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# The Intermediating Role of Self-Regulation in the Relationship between Math Educational Beliefs and Students' Math Anxiety

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## ABSTRACT

This study aimed to investigate the intermediating role of self-regulation in the relationship between mathematical educational beliefs and students' math anxiety. The correlational descriptive method was adopted ysing structural equation modelling. The statistical sample of this study was selected from 2710 male students in the ninth grade of senior public highschool in the 4th district of Tehran in the educational years 2020-2021. In this study, 300 students were chosen by a two-step cluster sampling method. To collect data, Plake and Parker's Math Anxiety Questionnaire (1982), Ledder and Forgasz's Math Educational Beliefs Questionnaire (2002), and Sawari and Arabzadeh's Self-Regulation Questionnaire (2013) were applied. Structural equation modeling(SEM) with SPSS 18 and AMOS23 were used to analyze the data. The findings showed that math educational beliefs and self-regulation have a direct effect on students' math anxiety ($p<0.01$)., and mathematical educational beliefs have an indirect effect on math anxiety with mediating of self-regulation ($p<0.01$), and the research model was approved. This study shows the importance of educational cognitive elements in math anxiety and it is suggested that the educational systems set plans to improve students' positive educational and cognitive beliefs and as a results decrease anxiety in educational settings especially math anxiety.

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## Introduction

Anxiety happens in reaction to a special and specific condition. When people are unable to understand what they are thinking about easily, they become anxious (Kibrislioğlu & Haser, 2018), because the cause or how it occurs is unknown to them and this leads to uncomfortable feelings (Vukovic et. al, 2013).

Math anxiety is an unpleasant emotional reaction to mathematics and many prospects of this course are more common in women than men (Hasty, 2021). Because of this feeling, many people avoid math and choose courses and jobs which are different from math (Ashcraft & Kirk, 2001). The challenges that exist for anxious people can cause academic failure (Kosiol, et al, 2019). Therefore, people with math anxiety not only avoid math but also ignore activities that affect their life (Chipman, et al, 1992). Because of that, math anxiety influences the life of people. These fears unsettle people's thoughts and disturb their reasoning (Beilock, 2008).

Math anxiety is a factor regarding students' discomfort during math performance and fear and students' math beliefs are related to their experiences (Kashenz et. al, 2020).Two of the most outstanding researchers in the domain of math anxiety are Richardson and Suinn (1972) who stated that the feeling of anxiety is precisely a tension that prevents using digits for solving mathematics and this affects people's daily life negatively.Therefore, it can be stated that math anxiety is a situation that provokes a person emotionally during learning mathematics (Bursal & Paznokas, 2006).

Motivation and how to do a task cause a kind of suitable performance in people (Fetterly, 2020). Math beliefs and motivations can be powerful tools for attaining the best jobs in a highly technical society (Gunderson et al., 2018). In connection with the various beliefs regarding mathematics, it can be said that some of those beliefs are in the culture for a long time and they can be investigated in the latent form (Akin & Kurbanoglu, 2011). The first related belief is that math is considered judgmental and says whether the answers are correct or not (Gresham, 2004). The second one is that it often leads children and teachers to consider mathematics as a subject to memorize and it's not necessarily comprehensible (Ernest, 2011).

Some people have a mathematical mind and others don't. Mathematicians often solve their problems quickly and mathematics needs a good memory (Chinn, 2012). On the other hand, some people process data slowly and this causes their belief, which is math needing a good mind, to be more widespread among people (Porkess, 2011). In mathematics, students have a lot of anxiety and this can have a negative influence on their success and learning process (Peker, 2009). Regarding that, researchers have studied the structures of students' academic beliefs and have considered various symptoms like panic, thoughts about failure, tension, annoyance, doubt, fear, nausea, tension in the stomach, difficulty in breathing, inadequacy in listening to the teacher, inability to concentrate, discomfort in using words and especially negative academic math beliefs (Bursal & Paznokas, 2006).

