

RESEARCH ARTICLE (ORIGINAL) 

Stress and anxiety in nursing students: Effects of a program based on relaxation techniques

Stresse e ansiedade em estudantes de enfermagem: Efeito de um programa baseado em técnicas de relaxamento

Estrés y ansiedad en estudiantes de enfermería: Efecto de un programa basado en técnicas de relajación

Jéssica Dias Costa ¹

 <https://orcid.org/0009-0005-7483-6497>

Rosa Cristina Correia Lopes ^{1,2}

 <https://orcid.org/0000-0003-2930-9194>

¹ Nursing School of Coimbra (EEnfC), Coimbra, Portugal

² Health Sciences Research Unit: Nursing (UICISA: E), Nursing School of Coimbra (EEnfC), Coimbra, Portugal

Abstract

Background: Clinical placements and the COVID-19 pandemic are experiences that cause stress and anxiety in nursing students.

Objective: To assess the effectiveness of the “Learning to Relax” (*Aprender a relaxar*) program in reducing stress and anxiety in nursing students.

Methodology: A pre-experimental, longitudinal study was conducted with seven students who sought an anxiety consultation. The “Learning to Relax” program was designed based on diaphragmatic breathing and progressive muscle relaxation techniques and implemented in eight sessions during five weeks. The evaluation was conducted at baseline, endline, and follow-up using the Perceived Stress Scale and the Zung Self-Rating Anxiety Scale.

Results: Stress levels were lower between baseline and endline ($p = 0.069$) and significantly lower between baseline and follow-up ($p = 0.033$). There was a significant decrease in anxiety between baseline and endline ($p = 0.033$) and between baseline and follow-up ($p = 0.006$).

Conclusion: Program had a positive impact on managing stress, anxiety, and associated symptoms. It is therefore a therapeutic resource for interventions with nursing students.

Keywords: stress; anxiety; relaxation; nursing students

Resumo

Enquadramento: O contexto de ensino clínico e a vivência da pandemia COVID-19 são potencialmente stressores e/ou ansiogénicos em estudantes de enfermagem.

Objetivo: Avaliar a eficácia do programa “Aprender a Relaxar” na redução do stress e ansiedade em estudantes de enfermagem.

Metodologia: Estudo pré-experimental, longitudinal, com amostra de sete estudantes seguidos na consulta de ansiedade. Concebido e implementado Programa “Aprender a Relaxar” baseado nas técnicas de respiração diafragmática e relaxamento muscular progressivo, com oito sessões, em cinco semanas. Avaliação inicial, final e *follow-up* utilizada Escala de Perceção de Stress e Questionário de Autoavaliação de Ansiedade de Zung.

Resultados: Redução dos níveis de stress entre avaliação inicial e avaliação final ($p = 0,069$) e diminuição significativa entre avaliação inicial e *follow-up* ($p = 0,033$). Diminuição significativa da ansiedade entre avaliação inicial e avaliação final ($p = 0,033$) e entre avaliação inicial e *follow-up* ($p = 0,006$).

Conclusão: Programa demonstrou efeito positivo na gestão do stress, autocontrolo da ansiedade e sintomatologia associada, sendo um recurso terapêutico útil na intervenção com estudantes de enfermagem.

Palavras-chave: stress; ansiedade; relaxamento; estudantes de enfermagem

Resumen

Marco contextual: El contexto de la enseñanza clínica y la experiencia de la pandemia de COVID-19 son factores potencialmente estresantes y/o ansiógenos para los estudiantes de enfermería.

Objetivo: Evaluar la eficacia del programa “Aprender a Relajarse” para reducir el estrés y la ansiedad en estudiantes de enfermería.

Metodología: Estudio longitudinal preexperimental con una muestra de siete estudiantes a los que se les hizo un seguimiento en la clínica de ansiedad. Diseño y aplicación del programa “Aprender a Relajarse”, basado en técnicas de respiración diafragmática y relajación muscular progresiva, con ocho sesiones a lo largo de cinco semanas. Evaluación inicial, final y de seguimiento mediante la Escala de Percepción del Estrés y el Cuestionario de Autoevaluación de la Ansiedad de Zung.

