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COMMENTARY

The Potential for School-Based Interventions that Target Executive Function to Improve Academic Achievement

A Review

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Over the last 10–15 years, there has been a growing interest in the potential for school-based interventions that target executive function to improve academic achievement. Executive function can be thought of as the set of cognitive skills required to direct behavior toward the attainment of a goal, including the ability to prioritize and sequence behavior, inhibit dominant responses, maintain task-relevant information in mind, resist distractions, switch between tasks, use information to make decisions and create abstract rules and handle novel situations.

Since such skills are key to successfully completing most academic tasks, it seems intuitive that they would be related to academic achievement. Indeed, prior research has documented that students with poor executive functioning skills tend to perform poorly in school and numerous studies have documented a correlation between executive function and achievement in both reading and mathematics. As a result, scholars and practitioners have hypothesized that an explicit focus on developing executive functioning skills in school could yield substantial gains in student achievement.

However, what is unclear from the current research is if the relationship is causal; that is, whether improvements in executive functions will lead to increases in achievement. Executive function could be a proxy for other background characteristics of the child, such as socio-economic status or a parent's education level, which are each highly correlated with both achievement and executive function.

In this study, to understand this relationship more fully, my colleague Julia Parkinson (American Institutes for Research) and I conducted a systematic review of what is known about the association between executive function and achievement, and then critically examined the body of research to assess whether there is evidence of a causal relationship between the two.

Our meta-analysis of 67 studies indicates that there is a moderate unconditional correlation (around .30) between executive function skills (defined and measured in a variety of ways) and achievement at both a single point in time and as a predictor of future achievement. The correlation is present for both reading and math and holds for all K–12 age groups and subcomponents of executive function.

However, a careful look at the literature finds limited evidence that these associations are causal. We identified only thirteen studies (of the 67 reviewed) that explored the relationship between executive function and achievement and also controlled for child background characteristics and IQ. These thirteen studies included a total of 30 different associations between executive function and achievement. Of these, only eight remained positive and statistically significant after covariates were included in the regression model. In almost all cases the standardized effect sizes dropped by more than half, compared to the unconditional correlations.

The few random assignment studies which rigorously evaluate interventions designed to impact executive function provide some evidence that executive function can be influenced by intervention (most studies showed some positive impacts on measures of executive function), but provide no compelling evidence that impacts on executive function lead to increases in academic achievement. Although several interventions found positive impacts on achievement, these studies all involved interventions designed to impact executive function and achievement simultaneously, and as a result there is no way to determine if changes in executive function led to observed increases in achievement.

More work is needed to establish a causal link between executive function and achievement. Although the link may well be causal, it should be more clearly established before programs designed to improve executive function in school-age children are taken to scale.

The full study is in Robin Jacob and Julia Parkinson, "The Potential for School-Based Interventions That Target Executive Function to Improve Academic Achievement, A Review," Review of Educational Research, December 2015 vol. 85 no. 4 512-552.

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