Additionally, from 2000 to 2018, many studies have used a wide range of intermediating variables including self-regulation to measure math beliefs and anxiety (Hill, 2016; Yaratan & Kasapoglu, 2012). Self-regulation is a cognitive and metacognitive activity such as setting goals, strategic planning, and continuous behavioral evaluation and correction (Cervone & Pervin, 2008). The reason for selecting and using the appropriate strategies for achieving explicit or implicit learning goals is awareness and conscious coordination of cognitive and metacognitive reasoning procedures and strategies of a person (Berryhill, et al, 2018). In this matter, Abdi and Yafdian (2019) proved that there is a meaningful connection between math anxiety and motivation in ninth-grade students.

Aligholi et al. (2019) have found that self-concept had a significant influence on performance, anxiety on performance, self-concept on motivation, and self-concept on math anxiety. Taheri Rad and Meshkani (2018) proved that there is a connection between math anxiety and students' common beliefs. Kurd (2016) has also found that self-regulation intermediates between goal orientation and progress in math performance.

Zhou et al. (2020) have found that self-regulation and math anxiety play a mediating role between the teacher-student relationship and the ability to solve mathematic problems. Moreover, Morosanova et al. (2020) have reported that there is a meaningful connection between conscious self-regulation, students' learning activities, the level of their exam anxiety, and their scores on math final exams. Ardi et al. (2019) found that there is a relationship between the components of individual beliefs about courses and the level of math anxiety. Also, Unlu et al. (2017) found that there is a relationship between personal beliefs of effectiveness in math and the level of math anxiety and math teaching anxiety. So, This research tried to answer the question of whether math beliefs affect math anxiety through the mediation of self-regulation in students.

## Method

### Design

This study is an applied one considering its purpose and adopted a descriptive correlational design to analyze the data using structural equation modeling.

## Participants

The statistical sample of this study was selected from 2710 male students of the ninth grade of the public senior high schools of 4th region in Tehran during the academic year 2020-2021.

Then, for determining the sample size based on the number of observed variables and assigning a coefficient of 20 for each variable (the number of variables is 12, with a coefficient of 20, the number of samples is 240), and considering the possibility of some incomplete questionnaire, 300 students were selected as the sample size, using the two-step cluster sampling method. In the first step, 6 schools were selected out of 10 schools, then in the second step, from among 18 classes of the chosen schools, 12 classes (each containing 25 students) were selected as a group.

## Instruments

**Math Anxiety Questionnaire of Plake and Parker (1982):** To evaluate anxiety in math and statistics classes, a math anxiety questionnaire was formed by Plake and Parker in 1982. This questionnaire has 24 terms and two subscales of math learning anxiety: the first 16 terms are about the process of learning math and numbers and the last 8 terms are the subscales of math evaluation anxiety which evaluates the students' anxiety level when they measure mathematics and statistics. The sum of the scores gives the total score of math anxiety. A high score means a bad situation. Structure and content validity were confirmed by the inventors and the reliability of .85 by Cronbach's alpha method was achieved. In this research the reliability of scale using the coefficient alpha was .81.

**Math academic beliefs Questionnaire of Ledder and Forgasz (2002):** Ledder and Forgasz developed a mathematical academic beliefs scale in 2002. The primal scale had 31 items. This questionnaire contains three metacognitive (14 questions), motivation (6 questions), and self-efficiency (3 questions) factors. This scale was scored individually and based on a 5-degree scale of definite boys (1), probably boys (2), both girls and boys (3), probably girls (4), and girls(5). The sum of the scores shows the total score of academic beliefs.

A high score indicates a good situation. Content validity was confirmed by the creators and a reliability of .86 was achieved by Cronbach's alpha method (Ledder & Forgasz, 2002). In another study, the reliability of scale using the alpha coefficient was reported .83 which is acceptable and satisfactory (Rafipour, et al, 2015). In this research the reliability of scale using the alpha coefficient was .80.

**Savari and Arabzadeh Self-regulation Questionnaire (2013):** To measure academic self-regulation, a questionnaire designed and validated by Sawari and ArabZadeh (2013) was applied to measure academic self-discipline. Setting and adjusting this questionnaire was done by studying items of some questionnaires from other countries and interviewing some high school students of the first region of Ahvaz city. Finally, an exploratory factor analysis was obtained and it contains 30 questions and six factors, titled "memory strategy" (5 items), setting a goal (3 items), self-evaluation (6 items), asking for help (6 items), responsibility(4 items) and organization (6 items). The 5-points Likert scoring is from 1 to 6. A high score shows a good situation. The reliability of the academic self-regulation questionnaire through Cronbach's alpha was estimated at .87 for the whole questionnaire, .74 for memory strategy, .75 for choosing a goal, .83 for self-evaluation, .71 for asking for help, .72 for responsibility, and .76 for the organization. In this research the reliability of scale using the alpha coefficient is .82.

