

# Cognitive Behaviour Therapy (CBT) and Relaxation Therapy Change Psychological and Biological Variables

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**Abstract:** This study focuses on the impact of CBT and relaxation therapy on examination stress, test anxiety and academic performance. 100 engineering students were selected and they were given Dr. Spielberger's test anxiety and Sarala's examination stress tools were administered and academic achievement scores were collected from their teachers before applying CBT and relaxation therapy. Their serotonin and Nor-adrenaline levels were also tested at the beginning of the experiment. Of 100 students 50 were treated as control students and 50 students were treated as experimental group. Experimental group was given CBT and Relaxation therapy for about four weeks and their test anxiety and examination stress were again tested and achievement marks were recorded and their serotonin and Nor-adrenaline levels were again tested after CBT and Relaxation therapy. Control group's test anxiety and examination stress scores were also collected and their serotonin and Nor-adrenaline levels were estimated. Results were statistically analyzed through 't' test, correlation coefficient, regression coefficient. It was concluded that CBT and Relaxation therapy had an impact on test anxiety and examination stress, serotonin, Nor-Adrenaline and academic achievement scores.

**Key Words:** CBT, examination stress, test anxiety, academic performance, serotonin, Nor-adrenaline

## I. INTRODUCTION

Cognitive Behavioral Therapy (CBT) is a psychotherapy based on modifying cognitions, assumptions, beliefs and behaviors, with the aim of influencing disturbed emotions. The general approach has been developed out of behaviour modification, Cognitive therapy and rational emotive behaviour therapy, including mood and anxiety disorders. The particular therapeutic techniques vary according to the particular kind of client or issue, but commonly include keeping a diary of significant events and associated feelings, thoughts and behaviors; questioning and testing cognitions, assumptions, evaluations and beliefs that might be unhelpful and unrealistic; gradually facing activities which may have been avoided; and trying out new ways of behaving and reacting. Relaxation and distraction techniques are also commonly included. CBT is

widely accepted as evidence and empirically based, cost-effective psychotherapy for many disorders and psychological problems. It is sometimes used with groups of people as well as individuals, and the techniques are also commonly adapted for self-help manuals and, increasingly, for self-help software packages. CBT is commonly based on the idea that how we think, how we feel, and how we act all interact and go together. Specifically, that our thoughts influence our feelings and behavior, our feelings influence our behavior and thoughts and our behavior influence our emotions and thoughts. These modalities are therefore interrelated, and change in one modality will in all probability influence at least one of the others. [1a]

Cognitive Behavioral Therapy most closely allies with the Scientist-Practitioner Model of Clinical Psychology, in which clinical practice and research is informed by a scientific perspective; clear operationalization of the "problem" or "issue;" an emphasis on measurement (and measurable changes in cognition and behavior); and measurable goal-attainment. Anxiety is defined as the intense somewhat debilitating feeling that something horrible is going to happen. Everyone feels anxiety at some point, but typically the normal person has a logical reason to feel anxious. With anxiety disorders, the reason for the anxiety may not be known, or it may not be logical if it is known.

## II. TEST ANXIETY

Test Anxiety is a type of performance activity—a feeling some one might have in a situation where performance really counts or when the pressures on to do well. Test-Anxiety in this study refers to the score obtained by the students in the Test Anxiety Scale

Test Anxiety has two major components, worry and Emotionality [5a]. Their definition of Emotionality primarily in terms of the physiological reactions evoked by evaluative stress is similar in many respects to S-Anxiety as described above. However, the physiological changes resulting from arousal of the autonomic nervous system are emphasized in this definition,

and less attention is given to the qualitative feelings that are associated with autonomic activation. The worry component of Test Anxiety is described as "Primarily cognitive concern about the consequences of failure". Worry was associated with performance decrements on tests and other intellectual tasks. In contrast, it is found little or no relation between emotionality and performance [5a].

On the basis of a comprehensive review of the test anxiety literature, [13b] concluded that the performance decrements of test-anxious students were primarily due to the worry cognitions experienced by these students during examinations. She suggested that the attention of high test-anxious individuals is diverted from task requirements by distracting worry cognitions such as self – criticism and by other task – irrelevant thoughts. According to [13b] "the high test-anxious person responds to evaluative conditions with ruminative, self-evaluative worry, and thus, cannot direct adequate attention to task-relevant variables".

