Age differences in the relationship between motor skills and cognitive functioning in Swiss preschool children

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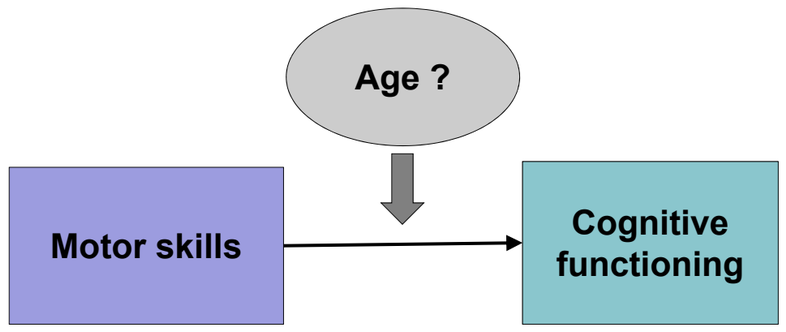
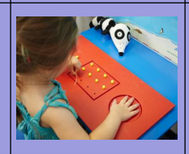
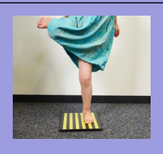
Introduction

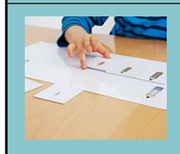
Many studies in clinical populations (e.g., preterms, ADHD) have reported about a positive relationship between motor skills and cognitive functioning[3,4], implying the more proficient in motor skills, the higher scores in cognition. However, investigations in healthy children are scarce. Most studies have found a weak positive correlation, which may be attributed to overlapping processes of executive functions[2,4]. Furthermore, it has been postulated that the relationship is depending on the age of the children. In fact, there is the hypothesis that the relationship is higher in young children[1] and decreases with age. We examined the extent and the nature of the relationship in typically developing children from 3 to 5 years of age.



Patients and Methods

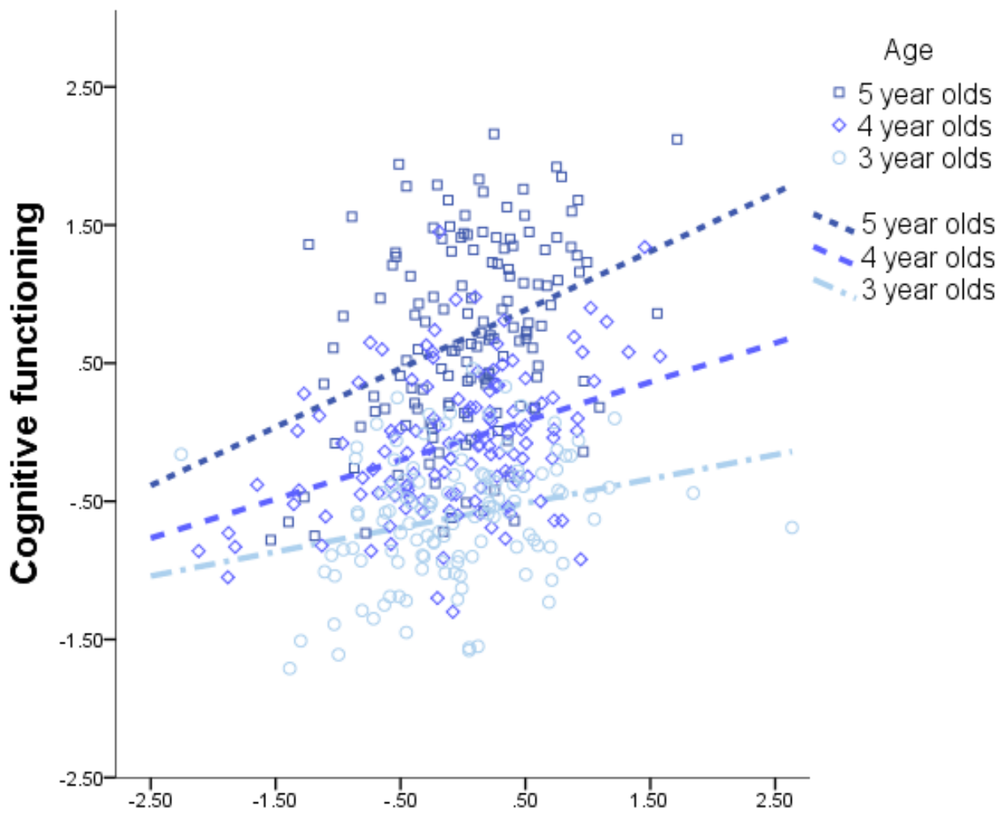
476 preschool children between 3 and 5 years participated in the Swiss Preschooler's Health Study (SPLASHY). The mean age was 3.88 (SD 0.68; 251 males, 225 females). All children were tested at the child care centres.
Motor skills were assessed using the Zurich Neuromotor Assessment 3-5 Years (ZNA 3-5). The cognitive functioning was measured with 4 subtests of the Intelligence and Development Scale for Preschoolers (IDS-P).

Motor skills				
pure motor	adaptative skills	dynamic balance	static balance	associated movements
				
repetitive / alternating hand movements, repetitive/ sequential finger movements	Pegboard	jumping sidewards, hopping on one leg, walking on a straight line, walking on tiptoes/heels	standing on one leg	involuntary movements of the contralateral body part

Cognitive functioning			
visual perception memory	selective attention	visual spatial working	figural reasoning
			
Order pencils among the size	Order ducks among the colour of their bills, while ignoring irrelevant cues (sun)	Remember geometric forms while ignoring the colour of the form	Copy presented figures with toy blocks

Results

We computed an overall mean score of the cognitive tasks and the motor skill tasks. There was a weak association between the overall scores of motor skills and cognitive functioning, *coef.* = .301, $p < .001$. This association was found to be moderated by age, *slope* = .176, *SE* = .051, $t(353) = 3.42$, $p = .001$.



Conclusions

We examined the relationship between motor skills and congitive functioning in 3 to 5-year-old children. Consistent with previous studies we found a weak positive association between these two abilities. Against the statement of Ackermann[1] our analyses indicated that for younger children this relationship is weaker than in older children.
These results may be due to higher developed executive functions (EF) in 5 year olds compared to 3 year olds. This explanation would also strengten the assumption that the association between motor skills and cognitive results form overlapping processes of EF.

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Literature

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