# EFFECTS OF GENDER, ANXIETY AND AFFECTIVE VALENCE ON WORKING MEMORY TASK PERFORMANCE

***A***

***Thesis submitted***

***In partial fulfilment of the requirement for the degree of***

**MASTERS OF ARTS**

**IN**

**PSYCHOLOGY**

**(COUNSELLING)**


**Submitted by:-**

**Taranpreet Kaur**

**(861702016)**

**UNDER THE SUPERVISION OF**

**Dr. Naveen**

**Lecturer**

**SCHOOL OF HUMANITIES AND SOCIAL SCIENCES**

**THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**(Deemed to be University), PATIALA**

**MAY 2019**

## CERTIFICATE

This is to certify that the thesis entitled **"Effects of gender, anxiety and affective valence on working memory task performance"** being submitted in partial fulfilment of requirement for the award of degree of **Master of Arts in Psychology in the School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology, Patiala** is a bona fide work carried out under the supervision of **Dr. Naveen**, Lecturer, School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology (Deemed to be University),Patiala and that no part of this project has been submitted for the award of any other degree.

Taranpreet Kaur

(TARANPREET KAUR)

This is to certify that above statement made by the student concerned is correct and true to the best of my knowledge.

(Dr. NAVEEN)

Lecturer, School of Humanities and Social Sciences

Thapar Institute of Engineering and Technology,

(Deemed to be University)

Patiala

## CANDIDATE'S DECLARATION

I hereby declare that the work presented in this thesis entitled "**Effect of gender, anxiety and valence on working memory task performance**" being submitted in partial fulfilment of requirement for the award of degree of **Master of Arts in Psychology**, in **the School Sciences, Thapar of Engineering and Technology, Patiala** is authentic record of my own work carried under the supervision of **Dr. Naveen**, Lecturer, School of Humanities and Social Sciences, Thapar of Engineering and Technology ( Deemed to be University), Patiala and refers other researcher's work which are duly listed in the reference section.

The matter embodied in the thesis has not formed the basis for the award of any other degree of this or any other university.

Date:

Place: Patiala

TaranPreet Kaur

(TARANPREET KAUR)

This is to certify that above statement made by the student concerned is correct and true to the best of my knowledge.

(Dr. NAVEEN)

Lecturer, School of Humanities and Social Sciences

Thapar of Engineering and Technology,

Patiala

## ACKNOWLEDGEMENTS

First of all, I would like to extend my sincere gratitude to my research guide, Dr. Naveen (Lecturer, Thapar of Engineering and Technology, Patiala) for his continuous support and help, Without his able guidance, this wouldn't have been possible. His observation and comments helped me to establish the overall direction of the research. Working under him has been a privilege for me.

I also express my thanks to all the faculty members in the department especially, Dr. Santha Kumari, Professor, School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology, Patiala for her never-ending guidance and the numerous opportunities she provided us with.

I would also like to express my heartfelt gratitude to my brother Sukhdeep Singh and my sister-in-law Rupinder kaur, who were a constant source of strength and supported me thought out the entire process of research. I stand deeply indebted to my friend, Radhika Bansal for her generous help and support. She kept me motivated to complete the project and was always beside me during difficult moments.

Lastly, I would like to decide this thesis to my father, Mr. Jasvir Singh for his endless love, support and encouragement. He has always shown faith in me and given me the liberty to choose what I desired. He was always around at the times, when I felt that it was impossible to continue. He kept me motivated and helped me whenever I needed him. Without his faith and support this work would never had been possible.

## Abstract

The present study, was designed to investigate the gender influence of, anxiety and valence, on working memory task performance. For this purpose, a sample of 60 students (30 males and 30 females) of the age range 18-25 years from Thapar Institute of Engineering and Technology, (Deemed to be University) Patiala took part in this study. A2 (Gender: male and female) ×2 (Trait anxiety: low and high) ×2 (State anxiety: low and high) ×3 (Valence: positive, negative neutral) mixed factorial design was used. Gender, trait anxiety and state anxiety were treated has between factor, and valance was within subject factor. Working memory task performance in term of hit, false alarm was observed as depended variable. Data was collected by using the State-Trait Anxiety Inventory (STAI) and emotional working memory task. The data was analysed by using statistics and analysis of variance (ANOVA) the results indicated that high anxiety people detected higher level of negative valance pictures during working memory task. Therefore our study clearly revealed that anxiety is a potential agent to affect the information being processed in working memory. In addition, female participants performed better under negative and neutral valence condition than positive valance. The obtained results are indicative of gender impact on information affect level being processed during working memory task. The findings of the study have clearly demonstrated that, people remember the negative information highly while processing the information in working memory. Therefore, the findings may be applied in the area of positive psychology, human resource management and in day to day communication.



**Keywords:** Anxiety, State Anxiety, Trait Anxiety Affective Valence Working memory,

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# CHAPTER 1

# INTRODUCTION

## 1.1 Anxiety

Anxiety may be defined as "an unpleasant state or condition that is characterized by feelings of tension, apprehension, and worry" (Bekker, Laegare, Stracey, O' Connor, & Lemyre, 2003). Anxiety's influence on daily life is complex and develops into various patterns- Individual may experience physiological changes such as increased heart rate, sweating, respiration, and muscular tension. Cognitive manifestations of anxiety occur in the form of intellectual, rational, perception and think deficits. Highly anxious individuals may suffer from threat-related reactions, (Bishop, Duncan, & Lawrence, 2004).They are also inclined towards taking risky decisions at times or decisions resulting in vague or ambiguous outcomes at other times.

Men and women respond differently in terms of intellectual and emotional performance during anxiety. Also, men and women show different brain activity patterns during decision-making. Females have greater risk of onset of anxiety disorders during adolescence and early adulthood as compared to males.

Anxiety is a state of emotion created due to, feelings of worry, negative thoughts, tension, and physiological changes like increased blood pressure, sweating, trembling, dizziness, feeling of imminent death etc. Individual's with anxiety disorders usually have frequent disturbing thoughts or fears and may avoid situations out of worry. Anxiety can be either a short term "state" or a long term "trait". Anxiety disorder are partially genetic but they may also be developed due to use of drug, alcohol, caffeine, and benzodiazepines (which are often prescribed to treat anxiety). Such disorders also manifest themselves as 'withdrawal' from drugs of abuse.

