How children's drawings of mathematicians relate to their gender and math identity

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Research Questions

This study investigated the developmental trajectory of third- to seventh-grade students' perceptions of mathematicians via their drawings of mathematicians and math identity.

RQ1: Are there gender differences in children's drawings of mathematicians and math identity?

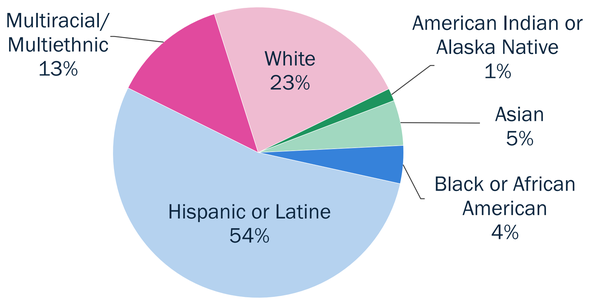
RQ2: Are there age-related differences in children's drawings of mathematicians and math identity?

Background Information

- By the third grade, gender differences in math performance are emerging [1]
- Prior work has found that in K-1, children drew more female than male mathematicians [2]
- By 2nd grade, children drew equal numbers of male and female mathematicians [2]
- By age 12-13, children drew more male than female mathematicians, although girls drew more female mathematicians than boys [3]

Participants

- *N* = 142 participants (58% female)
- 35.2% in 3rd grade; 38.0% in 4th grade; 18.3% in 5th grade; 8.5% in 7th grade
- 93% of parents had less than a bachelor's degree



Methodology

Draw A Mathematician Task

- Children were asked to draw a picture of a mathematician using markers and to provide a verbal description of their drawing

Coding Scheme

- Responses were coded for the presence of stereotypical features based on Chambers (1983)

Feature	Example
Symbols of Knowledge	Books, paper, "Eureka!"
Symbols of Research	Science equipment, calculator, pencil
Technology	Laptop
Math Symbols	Plus sign, division sign
Board	Chalkboard, whiteboard

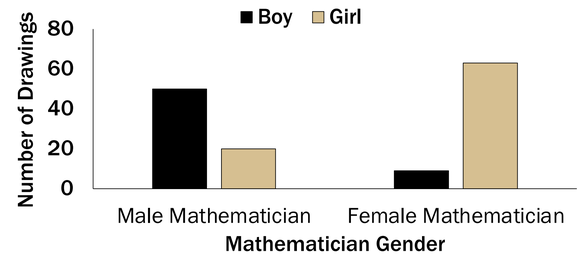
Math Identity Measure

- Measure developed based on Cribbs et al. (2015)'s framework showing interest, recognition, and competence as key components of math identity
- 15-item, 4-point Likert scale with 3 items targeting interest, 6 targeting recognition, and 6 targeting competence
- Scale and subscales were internally consistence (α = 0.88; $\alpha_{interest}$ = 0.78, $\alpha_{recognition}$ = 0.78, $\alpha_{competence}$ = 0.79)

Subscale	Example Item
Interest	I enjoy learning math
Recognition	My friends see me as a math person
Competence	I am confident that I can understand math

Results

51% of participants drew female mathematicians and 49% drew male mathematicians



RQ1:

- Girls were 18.45 times more likely to draw female mathematicians than boys (OR_{gender} = 18.45, *SE*=9.19, p<0.001).
- No gender differences in math identity (β_{gender} = -0.11, *SE*=0.12, p=0.32)

RQ2:

- Children in lower grades were 0.54 times more likely than children in higher grades to draw a female mathematician (OR_{grade} =0.54, *SE* = 0.13, p = 0.013).
- Children in lower grades also had higher math identity than children in higher grades (β_{grade}= -0.19, *SE*=0.05, p=0.04).
- This finding was driven by the Competence subscale ($\beta_{competence}$ = -0.20; *SE*=0.06, p=0.03)

Discussion

- Findings align with and expand on prior work, showing that not only did girls draw more female mathematicians than boys, they also drew significantly more female mathematicians than male mathematicians [2,3]
- Math identity, especially perceived competence in math, decreases with grade level, suggesting early childhood as a key time to intervene