

# Effect of State Anxiety on Numerical Task Performance of Adolescents

Sharmistha Halder<sup>1</sup>, Shambavi S.<sup>2</sup>

Department of Psychology, Jain University, India

## 1. Introduction

The project is concerned to determine the effect of state anxiety on numerical task performance of adolescents. State anxiety describes the experience of unpleasant feelings when confronted with specific situations, objects or events at a particular moment. This is different from its counterpart: trait anxiety which is the general level of anxiety predisposed in a person's personality. There are lot of researches showing the impact of anxiety on working memory, performance, memory, learning etc. In fact there are huge number of studies of how people with higher trait anxiety perform lower in cognitive tasks. Few studies show performance impairment as a result of state anxiety of the participants. So the present study focuses on intervening such a specific area which was not previously explored i.e., the effect of state anxiety on numerical task performance of adolescents. Adolescents have to solve numerical tasks in accordance with the syllabus, but whether their present situation affects their numerical task performance or not is the centre of focus of this research.

## 2. Review of Literature

A review of literature is a body of facts that aims to review the crucial and critical points of current body of knowledge including substantive findings. Its goal is to point out any research gap and situate the present study in the body of literature.

As the present study is to determine the effect of state anxiety on numerical task performance, the review is based on 2 sections

- 1) Anxiety
- 2) Numerical task performance

### Anxiety

Eelynn & Kerry (2016) in their study of test anxiety and children's working memory showed that trait anxiety has a direct and detrimental effect on working memory task performance while state anxiety was found to show little role.

According to Attentional Control Theory (Eysenck, Derakshan, Santos, & Calvo, 2007), anxiety impairs attentional control processes required to shift attention optimally within and between tasks.

In the study of the effect of state anxiety on performance using a task-switching paradigm showed that state anxiety reduces attentional control and therefore impairs performance.

Hopko, Crittendon, Grant & Wilson (2005), in their study the impact of anxiety on performance IQ found that testing anxiety has a substantial negative impact on the composite PIQ score, more specifically on block design and picture arrangement sub-tests using a multidimensional method of anxiety assessment.

The study of test anxiety and motor performance by Calvo & Alamo (1987) suggested a significant interactive effect of test condition (stress) and anxiety trait on motor performance.

A qualitative study done on dimensions of anxiety among high IQ children by Scholwinski, Ed and Reynolds, Cecil R.(1985) investigated underlying factors and patterns of responses for high IQ children. Also it revealed lower levels of anxiety for the high IQ and normative group.

Lesse, Stanley(1992) in their study of the relationship of anxiety to depression discusses the relationship of stress to the quantitative degree of anxiety and suggested a stress-anxiety-depression axis.

Thus, anxiety is found to have impact on various aspects: working memory, attentional control, motor performance, IQ and so on. Studies on specifically the effect of state anxiety is seldom performed.

### Numerical Task Performance

Rath, Domahs & Krinzinger(2015) in their study Patterns of linguistic and numerical performance in aphasia revealed inconsistent results for different levels of cognitive processing (e.g., lexical, semantic) as well as different stimulus materials (e.g., Arabic digits, number words, letters, non-number words).

In the correlational study of numerical anxiety and mathematics performance by Michael H.D. Morada revealed that mathematical performance is significantly related to numerical anxiety.

According to Richards and Suinn(1972) & Dew et al.,(1984), mathematics anxiety is a negative emotional response toward number manipulation, characterized by high arousal and physiological reactivity and resulting in avoidance of situations requiring mathematical reasoning.

Pletzer, Kronbichler, Nuerk, Kerschbaum(2015) in their study mathematics anxiety reduces default mode network(DMN) deactivation in response to numerical tasks found within the DMN in low mathematics anxiety participants(LMAs) compared to high mathematical anxiety

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participants(HMAs), while BOLD-response in task-related activation areas did not differ between HMAs and LMAs.

Recent observations by Macizo & Herrera(2011) found evidence suggesting that the seemingly automatic processing of numbers may be subject to cognitive control and may be monitored continuously and adapted depending on stimulus characteristics.

In the study of the origins of the numerical distance effect, Opstal & Verguts(2013) found that the distance effect in the same-different task originates from number representations rather than a decision process.

