International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html

Role of stress on students' performance: A cross-sectional study

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Abstract

Auto recommendations are a collection of particular self-administered procedures for enhancing mental health, self-assurance, and problem-solving skills. The study's goal was to determine whether autosuggestion can enhance academic achievement and lessen exam-related stress in secondary school students. On 58 secondary school students, this interventional study was carried out over the course of a year. Six months before to the exam, a validated questionnaire called the Perceived Stress Score was used to analyse their sense of exam-day stress (PSS). Just prior to the exam, saliva was taken in order to estimate cortisol levels, which were then evaluated using ELISA. GraphPad Instat version 3 was used to conduct the statistical analysis. The Wilcoxon rank signed test was used to compare grades and stress perception scores. The Chi square test was used to determine the relationship between cortisol levels and academic performance in students, and the Spearman correlation test was used to determine correlations. A statistically significant difference between the PSS in pupils before and after autosuggestion was discovered (p = 0.0002) Significant differences in the grades obtained before and after autosuggestion were found (p 0.0001). Cortisol levels and grades did not have a statistically significant relationship (p=0.4477), and the chi square statistic was 0.5766. In our study, autosuggestion led to lower stress levels and higher academic performance. Higher cortisol levels indicated a 50% lower likelihood of earning good grades, pointing to a link between academic achievement and the stress marker. A successful autosuggestion regimen increased the likelihood of reducing stress by 85%.

Keywords: Stress, Academics, Autosuggestion, performance, positive reinforcement

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1. Introduction

Exams are a regular component of academic life in high school or college. The phrase "Student exam stress is creating mental health time bombs" has been used occasionally [1]. While experiencing some stress is totally normal, excessive amounts will hinder performance. The requirement to take exams for schools, colleges, or competitive exams weighs heavily on students' minds and puts them under a great deal of stress. Either exam phobia or melancholy sets in for them. The British Association for Counseling and Psychotherapy and the Family Doctor Association have both noted a worrying increase in exam-related stress and are looking for assistance with such services. Exam anxiety is becoming more common. Exam anxiety is becoming more common. Exam stressors include societal pressure for the best outcome and future development, emotional immaturity, low self-esteem, negative thoughts, and the use of anxiety-stimulating substances like tea, coffee, cola, and other beverages prior to the exam. Student suicide attempts are more frequent around exam or results time, thus in these situations, they may require counselling, antidepressants, or additional family support [2]. Stress causes specific psychological and physiological responses in the body. Mild stress is good for cognitive function and tasks, but chronic, compounded stress can cause neuropsychiatric conditions like anxiety and depression. They are therefore the two halves of the same coin. Exams serve as a stressor and activate the hypothalamic-pituitary adrenal axis, which raises the amount of cortisol and is reflected in saliva [3]. Students' performance is hampered by stress, which changes their emotional and cognitive functioning via adrenaline and glucocorticoids [4]. They are portrayed in different ways and differ from person to person. While test stress in students can result in drug and alcohol misuse, shaky hands, and suicidal thoughts, early symptoms include tense muscles, palpitations, dry mouth, headache, loss of appetite, and sleep deprivation. Therefore, it is important to start good counselling for the pupils as soon as possible in order to lower their stress levels. It is preferable to avoid exam stress than to alleviate it. A little incentive to boost self-confidence is the best way for any adolescent to prevent exam anxiety, along with a methodical, consistent, organised, planned, and regular effort from the start of the academic session. The development of pupils' self-confidence and enhancement of their academic achievement may be significantly aided by auto suggestion.

Auto recommendations are a collection of particular self-administered procedures for enhancing mental health, self-assurance, and problem-solving skills. They come in positive and negative varieties. Repeating the same set of suggestions to a participant over the course of several sessions is often how auto suggestions are used clinically. This type of self-inflicted suggestion directs people's own ideas, emotions, and actions. It instils a happy attitude by fostering positive thoughts, and as a result, auto recommendations can have an effect on conditioning, moral judgments, and conduct. It also promotes a healthy lifestyle and enriches the workplace. Additionally, it aids in overcoming numerous phobias, which will immediately enhance their holistic development by enhancing their general sense of wellbeing in daily life [5].

