Does cooking involve 'math'? The relationship between math conception and math anxiety in Indian elementary and middle-school students

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Abstract

Math is all around us, but propensity to notice the role it plays in everyday life might differ from person to person. Here, we test whether children with broader conceptions of math experience lower levels of math anxiety. In Study 1, we gathered data from 98 Indian middle schoolers in Vadodara, Gujarat. Children who categorized more activities in a provided list as "math" demonstrated more positive attitudes towards math on a math anxiety scale. We also found that breadth of math category predicted how skilled children believed themselves on activities they included in their math conception. In Study 2, we explore when these effects emerge. We tested 94 children aged 7-10. We found that while children in this range exhibit significant variability in math conception, their breadth of math conception does not predict their math anxiety. We discuss implications of our findings for interventions to mitigate math anxiety in children.

Keywords: math anxiety; conceptions about math; STEM success

Introduction

We do math all the time, from planning exactly when to start running to the bus stop, to figuring out the optimal spatial organization of groceries in the fridge. While math is ubiquitous, and indeed, inevitable in day-to-day experience, a significant percentage of adults report experiencing *math anxiety* (Hart & Ganley, 2019), or an adverse emotional reaction to doing math (Ashcraft, 2002). Individuals with higher math anxiety demonstrate worse math performance, and are less likely to pursue fields of work that rely on math performance (Hart & Ganley, 2019). Multiple studies have found that individuals higher in math anxiety perform worse in math in academic settings (see Zhang et al. (2019) for review), with some arguing that math anxiety drives math performance and others arguing the opposite (see Carey et al. (2016) for review). Together, these lines of work suggest that math anxiety and math performance reinforce one another: a child who believes that they are bad at math in early childhood may be more likely to experience anxiety while doing math, and their anxiety may further strain their ability to perform well in math (Ashcraft & Kirk, 2001; Ashcraft & Krause, 2007). Ultimately, this cycle can generate dangerous results if it persists—youth who are still experiencing elevated math anxiety in high school are less likely to pursue career pathways in STEM fields (Eidlin-Levy et al., 2023). As such, it is of societal importance to better understand the factors that contribute to its development (Hembree, 1990). The present studies investigate whether math anxiety may develop in children and adolescents in part because of how they conceptualize math as a domain (Foushee et al., 2017; Jansen, 2021). From this perspective, individuals who have a broader conception of what math is—and who perceive math in many activities that they enjoy and feel skilled at—may be less likely to exhibit math anxiety and more likely to approach new activities that involve math, compared to individuals who associate math only with a narrow set of activities that they neither enjoy nor feel good at.

Prior work has identified several possible mechanisms to explain the developmental origins of math anxiety. For example, some research has found that teachers and caregivers can transmit math anxiety to children (Beilock et al., 2010). Children of math-anxious parents tend to struggle with math in school, and they exhibit higher levels of math anxiety themselves (Berkowitz et al., 2015; Maloney et al., 2015). Similarly, teachers who are higher in math anxiety tend to have students who perform worse on math assessments (Beilock et al., 2010). These associations may be driven by the ways in which adults interact with children, which may in turn shape children's intuitive theories of math performance, as demonstrated by similar work involving parental growth vs. fixed mindsets (e.g., Barger et al., 2022; Song et al., 2022; Xie et al., 2022). For example, parents' use of statements that describe aptitude for math as an innate attribute, like "You are just not a math person," predicts their children's math anxiety levels (Barger et al., 2022). Indeed, students who attribute failure in math to an intrinsic lack of ability (instead of to a lack of effort, for example) display higher levels of math anxiety (Arkin et al., 1983; Ramirez et al., 2018).

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Here, as previously proposed by Foushee et al. (2017) and Jansen (2021), we explore a potential source of math anxiety, located in how youth conceptualize "math" as a domain. We suggest that the functional definition of "math" varies between children, and that this variation is consequential in shaping children's math anxiety and propensity to approach (versus avoid) "math" in their daily lives. In our two studies, we measure the "breadth" of children and adolescents' math conceptions by asking them whether "math" is involved in a number of different activities—including some that obviously involve it, like arithmetic, as well as others that involve it in more implicit ways, like cooking. We expect that youth who have broader conceptions of what math is may more readily see "math" in activities that do not obviously involve math, and—compared to youth with more narrow conceptions of math—will be less likely to experience math anxiety because they see math in many everyday activities that they do not feel anxious toward.

