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To cite this article: Talia Berkowitz, Dominic J. Gibson & Susan C. Levine (2021) Parent Math Anxiety Predicts Early Number Talk, Journal of Cognition and Development, 22:4, 523-536, DOI: [10.1080/15248372.2021.1926252](https://doi.org/10.1080/15248372.2021.1926252)

To link to this article: <https://doi.org/10.1080/15248372.2021.1926252>



Published online: 21 Jun 2021.



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Parent Math Anxiety Predicts Early Number Talk

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ABSTRACT

Differences in children’s math knowledge emerge as early as the start of kindergarten, and persist throughout schooling. Previous research implicates the importance of early parent number talk in the development of math competency. Yet we understand little about the factors that relate to variation in early parent number talk. The current study examined the relation of parent math anxiety and family socioeconomic status (SES) to parent number talk with children under the age of three ($n = 36$ dyads). For the first time, we show preliminary evidence that parent math anxiety (MA) predicts the amount of number talk children hear at home, beyond differences accounted for by SES. We also found a significant SES by parent MA interaction such that parent MA was predictive of higher-SES parents’ number talk but not that of lower-SES parents. Furthermore, we found that these relations were specific to parents’ cardinal number talk (but not counting), which has been shown to be particularly important in children’s math development.

Children show wide variation in their understanding of basic numerical concepts by kindergarten entry (e.g., Starkey & Klein, 2008; Starkey, Klein, & Wakeley, 2004) and these differences tend to persist throughout schooling (e.g., Duncan et al., 2007). The early emergence of disparities in mathematical knowledge has raised questions about the factors contributing to these variations. In particular, parent “math talk” to young children varies widely, and differences in early math input predict young children’s understanding of foundational mathematical concepts, which in turn predict their long-term math achievement (Blevins-Knabe & Musun-Miller, 1996; Casey et al., 2018; Geary et al., 2018; Gunderson & Levine, 2011; LeFevre, Clarke, & Stringer, 2002; LeFevre et al., 2009; Levine, Gibson, & Berkowitz, 2019; Levine, Gunderson, & Huttenlocher, 2011; Levine, Suriyakham, Rowe, Huttenlocher, & Gunderson, 2010; Saxe, Guberman, & Gearhart, 1987).

These findings highlight the importance of encouraging parents to provide their children with high quality math talk, but to do so effectively, we must understand why some parents rarely engage in math talk with their children. Prior studies show that family socioeconomic status (SES) is associated with variations in parent math engagement (math talk as well as other types of math activities) with young children (Jordan & Levine, 2009; Levine et al., 2010; Saxe et al., 1987; Stipek, Milburn, Clements, & Daniels, 1992; Vandermaas-Peeler, Nelson, Bumpass, & Sassine, 2009). However, this relation of math talk to SES does not come close to accounting for all of the variation in parent math talk (for example, Levine et al. (2010) reported that SES accounted for only 9% of the variance in parent math talk). Yet, we understand little about what factors explain the variations in parents’ number talk that remain.

In the present study, we examine whether parent math anxiety is a significant, but overlooked factor accounting for variation in the early number talk parents engage in with their children. Math anxiety – the fear and apprehension associated with doing even simple forms of math – is experienced to some degree by many adults, particularly in the United States (Hart & Ganley, 2019). Math anxious individuals tend to avoid math engagement in their every day lives. For example math anxious individuals take fewer math classes than their non-math anxious counterparts, avoid math-related majors and careers, and may even avoid seemingly mundane activities like calculating a tip at a restaurant (Ashcraft, 2002; Ashcraft, Krause, & Hopko, 2007; Chipman, Krantz, & Silver, 1992; Hembree, 1990; Maloney & Beilock, 2012). Adults' math anxiety has previously been linked to children's math achievement in elementary school (parents: Berkowitz et al., 2015; Maloney, Ramirez, Gunderson, Levine, & Beilock, 2015; Schaeffer, Rozek, Berkowitz, Levine, & Beilock, 2018; teachers: Beilock, Gunderson, Ramirez, & Levine, 2010). One potential mechanism for this relation is that parent math anxiety may lead parents to talk less about number with their young children. This in turn could contribute to the previously observed achievement gap related to parent math anxiety. However, there is currently no direct evidence linking parent math anxiety to the quantity and quality of the math input parents provide to their young children, an important contributor to children's math knowledge. Therefore, in the present study, we ask whether parents' math anxiety relates to the quantity and quality of one of the earliest forms of math input parents provide their children – number talk to 1- to 3-year-olds.

