

Brief Biofeedback Intervention for Stress and Anxiety: a Study with Nursing College Students

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Abstract

Anxiety and Stress are two disorders with high prevalence among college students, interfering with their performance and quality of life. Biofeedback's efficacy as a solution to prevent and treat, anxiety and stress among college students was tested in this study. To do this, four groups were formed, based on STAI results. Two groups, one with high and another one with normal anxiety, participated in a 5 weekly biofeedback sessions program. The other two groups, also divided in high and regular anxiety, acted as control groups and were not submitted to any intervention. The participants were assessed with the Trait Anxiety Inventory and the Inventory of Stress for College Students one week before and one week after the biofeedback trial and the results were compared. The results indicate a good potential of biofeedback training on anxiety and stress intervention among college population, representing a simple and cost effective solution.

Keywords: Anxiety; Stress; Biofeedback; Nursing Students; Higher Education.

1. Introduction

Over the last few years mental health disorders among college students is increasing, with anxiety and stress having high rates of prevalence (Lindsey, 2014). The entrance at University can be particularly demanding to students, confronting them with difficulties of adaptation and transition to the new academic life, which is characterized by new and complex challenges in various areas of their lives. Also to many of these students, this transition occurs at the end of adolescence, a period marked by some emotional instability.

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These situations combined may represent a high risk of developing anxiety disorders, with negative repercussions on personal, social and academic performance level (Bayram & Bilgel, 2008; Kassim, Hanafi, & Hancock, 2008; Pereira, Monteiro, Santos, & Vagos, 2007; Pereira et al., 2009; Teixeira, Dias, Wottrich, & Oliveira, 2008; Vagos, Santos, Monteiro, Vasconcelos, & Pereira, 2010). Most of research about anxiety and intervention has been focusing on pharmacological intervention and classic psychotherapies, and campus health services face limited resources. The search for new cost effective intervention programs are a research demand. Since 2002, University of Aveiro has developed several initiatives to promote personal empowerment and education for health, and since 2005 several training modules, opened to all academic community, focused on stress symptoms, theoretical approaches and stress management strategies were carried out with positive results that supports these interventions (Vagos et al., 2010). The search for more effective protocols has led to new technologies, where biofeedback devices have been in evidence.

As a result of the unification of various fields of Psychology, Medicine, Neurophysiology and Cybernetics, the biofeedback is a self-regulation non-invasive and drugs-free technique that can be easily applied. It uses specific instruments to measure and amplify physiological signs and present them in meaningful visual and auditory cues. When a person becomes aware of how thoughts and behaviors influence their physiological processes, that person learns how to use them to voluntarily change those processes. With training the individual learns to control the target physiological response and consequently will be able to recognize and control the problematic symptoms (Frank, Khorshid, Kiffer, Moravec, & McKee, 2010; Neto, 2010; Schwartz & Andrasik, 2007; Singh & Kaur, 2007). Yucha and Montgomery (2008) have presented near 45 clinical conditions where biofeedback has showed positive results, in such diverse areas as alcoholism, substance abuse, arthritis, diabetes mellitus, insomnia, fibromyalgia, attention deficit hyperactivity disorder, epilepsy, headache, chronic pain, autism, depressive disorders, constipation, urinary incontinence, hypertension and anxiety. In anxiety treatment, biofeedback studies showed its effectiveness on anxiety reduction, used alone or as adjunct, considering it equivalent to other relaxation and self-control methods while it is occasionally shown to be superior to other interventions. More recent studies have reinforced the importance and effectiveness of biofeedback training programs on anxiety intervention. Reiner (2008) concluded that biofeedback may be a useful adjunct to behavioural therapies, and may be helpful to those who have difficulty adhering to and/or performing traditional relaxation therapies. Ratanasiripong, Sverduk, Prince and Hayashino (2012) conducted a study in order to investigate the impact of a biofeedback program in stress and anxiety of a nursing students group during their first clinical training. They observed that after five weeks of clinical trial, the biofeedback group stress levels remained stable and anxiety levels were significantly reduced, while in the control group stress levels increased significantly and anxiety levels increased moderately.

