

# Anxiety and Self Concept towards Mathematics amongst the University Students of North India with Reference to Uttarakhand and Uttar Pradesh

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## ABSTRACT

The anxiety in the subject is universal. In this study the mathematical self concept about the subject and its anxiety is studied upon. A negative attitude is developed by the discomfort a student faces while doing Mathematics which hinders their performance in the subject and their self-esteem. This study is done to analyze the mathematical self concept and anxiety of the University commerce students in Uttarakhand. Secondary data was collected from indexed journals. Primary data was collected by using the questionnaire targeted 300 students, responded 213, using scale developed by Mr Gourgey (1982) and Betz, N. (1978). Cronbach alpha (for internal consistency of the scales 0.90 and 0.86). The outcomes indicate the students have a negative attitude towards the subject, the males and the females are equally affected by the mathematical anxiety and the mathematical self concept of both, but the mathematical self concepts are different for different age groups.

**Keywords:** Mathematics, Self concept, Anxiety, Cognition, Stress

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## INTRODUCTION

The origin of mathematics is considered to be as old as human kind. The ancient past of the subject has been the basis of the advancements in philosophy, science and engineering. Mathematics rose from simple counting, calculations and measurements. It also involved the systematic study of shapes and motions which evolved as a broad and complex discipline called Mathematics. The history of maths is very long since time in memorial, from the early settlements in Egypt, Mesopotamia to the revolution times of Greece and its Hellenistic empires.

Feeling developed during the use of math related activities like tension, worry, fear can be referred to as math anxiety. Math cognition and its anxiety has been studied a number of times. A negative relationship between the two has been observed in different studies at different levels of math like simple counting to solving complex math problems and this negativity exists across different stages of development. To achieve the predetermined goals, in every country science, math and technology has been emphasized in the education system. But the performance of the students from the primary section to the higher secondary is still an issue although the subject is

familiarized to the students since their preparatory classes. Still the students of higher standards find it difficult to solve the basic question of math. They find the subject the most tough, killer, very difficult and hard to pass subject as a result all these negative feelings increases their anxiety.

A negative attitude is developed by the discomfort a student faces while doing Mathematics which hinders their performance in the subject and their self-esteem (Ashcraft, 2002; Chernoff & Stone, 2014).

A students rating of their ability, skills interest and their enjoyment in math can considered as Mathematics Self Concept.

### **LITERATURE REVIEW**

Chamorro-Premuzic and Furnham, 2003a; Furnham and Chamorro-Premuzic, 2004 stated that to find the variables responsible for the prediction of academic performance (AP) was the focus of psychologists. But initially the role of motivation and intelligence was used to predict AP. It has been suggested that Personality variables might play a role in the higher education in recent years.

Richardson and Suinn, 1972, p.551 in his study stated that feelings and anxiety in ordinary life and academic situations is that which interfere with the manipulations of mathematical problems for the last forty years. It is already well know fact that anxiety affects our working memory in a negative way.

Ashcraft et al, 1998 and Skemp (1971) said that mathematical anxiety inhibits reflective activity. Performance in maths and its anxiety is negatively correlated has been shown in studies in many countries. ( Betz, 1978; Hembree, 1990; Ma, 1999; Dowker, 2005; Ashcraft and Krause, 2007; Brunyé et al, 2013).

Fennema & Sherman, 1978; Brush, 1981; Stodolsky, 1985 in their studies stated that a negative attitude is seen towards the subject by many students.

Brush (1981) stated that in a longitudinal study done on 1500 students in U.S. that from 6th-12th grades, the anxiety about English decreased and about math increased amongst them progressively.

Quilter & Harper, 1988 said in his research that there were the strong negative feelings amongst the adults regarding the subject.

cf. Sarason, 1980; Zeidner and Safir, 1989 stated that the research in anxiety in Mathematics and Statistics showed that it developed due to the experience of their success and failure students in the subjects; it further consolidated during the school times and got influenced due to affective, social and cognitive factors like high parental pressures, expectations of success in maths, fear of punishments if failed, bad past experiences with the subject and self low confidence and ability for mathematics.

Burton and Russell, 1979 said that no foundation in mathematics and Smith, 1981 low math self-

esteem increases the anxiety.

Bates, 2019 said that if there are differences then they have contributed to factors rather than the mode of delivery.

[Skagerlund et al., 2019](#) in their study stated that the subject anxiety have an negative influence on mathematical ability in many ways. Example: Working memory while doing math problems. [Peters and Bjalkebring, 2015](#) in their manuscript said that although like other construct , self efficacy is related to math anxiety although it is separate from person's actual math ability.