As a further test of this idea, we hypothesize that when young people feel more skilled at activities that they believe involve "math," they will also report less math anxiety. As such, we administer a self-assessed skill measure here. Children appear to internalize the belief that STEM requires raw intelligence, or brilliance, by first grade, which affects their perceived self-efficacy and interest in math (Jenifer et al., 2022). When they reach the second grade, American children endorse the idea that math is just not for everyone to succeed in (Cvencek et al., 2011). This is to say that even before tangible differences in classroom math aptitude emerge, young children display strong beliefs about their own and others' math ability. In turn, these conceptions affect their own self-efficacy and perceptions of skill. Our studies complement prior work by asking whether children's concepts of what "math" is—above and beyond their theories of what it takes to be good at math—may be an important source of their math anxiety.

Consistent with our hypothesis, previous work has found that, among a sample of American adults and Indian middle school students, individuals with broader math conceptions reported less math anxiety (Foushee et al., 2017). For intellectual and practical reasons, it is important to understand how and when this association may emerge among children. Thus, we build on this prior work to trace the developmental trajectory of the relation between math conception breadth and math anxiety among 7- to 13-year-olds from a K-12 school in Gujarat, India. Critically, if the relative breadth of children and adolescent's math conceptions can protect them from developing math anxiety, then intervention efforts targeting conceptions of math in activities they enjoy and excel at might effectively reduce math anxiety and avoidance.

Study 1: Math Conception and Anxiety in Middle-Schoolers

Study 1 investigated the relationship between breadth of math conception and math anxiety in middle school children in Gujarat, India. We aimed to replicate the pattern of results found by Foushee et al. (2017), and expand upon the study design by incorporating measures of perceived skill. Our analyses, including our final model, are pre-registered here: https://aspredicted.org/bdz7-8kcx.pdf.[1]

Materials and Methods

Participants Using G*Power (Faul et al., 2007), we estimated that in order to detect an a medium-size effect (Cohen's f squared = .15), we would need 74 participants, given $\alpha = .05$ and $\beta = .95$. A total of 101 Indian 6th, 7th, and 8th grade students at a school in Vadodara, Gujarat participated in our task. Three were excluded for not following instructions, leaving a sample of 98 ($M = 12.20$, $SD = 0.82$, range: 10.80 - 13.80, 46 female) for final analyses. While the study itself was administered in English, all printed instructions were available in English and Hindi. All Hindi translations and back-translations were completed by bilingual research assistants. Participants were tested in groups of five to 10 by experimenters in a quiet classroom. Participants were seated apart from one another to minimize any chance that they could see one another's responses, and experimenters were present to ensure that participants did not share responses. Participants were assigned to one of four counterbalance orders.

Math Conception Our math conception measure consisted of a list of 40 activities that participants of this age and cultural context are familiar with, some of which explicitly involve math (e.g., 'geometry'), and others that involve it more implicitly (e.g., 'cooking' involves measurement and calculation; see Figure 1). These activities were chosen based on prior work that found them appropriate for this age range and cultural context (Foushee et al., 2017; Jansen, 2021). Participants were asked to circle "Yes" or "No" in response to the question "Is mathematics included in [this] activity?" We operationalized 'breadth' of math conception as the proportion of activities for which the participant responded "Yes." Going forward, items included in a participant's math conception will be referenced as "math" items, and items binned as *not* including math as "nonmath".

Self-assessed Skill The self-assessed skill questionnaire contained the same 40 activities as the math conception measure, presented in a different randomized order. Participants were asked what level of skill they have (or think they would have if they were to try the activity) for each item, on a scale of 1 to 5.

[1]There are two changes made in the present analyses from our pre-registration document. The first is that in our main model, we are including average self-assessed skill on "nonmath" items—items that a participant did not consider math—as a fixed effect. The second is an exclusion that we failed to specify in the preregistration: the maximum number of items in our breadth of math conception and self-assessed skill measures that could be left blank (5) before a given participant's data would be excluded from analyses.

