



## Correlation of Test Anxiety and Working Memory: A Survey Study of Secondary School Students

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### Abstract

*This study was conducted to find a connection between test anxiety and working memory. All the students of secondary schools of Punjab were taken as population. A total of 504 students were drawn as a sample through stratified random sampling among which 252 were boys and 252 were girls. For data collection; two tests for working memory and a Likert scale for test anxiety were used. It is concluded from the results that there is a significant negative connection exist among test anxiety and working memory. The direction of relation indicates that if test anxiety amplifies it will lower the working memory and vice versa. Based on the findings the study proposed subsequent recommendations: 1) the prevailing system of common education may be more dynamic, motivating and skill-oriented. 2) Rote memorizing of material should be discouraged. 3) The curriculum of the secondary school may be upgraded and industrialized.*

**Key Words:** Working Memory, Corsi-block Tapping Test, Central Executive

### Introduction

Anxiety is stated as an emotional state exemplified by verbal reports of suffering (e.g., uneasiness, worry), psychosomatic stimulation (e.g. increased heart rate), behavioral activation (e.g. escaping), and interruption of cognition processing (over-awareness about possible threat cues in the surroundings). Cognitive symptoms are more associated with anxiety than primitive activation and cues for its manifestation are more disperse and unpredictable. Expressive behaviors are more related to anxiety in terms of, the general level of movement, and a whole class of analytical behavioral and psychological symptoms (Seligman 2001).

There are three possible expressions of anxiety these general rubrics portray various accents within the problem of anxiety. The first possible face of anxiety is antecedent conditions: psychoanalytic and existentialist philosophers regard antecedent conditions anxiety as an obtained emotion, hardly ever initiated until the person has gone through some learning experiences. Second, are organismic conditions: these organismic conditions are the set of conditions that include under the dilemma of anxiety as a visible state of the individual. Third and final stage is consequent conditions: the subjective occurrence of anxiety is accessible only through the testimony of the human observer; as such, consequent occasion and falls into the same grouped as other behavioral and verbal consequences of some genuine or theoretical anxiety condition. These three states of anxiety may interchange into each other as different conditions may at a range of times shift from an organismic to a consequent state, or even from a consequent to an antecedent (Seligman, 2001).

The characteristics of anxiety are idealistic, agitation, bother, fear; sometimes generalized and unfocused which are the source of creating the feeling of agitation, problems inattentiveness, muscular trepidation and fatigue. Anxiety is perceived as an abnormal reaction to any situation (Sternberg, 2001).

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Test anxiety is a concoction of hypothetical physiological over-arousal, the feeling of frightening, worry, tension and dread, which causes the symptoms like sweating, shaky body, fail to remember, quivering, stress, aridity of mouth and rapid heartbeat and somatic indications that occur during examination situations (Zeidner 2007).

Among the different brain systems; working memory in the form of system which endows with provisional storage space and handling of mandatory information requisite for compound cognitive errands like language learning, formation and reasoning. Working memory use to grasp data derived by five senses; information retrieves from long-term memory at a time and is capable to effort mutually novel and stored information at a time (Baddeley, 2000).

There are two points of views regarding working memory; a few psychologists stress that working memory is short-term memory (STM) and foremost focal point of WM is its functionality rather than its intermission, on contrary other cognitive psychologists are in the view that WM and STM are two diverse brain systems, according to these psychologists short-term memory is only brief storage whereas working memory is not only storage of information but also an administrative centre for the handling of this information (Lepine & Camos, 2005).

The working memory process involves the mentally attentive conduct of a person for indulging in any cognitive task. It is a provisional workplace on which a person can store up and operating information. Although psychologists did not classify any physical position in the brain which can be taken, directly accountable for working memory procedure it appears that numerous parts of the brain contribute in the process of working memory as it fits into cognitive configuration (Lepine & Camos, 2005).

## **Literature Review**

As assumed in the attentional control hypothesis, anxiety predominantly effects on two of these central executive faculties; first of them is the ability to integrate obstruction (the management of undertaking dispensable jolts), second moving of attentional control (capacity to shift consideration between different assignments), and the phonological loop (Derakshan & Eysenck, 2009) however visuo-spatial sketchpad is not concerned here. The fundamentals of working memory have been emerging to effort in as a crucial part of academic achievements (Alloway, 2011).

The consequence of test anxiety on working memory turns out to be critical especially when it has been established that it drastically affect school accomplishment (Alloway, 2011). Anxiety is believed to persuade the attentional control fundamentals of the central executive, whereby two frameworks are to a great extent of the time corresponding with each other: top-down purpose resolute consideration along with hold up upbeat jolt. In attentional control hypothesis working memory is considered as an institutionalized approach toward the organization of common pressures as well as to integrated attentional management whereas test anxiety is believed as the source of adding up tension on the central executive. As a result, on the entire, discoveries displayed that the influence of test anxiety on WM tasks completion is reasonably dynamic and proceed additionally hold up to the hypothetical idea that increased degree of anxiety is associated with hindered working memory process (Eysenck et al., 2007). Research studies concluded that amplified anxiety caused to hold back the cognitive processing of central executive so dropping the capability of working memory.