Students can reduce their tension during exams using a variety of methods, including breathing exercises, complementary therapies like yoga, meditation, etc. Students lack the motivation to practice it frequently, therefore a straightforward method like positive autosuggestion may not only assist to increase their confidence but also aid to reduce tension, which will improve their performance in tests. To the best of our knowledge, this has not been tested, so conducting a study to examine how autosuggestion affects students' stress levels and academic performance is justified.

2. Materials and methods

58 Class X students from Pandith Government Higher Secondary School in Mangalore participated in an interventional study over the course of a year. Before beginning the study, the institutional ethics committee's consent was requested. Only students who were willing to employ autosuggestion throughout the trial were allowed to participate in this study. The principal of this school's previous written consent was secured, as well as the students' and parents' consent. Participants that refused to consent were not included. All of the study's participants were students from the same socioeconomic background. Six months prior to the exam, their assessment of the stress they felt during the test was examined using the Perceived Stress Scale (PSS), a validated questionnaire (table 1). This survey was made to be used with community samples who had completed at least junior high school. The degree to which students believe their lives are stressful is measured by this questionnaire. In the training, the ten steps of autosuggestion were to be carefully carried out (Table 2). For six months, students were instructed to regularly study for 15 minutes each day after practising autosuggestion for 15 minutes each day. The identical perception of stress scale questionnaire was given at the conclusion of the six-month period. Ten multiple-choice questions make up this survey. Saliva was sampled for 2 ml in order to measure cortisol levels. The guidelines below are used to calculate each person's overall stress score: Reverse the scores on the following four affirmative items (4,5,7,8): 0=4,1=3,2=2,1=4.

The levels of salivary cortisol were calculated using ELISA. Exam scores before and after auto recommendation were compared for the students.

On a daily basis, students' compliance with autosuggestion was assessed using a checklist, and the overall score was recorded as practise scores.

Prior to the exams, salivary cortisol levels were measured and participants' subjective levels of stress were evaluated using the same questionnaire.

2.1. Statistical analysis

GraphPad Instat version 3 was used to conduct the statistical analysis. Students' percentage grades and stress perception scores were compared before and after autosuggestion, individually for males and girls, using the Wilcoxon rank signed test. The Chi square test and the Spearman correlation test were used to determine the relationship between the levels of cortisol and students' academic performance. The Mann Whitney U test was used to compare grades, cortisol levels in saliva, and stress scores between males and girls. The question-by-question PSS results were compared using the same test.

3. Results and Discussions

58 class X students from Mangalore's Pandith Government Higher Secondary School participated in the study; of them, 41 were guys and 17 were girls. Boys had a mean age of 15.2 +/- 1.3 years, and girls had a mean age of 14.8 +/- 1.7 years. Figure 1 depicts the proportion of students experiencing low and moderate levels of stress.

Students' felt stress scores before and after autosuggestion were 19.293.73 and 16.265.31, respectively, with a statistically significant (p-value of 0.0002) value. Similar grades were obtained before autosuggestion (56.6018.07) and after it (62.1719.98), with a p value of 0.0001 (very significant) (table 3).