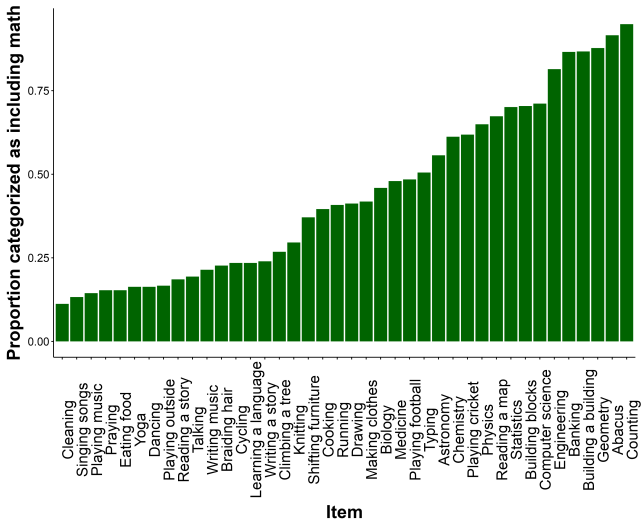

Figure 1: Proportion of participants in Study 1 who answered "yes" when asked whether each item could include math.

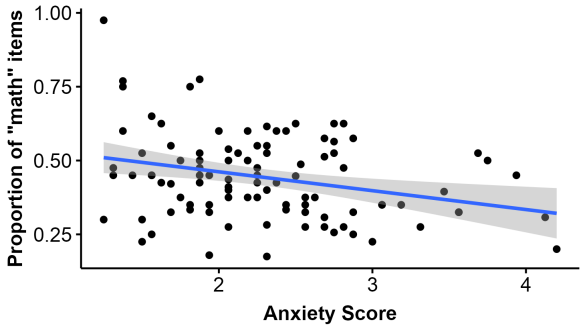

Figure 2: Relationship between math anxiety score and breadth of math conception in Study 1 ($\beta = -1.76$, $SD = 0.53$, $t(87.88) = -3.33$, $p = .001$).

Math Anxiety We adapted a version of the Child math anxiety questionnaire from Barner et al. (2016), which itself was adapted from Ramirez et al. (2013), for use among Indian middle schoolers, and has been validated. The questionnaire contains 19 (3 warm-up, 16 test) questions probing students' attitudes towards math, which participants responded to on a 5-point face scale from "Not nervous at all" to "Very, very nervous." Some questions measure anxiety in response to a given math problem (e.g., "How nervous do you feel when you have to solve $75\times$ 182?"), others in response to a scenario that might arise when doing math in a classroom (e.g., "How nervous do you feel when getting your math book and seeing all the numbers in it?"), and some in response to a situation that might arise in everyday life (e.g. "How nervous do you feel when figuring out if you have enough money to buy a sweet and a cool drink").

Results

We ran a pre-registered linear regression model using the lme4 package in R (Bates, 2015) to test the hypothesis that individuals with a broader conception of math display lower levels of math anxiety. Our dependent variable was item-by-item response on the math anxiety scale, with fixed effects for breadth of math concept, mean perceived skill on "math" items, mean perceived skill on "nonmath" items, gender, grade, and counterbalance, and random intercepts for subject and item.[2] We also ran an exploratory logistic mixed effects model with "math" vs. "non-math" categorization as a binary dependent variable to explore the effect of self-assessed skill of math conception.

[2]We did not include a random intercept for item in our pre-registration, but its inclusion did not change our pattern of findings.

Breadth of Math Conception There was considerable variability in placement of activities in the "math" category (Figure 1). On average, participants indicated that 44% of the activities on the provided list could include doing math (Range: $17.5\% - 97.5\%$; $SD = 14\%$). Activities explicitly practiced in math classrooms were almost unanimously considered to include math—'geometry' (88%), 'abacus' (92%), 'counting' (95%). On the other hand, everyday activities—'cleaning' (11%), 'singing songs' (13%), and 'praying' (15%)—were less likely to be considered as including math. Fields that recruit number or equation knowledge—physics (65%), statistics (70%)—and fields in the broader STEM category—biology (46%), medicine (50%)—received intermediate proportions of math category inclusion.

