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Physical activity in adolescents

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In the present issue of Jornal de Pediatria, Ceschini et al.[1] publish an article entitled "Prevalence of physical inactivity and associated factors among high school students from state's public schools." This topic is very important because physical activity has important health benefits in youth. Physical inactivity is associated with a clustering of cardiovascular disease (CVD) risk factors in youth, i.e., the levels of many CVD risk factors tend to increase simultaneously.[2] There may be many reasons for this clustering in sedentary children, but among the key candidates, decreased insulin sensitivity is essential. The biological effects found in relation to high physical activity levels in children are a lower blood pressure, more favorable serum lipid and lipoprotein levels, increased insulin sensitivity and decreased adiposity.[3] Physical inactivity and low level of fitness have been shown to be related to CVD risk factors in children independently of obesity.[4] Moreover, physical activity has been associated consistently with better psychological health, such as higher levels of self-esteem and lower levels of anxiety and stress. Physical activity in childhood and adolescence is also important to attain and maintain an appropriate bone strength, and it contributes to normal skeletal development.[3]

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The biological CVD risk factors may not be a serious problem in children, because few if any of the children suffer from disease because of a sedentary lifestyle. However, there could be two reasons to start preventive strategies in children. Firstly, many studies have shown that atherosclerosis starts early in life, and secondly, some studies do indicate that physical activity tracks from childhood into adulthood.[5] The latter evidence is not strong, because most of the longitudinal studies rely on self-reported physical activity, and especially in children it is difficult to quantify physical activity from self-report. On the other hand, clustering of CVD risk factors should be considered a serious problem even if the children do not exhibit any signs of real disease. In some quite healthy cohorts of children, clustering of CVD risk factors has been found in 10-15% of the children.[2] From a biological point of view, these children have an insufficient level of physical activity.

In the study of Cheschini et al.,[1] the authors classified more than 60% of the adolescents as physically inactive according to the international recommendation of at least 1 hour of moderate physical activity each day given by the American College of Sports Medicine and confirmed by the review of Strong et al.[6] Pate et al.[7] report "dramatic discrepancies" between self-reported and objectively measured estimates of activity. Self-reported levels of vigorous activity appear much higher than objectively measured levels. In contrast, when moderate-intensity activity is considered, children appear to be more active when activity levels are measured objectively compared with self-reported estimates. Riddoch et al. summarize some of the findings supporting this observation.[8] The 1997 Health Survey for England reported that 78% of boys and 70% of girls participate in at least 60 minutes of moderate activity on at least 5 days of the week – levels approximating current recommendations. The National Diet and Nutrition survey reported that 44% of the boys and 31% of the girls aged 15-18 years achieved 60 minutes of moderate activity per day. It can be clearly seen that these figures are much lower than the objectively measured

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estimates observed in the European Youth Heart Study,[8] but comparable to the study of Cheschini et al.[1] The likely explanation for this discrepancy is that moderate activity tends to be more sporadic, not planned, and therefore less memorable and quantifiable, especially in children. Moderate-intensity activity is therefore not collected properly by self-report methods, and levels reported by questionnaires are therefore likely to be underestimates of true activity. It is likely that children may engage in considerably more moderate-intensity physical activity than previously thought. However, the question of whether this is enough to provide health benefits is still uncertain. The increasing prevalence of overweight and obesity in children suggests that physical activity levels have decreased over time, and a substantial part of children is insufficiently active. Also, children who for other reasons are not able to participate in ordinary play and other moderate-intensity activities, such as blind children, have extremely low fitness levels,[9] and even moderate-intensity activity may be important to keep fitness at a healthy level. The study of Andersen et al.,[2] assessing dose-response relationships between activity and health risk factors, suggests that activity recommendations may be too low in children to achieve optimum health. However, if recommendations had been higher, even fewer of the adolescents in the study by Cheschini et al.[1] would have reached recommended activity levels.

