sample was randomly allocated by three groups. Initially, a total of 161 students interested in participating in the program was obtained, however, the experimental mortality of 22 participants was recorded. The overall inclusion rate was 85% and the dropout rate was 15% in the intervention group; 80% and 20% for the active control group; and 93% and 7% for the passive control group. Figure 1 shows the diagram of participants at each stage of the study, according to the model CONSORT. The final sample resulted

in 139 participants: 47 in EG; 41 in ACG; and 51 in the PCG.

Figure 1. Flow diagram of the progress
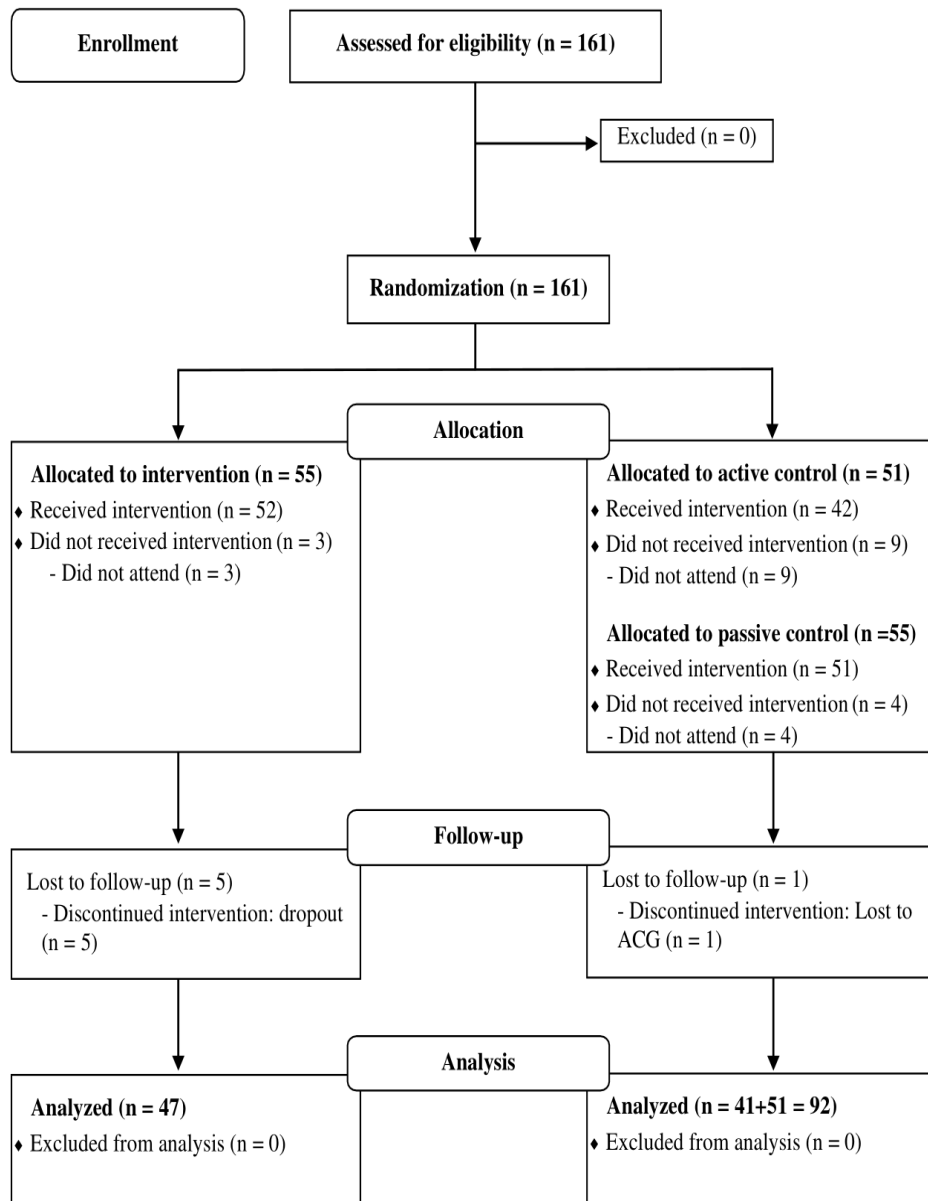
Adapted from Consolidated Standards of Reporting Trials (CONSORT, 2010).