The present study

We first explore whether parents who are anxious about math engage in less number talk with their young children (i.e., under age 3), at a time when math talk is very simple. We look specifically at parents' use of cardinal and counting number talk (henceforth referred to as number talk), since these types of number talk occur most frequently and are more related to children's subsequent number knowledge than other types of number talk (such as talk about number symbols, age, time and conventional nominatives) (Gunderson & Levine, 2011; Levine et al., 2010; Mix, Sandhofer, Moore, & Russell, 2012).

We then examine the quality of parent number talk and further examine whether the relation of parent math anxiety to number talk looks the same for number talk that differs in its content, examining counting and labeling the cardinal value of sets. We chose to look at differences between the relation of math anxiety to cardinal labeling and counting based on previous research suggesting that there are important differences in the benefits provided by these two types of number talk. For example, Casey et al. (2018) found that parents' labeling the cardinal value of a set (but not one-to one-counting or labeling numerals) when the children were 36 months old, predicted children's performance on the Woodcock-Johnson Applied Problems subtest when the children were 4.5 years old and when they were in 1st grade. Similarly, Ramani, Rowe, Eason, and Leech (2015) categorized parents' number talk as either "foundational" (e.g., counting and numeral identification) or "advanced" (e.g., cardinality, arithmetic, and ordinal relations) and found that it was specifically talk about the more advanced number concepts that related to ability on various number tasks.

Since we also know that some of the variation in parent input is related to SES, we controlled for SES in our models to observe the variation that is uniquely related to parents'

math anxiety. Additionally, since the strength of the relation of math anxiety and math performance differs by SES, at least among 15-year olds (OECD, 2013), we further hypothesized that it is possible math anxiety might relate differently to number talk in families with different educational backgrounds and incomes. For example, it is possible that for higher SES families, math anxiety plays a significant role in explaining variations in number talk. Higher SES families may have more access to books, games and toys that model or prompt number talk with young children, and avoidance of math conversations by math anxious individuals among this demographic would be easily captured by our measure. In contrast, for lower SES families, factors beyond math anxiety, such as lack of access to resources that can guide math interactions, may explain variations in number talk.

Method

Participants

Thirty-six caregivers participated in this study. Caregivers were drawn from a sample of 44 families included in our prior studies (Gunderson & Levine, 2011; Levine et al., 2010). Families in those studies were drawn from a sample of 63 families who were enrolled in a longitudinal study on language development and were excluded from those samples if they had not completed all of the necessary observation sessions ($n = 9$) or had multiple caregivers participate ($n = 10$). From those 44 families, we then excluded any families where the primary caregiver did not complete the math anxiety measure ($n = 8$). Mean education of our sample was 16.17 years, equivalent to a bachelor's degree ($SD = 1.88$ years, Range = 10 [less than high school] to 18 [master's degree or higher]), and mean income was 62,361 USD ($SD = 30,472$, USD Range = less than 15,000 USD to over 100,000 USD). Twenty-seven of the 36 parents in this study were White, three were African American, four were Hispanic, and two were Asian. The included dyads were representative of the original sample in terms of income and education, which was recruited through mailings and chosen to be representative of the demographics of the Chicagoland area in terms of race, ethnicity and income levels, with the caveat that all children in the study came from families that spoke English at home (Levine et al., 2010).

Procedure

Research assistants visited families at home every 4 months starting when the children were around 14 months of age and continuing until the children were 58 months of age. During these home visits, caregivers were told to do what they normally do, and all interactions were videotaped for approximately 90 minutes. Importantly, researchers did not mention anything about math in their instructions. Once children were 58 months of age, researchers continued to visit families' homes approximately three times a year, and when the children were in middle school (~10 years old), parents were given the Short Mathematics Anxiety Rating Scale (sMARS; Alexander & Martray, 1989) to assess their feelings of fear and apprehension around math. Even though parent math anxiety was not measured when children were 14 to 30 months of age, existing data indicates that the math anxiety of adults tends to be difficult to shift even with interventions (Hembree, 1990).

