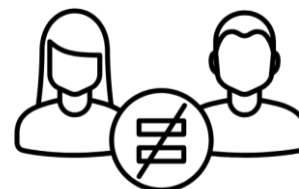


Math Field-Specific Ability Beliefs and Career Aspirations in Adolescents: Mediating Effects of Interest and Self-Efficacy

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1. Background

 **Women comprise less than 30% of STEM professionals globally** (Global Gender Gap Report, 2023).

The **field-specific ability beliefs (FAB) hypothesis** (Meyer et al., 2015) argues that this gender gap is related to:

- Beliefs that innate brilliance are required to succeed in a field (FAB)
- Negative gender stereotypes about female brilliance

 **Mathematics FABs are present in elementary school children**

- related to **lower aspirations towards a mathematics-related career**, and **reduced math motivation, especially in girls** (Jenifer et al., 2023; Zhao, 2021).

Potential Mediators:

- Following Lent et al.'s (1998) **Social Cognitive Career Theory**, we identified **math self-efficacy** and **interest** as possible mediators of the relationship between **math FABs** and **math job aspirations**.

Research Gaps:

- The mechanisms through which math FABs affect math job aspirations are largely unknown.
- Few studies have been conducted on early-adolescence, a crucial developmental stage for constructing career identity (Porfeli & Lee, 2021).

2. Research Questions

RQ1: Are math FABs differentially associated with math job aspiration, self-efficacy and interest among adolescent boys versus girls?

RQ2: Do math self-efficacy and interest mediate the relationship between math FABs and career aspiration?

3. Methods

Participants:

- 546 Singaporean 12-year-olds (52.9% male) from Growing Up in Singapore Towards healthy Outcomes (GUSTO), a comprehensive birth cohort study completed self-report measures on:

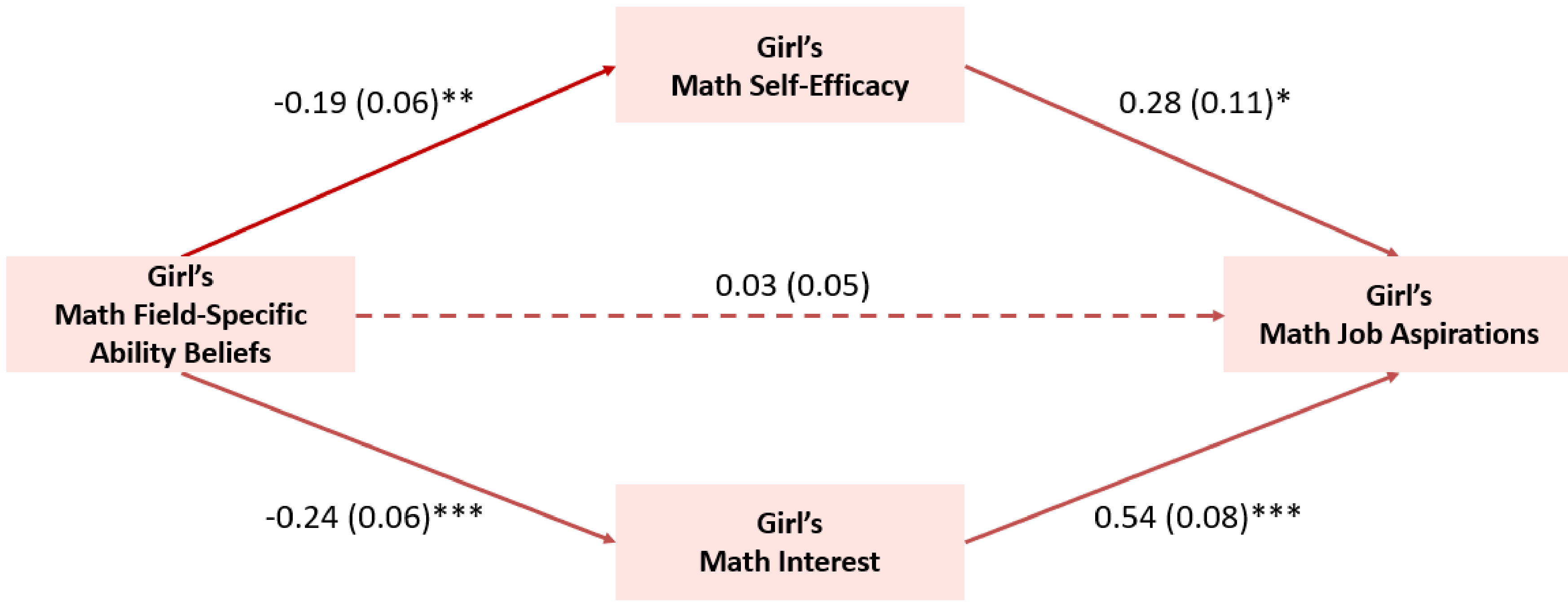
Measures	Sample items
Math field-specific ability beliefs (Jenifer et al., 2023; $\alpha = .86$)	Only a very smart kid could do well in math (1 = Strongly disagree; 4 = Strongly agree)
Math self-efficacy (Gunderson et al., 2017; Jenifer et al., 2023; $\alpha = .89$)	How good in math are you? (1 = Not good at all; 4 = Very good)
Math interest (Gunderson et al., 2017; Jenifer et al., 2023; $\alpha = .91$)	How much do you like doing math? (1 = Dislike very much, 4 = Like very much)
Math job aspiration (single-item)	When you grow up, how much do you want to do a math-related job? (1 = Really don't want; 4 = Really want)

4. Results

- RQ1: Correlation Analyses**
- In **girls**, math FABs negatively correlated with math self-efficacy ($r = -.24, p < 0.001$), interest ($r = -.13, p < 0.001$) and job aspiration ($r = -.13, p < 0.05$).
 - For **boys**, math FABs only negatively correlated with math self-efficacy ($r = -.13, p < 0.05$).
 - For both girls and boys, math self-efficacy ($r = .57, r = .41, p < 0.001$) and interest ($r = -.64, r = -.65, p < 0.001$) positively correlated with math job aspirations.

