Mechanisms Underlying the Multi-Generational Transmission of Achievement and Educational Attainments

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Introduction

- The goal of the present study is to explore students' educational attitude and emotions as possible mediators in the relations between students' educational attainment and two dimensions of parental socioeconomic status (i.e., education level and income).
- Previous studies have shown that parents of higher socioeconomic status tend to have higher academically achieving children (Farooq, Chaudhry, Shafiq, & Berhanu, 2011).
- Previous research has also shown positive relations between family income and child educational attainment as well as between parental education level and child educational attainment (Sirin, 2005). Specifically, students from higher income families and children of parents with higher education levels tend to be more academically competent (Dubow, Boxer, & Huesmann, 2009).
- Although familial factors that contribute to child academic success (e.g., income and parental education) have been established, the mechanisms underlying these relations, telling "why" those relationships exists, are still unclear.
- This current study seeks to examine these factors through the observation of child learning related beliefs, including math anxiety, math confidence, math gender stereotypes, math interest, and perceived importance of math.

Hypothesis

- Parents who are better educated and more affluent are more likely to foster and instill more positive learning attitudes, interests, and confidence in their children, which in turn will result in better achievement in their children.
- The hypothesis was tested in the domain of mathematics learning.

Results

- Parent math achievement is positively and significantly associated with their child's math achievement.
- Child math self-efficacy mediates the relation between parental education level and child math achievement. Specifically, there was a positive association between parental education and child's math self-efficacy, meaning that parents with higher levels of education have children who are more confident in their math abilities. Additionally, children with higher math self-efficacy had higher math achievement.
- There was a positive association between family income and perceived math importance and between family income and math gender stereotype. Children who come from a higher income family find math skills more important and believe that girls and boys are equally good at math (less gender bias).

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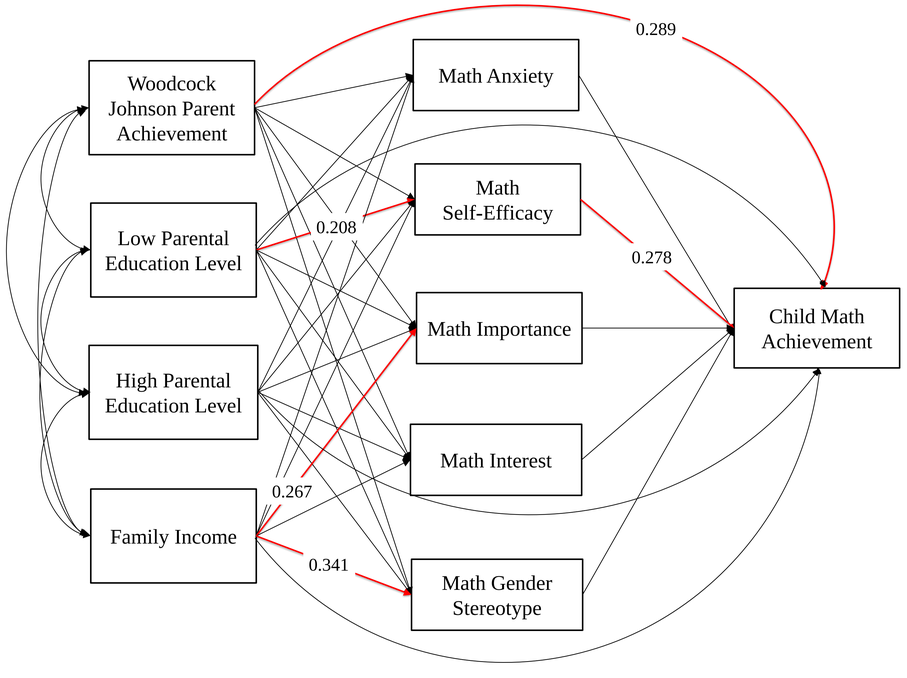
Methods

Participants
One parent and their child in 4th through 6th grade were invited to participate in this longitudinal study which consists of a total of 120 families.

Procedure
Each parent-child dyad where invited to the lab where both completed a series of surveys and subtests from the Woodcock Johnson Test of Achievement IV.

Measures
- *Woodcock Johnson Test of Achievement IV* (Schrank, Mather, & McGrew, 2014) was used to test the child and parent on their mathematical skills. Each child completed the Applied Problem, Calculation, and Number Matrices subtests, and each parent completed the Applied Problem subtest. In the Applied Problem subtest, participants were asked to integrate their math knowledge, calculation skills, and quantitative reasoning skills to solve the applied math problems. The Calculation subtest measures a participant's mathematical computation ability. The Number Matrices subtest measures participants' quantitative reasoning ability, in which participants were asked to find the numerical patterns and complete a series of number matrices.
- *Questionnaire*
  - Each parent reported his/her highest education level and family income.
  - Student provided self-report on math anxiety (i.e., nervousness and unease towards math activities) using the Mathematics Anxiety Scale for Children (Chiu & Henry, 1990)
  - Students provided self-report on their math attitudes using the Fennema-Sherman Mathematics Attitude Scales (Fennema & Sherman 1976). This scale measures students' math self-efficacy (the belief in one's ability to successfully complete math tasks), math interests (the enjoyment one experiences in math activities), perceived math importance (the belief that math is useful in real life), and math gender stereotypes (the perception that males are naturally better at math than females).

Figure 1.
The model explored the relations between each of the parental variables and the child's math achievement, mediated by child math attitudes including math anxiety, math self-efficacy, perceived math importance, math interest, and gender stereotype. Correlations between each pair of mediators are estimated, but not shown in the figure for simplicity. Numbers presented are standardized path estimates. The red arrows represent statistically significant paths.



Conclusion

- Results showed that higher parental education was associated with higher child self-efficacy in math, which in turn predicted higher child math achievement.
- Additionally, there was a positive association between family income and math importance and between family income and gender stereotype, suggesting that children from wealthier families find math skills more important and perceive less gender bias in math learning.
- However, family income was not associated with child math achievement, directly or indirectly.
- Our findings indicate that the achievement gap among students from different socioeconomic backgrounds are partly attributable to having parents of different education levels, who may engage in varying degrees of parental behaviors that foster or undermine academic self-efficacy.
- Future research should investigate parenting behaviors in highly educated parents that are effective in boosting student academic self-efficacy and develop programs that can equip less educated parents with such tools as well.

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