Coding and reliability

The current study makes use of the number talk coding originally analyzed in Gunderson and Levine (2011). Data is from the first five family visits (child ages 14, 18, 22, 26, and 30 months) for a total of 7.5 hours of parent-child interaction. All speech was transcribed at the utterance level, defined as any sequence of words preceded and followed by a pause, change in conversational turn, or change in intonational pattern. Dictionary words, onomatopoeic sounds (e.g. meow) and evaluative sounds (e.g. uh-oh), were counted as words. To establish transcription reliability, a second coder transcribed 20% of the videotapes. Reliability was assessed at the utterance level and was achieved when coders agreed on 95% of transcription decisions.

Measures

Parent number talk

Using a computer, transcripts were searched for uses of number words “one” through “ten”. A researcher then manually coded all instances of the word “one” as either numerical or non-numerical. Numerical uses of “one” included cardinal values (e.g. “one ball”), and counting (e.g. “one, two, three”), as well as references to Arabic numerals (e.g. “The number one”) and to time or age (e.g. “one minute”, “when you turned one”). All other uses of “one” were coded as non-numerical (deictics, e.g. “this one”; anaphoric uses of one, e.g. “that’s the pretty one”; and idioms, e.g. “one of these days”). A second researcher coded 20% of the sessions and achieved 99% reliability (Gunderson & Levine, 2011; Levine et al., 2010).

Number word tokens were then coded as instances. “Instances” were defined such that counting sequences would be coded as one instance of number talk, to ensure that counting sequences would not be over-weighted in analyses. For example, counting “one, two, three” or “one, two, three, four, five, six, seven” are both considered one instance but are classified as three and seven number tokens respectively (Gunderson & Levine, 2011). For all other types of number talk, each word was coded as a separate instance. For example, if a parent said “Here are three apples and two grapes” it would be coded as two instances of number talk.

Instances of number talk were further coded according to whether parents were counting, using cardinality (labeling the number of a set), or as “other” (i.e. included references to Arabic numerals, time, child’s age, or conventional nominatives like “high five”; Gunderson & Levine, 2011; see Table 1 for examples). As mentioned previously, our analyses primarily focus on counting and cardinal number talk, since they occur most frequently (75% of number talk in our sample was one of these two types) and are more related to children’s subsequent number knowledge than other types of number talk (e.g., Casey et al., 2018; Mix et al., 2012).

Table 1. Examples of types of parent number talk.

Type of talk	Example
Counting	“One, two, three, four, five.”
Cardinal Labeling	“Here are three bears”
“Other”:	
Arabic Numerals	“That’s a two”
Time	“One minute”
Age	“You are three years old”
Conventional Nominatives	“High five!”

Socioeconomic status

As in our previous work, we created a measure of socioeconomic status (SES) based on family income and the educational attainment of the primary caregiver. These variables were collected categorically on a parent questionnaire at or before the first visit and transformed into continuous scales (income categories: Less than 15,000, USD 15,000 USD – 34,999, USD 35,000 USD – 49,999, USD 50,000 USD – 74,999, USD 75,000 USD – 99,999, USD 100,000 USD or more; education categories: Some High School, High School or GED, Some College or Trade School, Bachelor's Degree, Advanced Degree). Income and education were positively related ($r(36) = 0.463, p = .004$) and were combined into one SES variable using a Principal Components Analysis. The analysis found one component, our composite SES score, which accounted for 73% of the original variance and weighted income and education positively and equally. Families with a high score on the SES composite have a high annual income and a primary caregiver with a high level of education.

The SES composition of the participants included in this study did not significantly differ from the original sample. That is, of the eight families that were included in the Levine et al. (2010) study but not in this study, four had incomes or education levels below the mean of the larger sample, and four had incomes or education levels above the mean. Additionally, while we use the reported income and education from the first session in these analyses, we also collected demographic information at each subsequent session so that we could track changes in income and educational attainment overtime. We recreated the composite SES score for the demographic variables collected at the session during which math anxiety was collected and the two SES composite scores were highly correlated ($r = .838, p < .001$).