In the study by Cheschini et al.,[1] the authors found an association between physical inactivity and gender, age, socioeconomic level, geographic area of the city, awareness of the "Agita São Paulo" program, non-participation in physical education classes, smoking, alcohol intake and time spent per day watching television. This observation is important and provides insight to how we can intervene and increase physical activity in the least active children. There is no reason to believe that the underreporting of moderate-intensity physical activity resulting from the use of self report differs between groups, and the observed associations are probably reliable. The observations could suggest that emphasis should be put on making physical education mandatory, and that interventions should target girls, certain geographic areas, and older adolescents. Further, it may pay off to target more than one health behavior and include smoking, alcohol intake and TV-watching together with physical inactivity in health promotion interventions. Better understanding of the correlates of physical activity and sedentary behavior in children and adolescents will support the development of effective interventions that promote an active lifestyle.

Many studies have been conducted focusing on correlates of children's and adolescents' physical activity and sedentary behavior. Sallis et al. summarized the studies on correlates of physical activity in children and adolescents published before 1999.[10] Van Der Horst et al. updated the area in 2007[11] and concluded: there was evidence for a positive association between physical activity and gender (male) and parental education. No association between socioeconomic status or body mass index and physical activity was found. For age and ethnicity, the evidence was inconclusive. Attitude, self-efficacy, and goal orientation/motivation were found to be positively associated with physical activity. For perceived benefits, self-perception, fun/enjoyment, and depression, no association with physical activity was found. The evidence for the associations between physical activity and intention, perceived barriers, and sport competence was inconclusive. There was evidence for a positive association between physical education/school sports and physical activity. No association was found between watching television/sedentariness and physical activity. The evidence for the association between smoking and physical activity was inconclusive. No association between parental activity and adolescent physical activity was found, and finally, no association between availability of facilities and adolescents' physical activity was found. Some of these conclusions from the review of Van Der Horst et al. have been challenged in recent studies using objectively assessed physical activity. Ekelund et al. supported the lack of association between accelerometer-assessed physical activity and TV-viewing, but at the same time they found that both low activity and time spent watching TV were independently associated with obesity.[12]

In conclusion, more studies should be carried out which analyze correlates of physical activity, and it would improve knowledge substantially if objectively measured physical activity was included. Self report can give important qualitative information, but some of the shortcomings could be solved by including an objective measure. In this way, we will get more evidence of how we can increase activity levels in sedentary children. The most effective approaches may differ between cultures, and local environment should be taken into account when interventions are chosen. Another important issue is improvement of our ability to select children with poor health, which could be improved by increased physical activity. At the moment, most health professionals mainly consider obesity as the key trait of metabolic disorders, but only about one third of the children with clustered CVD risk factors are obese, and a non-invasive strategy to diagnose metabolic disorders should, in addition to obesity, include either low physical fitness or low physical activity level.

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Lack of physical activity and excessive sitting: health hazards for young people?

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Regular physical activity provides important health benefits for children and adolescents, including beneficial effects on cardiovascular, metabolic, and musculoskeletal health, and on academic performance as well.[1] Physical activity patterns in youth are likely to extend into adulthood,[2] and therefore, the establishment of a physically active lifestyle in early life is essential for the prevention of obesity and chronic diseases during the life course. A physically active lifestyle may include different kinds of physical activities such as participation in organized sports or active commuting to and from school. Nowadays, it should also include the avoidance of excessive sitting, which has recently been suggested to be a health hazard, independently of participation in physical activities.[3-5]

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Some studies among adults have shown that time spent sedentary is associated not only with obesity, but also with poor metabolic health, independently of participation in moderate-to-vigorous intensity physical activity.[4] In the same study setting, prolonged sitting without breaks seemed to be detrimental to metabolic health, independently of total sedentary time.[5] Among young people, sitting time has been associated with musculoskeletal disorders,[3] independently of participation in physical activities. Sitting still in front of TV or computer screens for hours is relatively common among young people.[6] Also those children who participate in organized sports may, after training sessions, sit hours in front of screens.[6] Internet and TV provide entertainment for 24 hours per day. Time spent with entertainment media late at night may steel time from sleeping and may also dilute the quality of sleep, leading to daytime tiredness and lack of motivation to physical activity.

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