Regarding study 2, participants age ranged between 17 and 46 years old [$M = 20.96$ years, $SD = 3.66$], with 126 (90.6%) being female and 13 (9.4%) male. Of these, 18 (12.9%) attend the first year, 12 (8.6%) the second year, 88 (63.3%) the third year, 20 (14.4%) the fourth year, and 1 (7%) the fifth year. In addition, 112 (80.6%) students were attending psychology and 27 (19.4%) nursing. The average interpersonal relationships were medium-high ($M = 3.79$, $SD = .63$) and emotional regulation difficulties were medium-low ($M = 2.25$, $SD = .59$). In turn, the cognitive functioning that was assessed by the TMT-A ($M = 33.03$, $SD = 14.50$) and by the TMT-B ($M = 75.06$, $SD = 26.85$), were at an average

level showing no compromise. Still, the importance that students attributed to sociability was high (M = 6.31, SD = .86), in a seven-point Likert scale. Table 1 shows the sociodemographic characterization and the baseline data (pre-test) of psychological variables in each of the RCT groups.

Table 1. Characteristics of the sample distributed by EG, ACG, and PCG

Characteristics	Experimental Group (n = 47)	Active Control Group (n = 41)	Passive Control Group (n = 51)
Sex, n (%)			
Female	43 (91.49)	36 (87.80)	47 (92.16)
Male	4 (8.51)	5 (12.20)	4 (7.84)
Age (years), mean (SD)	20.82 (4.22)	20.68 (2.23)	21.27 (4.06)
Curricular year, n (%)			
1st year	7 (5.04)	4 (2.88)	7 (5.04)
2nd year	5 (3.60)	3 (2.16)	4 (2.88)
3rd year	29 (20.86)	26 (18.71)	33 (23.74)
4th year	6 (4.32)	8 (5.76)	6 (4.32)
5th year	0 (0)	0 (0)	1 (.72)
Importance attributed to sociability, mean (SD) [a]	6.21 (.13)	6.44 (0.12)	6.29 (.13)
Psychological variables, mean (SD) [b]			
Difficulties in emocional regulation	2.27 (.08)	2.35 (.10)	2.16 (.08)
Interpessoal relationship	3.80 (.10)	3.81 (.10)	3.75 (.09)
Cognitive functioning (TMT-A)	35.04 (2.52)	32.10 (2.03)	31.92 (1.80)
Cognitive functioning (TMT-B)	79.62 (3.95)	73.95 (4.05)	71.76 (3.82)

[a] Higher values indicate greater importance attributed to sociability (between 1 and 7).
[b] Higher results indicate higher levels of difficulties on emotional regulation (between 1 and 5) and better interpersonal relationships' quality (between 1 and 5) and cognitive functioning.

Study 1: Impact of the Relaxation Program on the Interpersonal Relationships over Time
Main Effects Analysis

Base Model. In the base model, without any predictor, the interpersonal relationships are estimated by a base value common to all individuals (global mean of all subjects = 3.85), plus a specific term that translates the variability between subjects (=.35) and an error term associated with each observation (=.09). The interest of this model lies in determining the fraction of the variance between groups concerning the total variance (attributed to the subjects), which is estimated by the Interclass Coefficient (ICC = .799). The results showed that 79.9% of the total variance was explained by the difference between participants, showing a statistically significant effect.

Random Model with Time Variable (Unconditional). This model adds the time predictor to assess whether it explains the variances of level 1 observations. Time has a significant effect (=.04; p =.04) so that between every two moments, on average, the value for interpersonal relationships increased 0,040 units and the global average of it decreases to 3,77. It should be noted that the analysis over time reduced the variance estimate of the error term by 23% (from 0,087 to 0,067), which shows that time explained part of the variance observed in interpersonal relationships. As this variance is still significantly different from zero ($p < .001$), other predictors may be considered (Table 2).

