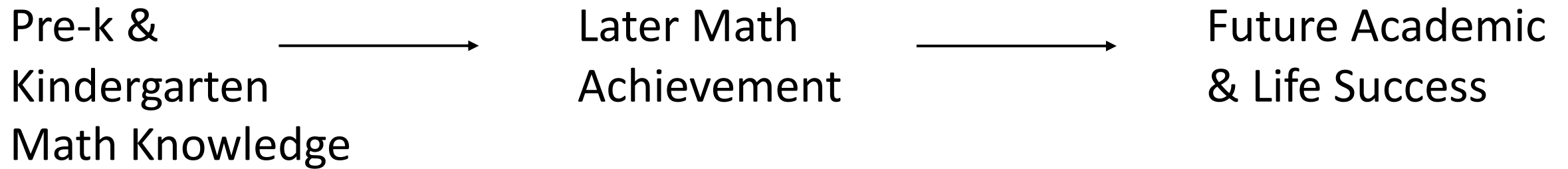


Parents'
numeracy
support during
informal versus
formal contexts

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Background/Motivation

Why is early numeracy development important?



Background/Motivation

Parental Math Beliefs



Home Math Engagement



Child Academic Achievement

Sociocultural factors and systems



The Home Math Environment (HME)

- + Encompasses the math-related activities and interactions parents & children engage in at home
- + Focus on parents and preschool-aged children





HME Activities: Informal versus Formal



Mutaf-Yıldız et al., 2020; Skwarchuk et al., 2014;
Thompson et al., 2017

The Role of Demographics on HME activities

- + Parents' socioeconomic status is often related to parent-child engagement in:
 - + numeracy activities **overall** (e.g., Casey et al., 2016; DeFlorio & Beliakoff, 2015; Thompson et al., 2017)
 - + **informal** but not formal numeracy activities (Skwarchuk et al., 2014; Susperreguy et al., 2020; Vandermaas-Peeler et al., 2009).
- + Child age is related to parent-child engagement in:
 - + numeracy activities **overall** (e.g., DeFlorio & Beliakoff, 2015; Thompson et al., 2017)
 - + **informal** and **formal** numeracy activities though findings are mixed (DeFlorio & Beliakoff, 2015; Skwarchuk et al., 2014; Susperreguy et al., 2020)
- + Other parent-child demographic characteristics like child gender, parent role/ gender, race, ethnicity & culture are often related to parents' **overall** numeracy support
 - + Casey et al., 2016; LeFevre et al., 2002; Uscianowski et al., 2020; Vandermaas-Peeler et al., 2009
 - + Little research on how these relate to the frequency of parents' engagement in informal versus formal numeracy support

Current study

We examined:

1. the characteristics of a measure of parent-reported engagement in formal numeracy activities and informal numeracy activities
2. the frequency of parents' reported engagement in formal versus informal numeracy more often
3. whether parent reported engagement in formal versus informal numeracy activities varies with parent-child demographic characteristics.

Method

- + Participants were 161 parents (51% mothers) of 3- to 5-year-olds (55% males) who completed an online survey
- + Most were White (75%) and had at least their bachelor's degree (59% of mothers, 58% of fathers).
- + All children spoke English at home, and most did not receive early intervention services (88%)

Results: Measuring Informal and Formal HME



+ Classifying items

- + Informal: items about games and other activities that are not typically focused on learning (n = 5)
- + Formal: items about activities that are typically focused on learning and did not have an example that was embedded in a game-like context (n = 5)

