

# Ordinal-symbol skills: The bridge between mathematics and quantity-symbol skills

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## Introduction

- The abilities to access quantitative and ordinal information in numerical symbols are fundamental skills for numerical cognition (Sury & Rubinsten, 2012)
- **Hypothesis:** Ordinal-symbol knowledge will mediate the relations between quantity-symbol knowledge and math outcomes in adults beyond calculation (Lyons & Beilock, 2011).

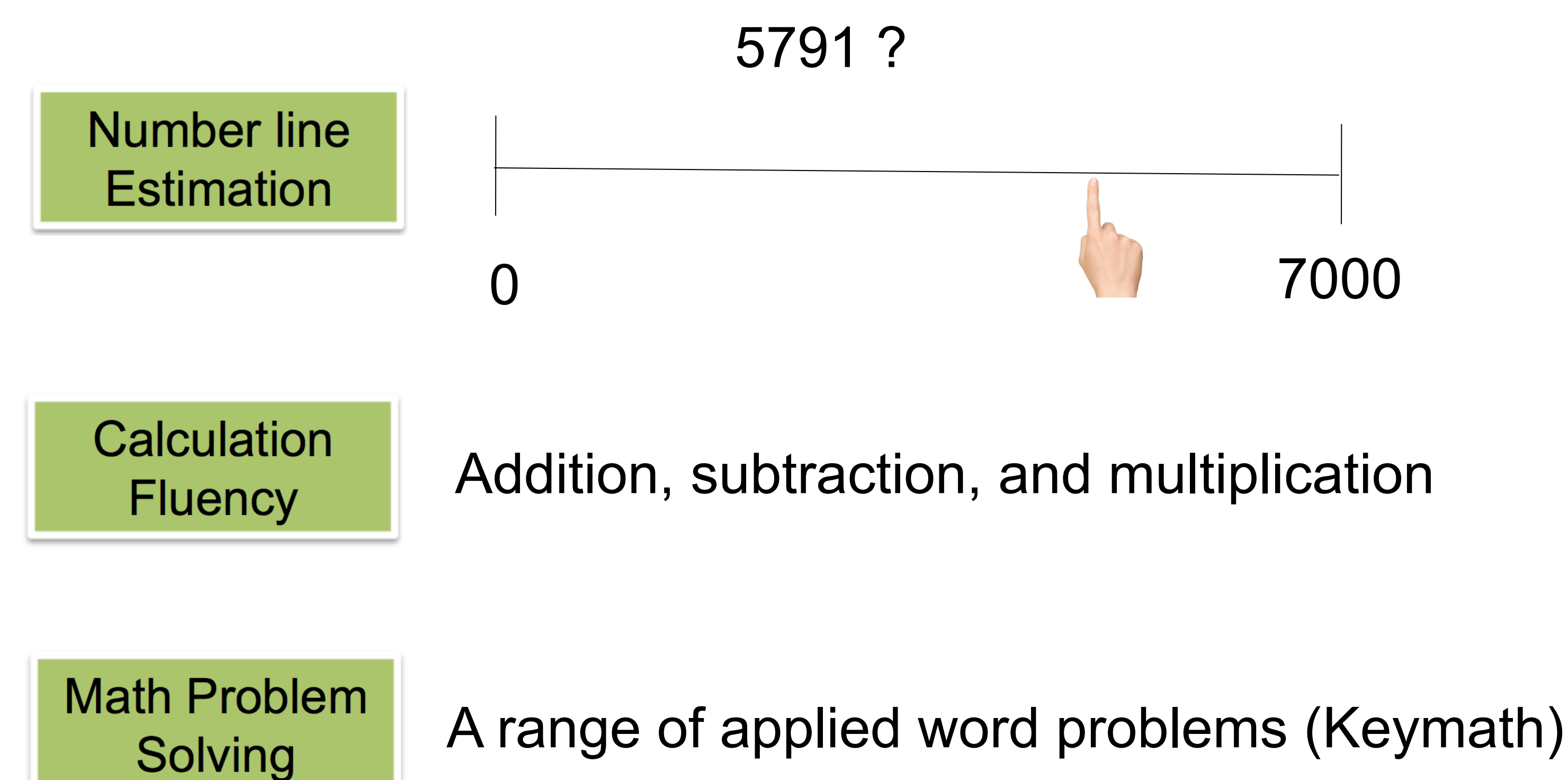
## Method

**Participants:**  $N = 142$  adults

**Basic numerical measures:**



**Mathematical measures:**



## Results

Table 1. *Correlations Among Measures*

	1	2	3	4
1. Quantity-symbol	-			
2. Ordinal-symbol	.67***	-		
3. Number line estimation <sup>a</sup>	-.27***	-.40***	-	
4. Calculation fluency	.40***	.64***	-.36***	-
5. Math problem solving	.34***	.47***	-.47***	.54***

Note: <sup>a</sup>Percent absolute error; † $p = .061$ ; \*\* $p < .01$ ; \*\*\* $p \leq .001$ .

