



## A study on the effectiveness of a stress management programme for College students

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### Abstract

The purpose of this study was to obtain empirical evidence of the effects of a stress management programme on undergraduate Pharmacy and Biochemistry students. As a first stage, we evaluated beliefs, academic skills and personal stress involvement problems in 136 students. As a second stage, we designed a stress management pilot programme (SMPP) including psycho-educational resources; coping skills training; deep breathing, relaxation and guided imaginary techniques; cognitive restructuring and time management. To evaluate the effects of the SMPP on students we assessed a set of variables before and after the treatment: Anxiety, anger, stress, coping strategies, helplessness, salivary cortisol and psycho-physiological reactivity levels. Towards the end of their SMPP exposure, students had lower levels of stress, anxiety, anger, neuroticism, helplessness and salivary cortisol. These results suggest that SMPP has a promising applicability to deal with high levels of stress, improving the students academic performance and health.

**Keywords:** *Stress management, students, salivary cortisol, psycho-physiological reactivity*

### Introduction

The effectiveness of stress reduction programmes has been well established since Donald Meichenbaum (1987) first designed it. Such programmes usually include a group of different treatment techniques such as relaxation training, cognitive restructuring, stress coping change, time management and others. The first applications showed their importance in the field of health psychology because of the deleterious role that negative states of mood as anxiety, depression, anger and frustration play at the illnesses onset, development and outcomes (Lovallo, 2003; Meichenbaum, 1988; Blake et al., 1988; Mattlin, Wethington, Kessler, 1990).

Recent animal studies have shown that stress hormones impair plasticity and neurogenesis in

hippocampal areas involved in memory and learning (McEwen, 2001; Sapolsky, 1996). It has been also shown that stress impairs working memory (Diamond, Fleshner, Ingersoll, Rose, 1996).

Academic stress has been a topic of interest for many years, because stress interferes with learning (Glesner, 1991), leading to difficulties for the students. In recent years a growing body of data has shown that young students suffer high levels of academic stress at college, independently of their major choices and previous skills. The University of Buenos Aires is one of the most acknowledged and, at the same time, one of the most crowded universities of our country, we decided to conduct a survey to establish student interest in implementing stress reduction programmes.

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A questionnaire about the degree of academic stress in undergraduate students was up. This consisted of the number and type of academic stressors, the extent to, which respondents were stressed (high, medium, low), the degree of academic skills and motivation to engage in a stress reduction programme were asked. The detection, discussion and modification of irrational beliefs and thoughts (Lazarus & Folkman, 1984), is an important feature of the programme. The authors decided to explore these factors at the beginning of the research. A stress management pilot program (SMPP) for under-graduate students was designed to include measures of psycho-education, stress coping resources and training, deep breathing, relaxation and guided imaginary techniques, cognitive restructuring and time management techniques.

Previous research has established the personal traits and characteristics that modulate the effects stressors have on learning, academic skills and health. The authors to decided to assess a set of variables in order to obtain a psychological profile of the students. They selected a classical set of variables used in stress research—anxiety, anger, stress coping strategies and helplessness. This profile could then be used in the future to select students at risk for new interventions.

It has also been proven that there is a close relationship between psychological traits of students and their academic performances (Iijima, 1998). High levels of hope, optimism, perseverance and motivation may be better predictors of academic achievement than scores or previous grades. Students who have negative feelings are more likely to experience academic problems. In addition, other researchers have found that perceived stress and coping resources available to young, middle aged, older adults and college students, predict the level of life satisfaction (Hamarat et al., 2001; Simons, Aysan, Thompson, Hamarat, Steele, 2002). It is also known that social support improves psychological health helping people to more successfully cope with stress (Saranson, Saranson, Gurung, 1997).

Research on the reliability of measures about the effects of this type of programme has been conducted. According to Kirschbaum (1989) and Cacioppo (1998) salivary cortisol are considered reliable stress clues in the literature.

Our group has previous experience in measurement both of cortisol salivary and stress levels. Both measures were adopted to assess stress reactivity levels in students before and after the administration of SMPP.