Parent math anxiety

Parent math anxiety was assessed using the sMARS (Alexander & Martray, 1989), which is a 25-item version of the widely used 98-item MARS (Suinn, 1972). Parents responded to questions about how anxious different situations would make them feel (e.g. “studying for a math test,” “calculating a tip at a restaurant,” etc.). Responses were recorded on a 5-point Likert scale (1 = *not at all*, 2 = *a little*, 3 = *a fair amount*, 4 = *much*, 5 = *very much*). All analyses were performed on the average of the 25 items. Parent math anxiety ranged from 1 to 4.2, with a mean of 2.22 ($SD = 0.91$).

Results

Descriptives of parent number talk

We first sought to characterize the frequency and types of parent number talk observed in our sample. Since parent number talk was relatively rare, we aggregated the data across the five sessions to create more stable measures of parent number talk that could be used in our models. Overall, the average of parent number talk was 52 instances ($SD = 35.32$, Range = 1– 144; see Figure 1). SES and Parent Math Anxiety were not significantly correlated with one another ($r = .228, p = .181$; see Table 2).

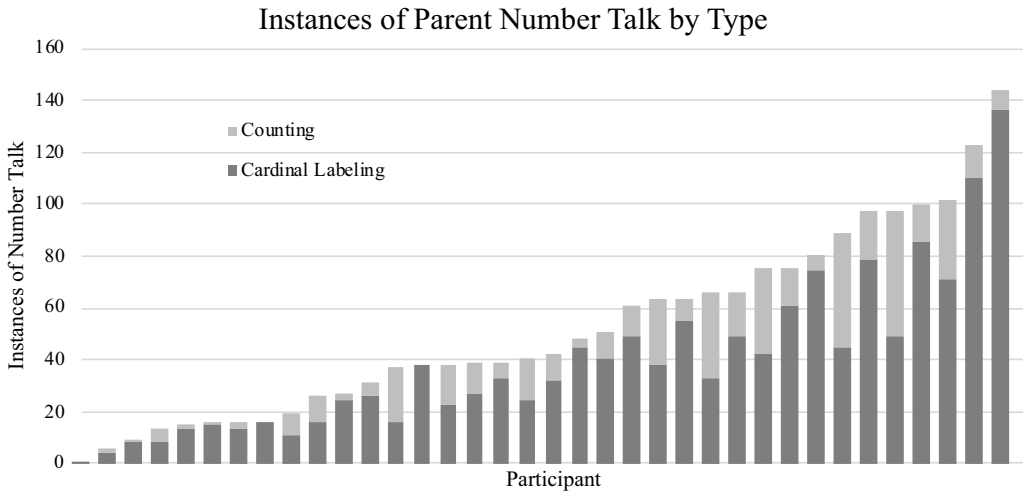


Figure 1. Average number talk across all five sessions for each participant by type. Parent number talk across all five sessions varied between participants. Almost all participants produced more instances of cardinal labeling than of counting number talk.

Table 2. Zero-order correlations.

	Parent Math Anxiety	SES	Number Talk	Cardinal Labeling
Parent Math Anxiety				
SES	.228			
Number Talk	-.248	.313 ^a		
Cardinal Labeling	-.242	.321 ^a	.942***	
Counting	-.121	.116	.569***	.261

^a $P < .10$; * $P < .05$; ** $P < .01$; *** $P < .001$

Relations between quantity of parent number talk, parent math anxiety, and SES

We conducted a series of regression analyses to explore the relations between parent math anxiety and the quantity of parent number talk. First, using a General Linear Model predicting parent number talk from SES, parent math anxiety and their interaction, we found a main effect of parent math anxiety on overall parent number talk ($F(1,32) = 5.43$, $p = .026$; see Figure 2a) and of SES ($F(1,32) = 11.23$, $p = .002$; see Figure 2b), the latter reproducing the results we found in our larger sample (Levine et al., 2010). Additionally, we found a significant interaction between math anxiety and SES ($F(1,32) = 5.92$, $p = .021$); see Table 3), indicating that SES significantly moderates the relation between parent math anxiety and parent number talk.

