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Math Achievement as a Function of Math Anxiety and Perceived Teachers' Social Support among Elementary Students

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This study intended to explore effects of students' anxiety that they experience towards math and perceived teachers' social support on their achievement towards math. Participants were 345 elementary school students (157 female and 188 male students) aged 12-14 years. Participants were approached through convenient sampling technique at their schools in Vehari city. Math anxiety and perception about instructor's support were measured through Math Anxiety Questionnaire (Wigfield & Meece, 1988) and Teacher Social Support Scale (Malecki, Demaray, & Elliot, 2000) respectively. Students' performance score in mathematics in their annual examination was used as math achievement. Employing Pearson Correlation and Regression Analysis, results revealed that math achievement was found with inverse relationship with math anxiety while was found positively correlated with teachers' support. Findings further indicated that students' anxiety towards math and perception of teacher's social support were found significant determinants of achievements in math. On the basis of these findings, it is suggested that teachers should provide support, autonomy, and empowerment to their students because the students' perception about their teachers always affect their performance in the course to be learnt.

Keywords: Math anxiety, math competence, academic achievement, perceived social support

Mathematics is considered as a distinctive elementary skill which an individual of the contemporary societies requires most in maintaining one's diurnal life. National Council of Teachers of Mathematics [NCTM], (2000) identified that 75 percent of all occupations entails primal mathematical and geometry concepts. Tobias (1993) as well as Recber (2011) accentuated that rudimentary mathematical understanding had great influence on accomplishment or dereliction in exams conducted for job in government and private sectors. Likewise, skills, command, and understanding in math calculations are vital factors in succeeding the NTS exam conducted for jobs in all sectors of Pakistan.

The paramount objectives of mathematics education in all grade levels are to be certain and appropriate math learners, create an uplifting disposition towards the utilization of arithmetic and be self-governing learners in the field of mathematics (National Council of Teachers of Mathematics [NCTM], 2000). On the other hand, the continuing issue of arithmetic training is that numerous students show poor performance in math and leave school with inadequate arithmetic skills around the world (NCTM, 2000).

Poor erudite execution does not necessarily imply that learners do not have the knack to do well in mathematics; on the other hand, it does imply that pupils may maintain a strategic distance from heartily taking an interest in the class and abstain from enlisting science subjects with their own particular decisions governed by their feelings and self -convictions as opposed to absence of capacity (Geoghegan, 2002). Those feelings and self-convictions have specific essentialness for learners' performance in mathematics (Erden & Akgul, 2010). In spite of the way that arithmetic is seen as cognitive and feeling free to teach, the emotional measurement ought not to be overlooked. Specifically, compact negative feelings lead practically no encounters in mathematics, though compact positive feelings lead more encounters (Hembree, 1990; Pajares & Graham, 1999). For example, among the students who feel vulnerable, incompetent or on edge are possible to surrender despite challenges and disappointments.

Math anxiety refers to getting stress that hinder the organization and arrangement of numbers and also create problem in handling mathematical issues in various usual events in life and educational classes. Experience of anxiety in mathematics may result in forgetting and losing one's academic confidence. This type of anxiety is associated with low and wretched performance in math handling in achievement exams for math. Math anxiety basically is related to negative feelings in terms of mathematics (Uusimaki & Kidman, 2004).

People report anxiety towards math as their powerful negative attitude when they feel low ability to understand and comprehend mathematical problems. Students experiencing anxiety for math perceive them as they are incompetent of exercising math problems and participating in math classes. In this way, feeling anxiety is an emotional rather than cognitive problem and it also obstructs one's competency to comprehend mathematics activities (Maloney & Beilock, 2012).

Students' low performance in mathematics, along with teachers' hapless and insufficient guidance in mathematics can be examined through intensity of math anxiety. Teachers with their complex and complicated teaching style foster anxiety in their students due to no command on subject matter and due to less confidence (Hadfield & McNeil, 1994). Manouchehri's work (1998) has demonstrated that most of the instructors enter into professional education courses with poor fundamental abilities and without comprehension in math problems.

The factor of math anxiety is not only the antecedent of many other outcomes. But it can also result from several other negative and uncomfortable feelings for mathematics or for an

instructor of math in earlier schooling. These kinds of experiences lead to put a student in the perceptions that he is deficient in ability to math handling. These false perceptions indeed end in poor outcomes in math that works for lowering confidence of students. Anxiety towards math produces divested and disadvantageous performance instead of success and achievement (Shields, 2006; Maloney & Beilock, 2012).

