

Strategies and activities for strengthening executive function in infants and toddlers



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Executive function supports children to control their thoughts, feelings and behaviours, so it is vital for [social and emotional competence](#), as well as the cognitive control children need for learning^{1 2}. Specifically, executive function skills comprise:

- **attention and inhibition:** the ability to focus and concentrate, to ignore distractions, and to control impulses and instead choose appropriate behaviours³
- **working memory:** the ability to hold several pieces of information in mind at the same time, in order to think about them, reason and make decisions⁴
- **cognitive flexibility:** the ability to think flexibly⁵, to switch gear and adapt to changing circumstances or demands when necessary, and to apply different rules in different settings⁶.

Executive function enables children to maintain attention and avoid getting distracted, to sit still and listen, to remember instructions, and to keep track of what they are doing as they are working. It can help children with skills such as waiting for a turn, cooperating well with others, resisting temptation, and dealing with difficult emotions such as anxiety, frustration or anger without hitting out^{7 8}.

Developing strong executive function skills supports children to develop their identities as competent and capable learners⁹. Executive function is related to the development of important learning dispositions¹⁰, such as being able to persevere (self-control), or to think creatively (cognitive flexibility). Research shows that children with high levels of executive function when they start school make faster progress in mathematics and can catch up with peers even if they are initially behind¹¹, and that higher levels of executive function protect students from the risk of academic failure associated with a poorer socioeconomic background¹². Outside of schooling, being able to make better decisions and operate effectively in a range of contexts¹³ are important life skills. The Dunedin Longitudinal Study found that strong self-regulation skills in early childhood were related to a range of areas of adult wellbeing and success in education, employment, health, and life satisfaction, and associated with a lower frequency of substance abuse or offending¹⁴.

The development of self-regulation and executive function skills is a gradual process which is shaped by children's experiences. The first important experiences are interactions with adults, which help infants to focus their attention, build their working memory, and manage their reactions to stimuli¹⁵. Self-regulation is a skill which improves with practice, and the early childhood years are an optimal time for the development of executive function skills, with different kinds of play and many everyday activities and games supporting this process^{16 17}. Younger children will need adult support while learning to regulate their behaviour, manage their attention and complete tasks, but ultimately the aim is for children to self-regulate, so adult support can be gradually withdrawn as children seem ready.

How to support the development of executive function skills

Language is essential in the development of executive function. Language helps children to understand and follow rules and instructions, both supporting them to manage their behaviour and to participate in games and play with others¹⁸. Language also helps children identify their thoughts and emotions, reflect on them, make plans, and remember information¹⁹. The development of executive function can be

facilitated by adults modelling their thought processes for self-control and self-management out loud, as well as plenty of adult-child talk in which adults support children to reflect on their experiences, to talk about their plans and outcomes, and to evaluate their ongoing progress towards a goal²⁰. Bilingualism should be encouraged and supported²¹, as access to another language is found to lead to better executive function and self-regulatory skills.

There are many **play activities and games** that encourage children to pay attention, hold information in memory, and adapt their responses to suit the changing needs of the game or play. Listed below are a range of games and activities based on language and play that are likely to enable children to practise their executive function skills, although their effectiveness has not been specifically evaluated by scientific research²².

Activities and games for younger infants (6-18 months)

For younger infants, self-regulation begins to develop in the context of supportive, reciprocal interactions with adults²³. These interactions help infants learn to focus, pay attention, and remember things that the adult says and does as well as the conventions of the interactions that they share.

Talk: Talking with infants helps to build attention, working memory and self-control²⁴. Learning language requires that infants develop their memory of words, and how they map to actions, objects and events²⁵. It is also very useful for children to experience conversations in home languages other than English.

- Follow infants' attention, and talk about the things that they are looking at or interested in, which helps infants to maintain their attention a little longer.
- Teach infants songs or chants with simple actions to help them develop self-control, language and working memory.

Play: Lap games with younger infants involve a predictable series of actions and provide some basic rules for guiding the adults' and infants' behaviour. Plenty of repetition is important, as it helps infants to learn their role in the game and manage their own behaviour to fit the game²⁶. It is important to pay attention to and select the games that infants enjoy and allow the infant to determine how long to play.