Resultados: Reducción de los niveles de estrés entre la evaluación inicial y la final ($p = 0,069$) y disminución significativa entre la evaluación inicial y el *follow-up* ($p = 0,033$). Disminución significativa de la ansiedad entre la evaluación inicial y la final ($p = 0,033$) y entre la evaluación inicial y el *follow-up* ($p = 0,006$).

Conclusión: Programa mostró un efecto positivo sobre la gestión del estrés, el autocontrol de la ansiedad y los síntomas asociados, lo que lo convierte en un recurso terapéutico útil para la intervención con estudiantes de enfermería.

Palabras clave: estrés; ansiedad; relajación; estudiantes de enfermería

Corresponding author

Rosa Cristina Correia Lopes

E-mail: rlopes@esenfc.pt

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Introduction

The process of transition and adaptation of young adults to higher education, especially during the pandemic, has required a high level of autonomy and effective coping mechanisms from students to cope with the personal, social, and/or academic challenges (Araújo et al., 2003). The specific nature of nursing education seems to accentuate the challenges posed to students, especially with regard to clinical teaching, triggering high levels of stress and anxiety with repercussions on their learning process and well-being (Sequeira et al., 2013).

The theories of attachment (Bowlby, 1969, as cited by Silva, 2014), psychosocial development (Erikson, 1971, as cited by Silva, 2014), and transitions (Schumacher & Meleis, 1994) allow for a deeper understanding of the potential adaptive problems and psychological distress related to stress and anxiety in nursing students during their transition and adaptation to higher education.

Studies show that nursing students experience high levels of stress (Firmino et al., 2018) due to financial and academic difficulties and, above all, clinical practice (McCarthy et al., 2018). Stress occurs when people appraise situations arising from the relationship between themselves and the environment as exceeding their resources, affecting their well-being (Lazarus & Folkman, 1984). Anxiety is also very prevalent among this population. Several studies have highlighted this problem and suggested interventions to promote mental health (Firmino et al., 2018; Labrague et al., 2018; Sequeira et al., 2013). Anxiety is a normal reaction to stress and refers to the anticipation of a future concern. It is associated with muscle tension and avoidance behavior. Although it is beneficial in some situations, it can become a disorder when it occurs inappropriately, leading people to try to avoid situations that trigger or worsen their symptoms, which can affect job performance, schoolwork, and interpersonal relationships.

This study is justified by the worrying levels of stress and anxiety among nursing students, with consequences for mental health and academic success (Firmino et al., 2018; Labrague et al., 2018; Martins et al., 2017). Psychiatric mental health nurses are responsible for helping people recover their mental health, namely through the design and implementation of programs to promote young people's mental health through the educational system (Ordem dos Enfermeiros, 2018). The lack of evidence of progressive muscle relaxation (PMR) programs in Portugal with nursing students also justifies the relevance of this study.

This study aimed to assess the effectiveness of the Learning to Relax (*Aprender a Relaxar*) program in reducing stress and anxiety in nursing students who are patients attending the anxiety consultation of the of a nursing school in Portugal. To this end, the Learning to Relax program was designed and implemented based on the application of diaphragmatic breathing (DB) and PMR techniques.

Background

The transition to higher education presents young students with a series of challenges that can be perceived as opportunities or threats, particularly at the personal, social, and institutional levels, as they are faced with a very different learning environment, especially in terms of the organization of teaching and assessment methods and relationships with teachers and peers (Araújo et al., 2003). Some of these challenges are related to the separation from family and friends; the need to manage financial resources; the integration into new contexts and environments; confronting situations that require greater autonomy, responsibility, and decision-making skills; adopting new roles; establishing new relationships; managing extracurricular activities and the need for autonomy (Amado et al., 2014).

The multiple challenges faced by young people require a higher degree of autonomy than in the previous stage of human development. Therefore, a successful transition and adaptation to higher education requires students to have and develop coping mechanisms to deal with the new demands. The difficulties perceived by students, especially when they first enter higher education, can be major obstacles to their adaptation and integration. These perceptions or representations may relate to the entry itself or to the quality and effectiveness of their adaptation resources as inadequate or insufficient and may lead to a sense of confusion in different dimensions of their lives (Araújo et al., 2003).

