

ADHD and Executive Function

"Executive function" refers to the conscious control of what we think and do. It is the process of making decisions and carrying them out.

The roles of executive function

Executive function plays two important roles:

- online, dynamic, moment-to-moment processing of information: the "orchestra conductor" role
- self-regulation over a longer time span, such as planning and decision-making: the "CEO" role



Executive function as orchestra conductor

One of the easiest ways to understand the moment-to-moment impact of executive function on behaviour is to think about the role of the conductor in an orchestra. An orchestra is made up of many different types of instruments, and each of these instruments is played independently. It is the conductor's role to integrate and organize the different instruments from moment to moment to achieve his musical goal regarding the piece. The conductor may need to respond to unexpected changes – for example, depending on the acoustics in the concert hall, he may need to ask one section to play louder.

Similarly, executive function allows a person to guide their own behaviour from moment to moment. Executive function involves a person's ability to:

- inhibit actions and regulate emotions
- resist distractions and control attention
- adapt flexibly to a changing situation

Executive function as CEO

Another role of executive function comes into play over longer time periods, when we set goals and make plans to achieve those goals. To understand this aspect of executive function, think about the role of the chief executive officer (CEO) in a large corporation. The CEO acts as the head "decision-maker" by organizing, planning, guiding, and integrating the various actions and decisions of the corporation's departments.

Similarly, executive function allows a person to control their actions and behaviour over the longer term. Examples of the CEO aspect of executive function include:

- representing or identifying a problem
- developing plans and executing them
- self-monitoring and evaluating the outcome of thoughts and actions

Individuals with executive function weaknesses often lack organization and focus and have difficulty adapting flexibly to the context or situation.

For a detailed discussion of executive function, please see the [AboutKidsHealth Executive Function series by Dr. Philip D. Zelazo](#).

Executive function and ADHD

Many studies have looked at executive function in children with ADHD. They have found that:

- ADHD is associated with weaknesses in executive function.
- Not every person with ADHD has these weaknesses.
- Children with ADHD and executive function weaknesses are more likely to repeat a grade, receive tutoring, or be placed in special education, compared with children who have ADHD but do not have executive function weaknesses.

An area of the frontal lobes called the prefrontal cortex is involved in executive function. This brain region is often smaller in children with ADHD.

Executive function and school success

There is a strong link between executive function and school success. This link is not surprising. Children in a classroom need to do many things that involve both the “conductor” and “CEO” roles of executive function. Children with executive function weaknesses may do poorly in school because they have trouble with these basic skills.

Because medication for ADHD may not address these problems, children with ADHD may need extra support at home and at school to help them compensate for weaknesses in executive function.

School success and the “conductor” role of executive function

The “conductor” role of executive function helps a child to:

- process incoming information while listening to a teacher’s explanation
- identify the relevant pieces of information
- inhibit irrelevant thoughts and ignore distractions
- hold the information in mind while linking it to what she already knows about the topic
- stay focused on a task

Children who have executive function weaknesses may have trouble with:

- holding directions in mind, especially if the directions are complex or multi-step

- multi-tasking (trying to organize and complete several tasks within a specific time frame)
- resisting or delaying impulses (for example, they tend to blurt out answers rather than raising their hand to be called on)
- monitoring how their actions affect others in a social context

School success and the “CEO” role of executive function

The “CEO” role of executive function is needed for:

- time management
- study skills
- planning
- setting goals
- self-monitoring
- integrating information and encoding it so the child can remember and retrieve it later on
- integrating skills, for example reading a book in order to write a book report
- applying established knowledge to new situations, for example applying math facts to word problems

Children who have executive function weaknesses may have trouble with:

- identifying the problem or knowing what the finished product of a task should look like
- planning, executing, and monitoring projects or assignments
- getting started on assignments, despite interest in the work
- setting goals and carrying out steps to achieve goals
- monitoring school work (for example, checking for errors)

Peter Chaban, MA, MEd
Rosemary Tannock, PhD

11/30/2009

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