Random Model with Time Variable (Conditional). This model adds the condition predictor to assess how it influences the explanation found in the previous model. Time no longer has a significant effect ($p = .03$; $p = .37$) and the global average of the interpersonal relationships was reduced to 3,75. Neither condition has significant effects on the interaction with time ($p = .39$; $p = .86$), nor are there major effects ($p = .80$; $p = .87$). The variance of the error term was practically unchanged (Table 2).

Table 2. Results of MLM Analysis for Interpersonal Relationships'

	Unconditional			Conditional		
	Coef.	EP	p	Coef.	EP	p
Fixed effects						
Intercept	30.766	.058	< .001	30.747	.096	< .001
Time	.040	.019	.039	.029	.032	.368
Condition 1				.036	.138	.797
Condition 2				.023	.144	.871
Time x Condition 1				.013	.046	.776
Time x Condition 2				.024	.048	.616
Random effects						
VAR (Intercept)	.311	.059	< .001	.311	.059	< .001
VAR (Time)	.018	.007	.016	.018	.007	.017
COV (Intercept x Time)	- .007	.017	.649	- .008	.017	.644
VAR (Residue)	.067	.008	< .001	.068	.008	< .001

Note. Condition 1 is the relaxation protocol (EG), Condition 2 is listening to music (ACG) and control is no intervention (PCG).

Study 2: Variables that Contribute to the Interpersonal Relationships

Relationship between Variables

The results showed that, in terms of WM and executive functions, higher levels of difficulty in emotional regulation were associated with poorer cognitive functioning ($r = .18$, $p < .05$). In turn, higher levels of difficulty in emotional regulation were associated with worse relationships ($r = -.24$, $p < .01$). Finally, better interpersonal relationships were associated with higher importance to sociability ($r = .40$, $p < .05$] (Table 3).

Table 3. Pearson's Correlations between Variables

Mesures	1	2	3	4
(1) Importance of Sociability	–	–	–	–
(2) TMT-A	.011	–	–	–
(3) TMT-B	-.07	.56 **	–	–
(4) Difficulties in Emotional Regulation	-.11	.12	.18 *	–
(5) Interpersonal Relationships	.40 *	-.16	-.12	-.24 **

Note. Correlations, N = 139; * $p < .05$; ** $p < .01$

Contribution of Variables to Interpersonal Relationships

The results showed that difficulties in emotional regulation and the importance attributed to sociability together accounted for 19.7% of the variation in the interpersonal relationships ($\Delta R^2 = .197$, F (2,136) = 16.682, $p < .001$) (Table 4).

The importance attributed to sociability contributed significantly to interpersonal relationships $t(136) = -2.55$, $p < .05$, as well as the difficulties in emotional regulation, $t(136) = 4.87$, $p < .001$. The importance attributed to sociability contributed more to interpersonal relationships ($\beta = .38$) than difficulties in emotional regulation ($\beta = -.20$).

Table 4. Results of Linear Regression for the Interpersonal Relationships' Quality

	R^2	ΔR^2	B	Standard Error β	Beta	t	p
Constant			2.52	.43	−	5.93	.000**
Dif. Emo. Reg.	.20	.19	-.21	.08	-.20	-2.55	.012*
Sociab. Import.			.28	.06	.38	4.87	.000**

Note. Regression, N = 139; * $p < .05$; ** $p < .001$

Importance Attributed to Sociability as a Moderator Between Emotional Regulation Difficulties and Interpersonal Relationships

The model that tested the moderating role of the importance attributed to sociability in the relationship between emotional regulation and interpersonal relationships was significant explaining 19.7% of the variance. Thus, there was a negative relationship between emotional regulation difficulties and interpersonal relationships ($\beta = -.21$, SE = .08, $t = -2.58$, $p < .05$), indicating that when emotional regulation difficulties were higher, interpersonal relationships were poorer. There was a positive relationship between the importance attributed to sociability and the interpersonal relationships ($\beta = .30$, SE = .06, $t = 5.21$, $p < .001$). Additionally, the association between emotional regulation difficulties and the importance attributed to sociability explained an additional variance of 2.6% in interpersonal relationships. Post-hoc analysis of the regression lines slope for different moderator levels showed that higher levels of emotional regulation difficulties were associated with poorer interpersonal relationships when students assigned average ($\beta = -.21$, $t = -2.58$, $p < .05$) or high ($\beta = -.35$, $t = -3.35$, $p < .01$) importance to sociability.