## 1.2 Working Memory

In 1960, "working memory" term was coined by Miller, Galanter, and Pribram, propounding that human mind is like a computer. What we now refer to as "working memory", was earlier recognized as a "short-term store" (Atkinson and Shiffirin, used the term in 1968) or "short-term memory", "immediate memory" "primary memory", "operant memory", and a "provisional memory". Short-term memory is individual's capacity to recall information over a brief period. Today's theories emphasise on the notion that mind possesses the data received and not merely as a storage of information.

As per Millier, who in 1956 propounded that it's the capacity in the form of a popular Number 7, and that the 'information-processing capacity' of young individuals is around seven elements, describing it as "chunk", regardless of whether the elements were in digit, letter, word, or other units. However it was later revealed that this number is depended on the type and category of chunk used (e.g., span of information may be around seven for letter, six for digits, and five for word and so on), and even on features of the chunk within a category, e.g., span is lower for longer words.

Anxiety is debilitating and unsettling for the person who is experiencing it. Anxiety disrupts the performance of the person experiencing it by consuming the attention and focus that is necessary to complete any task. It has been established that anxiety leads to cognitive impairment according to studies conducted over a period of many decades (Moran, 2016). There are 2 kinds of processes that take place due to anxiety - anxious arousal and anxious apprehension. Anxious arousal manifests in hyper vigilance, increased heart and pulse rate while anxious apprehension manifests in rumination and worry. Anxious apprehension leads to comparatively more inefficiency and errors in task performance due to shifting of focus from goal directed behavior as compared to anxious arousal. Anxiety disrupts verbal as well

as spatial working memory, but the level of difficulty in a task, only plays a role in verbal working memory, as the tasks with low and medium difficulty are performed poorly compared to tasks of higher difficulty level when performed under anxiety. This difference in difficulty level was not seen in case of spatial working memory (Vytal, Cornwell, Letkiewicz, Arkin, & Grillon, 2013). Moran (2016) conducted a meta-analysis of 177 studies and concluded that self-reported measures as well as experimental measures of anxiety were significantly related to poor task performance ranging from simple to complex and even dynamic tasks.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Anxiety and Working Memory

The effect of emotion on cognition has been widely studied in relation to perception, attention, memory and decision-making, reasoning and related constructs. Pazzaglia, Meneghetti and Ronconi (2018) found that those who were lower on anxiety, performed better on working memory tasks. In another study Yao, Chen and Qian (2018) studied the effect of trait anxiety on visual working memory and discovered that trait anxiety was negatively linked to visual working memory for valence educing positive, negative as well as neutral faces. Harris and Cumming (2003) established that there was no relationship between state and trait anxiety and working memory. Similar results were found by Moriya and Sugiura (2012) revealed that state anxiety and visual working memory capacity were not correlated. Ganley and Vasilyeva (2014) found a significant relationship between anxiety and visuospatial working memory task performance.

## 2.2 Valence and Working Memory

Galli, Wolpe and Otten (2011) discovered that positive valence eliciting pictures produced significantly shorter response times that neutral valence eliciting pictures and negative valence eliciting pictures while neutral valence eliciting pictures produced significantly shorter response times than negative valence eliciting pictures while in another study related to valence and encoding they revealed that women were significantly higher than men on encoding negative valence eliciting pictures while no difference was witnessed for positive valence eliciting and neutral valence eliciting pictures.

Grissman, Faller, Scharinger, Spuler and Gerjets (2017) found that negative valence significantly decreased the performance on working memory tasks. Gotoh, Kikuchi and

Olofsson (2010) measured the effect of valence on working memory and revealed that when the attention of participants was shifted from the task, they performed faster on negative cues compared to the positive and neutral cues, but, when attention was not shifted, subjects took longer time to respond to negative cues. In another study Grimm, Weigand, Kazzer, Jacobs and Bajbouj (2012) focused on the neural mechanisms associated with the effect of emotions on working memory and concluded no differences were found for word valence in verbal working memory task. As far as the neural mechanisms are concerned, emotions were linked to activation in cognition related brain areas.

In an recent study Sussman, Heller, Miller and Mohanty (2013) examined the effect of emotional distracters on attention and revealed that high arousal negative distracters were associated with poorer attention and task performance in comparison to positive and neutral distracters while low arousal negative distracters were associated with better attention and task performance in comparison to positive and neutral distracters. Gotoh (2008) conducted an experiment to measure the role of valence on working memory processes. He predicted that the participants would be distracted by valence eliciting stimuli and thus take more time in responding. Results revealed that positive and negative words lead to higher reaction time than neutral words.

### 2.3 Gender Differences and Working Memory

Ganley and Vasilyeva (2014) established that women performed poorly on visuospatial working memory tasks. This link was mediated by the worry factor of anxiety. Minor and Park (1999) conducted a study on schizophrenics as well as normal population to measure spatial working memory they reported no gender differences on working memory in either of the groups.

In addition, Robert and Savoie (2006) conducted a study to measure gender differences on visuospatial and verbal tasks for measuring working memory and concluded that females performed better than males on the digit-span working memory task while there were no gender differences on any other task.

**2.4 Anxiety and Valence**

To examine the relationship between of affective valance and anxiety, Pazzaglia, Meneghetti and Ronconi (2018) found a correlation between anxiety and controlling negative emotions. They further reported that people with high on anxiety had a difficulty in controlling negative emotions. In another research, Dresler, Meriau, Heekeren and van der Meer (2009) examined the role of anxiety on emotional interference. They discovered that state anxiety was positively linked to emotional interference by positive and negative valence enhancing words, and it was unrelated to neutral words. They further explained no relationship of trait anxiety with neutral words.

Aluja et al. (2015) found a positive link between anxiety and negative valence for both the genders, but the link was much stronger in case of females. Sussman, Heller, Miller and Mohanty (2013) discovered that high arousal negative distracters were associated with poorer attention and task performance while low arousal negative distracters were associated with better attention and task performance. These effects were mediated by worry component of anxiety.

Rinck and Becker (2009) conducted five experiments and discovered that there was no relationship between anxiety and valence. However, in an another research Carretie, Mercando, Hinojosa, Martin-Loeches and Sotillo (2004) discovered that people with high on state anxiety or on state as well as trait anxiety performed significantly higher on vigilance task especially to negative valence included stimuli. Gotoh (2008) hypothesised and later

confirmed that negative words as well as positive words lead to a higher reaction time than neutral words but anxiety did not play a role in this relationship. In addition, Cabeleira (2014) revealed that highly anxious persons had a less positive expectancy bias.

### 2.5 Gender Differences and Anxiety

Ganley and Vasilyeva (2014) found that women were significantly higher on anxiety than men. Baroun and Al-Ansari (2005) also measured the effect of gender on anxiety and discovered the same result with respect to gender in their study where females turned out to be significantly more anxious than males.