Moreover, due to the COVID-19 pandemic, social isolation measures were implemented to prevent the spread of the virus. As a result, face-to-face classes were suspended and students were confined to their homes (Xavier et al., 2020). Students expressed concerns about how the lockdown measures could affect their academic and professional prospects (Oliveira et al., 2021). The Portuguese Association of Psychologists (2020) states that some students may have experienced increased anxiety due to the interruption of their teaching and learning processes and uncertainty about the future and the completion of their studies, in addition to the anxiety caused by isolation. Stress results from students' appraisals of the situation and their perceptions of the adequacy of their coping resources. Nursing students experience various stressors during their academic career, particularly in clinical practice. Therefore, dealing constructively with stressful situations enhances personal growth and increases the development of coping skills.

Anxiety serves as a warning sign of imminent danger, allowing individuals to be alert and take measures to deal with threats or adapt to new circumstances (Frota et al., 2022; Sequeira & Sampaio, 2020). It is an adaptive and temporary response to stressful situations, which is caused by increased activity in the sympathetic nervous system (SNS; Saraiva & Cerejeira, 2014). Anxiety ceases to be adaptive when it becomes excessive and lasts beyond

appropriate periods, resulting in significant suffering or functional impairment (Costa et al., 2018; Frota et al., 2022). It can be classified into four levels: mild anxiety, moderate anxiety, severe anxiety, and panic level anxiety (Frota et al., 2022; Saraiva & Cerejeira, 2014). The term can refer to a manifestation of an affective state, a symptom present in several (medical or psychiatric) disorders, substance consumption, or a group of mental illnesses (Frota et al., 2022; Saraiva & Cerejeira, 2014).

According to the latest National Epidemiological Study of Mental Health in Portugal, anxiety disorders account for 16.5% of the total 22.9% of psychiatric disorders (Direção-Geral de Saúde, 2014).

Nursing students are at risk of experiencing stress and anxiety, particularly during clinical practice. Clinical practice is a predictor of anxiety in this population (Araújo et al., 2011), which can interfere with attention and blocks comprehension and reasoning, leading to decreased intellectual abilities and performance in general (Marchi et al., 2013). Deep breathing relaxation techniques lower blood pressure, heart rate, and muscle tension, improve physical fitness, increase concentration and the problem-solving process, and improve the ability to cope with stressors (Potter et al., 2017, as cited by Ariga, 2019).

DB is an effective breathing technique for reducing the perceptions and symptoms of anxiety. It consists of contracting the diaphragm muscle to move air to the lower part of the lungs, which increases diaphragm length and breathing efficiency, making exhalation easier and more effective (Chen et al., 2016). Deep breathing increases the activation of the parasympathetic nervous system (PNS), which increases neural plasticity and alters information processing. This can be beneficial in treating psychological disorders and stress by reducing anxiety, insomnia, and other symptoms (Chen et al., 2016).

PMR techniques are widely used to relieve stress and anxiety (Vickers & Zollman, 1999), with beneficial effects on anxiety and depression problems, as well as improving feelings of self-control and the ability to cope with stressful situations (Melo-Dias et al., 2019).

The reduction of patients' anxiety after performing the relaxation technique is due to the balance between the anterior and posterior hypothalamic nuclei which, by reducing the activity of the PNS, prevents the side effects of stress and anxiety and promotes relaxation in the body and mind. As a result, patients experience deep relief of tension and reduced anxiety (Harorani et al., 2020).

Methodology

This study is pre-experimental and employs a before-after intervention design with a single group. It is also prospective and longitudinal, with three evaluation moments: baseline, endline, and follow-up.

The study population consisted of higher education nursing students who exhibited symptoms of stress and anxiety. This study used on a nonprobability sample of seven students with stress and anxiety symptoms from all

years of the nursing undergraduate program of a nursing School. These students were being monitored in the anxiety consultation of the School Health Service of that institution.