Figure 2. Moderation Analynis for different levels of "Importance attributed to sociability" in the relationship between Emotional regulation (Difficulties) and Interpersonal Relationships (quality).
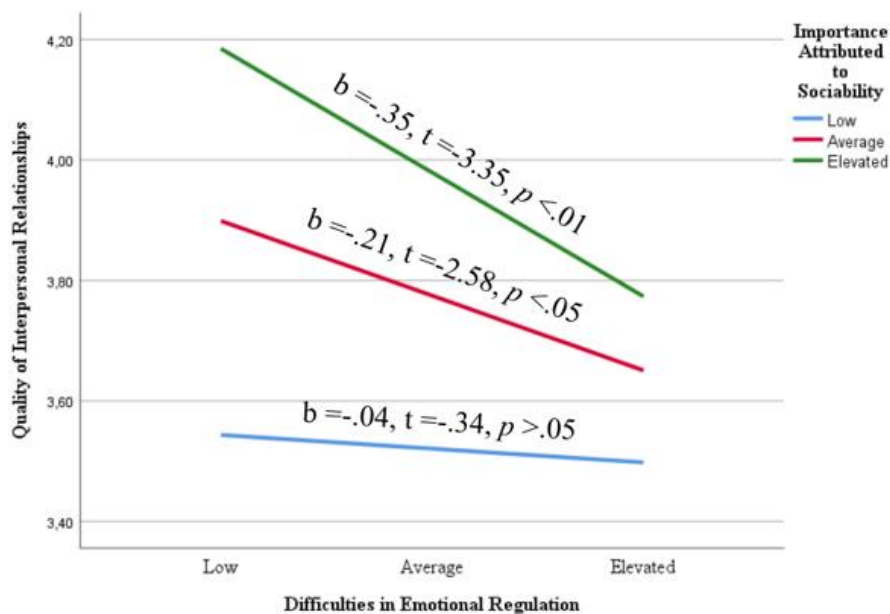
4 DISCUSSION

The results of study 1 showed no statistically significant differences between the three research groups (EG, ACG, and PCG), over the 10 weeks (from pre-test to follow-up), contrary to our expectations. A study with university students participating in an intervention to promote emotional regulation, by increasing competence through lectures, discussions, and group work, showed an improvement of global social functioning, indicating that high levels of emotional regulation were positively associated with sociability (Nelis et al., 2011).

Difficulties in emotional regulation and the importance attributed to sociability together accounted for 19.7% of the variation in the interpersonal relationships. Lopes et al. (2005) showed that students who proved to be more competent at emotional regulation considered themselves more sensitive and prosocial interpersonally than their colleagues. Additionally, a study from Lopes et al. (2004) revealed that the students' ability to manage emotions was associated with greater positive interaction and emotional support. Positive emotions are associated with sociability and serve as a guide for individuals' behaviour, therefore emotional regulation performs an essential role in interpersonal relationships.

Emotional regulation colours the emotional tone of social interactions i.e., the expression of pleasant emotions attracts favourable responses from others, while negative ones drive them away (Lopes et al. 2005). The ability to understand emotions influences social interaction by helping in the interpretation of internal and social clues, guiding emotional regulation, and social behaviour. It was expected that AT, a technique recognized for promoting emotional regulation (Shcherbatykh, 2000;

Ziabari & Treur, 2019), would have an impact on improving interpersonal relationships. Notwithstanding, only Atkins and Hayes (2019) study, which assessed an intervention with AT in students, showed an improvement in the relationships between them supporting the evidence about the impact of AT on improving social contact and interpersonal relationships.

The results of study 1 may also be explained by the fact that interpersonal relationships include several skills (e.g., emotional regulation), but each skill individually will have a diluted impact on social adaptation (Lopes et al., 2004). Thus, one may assume that the impact of AT practice on emotional regulation was not significant enough to manifest a change in interpersonal relationships. According to Burckhardt et al. (2016), young people may not have the necessary tools to manage the emotional impact of events perceived as stressors, since the negative emotions generated by stress impact social connections (Steptoe et al., 2009).