High test-anxious individuals were more self-centered and self-critical than low test-anxious individuals and were therefore more likely to experience personalized, self-derogatory worry cognitions that interfered with task performance [12a]. The highly test-anxious individual is one who is prone to emit self-centered interfering responses when confronted with evaluative situations [12b]. Sarason also noted that where as the less test-anxious person plunges into a task when he thinks he is being evaluated, the high test-anxious person plunges inward". High test-anxious students not only experience the attention blocks noted by Wine, but may also fail to appropriately interpret informational cues that are readily available to them.

#### A. Examination Stress- background of stress

Hans's selye is called as a father of the world "stress is his search for a new hormone he accidentally discovered that tissue damage is a non-specific to virtually all noxious stimuli. He called this phenomenon the general adaptatiOn syndrome (GA) and about a decade later he introduced the term "stress" in his wirings.

The Gas has three stages, alarm resistance and exhaustion I the alarm stage an outside stressor mobilizes the internal stress system of the body. There are a number of physiological and chemical re4actions, such as increased pituitary and adrenaline secretions, noticeable increase in respiration heavy rate, and blood pressure, and a heightening of the senses. Then the Gas moves into the resistance stage during which the body calls the resistance stage during which the body calls upon the needs organ or system to deal with the stressor. However while they may be a great deals of resistance to other unrelated stressors. This helps explain why a person going through an emotional strain may be particularly vulnerable to other illness or disease. Finally if the stressor persists over a

long period of time the reserves of the adaptive mechanisms during the second stage may become drained and exhaustion sets in when this happen there may be a return to the alarm stage and the cycle starts again with another organ or system or the automatic sheet off value; of death occurs. This Gas process of course can be very hard on the person and takes its toll on the human body.

#### B. Definition of Examination Stress

Stress is used to denote tension, or distress. This strain or stress during examination is called examination stress. "It is not necessarily bad, damaging or unhealthy. Stress during examination is not an event or circumstances. The same Examination situation provokes different responds in different students and even in the same student on his or her state of mind (Saraladevi K – 2001)

The examination situations may impose demands beyond that individual's capacity to meet them even given the resources available in that situation. These demands could be for productivity on a job. For resolving issue of great complexity or for resolution of conflicting expectations obviously the degree pf stress is a function of the ability of a given individual to meet these demands in the situations. The poor fit between the performance and the examination situation can also occur if the student motives and not satisfied by relevant supplied in the environment [3a].

#### C. Serotonin

1An organic compound, C<sub>10</sub>H<sub>12</sub>N<sub>2</sub>O, formed from tryptophan and found in animal and human tissue, especially the brain, blood serum, and gastric mucous membranes, and active as a neurotransmitter and in vasoconstriction, stimulation of the smooth muscles, and regulation of cyclic body processes

Serotonin is concentrated in certain areas of the brain; the hypothalamus and midbrain contain large amounts, while the cortex and cerebellum contain low concentrations. Like most neurotransmitters, it is stored in granules inside nerve endings, and is thus not exposed to inactivation by monoamine oxidases until it is released into the synaptic space between nerves. When a serotonin-containing nerve fires, serotonin is released and can bind to any one of a series of at least 14 distinct downstream serotonin receptors (5-HT receptors). Release of serotonin or other stored neurotransmitters can also be induced by alkaloids such as reserpine, which have been used as tranquilizing agents in the treatment of nervous and mental disorders. Although pharmacologic doses of serotonin produce a type of sedation and other depressant conditions of the nervous system, several types of clinically useful antidepressants, such as monoamine oxides (MAO) inhibitors, tri-cyclic antidepressants, and selective serotonin reuptake inhibitors (SSRIs), act by increasing the amount of active serotonin in nerve synapses in particular brain regions. Conversely, various conditions that lower serotonin levels are associated with depression, suggesting that

normal to slightly elevated serotonin levels tend to elevate mood and prevent depression.

Changes in serotonin levels can alter mood: increases have a calming effect, relieving depression, insomnia, and irritability; decreases are associated with wakefulness and greater sensitivity to pain. There is also a link between high serotonin levels and the early onset of fatigue: elevated levels induce lethargy and reduce the desire to exercise. Attempts have been made by some sports scientists to see if reducing serotonin levels can improve physical performance, but the results so far are inconclusive based on these ideas in mind the researcher has chosen the topic as CBT and Relaxation therapy change biological and psychological variables' for the present research.

### III. DESIGN OF THE STUDY

#### A. Sample

100 students from engineering college were taken for the study of which 50 students were treated as control group and 50 students were taken as experimental group of 50 students 25 were girls and 25 were boys their age group was 18 to 20 years. Experimental group were given CBT with relaxation therapy for about one month. Subjects were free from medical, psychiatric, and sleep disorders as determined by history, physical examination, biochemical screening tests, electrocardiograms, and psychological screening questionnaires. Pre test and post test scores of experimental group were statistically analyzed to tabulate the data.