According to Rinck & Becker (2005), memory was taken as rational features in different TA models; its' focal point was impacts of anxiety resting on logical, attentional measures, which have been previously anticipated to manage to survive as the core element of psychosomatic test anxiety. Adding up, test anxiety has a direct relation with memory, thus by affecting memory competence, in a sense that it impacts attention and concentration capability and skill while causing low performance. Prominent amounts of test anxiety revealed to interfere through the phonological loop, as well as the management of oral data, therefore probably diminishing the capacity to predetermine exam-related affair (Lee, 2010; Owens et al., 2012).

Davis (2004) studied anxiety; findings of his study demonstrated that test anxiety was a great source to reduce attention period, attentiveness and memory which may turn out to be the foundation of low academic feat. Anxiety affects equally the physical and intellectual procedure of individual, and vegetation him through insufficient carrying out of tasks.

Test anxiety is impatience or any other panic feelings come across, proceeding to during and subsequent examination owed to nervousness, hassle and trepidation of uncertain affair. It might have been exemplified by the equivalent as a series from declaring phenomenological, physiological and behavioral responses that leave with anxiety approximately feasible unenthusiastic outcomes or frustration looking into an examination or proportional evaluative situations (Zeidner, 2005).

At the net shell, research studies made obvious that the collision of test anxiety resting on WM tasks completion is somewhat vibrant and proceed as well as hold up the hypothetical thought that enlarged degree of anxiety is associated with stalled WM procedure (Eysenck et al., 2007). Research studies proved that a higher level of anxiety held back the cognitive dealing of central executive and caused a reduction in the capacity of working memory.

## Research Problem

Many new research studies stirring notion of untainted learning predictor and in this area, diverse investigational research studies were also conceded out. A new-fangled observable fact 'working memory and its' model was also initiated; which contributed a lot in the field of education. The present research is, therefore, paying attention to resting upon the special effects of test anxiety on the working memory capacity of school students.

## Objectives

Subsequent were the objectives of the research study

1. To examine test anxiety and its' levels in students of secondary school education.
2. To investigate the working memory capacity of the secondary school students.
3. To discover how test anxiety is related to working memory capacity of the students.

## Research Hypotheses

Subsequent hypotheses were employed in this study:

- H<sub>0</sub>1 Test anxiety and working memory do not significantly correlate.
- H<sub>0</sub> 2 There is no significant difference in the working memory of anxious and non-anxious students.

## Variables

Two variables were employed in this research study

- 1) Test Anxiety
- 2) Working Memory

## Operational Definition of Variables

### Test Anxiety

Test anxiety is a combination of hypothetical physiological over-arousal, the emotion of frightening, worry, tension and dread, panic, sweating, trembling of the body, forgetting, shuddering, dryness of mouth and speedy heartbeat and somatic symptoms that take place during test situations.

### Working Memory

Working memory is the ability to store up and processing information in mind for a brief period. It refers in the direction of the mental administrative centre which is used in daily actions and calculated through the multifaceted span errands, which involves real-time short-term memory and dealing out the novel information.

## Methodology

### Research Design

The survey study method was used in this research. The population of this study consists of all the students studying in the secondary educational institutions of Punjab government. A total 9 cities from the 36 cities of the

Punjab, where the board of secondary school education is located chosen and a sample of 504 students were selected from the randomly selected schools of these nine cities. The sample was taken in the direction of sample size table projected by KREJCIE and MORGAN (1970). Total of 504 students (252 Boys, 252 Girls) was taken for the study. Stratified random sampling technique was used to draw the sample. The population was divided into 2 strata 1) Boys 2) Girls. The sample size for each group was restricted to 252. Standardized tests were utilized for measuring test anxiety and working memory capacity of the students. For measuring test anxiety of the students The Westside Test Anxiety Scale developed by Richard Driscoll, PhD in 2004, with the reliability of .782 in Pakistani context was used. Two separate tests the digit memory test by Martin Turner Jacky Ridsdale 2004 and Corsi block tapping test were used for working memory. The reliability values of both tests were .767 and .789 respectively. The working memory of the students was established based on the combined score of both tests.