Finally, the authors hypothesize that the lack of improvement in interpersonal relationships may be due to AT being a technique especially focused on individual internal work. Although the benefits of AT may be enough on an individual level, they may not be sufficient regarding the relationship with others. Still, given the relaxation experience was short-lived, the changes at the internal level may have been insufficient to reach maturity and effectiveness. Future research should use longer relaxation training.

The results of study 2 revealed that there was a negative relationship between difficulties in emotion regulations and interpersonal relationships and a positive relationship between the importance of sociability and interpersonal relationships. Also showed that emotional regulation's difficulties and the importance attributed to sociability contributed 20% to interpersonal relationships.

Emotional regulation influences the way the emotions experienced by an individual are manifested and, when difficulty is present, in achieving adequate and effective regulation, the probability that the social and relational aspect is affected increases considerably (Veloso et al., 2011). This evidence seems to explain the predictive value found in the emotional regulation's difficulties regarding interpersonal relationships.

In line with Imaginário and Vieira (2011), students of psychology and nursing courses emphasize the important role of interpersonal relationships. In the current study, students were also enrolled in courses with the same characteristics, in which contact with individuals is central, therefore the importance related to interpersonal relationships is equally high explaining the importance attributed to the act of socializing. One may hypothesize that high levels of importance attributed to the social dimension of life are related to high levels of investment resulting in high levels of interpersonal relationships.

Additionally, study 2 revealed that the level of importance attributed to sociability moderated the effect of the difficulties in emotion regulation on interpersonal relationships. Thus, when the importance attributed to sociability was medium or high, higher levels of emotional regulation difficulties were associated with poorer interpersonal relationships. Therefore, if a student values the social aspect of his/her life, there may be an investment in the relationships established with others, with consequences on emotion regulation and implications for better interpersonal relationships. Further studies are needed on emotional regulation, interpersonal relationships, and socialization is given the importance of these variables in psychological adjustment (Veloso et al., 2011).

We hypothesized that students enrolled in degrees within the helping professions, value sociability (the relationship with others) to a greater degree and, for this reason, maybe more aware that they need to be competent in that field. Self-perceived difficulties and/or socialization may have consequences in terms of emotional regulation. Therefore, assisting students in the discovery of strategies that allow emotional self-regulation may have repercussions on the quality of the relationships and, consequently, on mental health, given the role of the social dimension (Marques et al., 2018).Also, it is known that emotion regulation is one of the basic skills of emotional intelligence, and low levels of emotional intelligence are associated with higher levels of impulsivity and worse interpersonal and social skills, favouring antisocial behaviours (Morales, Nájera, Resendiz, Tlalpan, & Luna, 2022).

In addition, study 2 showed that emotional regulation difficulties were negatively associated with cognitive functioning in terms of WM and executive functions. This result is in line with the literature since emotional regulation is known to interfere with the cognitive domain (Burckhardt et al., 2016), and when there are difficulties in this capacity, there is an increased probability of academic deficits (Veloso et al., 2011). This result is relevant due to the importance that emotional regulation suggests presenting in the students' learning process, denoting the proficiency on the programs developed in the educational scope that aim to assist the academic community in the acquisition of tools to manage negative emotions and promote general well-being.

5 LIMITATIONS, PRACTICAL IMPLICATIONS, AND FUTURE RESEARCH

This study has limitations that should be highlighted such as the sample characteristics that included mostly women, exclusive use of self-report measures, and not controlled variables regarding student's academic and individual life that may have impacted the relaxation's effectiveness. Future research should explore interpersonal relationships through a mixed-method research methodology, to understand the participants' experience.

The relaxation training duration may be considered short with a reduced impact on students and Abuín (2016) suggests that different approaches regarding the original technique may be relevant to its effectiveness such as therapist and patient characteristics (in this case students). In fact, there are two ways of performing AT one more focused on autogenous formulas (the six standard exercises) and the other more related to meditation.

