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A pilot study of pre- post anxiety treatment to improve academic performance for engineering students

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Abstract

In this paper, we present a pilot study of pre- post treatment toward overcoming anxiety in improving academic performance for engineering's students. The anxiety level measurement was used to examine the effect of the intervention, as well to acquire the prior finding on the effectiveness of a treatment to reduce anxiety in improving academic performance. It is based on a pre post design to evaluate the effect of intervention by using breath per-minute (bpm) and grade point average (GPA). Six males and females engineering's students participated in this study. They received six sessions of treatment each for two hours of intervention. It includes breathing retreatment, relaxation, study coping skills. The results show that, the number of anxieties was significantly reduced which bpm shows t (2;5)= 4.788; p=.005 (p<.05). Furthermore, for GPA the difference is not significant with t (0;5)= -1.894; p=.117 (p>.05). Since all participants had reduced their anxiety level and improve their academic performance, we recommend that this intervention as an effective approach in reducing anxiety level.
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Keywords: Pilot study; Treatment; Anxiety; Academic performance; Engineering student.

1. Introduction

Anxiety disorders can manifest in students' behaviour in the classroom such that those with anxiety disorders become more passive in their study. Feelings of nervousness, panic, failing examinations, feeling incapable of doing tasks, racing heartbeat, and restless mind are symptoms of anxiety which contribute to low academic performance among students (Vitasari *et al.*, 2010). Researchers also have revealed that high levels of anxiety results in the decrease of working memory, cause distraction, and reasoning in students (Cassady and Johnson, 2002; and Aronen *et al.*, 2005). Another finding reported that study anxiety is the main predictor of academic performance with a detrimental effect (McCraty, 2007). Researchers have demonstrated that students with higher level of anxiety tend to obtain lower marks in their end-of-semester examination (Hamzah, 2007). Others expressed the opinion that the high level of anxiety will be associated with low academic performance (Luigi *et al.*, 2007; and Sena *et al.*, 2007). Prior studies have shown that there was a significant correlation of high level anxiety and low academic performance among engineering students (Vitasari *et al.*, 2010).

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High anxiety students too need special attention, and they need to be provided with preventive solutions, such as special treatment to minimize the problem (Ratanasiripong *et al.*, 2010). Anxiety are prevalent and persistent in student population, most of them do not receive treatment even over two years period (Zivin *et al.*, 2009; and Cranford *et al.*, 2009). According to Zivin *et al.* (2009) knowing more about the persistent mental problems and help seeking is important to understanding of students' problems. However, this study proposes an enhanced treatment and intervention techniques to reduce anxiety in order to improve students' academic performance. This treatment is to help students overcome the anxiety disorders during study and to apply the intervention skills for improving academic performance. In turn, it provides treatment to students in a holistic manner to address their study anxiety (Robert, 2007).

In this paper, we present a pilot study of pre post anxiety treatment to improve academic performance. A total of 6 engineering students participated in this pilot study. It used Paired sample t-test to find the differences of pre post treatment. The level of anxiety was significantly reduced which bpm with t $(2;5)= 4.788$; p=.005 (p<.05). Furthermore, for GPA the difference was not significant with t $(0;5)= -1.894$; p=.117 (p>.05). Since all participants reduced their anxiety level and improved their academic performance, we recommend that the intervention used as an effective approach in reducing anxiety level.

The rest of this paper is organized as follows. Section 2 describes the related work. Section 3 describes the method. Section 4 describes result and discussion. Finally, the conclusion of this work is described in section 5.

2. Related Work

Anxiety is a kind of psycho-physiological difficulty encountered by students (Callahan, 2001). There are various forms of anxiety and they include excessive worrying, a sense of fear, restlessness, overly emotional responses, and negative thinking. Harris and Coy (2003) defined anxiety as a basic human emotion consisting of apprehension and uncertainty that typically appears when an individual perceives an occurrence as being a threat to the ego or self-esteem. In the conceptualization, individuals with high levels of anxiety generally hold heightened levels of trait anxiety, but in evaluative situations, the state anxiety also elevates. Anxiety intervention is appearing to play a useful role in the treatment of anxiety, as it is not only an effective technique but also adds a significant component for the benefit of the treatment. Intervention techniques are developed to reduce anxiety in improving academic performance. The anxiety intervention describes an assembly of techniques and skills in reducing anxiety and to improve academic performance.