To further probe the SES x Parent Math Anxiety interaction, we tested the conditional effects of math anxiety on parent number talk at two levels of SES (one standard deviation above/below the mean), as well as the conditional effects of SES on parent number talk at two levels of math anxiety. Analyses revealed that math anxiety was significantly related to parents' number talk for parents who were one standard deviation above the mean in SES ($b = -28.62$, $SE = 8.61$, $p = .002$, 95% CI $[-46.16, -11.09]$). However, math anxiety was not related to parents' number talk for those parents who were one standard deviation below the mean SES ($b = 1.93$, $SE = 8.42$, $p = .820$, 95% CI $[-15.22, 19.09]$; see Figure 3). Similarly, SES

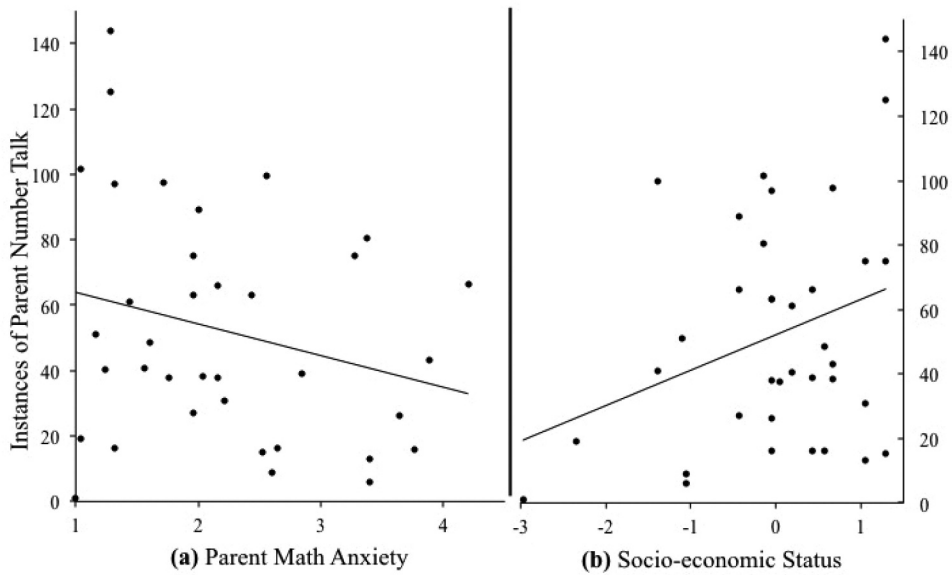


Figure 2. Relation of (a) Parent math anxiety and (b) SES to instances of parent number talk. (a) Parents who are less anxious about math engage in more number talk with their children and (b) parents who come from a higher SES background (i.e. higher level of education and/or higher level of income) engage in more number talk than parents of a lower SES background.

Table 3. Impact of parent math anxiety and SES on parent number talk.

Variable	95% CI				η^2_p
	B	SE	Lower Bound	Upper Bound	
Intercept	84.58***	13.78	56.51	112.64	.541
SES	39.24**	11.71	15.38	63.09	.260
Parent Math Anxiety	-13.39*	5.75	-25.11	-1.68	.245
SES x Parent Math Anxiety	-14.45*	5.94	-26.56	-2.35	.156
R-squared [†]	.330				
Adj. R-squared	.267				

* $P < .05$; ** $P < .01$; *** $P < .001$

[†]Parent SES accounted for 9.8% of the variance in our model. Parent Math Anxiety accounted for an additional 10.8% of the variance, and the interaction between the two accounted for an additional 12.4% of the variance.

was significantly related to parents' number talk for parents who were one standard deviation below the mean in math anxiety ($b = 20.42$, $SE = 5.92$, $p = .002$, 95% CI [8.37, 32.48]), but not for parents who were one standard deviation above the mean in math anxiety ($b = -5.97$, $SE = 9.67$, $p = .541$, 95% CI [-25.67, 13.72]). That is among higher SES parents, math anxiety is negatively associated with the amount of number talk they engage in with their children whereas this is not the case for lower SES parents. And, among lower math anxious parents, SES is positively associated with the amount of number talk they engage in with their children whereas this is not the case for parents who are more math anxious.