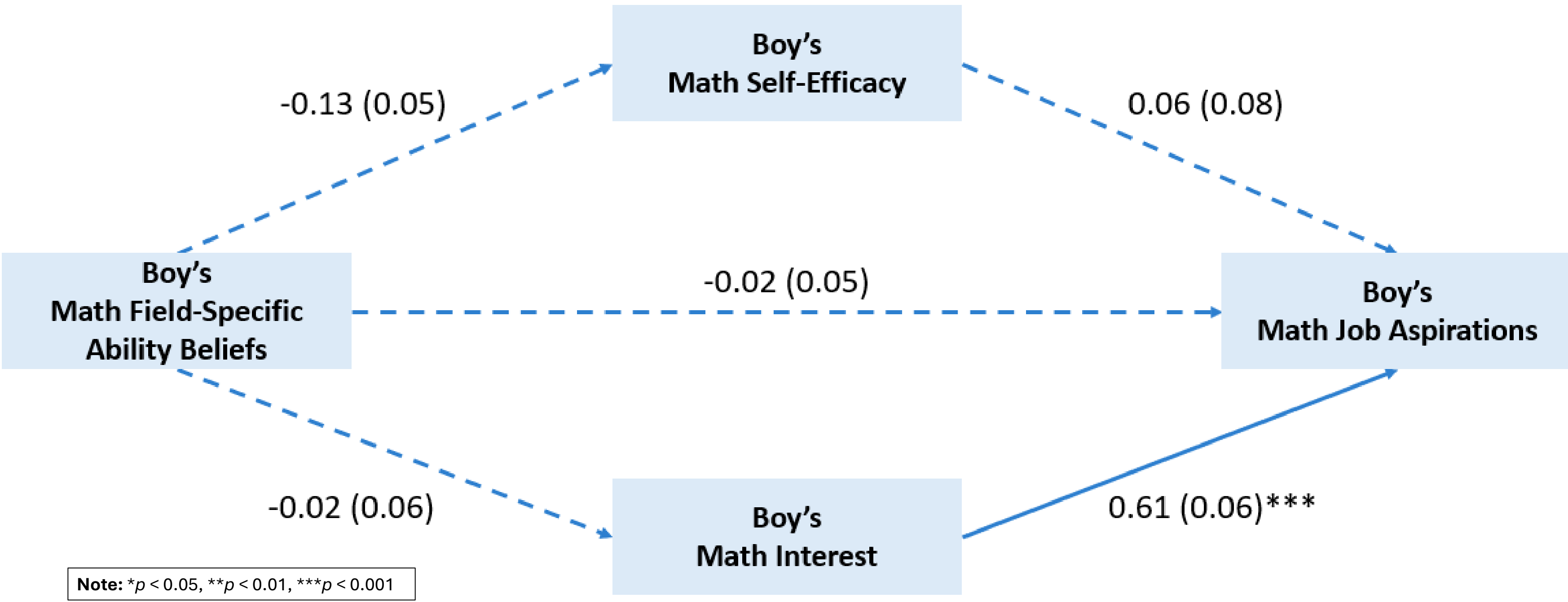
- RQ2: Mediation Analyses**
- Using 10,000 bootstrap resamples, we found that:
- In **girls**, math self-efficacy and interest mediated the relationship between math FABs and math job aspirations.

Mediating Effect of Girl's Math Self-Efficacy and Interest.



- In **boys**, math self-efficacy and interest did not mediate the relationship between math FABs and math job aspirations.

Mediating Effect of Boy's Math Self-Efficacy and Interest.



5. Discussion

- Gender differences in math FABS**
- Girls' higher math FABs were negatively correlated with math job aspirations.
 - Boys' higher math FABs not correlated with math job aspirations.
 - Our findings are aligned with past literature (Zhao, 2021).

- In girls but not boys, math self-efficacy and interest mediated the relationship between math FABs and job aspiration.**
- These findings are aligned with the Social Cognitive Career Theory and highlight that higher math FABs in girls may affect their career choices through reducing their **self-confidence in mathematics** and their **engagement with mathematics content**.
 - We found no evidence of the effects of boy's math FABs on their job aspirations, interest or self-efficacy, indicating that these beliefs are only detrimental to girls.

- Implications and future directions**
- Our study provides further evidence that **FABs differentially affect girls and their career aspirations**.
 - While Singaporean girl's stereotypes and beliefs may not affect their grades in school (e.g., Zhao, 2021), they have **implications for the future career decisions made by girls**.
 - Tackling the effects of FABs on girls may be vital to improve women's representation.
 - Interventions that aim to promote girls' math self-efficacy and interest may be helpful for this purpose.
 - The present study is limited in its use of cross-sectional data and future research replicate our findings using longitudinal data.

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