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Outside factors may help children develop internal control

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The ability to control your own behavior, known as executive function, might not exist all in your head. A new theory proposes that it develops with many influences from outside the mind.

The theory, detailed in *Perspectives on Psychological Science*, draws on dynamic systems theory which originated in mathematics and physics and has been used to describe complex organizing phenomena like cloud formation and flying patterns of birds. Now, a research team led by Washington State University human development assistant professor Sammy Perone is applying it to executive function, which has been shown to play a role in everything from children's readiness for school to their social relationships. Its development is also tied to long-term outcomes for adulthood.

"We propose that executive function is really about using cues from the environment to guide your behavior," said Perone. "As humans we use our experience and norms to decide what's the appropriate path to take, so to encourage executive function development, we want to help children build those connections between cues and appropriate behaviors."

In a classroom, these cues might include things such as decorations on the wall, verbal instructions or the way tables are set up. Eliminating environmental distractions may also help children control their behavior like having sharpened pencils on hand or resolving a tottering desk chair. In addition, physical things normally thought of as peripheral, like whether a child has adequate sleep or enough to eat, also influence executive function, Perone said.

Previously, the dominant view held that executive function was three distinct neurocognitive processes: working memory, inhibitory control, which is the ability to stop yourself from doing something, and cognitive flexibility, which allows you to transition from one activity to the next. This perspective has been called into question, Perone said.

"If these different cognitive processes are what makes up executive function, you would think you could just train those processes, and then,

you can then use them everywhere," he said. "Turns out, that doesn't work, and that's been shown over and over again. People think and behave in an environment, so we can't just train executive function by say doing computer exercises on working memory."

The new theory builds on the work of cognitive scientist Sabine Doebel who called for a redefinition of executive function in 2020 as the "development of skills in using control in the service of behavior." Perone and his co-authors from University of Kansas and University of Tennessee expand on that new definition by bringing in dynamics systems theory to help explain how humans use a variety of external factors to organize their behavior.

"We need to think more about executive function as it operates—as goal-directed behavior in the real world," Perone said. "When you take that perspective, all of the sudden, it becomes much more practical to childcare providers and parents, because that's where kids are thinking and behaving and developing."

More information: Sammy Perone et al, A Dynamical Reconceptualization of Executive-Function Development, *Perspectives on Psychological Science* (2021). DOI: 10.1177/1745691620966792

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