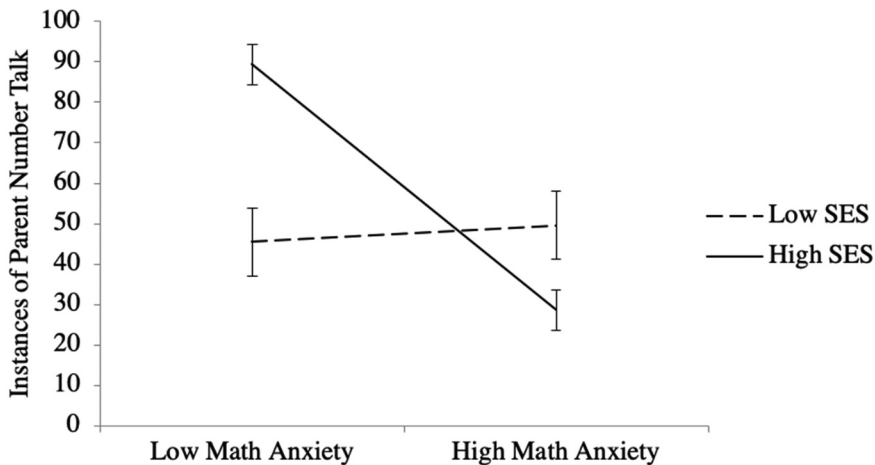


Figure 3. Relation of parent math anxiety and family SES to parent number talk. High-SES, low-math-anxious parents provided significantly more number talk to their children than their high-SES – high-math-anxious counterparts. Higher-SES adults who experience high levels of math anxiety look more similar to lower-SES parents, regardless of their math anxiety, in terms of the frequency of math talk they engage in with their children. High and Low distinctions for math anxiety and SES are based on $\pm 1SD$ from the mean. Error bars represent standard errors.

Relations between types of parent number talk, parent math anxiety and SES

We next explored how parents' math anxiety related to various types of number talk that parents engaged in. Overall, the average of cardinal number talk was 39 instances ($SD = 30.09$, Range = 1– 136) and the average of counting number talk was 13 instances ($SD = 12.24$, Range = 0– 48; see Figure 1). Cardinal and counting number talk were positively, but not significantly correlated with one another ($r = .261$, $p = .124$).

We then explored whether the significant effect of parent math anxiety on parent number talk was specific to their cardinal or their counting number talk. Using a Multivariate GLM predicting cardinal and counting number talk from SES, parent math anxiety and their interaction, we again found that overall, parent math anxiety was a marginal predictor of number talk ($F(2,31) = 2.87$, $p = .078$), and SES was a significant predictor of number talk ($F(2,31) = 6.55$, $p = .004$) as was the interaction between the two ($F(2,31) = 3.67$, $p = .037$; see Table 4 and Figure 4a). Looking at the specific types of math talk, we found that math anxiety was a significant predictor of parents' use of cardinal labeling ($b = -11.28$, $p = .025$) as was SES ($b = 35.89$, $p = .001$), and the interaction between parent math anxiety and SES was significant for parents' use of cardinal labeling ($b = -13.61$, $p = .010$). However, neither parent math anxiety nor SES were significant predictors of parents' counting behavior with their children, and the interaction of these two variables also was not significant. Furthermore, follow-up comparisons of these parameters found that the difference between the effect of math anxiety on cardinal number talk and counting was marginally significant ($F(1,64) = 2.92$, $p = .092$). The effects of SES and of the interaction term (math anxiety \times SES) were significantly different between the two types of number talk ($F_{SES}(1,64) = 8.87$, $p = .004$; $F_{SES*MA}(1,64) = 5.60$, $p = .021$), reflecting the significant effects of SES and the interaction

