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Is preschoolers' home math environment associated with their numerical and patterning abilities?

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Background

Prior home math environment (HME) research:

- Mainly focuses on numeracy
- Shows variability in children's HME - Is this associated with child characteristics?
- Reports equivocal results on the associations between the HME and cognitive outcomes

Research questions

RQ1

Is there an association between children's gender and/or SES and their HME?

RQ2

Is there an association between children's HME and their mathematical ability (numeracy and patterning)?

RQ3

Is the association between children's HME and their mathematical ability moderated by their gender and/or SES?

Method

Participants

Children came from 17 schools in Flanders (Belgium) → high-quality homogeneous federally funded preschool system with very high participation rate

- Children: n = 353; M_{age} = 5 years 10 months

Gender		SES			
♀	♂	Low	Below-average	Above-average	High
49%	51%	12%	27%	23%	38%

- Parents: mothers: 76%; fathers: 21%

Measures

Home math environment (based on LeFevre et al., 2009)

Activities	• **How often do you engage in the following activities?** • e.g., attending to written numerals during daily activities; creating patterns with concrete materials
Parental expectations	• **How important is it for you that your child masters the following competencies at the start of first grade?** • e.g., reciting the number sequence over 10; extending a pattern
Parental attitudes	• **What is your attitude towards mathematics?** • e.g., mathematics is important; I like mathematics

Mathematical ability

Numerical abilities	• Verbal counting; verbal arithmetic; object counting; Arabic numeral recognition; number order; symbolic calculation; symbolic comparison; non-symbolic comparison; dot enumeration
Patterning abilities	• Extending, generalizing, and identifying repeating patterns

Results

RQ1: *t*-tests & ANOVAs

HME	Gender differences	SES differences
Activities	⊗	⊗
Parental expectations	⊗	✓ 1 > 3, 4
Parental attitudes	⊗	✓ 4 > 2, 3

Note. 1 = low SES; 2 = below-average SES; 3 = above-average SES; 4 = high SES

RQ2: Correlation analyses

HME	Numerical abilities	Patterning abilities
Activities	⊗	⊗
Parental expectations	⊗	⊗
Parental attitudes	? p < .05, however BF10 = 1.70 → evidence = anecdotal	⊗

RQ3: Regression models

Neither gender nor SES moderated the associations between children's HME and their numerical and patterning abilities (ps > .06).

Discussion

- No evidence for strong effects of the HME
- Potential explanations:
  - Type of data: questionnaire ↔ observations
  - Preschool: Homogeneity? Quality? Participation?