Similar results were reported by Abdel - Khalek and Alansari (2004) and by Alansari (2006) who conducted a study across 10 and 16 countries respectively and found that out of the 10 countries studied by Abdel - Khalek and Alansari (2004), women scored higher on anxiety than men on all the 10 countries, but statistically significant results were seen for six out of the 10 countries. In the subsequent study by Alansari (2006), women were significantly higher on anxiety than men in 11 countries. Lau, Marsee, Kunimatsu and Fassnacht (2011) examined this relationship among adolescents and found that females were significantly higher than males on anxiety. Similarly Aluja et al. (2015) discovered a highly significant difference between the two genders on anxiety where females were much higher on this trait than males. The above mentioned studies clearly indicating that female are more prone to feel anxiety as compared to males.

### 2.6 Gender Differences and Valence

To investigate the gender effect on affective valance , Galli, Wolpe and Otten (2011) found that there were no gender differences on perception of affective valence. However, Aluja et al. (2015) however, found that females witnessed significantly higher on responding to positive and negative valence eliciting stimuli. The impact of gender was highest for

negative affect stimuli. Additionally Deng, Chang, Yang, Huo and Zhou (2016) measured the distinct reactions of the two genders on the expressivity and experience of emotional responses. They found no gender differences on valence, but they furthered reported that women expressed more emotions, especially negative emotions, while men had higher emotional experiences than females. In contrast, the study conducted by Grabe and Kamhawi (2006) on gender differences in processing valence eliciting stimuli, discovered that males responded with higher arousal level and had the best recognition and comprehension memory for negative valence eliciting stimuli. On the other hand, females were the most aroused after being presented with positive valence eliciting stimuli. Females also processed positive valence eliciting stimuli more efficiently. In addition, females gave avoidance responses to negative valence eliciting stimuli.

However, Lithari et. al (2010) measured whether females are more responsive to emotional stimuli than males. They reported that women showed greater responsiveness in their brain to emotional stimuli, the responsiveness were higher in case of negative visual stimuli. Also, both genders showed greater response to negative stimuli than to positive stimuli

# CHAPTER 3

# TASK, OBJECTIVES, RATIONALE AND HYPOTHESES AND SIGNIFICANE OF THE STUDY

## 3.1 Rationale for the Study

Various studies have been conducted on working memory task performance with respect to gender differences and anxiety, However, very few have incorporated valence and anxiety interaction during working memory task performance. Previous studies have examined such relationship among adults but very few have concentrated such relationship among young adults. In current changing scenario it has been found that people are on high with anxiety disorder especially among young adults. Therefore, the current study is an attempt to examined how anxiety affects individuals working memory performance. In addition, very few research have studied these affects in an experimental setting and the relationship between gender, anxiety and valence and its manifestation on the working memory task performance has not been extensively studied.

## 3.2 Objectives

1. To study the effect of gender on emotional working memory task performance.
2. To study the effect of anxiety on emotional working memory task performance.
3. To study the effect of valence on during working memory.

## 3.3 Hypotheses

**H1**: High trait anxiety group would perform better under negative working memory task condition.

**H2**: Low state anxiety group would perform better under positive working memory task condition.

**H3**: Female participant would perform better under negative stimuli working memory task condition.

**H4:** Participants would perform better under negative valence task conditions than positive and neutral.

# CHAPTER 4

# METHOD

## 4.1 Sample

In this study the participants comprised 60 students among which 30 were males and 30 were females. The age range of the students vary from 18-28 years of age. The participants were mostly students from bachelors and master's courses of Thapar Institute of Engineering and Technology, Patiala. The participants were asked to fill the questionnaire and perform a task on laptop, completion of which required 10-15 minutes.

## 4.2 Design

A2 (Gender: male and female) ×2 (Trait anxiety: low and high) ×2 (State anxiety: low and high) ×3 (Valence: positive, negative neutral) mixed factorial design was used. Gender, trait anxiety and state anxiety were treated has between factor, and valance was within subject factor. Working memory task performance in term of hit, false alarm were observed as depended variable.

## 4.3 Tools used

### State Anxiety and Trait Anxiety Scale

State Anxiety and Trait Anxiety Scale (SATAI) consists of 40 items and measures two subscale (state and trait anxiety) within 20 items for the State Anxiety and Trait Anxiety. State Anxiety measures the feelings of the participants at that particular moment and Trait Anxiety measure the feelings in general. Items scores are added to obtain the raw score for each sub scale. The score is between the range 20-80 high score indicates high Anxiety.

**E-Prime**

E prime software was used for development of working memory task. E-Prime is the word-leading software for behavioural research experiments. E-Prime's flexibility to create simple to complex experiment is deal for both novice and advanced users.

**Experimental Task**

An emotional N-back working memory task was used in the study. There were three different type of task comprises positive, negative and neutral valence. One hundred eighty pictures with three different valence conditions (i.e. is positive, negative, neutral) were used for the developmental of the experimental task. There were 60 picture in each emotional valence working memory task with 2-back load was use in study. A series of pictures were displayed on the computer screen with three valence conditions (i.e. positive, negative, and neutral). The participants were asked to press space bar whenever they see same valence picture in 2-back. In positive valence condition the positive picture was the target, in the negative valence condition negative picture was the target and in the neutral valence condition the neutral picture was the target.

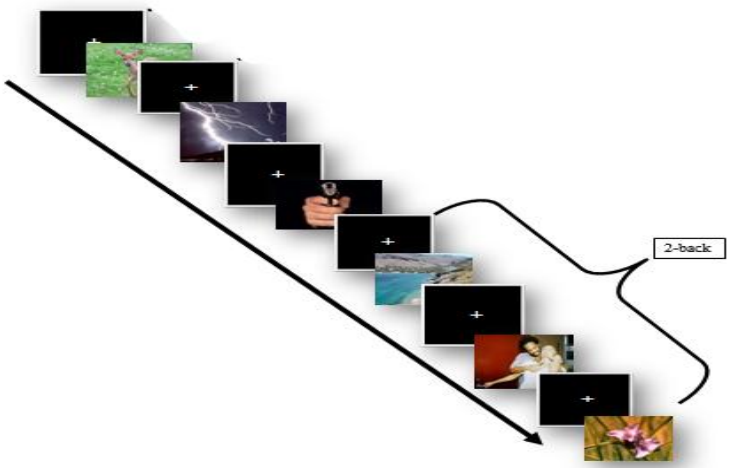


Figure 4.1 *Flow chart of experimental task.*

**Apparatus**

Apparatus for the experiment included a laptop with at least an i3 processor, 4GB ram and 64 bit operating system.