Students who met the criteria were informed about the program through the School Health Service and those who volunteered were referred to the researcher. Participants aged over 25 years or taking anxiolytic and/or antidepressant medication were excluded from the study. The data collection instrument included the sociodemographic questionnaire, the Portuguese versions of the Perceived Stress Scale (PSS; Pais-Ribeiro and Marques, 2009) and the Zung Self-Rating Anxiety Scale (SAS; Ponciano et al., 1982) at the beginning, end, and follow-up of the program), and the program evaluation survey (at the end). The program was implemented and data were collected between March 15 and May 21, 2021. Three evaluation moments were carried out using the Google Forms platform: baseline - at the beginning of the first session; endline - at the end of the last session; and follow-up - four weeks after the end of the program.

The PSS (Cohen et al., 1983) is a global measure of stress that assesses the degree to which individuals perceive their life situations as stressful. The PSS was translated and validated for the Portuguese population by Pais-Ribeiro and Marques (2009), with 13 items (positive and negative). It is a unidimensional five-point Likert-type scale that measures the frequency of certain feelings or thoughts (Cohen et al., 1983, as cited by Pais-Ribeiro & Marques, 2009). In this study, the Cronbach's alpha coefficient was 0.932, indicating good internal consistency (Pais-Ribeiro, 2010). The SAS (Ponciano et al., 1982) is a self-report instrument to measure anxiety levels based on four components: cognitive, motor, autonomic, and central nervous system (CNS). The scale consists of 20 items that cover the most common signs and symptoms of anxiety, rated on a four-point Likert-type scale (Ponciano et al., 1982). It was validated for the Portuguese population by Ponciano et al. (1982) and demonstrated good validity, reliability, and discrimination. The total score ranges from 20 to 80. The higher the total score, the higher the level of anxiety. Ponciano et al. (1982) suggest that scores above 37 are a strong indicator of anxiety, while scores above 40 indicate clinical levels of anxiety. In this study, Cronbach's alpha was 0.936, showing good internal consistency.

Regarding ethical procedures, it is important to note that the instruments were approved by their respective authors, received a positive opinion from the Ethics Committee (reference AD_P709_09/2020), were approved by the institution's President, and included informed consent from the participants. Additionally, data anonymity and confidentiality were ensured.

Statistical processing and data analysis were conducted using SPSS software version 28.0.1.0. Absolute and percentage frequencies were calculated, and measures of central tendency and dispersion were determined. Given the size of the sample, non-parametric tests were used (Friedman Test and Pairwise Comparison Method with Bonferroni correction). The level of statistical significance was set at 0.05.

Hypotheses

Hypothesis 1: Participation in the Learning to Relax program reduces stress levels in nursing students attending the anxiety consultation of the School Health Service.

Hypothesis 2: Participation in the Learning to Relax program reduces anxiety levels in nursing students attending the anxiety consultation of the School Health Service.

Learning to Relax program

The Learning to Relax program uses DB and PMR techniques. It consists of eight individual sessions of approximately 60 minutes each over a five-week period. The first six sessions were held twice a week, and the remaining two sessions were held once a week. Due to the COVID-19 pandemic, the sessions were conducted via Zoom Video Communications.

The program uses the expository method and, in particular, the practical and interactive component (training and assimilation of relaxation techniques and active participation) and the homework component (identification of the situation that generates anxiety, the signs and symptoms, the level of anxiety, and the strategies used to cope with it).

The program is divided into: preliminary contact (informed consent and scheduling of sessions); first session (presentation of the program; initial assessment with application of data collection instruments and information and health education session); second through eighth sessions (analysis and discussion of homework; use of DB and PMR techniques; DB and PMR training); end of eighth session (final assessment with application of data collection instruments and program evaluation survey). Each session begins with a reflection on the anxiety-generating situations identified and the effectiveness of the

strategies used.

The homework component consists of identifying a situation that generates anxiety, the signs and symptoms in this situation, namely the level of anxiety experienced, and the strategies used to cope with it.

Results

The sample consisted of seven female participants, with a mean age of 20.43 years. All participants were students (profession): two in their first year (28.57%), one in their second year (14.29%), three in their third year (42.86%), and one in their fourth year (14.29%). Four lived in the same district as the educational institution (57.14%) and five were displaced from their usual residence during the school term (71.43%). Of these, three (60%) lived with friends, one (20%) with family, and one (20%) alone. Three participants (42.86%) said they had already taken medication to reduce anxiety and four (57.14%) said they had not.