#### B. Tools used for the study

1. Test anxiety inventory by Dr,C,D . Speilberger
2. Examination stress inventory by Dr.K.Saraladevi(2001)

3. Serotonin estimation by scientific laboratory kit method.
4. Noradrenaline by lab. kit method

### IV. OBJECTIVES

1. To find out the impact of CBT and relaxation therapy on serotonin. Noradrenaline, Test anxiety and Examination stress among students
2. To differentiate the levels of serotonin. Noradrenaline, Test anxiety and Examination stress before and after applying CBT and Relaxation therapy.
3. To identify the significant differences between control and experimental group in serotonin. Noradrenaline, Test anxiety and Examination stress among control and experimental group students.

### V. HYPOTHESES

1. There are significant differences between pre test and post test scores of the individuals before and applying CBT and Relaxation therapy
2. There are significant differences between pre test scores of examination stress serotonin Nor-Adrenaline and academic achievement of control and experimental group individuals before applying CBT and Relaxation therapy
- 3 There are significant differences between pre test scores of examination stress serotonin Nor-Adrenaline and academic achievement of control and experimental group individuals after applying CBT and Relaxation therapy
4. CBT and Relaxation therapy has no impact on test anxiety and examination stress serotonin Nor-Adrenaline and academic achievement scores.

Table-1

To differentiate pre-test scores and post-test scores of psychological and biological variables of control and experimental group

Sample Psychological Variables	Control group				Experimental group			
	Pre-test		post-test		Pre-test		post-test	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Examination stress	154.3	10.7	155.2	11.4	153.9	8.5	114.8***	9.1
Test Anxiety	38.45	7.6	37.91	8.2	36.28	6.4	28.4***	5.8
Academic Performance	42.8	8.2	44.21	5.2	45.6	8.2	75.7***	6.9
Serotonin-ng/ml	132.12.	10.5	135.5	12.4	134.8	12.1	212.8***	10.6
Nor-adrenaline ng/ml	0.28	0.02	0.29	0.03	0.29	0.01	0.42***	0.02

Data shown are means (99% confidence intervals). Statistical comparisons of the values were compared to baseline values using an 'C.R' test: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

PRE TEST AND POST TEST SCORE OF THE CONTROL GROUP IN PSYCHOLOGICAL AND BIOLOGICAL VARIABLES

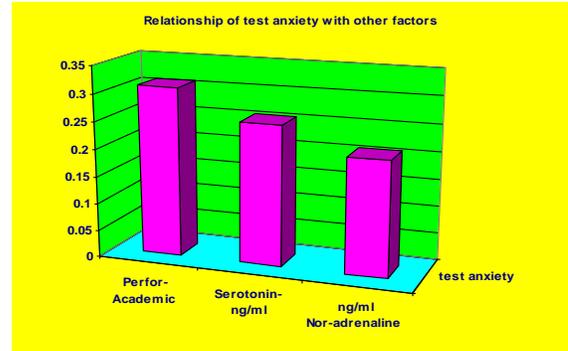
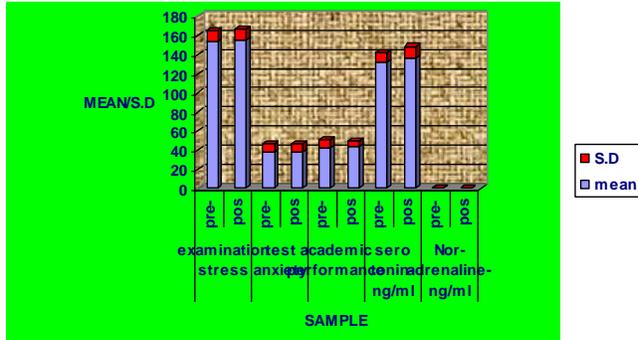


Table-2 To differentiate pre-test scores of psychological and biological variables of control and experimental group and post -test scores of control and experimental group

Sample Variables	Control group		Experimental group		Control group		Experiment al group	
	Pre-test		Pre-test		Post-test		post-test	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Examination stress	154.3	10.7	153.9	8.5	155.2	11.4	114..8***	9.1
Test Anxiety	38.45	7.6	36.28	6.4	37.91	8.2	28.4***	5.8
Academic Performance	42.8	8.2	45.6	8.2	44.21	5.2	75.7***	6.9
Serotonin-ng/ml	132.12.	10.5	134.8	12.1	135.5	12.4	212.8***	10.6
Nor-adrenaline ng/ml	0.28	0.02	0.29	0.01	0.29	0.03	0.42	0.02