2. Methods

2.1 Participants

It was selected from a Portuguese university the first year of nursing course, the final sample was composed of 40 adult volunteer students with a mean age of 19 years ($M=18.43$; $MD=1.414$). Because of the small representation of male individuals, all participants were females. The exclusion criteria included pre-existing health problems, substance abuse, at time psychotherapeutic process or psychopharmacological treatment.

2.2 Instruments

2.2.1 Biofeedback 2000x-pert. It is a modular biofeedback device developed by Schuhfried. In this study was used the MULTI module, that allows to collect skin conductance level, skin temperature, heart rate and blood volume pressure.

2.2.2 State-Trait Anxiety Inventory (STAI). The trait anxiety inventory (Silva & Spielberger, 2007) is widely used on trait anxiety evaluation. Consisting in 20 items on a 4-point Likert scale (1 for "almost never" to 4 "almost always"), higher scores indicates higher level of anxiety. The Cronbach's alpha for the present study was .905 for the pre-intervention and .898 for the post-intervention.

2.2.3 Inventory of Stress for College Students. The Inventory of Stress for College Students (Inventário do Stress em Alunos Universitários, ISEU) is an Inventory developed by Pereira et al. (2004). It aims to assess stress-inducing factors. Consisting in 24 items on a 5-point Likert scale (1 for "Strongly Disagree" to 5 "Strongly Agree", higher scores indicates higher stress. The Cronbach's alpha for the present study was .883 for the pre-intervention and .904 for the post-intervention.

2.3 Procedures

The study took place over eight weeks in ESSUA facilities. All participants were assessed before and after the intervention. After a brief explanation of the study and its objectives, informed consent was obtained. The pre-intervention assessment protocol, composed by demographic data, STAI and ISEU, was made by all participants. The participants were then divided in 2 groups, regarding their scores on STAI, resulting in a group with high anxiety and other with normal anxiety. Then, 20 participants of each group were randomly selected and assigned to control and biofeedback groups, resulting in 4 groups: one biofeedback group with high anxiety levels (BFBA), one Biofeedback with normative anxiety levels (BFBN), one control group with high anxiety levels (CGA) and one group with normal levels of anxiety (BFBN). Only biofeedback groups participants (BFBA and BFBN) took the biofeedback training, the participants in the control group did not receive any training or instruction.

The biofeedback training consisted by a 12 minutes session, once a week over 5 weeks. Participants were asked to observe their physiological data, presented in real time on a monitor in the form of graphics, and try to identify the thoughts that lead to an increase or decrease of physiological activation and then try to use those strategies to decrease their physiological arousal. One week after the last biofeedback session all participants made the post intervention assessment protocol (STAI and ISEU). Results were compared using SPSS Statistics 21.

3. Results

After Shapiro-Wilk normality test was done, non-parametrical statistics were chosen. Mann-Whitney test showed no significant differences in the basic characteristics and pre-intervention scores between the BFBA and CGA groups (table 1). and pre-intervention scores between the BFBA and CGA groups (table 1).

Table 1. Basic characteristics and pre-intervention scores between the BFBA and CGA groups

	BFBA(n=10)		CGA(n=10)		p
	M	DP	M	DP	
Age	18.90	1.524	18.70	1.567	.529
STAI-Y2	51.40	3.026	52.40	3.204	.481
ISEU	80.60	7.749	73.50	9.071	.105

Also no significant differences in the basic characteristics and pre-intervention scores were found between BFBN and CGN groups (table 2).

Table 2. Basic characteristics and pre-intervention scores between the BFBN and CGN groups