The results on the perception of stress (Table 1) indicate mean rank scores of 2.86 at baseline, 1.64 at endline, and 1.50 at follow-up.

The Friedman test showed statistically significant differences between the scores obtained at the different assessment times ($p = 0.018$).

Pairwise comparison with Bonferroni correction to adjust the significance level revealed that the difference was not statistically significant ($p = 0.069$), despite the decrease in stress levels between baseline and endline.

A statistically significant decrease in stress levels was found between baseline and follow-up ($p = 0.033$). Stress levels remained the same between endline and follow-up ($p = 1.000$).

Table 1

Summary statistics and results of the Friedman test for dependent samples: PSS total score ($n = 7$), at the three assessment moments

Dimensions	Baseline (a)	Endline (b)	Follow-up (c)	<i>p</i> -value	Pairwise comparison (post-hoc test)
	Mean Rank	Mean Rank	Mean Rank		
PSS total score	2.86	1.64	1.50	0.018	a-b ($p = .069$)
	Mean: 25.29 <i>SD</i> = 10.95	Mean: 15.14 <i>SD</i> = 4.30	Mean: 14.71 <i>SD</i> = 5.85		b-c ($p = 1.000$)
	Min.: 9; Max.: 41	Min.: 7; Max.: 19	Min.: 7; Max.: 23		a-c ($p = .033$)

Note. Min. = Minimum; Max. = Maximum; n = Sample; *SD* - Standard-deviation.

With regard to anxiety (Table 2), the results show mean rank scores of 3.00 at baseline, 1.64 at endline, and 1.36 at follow-up.

The Friedman test for the SAS total score and dimensions at the three assessment moments shows statistically significant differences in the motor ($p = 0.021$), autonomic ($p = 0.004$), and CNS ($p = 0.026$) dimensions and in the total score ($p = 0.004$).

The pairwise comparison method with Bonferroni correction to adjust the significance level revealed statistically significant differences in the motor dimension between baseline and endline ($p = 0.033$) and in the autonomic dimension between baseline and endline ($p = 0.033$) and between baseline and follow-up ($p = 0.006$). No statistically significant differences were found in the CNS dimension at any moment. Statistically significant differ-

ences were found in the SAS total score between baseline and endline ($p = 0.033$). A statistically significant decrease was found in anxiety

levels ($p = 0.006$) between baseline and follow-up. The scores were very similar between baseline and follow-up ($p = 1.000$).

Table 2

Summary statistics and results of the Friedman test for dependent samples: SAS total score ($n = 7$), at the three assessment moments

Dimensions	Baseline (a)	Endline (b)	Follow-up (c)	<i>p</i> -value	Pairwise comparison		
	Mean Rank	Mean Rank	Mean Rank		a-b	b-c	a-c
Cognitive	2.57	1.71	1.71	0.113			
Motor	2.79	1.43	1.79	0.021	0.033	1.000	0.184
Autonomic	3.00	1.64	1.36	0.004	0.033	1.000	0.006
CNS	2.64	1.93	1.43	0.026	0.544	1.000	0.069
SAS total score	3.00	1.64	1.36	0.004*	0.033*	1.000	0.006*
	Mean: 42.86 <i>SD</i> = 13.78 Min.: 27 Max.: 63	Mean: 32.29 <i>SD</i> = 7.57 Min.: 24 Max.: 47	Mean: 31.86 <i>SD</i> = 6.91 Min.: 24 Max.: 46				

Note. Min. = Minimum; Max. = Maximum; n = Sample; *SD* = Standard-deviation; The cognitive dimension is not included in the pairwise comparison because no statistically significant differences were found using the Friedman test.

The evaluation of the Learning to Relax program showed that 85.71% of the participants rated the “acquisition of new knowledge” and the “overall evaluation of the program” as *excellent*, while 14.29% rated it as *very good*. The results indicate that 71.43% of the participants reported significant improvement and 28.57% reported some improvement in “identifying signs and symptoms of stress and anxiety” and “self-control of stress and anxiety”. Additionally, 85.71% of the participants reported *significant improvement* and 14.29% reported some *improvement* in their “levels of stress and anxiety after performing PMR and DB techniques”.