Data shown are means (99% confidence intervals). Statistical comparisons of the values were compared to baseline values using an 'C.R' test: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

PRE-TEST AND POST TEST SCORES OF THE EXPERIMENTAL GROUP IN PSYCHOLOGICAL VARIABLES

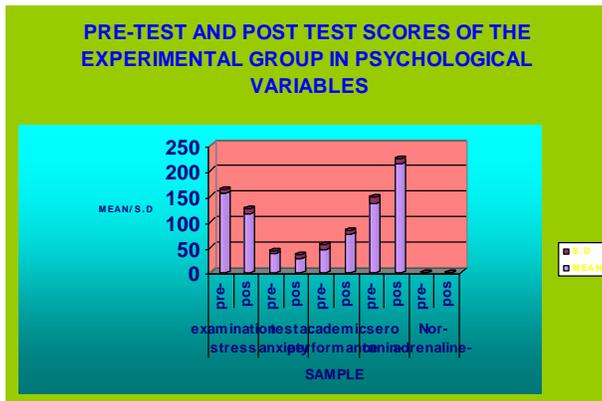
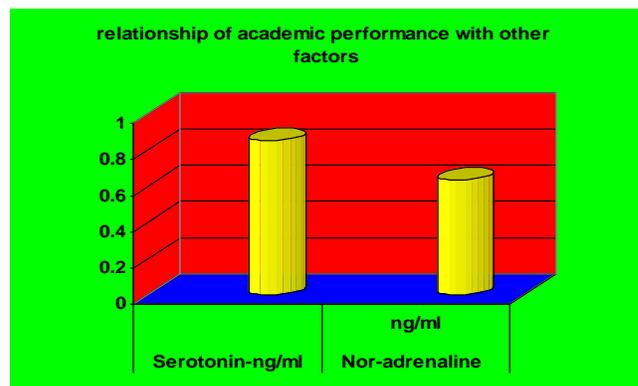
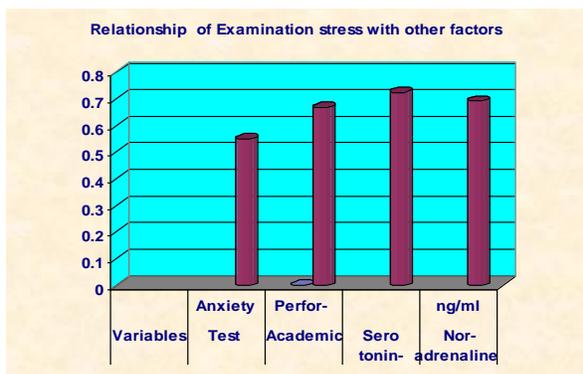
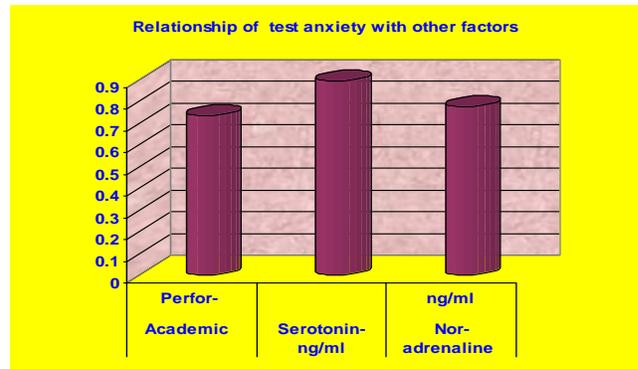
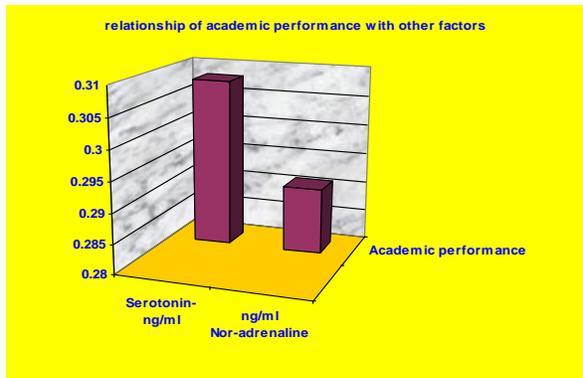


Table-3 to correlate post test scores of variables among themselves for control group