The treatment represents a valuable program for students at school, university, and educational institutions. Providing academic services and educational intervention techniques might assist student in developing and maintaining a positive self-image with decreasing emotional problems (Soler, 2005). Breathing regulation can be very important as a self regulation skill to reduce anxiety (Miller *et al.*, 2006). The anxiety intervention has adopted the existing techniques and skills in reducing anxiety and improving students' academic performance. By practicing the intervention techniques, students learn how to identify the unpleasant symptoms that appear with anxiety and replace them with more relaxed feelings. The intervention is expected to expedite anxiety reduction and also enhance positive adaptive attitude associated to each of the study anxiety sources. This means that the intervention can all contribute significantly to overall anxiety-reduction benefits. This intervention is also to help the students to become more sensitive to the early symptoms of study anxiety to improve their academic performance.

2.1. Breathing re-training

Breathing has physiological and psychological effects but many people are not aware that proper breathing can reduce anxiety symptoms (Schiraldi, 2009). Breathing exercises are aimed at guiding the participants to relax their sensations and release their anxiety. To promote a relaxed feeling, the breathing exercises should not produce more than 12 breaths per minute. A relaxed breathing is slow, effortless, regular, fluid, and quiet, and to master slow breathing could take a person several months (Schiraldi, 2009). Learning to use proper breathing technique benefits the physical and emotional health in the long run. Research has shown that proper breathing exercises can be very effective in reducing and preventing anxiety disorders. This can help a person feel relaxed and calm. There are two techniques of breathing: chest breathing and diaphragm breathing. Good breathing is through diaphragm breathing (Lehrer *et al.*, 2004) because it will make the person feel more relaxed. This slow breathing is effective in reducing the anxiety level. Practicing of breathing exercise will help you decrease the physical symptoms of anxiety and stay calm, as was administered during the treatment, as described below:

a.   Sit comfortable with your back straight and your shoulders relaxed. Put one hand on your chest and the other on your stomach.
b.   Inhale slowly and deeply through your nose. The hand on your stomach should rise, while the hand on your chest should move very little.
c.   Exhale slowly through your mouth, pushing out as much air as you can. The hand on your stomach should move in as you exhale, but your other hand should move very little.
d.   Try breathing during your activities, pick one the activities (see study) while continuing to breathe. Describe your experiences such physical sensation, thought, feelings, and your ability to breathe during your activities.
e.   Repeat and practice slow diaphragmatic breathing in a sitting, standing position, and while doing your activities till you are comfortable doing it anywhere and anytime.

2.2. Relaxation

Relaxation techniques have been used to combat the physical symptoms and psychological anxiety caused, by focusing the mind in a state of calm to reduce anxiety (Lehrer and Carrington, 2003; and Martin, 2006). Relaxation is a very useful treatment for those who feel anxious. Justified and reasonable benefits from relaxation treatment include greater control, having a better mood, improved immune system function, the ability to think more rationally, and improved work efficiency (Schiraldi, 2009). Another benefit is that relaxation techniques can help to reduce physical symptoms of anxiety such as tension, headaches, anxiety, and control the heart beat. The technique also teaches how to improve both physical and mental health as a guarantee of prosperity and success during the study.

Relaxation exercises are effective if done regularly. According to Schiraldi (2009), the exercise should be carried out during the relaxation skills treatment twice daily for ten to twenty minutes by focusing on one thing that is to improve sense of feeling. Benson noted in Schiraldi (2009) that four to six weeks of relaxation treatment is usually effective to reduce the anxiety level.

