

Supporting Early Numeracy Development with Card Games: *War* Tops The Deck

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Introduction

- Numeracy skills including magnitude comparison vary substantially at school entry, and these skills predict later academic achievement (Rittle-Johnson et al., 2017).
- Parents' engagement in numeracy with their children is related to children's early numeracy skills (Ramani et al., 2015).
- Further, frequent parent-child engagement with advanced early number concepts including magnitude comparison predicts children's early numeracy skills (Skwarchuk et al., 2014).
- However, this engagement tends to be infrequent (Vandermaas-Peeler, 2012) and may be related to parents' beliefs about math (Skwarchuk et al., 2014) and the type(s) of activity in which they engage (Daubert et al., 2018).
- Parents reportedly prefer informal math activities rather than formal ones (Cannon & Ginsburg, 2008). Card games might be a particularly good informal context for parent-child engagement in numeracy since card games usually require attention to numbers and parents likely have cards at home.
- However, little is known about whether specific card games inherently encourage parent-child engagement with advanced early number concepts.

Questions

- How does the type of informal activity (card game) in which parent-child dyads are engaged relate to how frequently they engage in magnitude comparison while playing with cards?
- How do parents' math-related beliefs and children's math and verbal skills relate to the frequency of parent-child engagement in magnitude comparison?

Participants

- Forty-six preschoolers ($M=4.56$ years, $SD=.29$) and a parent were recruited from 6 preschools in a Southeastern U.S. city.
- Preschoolers were 54% girls, were 46% White, 39% Black, 4% Biracial, 2% Asian, and 4% Hispanic, and 37% received financial assistance for tuition.
- Most of the parents were mothers (80%), about half identified as White (49%), and 87% of mothers and 62% of fathers reported having at least an Associate's degree.