+ Confirmatory Factor Analyses

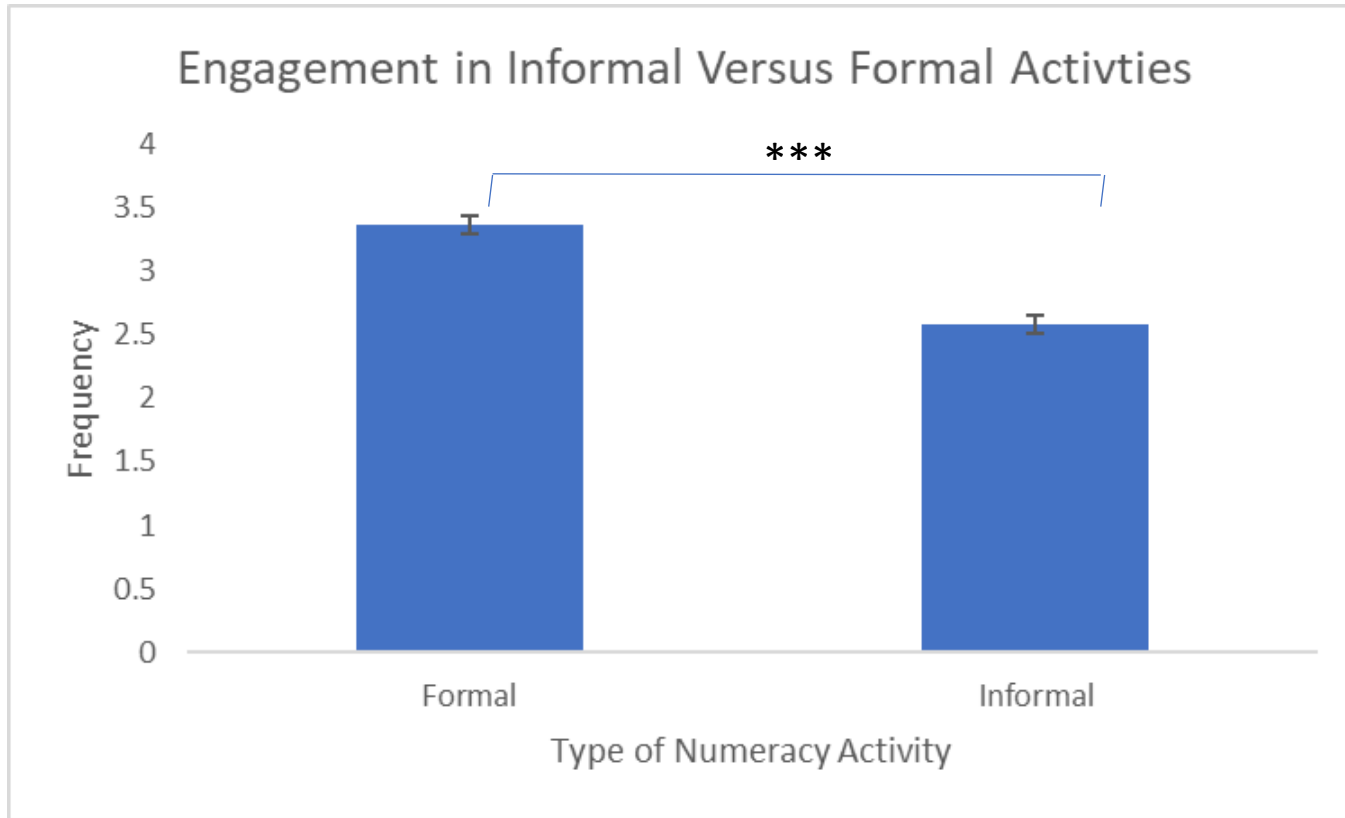
- + A 2-factor model with separate factors for informal and formal numeracy engagement had better fit than a single-factor model, $\chi^2(1, N = 161) = 52.52, p < .001$.
- + All activities hypothesized to be informal loaded significantly on one factor while all activities hypothesized to be formal loaded significantly on another.

+ Reliability

- + Both subscales had acceptable reliability, Formal: $\alpha = .76$ and Informal: $\alpha = .71$.



Results: Frequency of Informal and Formal HME



- Formal activities about 2-3 times a week
- Informal activities about once a week

