

# Math teaching anxiety and teachers' pedagogic practice in Swedish preschools

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*This presentation reports the results of a pilot study (N=50) testing the construct validity and reliability of a questionnaire in which teachers' ratings showed a negative, statistically significant ( $p=0.10$ ) correlation of moderate size between higher levels of math teaching anxiety and a lower frequency of math related language use in preschools ( $r=-0.360$ ). Math anxiety involves worry and feelings of tension manifested when manipulating numbers or solving math problems, in the classroom and in everyday life. As instruction quality of teachers with higher MA levels, and their own attitudes and beliefs about mathematics might impact students' MA and math performance, the results suggest that teachers' self-awareness of their language output in relation to their math teaching anxiety levels can contribute to mitigate the intergenerational effect of MA.*

## **Significance, results and application of the *interpretation account***

Math anxiety (MA) keeps children and adults alike away from engaging with mathematical concepts and operations. This may have short-term effects in terms of poor math performance and life-long effects in terms of education and career choices. This paper adopts an interpretative framework for discussing the relation between preschool teachers' math teaching anxiety (MTA) and how often they use math related language. Math anxious teachers are here viewed as teachers who report negative affect, tension and apprehension when exposed to math, which interferes with their math teaching performance.

Math anxiety in teachers and the relation between teachers' and children's MA levels are mostly unexplored. Furthermore, most studies measure teachers MA without exploring how it affects their teaching practices. To bridge this knowledge gap, we developed a self-reported questionnaire addressing the question *What is the relation between teachers' attitudes towards math (including MA and MTA) and their language practices?* A confirmatory factor analysis identified two separate constructs measured with this tool, here referred to as MA and MTA. This instrument also inquires how often preschool teachers engage into conversations about math content with the preschool children in diverse typical Swedish preschools' contexts. The results of the pilot study (involving 50 teachers) showed a negative, statistically significant ( $P= 0.010$ ) correlation of moderate size (according to Cohen's rules) between higher levels of MTA and a lower frequency of math related language use in preschools ( $r = -0.360$ ).

The questionnaire had teachers rank fourteen statements showing their level of agreement on a Likert scale from 1 to 5 (Completely Disagree-Agree Completely).

Statements 1 to 7 correspond to MA's emotionality, worry and social/evaluative aspects (e.g. *My palms start to sweat and I feel uneasy when I have to do math calculations*). Statements 8 to 14 inquired about MTA (e.g. *I worry about making mistakes while talking about math with the children in my group; If a child asks me to elaborate on a math concept, I would feel uncomfortable*). A third section contained four questions that focused on the frequency of math-related language use of teachers, providing examples of activities for each of the four areas indicated in the preschool curriculum: *counting, ordering, patterns, and geometry*. On a Likert scale from 1 to 5 (Never-Always) teachers indicated how often they engage in math-talk (e.g.: *To what extent do you talk to children about counting (recite the count words, count objects in a set, ask the children to count) in the following situations: gatherings, table time, halls, specific teaching moments, and excursions*). When the math-talk ranks reported in these four areas were combined as one value, we found a significant negative correlation with the math teaching anxiety levels (see Figure 1).

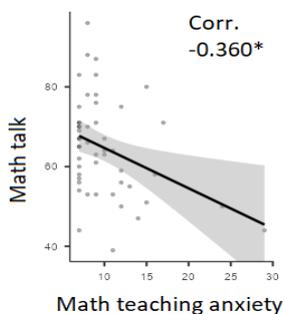


Figure 1. Negative relation between MTA and frequency of math talk \*( $p < .05$ )

So how can these results be interpreted and explained? Considering it is likely that the development of MA is influenced by social factors such as the interaction with teachers who themselves suffer from it, as well as from difficulties in numerical cognition (Dowker, et al., 2016), the aim of this study was to explore whether MA is a common cognitive-affective path, which

may modulate math teaching performance. The distinction between MA and MTA established by our results, provides initial insights on the mechanisms behind the intergenerational effect of MA and its development. It also relates MTA to teachers' pedagogic practices. Therefore, adopting the *interpretation account* of Ramirez, Shaw, et al., (2018), which claims that appraisal of math-related events explain the differences in performance of individuals with MA, our results point towards the need for a greater emphasis on math specific pedagogy in training programs offered to pre and in-service teachers, and for investment in exploration of didactic interventions that target teachers' appraisal and reappraisal of math related stimuli and language output.

## References

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