



There is some evidence that physical activity interventions can have a positive impact on executive function and, to a lesser extent, on self-regulation outcomes. This section covers engaging children with general physical activity such as running, skipping, or jumping. By ‘promoting physical activity’ we mean educators using physical activity to support children to develop their self-regulation and executive function. Educators proactively and regularly organise opportunities for children to engage in simple movements such as running and jumping. This could be part of their planned daily or weekly routine or through incorporating movements into wider teaching and learning opportunities (for example, asking children to ‘act out’ verbs in stories to help them attend to, and remember, the words and their meanings). Educators may also suggest and encourage the use of physical movement when needed to support children’s self-regulation.

Physical activities that explicitly include a cognitive component are discussed separately under the approach ‘Creating and Navigating Challenge’. Cognitively-engaging physical activity is less repetitive and involves complex movements and switching between tasks—for example, taking part in basketball, martial arts, or street dancing.

Eight systematic reviews evaluated the impact of physical activity interventions for children in the early years on their self-regulation or executive function (Bond, 2022; Carson et al., 2016; Criado et al., 2023; Li et al., 2020; Padial-Ruz et al., 2022; Song et al., 2023; Wood et al., 2020; Zeng et al., 2017).

Three reviews provided clear support for the approach. Of these, Zeng et al. (2017) found a positive effect of physical activity interventions on executive function in the majority of the studies identified. Similarly, the findings from Li et al. (2020) also suggested children that engaged in sustained physical activity (that is, interventions of over four weeks in duration) showed improvements in executive function outcomes such as working memory,¹ inhibitory control,² and cognitive flexibility.³ Most of the studies identified in a further review by Criado et al. (2023) also supported the approach of providing physical activity. Across those studies, children who took part in physical activity interventions typically performed better on executive function measures and measures of emotion regulation.

However, the picture was less clear for the other reviews, with studies often finding effects for some executive function outcomes but not others (Carson et al., 2016; Padial-Ruz et al., 2022; Wood et al., 2020). Of these, two reviews suggested that physical activity interventions had more consistently positive effects for attention than other executive function outcomes (Carson et al., 2016; Wood et al., 2020). Another review compared the effect of interventions consisting of a single physical activity session with interventions delivering sustained

activity over several sessions, with positive effects only identified for sustained interventions (Song et al., 2023). Bond et al. (2022) reported mixed findings from two additional relevant studies not covered in the other reviews. The first intervention, involving running or skipping, produced positive effects on children’s behaviour but not executive function. The second study demonstrated that a trampolining intervention produced no effect on children’s executive function.

There is some evidence that certain intervention features may determine whether physical activity interventions are successful in improving executive function outcomes. Physical activity interventions sustained over a longer period of time (that is, at least four to six weeks) may be especially effective (Li et al., 2020; Song et al., 2023). However, there is not a strong consensus in the evidence on the optimum intensity of physical activity—light, moderate, or vigorous—for improving self-regulation and executive function. While some evidence tentatively suggests that early years staff should focus on physical activity of moderate-vigorous intensity, many reviews highlight that understanding the best level of intensity is a gap in the evidence base (Carson et al., 2016; Criado et al., 2023; Padial-Ruz et al., 2022; Song et al., 2023; Zeng et al., 2017). It may be more important that educators ensure the activities themselves are developmentally appropriate (Criado et al., 2023). Incorporating physical activity into wider learning opportunities may also be helpful.

Two reviews (Song et al., 2023; Zeng et al., 2017) found that integrated, task-relevant physical activity was more likely than task-irrelevant physical activity to have positive effects on cognitive development. For example, a primary study from Australia compared three approaches to teaching children about the solar system. They found that it was more effective when the educator asked children to run to the correct representations of different planets, in order, and back to the Sun than when the educator asked children to simply run around the classroom in between listening to the names of planets, or than when the educator taught children about the solar system while they sat quietly. A similar example in an English setting might include running to representations of different shapes when learning about shapes. There is no evidence that physical activity interventions are likely to be more or less effective for children from lower-income families or children otherwise identified as at-risk.

Most studies included in our evidence base that used this approach involved research with three- to five-year-olds, with a smaller number involving children aged two or six years old. Studies were only included if the majority of children were aged six or under. Evidence underpinning this approach came from a broad range of countries.

¹ Working memory is an executive function that describes our ability to temporarily hold and manipulate information in our mind. It acts like a mental notepad that helps us complete tasks and solve problems.

² Inhibitory control is an executive function and describes our ability to control our urges and to think before we react.

³ Cognitive flexibility is an executive function that characterises our capacity to switch between different tasks and cognitive processes. It involves the ability to shift attention and modify thinking in response to changing situational demands.



References

Included reviews

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