**4.4 Procedure**

The present study was design to study the effect gender trait anxiety. State anxiety on working memory task. Firstly, the participants were provided with a consent form they were required to sign. After this the participants were provided with two questionnaires and were asked to mark the appropriate option which he and she feels his true for them.

Thereafter the participants were asked to perform to task on the laptop which was 2-back emotional task for measuring working memory of the participants. In this task the participants are presented a series of picture with mixed emotion (positive, negative and neutral). When the presented picture was identical to the one presented two trial ago it was considered has a target picture. Participants were asked to detect the target picture by pressing the space bar.

# CHAPTER 5

# RESULTS

The data were analysed with the help of SPSS 20.2. Participants were divided into two groups (low and high) on trait and state anxiety variable on the basis of median analysis. Means and standard deviations were computed for all dependent measure with all independent factor's conditions. Means results are presented in Table. Further A2 (Gender: Male and Female) ×2 (Trait Anxiety: Low and high) × 2 (State anxiety: Low and high) × 3(Valence: Positive, negative and neutral) mixed factorial analysis of variance were computed. The last factor valence was within subject factors. ANOVA results are presented in Table……

## Hits

Table 5.1. Means and Standard deviations (in parenthesis) on hit performance among various experimental conditions.

| Gender | TAC | SAC | Positive | Neutral | Negative |
|---|---|---|---|---|---|
| Female | Low | Low | 7.71 (2.05) | 8.85 (1.34) | 10.00 (3.16) |
| | | High | 5.70 (3.33) | 10.90 (2.13) | 9.90 (2.99) |
| | High | Low | 5.33 (2.06) | 12.50 (1.76) | 9.83 (3.71) |
| | | High | 6.70 (2.21) | 12.50 (2.41) | 10.10 (3.07) |
| Male | Low | Low | 12.00 (2.87) | 9.11 (3.05) | 9.55 (4.85) |
| | | High | 10.00 (1.54) | 4.00 (3.52) | 5.66 (3.82) |
| | High | Low | 10.22 (1.71) | 6.66 (3.42) | 5.88 (3.68) |
| | | High | 10.16 (1.46) | 7.91 (3.42) | 8.16 (4.93) |

The ANOVA results revealed no significant main effect of gender on working memory performance, F (1, 61) = 2.89 p =0.09, partial eta square .045. Which suggested that male and female participants perform similarly on hits of working memory task, irrespective of trait anxiety, state anxiety and affective valence. The main effect of trait anxiety was also not found significant, F (1, 61) = .170 p =.681, partial eta square .003. These results indicated that low and high trait anxiety participant reported similar hits on working memory task, irrespective of gender, state anxiety and valence. The main effect of state anxiety was also not found significant, F (1, 61) = .905 p =.345, partial eta square .015. The obtain-ed findings are clearly indicative of similar performance among low and high state anxiety groups, irrespective of gender, trait anxiety and valence. The main effect of affective valence was also not found significant, F (2,122) =.773 p =.464, partial eta square .013. These results clearly suggested that similar hits performance under different affective valance conditions, irrespective of gender, trait anxiety and state anxiety.

The Interaction effect between gender and trait anxiety was not also found significant, F (1, 61) =.687 p = .410, partial eta square .011. Which suggest that male and female participant with high and low trait anxiety perform similarly on hit of working memory task performance, irrespective of state anxiety and valence. Interaction effect between gender and state anxiety was also not found significant, F (1, 61) =2.10 p = .152, partial eta square .033. These results are clearly indicating that male and female participant with low and high state anxiety also perform similar on hits of working task performance. Interaction effect between trait anxiety and state anxiety was also significant, F (1, 61) = 6.65 p =.012, partial eta square .098. The obtained findings are clearly revealing that different performance on hits under the levels of trait anxiety and state anxiety conditions, irrespective of gender and affective valance. The Interaction effect of gender, trait anxiety and state anxiety were also found significant, F (1, 61) =4.143 p =.046, partial eta square .064. Which suggested that male and

female participants performed differently under state and trait anxiety conditions, irrespective of affective valance.

The interaction effect between gender and valence was found significant, F (2, 122) = 44.31, p = 0.000, partial eta squared = .421 (see figure5.1). These results are clearly indicating that male and female participants performed differently on hit performance of working memory task, irrespective of state anxiety, and trait anxiety.

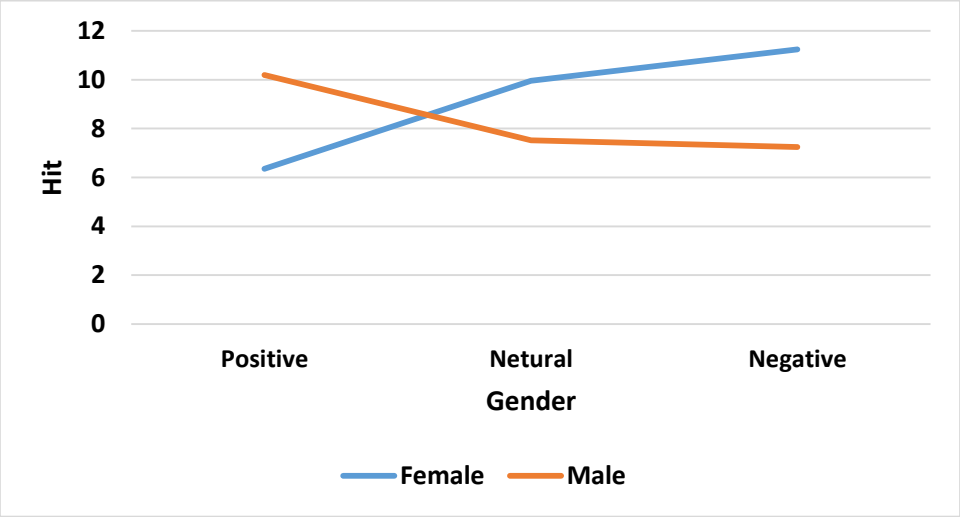


Figure 5.1 Hit performance as function of gender and affective valance.

Interaction effect between trait anxiety and affective valance was also found significant, F (2, 122) = 3.61, p = 0.03, partial eta squared = .05 (see figure 5.2). Results clearly indicating that trait anxiety affects working memory under different affective valence, irrespective of gender, state anxiety.

