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Effects of Gender and Ethnicity on STEM Self-Competencies in Classroom Interactions

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INTRODUCTION

Well established is a connection between gender stereotypes and children's STEM perceptions. STEM self-concept, for example, is consistently identified as stronger for boys than girls (Cvencek et. et al 2011). While research has documented differences in STEM self-competencies between adolescent boys and girls (Miller et. al 2018), there remains much to be learned about the classroom conditions that may explain how children understand stereotypes and act on that understanding in their interactions with other children. This research examined how informal classroom activities reveal both racial and gendered stereotypical preference patterns and how those patterns relate to students' self-competencies. Moving beyond documenting a link between gender and math self-competencies, this research importantly connected informal classroom activity as well as race and gender stereotypes to STEM self-competency among school age children.

RESEARCH QUESTIONS

1. Do children demonstrate a preference for particular racial and gender groups when they engage in different classroom activities? Does this preference vary by activity (e.g., Math/Art/Sit next to in class)?
2. Does this preference vary by their own race and gender? Does who they want to spend time with relate to self-competency in a STEM field (i.e., math, engineering)?

METHODS

Procedure & Sample

- Students were surveyed about their preferences for interacting with peers within informal classroom activities as well as their level of STEM self-competency.
- Data were collected from 936 students, of which 498 were girls and 438 were boys. Ages ranged from 4-7 years old.
- Data were collected from Southwest region of the United States.
- Ethnic breakdown of sample was: 40% Caucasian, 23% Latino/Hispanic, 9.3% Black, 4% Asian, 1.8% Native American, and 12.3% Other.

Measures

- *Engineering-related competency*. Measures how good the students perceive themselves to be at STEM-related fields. Likert scale of 0 (Not at all good) to 3 (Very good).
- *Peer Inclusion*. Asked question about who within their peers they would like to work with, sit with, or get help with different classroom activities and identified both gender and ethnicity of students.

Analysis

- Mixed design 2 (Gender) x 3 (Peer) ANOVA
- Mixed design 3 (Ethnicity) x 3 (Peer) ANOVA

Gender and ethnicity STEM stereotyped preference patterns inform classroom interactions that have significant effects on STEM related self-competencies.

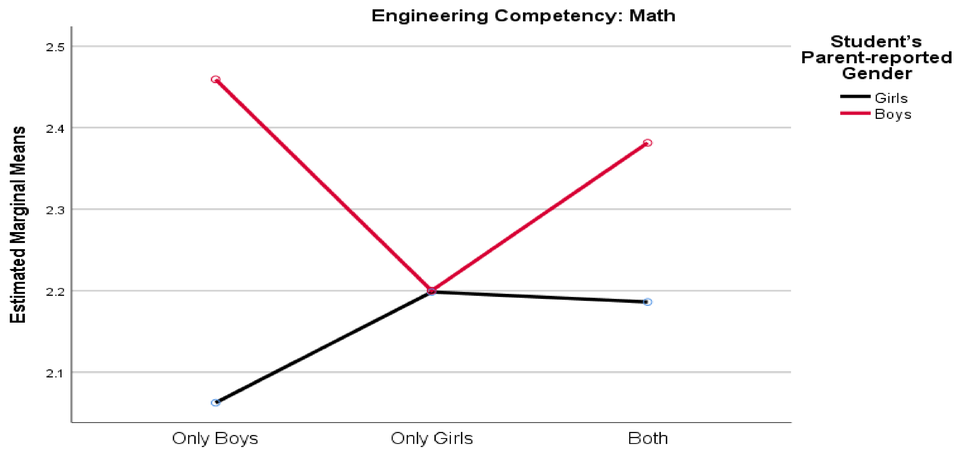

Figure 1

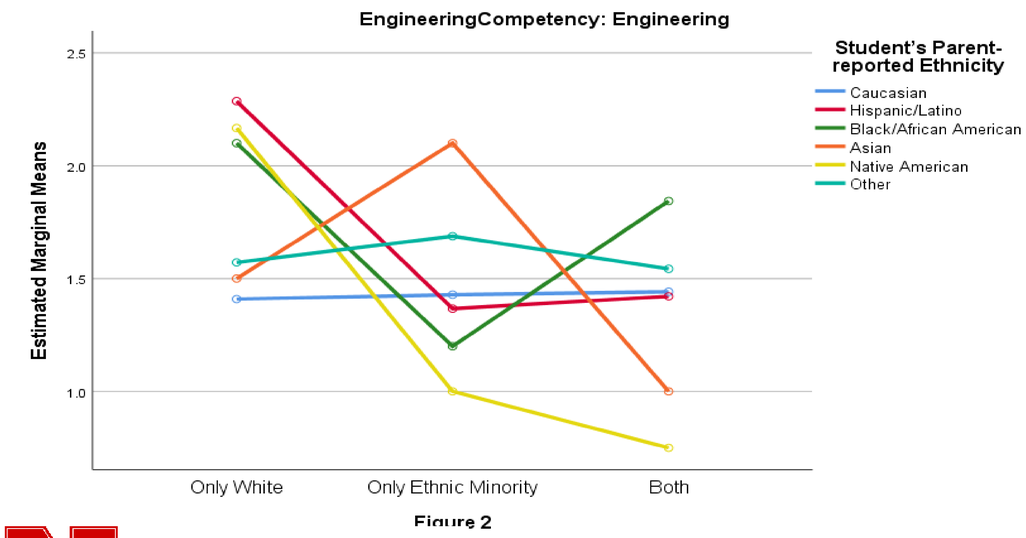

Figure 2

MCNAIR SCHOLARS PROGRAM

RESULTS

Gender

- Students who chose same gender students and had higher levels of competency in Math (p<.000).
- Boys reported higher levels of Math competency when they choose to sit with other boys (M=2.46) and was significantly lower when they choose to sit with girls (M=2.06) (Figure 1).
- Girls reported lower math competency when they chose to sit with boys (M=2.06) but reported higher levels of competency when they chose to sit with other girls (M=2.20) (Figure 2).

Ethnicity

- Students ethnicity played a role in who the students wanted to get math help from (p<.011) in relation to their own individual engineering competency.
- Latino (M=2.29) and Black (M=2.10) children showed higher levels of competency when they chose to get help from White students (Figure 2). When they chose to get help from non-White minorities, children's engineering self-competencies were lower for Latinos (M=1.37) and Black (M=1.20) (Figure 2).

DISCUSSION

- Results may be explained by gender and ethnic stereotypes informing students' decisions to engage with peers in informal activities such as who to sit next to and who to seek help from.
- Findings suggest that when students sit next to same gender peers, math competency is higher. When ethnic minorities choose to engage help from White children, engineering competency is higher.
- Children demonstrate a preference for ethnic and gender groups when they reporting choices for engaging in different classroom activities and this varies by activity.

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