[Dowker et al., 2016](#) in their view that a person can be very good at math even the anxiety and ability is negatively correlated and an individual may be bad in maths although he do not have math anxiety. [Boaler et al., 2018](#) in their research found that high math anxiety students indicated that new forms of teaching do not help them more. This showed that as compared to the students having no anxiety. They do not show any indication that they avoided any of the learning or teaching methods. It is evident that with the students suffering from math anxiety can be taught with both the new and old forms of learning and teaching. [Boaler et al., 2018](#) in their research showed that online tools like MOOC-“massive open online course” helped students about how to learn math well. Wondimu et al. (2012) in their study stated that that mathematical performance of students is affected by the negative feelings like cluelessness, helplessness and panic. They also stated that mathematical anxiety and self concept are reciprocally related. For the students opting mathematical courses in higher studies friends and parents involvement could play a positive role.

Aarnos and Perkkila (2012) stated that environmental factors could be the cause of mathematical anxiety. They stated that negative attitude or beliefs of children towards maths may be due to the parents and teachers views towards the subjects. [Tamim et al., 2011](#) in their findings stated that Thomas Alva Edison in the New York Dramatic Mirror had stated that 100 years from now books will become obsolete in schools. Every branch of knowledge would be able to be taught by motion pictures. Ahmed, Minnaert, Kuyper, & van der Werf, 2012; Cargnelutti et al., 2017; Foley et al., 2017; Madjar, Zalsman, Weizman, Lev-Ran, & Shoval, 2018 said that the relationships between mathematical anxiety and its related variables are bidirectional and nonlinear.

## **OBJECTIVE OF THE STUDY**

1. To know the level of mathematical self concept and mathematical anxiety amongst college students
2. Study the relationship between the mathematical self-concept and anxiety
3. Study the relationship between the two factors and the students

## **RESEARCH METHODOLOGY**

This study is focused on the undergraduate students of Uttarakahnd and Uttar-Pradesh Of commerce stream.

**Content Validity and Reliability:** Cronbach Alpha is calculated in Excel to check the reliability of internal scale of both the factors i.e. Mathematics Self concept and Mathematical Anxiety which

came out to be 0.90 and 0.86 respectively. It is considered to be very good values.

### Sampling Design

Both primary and secondary data was used in the manuscript. For primary data questionnaire was used with the help of a scale developed by Mr. Gourgey (1982) and Betz, N. (1978).

Instrument used was the Mathematics Self Concept Scale developed by Gourgey (1982) which covered the attitude, beliefs and the feelings of the respondents regarding the mathematics learning ability. There were 27 items in the scale which were cut short to 24 as per the requirements of the study out of which 9 items were positively and rest 13 negatively keyed. Responses were based on 5 point Likert Scale. (Reverse scoring was done for negative items). The possible range of scores was from 24 to 120.

Mathematics Anxiety Scale was used to study the anxiety amongst the students. These 10-item self-report scales by Betz (1978) half items were positively keyed and half were negatively keyed. Reverse scoring was done for negative items on 5 point scale. Possible range of scores was from 10 to 50.i.e. high mathematical anxiety.

For secondary data research papers were referred from online journals publications of high repute like SCOPUS, and various sites.

### DATA ANALYSIS

**Table-I: Demographic factors of respondents**

S.No.	Factors of respondents	Particulars	No of Respondents	%age
1	Gender	Male	84	39
		Female	129	61
		Total	213	100
2	Age Groups	15-20 years	191	90
		21-25 years	17	8
		26-30years	1	0
		30 years and above	4	2
		Total	213	100
3	Educationa l Qualificati on	XII pass with math	58	27
		XII pass without math	133	63
		Graduate with math	6	3
		Graduate without math	0	4
		9	3	
		Post Graduate without math		
		Post Graduate with mathematics	7	0
		Total	213	100

4	State	Uttarakhand	155	73
		Uttarpradesh	34	16
		Others	24	11
		Total	213	100

**Interpretation of Table-1**

From the demographic analysis of the data indicates that out of 213 respondents 129 (61%) were female and 84 (39%) were males. Maximum respondents i.e 191 (90%) were between the age groups 15-20 years i.e. they were mainly the students of second year and third year from commerce background. 21-25 years were 17 (8%). From 26-30 were only 1 (negligible). Four respondents (2%) were the students pursuing Ph.D. XII pass with math were 58 (27%), XII pass without math were 133 (63%), Graduate with math were only 6 (3%), Graduate without math Were 9 (4%), Post Graduate without math were 7 (3%) and Post Graduate with mathematics were 0%.

The respondents were mainly from Uttarakhand 155 (73%) and Uttar Pradesh 34 (16%). Rest were from 24 (11%) were from other states like Bihar, Andhra Pradesh, Jharkhand West Bengal etc. but they were studying the state.

The above data clearly shows that the people with mathematics in their educations were only 64 (30%). And respondents without mathematics were total 149 (70%). This shows the acceptance of the subject in general.

Responses in Mathematical Self Concept: Minimum score =37 and maximum Score= 116 (range-24 and 120). When we analyzed the range of responses for negative and positive aspect it was seen that scores for negative keyed questions scores were minimum=17 and maximum was= 78 and for positive keyed question scores were 13 and 40 only. People gave high scores for the negative aspect towards the concept of mathematics.

