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Review

Early motor skill competence as a mediator of child and adult physical activity

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ABSTRACT

Objective: In order to effectively promote physical activity (PA) during childhood, and across the lifespan, a better understanding of the role of early motor skill development on child and adult PA is needed. Methods: Here, we propose a conceptual model delineating the hypothesized influence of motor skill development on child and adult PA, while providing an overview of the current empirical research related to this model. Results: There is consistent and emerging evidence showing that adequate motor skill competence, particularly locomotor and gross motor skills, is associated with increased PA levels during the preschool, child, and adolescent years, with early motor skill development also influencing enjoyment of PA as well as long-term PA and motor skill performance. The physical education setting appears to be a well-suited environment for motor skill development. Conclusion: Employing appropriate strategies to target motor skill development across the childhood years is of paramount interest in helping shape children's PA behavior, their experiences related to PA, as well as maintain their PA.

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Introduction

The prevalence of child obesity has risen drastically over the last several decades, with this increased trajectory occurring worldwide (Wang and Lobstein, 2006). Preventing obesity during early childhood is of particular importance, as young obese children are at an increased risk for adolescent and adult obesity (Veltsista et al., 2010; Telama, 2009) and have an increased risk of developing various health morbidities, including hyperlipidemia, hypertension, insulin resistance, respiratory problems, orthopedic complications, and cancer (Freedman et al., 1999; Fuemmeler et al., 2009; Craig et al., 2008). The Bogalusa Heart Study, a longitudinal study with over 2500 participants, reported 77% of overweight children became obese adults, as classed by body mass index (BMI) (Freedman et al., 2001).

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One such modifiable behavior to prevent and treat obesity at all age groups, along with the consequences linked with obesity, is regular participation in physical activity (Plachta-Danielzik et al., 2011; Loprinzi et al., 2012). Despite the importance of regular physical activity participation among children, studies employing objective measures of physical activity demonstrate that children are not engaging in sufficient levels of daily physical activity. For example, results from the 2003-2004 National Health and Nutrition Examination Survey indicate that, while employing an objective measure of physical activity, only 42% of American children (6–11 years) are meeting the current 60-minute moderate-to-vigorous physical activity recommendation, with 8% of adolescents (12–19 years) meeting this threshold (Troiano et al., 2008).

Given that the majority of children and adolescents are not sufficiently active, coupled with the beneficial effects of physical activity in these populations, promotion of physical activity is of critical importance during early childhood development. Numerous factors have been shown to influence child physical activity (e.g., parent and peer support, physical activity preferences, behavioral intentions, program/facility access) (Loprinzi et al., 2012; Sallis et al., 2000). However, and often overlooked, evidence suggests that motor skill acquisition in early childhood may be an important prerequisite for child physical activity participation and engagement in physical activity later in life (Loprinzi et al., 2012). Notably, adequate motor skill competence is also linked with improved cognitive, social and emotional outcomes (Piek et al., 2006, 2008; Skinner and Piek, 2001).

In order to effectively promote physical activity among children, a better understanding of the influence of motor skill development on child and adult physical activity is required, given evidence suggesting motor competence may lead to increased physical activity across the lifespan (Lloyd et al., 2014). Based on national standards for physical education guidelines, fundamental-related motor skills consist of locomotor, manipulative, and non-locomotor skills (such as balance). Locomotor skills consist of activities that result in some degree or horizontal and/or vertical displacement during translocation, which may include, for example, walking, running, jumping and skipping. Manipulative skills are often defined as gross or fine skills, which often include no movement-related translocation. Examples of gross motor skills include throwing, catching and kicking, with fine motor skills including, for example, fine precision object-handling activities. Notably, certain activities, such as throwing darts, may target both gross and fine motor skills. Lastly, individuals with balance-related motor skills have adequate postural stability during stationary body movement (Gallahue and Cleland-Donnelly, 2007). To date, most of the studies examining the association of motor skill acquisition and physical activity have focused on locomotor and manipulative skills.

Fig. 1 presents a model delineating the hypothesized influence of motor skill development on child and adult physical activity. The overall goal of this review paper is not to provide an exhaustive quantitative review (i.e., systemic review) of the literature surrounding determinants of child physical activity, but rather to examine research assessing the links between the constructs proposed in our model. We acknowledge the direct link between physical education/sports and child physical activity, but the focus of this model and *narrative* review paper will center on the mediational influence of motor skill development and enjoyment of PA on physical activity behavior. This narrative review examines empirical research addressing the links in the proposed model and physical activity participation.

Overview of the proposed model

It is acknowledged that various psychosocial, cultural, and organizational factors may influence a young child's degree of participation in PE and, in particular, engagement in sports. Nevertheless, central to the proposed model (Fig. 1), PE and sports participation may directly influence child physical activity, as well as indirectly through improvements in perceived and actual motor skill development. Further, motor skill competence may indirectly influence physical activity through increased enjoyment of physical activity. Then, importantly, increased enjoyment and actual physical activity participation during early childhood may influence physical activity during later years (e.g., adolescents and adulthood). In this model we review, specifically, the effect early motor skill development has on PA participation, however, we do acknowledge a reciprocal relationship in that PA participation may help to cultivate motor skill acquisition.

Physical education/sports → child PA

Research has provided evidence that participation in physical education (PE) and sports may help facilitate child physical activity. Indeed, participation in sports has been shown to increase overall physical activity behavior among young individuals (Pfeiffer et al., 2006). Similarly, based on results from the U.S. National Longitudinal Study of Adolescent Health, adolescents were more active if they had daily physical education (Gordon-Larsen et al., 2000). However, as of 2006, only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools

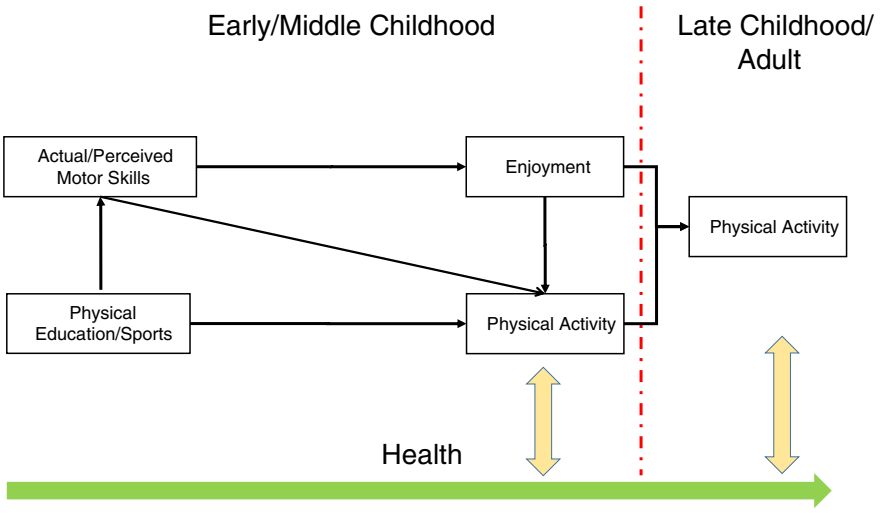

Fig. 1. Conceptual model delineating potential direct and indirect pathways of motor competence on child/adult physical activity.