Prior to autosuggestion, the perceived stress scores for boys were 19.464.25 and for girls they were 18.932.46; however, these differences were not statistically significant. After autosuggestion, the perceived stress scale for men and women was respectively 15.425.04 and 18.185.58, which was similarly not statistically significant (p=0.11). Male and female grades did not significantly differ before and after autosuggestion; prior to autosuggestion, male grades were 53.6116.37 and female grades were 63.8120.37; but, following autosuggestion, male grades were 60.2019.02 and female grades were 66.9121.99. Therefore, neither in PSS nor academic performance was there a discernible gender difference. However, boys' PSS significantly decreased, and their grades significantly improved (p 0.05). Girls' stress levels did not significantly decrease before or after autosuggestion (table 3), but their academic performance did (p 0.05). Studies of correlation between the perceived stress scale and the marks following autosuggestion were conducted, however the results were not statistically significant (r=-0.04 & p value=0.77). After autosuggestion, cortisol levels and the perceived stress scale showed a positive correlation (r = 0.1681 & p value = 0.26; no statistical difference was found), and marks and cortisol levels showed a negative correlation (r = -0.1170 & p value = 0.424; again, no statistical difference was found). Cortisol levels and marks did not have a statistically significant relationship, according to chi-square statistics, which was 0.5766 (p=0.4477). The odds ratio for the correlation between cortisol and marks was, however, 0.5789. The odds ratio for the relationship between the perceived stress scale and cortisol was 1.2, the chi-square value for it was 0.08378, and the correlation between them was not statistically significant (p=0.7722). Similar to this,

there was no statistically significant correlation between the practise score and felt stress scale (p=0.2671); the chi square statistic was 1.231. However, their relationship had an odds ratio of 0.1579.

Boys' cortisol levels were 1.230 ±16 and girls' levels were 1.530 ± 46; neither difference was statistically significant (p=0.7042). The felt stress score did not statistically significantly correlate with grades for either males (r= -0.2727, p=0.4181) or females (r= -0.08000, p=0.7684). Both the males and the females who participated in the study found no statistically significant correlation between cortisol levels and marks (r=-0.1597, p=0.3670 and r=-0.0679, p=0.8101 respectively). Significant improvements were seen in the sense of stress for the second and tenth question when comparing PSS scores question-by-question before and after autosuggestion (table 4). Even though the increases for the other items were statistically small, they nonetheless helped to improve the PSS scores overall and, in turn, academic achievement. A young boy's mind might experience a great deal of stress as a result of landmark exams like the tenth board exams, which define a child's future, profession, and the rat race associated to meet the expectations in order to achieve in examinations. Therefore, our study focused on class tenth students (Class X) at Pandith Government Higher Secondary School in Mangalore, where 54 of the students had moderate perceived stress scales and only 4 had mild stress prior to autosuggestion. This finding was supported by Subramani et al., who claimed that government school students experienced moderate stress as compared to private school students because of the excess homework, projects, and other academic-related assignments [6]. With autosuggestion practice, this outcome altered, and more students reported experiencing mild stress.

In our study, it was found that the administration of positive autosuggestion significantly reduced the perceived stress score, and the students' academic performance also improved (table 3). This suggests that repeated autosuggestion has the capacity to subtly create an affirmative statement or a trained thought process with repeated enchantment causing psychological feedback wherein the negative thoughts are transformed into positive thoughts and an improvement in mood. The phrase "Every day, in every way, I am growing better and better," used by French psychologist and pioneer of autosuggestions Emile Coue to teach conscious autosuggestions, was repeated repeatedly while maintaining entire faith and mental focus. The individuals felt they could accomplish any objective with this [7]. People who practised both autosuggestion and meditation had significantly lower HR, SBP, and DBP than those who merely meditated. The focus of this study, however, was not just on the influence of autosuggestion on these variables [8]. Positive suggestion techniques were combined with medical procedures that resulted in a significant decrease in pain and a quicker healing process, both of which were accomplished in an efficient manner, supporting the idea that autosuggestion has a significant impact on the body's response to medical ailments [9]. The adage "fake it till you make it" is appropriate when discussing autosuggestions since the mind is fooled by these repeated mantras, and our bodies begin acting accordingly. Reddy et al. came to the conclusion that stress management techniques like mindfulness, feedback, psychotherapy, and meditation were helpful [10]. Autosuggestion or autogenic training was suggested by Ikematsu et al. as a way to help college students in Japan acquire the English language. Positive autosuggestions about learning the language had to be regularly imposed to help students train their subconscious minds. Electroencephalography (EEG) was captured to assess their mental state. Positive findings led to the conclusion that AT or autosuggestion is superior to hypnosis and may become a crucial tool in teaching and learning [11].