## Results

**Table 4.1.** Correlations between Test Anxiety and Working Memory

	N	Mean	St. Deviation	r	Sig.
Test Anxiety	504	31.73	6.391	-.273	.000
Working Memory	504	19.26	3.510		

The results of the Pearson r table showed that there was a significant correlation between the test anxiety and working memory of the students. The sig. value (.000) demonstrated a significant correlation between the two variables (test anxiety and working memory). There was a significant relationship between the test anxiety of the students (M=31.73, SD=6.391) and working memory (M=19.26, SD=3.510), where  $r(504) = -.273$ , and Sig=.000. The significance of these results are at 0.05 level. So, the null hypothesis of the study which acknowledged that the “Anxiety and working memory do not significantly inter-relate” was rejected.

**Table 4.7.** T-Test Comparison for Working Memory of Anxious and Non- Anxious Students

	N	Mean	St. Deviation	t	Sig.
Anxious Students WM	252	18.36	3.853	-5.560	.000
Non- Anxious Students WM	252	20.14	2.963		

The results of the t-test table showed that there was a significant variation in working memory of the anxious and non-anxious students. The mean score for the anxious (18.36) and SD (3.853) was significantly different from the mean score of non- anxious students’ working memory (20.14) and SD (2.963). Paired samples t-test was carried out to compare the working memory of the anxious and non-anxious students of secondary school. The p-value (.000) illustrated a significant difference in the working memory of both groups.

There was a significant difference in the working memory of anxious (M=18.36, SD=3.853) and non-anxious students (M=20.14, SD=2.963),  $t(252) = -5.560$ ,  $p = .000$ . On the bases of these results, the null hypothesis of the study which stated that “There is no significant difference in the working memory of anxious and non-anxious students” was rejected.

## Findings

The results of this research affirmed a significant negative association ( $r = -.273$ ,  $p = .000$ ) among the test anxiety and working memory of the secondary school students. According to the results of this study, a higher altitude of test anxiety prejudiced the cognitive performance of the students. The working memory spans of the anxious students shrink; due to their anxious feeling, which is assumed to play a powerful role in performing cognitive tasks

The results of this study also showed a significant diversity in the working memory of the anxious and non-anxious students ( $t = -5.560$ ,  $p = .000$ ) It is discovered on the bases of the outcomes that test anxiety has been negatively effecting on working memory of anxious students. Non-anxious male and female be liable to carry out better performance in working memory tasks in contrast to their anxious fellow mates

The results of the present study demonstrated negative correlation among test anxiety and working memory capability (means if the level of test anxiety increased, it would result in a notable decrease of working memory) but the correlation is not highly significant; it may be owed to fewer deviation in working memory competence of the participants.

## Discussion

The inspiration for subsequent work was to come across from the linking test anxiety and working memory (WM) of secondary school students. 504 secondary school students completed a test series containing one test anxiety scale and two WM tests. The indispensable relationship between test anxiety and WM was established.

- The conclusions of the present study were in accord with Rinck & Becker, 2005; Owens et al., 2012 whom study the connection among anxiety altitude and memory capability and done with the findings that anxiety has negative consequence resting upon the working memory capacity and cause the minimize competence of information processing.
- Moreover, the outcomes of the existing inquiry which were confirmed via the study carried out by Eysenck et al., (2007) who established that anxiety immobilized the carrying out of tasks by decreasing the working memory ability. Davis (2004) measured the outcomes of anxiety in his study; the conclusion proved that test anxiety was the basis of a decline in attention span, attention and memory which turned into the source of squat academic accomplishment.
- The results of the study were also dependable with the findings of Zeidner, 2005. He anticipated to anxiety persuades the working memory, besides, to operate like an anxiety barrier.

## Conclusion

The purpose of undertaking a current research study was to explore the special effects of test anxiety resting upon students' working memory and to discover dissimilarity of working memory within anxious and non-anxious students.

- It was acknowledged based on results that a noteworthy negative correlation was presented among test anxiety and working memory.
- The findings of this research helped to set up the thought that when the level of test anxiety increased accordingly working memory would decrease. On the vice versa when anxiety decreased consequently working memory would increase.
- The conclusion sketched in this research may be only generalized to comparable populations. Exclusive of additional research; the implication of the consequences of this inquiry is restricted.

## Recommendations

Subsequent recommendations based findings are drawn from this piece of research:

- Offered structure of common secondary education may be replaced with supplementary industrious, motivating and consequential, realistic furthermore skill-oriented education meant for students to condense study pressure which is a big source of anxiety. Test anxiety has a powerful influence on students' working memory at every level so it is also obligatory that teachers may have an understanding of the test anxiety and its direct effects on the working memory and indirect effects on academic achievement.

- Teachers may endeavour to eradicate anxiety at possible levels with the help of special comforting techniques for this purpose teachers may behave training taken from counsellors and psychologists in different workshops.
- Academic tasks should be developed in such a way that they turn out to be motivating and relaxing for the student rather than anxiety-provoking.
- Further studies can be carried out to explore the constructive impacts of anxiety on working memory and developing strategies to make use of this facilitating anxiety creatively.

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