Parent Ratings of Preschoolers’ Numeracy Skills Predictive of Direct Assessments
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Introduction
- Parents must have an accurate understanding of children’s numeracy abilities to provide a high-quality home numeracy environment (HNE; Zippert & Ramani, 2017) – a context related to preschool children’s developing mathematical abilities (Anders et al., 2012; LeFevre et al., 2009).
- Little research has addressed parents’ accuracy in rating preschoolers’ specific numeracy skills (Zippert & Ramani, 2017).
- Examining how accurate parents are at rating children’s numeracy skills can give researchers insights into how supportive children’s HNEs may be for facilitating their mathematics development and inform measurement of children’s numeracy skills in future work.
- These two related issues have far-reaching implications for future HNE research.

Research Questions (RQ):
1. Are parent ratings of their children’s numeracy skills (i.e., verbal counting, simple arithmetic, numeral identification) accurate?
2. How fine-grained are parent ratings of children’s specific numeracy skills?
3. Do aggregated parent ratings of children’s numeracy skills predict directly assessed overall numeracy?

Methods
Sample
Parents (n = 129) were recruited from 18 preschool and childcare centers in the Midwestern United States.
- Parents (n = 129) o 53.5% < Bachelor’s, 46.5% Bachelor’s or higher o Preschoolers (n = 129) o 52.3% male o 81.0% White, 4.8% Latino, 4.8% Asian, 9.5% other/multiracial o Age: 3.07 ± 0.95 years old (M = 4.62, SD = 0.54)

Measures
Parent questionnaire. Parents reported on the following:
- **Verbal counting:** “How high can your child count?”
- **Simple arithmetic**: respond “yes”/“no” to “My child can calculate simple sums (e.g., 1 + 1 = __ , 1 + 2 = ___ ).”
- **Numerical identification**: circle numerals 1-15 that child could identify

Direct child assessments. Trained assessors measured children’s:
- **Verbal counting:** “I want you to count as high as you can starting with the number one. Go ahead.”
- **Simple arithmetic**-read and show addition problems with sums less than five, printed on individual sheets of paper (e.g., assessor asked, “What is one plus two?” while pointing to “1 + 2 = ___”).
- **Numerical identification**- shown cards with numerals (i.e., 1, 2, 3, 7, 8, 10, 12, 14, 15) printed on them and asked, “What is the name of this number?”

Results
Table 1. Relations between parent ratings and children’s direct assessments

<table>
<thead>
<tr>
<th>Parent rated verbal counting</th>
<th>0.25**</th>
<th>0.51***</th>
<th>-2.92**</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 113)</td>
<td></td>
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<tr>
<td>Parent rated simple arithmetic</td>
<td>0.42***</td>
<td>0.56***</td>
<td>-1.67</td>
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<tr>
<td>(n = 114)</td>
<td></td>
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</tr>
<tr>
<td>Parent rated numeral identification</td>
<td>0.56***</td>
<td>0.46***</td>
<td>1.66</td>
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<tr>
<td>(n = 111)</td>
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Discussion
- Parent ratings of children’s specific numeracy skills appear to be targeting broader numeracy abilities, even after controlling for other cognitive skills.
  - This is promising, considering that parents of young children, on average, do not spend much time on numeracy activities (Cannon & Ginsburg, 2008).
- Parent ratings of children’s numeracy abilities may be used together as a measure of global numeracy abilities when direct assessment is not possible.
  - Despite measurement implications, parent perceptions are not fine-grained enough or specific to individual numeracy skills.
  - Parents may not be appropriately attending to the different aspects of children’s numeracy development.
- Researchers and interventionists should focus on exposing parents to the range of numeracy skills that exist, as well as to the various activities that may contribute to the development of these skills.

Figure 1. Measurement model for overall parent ratings of children’s numeracy. Standardized coefficients shown. * p < .05; ** p < .01; *** p < .001

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