- **Play games like peekaboo**, in which children learn to predict and manage tension around the expected surprise of the reveal. The infant needs to use their working memory to remember who is hiding, and to practise self-control as they wait for the adult to reveal themselves.
- **Use *Round and round the garden* and other rhymes** to promote the development of working memory. As infants become familiar with the rhyme, they learn to manage high levels of stimulation, and to inhibit their anticipatory reactions while waiting for the expected action at the end of the rhyme (the tickle).

Hiding games challenge infants' working memory as they have to remember what they are looking for. They might also need to mentally track and remember where they have looked while searching.

- **Hide toys** while infants are watching what you are doing. This encourages the infant to track and remember your movements while hiding the toy, to know where to look for the toy. You can also hide a toy without showing an older infant where it is and encourage them to look for it. They will have to keep track of where they have searched as they look.
- **Encourage older infants to hide themselves.** As they listen to you search for them, they will be mentally tracking your location, and inhibiting their anticipation and excitement at being found.

- **Hide an object** under one of a set of cups, and then move the cups around (consider using a turntable or 'lazy Susan' to spin the cups). This encourages the infant to mentally track the movement of the cup which covers the item.

Infants also enjoy imitation. To imitate you, infants need to keep track of your actions, hold them in their memory and wait their turn to complete the action.

- **Initiate copying exchanges** in which infants imitate your actions (such as clapping, waving, and so on). You can also demonstrate ways to play with toys for infants to copy, such as making a car move or cuddling a teddy bear.
- You might **invite infants to copy play actions**, such as building simple towers and knocking them down²⁷. Increase challenge by making patterns to copy more complex as infants' skills improve.
- **Allow toddlers to copy and join in with tasks** such as sweeping the floor and folding the laundry. To do this they have to practise maintaining their attention, holding the various elements of the task in mind, and inhibiting impulses to do other things. As toddlers get older, they will be able to remember more complicated roles and sequences of actions. You can provide props (such as cleaning or cooking tools) to support this kind of role play.

Activities and games for toddlers (18-36 months)

Talk: It is important to continue conversing with older toddlers, as well as to watch and narrate their play, so they can understand the way in which language can describe what they are doing and thinking.

- **Describe what you see toddlers doing** and ask questions. This can help children reflect on what they are doing, evaluate their success, and plan further action.
- **Talk to children about their feelings**, and label children's feelings with language as they experience them²⁸. Emotion language gives children a tool with which to reflect on their feelings and supports children's growing capacity for emotional regulation.
- **Help children reflect on experiences** by telling stories about past shared events. As children listen, they practise holding the experience in working memory.

Play: As older toddlers develop, they can begin to use executive function skills to achieve more complex goals. They are increasingly able to focus and sustain attention on a task or goal, inhibit irrelevant actions, and be flexible in trying different approaches if their first attempts fail²⁹. At this age, children need lots of stimulus for learning new skills, such as throwing and catching balls, running up and down a slope, jumping, balancing and so on. These activities are not likely to be sustained for long and toddlers may need frequent reminders from adults as support.

- **Add extra rules and challenges** to physical games and activities to extend children's working memory and inhibition, such as remembering to collect a particular colour of scarf from the basket at the other end of the balance beam.
- **Use games such as *Follow the leader*** in which all the children have to imitate another child (this requires skills in working memory, attention and inhibition). You might also try freeze games like *Musical Statues* (with lots of reminders about when to freeze!) and song games, like *Ring-a-ring-a-ring-a-rosy*, or *Jack in the Box*, in which children have to start and stop, or slow down and then speed up, according to different cues.
- **Teach songs with actions**, which encourages toddlers to learn the words of the song and hold them in working memory so that they can do the actions at the appropriate points.

- **Offer matching and sorting activities**, which encourages children to hold and follow a rule for sorting or matching in mind (such as ‘all the red ones’). You can make this more challenging by asking children to put all the small shapes in a big bucket, and all the big shapes in a small bucket. Children are more likely to want to put the big shapes in the big bucket, so this will practise their ability to inhibit an action.

Endnotes

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- 11 Ribner, A. D., Willoughby, M. T., Blair, C. B. & the Family Life Project Key Investigators. (2017). Executive function buffers the association between early math and later academic skills. *Frontiers in Psychology*, 8 (869). <https://doi.org/10.3389/fpsyg.2017.00869>
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- 20 Centre on the Developing Child at Harvard University (2014)
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- 22 All the activities are taken from the Centre on the Developing Child at Harvard University (2014)

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