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EDITORIAL

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Developmental perspectives on motor competence and physical fitness in youth

The aim of this special issue in *Scandinavian Journal of Science & Medicine in Sports* was to provide an update of research examining motor competence and physical fitness in childhood and adolescence from a longitudinal perspective. Motor competence and physical fitness play an important role in children and adolescents' overall health and growth.[1,2] Motor competence refers to an individual's degree of proficiency in performing various motor skills and is underpinned by coordination and control.[3] Developing adequate levels of competence in fundamental motor/movement skills is critical for all children as they form the foundation for more complex skills used in games, sports, and other types of physical activities across the life span.[4] Physical fitness refers to an individual's capacity to perform physical activity and includes components such as cardiorespiratory fitness, musculoskeletal fitness (i.e., muscular endurance and strength), and flexibility.[5,6] Motor competence and physical fitness are correlated in young people.[7] Both outcomes are also shown to be related to a range of physical, psychological, and cognitive aspects of health, and are important to promote a healthy and active lifestyle.[8,9] In their conceptual framework, Stodden et al.[10] described the relationship between motor competence and physical activity across childhood and adolescence, with physical fitness being an important mediator in that relationship. Similarly, Hulteen et al.[11] put forth a model outlining the progression of motor/movement skills across age, how this is affected by physical and psychological outcomes such as physical fitness and perceived competence and how it contributes to lifelong physical activity. Both models emphasize the importance of understanding how motor competence and physical fitness develop and how they influence and are influenced by other health outcomes (e.g., perceived competence, weight status) across developmental time.

Over the past decade, there has been a growing body of literature exploring associations among motor competence, physical fitness, and other health outcomes. However, although numerous cross-sectional studies have investigated association between motor competence and physical fitness in different age-groups in childhood and (to a lesser extent) adolescence,[12] there is limited evidence on changes and interactions over time. As noted by Robinson et al.,[12] "children's physical and psychological development is a complex labyrinth of biological, environmental, psychosocial, and behavioral factors that synergistically evolve across developmental time" (p. 1273). Longitudinal research provides an opportunity to explore a number of aspects, including causal mechanisms, growth and maturation factors, and other correlates of motor competence and physical fitness development, among others. Moreover, longitudinal investigations allow us to investigate the dynamic and reciprocal nature of relationships among motor competence, physical fitness, and other health outcomes. Investigating how these health outcomes change and influence each other across time will help broaden our theoretical and pedagogical understanding of young people's development, and support evidence-based practice.

With this special issue, we sought to provide insight on a number of research questions that focus on change in motor competence and physical fitness over time. This special issue includes eight studies from different countries (Belgium,[13] Brazil,[14] Germany,[15] Norway,[16] Portugal,[17] Spain,[18] and UK[19,20]) and covers a wide age range from young childhood to young adulthood. Moreover, a range of methodological approaches for analyzing longitudinal data have been used including multilevel modeling, structural equation modeling, and latent growth curve modeling. Additionally, observational and intervention studies are included in this special issue.

The first four studies in this special issue report on motor competence development and its link with other health outcomes. Two of these studies cover interrelations between motor competence and weight status in early and middle childhood. Duncan et al.[19] examined preschool children's motor competence, physical activity (sedentary, light, and moderate-to-vigorous), and weight status at age 4 and age 5. Motor competence at age 4 significantly predicted weight status and physical activity at age 5. Moreover, the results showed that motor competence may have a stronger influence on time spent in sedentary activity than light/moderate-to-vigorous activity. Lima et al.[14] examined associations