Students in secondary and higher education institutions are more stressed out about their academics. According to Michaela C et al., the Organization for Economic Co-operation and Development (OECD) conducted a poll with students between the ages of 15 and 16 in 72 countries, and 66% of pupils expressed stress over receiving poor grades and 55% expressed worry despite being well-prepared [12]. In our study, the proportion of students who scored low on the stress scale rose and those who scored moderately stressed feel following autosuggestion. After autosuggestion, the perceived stress scale and students' academic performance did not significantly correlate. However, a negative correlation was found, indicating that higher levels of stress were associated with lower academic performance in students. Stress and cortisol levels were found to positively correlate, indicating that stress causes a higher release of the stress hormone. Additionally, our study revealed that pupils with greater cortisol levels had a 50% chance of receiving a high academic score compared to those with lower cortisol levels. Because glucocorticoids are completely blocked when the adrenal cortex produces too much cortisol under stress, the hippocampus, amygdala, and prefrontal cortex are less able to retrieve memories and perform other cognitive activities. Additionally, it hinders the hippocampus' capacity to store and retrieve memories. They might change how information is stored in the hippocampus, which would lead to subpar test results [13]. Many studies have reached the same conclusions and found evidence of the negative effects of stress on academic performance. Academic grades perform better when students are under less stress. According to an analysis of the autosuggestion practice score from our study, students who practiced at least 50% of autosuggestion daily had an 85% higher chance of scoring low on the stress scale than those who practiced less than 50% of autosuggestion daily. There is a dearth of research on the benefits of autosuggestion for lowering test anxiety and improving grades. How did the students interpret unexpected happiness was the first PSS question in our study. After autosuggestion, the ratings indicated a 16% improvement in perception. The ability to govern the crucial aspects of their lives improved by 45% in response to question 2, which resulted in a substantial improvement in PSS score (p=0.0019). Other questions' improvements were statistically negligible. However, the percentage of improvement for questions 3 to 10 was 16%, 21%, 22%, 36%, 0%, 23.8%, 16%, and 36%, respectively. These results imply that pupils were more at ease and self-assured; they were also better able to deal with whatever situation arose. They were able to handle the tasks they were given.

Table 1: Components of the questionnaire for the perceived stress scale

1	How often did something unexpected happen within the past month make you upset?
2	How many times over the past month have you felt powerless to influence the significant events in your life?
3	How often have you felt anxious and stressed over the past month?
4	How frequently did you feel assured in your capacity to manage
5	How frequently did it feel like things were going your way over the past month?
6	How frequently did you feel you couldn't handle everything you had to do in the past month?
7	How frequently have you been able to manage irritants in your life over the past month?
8	How frequently did you feel in control of the situation in the past month?
9	How frequently did you become enraged in the past month as a result of things that occurred that you had no influence over?
10	How often did you feel in the past month that your problems were getting so bad you couldn't handle them?

Table 2: Steps of auto suggestion (Positive reinforcement)

1. I am sitting in a comfortable position.
2. I am a point of energy in the middle of brain.
3. I start visualizing my body.
4. I find myself relaxed. 5. Slowly I start visualizing my forthcoming examination days 6. I visualize the examination hall. 7. Slowly I imagine myself sitting and receiving my question paper. 8. I realize that almost all the questions are according to my expectations and I thank my luck and preparation 9. Now I take my attention to another day of exam where the questions are not according to my expectation. Still, I am calm and relaxed and I am facing it as I have regularly studied those topics earlier. 10. I am able recall all the answers and I still thank my luck and by always.