Variables	Examination stress	Test Anxiety	Academic Performance	Serotonin-ng/ml	Nor-adrenaline ng/ml
Examination stress	-----	0.12	0.24	0.137	0.27
Test Anxiety	0.12	----	0.31	0.267	0.2104
Academic Performance	0.24	0.31	-----	0.308	0.291
Serotonin-ng/ml	0.137	0.267	0.308	-----	0.22
Nor-adrenaline ng/ml	0.27	0.2104	0.291	0.22	-----

Table-4 to correlate post test scores of variables among themselves for experimental group

Variables	Examination stress	Test Anxiety	Academic Performance	Serotonin-ng/ml	Nor-adrenaline ng/ml
Examination stress	-----	0.549	0.667	0.724	0.692
Test Anxiety	0.549	----	0.732	0.890	0.773
Academic Performance	0.667	0.732	-----	0.856	0.638
Serotonin-ng/ml	0.724	0.860	0.856	-----	0.837
Nor-adrenaline ng/ml	0.692	0.773	0.638	0.837	-----



From the table-1 and also from the figures, it is clearly understood that the calculated values were more than that of table C.R value. Hence hypothesis was accepted and proved there were significant differences (  $p < 0.01, N = 50$  ) between pre-test and post scores of experimental group. Hypothesis was accepted for the experimental group. In the case of control group there were no significant differences between pre-test and post scores and the hypothesis was rejected

From the table-2 and also from the figures; it is clearly understood that the calculated values were more than that of table C.R value. Hence hypothesis was accepted and proved there were significant differences (  $p < 0.01, N = 50$  ) between post scores of control group and post scores of experimental group. Hypothesis was accepted for the post test scores. In the case of pre-test scores of control group and experimental group there were no significant differences between their scores and the hypothesis was rejected for the pre-test scores.

From the table-3 , and also from the figures, it is clearly understood that the calculated correlation coefficient values were less than that of table correlation coefficient values .Hence hypothesis was accepted and proved there were no significant relationship (  $p < 0.01, N = 50$  ) between variables of post test scores of control group

From the above table-4 and also from the figures ,it is clearly understood that the calculated correlation coefficient values were more than that of table correlation coefficient values .Hence hypothesis was rejected and proved there were significant relationship (  $p < 0.01, N = 50$  ) between variables post test scores of experimental group. Our present research is line with the following studies. First, in a lot of cases test anxiety and examination stress are treated as the same thing. Some studies examine the influence of examination stress on grade [13 a] and measure students' perceptions of worry in such a way that is indistinguishable from that of test anxiety. Second, as stress is defined in a much broader way than anxiety, it is possible to conceptualize examinations as stressful by virtue of their own properties or functions without having to refer to perceived worry and arousal [3b]. Questions about the causal status of test anxiety have been raised on the basis that test anxiety may just be a proxy measure of ability and that both high anxiety and poor performance are joint effects of poor study skills. Research tried to address the first of these problems by including measures of ability, such as IQ, as [14].

Treatment for depression with cognitive behavioral therapy (CBT), which teaches ways to modify thoughts and behaviors that contribute to depression, may help in raising brain serotonin levels and in improving depressive symptoms. This study will examine changes in brain serotonin activity using single photon emission computed tomography (SPECT) imaging in people with depression before and after they receive CBT. The study will also use SPECT imaging to compare brain serotonin activity of non-depressed healthy participants with that of depressed participants. Depressed participants will then

attend at least once weekly CBT sessions for 12 weeks. During the 45-minute sessions, participants will meet with a therapist to learn ways to adjust thoughts and behaviors that may be adding to their depression (20) Both cognitive-behavioral therapy (CBT) and selective serotonin reuptake inhibitors (SSRIs) alleviate depression by lowering brain activity levels, but the drugs apparently depress limbic system activity while the therapy decreases frontal cortex activity(3a).

Antidepressants are not very effective in milder forms of depression, but may be of benefit if you are suffering with anxiety. They have been shown to be effective in moderate to severe depression, and, in severe depression, can be combined with CBT (21).

CBT is a model of counseling that looks at the link between any given trigger event, the thoughts and evaluations that the mind makes of that trigger, and the resultant emotions, behaviours and physical symptoms. Thus, in the context of exam stress, the fear and anxiety a pupil or parent experiences at exam time is in reality a function of the underlying thought process for that individual. To explain this: the link between the activating event (I'm sitting this exam) and the resultant emotion (fear/anxiety) is contained in the negative automatic thought that underlies this (such as 'I will fail and my life is therefore ruined'). Notice how in this example the 'thought' is catastrophising the outcome. [www.talkmebetter.com](http://www.talkmebetter.com).