Also, interpersonal relationships, in the present sample were at medium-high levels, revealing that the contact established with others was already satisfactory, leaving no margin for significant improvement. Future research should therefore evaluate the impact of relaxation in students with unsatisfactory levels of interpersonal relationships, whether these are psychological, social, or educational.

6 CONCLUSION

Taking into account the results of this research, although relaxation has not shown significant effects on interpersonal relationships, high levels of emotional regulation were associated with better interpersonal relationships and cognitive functioning (e.g., WM). Although some results did not correspond to what was expected, they raise new hypotheses. Future studies should use mixed methods and include other variables (e.g., differentiation of the self), as well as high school students or even clinical samples. Moreover, it would be interesting to offer the relaxation program for an entire full semester or academic year, since the time factor may have been an important key to the observed results.

DECLARATION OF INTEREST STATEMENT

No potential conflict of interest was reported by the authors. This manuscript is an original work that has not been submitted to nor published anywhere else. All authors have read and approved the paper and have met the criteria for authorship.

REFERENCES

Abuín, M. R. (2016). Terapia autógena: técnicas, fundamentos, aplicaciones en la salud y clínica y apoyo empírico. *Clínica y Salud, 27*(3), 133-145. http://dx.doi.org/10.1016/j.clysa.2016.09.004

Almeida, L. S., Ferreira, J. A. G., & Soares, A. P. C. (1999). Questionário de Vivências Académicas: Construção e validação de uma versão reduzida (QVA-r). [Academic Experiences Questionnaire: Construction and validation of a reduced version (QVA-r)]. *Revista Portuguesa de Pedagogia, 33*(3), 181-207.

Atkins, T., & Hayes, B. (2019). Evaluating the impact of an autogenic training relaxation intervention on levels of anxiety amongst adolescents in school. *Educational and Child Psychology, 36*(3), 33-51.

Bhide, A., Shah, P. S., & Acharya, G. (2018). A simplified guide to randomized controlled trials. *Acta Obstetricia et Gynecologica Scandinavica, 97*(4), 380-387. http://dx.doi.org/10.1111/aogs.13309

Burckhardt, R., Manicavasagar, V., Batterham, P. J., & Hadzi-Pavlovic, D. (2016). A randomized controlled trial of strong minds: A school-based mental health program combining acceptance and commitment therapy and positive psychology. *Journal of School Psychology, 57*, 41-52. http://dx.doi.org/10.1016/j.jsp.2016.05.008

Carruthers, M. (1979). Autogenic training. *Journal of Psychosomatic Research, 23*(6), 437-440.

Cavaco, S., Gonçalves, A., Pinto, C., Almeida, E., Gomes, F., Moreira, I., Fernandes, J., & Teixeira-Pinto, A. (2013). Trail Making Test: Regression-based norms for the Portuguese population. *Archives of Clinical Neuropsychology, 28*(2), 189-198. http://dx.doi.org/10.1093/arclin/acs115

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2ª ed.). Lawrence Erlbaum Pub.

Consolidated Standards of Reporting Trials (2010). *CONSORT 2010 checklist of information to include when reporting a randomised trial*. Retrieved from: http://www.consort-statement.org/

Coutinho, J., Ribeiro, E., Ferreirinha, R., & Dias, P. (2010). Versão portuguesa da Escala de Dificuldades de Regulação Emocional e sua relação com sintomas psicopatológicos. [Portuguese version of the Difficulties in Emotion Regulation Scale and its relationship with psychopathological symptoms]. *Revista de Psiquiatria Clínica, 37*(4), 145-151. http://dx.doi.org/10.1590/S0101-60832010000400001

Diniz, A. M. (2005). *A Universidade e os seus estudantes: Um enfoque psicológico.* [*The University and its students: A psychological approach*]. ISPA.

Ferreira, J. A., Almeida, L. S., & Soares, A. P. C. (2001). Adaptação académica em estudante do 1º ano: diferenças de género, situação de estudante e curso. [Academic adaptation in 1st year student: gender differences, student situation and course]. *Psico-USF, 6*(1), 1-10. http://dx.doi.org/10.1590/S1413-82712001000100002

Fino, S. S. (2016). *Funcionamento cognitivo em idosos: O papel da estimulação cognitiva e do uso da internet nas funções executivas. [Cognitive functioning in the elderly: The role of cognitive stimulation and the use of the internet in executive functions].* Dissertação de mestrado (não publicada), Universidade Fernando Pessoa.

