

# Words Matter: Effects of Manipulating Storybook Texts on Parental and Children's Math Talk

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## Background

- **Quality and quantity of parental math talk is predictive of children's number knowledge** (Gunderson & Levine, 2011)
- **Parent-child interactions around math storybooks has been found to promote math learning** (Purpura et al., 2021; Hojnosi et al., 2014; Anderson et al., 2005)
- **Research in literacy indicates that extratextual parental talk offers unique benefits in shared book reading** (Blewitt & Langan, 2016; Mol & Neuman, 2014)
- **There is little information about how the features of storybooks affect parental math talk**

## Purpose & Hypotheses

Examine whether embedding mathematical language into storybook texts versus in the illustrations alone impacts parental and children's math talk

### Alternative Hypotheses:

- Text with math embedded > only illustrations because it primes parents
- Only illustrations > text with math embedded because do not deviate from text

## Method

### Participants:

- Preschoolers ( $N=50$ ), 52% female,  $M_{age} = 46.4$  months
- Middle-to-high income families; highly educated parents

### Conditions:

- **Implicit:** math concepts embedded *only* in illustrations
- **Explicit:** math concepts embedded in text *and* in illustrations

### Other storybook features:

- Each of the 18 pages corresponds to one or more math concept
- Math concepts include: counting/cardinality/numeral identification, spatial skills (shape/patterning, size/height comparison), number comparison, and arithmetic
- Number of words and complexity of the texts are comparable in both conditions

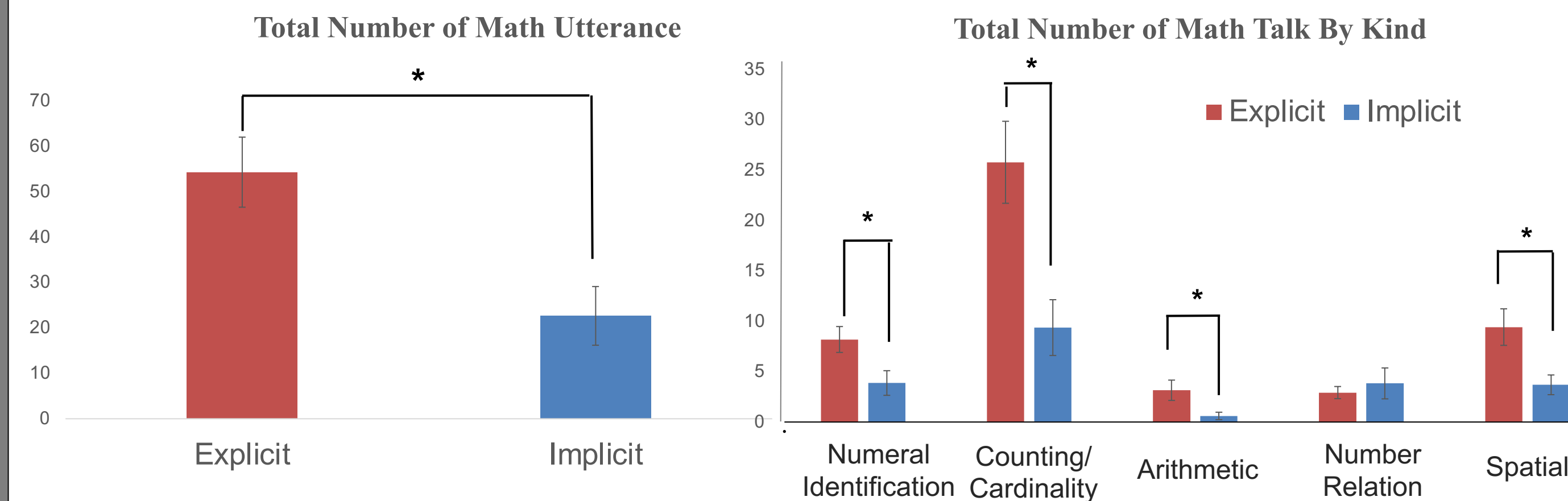
### Procedure:

- Parent-child dyads were randomly assigned to either the explicit ( $N = 24$ ) or the implicit ( $N = 26$ ) condition
- Parents read the storybook with their children over Zoom

