Does Teacher Math Anxiety Predict Student Math Learning?

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Introduction

- Theoretical and empirical work has suggested the importance of teachers' knowledge, attitudes, and beliefs for their students' learning (Ernest, 1989; Beilock et al., 2010)
- Research has found that teachers' math anxiety in particular may be important for student math learning (e.g., Beilock et al., 2010; Hadley & Dorward, 2011)
- Critically, research also shows teacher math anxiety can be changed, thus acting as a potential point of intervention for teachers (e.g., Gresham, 2007)

Current Study

- Using a pilot sample, we examine if teacher math anxiety predicts student math learning, after accounting for other teacher factors (knowledge, experience, beliefs)

Method

Participants

- 29 first-grade teachers and their 324 students

Measures and Procedure

- **Teachers** completed measures in the fall:
  - General math anxiety and anxiety about teaching math: Math Anxiety Scale for Teachers (Ganley et al., 2019)
  - Years of teaching experience: self-report
  - Math knowledge for teaching (MKT): Knowledge for Teaching Early Elementary Mathematics (K-TEEM; Schoen et al., 2017a)
  - Mathematical fixed mindset: Math Theories of Intelligence Scale (Dweck et al., 1995)
- **Students** completed measures in fall and spring:
  - Elementary Mathematics Student Assessment (Schoen et al., 2017b)

Results

Table 1. ***Student-Level Correlations***

	Spring Math	Free/Reduced Lunch	Gender
Spring Math Score	1		
Free/Reduced Lunch	-.35***	1	
Gender	.07	-.11*	1
Fall Math Score	.70***	-.42***	.07

Notes. * $p < .05$, *** $p < .001$

Table 2. ***Teacher-level Correlations***

	Student Spring Math Score	General Math Anxiety	Anxiety about Teaching Math	Years of Teaching	Math Knowledge for Teaching
General Math Anxiety	-.21	1			
Anxiety about Teaching Math	-.29	.73***	1		
Years of Teaching Experience	.65	.10	.13	1	
Math Knowledge for Teaching	.01	-.17	-.10	-.03	1
Fixed Mindset	.07	.06	.27	-.01	-.45*

Notes. * $p < .05$, *** $p < .001$; Significance is not marked for student/teacher-level correlations.

Table 3. ***Multilevel Modeling Results***

	Student Variables Only	Student and Teacher Variables
	b (se_b)	b (se_b)
Student Variables (level 1)		
Free/Reduced Lunch	-.04 (.02)*	-.04 (.02)**
Gender	.01 (.02)	.01 (.02)
Fall Math Score	.50 (.03)***	.50 (.03)***
Teacher Variables (level 2)		
General Math Anxiety		.01 (.01)
Anxiety about Teaching Math		-.03 (.02)*
Years of Teaching Experience		.004 (.001)***
Math Knowledge for Teaching		.06 (.08)
Math Fixed Mindset		.02 (.01)

Notes. * $p < .05$, ** $p < .01$, *** $p < .001$; For free/reduced price lunch, students received a 1 if they qualified for free or reduced lunch and a 0 if they did not. For gender, girl was coded 0 and boy was coded 1. Both these variables were reported by parents.

Results

Correlations

- Tables 1 and 2 display zero-order correlations between student and teacher variables

Multilevel Model

- We examined the relation of general and teaching-specific math anxiety with students' spring math scores, while covarying out students' fall math scores, free/reduced lunch status, and gender (at level 1) and teacher's years of experience, MKT, and fixed mindsets (at level 2)
- At the teacher level, teachers' anxiety about teaching math ($b = -.031$, $se_b = .016$, $p = .045$) and their years teaching experience ($b = .004$, $se_b = .001$, $p < .001$) predicted student math scores (Table 3)
- Teachers' general math anxiety, math knowledge for teaching, and math fixed mindset beliefs did not predict student spring math scores

Discussion

- Findings suggest teachers with more experience and less anxiety about teaching math had students who learned more math over the course of the school year, after accounting for student-level covariates and other teacher variables
- General math anxiety, math knowledge for teaching, and mathematical fixed mindsets did not relate to student math learning
- When the full data are available (230 teachers), we will be able to get a better view of these relations
- Thus far, results suggest anxiety about teaching math may be an important target for intervention

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