Math Anxiety & Math Conception Anxiety score, as a subject level variable, was calculated using the mean of responses to the 16 test questions. On average, participants received an anxiety score of 2.30 out of 5 (range: $1.25 - 4.20$; $SD = 0.66$). Their average math conception breadth, or the proportion of activities they categorized as "math" was 0.44 ($SD = 0.14$) and they had an average self-assessed skill level of 3.96 ($SD = 0.65$) across all activities.

As predicted, our pre-registered model revealed that children with broader conceptions of math had lower average math anxiety scores ($\beta = -1.76$, $SD = 0.53$, $t(87.88) = -3.33$, $p = .001$) (Figure 2). Self-assessed skill on "math" items, on the other hand, was not a significant predictor of math anxiety levels ($\beta = -0.08$, $SD = 0.10$, $t(87.9) = -0.79$, $p = .44$), and neither was self-assessed skill on "nonmath" items ($\beta = -0.11$, $SD = 0.11$, $t(88.0) = -0.99$, $p = .33$). Math anxiety did not significantly differ by participant's gender ($\beta = -0.20$, $SD = 0.14$, $t(87.89) = -1.47$, $p = .14$) or grade in school ($\beta = -0.32$, $SD = 0.17$, $t(87.84) = -1.89$, $p = .06$).

To test whether perceived skill was related to breadth of math conception, we ran an exploratory logistic mixed effects model on trial-wise data with "math" categorization (versus

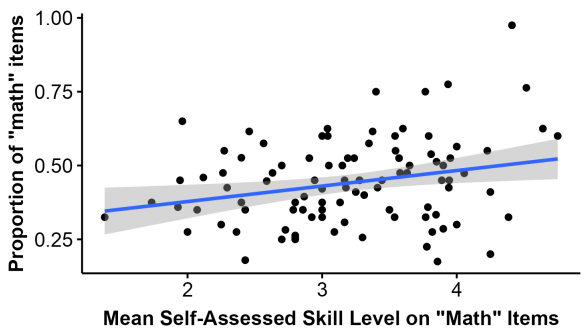

Figure 3: Relationship between mean self-assessed skill on "math" items and breadth of math conception in Study 1 ($\beta = 0.08$, $SD = 0.04$, $z = 2.34$, $p = .02$)

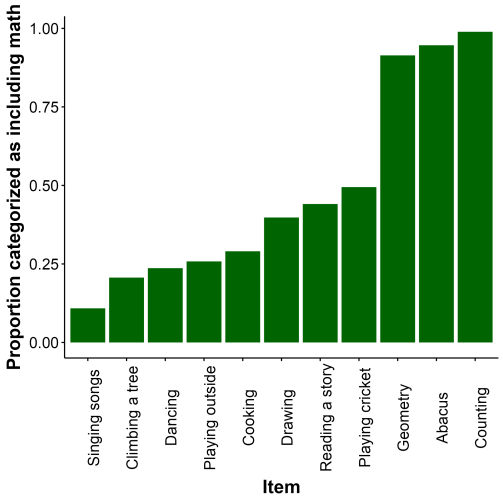

Figure 4: Proportion of participants in Study 2 who answered "yes" when asked whether each item could include math

"nonmath") of a given activity as a binary dependent variable, fixed effects for self-assessed skill for that activity, gender, and grade, and random effects of activity and subject. We found that children who indicated that they were more skilled at an activity were more likely to categorize that activity as involving "math" ($\beta = 0.08$, $SD = 0.04$, $z = 2.34$, $p = .02$) (Figure 3). When we add math anxiety score as a fixed effect to this model, self-assessed skill remains significant ($\beta = 0.08$, $SD = 0.04$, $z = 2.25$, $p = .02$), and math anxiety is also a significant predictor breadth of math conception ($\beta = -0.40$, $SD = 0.123$, $z = -3.22$, $p = .001$), as in our pre-registered model.