## Results

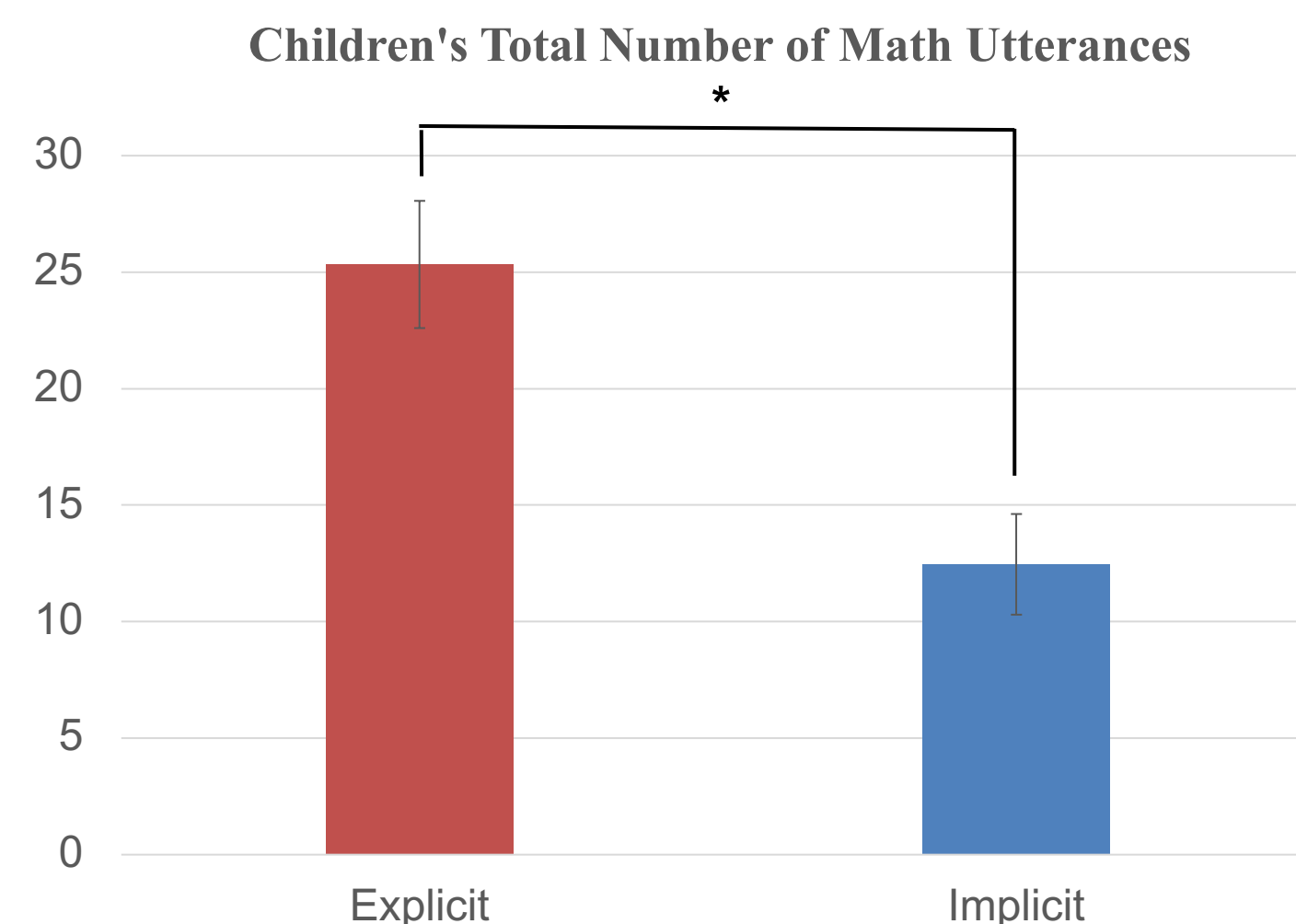
### Parental Math Talk

- **Quantity:** Parents in the explicit condition produced more math-related utterances than those in the implicit condition,  $F(1, 48) = 10.68, p < 0.01, \eta_p^2 = .18$
- **Kind:** Parents in the explicit condition produced more utterances related to numeral identification,  $p = .031, \eta_p^2 = .09$ ; counting/cardinality,  $p < 0.01, \eta_p^2 = .22$ ; arithmetic,  $p = 0.046, \eta_p^2 = .08$ , and spatial talk,  $p = 0.01, \eta_p^2 = .22$ ;