## Materials and methods

### Participants

Undergraduate students in the second year of the Pharmacy and Biochemistry course at Universidad de

Buenos Aires were recruited to the study. A total of 136 undergraduate students received a questionnaire; all students who declared willingness to improve their stress management ( $n = 89$ ), had the option to give their e-mail details to be contacted for inclusion in the stress management programme. A recruiting e-mail explaining the purpose of the programme, voluntary affiliation and time commitment was sent to 89 students address to be contacted for their inclusion in the stress management program. A recruiting e-mail explaining the program purpose, voluntary affiliation and time commitment was sent to the 89 students. We selected a group of 10 students randomly. The other students were in a waiting list for the next program.

### Measures

*Psychological profile variables.* The psychological profile of students include personality traits, anger and anxiety levels, coping styles and hopelessness. Personality was evaluated by the Eysenck Personality Inventory (EPI, 1978). Anger-in, anger-out and anger control were measured by the Spielberger Anger Inventory (STAXI, 1991). Anxiety was assessed by the Spielberger State-Trait Anxiety Inventory (STAI, 1984). Coping Styles were evaluated by the Miguel Tobal and Cano Vindel Valuation and Coping Inventory (IVA, 1994). Hopelessness was assessed by the Beck Hopelessness Inventory (BHI, 1988).

### Psychophysiological variables

Psychophysiological stress reactivity was measured both by salivary cortisol levels and by a polygraphic device. Salivary cortisol measurement by radio-immunoassay is a reliable marker of plasma cortisol concentration. It evaluates hypothalamic-pituitary-adrenal axis activity and it is a useful stress marker. Salivary cortisol was collected at home at 8 am by chewing on a cotton dental roll until it was saturated with saliva; a non-invasive procedure. The dental roll was then placed in a plastic centrifuge tube and refrigerated until it was returned to the laboratory.

Stress reactivity measures were obtained using the "Dr Schuhfried Physiorecorder" Ges m.b. H. A-2340 model, (Kindly provided by the Vienna-Test house from Austria). This is a computer-based polygraph that measures in real time heart rate, total peripheral blood volume, peripheral temperature, electromyography and skin conductance levels. The measures were taken both without and under a psychological stressor: A digital tensiometer Omron model HEM-413 C was used to measure systolic and diastolic pressure.

All patients completed two different standard 6-min laboratory challenge tests (mental tests); one before and one after the treatment, with a 6-min period of adaptation before them and two periods of recovery

after them (at the 6 and 10th min after the withdrawal of the stressor). These tests are established procedures to induce sympathetic responses and were therefore appropriate measures.

**Results**

*First stage. Questionnaire results (n = 136 students)*

Students suffer high stress when they face exams, reaching the highest stress levels at the beginning of the exam, which decrease during the exam, decreasing again to reach the lower values afterwards. In the previous work (Spangler, Pekrun, Kramer, Hofmann, 2002) the emotional reactions and adrenocortical responses of a group of students [measured by means of their salivary cortisol levels to an exam were evaluated]. Negative emotions were highest before the beginning of the exam. Positive emotions increased during the exam and reached their highest values afterward. The study found an association between emotional and cortisol levels.

We also found that Phrases that affirm irrational beliefs had a high frequency:

“I must study all the time” (59% of the students answered YES),

“I need the best grade rank to be the best professional” (15% of the students answered YES),

“I have no time for fun or leisure” (50% of the students answered YES)

“I have no control of my life” (41% of the students answered YES).

Agreement with these types of beliefs was correlated with anxiety levels

(Sheehy et al., 2000; Roshenow et al., 1982). We also found that the students who perceived a high level of stress in their families had worse academic performance.

**Second stage. SMPP results (n=10 students)**

Figures 1–6

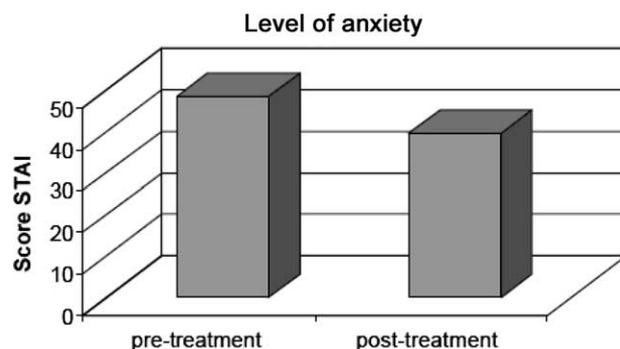


Figure 1. The pre-treatment anxiety levels significantly decreased after the treatment ( $z = 2.17, p < 0.03$ ).