Study 2: Math Conception and Anxiety in Elementary School Students

In Study 1, we replicated previous work that demonstrated a relationship between the breadth of math conception and math anxiety level in Indian middle schoolers. We also found that individuals who judged that a broader set of activities could involve math felt that they were more skilled at those activities. Next, we adapted our measures for use with a younger age group–3rd through 5th graders–to understand whether they also exhibit variable conceptions of math, and whether breadth in their math conception predicts their math anxiety. Given previous research showing that math anxiety can emerge as young as the second grade (Wu et al., 2012), investigating whether elementary school students' attitudes about doing math are shaped by their conceptions of "math" could inform possibilities for early intervention. Our analyses are pre-registered here: https://aspredicted.org/kbq7-t3n3.pdf

Materials and Methods

Participants Given the same parameters as our power analysis in Study 1, we determined that we would need a sample of 74 students. 94 Indian 3rd, 4th, and 5th grade students from the same school in Vadodara, Gujarat completed our study. One was excluded for participating twice, leaving 93 participants ($M = 9.38$, $SD = 0.82$, range: $7.90 - 10.9$, 48 female) for final analyses.

Math Conception To make our measures more appropriate for the attention spans of younger participants, we reduced our math conception measure from 40 to 11 items. The final subset of items was selected based on observed variability in Study 1 , to elicit a wide, meaningful range of "math" placements in Study 2. Some of the items we retained from Study 1 were almost always binned as "math" (e.g. counting), some were almost never binned as "math" (e.g. cleaning) and some fell somewhere in the middle of the distribution (e.g. cooking) (see Figure 4). To ensure that participants understood the activities being referenced, they were shown a picture of a child (of the same gender as the participant) acting out the listed activity.

Self-assessed Skill We elicited skill judgments for the same 11 items used in the math conception measure, presented in a different order. Participants were presented the same pictures of a child performing the activity as in the math conception measure and were asked how "good [they are] at each item" on a 5 point thumbs-up scale from "Poor" to "Very Good" (Kano et al., 2010).

Math Anxiety We used the math anxiety measure developed by Barner et al. (2016) exactly as is, as it was originally created for use within this age range and cultural context.

Results

We ran the same analyses as for Study 1 (see Study 1 Results, page 3) again here, including a pre-registered linear regression model, and an exploratory logistic mixed effects model with "math" vs. "nonmath" categorization as a binary dependent variable.

Breadth of Math Conception As with the older children, there was a wide range in the placement of activities in the

"math" category and in the number of items categorized as math by each individual (see Figure 4). On average, participants considered 48% of the items to include math (range: $9\% - 100\%$; $SD = 17\%$). 'Counting' (99%), 'abacus' (95%), and 'geometry' (91%) were widely considered to involve math, as in Study 1. 'Playing cricket' was moderately considered to involve math (50%), while activities that do not heavily recruit counting or numbers frequently—'climbing a tree' (21%), 'singing songs' (11%)—were least likely to be considered involving math.

Math Anxiety & Math Conception On average, participants received an anxiety score of 2.27 out of 5 (range: $1.0 - 4.18$; $SD = 0.70$). Their average breadth of math conception, or the proportion of activities that binned as "math" was 0.48 ($SD = 0.17$), and had an average self-assessed skill level of 3.98 across all activities ($SD = 0.65$).

Although participants exhibited variability in the activities they included in the "math" category, participants with broader conceptions of math did not demonstrate significantly lower levels of math anxiety ($\beta = -0.07$, $SD = 0.45$, $t(83.99) = -0.16$, $p = .87$). However, we found a negative trend between self-assessed skill on "math" items and math anxiety score ($\beta = -0.21$, $SD = 0.11$, $t(83.99) = -1.88$, $p = 0.06$). Though this effect was small and not significant, the directionality is consistent with our prediction that when youth feel skilled in the activities that they could potentially see "math" in, they are less math anxious. We did not find a similar effect of self-assessed skill on "nonmath" items and math anxiety score ($\beta = -0.11$, $SD = 0.10$, $t(83.99) = -1.13$, $p = .26$), suggesting that participants who felt that they were more skilled at activities in general, did not report experiencing less math anxiety. Math anxiety did not differ by participant gender ($\beta = -0.10$, $SD = 0.14$, $t(83.99) = -0.70$, $p = .49$), but did differ by grade ($\beta = -0.40$, $SD = 0.18$, $t(83.99) = -2.23$, $p = .03$) with fifth graders reporting lower math anxiety.