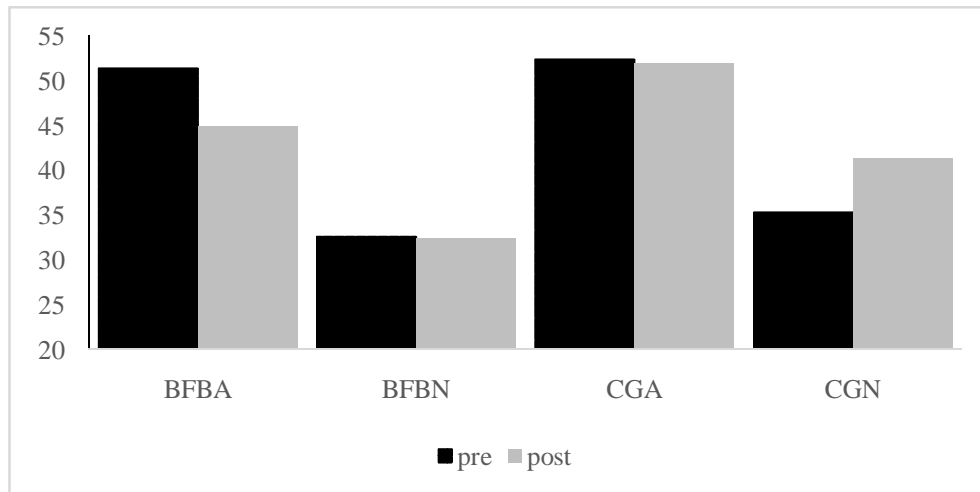
	BFBN(n=10)		CGN(n=10)		p
	M	DP	M	DP	
Age	18.50	0.972	18.80	1.687	.912
STAI-Y2	23.60	3.026	35.30	4.084	.123
ISEU	65.20	18.522	56.30	12.561	.218

The results on anxiety (figure 1) show that BFBA group had a significant decrease of STAI scores, over 7 weeks, while CGN had a significant increase. The CGA and BFBN had slight decreases.

For the BFBA the mean pre-intervention score (M=51.40; DP=3.026) was significant higher than the post-intervention score (M=44.90; DP=7.475), for the BFBN the mean pre-intervention score (M=32.60; DP=3.026) was almost the same as post-intervention score (M=32.50; DP=5.401), for the CGA the mean pre-intervention score (M=52.40; DP=3.204) was slightly higher than the post-intervention score (M=51.90; DP=6.402), and for the CGN the mean pre-intervention score (M=35.30; DP=4.084) was significant lower than the post-intervention score (M=41.90; DP=9.267).

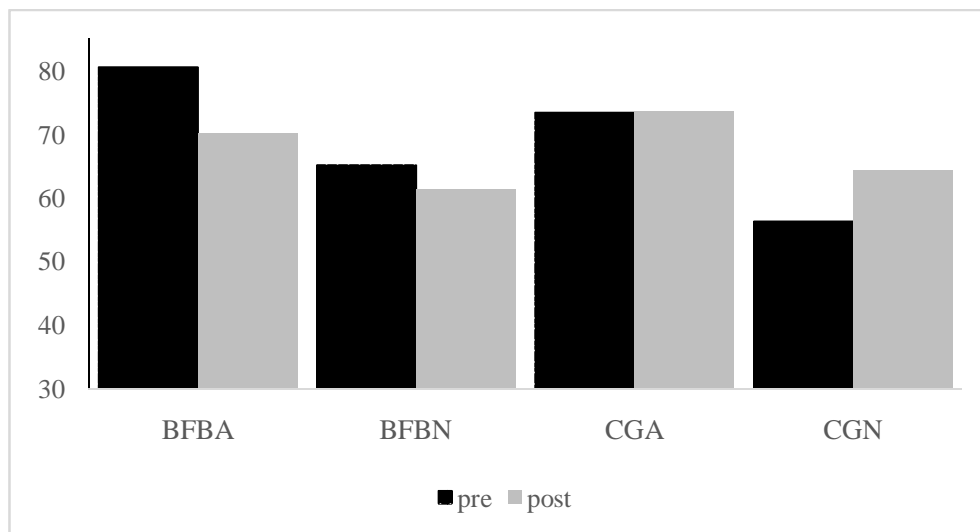
Wilcoxon test for 2 paired samples indicated significant differences on BFBA decreased scores ($Z=-2.096$; $p=.036$) and CGN increased scores ($Z=-1.989$; $p=.047$), and non-significant differences on BFBN ($Z=-.255$; $p=.798$) and CGA ($Z=-.714$; $p=.475$) decreased scores.