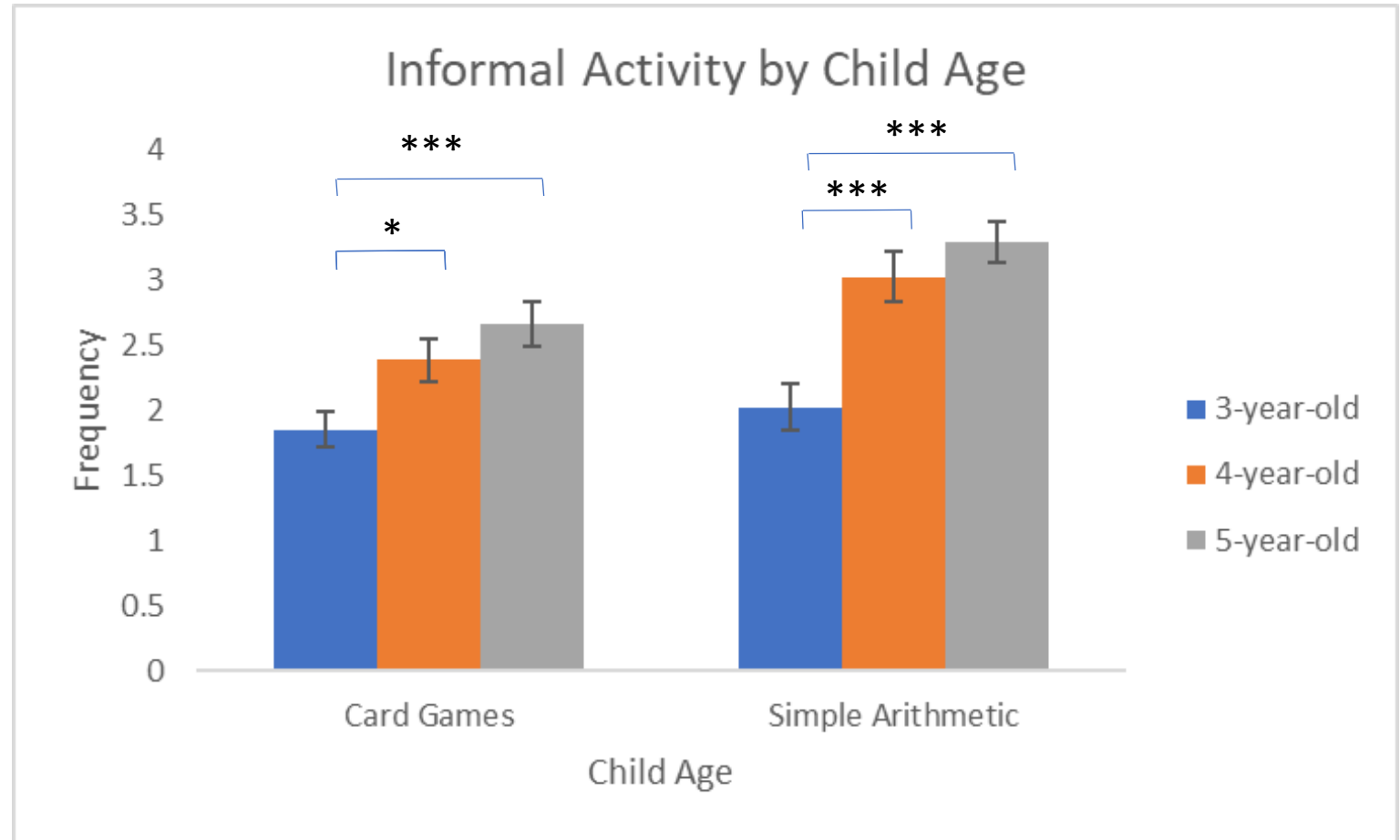
Note. 1= Never, 2 = Once, 3 = 2-3 times, 4 = 4-6 times, 5 = daily

Results: HME by Child Age and Gender

Demographic Characteristic	Informal		Formal	
	M(SD)	F or t value	M(SD)	F or t value
Child Age				
3-year-old	2.32(0.77)	3.50*	3.18(0.86)	1.83
4-year-old	2.69(0.82)		3.43(0.86)	
5-year-old	2.69(0.86)		3.48(0.79)	
Child Gender				
Male	2.58(0.81)	0.03	3.30(0.80)	1.23
Female	2.58(0.87)		3.46(0.88)	