Students in general get spirit for their motivation and performance from the sources of their families, friends, group fellows and teachers particularly. Laugesen, Dugas and Bukowski (2003) postulated through their research conducted on 7th grade students that the encouragement, endorsement and help from family have promising impact on reducing low esteem, anxiety, and depression. Another study conducted by Demaray and Malecki (2002b) presented that the perceived societal help and support from family, fellows, and instructors is related to positive social, behavioral and emotional outcomes such as social abilities, acquired knowledge, positive behavioral patterns, and problem solving ways of learners. Thus it has been observed that individual who perceives his/her family as a significant source and provider of assistance, encouragement, and support becomes high achiever and remains free of many negative emotional symptoms. Furthermore, Helsen, Vollebergh and Meeus (2000) have also provided the strength between the connection of social support and behavioral outcomes. They reported that adolescents shift their perceived social support from parents to peer group.

As mentioned earlier that families, peer group, and teachers are crucial origin of social support for learners, source of support from teachers has been found more essential for students to promote and develop a person as a confident and independent individual (Sayar, 2006). Demaray and Malecki (2002a; 2002b) commented that teachers' support helps students to get better adjustment in the school environment and to develop positive emotions towards teachers and school. The authors also argued that when students perceive their teachers as support providers they also develop social competency, stable behaviors, and healthy dispositional traits. Sayar (2006) further noted a positive connection between the academic flourishing of learners and perception of teachers' support while negative relationship between sad mood symptoms and such kind of support.

Mostly students feel anxiety concerning the subject of math in Pakistan commonly because base of mathematics is weak and their basic mathematical concepts are not clear due to which students feel anxiety in this subject and their performance is poor. Literature indicates that there is a connection among mathematics anxiety, teacher support and math achievement, the direction and nature of this connection is significant (Tobias, 1993; Ellsworth & Buss, 2000; Haylock, 2003; Sakiz, Pape & Hoy, 2012). Mathematics anxiety is inversely proportional to teacher support and math achievement.

Accosting the review of literature, this study was an effort to investigate the effects of anxiety toward math and support from teachers on achievement in mathematics. It was hypothesized that anxiety for math handling and perceived teachers' support will predict the success in achievement.

Method

Participants

The sample consisted of 345 students (157 girls and 188 boys) attending 7th and 8th grades from public elementary school in Vehari city. Participants were selected through convenient sampling technique. The inclusion criteria was based on already enrolled students in 7^{th} and 8^{th} grade in government elementary schools with age range of 12-14 years (M=12.90, SD=0.92). They were more or less similar in their cultural background.

Measures

Child and Adolescent Social Support Scale: This scale developed by Malecki, Demaray and Elliot, (2000) has 60 items that assess one's perceptions about social support from five main origins of support letting in parents, teachers, classmates, close friends, and school. Every subscale is measured through 12 items that assess four different dimensions of social support: emotional, instrumental, appraisal, and informational. Information is collected on ratings from 0 (*never*) to 6 (*always*). Greater score is interpreted as greater perception of support from a particular origin. The present study has utilized the subscale measuring teachers' support. The reliability coefficient for original scale is .74 and for Urdu translated scale is found to be .72 in the present study.

Math Anxiety Questionnaire (Wigfield & Meece, 1988) was used to measure math anxiety among elementary students. The scale consisted of 11 items with a response format 5-point Likert scale rating as 0 = Strongly Disagree and 4 = Strongly Agree. High score shows greater level of anxiety towards math. The scale has reliability coefficient of .73, and Urdu translated scale is found to be .71 for the current research.

Math Achievement: Students' average scores obtained in the first and second term examination in the subject of mathematics were used as math achievement scores.

Procedure

The study was completed in two phases.

In phase 1, the instruments to be used in main study were adapted and validated. First the tools were checked whether are relevant to respondent's culture with the help of a sample of 20 educationists. They were requested to check the relevancy of each item in questionnaires. On the basis of experts' opinions, all the items were found quite relevant to the Pakistani culture. For the purpose of translation, the Back Translation Method was followed. The whole procedure of translation was done in the following steps.

1. ***English to Urdu translation.*** A sample of 10 bilingual educationists was contacted to translate the questionnaires. They were asked to translate each item in such a way that

statements could express the similar meanings of English versions of scales. One closest translation of each

2. item was selected from 10 translations keeping its similarity of meanings. Then Urdu-translated scales were given to three subject experts (Psychology) for the understanding of grammar, content, and expression of items. They rated both English and Urdu translated on a 4-point rating scale indicating close meanings of Urdu statements with English statements. In the light of experts' opinion the closest translations were accepted in the final scales.
3. ***Back translation from Urdu to English.*** The Urdu translated versions were then again translated into English by another sample of 10 bilingual experts who were not known to the original scales. They provided translation conveying the most possible similar meanings.
4. ***Reliability and Validity.*** Both Urdu translated questionnaires were administered to a sample of 100 school students; 50 boys (M_{age}= 13.1, *SD* = 1.01) and 50 girls (M_{age} = 12.85, *SD* = 0.98) to determine the reliability and validity of both scales. Cronbach alpha coefficients were found to be.72for teachers' support scale and .71 for math anxiety questionnaire.

