



Education as a hope in uncertain times

Thessaloniki 22 - 26 August 2023

Individual differences in early numeracy, executive functions, motor skills and physical activity

My talk focus on our research groups' latest research findings about young children's early numeracy learning and possible learning difficulties in it. We aim to produce new scientific evidence about developmental dynamics in early numeracy, executive functions, motor skills and physical activity. We also control for fine motor and language skills, and family socioeconomic-status. The study line started with an observation that children's physical activity, motor skills and the knowledge of mathematical skills have been decreasing during the last decade. Is it so that an inactive lifestyle causes problems for learning?

Empirical evidence from school age children has recently been obtained concerning the positive association between motor and academic performance in cross-sectional and longitudinal paradigms. For instance Diamond (2000) suggested that the close association between motor and cognitive development is mediated by the coactivation of the cerebellum (critical for complex and coordinated movements) and the prefrontal cortex (critical for higher-order cognitive functioning, for example, the executive functions). Early numeracy development has been shown to be associated with children's EF and language skills, but less studies have studied them together particularly with a focus on children with mathematical learning difficulties.

We collected longitudinal data from three measurement points with 300 children aged 3-6 years. We have also used the interventions to manipulate the developmental trajectories: we investigate the effects of three interventions: early numeracy and motor skills intervention, motor skills intervention, and early numeracy intervention. Our preliminary results demonstrate a mediating role for executive functions in relation between motor and early numeracy skills. The results from the pilot intervention study suggest that it is beneficial to combine motor and early numeracy skills practice with preschoolers' having low early numeracy performance. In EARLI 2023 I present the results from the longitudinal data set and two intervention studies.



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