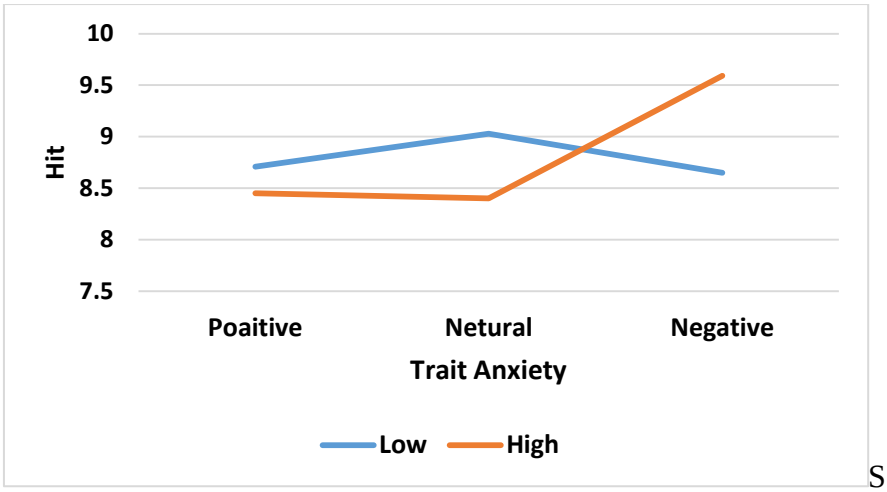

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Figure 5.2 Hit performance as function of trait anxiety and affective valance.

The interaction effect of state anxiety and affective valance was not found significant, F (2, 122) = 00.57, p = 0.94, partial eta squared = .001 (see figure5.3). The obtained findings are clearly indicative of similar performance of state anxiety groups under different affective valence conditions, irrespective of gender and trait anxiety.

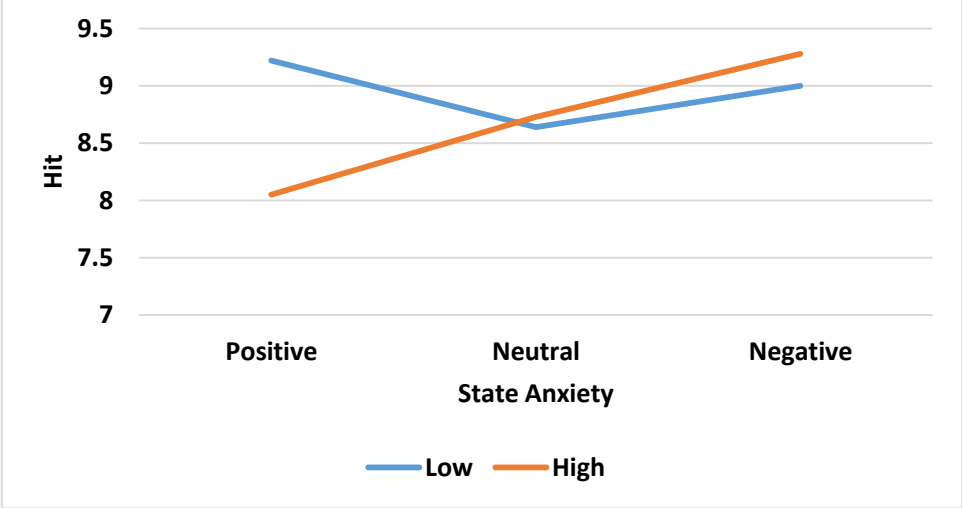


Figure 5.3 Hit performance as function of state anxiety and affective valance.

Interaction effect between gender, trait anxiety and valance were also not found significant, F (2, 122) = 00.45, p = 0.63, partial eta squared = .007. Interaction effect between gender, state anxiety and valance were also not found significant, F (2, 122) = 00.84, p =

0.43, partial eta squared = .01. The interaction effect between gender, trait anxiety, state anxiety and valance were found significant, F (2, 122) = 3.53, p = 0.03, partial eta squared = .05. These findings are clearly indicating different hits performance across various conditions.

Table 5.2. Summary of analysis of variance of hit performance on gender, trait anxiety, state anxiety and affective valance.

| Source of variance | df | Sum of square | Mean square | F | Sig | Partial Eta squared |
|---|---|---|---|---|---|---|
| **Between Subject Factor** | | | | | | |
| Gender: A | 1 | 38.70 | 38.70 | 2.89 | 0.09 | 0.04 |
| Trait Anxiety: B | 1 | 2.27 | 2.27 | 0.17 | 0.68 | 0.00 |
| State Anxiety: C | 1 | 12.08 | 12.08 | 0.9 | 0.34 | 0.01 |
| A × B | 1 | 9.18 | 9.18 | 0.68 | 0.41 | 0.01 |
| A × C | 1 | 28.05 | 28.05 | 2.1 | 0.15 | 0.03 |
| B × C | 1 | 88.85 | 88.85 | 6.65 | 0.01 | 0.09 |
| A × B × C | 1 | 55.34 | 55.55 | 4.14 | 0.04 | 0.06 |
| Error | 61 | 814.12 | 3.35 | | | |
| **Within Subject Factor** | | | | | | |
| Valence: D | 2 | 11.57 | 5.78 | 0.77 | 0.46 | 0.13 |
| A × D | 2 | 663.67 | 331.83 | 44.31 | 0.00 | 0.42 |
| B × D | 2 | 54.08 | 27.04 | 3.61 | 0.03 | 0.56 |
| C × D | 2 | 0.85 | 0.42 | 0.05 | 0.94 | 0.01 |
| A × B × D | 2 | 6.81 | 3.41 | 0.45 | 0.63 | 0.07 |
| A × C × D | 2 | 12.69 | 6.34 | 0.84 | 0.43 | 0.01 |
| B × C × D | 2 | 2.50 | 1.25 | 0.16 | 0.84 | 0.00 |
| A × B × C × D | 2 | 52.96 | 26.48 | 3.43 | 0.03 | 0.05 |
| Error Valence | 122 | 913.56 | 7.48 | | | |

**False Alarms**

**Table 5.3.** Means and Standard deviations (in parenthesis) on false alarms performance among various experimental conditions.

| Gender | TAC | SAC | Positive | Neutral | Negative |
|---|---|---|---|---|---|
| Female | Low | Low | 11.14 (6.41) | 11.14 (6.41) | 12.57 (8.079) |
| | | High | 10.50 (8.14) | 10.50 (8.14) | 12.00 (7.58) |
| | High | Low | 9.50 (5.35) | 9.50 (5.35) | 14.83 (13.18) |
| | | High | 11.30 (5.98) | 11.30 (5.98) | 12.10 (7.06) |
| Male | Low | Low | 8.77 (5.47) | 8.77 (5.47) | 17.22 (9.49) |
| | | High | 5.33 (2.16) | 5.33 (2.16) | 16.50 (9.64) |
| | High | Low | 9.22 (4.43) | 9.22 (4.49) | 18.22 (8.24) |
| | | High | 6.83 (5.024) | 6.83 (5.02) | 14.33 (10.43) |