**Level of disfunctional expression of anger**

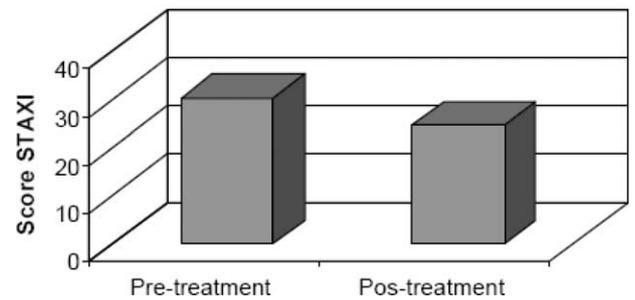


Figure 2. Post-treatment anger levels decreased in comparison to pre-treatment values ( $z = 2.67, p < 0.003$ ); which was also the case for anger-out ( $z = 2.17, p < 0.03$ ) and anger expression ( $z = 2.52, p < 0.01$ ).

**Discussion**

Questionnaire results showed that students who perceived high levels of stress were motivated to engage in a stress management programme.

The fact that anxiety and anger levels decreased after the SMPP suggests that either the expression of negative emotions, or the actual experience of negative emotions was modified by the programme. Consistent with these findings, emotional coping measured by IVA increased after the programme.

Decreased neuroticism levels after the SMPP attests an important change. As neuroticism is a factor of a vulnerable personality to stress and emotional instability, lower levels of treatment are consistent with the decrease of anger and anxiety achieved by the students after the SMPP.

Both changes suggest that students learnt new cognitive or behavioural skills to manage emotional situations. They were able to prevent the emission of inappropriate physiological or behavioral responses to stressors after the treatment.

Decreased respiratory rates obtained by the students after SMPP both under stress and relaxation conditions could indicate that the students acquired new breathing skills and were able to use them also

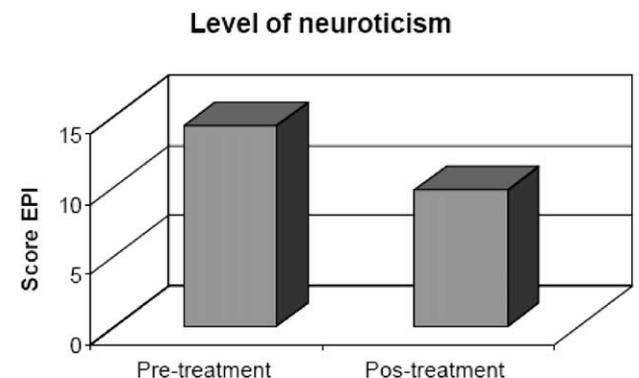


Figure 3. Neuroticism decreased after the treatment ( $z = 2.25, p > 0.02$ ) in comparison to pre-treatment values.

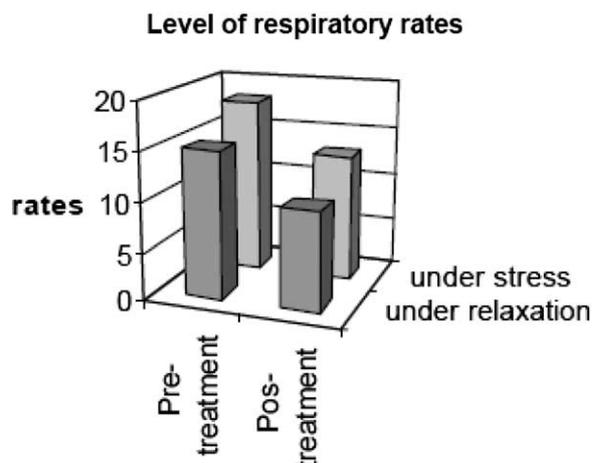


Figure 4. Respiratory rates after treatment decreased compared to pre-treatment values both under stress ( $z = 1.94, p < 0.05$ ) and relaxation ( $z = 2.14, p < 0.05$ ).

under emotional disturbances. In fact, SMPP made the students conscious of their breathing and provided formal training in deep breathing, especially in stressful interpersonal situations.