Results: HME by Child Age

- + 2 of the 5 informal activities differed among parents of 3- to 5-year-olds

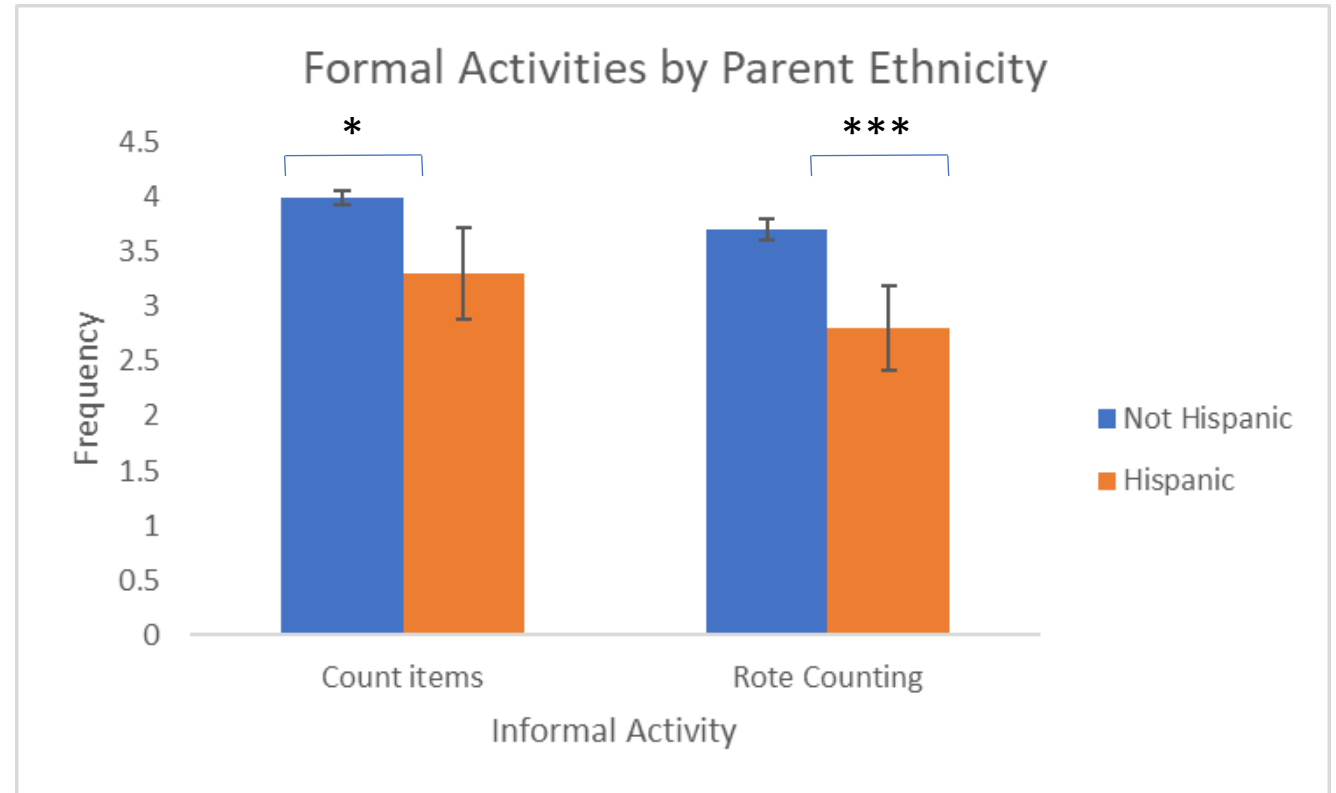


Results: HME by Parent Race and Ethnicity

Demographic Characteristic	N	Informal		Formal	
		M(SD)	F or t value	M(SD)	F or t value
Parent Race/Ethnicity					
Caucasian or White	120	2.58(.84)	0.10	3.41(.84)	-0.85
Minoritized Races/ Ethnicities	41	2.59(.81)		3.28(.83)	
Parent Hispanic					
No	151	2.60(0.83)	1.17	3.40(0.84)	1.70*
Yes	10	2.28(0.78)		2.94(0.68)	

Results: HME by Parent Ethnicity

- + 2 of the 5 formal activities differed among parents who identified as Hispanic or not Hispanic

