World Academy of Science, Engineering and Technology
International Journal of Psychological and Behavioral Sciences
Vol:19, No:12, 2025

Math Anxiety on Math Achievement: The Mediating Roles of Math Motivation and Classroom Engagement

Authors : Michaela Quintero

Abstract : Research has demonstrated the inter-relatedness of math anxiety (MA), classroom engagement, and math motivation. First, MA plays a crucial role in learning avoidance patterns. Students with higher MA are more likely to disengage from math-related topics. However, this learning avoidance pattern differs depending on which dimension of classroom engagement is examined. Specifically, MA has shown to negatively predict cognitive-behavioral and emotional engagement, but not social engagement. Second, MA may also be negatively associated with students' math motivation, yet mixed findings surface when math motivation is examined from a multidimensional perspective. Third, motivation and engagement share a reciprocal and positive relationship. However, the strength of this relationship may differ depending on which dimension of motivation and engagement is examined, a question that is under-investigated. Additionally, given that motivation is an important pre-requisite for engagement, it is possible that negative emotions such as MA may negatively influence students' learning behaviors (e.g., classroom engagement) by undermining students' motivation to learn. Thus, the primary goal of this study is to examine whether the different dimensions of math motivation mediate the associations between MA and the different dimensions of classroom engagement. Research has highlighted the important role of emotional, motivational, and behavioral factors on predicting student achievement outcomes. However, it is still unclear how these processes integrate and set students on unique academic trajectories. The second aim of the present study is to investigate how the interrelated constructs of MA, math motivation, and classroom engagement together contribute to individual differences in math achievement through 4th-6th grade. The aim of the current study was to examine: (1) How the different dimensions of math motivation (i.e., math self-confidence, math utility value, and math interest) mediate the association between math anxiety (MA) and the different dimensions of classroom engagement (i.e., cognitive-behavioral, emotional, and social); (2) How the interrelated constructs of MA, math motivation, and classroom engagement all contribute to individual differences in math achievement. Data were collected from an ongoing longitudinal study that examines affective factors in the development of math learning. The total sample consisted of 207 participants from 4th through 6th grade (50% female). Students self-reported their MA, math motivation, and classroom engagement through the Mathematics Anxiety Scale for Children, Fennema-Sherman Mathematics Attitude, and Math and Science Engagement Scale, respectfully. Student math achievement was assessed using the Woodcock-Johnson IV Tests of Achievement. Results showed that all three math motivation dimensions mediated the relationship between MA and all three dimensions of classroom engagement. Additionally, the combination of math utility value and cognitive-behavioral/social engagement as well as the combination of math interest and cognitive-behavioral/social engagement mediated the association between MA and math achievement. The current findings expand on previous literature by delineating the joint roles of emotions, motivations, and learning behaviors in math achievement among elementary and early middle school students.

Keywords : academic achievement, adolescent development, classroom engagement, elementary, math anxiety, math motivation, middle school
Conference Title : ICDPA 2025 : International Conference on Developmental Psychology and Adolescence
Conference Location : Honolulu, United States
Conference Dates : December 20-21, 2025