The results of this study also suggest that the group of students who completed it could have decreased breathing associated with hyperventilation and stress states. They acquired a slow breathing techniques that in turn prevented physiological symptoms associated with anxiety. The fact that among all polygraph measures only respiratory rates changed after the SMPP poses a challenge. Since all the students were healthy and young, we expected cardiac reactivity to be normal; We found no significant differences before and after the treatment in this variable.

It has been demonstrated that increased levels of cortisol in healthy people are associated with stress and negative affective states and illnesses (Vila, 2000). After the SMPP exposition, all students showed lower salivary cortisol levels compared to their own first values, in accordance with the diminished anxiety, anger and reactivity levels after SMPP.

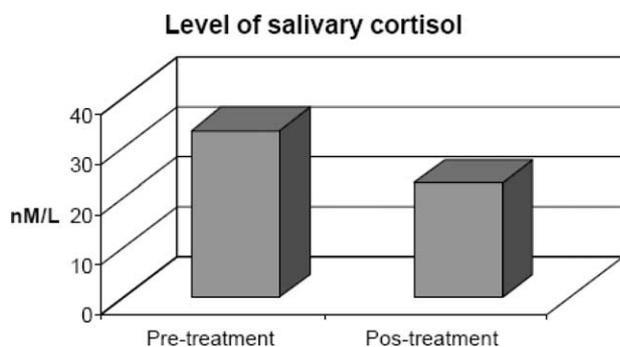


Figure 5. Salivary cortisol levels also decreased after the treatment ( $z = 2.10, p < 0.04$ ).

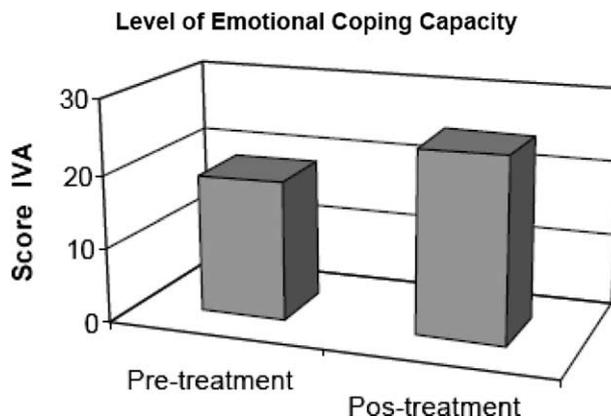


Figure 6. Emotional Coping Capacity increase in comparison to pre-treatment values ( $z = 2.25, p < 0.05$ ).

Differential activation of the HPA axis and sympathetic nervous system and their interrelationships may explain the lack of difference between the psychophysiological reactivity before and after treatment, and the significant differences found between salivary cortisol levels. Empirical evidence showed that cortisol levels were related to subjective states of fear, frustration and negative emotions. On the other hand, sympathetic activation supports metabolic processes related to arousal states, regardless of the emotional balance. Therefore, decreased salivary cortisol levels could be consistent with the reduction in negative emotional reactions after the treatment. The new coping resources provided to students by SMPP may have decreased emotional responses in the face of stressful situations.

All in all, our results are consistent with other studies demonstrating that special programmes help students to deal with stress. Institutions in Argentina do not provide special programmes to teach students how to handle academic anxiety and stress. Our pilot programme had the support of Pharmacy and Biochemistry College and Psychology College at the Buenos Aires University. If stress reduction programmes were available for students, staff and other College members, both undergraduate and graduate students would experience less academic stress, which would prevent illnesses.