Specifically, that our thoughts influence our feelings and behavior, our feelings influence our behavior and thoughts and our behavior influence our emotions and thoughts. These modalities are therefore interrelated, and change in one modality will in all probability influence at least one of the others.[5] A large-scale study [8] showed substantially higher results of response and remission when a form of cognitive behavior therapy and an anti-depressant drug were combined than when either modality was used alone.

CBT has a good evidence base in terms of its effectiveness in reducing symptoms and preventing relapse. It has been clinically demonstrated in over 400 studies to be effective for many psychiatric disorders and medical problems for both children and adolescents.

We found a significant positive correlation between mean test anxiety scores and mean baseline taste thresholds for bitter and salt. This is, in part, surprising, given that salt thresholds do not alter in response to acute 5-HT or NA manipulation. Previous reports on patients with severe depression requiring hospitalization (13a) or seasonal affective disorder (1), suggested that different taste modalities, including salt, could be affected by these chronic disorders.

## VI. RESULTS

1. There were significant differences between pre test and post test scores of the individuals before and applying CBT and Relaxation therapy
2. There were no significant differences between pre test scores of examination stress serotonin Nor-Adrenaline and academic achievement of control and experimental group individuals before applying CBT and Relaxation therapy
3. There were no significant differences between post test scores of examination stress serotonin Nor-Adrenaline and academic achievement of control group individuals after applying CBT and Relaxation therapy
4. There were significant differences between post test scores of examination stress serotonin Nor-Adrenaline and academic achievement of experimental group individuals after applying CBT and Relaxation therapy
5. CBT and Relaxation therapy had an impact on test anxiety and examination stress serotonin Nor-Adrenaline and academic achievement scores.

## VII. IMPLICATIONS

1. Early identification of highly test-anxious students is difficult, as test-anxious responses may not manifest until high stakes examinations. Practitioners should look out for signs such as procrastination and loss of interest in academic work.
2. How should highly test-anxious students be supported? Changing the examination conditions to make them less stressful (perhaps extra time, breaks or a smaller venue than a hall) or helping the student to cope more effectively, or become more resilient, with examinations? There are obvious tensions here between notions of inclusivity, equality of opportunity and fairness.
3. Should anxiety be the main focus of intervention or support? Might the student be better served by targeting the factors that lead to a high test-anxious response in the first place: improving study and test-taking skills, improving academic self-concept (perhaps through addressing attributions for success or failure) or more individual subject-specific tuition? This kind of approach requires recognition that a student might become test-anxious for a variety of reasons.

## VIII. FUTURE DIRECTIONS

One of ways in which test anxiety research is moving forward is by examining how it might be related to other, similar constructs, including achievement goals and academic self-concept. [5] 2 x 2 framework for achievement goals conceptualizes distinct performance and mastery goals, focusing on grades and learning respectively, along dimensions of approach and avoidance. A performance-avoidance goal, characterized by a fear of failure, is the most likely point of convergence between the achievement goals and test anxiety constructs (10). Initial research by [4] supports this proposition. Their integrated hierarchical model suggests students high on trait anxiety may hold performance-approach or performance-avoidance goals, but it is only the test anxious students holding the avoidance goal that are showing a negative relationship to performance via state worry. This distinction is consistent with the suggestion above that there may be different types of test-anxious students, only some of whom show a negative relationship with performance.

This finding has not been replicated by all research, however, suggesting that some degree of theoretical refinement is necessary. For instance, [12] tested an expanded hierarchical model containing a range of test-related emotions. We found that a performance-avoidance goal was more strongly related to anger, shame and hopelessness than to anxiety. Academic self-concept may also play an important role, providing the self-knowledge upon which self-referent processing is based (as in Zeidner and Mathews' model). Research has supported this prediction, finding that both academic performance and perceived test competence are both negatively related to test anxiety [12]. This study also examined achievement goals, finding that mastery-avoidance rather than performance-avoidance goals were most strongly related to test anxiety, again suggesting that this relationship should be re-examined.

## IX. CONCLUSION

Since CBT and Relaxation therapy has given to experimental group they showed significant results in test anxiety and examination stress serotonin Noradrenaline and academic achievement scores. Triggers are the thoughts, emotions, situations, and times of year, events, or environments that set off a depressive or manic episode. By learning how to understand and recognize their triggers, the students can then learn to avoid the triggers entirely, thereby decreasing the number and severity of depressive and manic episodes.