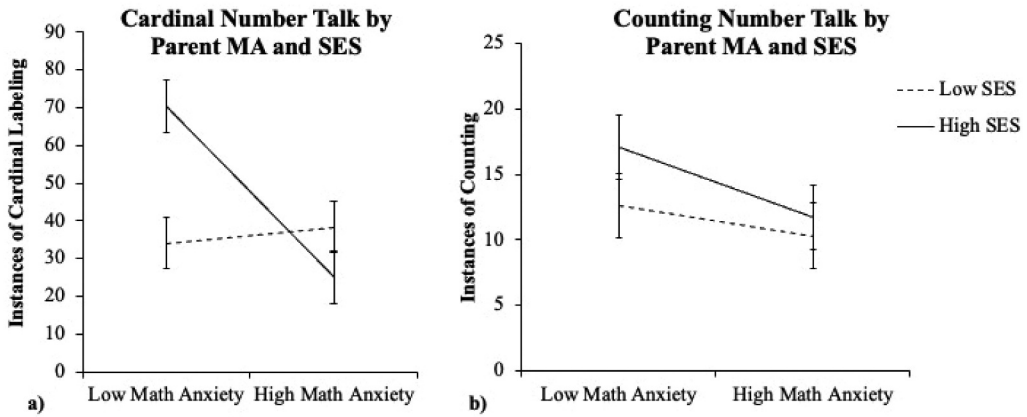


Figure 4. Relation of parent math anxiety and family SES to (a) Parent’s cardinal number talk and (b) Parent’s counting number talk. There is a main effect of math anxiety and SES, as well as a significant interaction between the two, on parents’ use of cardinal number talk with their young children. However, no such relation exists for counting number talk. High and Low distinctions for math anxiety and SES are based on $\pm 1SD$ from the mean. Error bars represent standard errors.

Table 4. Multivariate test of cardinal and counting number talk.

Variable	Multivariate Tests					Univariate Parameter Estimates			
	Λ	F	df ₁	df ₂	η^2_p	B	SE	95% CI	η^2_p
SES	.703	6.55**	2	31	.297				
Cardinal Labeling						35.89***	9.76	16.02, 55.77	.515
Counting						3.34	4.86	-6.55, 2.75	.015
Math Anxiety	.848	2.78 ^a	2	31	.152				
Cardinal Labeling						-11.28*	4.80	-21.04, -1.52	.148
Counting						-2.11	2.39	-6.97, 2.75	.024
SES x Math Anxiety	.808	3.67*	2	31	.192				
Cardinal Labeling						-13.61**	4.95	-23.69, -3.52	.191
Counting						-.847	2.46	-5.87, 4.17	.004

^a $P < .10$; * $P < .05$; ** $P < .01$; *** $P < .001$

between SES and math anxiety for cardinal labeling but not counting (see Table 4 and Figure 4b).

Discussion

Building on the previously reported relation between early parent number input and SES (Levine et al., 2010), the current study found evidence that parent math anxiety relates to parent number talk. In particular, we found that the relation of parent math anxiety to parent number talk in this sample was driven by certain kinds of number talk – specifically, talk about cardinal number, a kind of talk that has been identified as being especially important in children’s math development (Casey et al., 2018; Geary et al., 2018). This is the first report that parents’ own math anxiety is related to a common and important kind of early number talk in the home environment.

Most notably, we found that parents who were high math anxious were less likely to engage in cardinal number talk than their lower-math anxious counterparts. In addition, we found that low SES parents engaged in less cardinal number talk than their high SES counterparts. Interestingly, the relation of math anxiety to parent number talk was driven by high SES parents; that is, high SES/low math anxious parents engaged in more number talk than did their high SES/high math anxious peers. However, this was not the case for low SES parents, who tended to produce less number talk than higher SES parents, regardless of their math anxiety. We did not see a relation of math anxiety or SES for counting number talk, though this lack of an effect may be due to the fewer instances of counting observed in our data.

Previous research suggests that labeling cardinal values of sets is the kind of early number talk that is most related to children's math knowledge, and thus, at least in that sense can be regarded as "high quality" (e.g., Casey et al., 2018; Elliott, Braham, & Libertus, 2017; Geary et al., 2018; Ramani et al., 2015). Notably, this is the type of number talk that is the most common kind of number talk found in early parent-child interactions. Thus, the lower amounts of this kind of number talk found in higher-SES, high math anxious parents, and in lower-SES families regardless of math anxiety, could have a negative long-term effect on children's math knowledge.