## Procedure

In the practical phase before sampling, some explanation was given to the participants about the purpose of the study and the confidentiality of their information. At the same time, the informed consent was gathered from the participants about their participation in the study. Then, the questionnaires were administered. In this study, Structural equation modeling(SEM) was applied to analyze the obtained data. To analyze the data, SPSS18 and Amos23 were used.

## Findings

Before entering the analysis regarding the missing values, single variable outlier data was used from the box plot, 5 of the samples were out of the normal values and were excluded from the analysis. Also, regarding the multivariate analysis of outlier data based on the statistics obtained from the Mahalanobis, the deviation of 10 samples according to the two-criterion chi value for the number of variables was 27.587, which after data correction, the number of samples was reduced to 285 people. The data showed that the index related to the skewness and kurtosis of any of the factors did not cross the ±2 limit and the data distribution for each of the research variables is normal.

The results of the Kolmogorov-Smirnov test also showed that this assumption is true ($p>0.05$), so it can be said that the distribution follows a normal curve. The results of the regression coefficient homogeneity test were also not significant for any of the variables ($F=0.785$, $p>0.05$), therefore, the assumption of regression homogeneity is valid. In order to check the independence of the errors with the Watson camera, the

obtained value was equal to 1.31, which indicates that the errors are independent in the range between 1 and 3. In order to check the multiple non-collinearity, the VIF index was used, considering that the value of 1.02 was obtained, so it can be said that the assumption of multiple non-collinearity is also valid.

**Table 1.**
*Correlation Matrix Between the Variables of Math Academic Beliefs and Self-Regulation with Math Anxiety Variable*

| Variable | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **metacognitive** | 39.21 | 3.76 | 1 | | | | | | | | | | | | |
| **motivation** | 13.70 | 2.06 | **81. | 1 | | | | | | | | | | | |
| **Efficacy** | 8.33 | 1.46 | **83. | **95. | 1 | | | | | | | | | | |
| **Mathematics academic beliefs** | 61.23 | 10.92 | **94. | **90. | **91. | 1 | | | | | | | | | |
| **Memory** | 18.23 | 2.82 | **37. | **41. | **43. | **40. | 1 | | | | | | | | |
| **targeting** | 12.59 | 1.15 | *35 | **44. | **48. | **0.40 | **85 | 1 | | | | | | | |
| **self assessment** | 17.95 | 2.53 | **41. | **49. | **55. | **.36 | **61. | **47 | 1 | | | | | | |
| **ask for help** | 23.10 | 1.51 | **28. | **38. | **44. | **.33 | *55.. | **51. | **38. | 1 | | | | | |
| **responsibility** | 18.99 | 1.44 | **37. | **48. | **54. | **.43 | **75.. | **81. | **050. | **78. | 1 | | | | |
| **organize** | 29.40 | 1.87 | **33 | **44. | **50. | **.39 | **59 | **72. | **.45 | **86 | **.91. | 1 | | | |
| **self regulation** | 120.26 | 9.31 | **44. | **54. | *40.. | **.46 | **82. | **88. | **.69 | *77.. | **.94 | **.89 | 1 | | |
| **Anxiety learning math and figures** | 53.48 | 5.55 | **25.- | **33.- | **38- . | 0**.29- | **.30- | **36- | .**45- | **36- . | .**42- | **.40- | **.46- | 1 | |
| **Math test anxiety** | 28.06 | 3.46 | **32- . | **33.- | **36 | **34- | **32- . | **34- | .**47.- | **21- . | **32- . | **.27- | **.41- | **.40 | 1 |
| **Math anxiety** | 81.54 | 7.63 | **33- . | **39- . | *33- . | **37- | ****37- . | **42.- | **54.- | *36- . | **45- . | **.42- | **52- . | **.91 | **.744 |

*It is meaningful at the 0.05 level **It is meaningful at the 0.01 level

The results of Table 1 show that there is significant solidarity between the variables of math academic beliefs and self-regulation with math anxiety. Particularly, it indicates a significant negative correlation between the variables of math academic beliefs and self-regulation with math anxiety in students.