CBT for students is similar to behavioral therapy for adults the component for CBT treatment for children with

Obsessive Compulsive Disorder is a technique called exposure plus response prevention. The steps include developing a rank ordered list of all the child's fears and rituals along with the situations in which these symptoms occur. The children are then persistently exposed to the situations starting with the least anxiety fear and working up to the most difficult. The children are encouraged to resist their urges to compulsive. When exposures occur consecutively the child's fears decreased through a process called autonomic habituation. Habituation is a process by which an individual slowly becomes accustomed to something over time. Repeated exposure to obsessions leads to a weakening and reduction in obsession and compulsive behaviors

Overall, CBT is a viable and quite successful treatment for all the problems, and can be a healthy alternative to medication in some cases. Serotonin levels are responsible for mood stability, depressive states, and control of anxiety, fears, or phobias. Given the current climate in India of increasing the amount of high stakes testing in children, debates around the issue of test anxiety and examination stress are unlikely to go away for the foreseeable future. Although this line of research has a long history, the recent changes in educational policy present a new and interesting challenge for psychology to engage with some of the 'big' questions in this area: At what age should we be testing children? Is a lot of testing bad for children? Does the focus on testing encourage shallow learning and performance goals at the expense of deep learning and mastery goals? Do individualized accounts of stress focus attention away from the surveillance function of examinations? and so forth. Although many educational commentators are ready to offer opinions on these and other related questions, evidence at present is very scarce indeed, and there is a real opportunity now to inform future policy making with both research evidence and critical commentary.

## REFERENCES

[1] Arbisi et al., Arbisi PA, Levine AS, Nerenberg J, Wolf J, "Seasonal alteration in taste detection and recognition threshold in seasonal affective disorder: the proximate source of carbohydrate craving", *Psychiatry Res*, vol. 59, pp. 171–182, 1996.

[1a]. Bernard W. Agranoff, Stephen K. Fisher, R. Wayne Albers, Michael D. Uhler, "Understanding the neuroanatomical organization of serotonergic cells in the brain provides insight into the functions of this neurotransmitter", in George J. Siegel: Basic Neurochemistry, Sixth, Lippincott Williams and Wilkins, 1999.

[2]. Calvo, M.G., "Anxiety and cognitive performance: Attentional control theory", *Emotion*, vol. 7(2), 2007.

[2a]. Cox .T, *Stress* London, Macmillan, 1978.

[3]. Deems DA, Doty RL, Settle RG, Moore-Gillon V, Shaman P, Mester AF, Kimmelman CP, Brightman VJ, Snow JB Jr "Smell and taste

disorders, a study of 750 patients from the University of Pennsylvania Smell and Taste Center", *Arch Otolaryngol Head Neck Surg*, vol. 117, pp. 519–528, 1991.

[3a]. Dingfelder, Sadie F., "gender bender", *Monitor On psychology*, vol 35, No. 4 , pp. 48, 2004.

[3b]. Denscombe, M., "The Good Research Guide for Small-Scale Social Research Projects". Buckingham: Open University Press, 2000.

[3c]. Elliot, A.J. & McGregor, H.A., "Test anxiety and the hierarchical model of approach and avoidance achievement motivation", *Journal of Personality and Social Psychology*, 76(4), 628–644, 1999.

[3d]. Ellis. C. Albert, *Overcoming Destructive Beliefs, Feelings, and Behaviors*. Prometheus Books, 2001.

[3e]. Ergene, T., "Effective interventions on test anxiety reduction: A meta analysis", *School Psychology International*, vol. 24(3), pp. 313–328, 2003.

[3f]. Hirschfeld R.M., "History and evolution of the monoamine hypothesis of depression", *J Clin Psychiatry*, vol. 61: (6), pp. 4–6, 2000.

[4] Keller, M. et al. "A Comparison of Nefazodone, the Cognitive Behavioral-Analysis System of Psychotherapy, and Their Combination for the Treatment of Chronic Depression", *New England Journal of Medicine*, vol. 342, pp. 1462-1470, 2000.

[5] Lesurtel M. et al., "Platelet-derived serotonin mediates liver regeneration", *science*, vol. 312 (5770), pp. 104–7, 2006.

[5a]. Liebert, R. M., & Morris, L, W., "Cognitive and emotional components of test anxiety: A distinction and some initial data", *Psychological Reports*, vol. 20, pp. 975-978, 1967.

[6] McGregor, H.A., "A 2 x 2 achievement goal framework", *Journal of Personality and Social Psychology*, vol. 80(3), pp. 501–519, 2001.

[7] Putwain, D.W., "Do different measures of assessment performance bias or exaggerate relationships"? *Paper presented at the BERA Annual Conference*, Institute of Education, 2007.

