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# Math Anxiety in Primary School Students: Measurement, Mediators, and Cross-Cultural Comparisons

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## Akademisk avhandling

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### **Abstract**

This thesis was conducted within the project Choking Under Pressure, a longitudinal study following Swedish Grade 4 students during four semesters. The main purpose of this thesis was to develop and validate a math anxiety rating scale for Swedish-speaking primary school students in a Nordic context, and to explore the underlying mechanisms in the math anxiety–math performance relationship. This thesis consists of four studies, where Studies I and II adopt a measurement perspective. Study III provides a review of the role of working memory in the math anxiety–math performance relationship. Study IV extends Study III by empirically examining working memory and self-concept as mediators.

Study I assessed the validity and reliability of the Swedish MARS-E. Test-retest reliability and internal consistency demonstrated longitudinal stability and strong item agreement. Dimensionality analysis supported a one-factor structure, with evidence of both gender and longitudinal invariance. Significant gender differences in math anxiety were found, increasing across time points.

Study II extended Study I by combining data from two Finnish projects—one Finnish and one Finland-Swedish—with the Swedish sample. All measurements were conducted in Spring 2023 on Grade 4 students using the same instruments. A one-factor model was found for both Swedish-speaking groups, whereas the Finnish version of the MARS-E supported a two-factor model.

Study III was a literature review employing meta-analysis to examine the relationship between working memory and math anxiety, and the mediating role of working memory in the math anxiety–performance link. Results from 57 studies showed a significant negative correlation, and data from 8 studies indicated a partial mediation effect.

Study IV empirically examined how working memory and math self-concept influence the math anxiety–math performance link. Using structural equation models across two longitudinal waves, as well as multiple mediation, the results showed that both working memory and self-concept in math are important mediators in this relationship.

The main contributions of this thesis are the development and validation of the Swedish MARS-E, as well as a deeper understanding of the mediating roles of working memory and math self-concept in the math anxiety–math performance relationship. These findings have implications for both research and educational practice, refining theoretical models of math anxiety and its cognitive and motivational correlates, and providing a foundation for interventions targeting math anxiety.

### **Keywords**

Math anxiety, working memory, math performance, validity, mediation

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