**Table 2.**
*Fit Indices Obtained from the Analysis of Data and Variables*

| Title Of Exam | Acceptable Values | The Amount Obtained |
|---|---|---|
| **$X^2$/df** | 3< | 2.28 |
| **RMSEA** | 0.1< | 0.03 |
| **GFI** | >0.9 | 0.99 |
| **NFI** | >0.9 | 0.99 |
| **CFI** | >0.9 | 0.99 |
| **DF** | | |

According to Table 2, the value of RMSEA is equal to 0.31, so this value is less than 0.1 which indicates that the average of squared errors of the model is appropriate and the model is acceptable. The chi-square value of the degree of freedom (2.286) is between 1 and 3 and the GFI, CFI, and NFI indicators are almost equal and greater than 0.9 and this means the model for measuring the research variables is a fitting and adequate model.

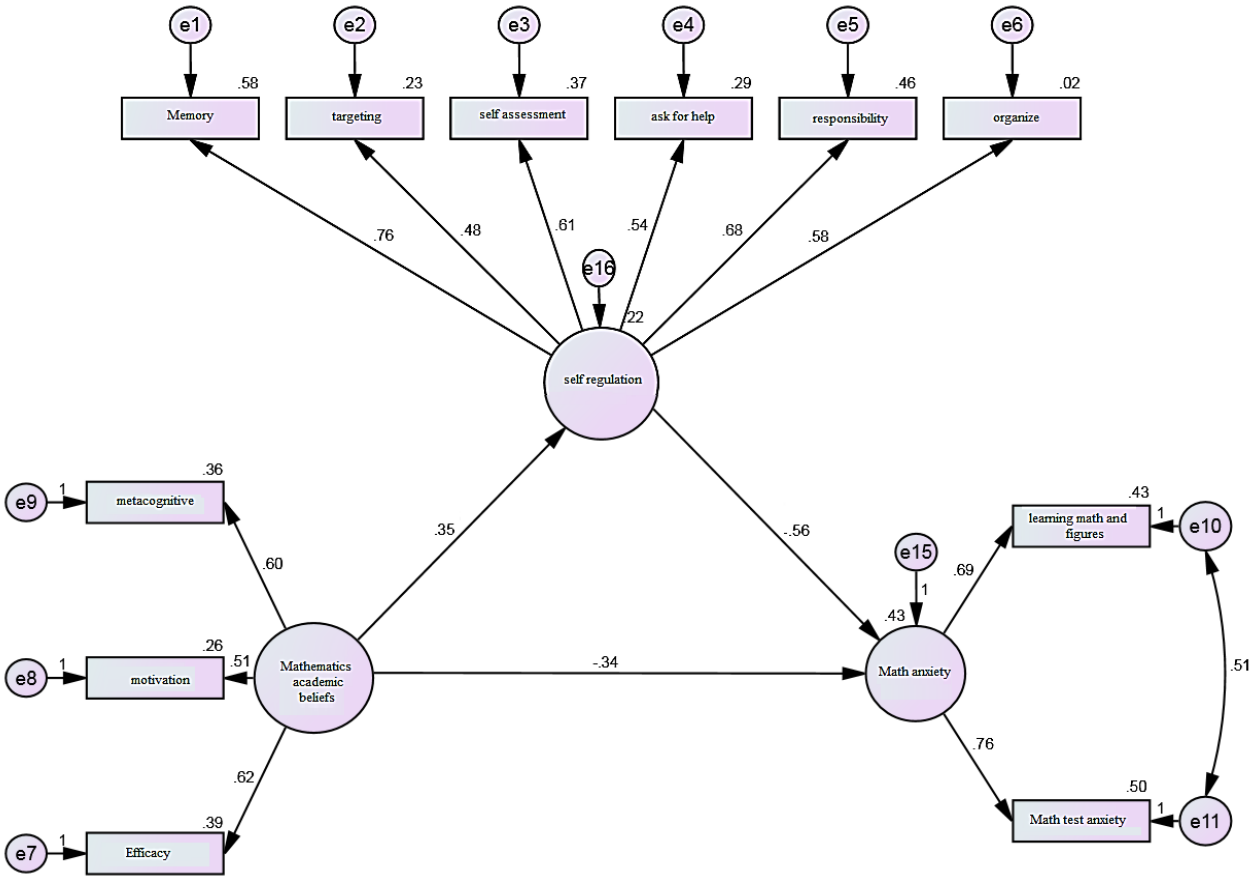
**Table 3.**
*Direct and Indirect Model Estimation with Maximum Likelihood (ML)and Bootstrap Methods*