[8] Putwain, D.W., "Deconstructing test anxiety Emotional and Behavioural Difficulties", vol. 13, pp. 141–155, 2008 a.

[9] Putwain, D.W., Do high stakes examinations moderate the test anxiety–examination performance relationship?, *Educational Psychology*, vol. 28(2), pp. 109–118, 2008 b.

[10] Putwain, D.W., "Supporting assessment stress in Key Stage 4 students", *Educational Studies*, vol. 34(2), pp. 83–95, 2008 c.

[11] Putwain, D.W. (in press), "Assessment and examination stress in Key Stage 4". *British Educational Research Journal*.

[12] Schiffman SS, Zervakis J, Suggs MS, Budd KC, Iuga L, "Effect of tricyclic antidepressants on taste responses in humans and gerbils". *Pharmacol Biochem Behav*, vol. 65, pp. 599–609, 2000.

[12 a]. Sarason, I. G., “*Experimental approaches to test anxiety*”. In C. D. Spielberger (Ed., *Anxiety: Current trends in theory and research*, vol. 2, pp. 383-403). New York: Academic Press, 1972.

[12b]. Sarason, I.G. “Anxiety and preoccupation” In I.G Sarason and C.D. Spielberger (Eds.), *Stress and Anxiety* (Vol 2) Washington: Hemisphere, pp 27-44, 1975.

[13]. Struthers, C. W., Perry, R. P., & Menec, V. H. “An examination of the relationship among academic stress, coping motivation, and performance in college”. *Research in Higher Education*, 41, 581-592, 2000.

[13a] Steiner et al., Steiner JE, RosenthalZifroni A, Edelstein EL, « Taste perception in depressive illness”, *Isr Ann Psychiatr Relat Disci*, 7:223–232, 1969.

[13b]. Wine, J. D., “Test anxiety and the direction of attention”, *Psychological Bullerin*, vol. 76, pp. 92-104, 1971.

[14] Zatz, S. & Chassin, L. “Cognitions of test-anxious children under naturalistic test-taking conditions”. *Journal of Consulting and Clinical Psychology*, vol. 53, pp. 393–401, 1985.

[15]. [www.biopotfolio.com](http://www.biopotfolio.com)

[16]. [www.biopotfolio.com](http://www.biopotfolio.com)

[17]. <http://whatyoushouldknow.depression-alliance.co.uk/antidepressants>

## Biographies



The first author of this paper Dr.K.Saraladevi, M.Sc., M.Phil., M.Ed., Ph.D., PDF., Associate Professor in Physical Science, Meston College of Education, Chennai-600014, Tamilnadu, India. She is a practitioner of NLP and Cognitive Behaviour Therapy. Her biographies has been published in the books of Asian admirable achievers, Men and Women achievements in Asia, Asia’s WHO’s WHO, National’s WHO’s WHO and also received awards such as Bharath Excellence Award, Best Citizens of India, 2011, Best Personalities of India, Adhunik Prasati Award, Inspiring Pillars of India, Golden Personalities of India, Bharat Mahila Award, Rajiv Gandhi Arch Excellence Award. She is a research awardee from University Grants Commission for doing Post Doctoral Fellowship during 2009-2011. She has 31 years of teaching experience and more than 16 years of research experience. She has published 12 research papers in national and international research journals, 13 papers presented at state, national and international seminars in India. She has published 25 research articles in the conference proceedings at international venues. She is member of TASC Chennai, ITAA, USA, NFNLP, U.S.A, STAR, Germany (National Representative), METANEXUS, U.S.A., APA, U.S.A, EHPS, UK. She guided 58 M.Ed, 56 M.Phil projects. 5 Ph.D scholars have been awarded under her supervision and guiding 9 students at present. She has earned 85 CE credits.



The second author Miss. Nithiya Amirtham .S, M.Sc., M.Ed., UGC Junior Research Fellow (JRF), doing Ph.D under the guidance of Dr.K.Saraladevi, M.Sc., M.Phil., M.Ed., Ph.D., PDF, (Associate Professor in Physical Science) working on Educational Psychology and Bio-Physics in Meston College of Education (Autonomous), Chennai-600014, Tamilnadu, India. She has qualified in University Grants Commission of India National Eligibility Test (NET) and also she has been awarded Junior Research Fellowship for doing doctoral research. Her research interest is in the field of Cognitive and Behavioral Neuro-psychology among students of different age group with the focus of child development in the field of Education. She has published two research papers in international research Journals. She has presented 5 papers in national conferences and an article has been published in an international journal.