Discussion

The stress assessment results showed a statistically significant decrease between baseline and follow-up, indicating that participation in the Learning to Relax program effectively reduces stress levels, particularly four weeks after implementation. These results support those found in a similar study (Gangadharan & Madani, 2018). Regarding anxiety assessment, a statistically significant decrease was observed in the comparison of the three assessment moments for dependent samples. This decrease was observed between baseline and endline, as well as between baseline and follow-up. These results indicate that the Learning to Relax program is effective in reducing anxiety in at least four weeks. This finding reinforces the importance of learning and acquiring relaxation techniques to maintain or reduce anxiety levels after program implementation. These results support the findings of Mojarrab et al.’s (2020) quasi-experimental

study with nursing students.

Although several stress-inducing situations were identified during the Learning to Relax program, this was not the case for anxiety, which suggests that the participants’ perception of stress-inducing situations had changed. After the program, the participants felt more capable of coping with situations that had previously been perceived as threatening. On the one hand, the implementation and training of DB and PMR techniques helped to reduce the emotional response of anxiety towards stress-inducing situations. On the other hand, the acquisition of constructive coping mechanisms empowered participants to manage problems and increase resilience.

The results before and after the Learning to Relax program in reducing anxiety levels confirm that the objective was achieved.

With regard to the dimensions of anxiety, significant improvements were observed in the motor dimension (between baseline and endline) and in the autonomic dimension (between baseline and endline and between baseline and follow-up). In the CNS dimension, the Friedman test revealed statistically significant differences but not in the comparison between the assessment moments. No statistically significant differences were found in the cognitive dimension.

Regarding the final evaluation of the program, most of the participants reported significant improvements in their levels of stress and anxiety after performing the relaxation techniques, their identification of signs and symptoms of stress and anxiety, and their ability to self-control stress and anxiety. These results are consistent with those obtained in the PSS and the SAS.

According to several national (Firmino et al., 2018; Mar-

tins et al., 2017) and international (Labrague et al., 2018) studies, nursing students are at risk for stress and anxiety. Therefore, it is necessary to intervene in this population, namely through the implementation of mental health programs.

The Learning to Relax program has proven to be an effective therapeutic tool for stress management and self-control of anxiety and related symptoms because it teaches about the problem, promotes identification of triggering factors, increases awareness of the signs and symptoms of anxiety, and, most importantly, trains and contributes to the acquisition of DB and PMR techniques. Thus, the Learning to Relax program is a useful and effective tool for higher education nursing students because of its positive effect on reducing stress and anxiety, despite the emergence of several factors perceived as stressful. In addition, the acquisition of new self-control strategies such as DB and PMR techniques enables students to self-manage stress for at least four weeks after the end of the program.

Conclusion

The results of this study indicate that the Learning to Relax program effectively reduces stress and anxiety levels while training participants to manage anxiety and stressful events through relaxation techniques, thus promoting the mental health of participants.

The Learning to Relax program, which is based on DB and PMR techniques, demonstrated a positive effect on reducing stress and anxiety levels in nursing students. This contribution adds to the scientific evidence supporting the effectiveness of programs based on DB and PMR techniques for nursing students, without the need to create new programs or resort to programs with no proven effectiveness.

This program is a low-cost, easy-to-access intervention whose main advantage is its remote implementation and the greater flexibility in scheduling and rescheduling sessions.

The implementation of the program may be challenging due to the need for digital resources (COVID-19 pandemic) and the limitations related to the sample (convenience, small size, and only women). The Learning to Relax program should be replicated with a larger and more diverse sample, possibly randomized, and with a control group.

Author contributions

Conceptualization: Lopes, R., Costa, J.

Data curation: Lopes, R., Costa, J.

Formal analysis: Costa, J.

Investigation: Costa, J.

Methodology: Lopes, R., Costa, J.

Resources: Lopes, R., Costa, J.

Software: Costa, J.

Supervision: Lopes, R.

Writing – original draft: Lopes, R., Costa, J.

Writing – review and editing: Lopes, R.

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