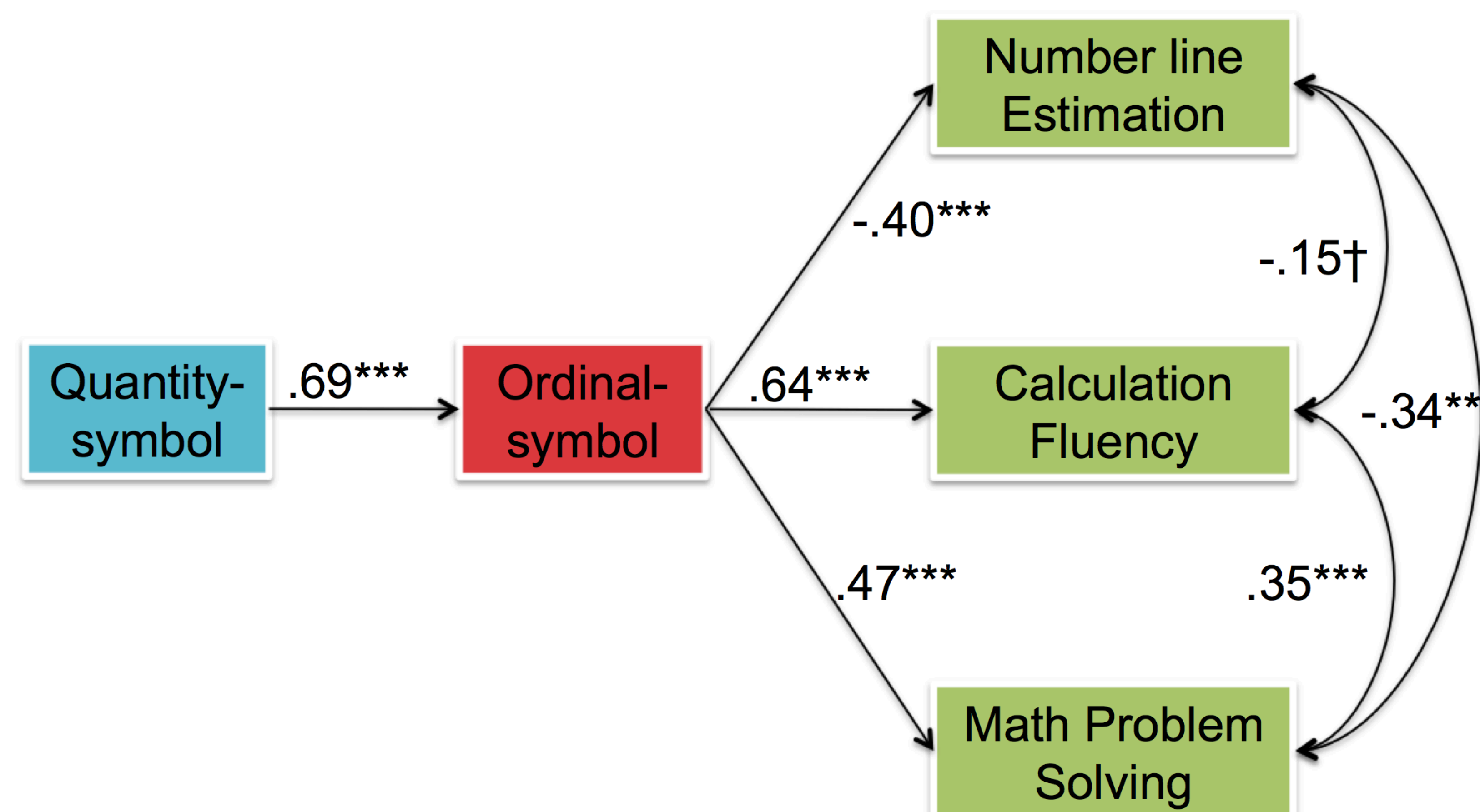


Figure 1. The numbers above the arrows are the standardized coefficients for the path model. Model fits well:  $\chi^2(3) = .89$ , RMSEA = .93, CI = [0, .07], CFI = 1.0, SRMR = .007.

## Discussion

- Extends prior work by showing that performance on the ordinal judgment task is a strong predictor of math skills beyond calculation (cf. Lyons & Beilock, 2011).
- Ordinal-symbol skills also mediated the relations between quantity-symbol skills and math problem solving, suggesting that ordinal-symbol knowledge captures individual differences that are important for a range of mathematical tasks.
- The shared relations between number line performance and complex calculation were accounted for by their shared links to ordinal-symbol skills.

## Implications

- In line with the results of Lyons et al. (2014) that the knowledge of ordinality as opposed to quantity becomes increasingly important for children as they learn more complex math skills.
- The ability to access ordinal information as opposed to quantitative information in numerical symbols might be a milestone for the acquisition of mathematical development.