In the second phase of the study 345 students were approached at 10 government elementary schools in Vehari city. Translated versions of Math Anxiety Questionnaire and Teacher Social Support Scale were administered to the participants after receiving the consent from them. Complete instructions were provided to them about responses on scales. Confidentiality was assured to them as well as for their responses. SPSS-17 was used to analyze the data.

Results

The present study aimed to investigate the role of math anxiety and perceived teachers' social support in prediction of achievement in mathematics. The Pearson product moment correlation coefficient was computed to find out the relationship among the variables. Multiple regression analysis was computed to see the impact of anxiety towards math and perceived teacher support on achievement in mathematics.

Table 1

Descriptive Statistics and Correlation Coefficients of the Study Variables

Variables	M (SD)	Perceived Teachers Support	Math Achievement
Math Anxiety	24.96 (6.49)	-.41*	-.55**
Perceived Teachers Support	33.76 (7.29)	1	.59**
Math Achievement	58.28 (5.45)	-	1

*p< .05, **p< .01

Table1 demonstrates mean, SD, and correlations among the variables. The results reveal that math anxiety has an inverse relation with math achievement and teachers social support

whereas positive relationship was found between perception of teacher support and achievement in mathematics.

Table 2

Linear Regression Analysis Explaining Impact of Math Anxiety and Perceived Teacher Support on Math Anxiety

Variables	R^2	ΔR^2	*B*	*SE*	β	*t*	*P*
Constant	.019	.016	3.559	.576			
Math Anxiety			-.028	.011	-.136	-2.57	.011*
Constant	.023	.020	1.539	.189			
Perceived Teachers Support			.024	.008	.152	2.86	.004**

(F=6.958, *p< .05), (F=8.024, **p<.01),*p< .05, **p< .01

Table 2 presents multiple regression analysis for math anxiety and perceived support from teacher and their impacts on success in math problems. Results show that experience of anxiety in math subject negatively affect the attainment in math (β = -.136, t = -2.57, p < .05) and perception of teacher support positively influence math achievement (β = .152, t = 2.86, p < .01).

Discussion

This study has presented the significant findings in terms of the relationship existing between anxiety experience while doing math problems, perception of teacher support, and attainment in math. Findings postulated that math anxiety negatively predicted the math achievement but perceived teacher support positively predicted the math attainment. These results are consistent with the findings of a research that reported significant negative association of anxiety in mathematics and achievement (Bates, 2007; Erden & Akgul, 2010; Sakiz, Pape & Hoy, 2012) and found significant positive connection of teacher support to success in math (Erden & Akgul, 2010).

In other words, learners perform more effectively when they receive support from the teacher and become less apprehensive regarding particular subject. It is salient that these two emotional variables clarify an imperative part of accomplishment. Accordingly, it may be prescribed that educators ought to maintain a strategic distance from the variables bringing on anxiety and they ought to give help that is more social to learners in class setting.

Sakiz, Pape, and Hoy (2012) have identified that teachers behaviors like negative discourse, deficient criticism, overlooking learners and disheartening them can cause anxiety towards math during the time from very early schooling to higher education. Absence of educator support definitely causes the negative outcomes in students' academic activities. Thus, if social support is higher, the feelings of anxiety will be minimized. Studies revealed that societal support facilitate learners in getting adjustment to class (Demaray & Malecki, 2002b, 2005; Bowen & Brewster, 1998). Learners sensitive to class, then again, are more intrigued by their studies and they are more effective.

Conclusion

It is concluded from the above discussion that students who receive support from their teachers show an increase in achievement and exhibit a decrease in anxiety level. In nutshell, the amount of anxiety associated with math and teacher support are identified as substantial in illuminating learners' arithmetic accomplishment. This establishes that teaching instructors ought to concentrate on systems for enhancing the fullness of feeling aptitudes of instructor competitors other than enhancing their cognitive abilities in word related courses. For this reason, there is a need for further investigation on deciding the instructor practices for enhancing the people help recognition and lessening the level of anxiety of learners.

Limitations

Hence this study bore significant findings, but some of the limitations are important to highlight here for the future strength of present findings. Study lacks the external validity due to the small sample size. Students enrolled in 7^{th} and 8^{th} grade were selected through convenient sampling technique in this study while the sample should be drawn through probability approach involving simple random sampling.

Suggestions and Implications

The future research must be carried out on the larger samples of the elementary school students of different cities of Pakistan. Moreover, future researches ought to look into the differences on the basis of demographic variables. It is also recommended that future research may also explore some personal factors like self-efficacy, self-confidence, attitudes of students as well as teachers towards science education etc. The present findings can be helpful in designing the teachers training programs. Teacher training programs should centre on strategies for enhancing the effective skills of teachers along with promoting their intellectual abilities in professional courses.

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