Table 3: Comparison of stress scores and marks before and after autosuggestion

Parameters	Before autosuggestion Mean±SD	After autosuggestion Mean±SD	P value
PSS	19.29 ± 3.73	16.26±5.31	0.0002*
Marks in percentage	56.60±18.07	62.17± 19.98	< 0.0001*
PSS in Boys	19.46±4.25	15.42±5.04	<0.05*
PSS in girls	18.93±2.46	18.18±5.58	0.86
Grades in % in boys	53.61±16.37	60.20±19.02	<0.05*
Grades in % in girls	63.81±20.37	66.91±21.99	<0.05*

*p<0.05 statistically significant

Table 4: Comparison of Question wise PSS Scores before and after autosuggestion

Questions	Before Mean ± SEM	After Mean ± SEM	p value
Question 1	1.57 ± 0.1879	1.82 ± 0.1568	0.3435
Question 2	2.023 ± 0.1609	1.36 ± 0.1493	0.0019*
Question 3	1.86 ± 1.194	1.57 ± 0.2041	0.2451
Question 4	1.43 ±0.1822	1.73 ± 0.2214	0.2219
Question 5	1.82 ± 0.1464	1.47 ± 0.1937	0.1716
Question 6	2.20 ± 0.1827	1.45 ± 0.1575	0.0025
Question 7	1.82 ± 0.1698	1.82 ± 0.1875	0.9160
Question 8	1.68 ± 0.1207	1.45 ± 0.1990	0.3414
Question 9	2.43 ± 0.1763	2 ± 0.2056	0.0949
Question 10	2.29 ± 0.1738	1.48 ±0.1705	0.0024*

