

## REVIEW ARTICLE

# Association Between Motor Competence and Response Time in Portuguese Youth

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**ABSTRACT.** This study explores the association between motor competence (MC) and response time (RT) in schoolchildren. 251 participants (mean age  $14.58 \pm 3.07$  years) completed assessments over two sessions using standardized procedures. MC was evaluated through the Motor Competence Assessment, which includes stability, locomotor, and manipulative skills, while RT was measured using a structured reaction task. Pearson correlations and multiple linear regression analyses examined the relationships between variables. Moderate correlation ( $r = -0.35$ ,  $p < .001$ ), with stability and manipulative skills as significant predictors of RT were found. The model accounted for 24.4% of RT variance, highlighting MC's role in neuromuscular coordination and cognitive processing. These findings emphasize the importance of MC in more efficient responses during youth, with potential applications for physical education and sports.

**Keywords:** motor behavior, motor learning, motor abilities, youth, education

## Introduction

Physical education (PE) classes are important in students' development, serving as a foundational element for physical, social, and cognitive growth. Regular participation in PE provides participants with opportunities to develop and refine fundamental motor skills such as running, jumping, throwing, and catching, which are essential for engaging in a wide variety of physical activities and sports (Flôres, 2024; Gallahue, 1996). Mastery of these skills not only enhances youth motor competence (MC), confidence, and motivation to engage in lifelong physical activity, but also contributes to the development of a broader range of motor abilities and improvements in response time (RT) (Albuquerque et al., 2022; Bao et al., 2024; Invernizzi et al., 2022; van der Fels et al., 2015). In fact, MC is also important in many actions of daily life (e.g., dressing, eating, playing, walking, tying shoes, and riding a bicycle), regardless of age or sex (Albuquerque et al., 2022).

MC is a well-known term encompassing various gross motor skills that enable individuals to perform different motor tasks effectively (Rodrigues et al., 2021; Rudd

et al., 2015). These skills are part of the child's physical, cognitive, and social development (Robinson et al., 2015) and, nowadays, it has been investigated concerning various components such as physical activity (Coe et al., 2024; Gao et al., 2019; Lopes & Rodrigues, 2021; Luz et al., 2017; Santos et al., 2017), physical fitness (Almeida et al., 2023; Coe et al., 2024; Costa et al., 2024; den Uil et al., 2023), sports participation (Ferreira et al., 2019; González-Víllora et al., 2019; Schembri et al., 2019; Ulrich, 1987) and association with other general variables (Chagas & Barnett, 2023; Nobre et al., 2016; Pombo et al., 2022, 2024; Sá et al., 2021). Concerning cognitive processes in the brain, Albuquerque et al. (2022) found that MC can significantly predict 6- to 11-year-old children's executive functions, suggesting a moderate association between variables. Children aged 10- to 12-year-olds with higher MC levels tend to demonstrate superior executive function skills, with locomotor skills linked to working memory and object control associated with inhibitory control (Ludyga et al., 2018). Bao et al. (2024) highlight that MC and executive functions co-develop throughout the first years of life. These functions, such as inhibitory control, working memory, and cognitive flexibility, are not only crucial for academic success and adaptive behavior but are also closely linked to RT, as they enable faster decision-making and more efficient responses and have been shown to develop in parallel with MC (Albuquerque et al., 2022; Bao et al., 2024; Brocki & Bohlin, 2004; Kubesch et al., 2009).

RT is a crucial indicator of cognitive and neuromuscular functioning, reflecting the total time required to respond to a stimulus. It comprises the reaction time, defined as the time interval between the presentation of an unexpected signal and the initiation of movement, and movement time, which is the duration from the onset of movement to its completion (Fairbrother, 2010; Magill & Anderson, 2017; Schmidt et al., 2018). In

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