Beannon & Walle(2001) in their study of the development of ordinal numerical competence in young children found that number may become a salient dimension as children begin to learn to count. An analog magnitude representation of number may underlie success on the ordinal task.

Therefore, it can be seen that a lot of studies were done in relation to numerical task ranging from mathematical anxiety, number manipulation to numerical competence. The present study thus aims to find out how and by how much state anxiety affects numerical task performance of both low and high complexities.

### 3. Need for the Study

- 1) Since no previous study focused specifically on the effect of state anxiety on the numerical task performance, the current study will add to the body of knowledge and fact.
- 2) Numerical task is an important part of an adolescent's education; the current study would cast some light on how to improve the numerical task performance.
- 3) The study will measure quantitatively the effect of state anxiety on numerical task performance which will heuristically encourage for further qualitative research of the factors that can improve numerical task performance.
- 4) Finally, it will help the primary and secondary educational system through its findings.

### 4. Methodology

#### Aim

To determine the effect of state anxiety on numerical task performance of adolescents.

#### Objectives

- 1) To find out the effect of state anxiety on numerical task performance of low complexity.
- 2) To find out the effect of state anxiety on numerical task performance of high complexity.
- 3) To compare the effect of state anxiety on numerical task performance with high and low complexities.

#### Hypothesis

- 1) There is a significant effect of state anxiety on numerical task performance of low complexity.
- 2) There is a significant effect of state anxiety on numerical task performance of high complexity.
- 3) There is a significant difference between the effect of state anxiety on numerical task performance of low

complexity and that on numerical task of high complexity.

#### Research questions

- 1) What is the effect of state anxiety on numerical task performance of low complexity?
- 2) What is the effect of state anxiety on numerical task performance of high complexity?
- 3) Is there any difference between the effect of state anxiety on numerical task performance of low complexity and that on numerical task performance of high complexity?

#### Variables

- 1) Independent variable: State anxiety
- 2) Dependent variable: Numerical task performance
- 3) Relevant variables: IQ, age, task, situation etc.

#### Operational definitions

State anxiety: It is defined as an unpleasant emotional arousal in face of threatening demands or dangers. A cognitive appraisal of threat is a prerequisite for the experience of this emotion (Lazarus, 1991).

Numerical task performance: A numerical task is a unit of work that contributes to the fulfilment and completion of a scheduled mathematical item. Numerical task performance is the action of performing the numerical task efficiently.

#### Tools of Assessment

- 1) Wechsler Intelligence Scale: The Wechsler Intelligence Scale is an intelligence test that can be administered to both children and adults. Developed by Dr. David Wechsler, a clinical psychologist with Bellevue Hospital, in 1939, the tests measure one's ability to "adapt and constructively solve problems in the environment," as Wechsler defined. The test contains 10 subtests and 5 supplemental tests.
- 2) State subscale of State-trait Anxiety Inventory (STAI): The State-Trait Anxiety Inventory (STAI) is a commonly used measure of trait and state anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The state subscale of STAI includes 20 items for assessing state anxiety.
- 3) Sample math tests: Two forms of math test developed by the researcher herself keeping in view the basic mathematical knowledge adolescents possess. The first form contains 5 additions and 5 subtractions of three-digit numbers: considered as numerical task of low complexity. The second form contains 5 multiplications and 5 divisions of three-digit numbers: considered as numerical task of high complexity. For each task, 2 minutes will be given.

#### Sample

In the present study, sample size would be from 120 to 150. At first convenience sampling method would be applied to choose a temporary sample. Wechsler Intelligence scale would be administered on them and only the average intelligent adolescents would be selected. The number of individuals for the final sample will not exceed 150.

### **Nature of the study**

Quantitative, cause and effect study

### **5. Procedure**

The present study includes around 150 adolescents, both male and female whose age range is between 13 and 17years. The informed consent will be taken by the participants and socio-demographic data will be collected from them before the experiment is administered. The participants will then be informed about the numerical task to be performed and to induce a little bit of state anxiety they will be told that the accuracy of the task will show their level of intelligence. Before starting the task, they will be asked to fill up the state anxiety form. Analysis of variance will be used to find out whether state anxiety has a significant effect on numerical task performance. Interpretations will be made accordingly.

### **Statistical Analysis**

In the present study ANOVA (Analysis of variance) will be used to analyse the relationship between state anxiety and numerical task performance.