## References

- Blake, R. L., & Vandiver, T. A. (1988). The association of health with stressful life changes, social supports and coping. *Family Practice Research Journal*, 7(4), 205–218.
- Q2 Cacioppo, J. T., Malarkey, W. B., Kiecolt, G., Janice, K., & Uchino, B. N. (1998). Heterogeneity in neuroendocrine and immune responses to brief psychological stressors as a function of autonomic cardiac activation. *Psychosomatic Medicine*, 57, 154–164.
- Q2 Cacioppo, J. T. (1998). Somatic responses to psychological stress: The reactivity hypothesis. In En J. G. Adair, D. Bélanger,

- & K. L. Dion (Eds.), *Advances in Psychological Science* (pp. 87–109). UK: Psychology Press.
- Diamond, D. M., Fleshner, M., Ingersoll, N., & Rose, G. M. (1996). Psychological stress impairs spacial working memory: Relevance to electrophysiological studies oh hippocampal function. *Behavioral Neuroscience*, *110*, 661–672. **Q3**
- Glesner, P. G. (1991). Fear and loathing in the law schools. *Connecticut Law Review*, *23*, 627–658. **Q2**
- Kirschbaum, C., & Hellhammer, D. H. (1989). Salivary cortisol in psychobiological research: An overview. *Neuropsychobiology*, *22*, 150–169. **Q2**
- Hamarat, E., Thompson, D., Zabrocky, K., Steele, D., Matheny, K., & Aysan, F. (2001). Perceived stress and coping resource availability as predictors of life satisfaction in young, middle aged, and older adults. *Experimental Aging Reserch*, *27*, 181–196. **Q3**
- Iijima, A. L. (1998). Lessons learned: Legal education and law school dysfunction. *Journal of Legal Education*, *4*, 524–538. **Q2**
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. Nueva York: Springer publishing company.
- Lovallo, W. R., & Gerin, W. (2003). Psychophysiological reactivity: Mechanisms and pathways to cardiovascular disease. *Psychosomatic Medicine*, *65*, 36–45. **Q2**
- McEwen, B. S. (2001). Stress, sex, hippocampal plasticity: Relevance to psychiatric disorders. *Clinical Neuroscience Research*, *1*, 19–34. **Q3**
- Mattlin, J. A., Wethington, E., & Kessler, R. C. (1990). Situational determinants of coping and coping effectiveness. *Journal of Health and Social Behavior*, *31*, 103–122.
- Meichenbaum, D. (1988). Stress inoculation training. *The Counseling Psychologist*, *16*, 69–90. **Q3**
- Meichenbaum, D., & Jaremko, M. (1987). *Terapia de Inoculación de Estrés*. Bilbao, España: Edit.Desclée Bower. **Q2**
- Rohsenow, D. J., & Smith, R. E. (1982). Irrational beliefs as predictors of negative affective states. *Motivation and Emotion*, *6*, 299–314. **Q2**
- Sapolsky, R. M. (1996). Stress, glucocorticoids and damage to the nervous system: The current state of confusion. *Stress: The International Journal on the Biology of Stress*, *1*, 119.
- Saranson, B., Saranson, I., & Gurung, R. (1997). Close personal relationships and health outcomes: A key to role a social support. In *Handbook of personal relationships* (pp. 547–573). N.Y: Wiley.
- Sheehy, R. S., & Horan, J. J. (2000). *The effects of stress-inoculation training on the anxiety and academic performance of first year law students*. Paper presented at the annual meeting of the American Psychological Association. Washington, D.C.). **Q2**
- Simons, C., Aysan, F., Thompson, D., Hamarat, E., & Steele, D. (2002). Coping resource availability and level of perceived stress as predictors of life satisfaction in a cohort of Turkish college students. (Statistical Data included). *College Student Journal*. **Q3**
- Spangler, G., Pekrun, R., Kramer, K., & Hofmann, H. (2002). Students' emotions, physiological reactions, and coping in academic exams. *Anxiety, Stress & Coping*, *4*, 413–432.
- Vila, J. (2000). Cardiac defense and emotion: Psychophysiological and clinical implications. *Taylor & Francis Group, Psychology at the Turn of the Millenium* (pp. 413–439). Stockolm: Psychology Press.

## **Author Queries**

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