Finally, as in Study 1, our exploratory logistic regression model found that participants were more likely to categorize an activity as involving 'math' when they felt that they were more skilled at that activity ($\beta = 0.23$, $SD = 0.08$, $z = 2.95$, $p = .003$). When we add math anxiety score as a fixed effect, self-assessed skill remains a significant predictor ($\beta = 0.24$, $SD = 0.08$, $z = 2.96$, $p = .003$), and anxiety score remains insignificant, as reflected in our pre-registered model ($\beta = 0.05$, $SD = 0.18$, $z = 0.26$, $p = .80$).

General Discussion and Conclusion

In two pre-registered studies, we explored one potential source of variability in children's attitudes toward math: their conceptions of what "math" is. We asked middle-school (Study 1) and elementary-school (Study 2) children in India to indicate whether each activity on a provided list could include doing math. We used the proportion of activities for which they answered "yes" as an index for the breadth of their "math" conception. Participants also rated how skilled they believed themselves to be on each activity as a measure of self-efficacy, and completed a math anxiety questionnaire. Based on prior work with adults and middle-schoolers (Foushee et al., 2017), we predicted that children with a broader conception of math would more readily see "math" in activities that don't explicitly require it, and that these children would also express less math anxiety. The novel perceived skill measure we introduce builds on existing work by accounting for the possible effect of self-efficacy in shaping the breadth of children's math conceptions and their relation to math anxiety.

With both age groups, we found that children had diverse conceptions of math. In middle-schoolers (Study 1), we found that the broader participants' math conception, the lower they scored on a math anxiety scale. We did not detect this relationship amongst our younger sample (Study 2), though we observed a non-significant trend between self-assessed skill level on "math" items and math anxiety in this sample. In both studies, we also found that children who felt more self-efficacy on a particular activity were more likely to categorize it at "math". While gender disparities in math anxiety are highly prevalent in American populations, we did not find these differences in our studies, complementing other work in suggesting that gender disparities in math attitudes are not inevitable (e.g., Brown et al., 2020; García-Santillán et al., 2018; Sarfo et al., 2020).

In both studies, our measure for gauging children's math conceptions produced significant variability. It could be that before being asked to think about whether activities included math in our study, children had already categorized these activities as involving math or not. It is also possible that, for at least some of the activities, children had not previously reflected on whether math was involved or not, but when prompted to do so, those with a broader, more dynamic conception of math were more likely to see it, even within activities that only implicitly involve math. Regardless, it is striking that even before receiving advanced math education, young children seemingly form sophisticated and diverse ideas of where "math" can be found in the day-to-day. Prior work (Jansen, 2021) that probed conceptions of math in American 5- to 7-year-olds similarly found that young children are already developing variable ideas of what can be considered "doing math." An important task for future work will be trace how math conceptions broaden or narrow with age, and the factors that predict this.

One such factor highlighted in the present study is self-efficacy: we found in both studies that children who reported being more skilled at an activity were also more likely to categorize it as involving math. One explanation for this finding is that people are more able to see math in things that they have some depth of knowledge and skill in. It is also possible that feelings of self-efficacy toward such activities ultimately lead individuals to explore new activities that are introduced as having "math" in them, leading them to further broaden their math concepts.

By finding that middle schoolers with broader conceptions of math experience lower levels of math anxiety on average, we successfully replicated previous work that has found this same relationship among American adults and Indian middle schoolers (Foushee et al., 2017; Jansen, 2021). One explanation for the relationship between breadth of math conception and decreased math anxiety is that individuals who have a narrow and superficial conception of math, and who perceive math only in a few items that explicitly involve math—algebra, geometry, and arithmetic, for example—may be at risk for developing negative attitudes towards all of math as a whole. Their limited experience with only a select few activities that they dislike may effectively color all of math unenjoyable and unapproachable. As a result, they may be more anxious about doing math. By contrast, individuals who have a richer, more abstract conception of math may more readily see it in a range of activities, which may protect them from developing negative attitudes toward math as a whole. Any negative experiences that they have with some aspects of math may be diluted by the presence of other activities in which they also see math. It is also possible that experiencing math anxiety could discourage individuals from pursuing additional forms of math, ultimately restricting their breadth of math conception, and preventing them from participating in activities that they would be good at or enjoy–and which could, in fact, lower their math anxiety in the long-run.