| Maximum Likelihood Method Of Direct Effect | b | β | $R^2$ | t statistic | P |
|---|---|---|---|---|---|
| Mathematical academic beliefs on math anxiety | -0.405 | -0.342 | 0.138 | 3.463 | 0.01 |
| Self-regulation of math anxiety | -0.447 | -0.360 | 0.160 | 3.754 | 0.01 |
| the bootstrap method of indirect effect | β | $R^2$ | lower limit | upper limit | P |
| Math academic beliefs on math anxiety with the mediation of emotional self-regulation | -0.562 | 0.430 | 0.693- | 0.397 | 0.01 |

In Table 3, the value achieved from the weighted regression statistics to determine the values of effect (**β**) can be seen according to the significant level obtained from the critical ratio, which shows the values of the significant effect of the subscales on the overall variable and external variable. (mathematical academic beliefs and self-regulation) is on the final endogenous variable (mathematical anxiety).

considering standard values (β), obtained, the indirect routes considered, and according to the standardized values (β), obtained, the indirect routes, mathematical academic beliefs with the mediation of self-regulation on math anxiety were approved according to the bootstrap estimation method.

**Figure 1.**
*The Final Tested Model with the Standardized Prediction Statistics*




According to the statistics obtained from the three main indicators, absolute, comparative, and economical, the research model was confirmed and in general, two variables have predictive power (R2=0.43) of the math anxiety variable, which is 43 percent of math anxiety can be anticipated by the variables of math academic beliefs and self-regulation in direct and indirect routes.

## Discussion

This study aimed to investigate the mediating role of self-regulation in the relationship between math academic beliefs and math anxiety in students. Specifically, math academic beliefs have an indirect effect on math anxiety through the mediation of self-regulation in students and terms of the connection between these variables, The results are in line with the findings of Abdi and Yaftian (2020), Aligholi et al. (2019), TaheriRad and Meshkani (2018), Kurd (2016), Badmsioglu, et al. (2017), Zhou et al. (2020), Morosanova et al. (2020), Unlu et al. (2017), and Ardi et al. (2019).

The obtained results can be explained in this way that mathematical academic beliefs have been recognized as one of the most important determining factors in the ability of self-efficacy and adaptation to new problems and educational progress (Hasty, 2021). In fact, the structure of mathematical academic beliefs includes resource management and self-efficacy. Resource management also includes managing time and study environment, organizing effort, learning from peers and asking for help, which will strengthen the level of academic persistence that can reduce anxiety (Chang et al., 2016). In addition, studies have shown that self-efficacy and beliefs are important predictors of learning and success (Akin & Korbanoglu, 2011). Therefore, mathematical academic beliefs are related to academic anxiety.

## Conclusion

According to the research background, mathematical academic beliefs play a pivotal role in academic anxiety (Segarz et al., 2020). Students who have personal and internal motivations for education, see their personal goals and desires in danger during the activity, and failure in obtaining desirable results means losing the results of personal activities and also moving away. They know about achieving their goals (Jain & Dowson) and this can cause emotional reactions and anxiety in them, but for students who have external motivations, things such as getting incentives and approval from others are more important than internal students. They have internal motivations and are less anxious.

In self-regulation, internal reinforcement from self-evaluation is stronger than external reinforcement provided by others. Unfortunately, if a person's standards are very high, they can become a source of discomfort for him, which will cause anxiety. Self-regulation is involved in almost all aspects of the behavioral and interactive process and affects the cognitive and behavioral processes that explain motivation and success in students (Gunderson et al., 2018). Pakran's cognitive-motivational model is an important model in the field examining the effect of self-regulation on anxiety (Sarai et al., 2017). The basic premise of Pakran's cognitive-motivational model is that self-regulation affects cognition and adaptive behavioral tendencies such as academic performance. Therefore, the most important factors, along with cognitions and behavioral strategies, are the sources of self-regulation (Vuko et al., 2013). Self-regulation has different effects in these paths. Positive self-regulation requires more cognitive resources than optimal positive emotion regulation (such as attention) and due to more resources available for task-oriented activities, it leads to cognitive processing that is more productive and efficient.

