Fairmont Roundtable Session Eleven
Sat, April 15, 9:50 to 11:20am

Parents' Early Home Numeracy Approaches Do Not Match the Approaches They Think are Most Important

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Abstract

Although children's exposure to math at home is a crucial source of early math knowledge, little is known about why parents choose particular pedagogical approaches at home. The current study examines what pedagogical approaches parents believe to be best and if these beliefs align with the approaches they use most often. In a survey of 344 preschool parents, most parents (45%) reported that they most often use the pedagogical approach of incorporating math during daily routines. Notably, although used most often, the "daily routines" approach was most frequently chosen by parents (38%) as the least important approach. In fact, parents mostly frequently (38%) ranked the "direct teaching" approach as most important.

Objectives

What is the HME? The HME encompasses the math-related activities and interactions children engage in at home, including the math support parents provide their preschoolers through math talk, toys, or everyday interactions.

What are Pedagogical Approaches? Parents' pedagogical approach, or the approaches they use and believe are most important for helping their children learn math, is a limited factor studied within the HME. Three past studies measure pedagogical approach beliefs (Cannon & Ginsburg, 2008; Deflorio & Beliakoff, 2015; Sonnenschein et al, 2016) but do not examine use or examine how these beliefs relate to their frequency of HME activities. See Table 1 for a list of four pedagogical approaches provided to parents in the current study.

Study Questions:

1. Is there a difference between the pedagogical approach(es) parents use at home and what approach they believe is most important?
2. Are there differences in the pedagogical approach(es) parents use and/or believe are most important based on their socioeconomic status (SES)?
3. How do the pedagogical approach(es) parents use and/or believe are most important relate to the frequency of parents' engagement in numeracy activities with their children?

Perspective(s) or Theoretical Framework

Situated Expectancy Value Theory posits that parents' beliefs about the value and expectancies of math influence the academic socialization that they facilitate for their children which then influences their children's academic achievement (Eccles et al., 1983; Eccles, 1993, Skwarchuk et al. 2014).

Method

- ***Sample***
  - 344 parents (56% mothers) of 3- to 4-year-olds (61% boys) in the USA.
  - Most parents were White (77%), reported middle to high income, and had at least a bachelor's degree as their highest educational attainment.
- ***Procedure***
  - 20-minute online survey via Amazon Cloud Research platform
  - ***Pedagogical Approach:*** Two Pedagogical Approach Questions with four pedagogical approaches (Table 1):
    - "Which of the following approaches do you use at home on a regular basis to help your child develop math knowledge and skills?" & follow up with "Which approach do you use most often?"
    - "Rank the following approaches from least important (1) to most important (4) in your home"
  - ***Numeracy Support:*** 15 HME numeracy activities and reported the frequency at which they engaged in each activity (e.g., "Add simple sums or talk about number facts") in the last month from 0 "never" to 5 "daily"

Table 1

Proportions for Parents' Pedagogical Approaches Use and Belief

	Pedagogical Approach	Proportion Who Used	Proportion Who Used Most Often	Proportion Who Believed Most Important	Proportion Who Believed Least Important
Daily Routine	I give my child math-related tasks or ask math-related questions during ongoing daily living experiences or routines (e.g., we talk about numbers as we use measuring cups or spoons while preparing food).	.73	.45[a]	.19	.38
Direct Teaching	I set aside time to focus on directly and intentionally teaching my child math skills (e.g., we use a math workbook or math flashcards).	.52	.20[a]	.38	.21
Give Math Toys	I enrich my child's playtime by providing math-related toys and materials that my child uses alone or with other children (e.g., my child spontaneously plays with playing cards or puzzles alone).	.67	.19	.21	.23
During Child Enjoyment	I incorporate math during activities that I think my child will enjoy or play math games with my child to engage my child's math interest (e.g., we talk about math while playing board games or watching Sesame Street together).	.55	.16[a]	.22	.18

Note. [a]Significant difference in the proportion who believed this approach was most important and used it most often.
There was a significant difference in pedagogical approach used most often and believed to be most important, $X^2 (9, 335) = 33.16$, $p < .001$
At the individual level, 83% of parents showed a mismatch in the approach they reported they used most often and believed to be most important