2.3. Study coping skills

To be successful in studies requires high motivation, lots of effort, strong study skills, effective time management, and good examination strategies. Study skills provide tips to learn the tricks toward success. This treatment does not recommend students to learn at the last minute before the examination. An effective way to study is to spend at least two hours of self-study reviewing for every hour of materials, equivalent to one credit hour, studied in class. The anxiety treatment is useful if the student is willing to take the time to practise those skills continuously and regularly.

3. Method

Method in this study includes description of participants, procedure, and data analysis. The description of method is as follows.

3.1. Participants

The participants in this study were engineering undergraduate students from Universiti Malaysia Pahang (UMP). Six engineering students participated in this study.

3.2. Procedure

The six participants participated in pre and post treatment to reduce anxiety in improving academic performance. This was done to enable the participants to focus and learn the intervention techniques during six sessions. The anxiety level was measures by *Stress Sweeper* device to calculate the breathe per-minute. *Stress Sweeper* is a powerful and scientifically valid breathing treatment tool that offers reliability and flexibility to the clinician and researcher (Pougatchev and Pougatchev, 2008). Grade point average was used to measure students' academic performance.

3.3. Data analysis

The study used quantitative method to analyze the data collected. Paired t-test was used to compare mean of pre post treatment. The statistical analysis runs on SPSS 16.00 statistical software. Significant level for all tests used $p < .05$.

4. Results and Discussion

The results presents the demography profile of participants, breathing per-minute and grade point average. These are explained below.

4.1. Demographic profile of participants
The demographic profile of participants displays students' gender, age, and race. The participants were of five male and one female, average age between 22-26 years old, and in terms of ethnicity there was 5 Malay students and one non-Malay.

4.2. Breathe per-minute (bpm)
The result of Paired samples t-test shows significant different of breathe per-minute (bpm) with Mpre=17.950; SDpre=6.062 and Mpost=8.150; SDpost=2.325. With large correlation .604; t (2;5)= 4.788; and p=.005 (p<.05). Therefore, it can be concluded that there is a significant relationship between high level of anxiety and low academic performance among UMP engineering's students. Table 2 presents the result as follows.

Table 2: Mean values, standard deviation, correlation, Paired-value, and significant

Measures	Mean values	Stand. Deviation	Correlation	Paired-value (t)	Significant (p)
Bpm			.604	4.788	.005*
Pre	17.950	6.062			
Post	8.150	2.325			

Where *p<.05

4.3. Grade point average (GPA)
Table 3 present the results. Paired samples t-test was used to examine the effect of intervention in improving academic performance. The result shows, there were no significant different in pre post treatment of academic performance with t (0;5)= -1.894; p=.117 (p>.05); and correlation was small yield .376. Nonetheless, the participants had shown improvement in their GPA in post treatment with Mpre=2.280; SDpre=.446 and Mpost=2.260; SDpost=.433.

Table 3: Mean values, standard deviation, correlation, Paired-value, and significant

Measures	Mean values	Stand. Deviation	Correlation	Paired-value (t)	Significant (p)
GPA			.376	-1.894	.117**
Pre	2.280	.446			
Post	2.260	.433			

Where **p>.05

The pilot study was conducted in six sessions. The results show significant difference in pre post treatment in reducing anxiety. The academic performance shows there was no significant increase, but the result obtained had shown that the participants had improved their GPA compared with the results obtained during the pre treatment. However, six sessions was not enough to deliver the intervention and the students did not have sufficient time to apply the techniques. Hence, it is recommended that the treatment must be conducted in more than six sessions to attain the effect of the intervention for students' to improve their academic performance (Schiraldi, 2009).