Figure 1. Comparison between the STAI mean scores for pre and post-intervention for the 4 groups



The results on Stress (figure 2) show that BFBA group had a moderate decrease of ISEU scores, over 7 weeks, while CGN had a significant increase. The CGA had a slight increase and BFBN had slight decrease. For the BFBA the mean pre-intervention score ($M=80.60$; $DP=7.749$) was significant higher than the post-intervention score ($M=70.30$; $DP=12.910$), for the BFBN the mean pre-intervention score ($M=65.20$; $DP=18.522$) was slightly higher than post-intervention score ($M=61.30$; $DP=11.295$), for the CGA the mean pre-intervention score ($M=73.50$; $DP=9.071$) was almost the same as post-intervention score ($M=73.70$; $DP=15.628$), and for the CGN the mean pre-intervention score ($M=56.30$; $DP=12.561$) was significant lower than the post-intervention score ($M=64.30$; $DP=15.514$). Wilcoxon test for 2 paired samples indicated significant differences on CGN increased scores ($Z=-2.349$; $p=.019$), non-significant differences for the CGA increased score ($Z=-.307$; $p=.759$), and decreased scores of BFBN ($Z=-.773$; $p=.440$) and BFBA ($Z=-1.829$; $p=.059$).

Figure 2. Comparison between the ISEU mean scores for pre and post-intervention for the 4 groups



4. Discussion

The transition to higher education is demanding and confronts students with new challenges. While adapting to a new academic reality sometimes associated with leaving home, with detachment from family and friends, students are subjected to various forms of pressure, leading to the experience of emotional reactions and consequent mood disorders and anxiety. Several studies shows that more than half of students entering higher education have difficulties in this transition and others even suggest an increase in psychopathology, particularly depression and anxiety (Almeida & Soares, 2003; Bayram & Bilgel, 2008; Dyson & Renk, 2006; Teixeira et al., 2008).

This study aimed to validate the use of biofeedback in university first year students not only as an anxiety treatment intervention but also as a preventive tool of stress and anxiety increasing. To do this, four groups were created. A group of high anxiety subject to biofeedback training, which was intended to observe a reduction in the levels of stress and anxiety; a group with normal anxiety, subject to biofeedback in order to verify the maintenance of anxiety and stress levels; and two control groups with and without high anxiety, in which was expected an increase in stress levels and anxiety.

The results of control group with normative anxiety levels points that first year college students might experience a significant increase on their anxiety and stress levels. The results of control group with high anxiety levels the results are not so significant, but the fact that the high anxiety and stress levels were almost the same after 8 weeks should not be ignored. Both results reinforces that anxiety and stress are a serious problem among a great number of college students. The efficacy of biofeedback training to reduce anxiety and stress on anxious students seems to be supported by the significant decrease of anxiety levels of the biofeedback group with pre intervention high anxiety levels. The reduction of stress was not as strong, but even though it is a moderate solid result and differences observed were almost significant. Similar results were found on previous studies.

The use of biofeedback training as a prevention strategy for anxiety and stress increasing also seems to be supported by this study. While students with normative levels from control group increased significantly their levels over 7 weeks, the students with normative levels that have done the biofeedback training did not present the same increase. Similar results with biofeedback usage were found in previous studies like Ratanasiripong, Ratanasiripong, and Kathalae (2012), Chaló, Pereira, and Sancho (2013) and Ratanasiripong, Kaewboonchoo, Ratanasiripong, Hanklang and Chumchai (2015).

Although these are positive results, it seems that with more sessions the results could be more expressive. An example is the stress reduction on biofeedback group with high anxiety; it seems that with more sessions the stress decreasing might be stronger and significant. In fact according to McKee (2008) the great majority of patients only obtain benefits after 8 to 12 sessions. Another limitation of the present study could be the participants. Generalization should be done with caution, as a result a small sample, composed only by females from a single Portuguese University. At last, the results rely on self-reported inventories. Considering the results and limitations, the authors consider that this study emphasizes the biofeedback potentiality on anxiety and stress intervention among college population, representing a simple and cost effective solution. Although future studies should consider the increasing amount of biofeedback sessions.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards

Informed consent

Informed consent was obtained from all individual participants included in the study.

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