### Children's Math Talk

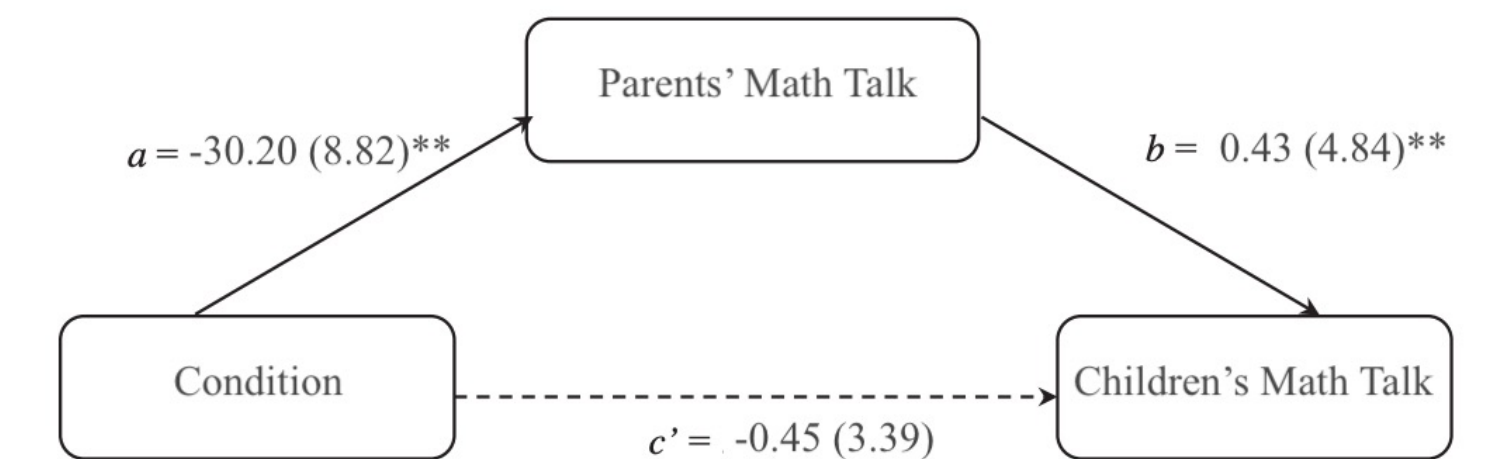
- **Quantity:** Children in the explicit condition produced more math-related utterances than those in the implicit condition,  $F(1, 48) = 7.31, p < 0.01, \eta_p^2 = .13$ .
- **Kind:** There were no significant differences in the kind of math talk produced by children



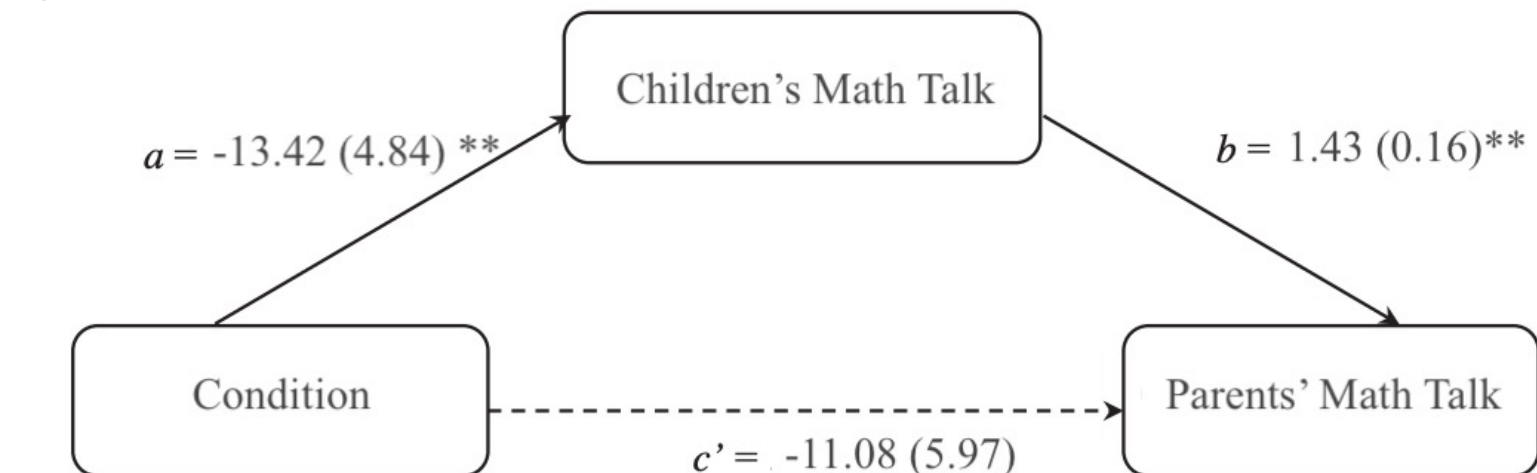
## Results (cont.)

### Mediation Analyses

- **Condition explained children's math talk via parental math talk**,  $R^2 = 0.14, F(1,49) = 7.69, p < 0.01$



- **Condition explained parent math talk via children's math talk**,  $R^2 = 0.19, F(1,49) = 11.73, p < 0.01$



## Conclusions/Future Directions

- **Embedding mathematical language in storybook text matters:**
  - Both parents and children produced significantly more mathematical talk in the explicit condition.
- **Mediation analyses suggest future studies should examine the nature of parent-child interactions (e.g., evocative effects) during storybook reading**

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