

# Emotion, cooperation and locomotion crucial from an early age

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What are the fundamental skills that young children need to develop at the start of school for future academic success? While a large body of research shows strong links between cognitive skills (attention, memory, etc.) and academic skills on the one hand, and emotional skills on the other, in students from primary school to university, few studies have explored these links in children aged 3 to 6 in a school context.

Researchers from the University of Geneva (UNIGE) and Valais University of Teacher Education, Switzerland (HEP-VS), in collaboration with teachers from Savoie in France and their pedagogical advisor, examined the links between emotion knowledge, cooperation, locomotor activity and numerical skills in 706 pupils aged 3 to 6. The results, to be read in the journal *Scientific Reports*, show for the first time that emotion knowledge, cooperative social behavior and locomotor activity are interrelated and associated with numerical skills. These results are in line with the political and scientific consensus on the importance of social-emotional skills in early schooling and suggest that locomotor activity should be added to these fundamental skills.

A growing number of studies are examining the fundamental abilities that prepare children for school and that are particularly crucial for their future academic success. "Among these abilities, 'emotion knowledge' contributes significantly and is a long-term predictor of social behavior and academic success," says Edouard Gentaz, professor in the Department of Psychology at the Faculty of Psychology and Educational Sciences (FPSE) of the UNIGE and the last author of this study. On the other hand, few studies have examined the links between socio-emotional and academic skills in preschool children. "To fill this gap, we joined forces with the HEP-VS and a team of teachers from Savoie in France and their pedagogical advisor to examine how emotion knowledge, social behavior and locomotor activity are associated and linked to the numerical skills in 706 pupils aged between 3 and 6 years old," continues the Geneva-based researcher. Unlike most research that generally examines school results through reading tests, this study focuses on numerical learning, the performance of which is less correlated with parents' socio-economic level than language skills.

## **Original tests adapted to the preschool age and educational context**

To examine the links between the four variables studied, age-appropriate tests were developed in close collaboration with 33 volunteer teachers, who participated in an interactive workshop in which they were trained to set up, perform and evaluate the different tests in a standardized manner. Thus, emotion knowledge was assessed through two emotion comprehension tasks. The first measured the recognition of the primary emotions of anger, fear, joy and sadness as well as a neutral facial expression and the second measured the understanding of the external causes underlying these emotions in others. This second task was subdivided into two different subtasks: the teacher successively presented the student with five drawing scenarios illustrated by a picture of a character with a blank face facing a particular situation (e.g., "This boy has just received a present for his birthday") and then asked the student to indicate, among five illustrations of facial expressions, the one that corresponded to what the character felt in each situation, first by pointing to it (non-verbal responses) and then by naming it. The assessment of mathematical skills included three numerical tests. For example, the first test sought to assess whether students understood that the cardinal of a collection does not change when the spatial arrangement or nature of its elements is modified: the teacher placed a photograph in front of the student showing four collections of objects (two of which were composed of the same number of elements) and asked the student to indicate which collection contained the largest number of objects, which contained the fewest, and which two collections contained the same number.

Working closely with the teachers and their advisor, the psychologists developed observation grids to assess the locomotor activity and social behavior of the pupils. For locomotor activity, the grid created made it possible to rate the children's performance on an agility course consisting of various installations on the ground and in the air. As for social behavior, the grid developed made it possible to evaluate the children's reactions and attitudes during the practice of two different team games

(one with a ball and the other without) observed by the teachers.

## Key skills to promote numerical learning

The results of this study reveal that emotion knowledge, locomotor activity and social behavior are interdependent and associated with pupils' numerical skills from the age of 3 to 6 years. "Indeed, specific statistical analyses (regression and mediation) show that high scores on tests assessing emotion knowledge, locomotor activity and social behavior predict better mathematical performance in these students," notes Thalia Cavadini, researcher in the Department of Psychology at FAPSE and first author of the study. "Thus, our results are in line with the scientific consensus on the importance of social-emotional skills at the beginning of schooling and suggest that locomotor activity should be added to these fundamental skills," she concludes. Furthermore, this study is the first to show that emotional, social and locomotor skills promote school learning in toddlers.

**More information:** Thalia Cavadini et al, Emotion knowledge, social behaviour and locomotor activity predict the mathematic performance in 706 preschool children, *Scientific Reports* (2021). [DOI: 10.1038/s41598-021-93706-7](https://doi.org/10.1038/s41598-021-93706-7)

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