This research faced some limitations. Considering the mental and psychological conditions of the people and spread of corona disease, the process of sampling and filling the questionnaire was done with difficulty. It is recommended that other researchers conduct studies with other age and gender groups to increase the generalizability of the results to the population. Considering the effect of math academic beliefs and self-regulation on math anxiety, it is suggested that if educational systems intend to strengthen students' educational improvement, the first step should be evaluating people's attitudes and behaviors in several dimensions and in the second step, they can reinforce the quality of communication between the educational and inclusive environment by examining the educational facilities.

## Conflicts of Interest

No conflicts of interest declared.

## References

Abdi, H., & Yaftian, N. (2020). *Investigating the relationship between math anxiety and math motivation of the ninth grade student*s. Conference of Psychological and Educational Sciences. Tehran.

Akin, A., & Kurbanoglu, I. N. (2011). The relationships between anxiety, attitudes, and self- efficacy towards math: A structural equation model. *Studia Psychologica*, *53*(3), 263.

Aligholipour, A., Erfani, N., & Berahmand, A. (2019). A structural model for predicting math performance based on students' self-concept, motivation, and math anxiety. *Journal of Educational Research, 69*, 15-42.

Ardi, Z., Rangka, I. B., Ifdil, I., Suranata, K., Azhar, Z., Daharnis, D., & Alizamar, A. (2019). Considering the elementary students'risks for learning difficulties in the mathematics based on students' mathematical anxiety, self-efficacy and valuable beliefs using Rasch measurement. *Journal of Physics, 3*(1157), 032091-032099.

Ashcraft, M. H., & Kirk, E. P. (2001). The relationships among working memory, math anxiety, and performance. *Journal of Experimental Psychology, 130*(2), 224-230.

Beilock, S. L. (2008). Mathematical performance in stressful situations. *Current Directions in Psychological Science, 17*(5), 339-343.

Berryhill, M. B., Harless, C., & Kean, P. (2018). Cohesive-flexible functions of college studentswith regard to mental health: Examining the gender differences and positive mediation effects of communication and self-compassion. *The Family Journal*, *26*(4), 422-432.

Bursal, M., & Paznokas, L. (2006). Mathematical anxiety and pre-service of elementary teachers' confidence to teach mathematics and science. *School Science and Mathematics, 106*(4), 173- 179.

Cervone, D., & Pervin, L. A. (2015). *Personality: theory and research*. John Wiley & Sons.

Chang, S. J., Kwak, E. Y., Hahm, B. J., Seo, S. H., Lee, D. W., & Jang, S. J. (2016). Effects of a meditation program on nurses' power and quality of life. *Nursing Science Quarterly, 29*(3), 227-234.

Chinn, S. (2012). Belief and anxiety in mathematics acquisition.*Child Development Research, 5*, 26-36.

Chipman, S-F., Krantz, D-H., & Silver, R. (1992). Mathematical anxiety and science careers among skillful college females. *Psychology Science, 3*, 292-295.

Ernest, P. (2011). *The psychology of learning mathematics*. Germany: Sarbrucken.

Ernest, P. (2018). *The ethics of mathematics: Is mathematics harmful?* Springer: Cham.

Fetterly, J. M. (2020). Fostering mathematical creativity based on beliefs and anxiety in Mathematics. *Journal of Humanistic Mathematics, 10*(2), 102-128.

Forghani, Y., & Seyf, D. (2018). Prediction of math anxiety dimensions based on metacognitive beliefs among smart high school students. *Researches of Education and Acqusition, 15*(1), 21-36.

Gresham, G. (2004).Elementary students' anxiety of Mathematics.*CMC ComMuniCator, 29*(2), 28-29.

Gunderson, E. A., Park, D., Maloney, E. A., Beilock, S. L., & Levine, S. C. (2018). Cosidering reciprocal relations among motivational framework, math anxiety, and math achievement among elementary schools.*Journal of Cognition and Development, 19*(1), 21-46.

