Continuity of Home Numeracy Factors and Pre-k Mathematics Scores Across Six Months

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Introduction

Home numeracy activities generally predict early mathematics scores, and some believe that specific home numeracy activities (HNA) may be better predictors of mathematics skills than others. This report focuses on the continuity and predictiveness of HNA factors for children's mathematics scores across a 6-month period.

Method

Participants

Seventy children (39 girls), ages 39 to 68 months (M = 52.7 months, SD = 6.5), and their parents; primarily Caucasian.

Assessment Strategy

Parents completed assessments on home numeracy activities. Children were given the TEAM, an assessment of numeracy and geometry skill. All assessments were repeated about 6 months later.

Measures

Home Numeracy Activities Survey (HNAS)

Tools for Early Assessment in Math (TEAM):

- TEAM A: Numeracy Skill
- TEAM B: Geometry Skill

Table 1: Descriptive Statistics and Rotated Factor Loadings for Home Numeracy Factors Predicting TEAM Performance at Time 1 & 2

Time 1 (n = 74)						Time 2 (n = 70)		
Matching Numbers (alpha = .86)	Mean (SD)	Factor loadings	**Applying Numbers** (alpha = .86)	Mean (SD)	Factor loadings	**Teaching Numbers** (alpha = .86)	Mean (SD)	Factor loadings
• Playing card games w/o parent	1.93 (1.68)	.75	• Talk about money when shopping	3.00 (2.08)	.79	• Count objects > 10	4.86 (1.84)	.83
• Playing Monopoly Junior w/ parent	.53 (1.29)	.75	• Talk about clocks or calendars	4.41 (2.19)	.75	• Helping w/ simple sums	4.09 (2.21)	.80

Note: These are examples of the items in each factor. The full table is available upon request.

Results by Research Questions

1. How consistent is the factor structure on the Home Numeracy Activities Survey (HNAS) across a 6-month period (Time 1 to Time 2)?

About half of the items with a factor loading of .4 or higher were in a factor at Time 1 and Time 2. The items on the factors at Time 1 and Time 2 were distributed differently across factors. Cronbach Alphas on all factors were .80 or higher (see Table 1).

2. Are children's TEAM scores predicted at Time 1 and Time 2 by HNAS factors?

The best predictors of the TEAM were contemporaneous. Two factors at Time 1 predicted TEAM A and TEAM A & B at Time 1. A different factor at Time 2 predicted TEAM A and TEAM A & B at Time 2 (see Tables 2 & 3). Of note, results show these factors support numeracy skill but not necessarily geometry skill.

Implications

Children's math skills improved between Time 1 and Time 2. Different home numeracy factors predicted TEAM performance at Time 1 and Time 2, indicating the dynamic process between home activities and math performance across time.

Table 2: Descriptives for TEAM at Time 1 & Time 2

	n	$M(SD)$	t	df
TEAM A				
Time 1	74	16.61(9.25)	5.93***	62
Time 2	66	21.35(10.07)		
TEAM B				
Time 1	73	8.05(5.31)	2.84*	62
Time 2	66	10.13(4.15)		
TEAM A&B				
Time 1	74	24.55(12.22)	6.19***	62
Time 2	66	31.48(13.02)		

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 3: Linear Regressions for HNAS Factors predictive of TEAM Performance at Time 1 & Time 2

TEAM	HNAS Factor	β	Sig.	R^2
Time 1 (n = 73)				
TEAM A	Matching Numbers	.21	.05	.42
TEAM B	-	-	-	-
TEAM A&B	Applying Numbers	.22	.05	.39
Time 2 (n = 68)				
TEAM A	Teaching Numbers	.31	.01	.46
	Matching Numbers	.25	.05	.41
TEAM B	-	-	-	-
TEAM A&B	Teaching Numbers	.27	.01	.46
	Matching Numbers	.22	.05	.43

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