



# Understanding biological maturation and motor competence for physical activity promotion during the first years of life

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Having in mind several changes on modes of life through the years, including lifestyle, advances on medicine and technology, chronic diseases became the greatest cause of death worldwide (1). Even the majority of chronic diseases occurring during adulthood, several morbidities have its onset during adolescence, as mental disorders (2) and metabolic diseases (3). In this sense, prevention strategies for the development of chronic diseases are warranted since the first years of life as childhood and adolescence. Among protective factors for these diseases, the adoption and maintenance of an active lifestyle has been highlighted as one of the main preventable causes of death worldwide, with substantial gains in life expectancy when avoided (4-7). In this perspective, the World Health Organization created the “*Global Action Plan on Physical Activity 2018–2030*” (8), with several goals and proposing actions through the years.

However, the current challenge is how to effectively promote active lifestyle in different population sub-groups, especially during the first two decades of life. It seems clear that “one size fits most” strategies are ineffective since those determinants of active behaviors tend to vary greatly into the population. Thus, ecological models for physical activity promotion has been suggested (9). In this sense, during the first years of life, individual, interpersonal and environment factors seem the greatest determinants of physical activity, while with the advance of age through adulthood, other aspects as regional and national policies as well as global

factors earn importance as determinants (9).

During the adolescence, the process of biological maturation affects several aspects of life, such as all human body tissues and cognition (10). Thus, biological maturation is associated with metabolic risk factors (11,12), mental health (13) as well as behaviors such as physical activity, being that adolescents with early biological maturation exhibit the highest risk. The association between biological maturation and physical activity is especially through a biocultural pathways, including biological mediators as adiposity, physical fitness and motor competence as well as psychological factors as psychological distress, self-efficacy and self-esteem (14,15).

However, given most evidences come from cross-sectional studies, it is difficult to establish clear temporality between these events. For example, lower motor competence is a risk factor for physical inactivity, especially because people with lower motor competence often present a lower self-efficacy and, hence, tend to reduce the opportunities of participation in physical activities (16). On the other hand, inactive youth tend to experience less motor challenges during their childhood, leading to lower motor competence. Also, although physical inactivity contributes to early onset of puberty, especially through the body fat pathway, early maturing adolescents tend to be less active considering general indicators of physical activity (17).

Helping to shed light on this issue, a recent article

published by Drenowatz and Greier (18) on *Translational Pediatrics* analyzed the cross-sectional and prospective association between biological maturation and motor competence among adolescents. This well-conducted study presented as strengths a follow-up of 3 years, with a randomized sample of 212 adolescents of both sexes. The authors found that somatic maturation (through the indicator of estimated age of peak height velocity) was associated with specific markers of motor competence (stand and reach as well as push-ups), given that early maturing adolescents presented lower motor competence. The authors also found that somatic maturation was associated with weight gains and when the association between somatic maturation and motor competence was adjusted for weight gain, this association lost its significance. This can be an indication of a potential mediation, which was already tested in cross-sectional studies (18), and still lacking in longitudinal designs.

The results from Drenowatz and Greier (18) are in line with the concerns regarding the need for behavioral interventions focusing on early-maturing adolescents. Early maturing adolescents have several psychological, biological and behavioral components that are risk factors for physical inactivity (14,15). These findings can be inferred in the light of the biocultural approach of the association between biological maturation and physical activity, which includes motor competence (19).

Adding the finding from Drenowatz and Greier (18) with the evidence available, seems clear that physical activity promotion should be prioritized since the first years of life. In the cascade of effects, an active child tends to show good motor competence, body composition and normal biological rhythms. On the contrary, interventions on adolescence must target early maturing adolescents and those with lower motor competence. It is worth highlighting that, given the biological nature of these events, it is not expected great differences between developed and in developing countries. The general extrapolation of these findings has to respect the interaction between biological, cultural and social issues, which deserves further studies.

The issue discussed along this editorial it may seem restricted to pediatric groups, but it is not. The impact of the relationship between biological maturation and motor competence is a public health concern, mainly because affects significantly adulthood health. For example, poor performance in tests of cardiovascular fitness and muscular strength are associated with higher all-cause mortality rates among adults (20). Moreover, sports participation

is a behavior that tracks from adolescence to adulthood more consistently than other manifestations of physical exercise (21). Therefore, the impact of early, on time and late maturing on motor competence performance and, hence, its impact on engagement/maintenance of these adolescents should not be underestimated by health professionals and physical educations teachers.

Future studies should further investigate potential mediators of the association between biological maturation and motor competence with longitudinal designs. Moreover, intervention studies focusing on early maturing adolescents for the improvement of motor competence as well as in the mediators of the association between biological maturation and motor competence should be tested.

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