



- **About the Council**

- **Publications**

- **Projects**

## Focus and Planning Skills Can Be Improved *Before* a Child Enters School

**A review of a recent study that tested preschoolers' executive function skills after participating in a program designed to enhance them vs. a standard curriculum.**

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- **Contact Us**

**Why was the study done?** Academic achievement is the result of a combination of cognitive and noncognitive skills. These skills, which children rely on heavily throughout their educational careers, begin to develop in early childhood. Noncognitive skills include the ability to focus and ignore distractions, retain and use new information, plan actions and revise plans as needed, and inhibit impulsive behavior. Together, these skills are called “executive functions.” Executive function skills have been found in previous research to be associated with school readiness and academic success. But the brain processes underlying these skills are slow to mature, and therefore executive function skills are poorly developed in most preschoolers. Can a preschool curriculum specifically designed to improve these skills in young children succeed in doing so?

**How was the study conducted?** A total of 147 5-year-olds in their second year of preschool from a lower-income, urban school district participated in this study. The preschoolers were in 18 classrooms that were randomly assigned to either an executive function curriculum called “Tools of the Mind” or a standard academic curriculum that covered the same academic content but did not explicitly address executive function skills. The Tools of the Mind curriculum focused on both academic skills (e.g., literacy, math, science) and executive function skills, concentrating roughly 80 percent of a typical day’s activities specifically on executive function skill training. Exercises encouraging private self-talk (to help children remember and plan); activities to facilitate memory and attention; and dramatic play aimed at fostering cooperative planning and intentional role-play were embedded in classroom activities throughout the day. Teachers were trained in ways to support children’s efforts to acquire executive function skills. After the children had participated in either the executive function or the standard academic curriculum for one or two years, they were tested on a variety of follow-up measures evaluating executive function, including tests asking children to focus on a decision-making task while being presented with distractions and to shift from one rule to another in a timed identification task.

**What did the study find?** First, children who participated in the executive function curriculum performed better on the follow-up measures of executive function than children with the standard curriculum. Differences between children in these two groups were most pronounced on the more demanding tests of executive function skills. Second, for children in the executive function curriculum, performance on the follow-up measures correlated with independent measures of

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summarize the findings and implications of a recent study in basic science or clinical research. Studies are selected for review based on their scientific merit and contributions to understanding early development. No single study is definitive, of course. Understanding of early development is based on many studies that, taken together, permit broad conclusions and human applications. Generalizing to human children the results of studies with animals, for example, must be done cautiously and confirmed by research with children and their families. The National Scientific Council rests its work on a rigorous discussion of the validity of many studies like these conducted over many years and using different methodologies and samples.

academic performance such as reading. In other words, children who improved in executive function skills also made improvements in other measures of academic performance. Children with the standard curriculum were tested only on executive function skills, not on academic performance, so no comparisons in these outcomes were possible.

**What do the findings mean?** Although at preschool age most children are only just beginning to learn executive function skills, these findings indicate that an intensive training program, focusing explicitly on these skills, can help children develop these important tools. Preschool age children are in a developmental period of rapid growth in self-control, memory and attention, and the ability to make intentional plans with others. Findings suggest that focusing our attention on these executive function skills in this formative developmental period, through a curriculum incorporating noncognitive skill development like the “Tools of the Mind” curriculum, can be helpful and may also improve the development of more traditional academic skills. The findings of other research, indicating that executive functions are associated with academic success, are encouraging, but more research is needed to show whether this particular executive function curriculum will actually improve academic performance.

**Study Title and Authors:** Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science*, 318:1387-1388.

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