Flor, R. K., Monir, K. C., Bita, A., & Shahnaz, N. (2013). Effect of relaxation training on working memory capacity and academic achievement in adolescents. *Procedia-Social and Behavioral Sciences, 82*, 608-613. http://dx.doi.org/10.1016/j.sbspro.2013.06.318

Foster, T., Steen, L., O'Ryan, L., & Nelson, J. (2016). Examining How the Adlerian Life Tasks Predict Anxiety in First-Year Counseling Students. *The Journal of Individual Psychology, 72*(2), 104-120. http://dx.doi.org/10.1353/jip.2016.0009

Goetz, T., & Bieg, M. (2016). Academic emotions and their regulation via emotional intelligence. In A. A. Lipnevich et al. (eds.), *Psychosocial Skills and School Systems in the 21st Century* (pp. 279-298). Springer. http://dx.doi.org/10.1007/978-3-319-28606-8_11

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54. http://dx.doi.org/10.1023/B:JOBA.0000007455.08539.94

Hashim, H. A., Hanafi, H., & Yusof, A. (2011). The effects of progressive muscle relaxation and autogenic relaxation on young soccer players' mood states. *Asian Journal of Sports Medicine, 2*(2), 99-105. http://dx.doi.org/10.5812/asjsm.34786

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression based approach*. Guilford Press.

Imaginário, S., & Vieira, L. S. (2011). Bem-estar subjectivo, integração social e vivências académicas numa amostra de estudantes da Universidade do Algarve. [Subjective well-being, social integration and academic experiences in a sample of students from the University of Algarve]. *AMAzônica, 7*(2), 40-60.

Johnson, D. W., & Johnson, R. T. (2001). The three Cs of promoting social and emotional learning: Cooperation, conflict resolution, and civic values. *The CEIC Review, 10*(6), 10-11.

Junior, C. A. M., & Melo, L. B. R. (2011). Integração de três conceitos: função executiva, memória de trabalho e aprendizado. [Integration of three concepts: executive function, working memory and learning]. *Psicologia: Teoria e Pesquisa, 27*(3), 309-314. http://dx.doi.org/10.1590/S0102-37722011000300006

Kanji, N. (2000). Management of pain through autogenic training. *Complementary Therapies in Nursing and Midwifery, 6*(3), 143-148. http://dx.doi.org/10.1054/ctnm.2000.0473

Kestenberg, C. C. F., Silva, A. V., Fabri, J. M. G., Silva, N. A. B., Rosa, B. M. S., & Branco, L. M. (2014). Estresse em graduando de enfermagem: técnicas de relaxamento para lidar com fatores estressores. [Stress in nursing students: relaxation techniques to deal with stressors]. *Interagir: pensando a extensão*, (17-19), 37-43. http://dx.doi.org/10.12957/interag.2014.13565

Klott, O. (2013). Autogenic Training–a self-help technique for children with emotional and behavioural problems. *Therapeutic Communities: The International Journal of Therapeutic Communities, 24*(4), 152-158. http://dx.doi.org/10.1108/TC-09-2013-0027

Linden, W. (2007) *The autogenic training method of J. H. Schultz*. In P. M. Lehrer, R. L. Woolfolk, & W. E. Sime (Eds.), *Principles and practice of stress management* (p. 151–174). The Guilford Press.