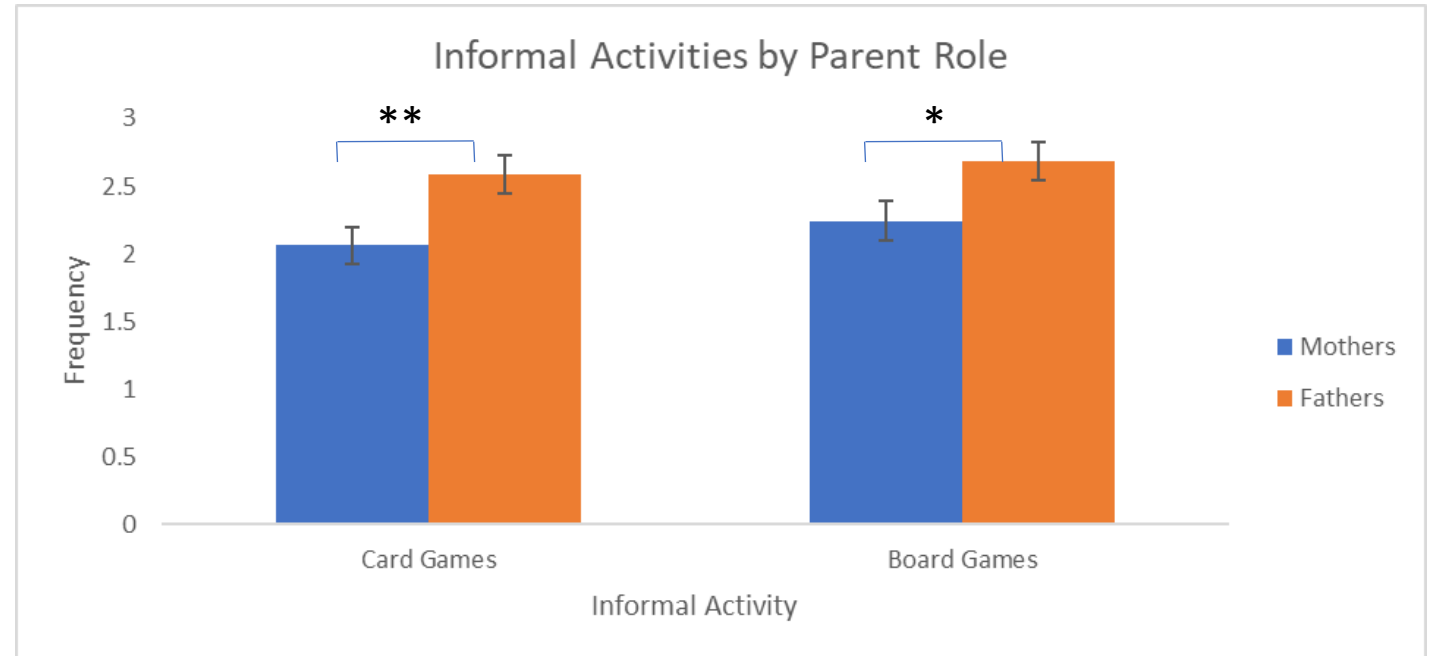


Results: HME by Parent Gender and Education

Demographic Characteristic	N	Informal		Formal	
		M(SD)	F or t value	M(SD)	F or t value
Parent Gender					
Father	78	2.77(0.85)	2.84***	3.41(0.80)	0.49
Mother	83	2.40(0.78)		3.34(0.88)	
Fathers' Education					
Bachelor's or higher	92	2.72(.78)	2.34**	3.42(.86)	0.79
Less than bachelor's	68	2.41(.87)		3.32(.82)	
Mothers' Education					
Bachelor's or higher	95	2.66(.81)	1.51	3.44(.84)	1.20
Less than bachelor's	66	2.46(.86)		3.28(.84)	

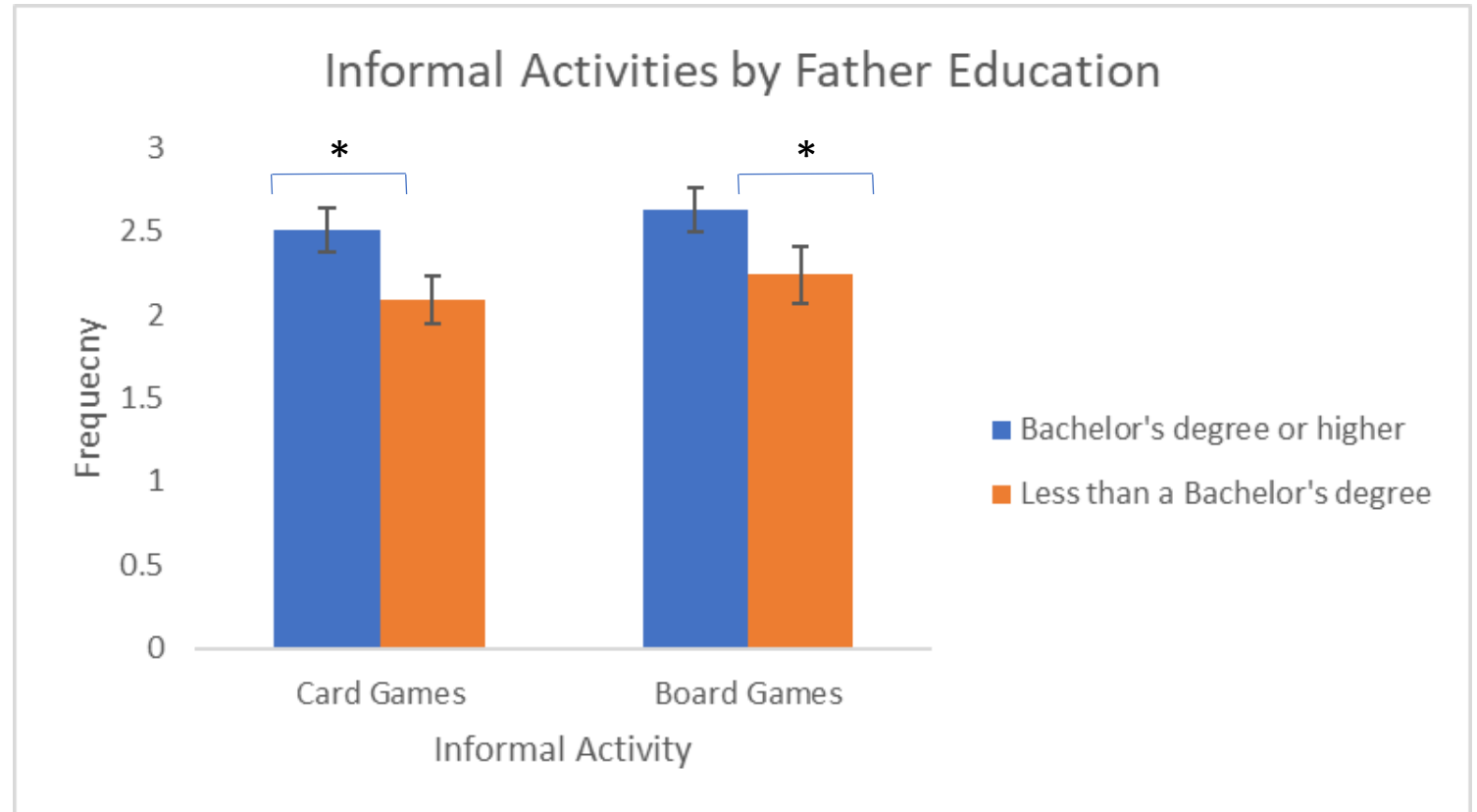
Results: HME by Parent Gender and Education