The main effect of gender was not found significant, F (1, 61) =.012 p =.914, partial eta square .001. Which suggested that male and female participants committed similar level of false alarms on working memory task performance, irrespective of trait anxiety, state anxiety, and affective valence. The main effect of trait anxiety was also not found significant, F (1, 61) =.491 p =.486, partial eta square .008. These results indicated similar false alarms among low and high trait anxiety group participants, irrespective of state, gender, and affective valance. The main effect of state anxiety was also not found significant, F (1, 61) =2.083 p =.154, partial eta square .033. The findings are clearly indicating that participants with low and high state anxiety committed similar level of false alarms, irrespective of gender, trait anxiety and valance. The main effect of affective valence was found significant, F (1.790, 109.186) =23.396 p =.000, partial eta square .277. Which suggest that participant reported committed different level of false alarms across three different valence condition.

Interaction effect between gender and trait anxiety was also not found significant, F (1, 61) =.001 p =.972, partial eta square .001. Which suggest that male and female participant with low and high trait anxiety made similar level false. The interaction effect between gender and state anxiety was also not significant, F (1, 61) = .419 p =.520, partial eta square .007. Which suggested that male and female participant with low and high state anxiety also committed similar level of false alarms on working memory task performance. Interaction effect between trait anxiety and state anxiety was also not significant, F (1, 61) =.053 p =.818, partial eta square .001. The obtained findings suggest that participant with low and high trait anxiety and low and high state anxiety made similar level of false alarms. Interaction between gender, trait anxiety and state anxiety were also not significant, F (1, 61) =.048 p =.827, partial eta square .001. Which revealed that male and female participant with high and low trait anxiety and low and high state anxiety committed similar level of false alarms on working memory task performance.

The ANOVA result revealed significant main effect of gender and affective valance on working memory task performance, F (1.790, 109.186) =6.235 p =.001, partial eta square. 09 (see figure 5.4) which suggested that male and female participant performed differently on working memory task performance.

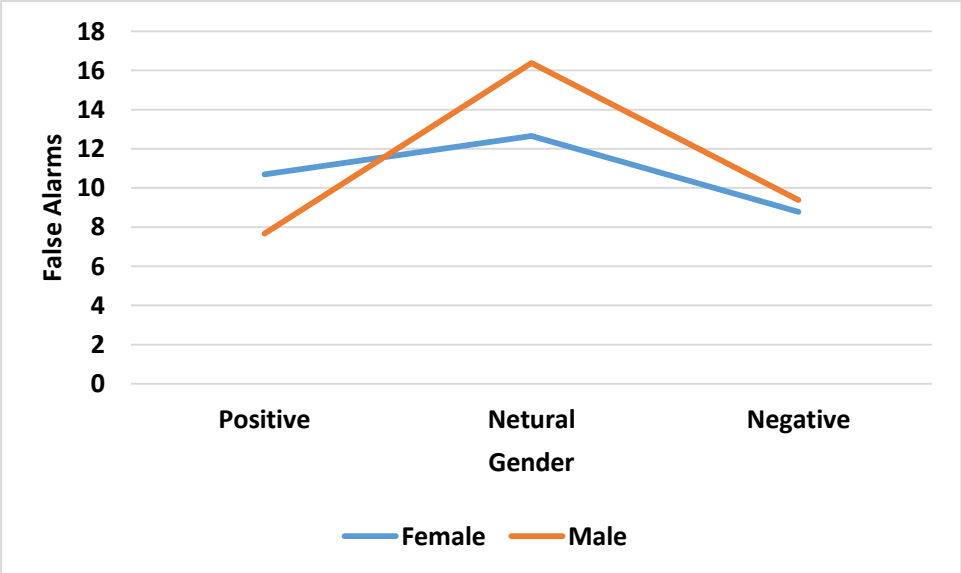

Figure 5.4 False alarms performance as function of gender and affective valance.

The interaction effect of trait anxiety and affective valence not found significant, F (1.790, 109.186) =.829 p =.042, partial eta square .01 (see figure 5.5). These results indicated that low and high trait anxiety participant reported similar false alarms, irrespective of gender, state anxiety.

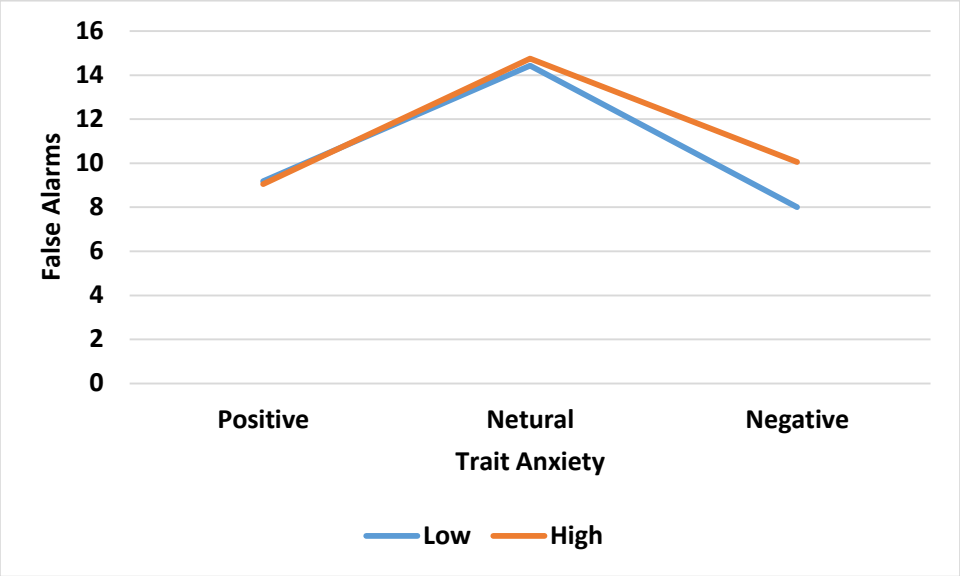


Figure 5.5 False alarms performance as function of trait anxiety and affective valance.

Interaction effect between state anxiety and affective valance was also not found significant, F (1.790, 109.186) =0.05 p =.93, partial eta square .005 (see figure.5.6) which suggested that low and high state anxiety groups of participants performed similarly across various affective valence conditions.

