

Disrupting the Effects of Parental Math Anxiety: How Parental Expectations and Involvement Matter for Children's Mathematical Outcomes



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Background

Math anxiety is defined as feelings of tension or worry that interfere with mathematical performance (e.g., Wigfield & Meece, 1988). Students who have math anxiety take fewer mathematics courses and hold lower perceptions of their mathematical abilities (e.g., Hembree, 1990). Importantly, math anxiety is not experienced only in the school-aged years, and students with math anxiety grow up to be parents with math anxiety. Little is known about how math anxiety in adult parents may impact their engagement in their children's education (i.e., parental engagement, parental educational expectations) or how parental anxiety might impact children's mathematical outcomes (i.e., children's mathematical achievement and children's math anxiety). This is important to determine as parental involvement and parental educational expectations have been found to be important sources of children's academic success (Fan & Chen, 2001; Jeynes, 2003, 2005). Understanding the link between parental math anxiety and parental educational expectations is especially critical because high educational expectations have been found to be an important protective factor especially for minority students (Jeynes, 2003, 2005).

Research Questions

1. How do parents with high math anxiety differ from parents with low math anxiety on their parental involvement (i.e., home-school communication, school-based and home-based involvement) and parental educational expectations?
2. Do parental educational expectations mediate the effects of parental math anxiety on their children's math outcomes (i.e., mathematical achievement and Children's math anxiety)?

Methodology

Participants

- 47 adult parents (83% female, 51.1% employed) and their children.
- 29.8% of mothers had less than high school, 27.7% high school and 38.3% greater than high school education. 31.9% of fathers had less than high school, 23.4% high school and 27.7% greater than high school education.
- Children attended Title 1 elementary schools in a large urban city in the northeast United States.
- 95.8% of children received free or reduced lunch
- 19.1% of children were Black and 76.6% Latino.

Procedure

- Parents completed a questionnaire measuring math anxiety, parental involvement, and parental educational expectations. Parents received a \$5 gift card for participation.
- Children's mathematical achievement (i.e., algebra, geometry, data analysis/probability) and math anxiety were measured in the children's classrooms during the regular school day. Math anxiety was always measured after mathematical achievement.

Measures

Variable Name	Scale	Construct
Parental Math Anxiety	The Abbreviated Math Anxiety Scale (Hopko Mahadevan, Bare, & Hunt, 2003).	Parents indicate how anxious they would feel in various math-related situations on a 5-point scale ranging from 1 (not at all) to 5 (very much). Sample item: "Figuring the sales tax on a purchase that costs more than \$100."
Parental Involvement	Family involvement questionnaire (e.g., Fantuzzo, 2000).	Parents respond to how frequently they engage in specific behaviors related to i) home-school communication; ii) school-based involvement; and iii) home-based involvement, on a 4-point scale from 1 (rarely) to 4 (always). Sample item: "I call the teacher or principal to get information."
Parental Educational Expectations	Researcher-developed survey adapted from Min, Kushner-Benson, Muderey-Camino, and Steiner (2009).	Parents indicate how much they agree with 7 statements about their children's future educational attainment on a 4-point scale from 1 (not at all sure) to 4 (very sure). Sample item: "I expect my child to get good grades in math this year."
Mathematics Achievement	<i>KeyMath</i> - Third Edition (Connolly, 2007).	With the Algebra, Geometry, and Data Analysis and Probability subtests, children work with number sentences, describe patterns, represent, analyze objects, use visualization to solve problems and interpret tables. A composite score was created and used in analyses.
Children's Math Anxiety	Math Anxiety Rating Scale- Elementary (MARS-E; Suinn et al., 1988).	Children indicate how nervous or anxious they would feel in 26 math-related scenarios on a 5-point scale from 1 (not at all nervous) to 5 (very, very nervous). Sample item: "Thinking about a math test the night before."

Results

RQ1: How do parents with high math anxiety differ from parents with low math anxiety on home-school communication, school-based and home-based involvement, and parental educational expectations?

Variable	Low MA M (SD)	High MA (SD)	t-value	Effect size
Home-school communication (max 28)	18.74 (4.60)	15.61 (3.66)	2.358*	0.753
School-based involvement (max 36)	16.50 (7.05)	16.68 (4.88)	- 0.094	0.029
Home-based involvement (max 44)	36.36 (6.01)	30.56 (6.13)	3.100*	0.955
Parental educational expectations (max 28)	23.85 (4.14)	21.15 (4.79)	2.046*	0.603

Note: MA = math anxiety. Effect size: small = .20, medium = .50, large = .80 and 1.30 = very large, Cohen's *d* (1988).

* $p < .05$

RQ2: Do parental educational expectations mediate the effects of parental math anxiety on their children's math outcomes (i.e., mathematical achievement and children's math anxiety)?

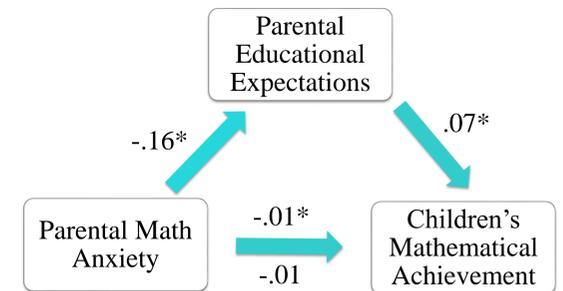


Figure 1

Parental educational expectations mediated the relation between parental math anxiety and children's mathematical achievement.

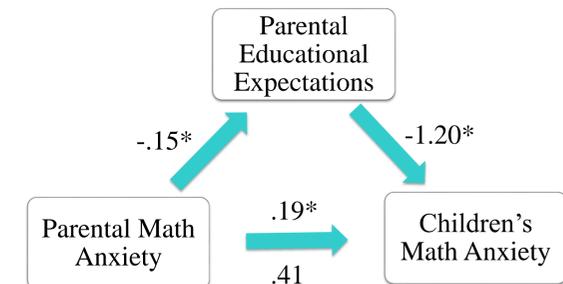


Figure 2

Parental educational expectations mediated the relation between parental math anxiety and children's math anxiety.

Discussion and Future Research

➢ **RQ1:** Parents with high math anxiety reported lower levels of home-school communication, home-based involvement and parental educational expectations. Therefore, schools should focus on creating inclusive environments for parent's with high math anxiety and help them cope with their own math anxiety.

➢ **RQ2:** Parental educational expectations disrupted the relation between parental math anxiety and children's mathematical achievement such that higher levels of parental expectations mitigated the effects of parental math anxiety on children's math anxiety and achievement. Programs that target parental involvement should train parents on how they can foster positive educational expectations in math.

Future studies should focus on investigating whether parents of an ethnic background have lower parental educational expectations compared to non-ethnic minority parents. Secondly, studies should investigate whether low-income ethnic minority parents who didn't graduate from high school are more math anxious than parents who did. Future studies should also test this mediation analysis on a larger ethnic sample.