

Poor motor skills in two-year-olds could indicate slow development in mathematical proficiency

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A Norwegian study shows that two-year-olds with poor motor function also exhibit poor mathematical skills. This knowledge will make it easier for teachers to identify children who may need extra help.

Children relate to mathematics from birth. A newborn uses shape recognition to distinguish its mother's face from that of stranger, a one-year-old encounters classification by noticing that animals that make different sounds are called different things, a two-year-old explores shapes and sizes when playing with blocks, and the ability to think logically is necessary for knowing what clothes to put on when it is raining. Nevertheless, it can be challenging for the teachers of small [children](#) to say what mathematical level the children are actually on. Researchers at the University of Stavanger's Norwegian Reading Centre have now established that there is a correlation between motor skills and [mathematical skills](#) in two-year-olds. The results were published in the European Journal of Early Childhood Education in June of this year.

"It is important that teachers of small children are aware of these findings. It will be easier for them to identify children who may be at risk of having difficulties in understanding mathematics. This knowledge can ensure that teachers and staff are quicker to help and support such children with mathematics", says Associate Professor Elin Reikerås of the Norwegian Reading Centre at the University of Stavanger.

Big differences in mathematical proficiency

Reikerås is one of the researchers involved in the Stavanger Project, which is monitoring the development of over 1000 children aged two to ten years in kindergartens and schools in Stavanger. The vast majority of Norwegian children start kindergarten at the age of 1. The study into the correlation between mathematical skills and [motor function](#) uses data from structured observations of children between the ages of two and nine months.

The motor skills the researchers looked at were whether the child had mastered activities such as putting on clothes, doing jigsaws, eating with a spoon and fork, using scissors, walking around the room without bumping into things, using playground equipment and throwing and catching a ball. The researchers divided the children into three groups according to their level of motor skills: poor, average and strong.

Different mathematical skills were examined, such as if the two-year-olds were able to use their fingers to show how old they were, if they could use the shape sorter box, play picture lotto, sort toys or objects (according to colour, size or category, for example), demonstrate the difference between big and small through the use of body language or words, use numerals ("I have a thousand cars!") and draw a tadpole.

"Children with good motor skills were more mathematically advanced in all of the areas that were studied, and those with average scores in the motor skills group also had average scores for mathematical skills. There were big differences in mathematical skill levels between the children with the strongest and poorest motor skills. Most of the children who had poor motor skills were not very good at mathematics. We cannot comment on causality, only that the level of mathematical proficiency can be reflected in motor skills", says Reikerås.

Learning with the body

Children's motor skills are important for play, discovery and experience.

"Children create experiences when they use their bodies. This is also important within mathematics. When children play, climb, crawl and hide outdoors, this contributes to the development of spatial awareness. Shapes and sizes are explored through drawing, painting and playing with blocks. Putting on clothes in the right order or sorting and tidying toys requires both logical reasoning and motor skills. Dealing with numbers, such as giving a cup to everyone and then pointing and saying the numbers, also involves connections with motor function", Reikerås points out.

More research is required, however, into the significance of motor skills and the early development of mathematical proficiency. As this study has only looked at two-year-olds, the researchers do not currently know if children continue to develop within these two areas and if the correlation continues to be as strong later on.

"The Stavanger Project has data available that could facilitate further study in this area. It would be particularly interesting to study if poor motor function in two-year-olds could be an indicator of slow development in mathematical proficiency" says Reikerås.

The importance of a holistic approach

"Number, space and shape" has been one of seven focus areas in Norwegian kindergartens since 2006. The framework plan for Norwegian kindergartens states that: "Children develop mathematical skills through play, experimentation and everyday activities. Kindergartens have a responsibility to encourage children to explore and

to facilitate early and appropriate stimulation."

"Mathematics is already an important part of everyday activities in kindergarten, and Norwegian kindergartens are good at facilitating play and physical development", says Reikerås, who emphasises that a holistic approach is very important in the education of young children.

"Even though we have found a close correlation between mathematical skills and motor function, this does not mean that if we just focus on one area there will be also an improvement in the other area. Our findings reinforce the strength of the holistic approach, which characterises the work of Norwegian kindergartens. It is important to facilitate play-based activities where children can develop in several areas at the same time. Both motor and mathematical skills are important for children in the here and now, at play and during [everyday activities](#), but these skills are also important with regard to development and learning. The earlier this foundation is in place, the better it is for the child. Our findings mean that children with poor [motor skills](#) should be observed more closely for poor mathematical skills," says Reikerås.

Provided by University of Stavanger

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