5. Conclusion

Prior   studies showed that there was a significant correlation of high level anxiety and low academic performance among engineering students. Anxiety disorders can manifest in the students' behaviour in the classroom such that those with anxiety disorders become more passive in their study. The anxiety level measures the effect of the intervention, as well to acquire the prior finding on effectiveness of the treatment to reduce anxiety in improving academic performance among students. This study used a pre post design to evaluate the effect of intervention by using breath per-minute (bpm) and grade point average (GPA). Six engineering students participated in this study during six sessions. The intervention includes breathing retreatment, relaxation, study coping skills. The level of anxiety was significantly reduced for breath per-minute t (2;5)= 4.788; and p=.005 (p<.05). Conversely for GPA

shows no significant different with t (0;5)= -1.894; p=.117 (p>.05). The participants managed to reduce their anxiety level and improve their academic performance. This result confirms that the intervention was effective in reducing anxiety level. However, the six sessions are not enough to improve academic performance. In future research, it is recommended that the study should be designed to accommodate more than six sessions, which will facilitate the student to learn during the period of intervention.

Acknowledgement

References

Aronen, E.T, Vuontella, V., Steenari, M.R, Salmi, J., and Carlson, S. (2004). Working memory, psychiatric symptoms, and academic performance at school. Neurobiology of Learning and Memory. **83**(1): 33-42.

Cassady, J. C., and Johnson, R. E. (2002). Cognitive test anxiety and academic performance. Contemporary Educational Psychology. **27**: 270–295.

Cranford, J.A., Eisenberg, D., and Serras, A.M. (2009). Substance use behaviors, mental health problems, and use of mental health services in a probability sample of college students. Addictive Behaviors. **34**: 134-145.

Hamzah, M.H. (2007). Language anxiety among first year Malay students of the international Islamic college: an investigation of l2 skills, sources of anxiety, and L2 performance. Master. Thesis. International Islamic University of Malaysia, Malaysia

Lehrer, P., and Carrington, P. (2003). Relaxation and autogenic treatment, and meditation. In Moss, D., McGrady, A., Davies, T. and Wickramaskera, I. (Eds.), Handbook of Mind-body medicine for primary care, pp. 137-149. California: Sage Publishing.

Luigi, M., Francesca, D., Maria, D.S., Eleonora, P., Valentina, G.D., and Benedetto, V. (2007). The role of anxiety symptoms in school performance in a community sample of children and adolescents. BMC Public Health**. 7**(347): 1471-2458.

McCraty, R. 2007. When anxiety causes your brain to jam, use your heart. Institute of Heart Math. HeartMath Research Center, Institute of HeartMath, Boulder Creek, CA

Miller, M., Morton, J., Driscoll, R., and Davis, K.A. (2006). Accelerated Desensitization with Adaptive Attitudes and Test Gains with 5th Graders. ERIC, pp. 1-14.

Pougatchev, V.M.D. and Pougatchev, I. (2008). Breathing exercise trainer: Stress Sweeper user's manual, version 10. USA: Advanced Wellness Solutions LLC

Ratanasiripong, P., Sverduk, K., Hayashino, D. and Prince, J. (2010). Setting up the next generation biofeedback program for stress and anxiety management for college students: a simple and cost-effective approach. College Student Journal. **44**(1): 97-100.

Schiraldi, G.R. (2009). The post traumatic stress disorder: Sourcebook 2nd Ed. New York: Mc Graw Hill.

Sena, J.D.W, Lowe, P.A. and Lee, S.W. (2007). Significant predictors of test anxiety among students with and without learning disabilities. Journal of Learning Disabilities. **40**(4): 360-376.

Soler, K.U. (2005). The Relation among Depression, Anxiety, Memory, and Attention in a Sample of College Students with Learning Difficulties. Ph.D. Thesis. Carlos Albizu University, USA.

Vitasari, P., Abdul Wahab, M.N., Othman, A., Herawan, T., and Sinnadurai, S.K. (2010). The Relationship between Study Anxiety and Academic Performance among Engineering Students. Procedia Social and Behavioral Sciences. 8: 490-497.

Zivin, K., Eisenberg, D., Gollust, S.E. and Golberstein, E. (2009). Persistence of mental health problems and needs in a college student population. Journal of Affective Disorders. **117**: 180–185.