- + 2 of the 5 informal activities differed among fathers and mothers



Results: HME by Parent Gender and Education

- + 2 of the 5 informal activities differed among fathers with and without a Bachelor's degree



Results: Summary

- + Fathers engaged their preschoolers in more informal activities than mothers, driven by father-child engagement in board games and card games
- + Fathers' but not mothers' educational attainment was related to parent-child engagement in informal numeracy activities.
- + Child age was positively related to informal engagement and overall engagement.
- + Parent-child engagement in numeracy activities did not vary significantly by child gender or parent race.

Discussion

- + How do parents' numeracy support change across the preschool years?
- + Parents of 4-year-olds and 5-year-olds report more frequent engagement than parents of 3-year-olds in numeracy activities **overall** and **informal** ones
 - + mixed findings in previous research e.g., DeFlorio & Beliakoff, 2015; Douglas et al., 2019; Thompson et al., 2017; Skwarchuk et al., 2014; Susperreguy et al., 2020)
- + No difference in frequency of parent-child engagement in formal numeracy activities by child age
 - + mixed findings in previous research (DeFlorio & Beliakoff, 2015; Skwarchuk et al., 2014; Susperreguy et al., 2020)
- + Role of parents' views about the types of activities that are appropriate for preschoolers and about approaches to math support

Poster to presented by
Camille Msall in session 3

Discussion

- + Few HME studies include many fathers or have examined the effects of parent
- + No difference in frequency of mother-child versus father-child engagement in numeracy activities **overall** (Uscianowski et al., 2020) or **formal** ones, but fathers provided more **informal** support than mothers
- + Fathers' education had a significant effect on the informal support they provide, with fathers with a bachelor's degree or more providing more informal support
- + Perhaps fathers are an important missing piece in HME literature
 - + Evidence that fathers' and mothers' support of their children's academic development have unique effects on their children's achievement and academic interest (Baker, 2013; Cheung et al., 2022; Cook et al., 2011; del Rio et al., 2017; Foster et al., 2016)
 - + mother-child informal learning activities and mothers' and fathers' autonomy support were positively linked to children's numeracy and literacy skills via children's reported school liking.

Future Directions

- + Changes in parents' numeracy support and beliefs across the preschool and early elementary years
 - + Longitudinal study
- + Quality of fathers' and mothers' numeracy input during their engagement in formal and informal activities
- + Role of family constellation (e.g., role of siblings and other adults)
- + Impact informal versus formal numeracy support on children's early math beliefs

Thank you!

- + Research team
- + Students and families



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