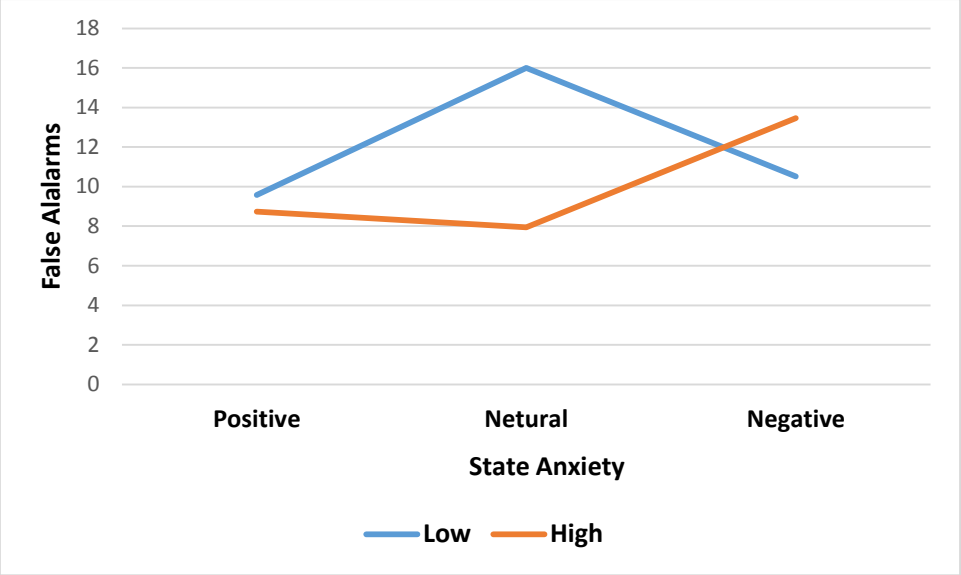


Figure 5.6 False alarms performance as function of state anxiety and affective valance

Interaction effect of affective valence, trait anxiety and state anxiety was also not found significant, F (1.790, 109.186) =.371 p =.691, partial eta square .006. Which suggest that participant with low and high trait anxiety and low and high state anxiety performed similarly across the condition. Interaction effect of gender, trait anxiety and state anxiety was also not found significant, F (1.790, 109.186) =1.166 p =.311, partial eta square .010. Which revealed that male and female participant with high and low trait anxiety and low and high state anxiety also perform similar on working memory task performance. Interaction effect of gender, state anxiety, trait anxiety and affective valence was not found significant, F (1.790, 109.186) =.613 p =.526.

Table 5.4. Summary of analysis of variance of false alarms performance on gender, trait anxiety, state anxiety and affective valance.

| Source of variance | df | Sum of square | Mean square | F | Sig | Partial Eta squared |
|---|---|---|---|---|---|---|
| **Between Subject Factors** | | | | | | |
| Gender: A | 1 | 1.17 | 1.17 | 0.01 | 0.91 | 0.00 |
| Trait Anxiety: B | 1 | 49.01 | 49.01 | 0.49 | 0.48 | 0.08 |
| State Anxiety: C | 1 | 207.82 | 207.82 | 2.08 | 0.15 | 0.03 |
| A × B | 1 | 0.12 | 0.12 | 0.00 | 0.97 | 0.00 |
| A × C | 1 | 41.78 | 41.78 | 0.41 | 0.52 | 0.00 |
| B × C | 1 | 5.30 | 5.30 | 0.05 | 0.81 | 0.01 |
| A × B × C | 1 | 4.82 | 4.82 | 0.04 | 0.82 | 0.01 |
| Error | 61 | 60870.12 | 99.78 | | | |
| **Within Subject Factors** | | | | | | |
| Valence: D | 1.79 | 1407.32 | 786.24 | 23.39 | 0.00 | 0.27 |
| A × D | 1.79 | 375.04 | 209.53 | 6.23 | 0.00 | 0.09 |
| B × D | 1.79 | 49.87 | 27.86 | 0.82 | 0.42 | 0.01 |
| C × D | 1.79 | 28.60 | 15.98 | 0.05 | 0.93 | 0.00 |
| A × B × D | 1.79 | 22.29 | 12.45 | 0.37 | 0.69 | 0.00 |
| A × C × D | 1.79 | 17.69 | 9.88 | 0.29 | 0.72 | 0.00 |
| B × C × D | 1.79 | 76.73 | 39.18 | 1.16 | 0.31 | 0.01 |
| A × B × C × D | 1.79 | 36.84 | 20.58 | 0.61 | 0.52 | 0.01 |
| Error | 109.18 | 3669.29 | 33.60 | | | |

# CHAPTER 6

# DISCUSSION

## 6.1 Discussion of Results

Four hypotheses were formulated to examine the effect of gender, trait anxiety, state anxiety and valence on emotional working memory task performance. **(1)** High trait anxiety group would perform better under negative working memory task condition (**2)** Low state anxiety group would perform better under positive working memory task condition (3) Female participant would perform better under negative stimuli working memory task condition (4) Participants would perform better under negative valence task conditions than positive and neutral.

The obtained findings revealed that high trait anxiety participants scored higher hit rate under negative valance condition, as compared to low trait anxiety participants. However, both the groups did not differ on false alarms performance. Hence on the basis of hit performance, our first hypothesis stated that, high trait anxiety group would perform better under negative valence working memory tasks stands accepted. The findings furthered revealed that low and high state anxiety groups did not differed on working memory task performance in terms of hit and false alarms. Therefore our second hypothesis stated low state anxiety group would perform better under positive working memory task condition stands rejected. These findings are clearly indicating that only trait anxiety have significant potential to affects cognitive performance. The results are in line with the previous findings of Sotillo (2004). Participants with high level of anxiety were more vigilant to the negative valance stimuli, compared to the positive stimuli. Previous research also has revealed that high anxiety people have less positive expectancy biases (Cabeleira, 2014). Therefore, it can be concluded that participants were less vigilant for positive valance stimuli condition which

improved the detection rate of negative valence condition, however, this explanation was found to be true only with trait anxiety persons.