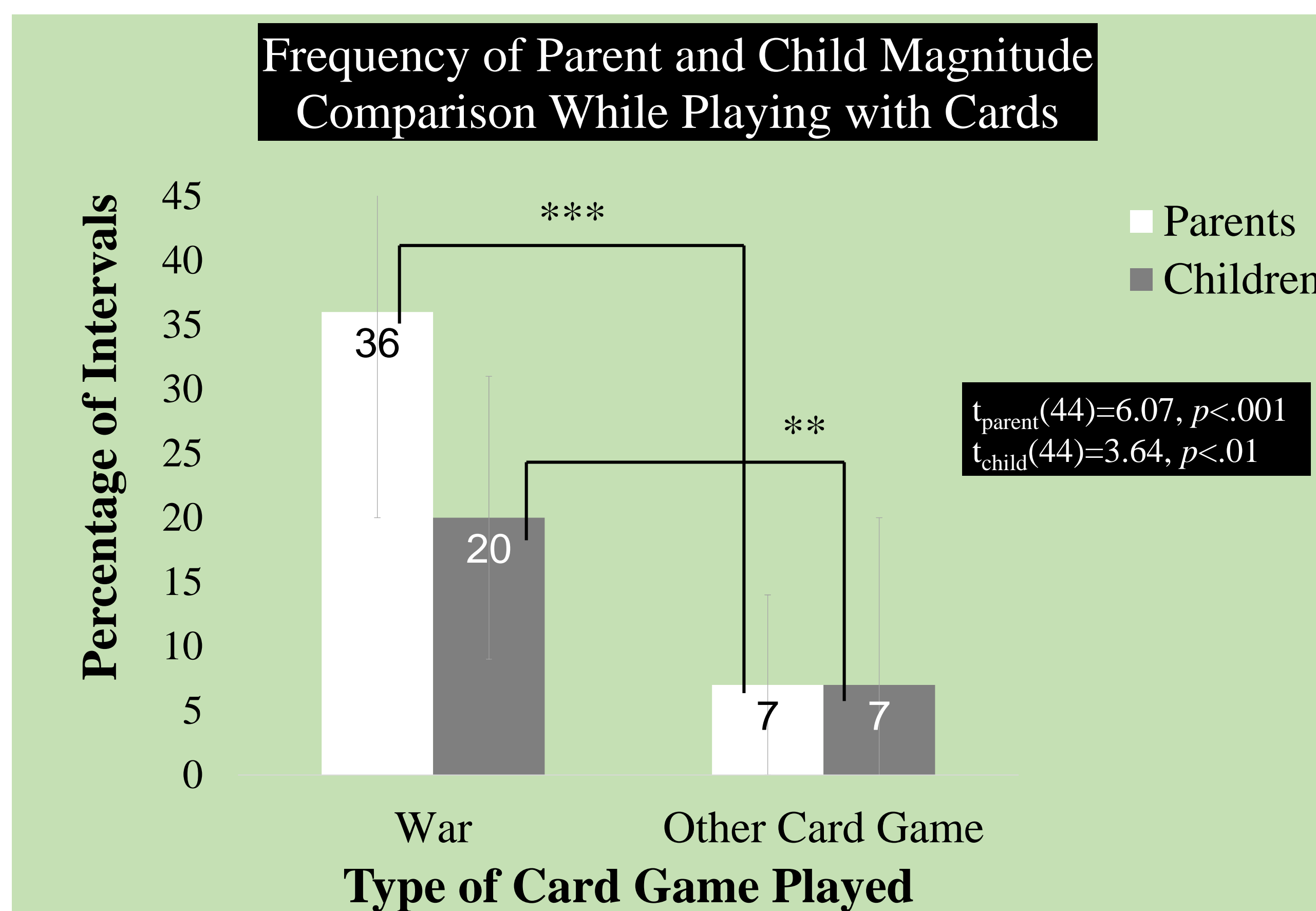
Method

- Parent-child dyads played a card game of their choice at the children's preschool (after receiving two suggested card games: *War* and *Order Up*).
- The play sessions ($M=7.5$ minutes, $SD=2.9$) were coded for the card game that was played and were interval-coded every ten-seconds for parents' and children's magnitude comparison.
- Parents reported their math-related beliefs via a survey (Zippert & Rittle-Johnson, 2018).
- Children's math and verbal abilities were assessed using the Research-based Early Mathematics Assessment Short-Form (Weiland et al., 2012) and the Picture Vocabulary Test (Weintraub et al., 2013) respectively during a separate session.

Results

Frequency of Card Games/ Activities			
Card Game Played	Percentage of Participants	Frequency of Magnitude Comparison $M(SD)$	
		Parent	Child
<i>War</i>	56.5	35.5(16.3)	20.3(21.0)
<i>Order Up</i>	19.6	12.0 (21.1)	7.1(8.8)
<i>Matching Numbers</i>	10.9	3.6(5.0)	12.1(23.8)
<i>Go Fish</i>	6.5	5.2(5.9)	4.8(1.9)
<i>Free Play</i>	4.3	0.0(0.0)	0.0(0.0)
<i>Number Identification</i>	2.2	0.0(0.0)	0.0(0.0)

Notes. Eight dyads chose to play multiple card games however the analyses only include the first card game that they played. Participants who played card games other than *War* were collapsed into one group ("Other Card Game") for analyses. Across all card games, parents compared magnitudes for 23% of the play session ($SD=21.0$) and children compared magnitudes for 15% of the session ($SD=14.0$).



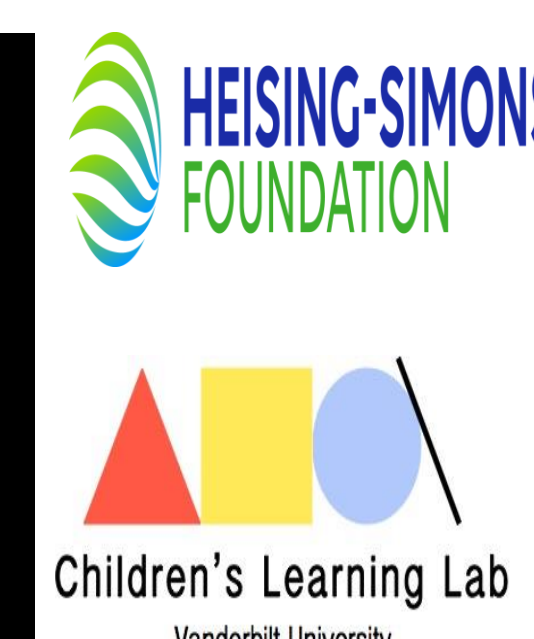
Hierarchical Regression Predicting Frequency of Parent Magnitude Comparison

Model Variables	β	t	R ²	ΔR^2
Step 1				
Child Magnitude Comparison	.53	4.18***	.28 ^a	
Step 2				
Child Magnitude Comparison	.27	2.23*	.51 ^b	.23
Type of Card Game Played	.56	4.49***		

* $p<.05$ *** $p<.001$ ^a $df=(1,44)$ ^b $df=(2,43)$

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Results

Relationship Between Parents' Magnitude Comparison, Parents' Math Beliefs About Themselves and Children's Abilities (no significant correlations)

Parent and Child Factors	Parent Rating $M(SD)$	Correlation with Magnitude Comparison
Parents' Beliefs About Self		
Good at math ^a	5.23(1.45)	.11
Important to be good at math ^b	6.1(1.09)	.07
Like math ^c	4.71(1.84)	.11
Anxious about math ^d	3.13(2.08)	-.02
Child Abilities		
Math	10.91(4.04)	.23
Verbal	99.93(17.68)	.11

Notes: ^aThis was a composite of parents' belief that they are currently good at math and that they were good at math while they were in school on a scale from 1 (not good) - 7 (very good) ^b1(not at all important) - 7 (very important) ^c1 (not at all) - 7 (very much) ^d1 (not at all anxious) - 7 (very anxious)

Discussion

- The context of parent-child interactions influenced the frequency of parent-child engagement with an advanced number concept – magnitude comparison.
- In contrast, parents' math-related beliefs and their children's math and verbal skills were not related to the frequency of their magnitude comparison with their children.
- Thus, identifying and recommending card games such as *War* may encourage engagement in advanced number concepts and may be an effective way to help parents support their children's early numeracy development.
- Future studies should explore the effects of parent-child engagement in card games like *War* on children's skills.

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