Table 2.
Proportion of Parents who selected Pedagogical Approach Most Often and Most Important by SES

		Most Often[a]				Most Important			
	N	Daily Routine	Direct Teaching	Give Math Toys	During Child Enjoyment	Daily Routine	Direct Teaching	Give Math Toys	During Child Enjoyment
Highest Education									
< bachelor's degree	73	0.40	0.13	0.21	0.26	0.21	0.4	0.25	0.15
bachelor's degree	189	0.44	0.24	0.19	0.13	0.15	0.38	0.17	0.29[a]
> bachelor's degree	82	0.52	0.17	0.20	0.11	0.24	0.38	0.24	0.13
Household Income									
< $45,000	95	0.44	0.24	0.16	0.16	0.22	0.35	0.22	0.21
$45,000 to $89,999	140	0.51	0.13	0.19	0.17	0.14	0.45	0.18	0.23
> $90,000	109	0.38	0.26	0.23	0.13	0.21	0.33	0.23	0.23

Note. [a]Parents with less than a bachelor's degree and more than a bachelor's degree were significantly different from parents with a bachelor's degree, $p < .05$.
There was no significant difference in the pedagogical approach used most often by highest educational attainment, $X^2(6, 338) = 11.66$, $p = .07$, or by household income, $X^2(6, 338) = 9.72$, $p = .14$.
There was a significant difference in pedagogical approach believed to be most important by highest educational attainment, $X^2(6, 338) = 13.31$, $p = .04$, but not by household income, $X^2(6, 338) = 6.14$, $p = .41$.
Highest education and household income variables were collapsed to create more equally distributed groups for these analyses than what the parents answered on the survey. Important to note, the sample was largely well-educated and middle to high-income which does not match the U.S. population.

Table 3.
Average Frequency of HME Numeracy Activities by Pedagogical Approach Selected as Used Most Often and as Most Important

	Mean(SD)	
	Most Often	**Most Important**
Daily Routine	4.32(.91)[a]	4.40 (.92)
Direct Teaching	4.70 (.83)	4.25 (.91)
Give Math Toys	4.57 (.90)	4.32 (.88)
During Child Enjoyment	4.18 (.84)[a]	4.68 (.96)[a]

Notes. [a] significant difference between parents who reported this approach vs. the "direct teaching" approach on their frequency of numeracy activities
There was a significant effect of the pedagogical approach that parents reported using most often on the frequency of numeracy activities, $F(3, 331) = 4.82$, $p < .01$
There was a significant effect of the pedagogical approach that parents reported believing most important on the frequency of their numeracy activities, $F(3,340) = 3.69$, $p = .01$
Frequency rating scale: 0 = never, 1 = once a month or less, 2 = few times a month, 3 = about once a week, 4 = a few times a week, 5 = daily

Discussion

- First study to separately examine parents' use and beliefs about how to best approach supporting their children's home math development
- Parents who know their actions to be inconsistent with their beliefs about what is most beneficial may develop self-doubt about the quality of support they are providing to their preschool children.
- Our findings also suggest a relationship between approaches and the frequency of activities. Current research often relies on the frequency of specific activities to measure the HME. Further research is needed to explore how pedagogical approaches relate to the HME. Specifically, how the four pedagogical approaches align with different types of numeracy activities.
- Notably, parents' belief that direct instruction was most important to their children's learning does not align with beliefs among psychologists that play-based learning is best for preschool-age children (e.g., Hirsch-Pasek et al., 2009; Skene et al.; 2022; Weisberg et al. 2013). Perhaps, parents' beliefs are shaped by educational or other resources about formal school readiness where direct instruction is emphasized. At the same time, most parents are using the informal, play-based approaches that psychologists suggest are best for preschool-age children. Interventions geared at changing parents' beliefs about the importance of a pedagogical approach may not be enough; parents may not adopt approaches even if they are convinced that the approach is the most beneficial.
- More research is needed to understand what frictions prevent parents from acting on their beliefs and parents' understanding and feelings toward this misalignment.