Responses in Mathematical Anxiety: Minimum score =11 and Maximum= 49 (Range of score-10 to 50). For the positively keyed questions scores were minimum 5 and maximum 24 and for negatively skewed question minimum scores were 5 and maximum 25. It shows that for both the keyed questions scores were more or less the same.

**Hypothesis**

Ho: There is no significant difference between the factors and the genders. H1: There is significant difference between the factors and the genders.

**Table II:** Analyzing the effect between factors and the Genders. (t- Test two tailed unequal variance)

S. No.	Factors	Gender	Mean	Standard Dev.	N	d.f	t	P-value	t-Critical
1.	Mathemat-	Male	3.35		48	17	0.76	0.44	1.97
			3			4	7	4	4

	ical Self Concept	Female	3.29 2	129				
2	Mathem at -ical Anxiety	Male	3.16 3	84	17 4	0.68 6	0.49 4	1.97 4
		Female	3.09 0	129				

**Interpretation of Table-2**

Since the t calculated value (0.767) < t-Critical value and p-value (1.974 >0.5) hence null hypothesis is accepted. It is evident that the males and the females are equally affected by the mathematical anxiety and the mathematical self concept of both is same. It is also seen that the mean value for mathematical self concept for male- 3.353 and female= 3.292 more or less the same and mathematical anxiety, for male 3.16 and female 3.09 hardly any difference.

**Hypothesis**

H0: There is no significant difference between the different age groups and mathematical self concept.

H1: There is significant difference between the different age groups and mathematical self concept.

**Table 3: Age and Mathematical Self Concept**

<b>Anova : Single Factor</b>				
<b>SUMMARY</b>				
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
15 to 20 years	191	597	3.1256 54	0.584969964
21-25	17	53.6	3.1529 41	0.300147059
25-30	1	1	1	#DIV/0!
30 and above	4	12.4	3.1	0.76

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit.</i>
Between Groups	4.519	3	1.50 6	2.662930 56	0.04902 7	2.64 7
Within Groups	118.2 26	209	0.56 5			

Total	122.7	212
	45	

**Interpretation of Table 3**

From the table above we can see F calculated value > F-Critical value and p-value (0.0490 < 0.05). We do not accept null hypothesis. It can be said that the mathematical concepts are different for different age groups.

**Hypothesis**

H0: There is no significant difference between the different age groups and mathematical anxiety.

H1: There is significant difference between the different age groups and mathematical anxiety.

**Table 4: Age with Mathematical Anxiety**

<b>ANOVA: Single Factor</b>							
SUMMARY							
Groups	Count	Sum	Average	Variance			
15 to 20 years	191	633	3.314136	0.334114			
21-25	17	57.83333	3.401961	0.180977			
25-30	1	2	2	#DIV/0!			
Above 35	4	13.375	3.343	0.1358			
ANOVA							
Source of Variation	SS	df	MS	F	P-value	F crit	
Between Groups	1.861	3	0.620	1.941	0.123	2.647	
Within Groups	66.784	209	0.319				
Total	68.646	212					

**Interpretation of Table 4**

From the table above we can see F calculated value < F-Critical value and p-value (0.123 > 0.05). We do not reject the null hypothesis; it is also evident from the averages that the mathematical anxiety varies for different age groups. The averages of different age groups also varies

**Table 5: Correlation between the two variables**

	Mathematical Concept	Self	Mathematical Anxiety
Mathematical Concept	1.00		
Mathematical	0.75		1

Anxiety		
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### Interpretation of Table 5

From the table above there exists a positive correlation between the two factors. Since the value is 0.75. It is considered to be good relationship. It shows that mathematical self concept may be one of the reasons for the anxiety of the students towards the subject.

### CONCLUSION

This study focused on the commerce students at college level indicates that The respondents were mainly from Uttarakhand 155 (73%) and Uttar Pradesh 34 (16%.) Rest were from 24 (11%) were from other states like Bihar, Andhra Pradesh, Jharkhand West Bengal etc. but they were studying the state. The study shows that the respondents with mathematics in their educations were only 64 (30%). without mathematics were total 149 (70%). This shows the low acceptance of the subject in general. Responses indicates for positive keyed response range was from 5 to 24 (Range was 10-50), It is evident that the males and the females are equally affected by the mathematical anxiety and the mathematical self concept of both is same, It can be said that the mathematical concepts are different for different age groups. It is also clear from the averages that the mathematical anxiety varies for different age groups. The average of different age groups also varies. The correlation was 0.75 between the factors. The study shows that there is a negative attitude towards the subject which is also seen their self concept.

### LIMITATIONS

1. Sample could have been more
2. Were not able to do the Lehman test in Excel
3. Latest secondary data was not much available.

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