Hasty, L. M., Malanchini, M., Shakeshaft, N., Schofield, K., Malanchini, M., & Wang, Z. (2021).When anxiety becomes my propeller.*British Journal of Educational Psychology, 91*(1), 368-390.

Hill, F., Mammarella, I. C., Devine, A., Caviola, S., Passolunghi, M. C., & Szűcs, D. (2016). Mathanxiety in primary and secondary school students: Gender differences, developmental changes and anxiety specificity. *Learning and Individual Differences, 48*, 45-53.

Hooman, H. (2014). *Modeling of structural equations using Lisrel software* (1st ed.).Tehran: Samt.

Jain, S., & Dowson, M. (2009). Mathematics anxiety as a function of multidimensional self-regulation and self-efficacy. *Contemporary Educational Psychology, 34*(3), 240-249.

Kaskens, J., Segers, E., Goei, S. L., van Luit, J. E., & Verhoeven, L. (2020). Impact of children's self-concept, self-efficacy, anxiety, and teachers' competencies on the math development. *Teaching and Teacher Education, 94*, 103096.

Kord, B. (2016). The role of the orientation of progress goals in mathematics performance: with the mediation of students' self-regulation. *Psychology of School, 5*(4), 92-105.

Kosiol, T., Rach, S., & Ufer, S. (2019). Which mathematicalinterest is important for a successful transition in a university program? *International Journal of Science and Mathematics Education, 17*(7), 1359-1380.

Morosanova, V., Fomina, T., & Filippova, E. (2020). The relationship between the conscious self-regulation of schoolchildren's learning activity, anxiety level, and the final exam result in mathematics. *Behavioral Sciences, 10*(1), 16.

Peker, M. (2009). Anxiety and styles of teachersin teaching mathematics.*Eurasia Journal of Mathematics, Science and Technology Education, 5*(4), 335-345.

Plake, B. S., & Parker, C. S. (1982). The development and validation of a revised version of anxiety rating scale in mathematics. *Educational and Psychological Measurement, 42*(2), 551-557.

Porkess, R., Vorderman, C., Budd, C., Dunne, R., & Hart, M. (2011). *A world-class mathematics education for all our young people*.

Rafipour, A., Faramarzpour, N., & Hosseinchari, M. (2015). Examining the psychometric properties of academic beliefs in mathematics. *Quarterly of Educational Measurement, 5*(19), 177-192.

Richardson, F. C., & Suinn, R. M. (1972). Anxiety rating scale in learning mathematics: psychometric data. *Journal of Counseling Psychology, 19*(6), 551.

Saraei, A. A., Mohammadipour, M., & Jajermi, M. (2017). The role of motivational beliefs on academic performance by mediating types of goal orientation in Farhangian University students. *Two Quarterly Sociology of Education, 10*, 134-146.

Savari, K., & Arabzadeh, S. H. (2012). Determining the psychometric characteristics in academic self-regulation questionnaires.*Psychology of School, 2*(2), 75-92.

Taheri, H., & Meshkani, M. (2018).*The relationship between middle school students'math anxiety and common belief in Kalaleh with an emphasis on gender*. Sixth Conference of Stable Development in Educational Sciences and Psychology. Tehran.

Unlu, M., Ertekin, E., & Dilmac, B. (2017).Predicting relationship between anxiety andself-efficacy inteaching mathematics.*International Journal of Research in Education and Science, 3*(2), 636-645.

Vukovic, R. K., Kieffer, M. J., Bailey, S. P., & Harari, R. R. (2013). Mathematics anxiety in young children: Concurrent and longitudinal association with mathematical performance. *Contemporary Educational Psychology*, *38*(1), 1-10.

Yaratan, H., & Kasapoğlu, L. (2012). Eighth grade students' attitude, anxiety, and achievement pertaining to mathematics lessons. *Procedia-Social and Behavioral Sciences*, *46*, 162-171.

Zhou, D., Du, X., Hau, K. T., Luo, H., Feng, P., & Liu, J. (2020). Teacher-student relationship and mathematical problem-solving ability: Mediating roles of self-efficacy and mathematical anxiety. *Educational Psychology*, *40*(4), 473-489.