Critically, we did not detect a significant effect of math conception breadth on math anxiety levels in our younger age group (Study 2), even though participants reported mild levels of math anxiety. It is possible that a wider math conception only begins to act as a protective factor against math anxiety as children receive more exposure to math. Borrowing from work done with parent-child dyads that demonstrates an immediate increase in children's spontaneous focus on number after playing a number-centric game (Braham et al., 2018), one possibility is that on a broader scale, children become more aware of math in the everyday after engaging with it more frequently. That is, children may be more likely to perceive math in activities that might not explicitly recruit it (e.g. cooking) as they are exposed to it more. As children receive richer, and more varied information about the many facets of math, they may become increasingly able to see math in everyday activities that they are skilled at and enjoy which could later affect their attitudes toward math as a whole.

Although we did not detect a relationship between math anxiety and breadth of math conception among younger children (Study 2), there was a non-significant trend whereby these children were less likely to express math anxiety when they reported higher levels of skill on items they had categorized as involving math. We did not find a similar effect of average skill on "nonmath" items, which suggests that it is particularly how self-efficacious children feel about activities in which they perceive "math" that may be related to their math anxiety. It is plausible, and indeed consistent with our hypothesis and previous findings (Cuder et al., 2024; Ferdinand et al., 2024; Jansen, 2021), that the more self-efficacious individuals feel about the activities in which they can perceive math, the more positively they feel about the domain, regardless of how broadly they construe the domain.

This work is not without limitations. It is possible that the null effect of math conception on math anxiety in Study 2 reflected challenges in the measurement of these constructs. For example, the younger children in Study 2 were provided a list of only 11 activities to make the task less taxing (reduced from the 40 items presented to older children in Study 1), but this could have led to more noise in our measurement of math conception breadth–an issue that could be addressed in future work. Moreover, attitudes towards math manifest in a myriad of ways, and here, we only focused on math anxiety. For example, we included a novel behavioral measure to probe children's math *avoidance* that we do not report in this paper. Such measures may inform how math anxiety and other attitudes toward math affect children's behavior and decision making.

Overall, a large body of prior work shows that children's anxiety toward doing math can be a barrier to performing well in math in school and pursuing STEM-related careers (e.g., Ahmed, 2018; Eidlin-Levy et al., 2023; Ferdinand et al., 2024). If a more varied conception of math can serve as a possibly protective factor against math anxiety, interventions that seek to broaden and enrich people's conceptions of math could encourage them to explore STEM-related pursuits. Prior work has attempted to broaden math conceptions in middle school students and shown promise (Foushee et al., 2017; Jansen, 2021). Still, further investigation is needed to establish whether broadening children's conceptions of math is sufficient to reduce their math anxiety. Subsequent work should also further probe the specific role of self-efficacy and enjoyment on activities that include math—both implicitly and explicitly—in shaping attitudes and conceptions of math. If feeling more efficacious about activities in one's math conception encourages further exploration of math-related activities, re-appraising children's abilities in these activities, either while or subsequently re-construing these activities as "math," could encourage them to approach math in new forms and alleviate their anxiety about doing it.

Ultimately, we hope that the work outlined here will provide insight into how the ways in which we see "math" in the world around us affects our attitudes towards math as a domain. To our knowledge, these are the first studies that examine the relationship between math conception, math anxiety, and self-efficacy among children. We build on existing work by providing evidence that what children believe "math" is could be an important contributor to their math anxiety. Crucially, if children's math conceptions can shield them from the discouraging effects of math anxiety, then interventions that broaden children's math conceptions can mitigate math anxiety and its detrimental consequences.

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