*p value <0.05 is significant

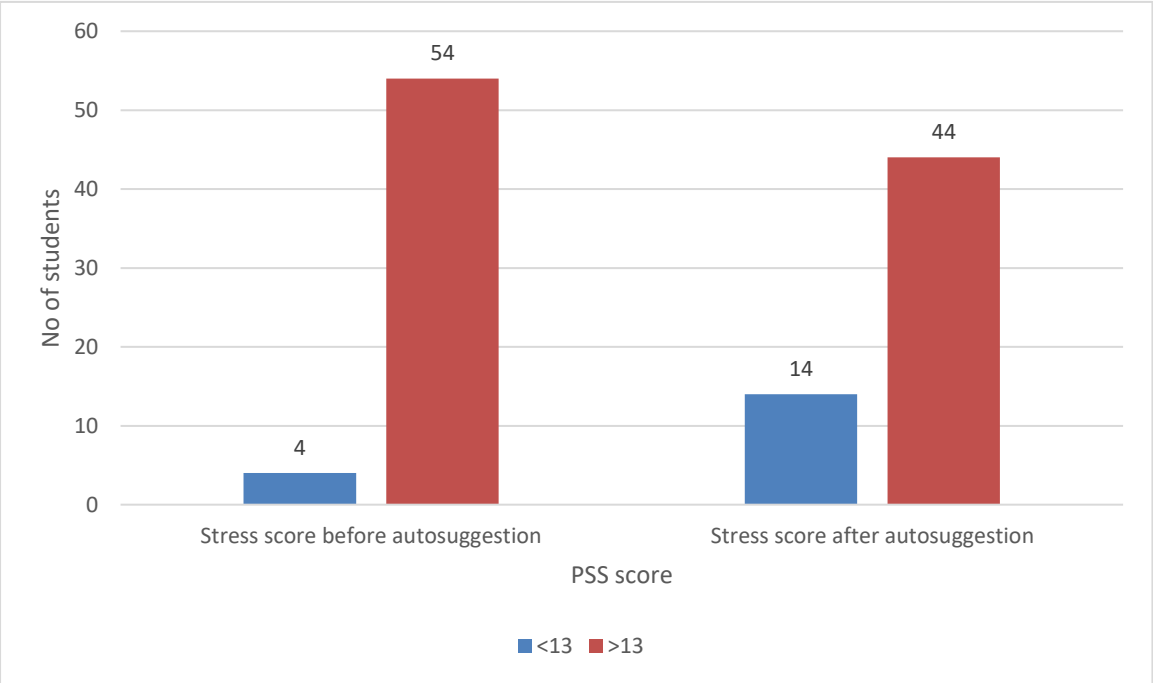

Fig. 1: PSS score categories before and after autosuggestion

4. Conclusions

Autosuggestion had a considerable impact on students' grades and stress levels; in our study, stress levels decreased and academic performance improved. Despite there being no statistically significant impact of autosuggestion on the stress scores of the boys, there was a 21% clinical reduction in stress and a 13% academic improvement. Higher cortisol levels were associated with a 50% reduction in the likelihood of earning good grades. The likelihood that stress would be reduced by an effective autosuggestion regimen increased by 85%. Autosuggestions could therefore help students relax on test day, increase their self-esteem, and eventually improve academic performance. While some kids might not be mature enough to understand the importance of autosuggestion in daily life, students must focus, pay attention, and have faith in the assertions in order to follow autosuggestion. Since mental health is just as vital as physical health, they should be included in the higher secondary school curriculum so that it is practiced daily.

Acknowledgement

Sincere thanks to the Department of Microbiology, KS Hegde Medical Academy, Mangalore for the laboratory support.

References

[1] A. Hough. (2012). Middle-class student exam stress 'creating mental health time bomb'. The Telegraph, UK. 2011 May 21. Available from: http://www.telegraph.co.uk/education/education news/8527066/ Middle-class-student-exam-stress-creating-mentalhealth-timebomb.html.

[2] S. Mohapatra, S. K. Panigrahi, D. Rath. (2012). Examination stress in adolescents. Asian Journal of Paediatric Practice. 16(1), 1-3.

[3] R. Singh, M. Goyal, S. Tiwari, A. Ghildiyal, S. M. Nattu, S. Das. (2012). Effect of examination stress on mood, performance and cortisol levels in medical students. Indian J Physiol Pharmacol. 56(1), 48-55.

[4] P. Ganesh, L. M. Nishitha, K. Manisha. (2014). Evaluation of Examination Stress and Its Effect on Cognitive Function among First Year Medical Students. Journal of Clinical and Diagnostic Research. 8(8), BC05-BC07.

[5] P. Aparna. (2020). Autosuggestion – A helpful therapeutic technique. International Journal of Humanities and Social Science Invention. 09(4). 18-20.

[6] C. Subramani, & S. Kadhiravan. (2017). Academic stress and mental health among high school students. Indian Journal of Applied Research. 7(5), 404-406.

[7] L. B. Yeates. (2016). Emile Coue and his method (II): Hypnotism, suggestion, ego-strengthening, and autosuggestion. Australian Journal of Clinical Hypnotherapy & Hypnosis. 38(1), 28-54.

[8] B. Center. (2020). Effects of meditation compared with effects of meditation with autosuggestion on cardiovascular variables and autonomic functions–An analytical study. National Journal of Physiology, Pharmacy and Pharmacology. 10(06).

[9] Z. Kekecs, K. Varga. (2013). Positive suggestion techniques in somatic medicine: A review of the empirical studies. Interventional Medicine and Applied Science. 5(3), 101-111.

[10] K. J. Reddy, K. R. Menon, A. Thattil. (2018). Academic stress and its sources among university students. Biomedical and pharmacology journal. 11(1), 531-537.

[11] M. Ikematsu, Can autosuggestion improve English proficiency of Japanese college students. ISATE2014, 9, 24-26.
[12] M. C. Pascoe, S. E. Hetrick, & A. G. Parker. (2020). The impact of stress on students in secondary school and higher education. International journal of adolescence and youth. 25(1), 104-112.
[13] S. Vogel, L. Schwabe. (2016). Learning and memory under stress: implications for the classroom. npj Science of Learning. 1(1), 1-10.