We take these results as a preliminary indication that higher math anxious parents are less likely to incorporate a common and important kind of number talk – labeling the cardinal value of sets – into their daily routines and play at home, possibly reflecting the math avoidance that has been reported for math anxious adults in other contexts such as electing to engage in math activities and classes. These results also provide further support for the paucity of number talk – particularly cardinal number talk – provided by lower SES families. Lower SES families may be engaging in less number talk for several reasons. First, there are many possible socio-cultural factors that could influence this relation. For example, this could be related to parents' work schedules and other commitments, difference in which skills parents prioritize helping their children build (e.g. literacy or social/emotional skills over math), differences in whether they view math learning as the responsibility of the schools rather than their responsibility, or differences in parents' own math education. Math anxiety may also cause some individuals to avoid taking math classes, which in turn may lead to them being less likely to engage their children in math at home. Alternatively, lower levels of math talk by math anxious parents may be another manifestation of their math avoidance.

These findings highlight the importance of taking the time to understand the specific barriers to math engagement that families face. The interaction of math anxiety and SES suggests that the approaches we use to support family math engagement need to take family demographics as well as parent attitudes into account. Here we focused on one such barrier, math anxiety, but parent-child math interactions may also be influenced by parents' other math attitudes (e.g. stereotypes, math self-efficacy, and expectations and values of children's math achievement). Differences might also be related to variations in parent knowledge about the importance of early math talk to later math achievement.

Boosting the quantity of number talk among low-SES families remains an important goal, and this is the case for parents across the spectrum of math anxiety. While we found it is clearly important to focus on finding ways to boost number talk among higher-SES parents who are experiencing math anxiety, future work should explore the specific

opportunities for math engagement, and impediments to math engagement, that families from diverse backgrounds experience in order to develop interventions that align with the cultural practices and values of families.

There are several limitations of our findings. First, it is important to note that our findings are correlational in nature. Second, while naturalistic observations provide a glimpse into what parents are doing at home, the interactions did not include large amounts of number talk (on average, number word tokens accounted for < 1% of all word tokens during these interactions; Levine et al., 2010). Relatedly, it is particularly worth noting that when number talk was broken down into types, we found a significant relation of both math anxiety and SES with cardinal labeling but no relations between math anxiety or SES and the less frequent type of number input (i.e. counting). This may be because parents are more likely to know that they should count with children than to know that labeling set size is important, muting the relation of SES and math anxiety to counting. Alternatively, because counting occurred relatively infrequently in our sample we may not have been able to detect significant associations with math anxiety and SES. Future work with a larger sample size is needed to clarify these findings.

Conclusions

This study found that parents who are from low-SES backgrounds or who are higher in SES but highly math anxious engage less with their children in a particular kind of high quality number talk – labeling the cardinal value of sets – and that both of these factors relate to parent-child math engagement even during the earliest years of a child's life, when children range in age from approximately 1 to 2 ½ years of age. These findings highlight the importance of supporting parent-child math engagement for families who are low-SES regardless of parent math anxiety and for higher SES families in which parents are anxious about math. This can be done by creating materials that promote math talk at home, an idea we have started to explore in our work through both number books (Gibson, Gunderson, & Levine, 2020), apps (Berkowitz et al., 2015), and puzzles (Eason et al., 2018). Furthermore, these results highlight the need for additional research examining how math anxiety relates to parent-child math engagement with regard to both the activities and math talk families engage in with their children at home. Interventions designed to support parents in their math interactions with their young children will be most successful if they are developed in conjunction with the parents who will be using them, and if they build on parents' typical routines, practices and culture. Understanding why some parents may or may not frequently engage in certain kinds of math conversations with their young children is a critical first step in the diagnosis of the problem. Collaborating with families to find ways that build on their strengths – such as adding cardinal labels to the counting they are already doing – can ultimately lead to more robust early math learning for all children.

Acknowledgments

We wish to thank Kristi Schonwald and Jodi Khan for administrative and technical support, as well as the project research assistants that facilitated data collection. Finally, we wish to thank our participating families for their time and effort.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

Research reported in this publication was supported by the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health under Award Number [P01HD040605] to Susan Goldin-Meadow and Susan C. Levine, the National Science Foundation Spatial Intelligence and Learning Center (Grants [SBE-1041707 and SBE-0541957] to Susan C. Levine), and the National Science Foundation Science of Learning Collaborative Network Grant #[1540741] to Susan C. Levine.

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