between motor competence and weight status in children from age 3–5 to age 7–9. Overall, children with normal weight demonstrated higher motor competence scores than children who were overweight and obese. Children with normal weight at age 3–5 showed higher motor competence scores at age 5–7 and 7–9. Similarly, children with normal weight at age 5–7 performed better on motor competence at age 7–9 than their overweight and obese counterparts. Moreover, changes in weight status were associated with changes in motor competence, which indicates that improving weight status may also enhance motor competence. In the next study, Coppens et al.[13] conducted a six-year follow-up of an early childhood fundamental motor skill intervention (i.e., Multimove for Kids) to determine the long-term impact of the intervention on motor competence and to examine the potential impact of sports participation on the development of motor competence across 6 years. While no long-term effects of the intervention on motor competence were found, sports participation was shown to positively influence motor competence development over time. Finally, Estevan et al.[18] examined profiles of perceived and actual motor competence and physical fitness in children aged 4–9 years across a two-year timespan and investigated differences in physical activity and weight status among children with different profiles. Distinct profiles were found for boys and girls differing in levels of and alignment between perceived competence and actual motor competence and fitness. Additionally, boys and girls with profiles of high and aligned levels of perceived competence and actual motor competence and fitness were more physically active and showed a healthier weight status at each time point compared to those with profiles of low and/or non-aligned levels. Interestingly, changes in profiles were found over time indicating that children can shift from one profile to another.

The next four studies in this special issue report on physical fitness development and its implications for physical education and sports programs. The study by Pereira et al.[17] followed boys from 6 years of age annually for 4 years to estimate age at mid-growth spurt and examine spurts in different components of physical fitness. Age at mid-growth spurt was ~8 years. Physical fitness spurts occurred at different times depending on specific components; for instance, spurts in flexibility occurred before or at mid-growth spurt, while spurts in speed and agility occurred at or after mid-growth spurt. The next study by Hanssen-Doose et al.[15] examined the effect of physical fitness components on perceived health from childhood through adolescence to early adulthood. Although cardiorespiratory fitness was not found to be a significant predictor of perceived health, musculoskeletal fitness and coordination were associated with current and future perceived health. In the following study, Landgraff et al.[16] monitored cardiorespiratory fitness levels of athletes at ages 12, 13, and 15 to examine differences in fitness between individuals following high-volume endurance training and those following a low-volume endurance training focused primarily on technical and tactical skill development. There were no group differences in cardiorespiratory fitness levels over the three-year timespan, which indicates that a focus on endurance training may not provide a greater benefit to cardiorespiratory fitness. Finally, Dugdale et al.[20] examined across a period of 12 years physical fitness levels of graduates from a youth soccer academy who either were or were not successful in obtaining a professional contract. Successful graduates only demonstrated higher fitness scores from age 13–14 years onwards compared to unsuccessful graduates. Prior to this age, fitness levels either did not differ or were in favor of unsuccessful graduates, which suggests that high fitness performance during childhood and early adolescence may not lead to a successful transition into professional soccer.

Overall, this special issue contributes to the body of knowledge on the (co-)development of motor competence and physical fitness from early/middle childhood through adolescence and into young adulthood. It provides longitudinal perspectives across varying timespans demonstrating how motor competence and physical fitness change across developmental time and how these factors influence and are influenced by other health outcomes. Moreover, practical implications for physical education and youth sports programs are discussed in the diverse studies covered in this issue.

Farid Bardid[1,2]
Till Utesch[3]
David F. Stodden[4]
Matthieu Lenoir[2]

[1]*School of Education, University of Strathclyde, Glasgow, UK*
[2]*Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium*
[3]*Department of Educational Sciences, University of Münster, Münster, Germany*
[4]*Department of Physical Education, University of South Carolina, Columbia, SC, USA*

Correspondence
Farid Bardid, School of Education, University of Strathclyde, Scotland, UK.
Email: farid.bardid@strath.ac.uk

ORCID
Farid Bardid https://orcid.org/0000-0001-8591-0596
Till Utesch https://orcid.org/0000-0001-7185-4239
David F. Stodden https://orcid.org/0000-0003-1988-1701
Matthieu Lenoir https://orcid.org/0000-0003-3906-1137

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