Dynamics between motor competence, cardiorespiratory fitness and weight status in children: A cross-lagged longitudinal analysis

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Abstract

Motor competence plays a crucial role in children's overall health. In their conceptual model, Stodden et al. (2008) stipulated that the relationship between motor competence and other health-related factors such as physical fitness (which includes cardiorespiratory fitness, musculoskeletal fitness, and flexibility) changes over time. Although recent literature has supported some of the relationships proposed by Stodden and colleagues (2008), there is limited evidence on the dynamics between these health factors across childhood (Robinson et al., 2015). Using cross-lagged analysis, the present study investigated the reciprocal relationships between motor competence, cardiorespiratory fitness and weight status among 664 children aged 6-9 years, over a 3-year time period with one measurement per year (t1-t3). Children's motor competence was evaluated using the Körperkoordinationstest für Kinder (KTK) and cardiorespiratory fitness was assessed using the endurance shuttle run test (EUROFIT). Height and weight were also measured to compute BMI. Structural equation modelling with robust standard errors ($p < .05$, CFI = .97, SRMR = .03) revealed that motor competence (t3; R2 = .75) is predicted by prior levels of motor competence, cardiorespiratory fitness and BMI. Similarly, cardiorespiratory fitness (t3; R2 = .58) is predicted by preceding levels of fitness, motor competence and BMI. In contrast, BMI (t3; R2 = .92) is only predicted by previous levels of BMI. This study provided some evidence for the inter-relationship between motor competence, cardiorespiratory fitness and weight status over time as proposed by Stodden et al. (2008). However, motor competence and cardiorespiratory fitness were not found to be predictors of future weight status when controlled for one another. Further longitudinal and multivariate research into the dynamics between motor competence and other health-related factors is needed in order to gain a better understanding of mechanisms underlying positive (or negative) developmental trajectories of health during childhood.