Lopes, P. N., Brackett, M. A., Nezlek, J. B., Schütz, A., Sellin, I., & Salovey, P. (2004). Emotional intelligence and social interaction. *Individuality and Social Psychology Bulletin, 30*(8), 1018-1034. http://dx.doi.org/10.1177/0146167204264762

Lopes, P. N., Salovey, P., Côté, S., Beers, M., & Petty, R. E. (2005). Emotion regulation abilities and the quality of social interaction. *Emotion, 5*(1), 113-118. http://dx.doi.org/10.1037/1528-3542.5.1.113

Lufiego, C. A. F., Schneider, R. H., & Bós, Â. J. G. (2017). Avaliação do estresse e ansiedade em pacientes quimioterápicos submetidos a relaxamento. [Assessment of stress and anxiety in chemotherapy patients undergoing relaxation]. *Psicologia, Saúde & Doenças, 18*(3), 789-800. http://dx.doi.org/10.15309/17psd180313

Marques, I., Balreira, M. L., & Temótio, J. T. (2018). Psiquiatria positiva, psicologia positiva e mindfulness: Uma visão comum. [Positive psychiatry, positive psychology and mindfulness: a common view]. *Psicologia, Saúde & Doenças, 19*(2), 354-368. http://dx.doi.org/10.15309/18psd190215

Morales, C., Nájera G., Resendiz, B., Tlalpan T., & Luna, A. (2022). Emotional Intelligence in students of complementary programs: Nursing Technician and podiatry technician. Latin American Journal of Development, 4, (2), 395-402. Doi 10.46814/lajdv4n2-009.

Naylor, R. T., & Marshall, J. (2007). Autogenic training: a key component in holistic medical practice. *Journal of Holistic Healthcare, 4*(3), 14-19. http://dx.doi.org/10.1027/1016-9040.1

Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion, 11*(2), 354-366. http://dx.doi.org/10.1037/a0021554

Nunes, M. V. R. S. (2009). Envelhecimento Cognitivo: principais mecanismos explicativos e suas limitações. [Cognitive aging: main explanatory mechanisms and their limitations]. *Cadernos de Saúde, 2*(2), 19-29.

Nunes-Silva, M., Valadares, A. C. D., Rosa, G. T., Lopes, L. C. M., & Marra, C. A. S. (2016). Avaliação de músicas compostas para indução de relaxamento e de seus efeitos psicológicos. [Evaluation of music composed to induce relaxation and its psychological effects]. *Psicologia: Ciência e Profissão, 36*(3), 709-725. http://dx.doi.org/10.1590/1982-3703001672014

Pinazo, D., & Breso, E. (2015). The effects of a self-observation-based meditation intervention on acceptance or rejection of the other. *International Journal of Psychology, 52*(4), 300-307. http://dx.doi.org/10.1002/ijop.12223

Shcherbatykh, Y. V. (2000). Self-regulation of autonomic homeostasis in emotional stress. *Human Physiology, 26*(5), 641-642. http://dx.doi.org/10.1007/BF02760382

Steptoe, A., Dockray, S., & Wardle, J. (2009). Positive affect and psychobiological processes relevant to health. *Journal of Personality, 77*(6), 1747-1776. http://dx.doi.org/10.1111/j.1467-6494.2009.00599.x

Teixeira, M. A. P., Castro, G. D., & Piccolo, L. R. (2007). Adaptação à universidade em estudantes universitários: um estudo correlacional. [University adaptation in university students: a correlational study]. *Interação em Psicologia, 11*(2), 211-220. http://dx.doi.org/10.5380/psi.v11i2.7466

Veloso, M., Gouveia, J. P., & Dinis, A. (2011). Estudos de validação com a versão portuguesa da Escala de Dificuldades na Regulação Emocional (EDRE). [Validation studies with the Portuguese version of the Difficulties in Emotion Regulation Scale (DERS)]. *Psychologica,* (54), 87-110.

Wadlinger, H. A., & Isaacowitz, D. M. (2010). Fixing our focus: Training attention to regulate emotion. *Personality and social psychology review, 15*(1), 75-102. http://dx.doi.org/10.1177/1088868310365565

Yurdakul, L., Holttum, S., & Bowden, A. (2009). Perceived changes associated with autogenic training for anxiety: A grounded theory study. *Psychology and Psychotherapy: Theory, Research and Practice, 82*(4), 403-419. http://dx.doi.org/10.1348/147608309X444749

Ziabari, S. S. M., & Treur, J. (2019). Cognitive modeling of mindfulness therapy by autogenic training. In S. C. Satapathy et al. (eds.), *Information Systems Design and Intelligent Applications* (pp. 53-66). Springer.