Our third hypothesis is that, female participant would perform better under negative stimuli on working memory task. The findings reveal that male and female participants did not differed on emotional working memory task performance. However, male and female participants differed on different affective valence conditions. Female participants reported higher detection rate under negative and neutral stimuli conditions as compared to male participants. Hence our third hypothesis also gets accepted. The results are in line with the previous findings of Galli, Wolpe and Otten (2011). They found no difference in emotional working memory task performance. In addition, Lithari et. al (2010) reported that females are more responsive to the emotional stimuli. They further explained in their study that high responsiveness among female participants for negative stimuli as compared to males. In contrast, Grabe and Kamhawi (2006) found that males responded with higher arousal level and have best recognition and comprehension memory for negative valence eliciting stimuli. On the other hand, females were the most aroused after being presented with positive valence eliciting stimuli. Females also processed positive valence eliciting stimuli more efficiently. Therefore further research is needed to elucidate the question.

The fourth hypothesis stated that participants would perform better under negative valence task conditions. The findings revealed that participants did not differed on hit performance among valance condition. However, participants committed higher level of false alarms under neutral valence task conditions as compared to positive and negative valance task conditions. Hence our fourth hypothesis stands rejected.

## 6.2 Conclusion

The present study reveals that, individuals with high anxiety detected more negative stimuli during working memory task, as compared to their counterpart low anxiety persons. Therefore, it can be concluded that anxiety is a potential construct which has capacity to affect working memory performance of an individual. However, according to our results it is only true with trait anxiety among individual as state anxiety did not affected working memory performance significantly. In addition, this research also claims, that gender significantly affect valence recognition during working memory. Male were more responsive to positive, whereas, females were more responsive to the neutral and negative stimuli. In sum, it can be concluded that anxiety affects information being processed (i.e. positive, negative, neutral) in working memory.

## 6.3 Implications

The findings of the present study have clearly demonstrated that people remember the negative information highly while processing the information in working memory. Therefore, the findings may be applied in the area of positive psychology, human resource management and in day to day communication.

## 6.4 Limitations

Several factors limit the results of this research. IAPS pictures were used in this study to develop emotional valance working memory task. These pictures needed to be standardized with Indian population, as culture may affect the perception of the emotional valence. Further sample size was relatively small, as no physiological measures such as GSR, Heart rate, SPo2 etc. were used to standardize the anxiety score obtained through anxiety questionnaire. The individuals included in the sample were very young therefore the findings cannot be generalized to the other age population.

## 6.5 Scope for Future Research

The present study opens a window for further research and extensive study on the effect of anxiety, gender and affective valance on working memory. This study opens an area to standardize the pictures of IAPS with Indian populations as culture is a potential agent to affect the perception of these pictures. The participants were divided into low and high anxiety groups were only on the basis of score obtained through questionnaire. Future research may include some physiological correlates such as GSR, SPo2, hearing rate, body temperature etc., to explore this relationship extensively.

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## **APPENDIX A:** CONSENT FORM

The following forms enquire about your thoughts and feelings in a variety of situations. Read each item carefully and respond according to what describes your experience appropriately. There are no right or wrong responses, answer as honestly as possible. All personal information gathered during test will remain confidential.

I, _____, hereby give my consent for participating in this study. I am aware about its further use and have read and understood the above information.

Age:

Gender:

_____

(Signature)

**APPENDIX B:** STATE ANXIETY AND TRAIT ANXIETY SCALE (SATAI)

DIRECTIONS: A number of statements which people have used to describe them are given below. Read each statement and then tick on the appropriate column, according to how you feel right now. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best

STAI form X-1

| **S.No.** | | **Not at all** | **Some what** | **Moderately so** | **Very much So** |
|---|---|---|---|---|---|
| 1. | I feel calm | 1 | 2 | 3 | 4 |
| 2. | I feel secure | 1 | 2 | 3 | 4 |
| 3. | I am tense | 1 | 2 | 3 | 4 |
| 4. | I feel Strained | 1 | 2 | 3 | 4 |
| 5. | I feel at ease | 1 | 2 | 3 | 4 |
| 6. | I feel upset | 1 | 2 | 3 | 4 |
| 7. | I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. | I feel satisfied | 1 | 2 | 3 | 4 |
| 9. | I feel frightened | 1 | 2 | 3 | 4 |
| 10. | I feel comfortable | 1 | 2 | 3 | 4 |
| 11 | I feel self-confident | 1 | 2 | 3 | 4 |
| 12. | I feel nervous | 1 | 2 | 3 | 4 |
| 13. | I am Jittery | 1 | 2 | 3 | 4 |
| 14. | I feel indecisive | 1 | 2 | 3 | 4 |
| 15. | I am relaxed | 1 | 2 | 3 | 4 |
| 16. | I feel content | 1 | 2 | 3 | 4 |
| 17. | I am worried | 1 | 2 | 3 | 4 |
| 18. | I feel confused | 1 | 2 | 3 | 4 |
| 19. | I feel steady | 1 | 2 | 3 | 4 |
| 20. | I feel pleasant | 1 | 2 | 3 | 4 |

**APPENDIX B:** STATE ANXIETY AND TRAIT ANXIETY SCALE (SATAI)

STAI form Y-2

| s.no. | | Almost never | Some-time | Often | Almost always |
|---|---|---|---|---|---|
| 21. | I feel pleasant | 1 | 2 | 3 | 4 |
| 22. | I feel nervous and restless | 1 | 2 | 3 | 4 |
| 23. | I feel satisfied with myself | 1 | 2 | 3 | 4 |
| 24. | I wish I could be as happy as others seem to be | 1 | 2 | 3 | 4 |
| 25. | I feel like a failure | 1 | 2 | 3 | 4 |
| 26. | I feel rested | 1 | 2 | 3 | 4 |
| 27. | I am calm, cool, and collected | 1 | 2 | 3 | 4 |
| 28. | I feel that difficulties are piling up so that I cannot overcome them | 1 | 2 | 3 | 4 |
| 29. | I worry too much over something that really doesn't matter | 1 | 2 | 3 | 4 |
| 30. | I am happy | 1 | 2 | 3 | 4 |
| 31. | I have disturbing thoughts | 1 | 2 | 3 | 4 |
| 32. | I lack self confidence | 1 | 2 | 3 | 4 |
| 33. | I feel secure | 1 | 2 | 3 | 4 |
| 34. | I make decision easily | 1 | 2 | 3 | 4 |
| 35. | I feel inadequate | 1 | 2 | 3 | 4 |
| 36. | I am content | 1 | 2 | 3 | 4 |
| 37. | Some unimportant thoughts runs through my mind and bothers me | 1 | 2 | 3 | 4 |
| 38. | I take disappointments so keenly that I can't put them out of my mind | 1 | 2 | 3 | 4 |
| 39. | I am a steady person | 1 | 2 | 3 | 4 |
| 40. | I get in a state of tension or turmoil as I think over my recent concerns and interests | 1 | 2 | 3 | 4 |