

### What is executive functioning?

Executive functions are a set of cognitive skills that are used for both planning and carrying out tasks, and organising and regulating behaviour over time. Most researchers agree that working memory, mental flexibility and inhibition (CDC, 2011; Happe et al, 2006), along with attention and planning are all important elements. Dawson & Guare (2010) describe two broad areas of executive functioning and the elements that comprise these.

They are:

1. Skills that allow us to select and achieve goals, including:
  - Planning – deciding on what's important (and not important) and then creating a plan to complete a task
  - Organisation – the ability to use systems and materials to stay on task
  - Time management – understanding the importance of time and the ability to allocate tasks appropriately
  - Working memory – the ability to remember information while working on other tasks
  - Metacognition – thinking about our own thinking, includes self-monitoring and self-evaluation skills
2. Skills that guide behaviour, including:
  - Response inhibition – stopping an immediate response, thinking about the consequences of our actions before acting
  - Emotional control / self-regulation of affect – managing emotions to allow us to complete a task
  - Sustained attention – the ability to pay attention to a task as needed, despite boredom or fatigue
  - Task initiation – beginning a task without procrastinating
  - Flexibility – being able to change plans and adapt in the face of new information
  - Goal directed persistence – the ability to persist to see a project or task through to completion

Together, these skills allow us to make plans, keep track of time and finish work on time, cope with distractions, evaluate ideas, ask for help when needed, take turns in games and conversations, and stop ourselves from over reacting to minor situations. In addition, our executive functions help us to focus on multiple streams of information, check for errors, make decisions and revise plans given new information (CDC, 2011). Successful use of these skills allow students to participate successfully at school and manage their own behaviour, and are crucial in developing and maintaining social interactions.

Executive functioning skills begin to develop in infancy and continue to improve and change through to adulthood. Research with students on the autism spectrum has showed that older students perform better than younger students on measures of executive functioning (Happe et al., 2006). It is important to note however, that executive functioning difficulties might not be obvious in early childhood or during the early years of school, but may become more problematic in upper primary and high school when teachers are less likely to provide scaffolds and structure for students throughout the day.

### Executive functioning and autism

Researchers have suggested that the difficulties seen in children on the spectrum, including social difficulties and repetitive behaviours, may be attributed to difficulties with executive functioning (Happe et al., 2006). This cognitive theory of autism is in part based on the similarities noted in patients with acquired frontal lobe damage

(the location of most executive function skills) and those on the spectrum, such as repetitive behaviour and social difficulties (White, Burgess & Elizabeth, 2009).

Research has also indicated that differences in executive functioning skills exist between children on the spectrum and typically developing control groups. It is important to note however, that executive functioning problems are unlikely to provide a complete explanation for autism, partly because the executive functioning deficits seen are not specific to autism, but are also observed in children with diagnoses including attention deficit hyperactivity disorder (ADHD), and other disabilities (Happé et al., 2006; Liss et al, 2001).

While research indicates that children on the spectrum generally show deficits in executive functioning, it is not yet agreed which elements are most impaired and whether these impairments apply to all children on the spectrum. Some researchers have found that children on the spectrum show poorer performance than typically developing children and those with ADHD on measures of inhibition, working memory and flexibility (Corbett et al., 2009). Others have found difficulties with inhibition and flexibility, as well as with planning and verbal fluency (Geurts et al., 2004) but they possess better skills in working memory. Happé et al. (2006) suggest inhibition is relatively strong in children on the spectrum, but that they showed more difficulty in monitoring tasks.

It is likely that there may be no common executive functioning impairment across all people on the spectrum (White et al., 2009); rather, it is possible that a range of executive functioning deficits contribute more generally to some of the functional, academic and social difficulties experienced by children on the spectrum.

Some of the difficulties related to executive functioning that may be seen in children on the spectrum include:

- Difficulties with flexibility – it is possible that observed difficulties coping with changes, as well as the tendency for repetitive behaviour, may be strongly related to cognitive flexibility deficits
- Planning – many children on the spectrum need support to break tasks down into sections, understand the order in which to complete tasks and how to go about undertaking each task
- Working memory – while some children show strong memory skills, others may show poor working memory skills and struggle to remember longer instructions and other difficulties which can impact on learning
- Inhibition – for some children, difficulties with inhibition mean that they may struggle to take turns appropriately, wait for information before starting a task or have difficulty managing their own behaviour

Encouragingly, some research has indicated that while executive functioning skills continue to be an area of significant weakness in children with ADHD, children on the spectrum show improvement in executive functioning as they get older (Happé et al., 2006).

### How is executive functioning assessed?

Best practice suggests that information is gained from a variety of sources, including parent history, parents and teacher questionnaires, formal assessment and observation (Dawson & Guare, 2010; Cantin, Mann & Hund, 2012). Elements of executive functioning can be formally assessed by psychologists using a range of tools including formal assessment and parent/teacher questionnaires. It is important to note, however, that testing alone may not provide evidence of executive dysfunction (Dawson & Guare, 2010). Rather, information about the child's real life functioning is crucial in determining whether executive functioning issues may be playing a role in a child's difficulties at school and home. Teachers play a vital role in the assessment process by making observations about student functioning across a range of areas and by completing questionnaires.