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

Tuija Tammelin\*

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.<sup>1</sup> Physical activity patterns in youth are likely to extend into adulthood,<sup>2</sup> 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.<sup>3-5</sup>

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.<sup>4</sup> In the same study setting, prolonged sitting without breaks seemed to be detrimental to metabolic health, independently of total sedentary time.<sup>5</sup> Among young people, sitting time has been associated with musculoskeletal disorders,<sup>3</sup> independently of participation in physical activities. Sitting still in front of TV or computer screens for hours is relatively common among young people.<sup>6</sup> Also those children who participate in organized sports may, after training sessions, sit hours in front of screens.<sup>6</sup> Internet and TV provide entertainment for 24 hours per day. Time spent with entertainment media late at night may steal time from sleeping and may also dilute the quality of sleep, leading to daytime tiredness and lack of motivation to physical activity.

**See related article  
on page 301**

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The current physical activity recommendations for school-aged children state that all young people should be involved in physical activity of at least moderate intensity for at least 1 hour per day.<sup>1</sup> However, many young people fail to meet these recommendations; the proportion of sufficiently active young people is estimated at one third,<sup>7</sup> with wide variations between age groups, genders, and countries. Ceschini et al.<sup>8</sup> reported that the prevalence of insufficiently active adolescents was as high as 62.5% among high school students in São Paulo, Brazil. Physical inactivity was much more prevalent among girls than among boys (74 vs. 50%, respectively).<sup>8</sup> This kind of national survey provides important information about physical activity level in different population groups. Ceschini et al.<sup>8</sup> used the International Physical Activity Questionnaire (IPAQ) in their study, which provides an opportunity for international comparisons as well. However, alongside with these questionnaire-based surveys, we would also need objective monitoring of physical activity. Studies using direct measures of activity, such as accelerometers, have suggested higher estimates for the proportion of adequately active youths.<sup>9</sup>

The recent increase of obesity among young people has been attributed to too much time spent in front of TV and computer screens. According to the recommendation of the American Academy of Pediatrics,<sup>10</sup> TV viewing in young people should be restricted to 2 hours per day to avoid negative effects on body weight and other health outcomes. Some national recommendations of physical activity for school-aged children have also mentioned guidelines for sedentary time. In Finland, national recommendations for young people<sup>11</sup> state that "continued periods of sitting for more than 2 hours at a time should be avoided. Screen time with entertainment media should be limited to 2 hours per day." The expert panel who created these physical activity guidelines<sup>11</sup> also wanted to give recommendations of screen time and thereby encourage parents and other important people in young people's life to discuss about excessive screen time and to restrict it if necessary. For pediatrics, it would be important to pay attention to both children's participation in physical activities and their screen time. However, further research is needed about the dose-response association between sedentary behaviors and health outcomes to more accurately define the safety level for different sedentary pursuits.

We also need information about prevalence, trends in, and correlates of physically active and sedentary behaviors. These studies and surveys should include accurate, objective measurements of these behaviors, such as accelerometers combined with diaries, during both weekdays and weekends and during different seasons. It is also important to identify the inactive risk groups in order to target the physical activity interventions efficiently. Several factors affect young people's physical activity, such as friends, parents, siblings, health, physical fitness, physical activity skills,

and environmental opportunities.<sup>12</sup> Ceschini et al. reported that physical inactivity among Brazilian adolescents was associated with female gender, smoking, alcohol intake and high time spent watching TV.<sup>8</sup> This observation demands some special activities targeted to young Brazilian girls and adolescents who have other unhealthy habits in order to enhance their physical activity level. What kind of physical activity interventions would be most effective among adolescents and should be promoted? Based on a review report of randomized controlled trials among adolescents,<sup>13</sup> it seems that a multilevel approach to promote physical activity seems to be most effective among adolescents and should be promoted. This means combining school-based interventions with family or community involvement, and educational interventions with policy and environmental changes.<sup>13</sup> This challenges all actors living or working with young people to collaborate and promote physically active lifestyle in youth.

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## Gastrointestinal flora composition and health

Yvan Vandenplas\*

In this issue, de Mello et al. report that lactobacilli (Lb) and bifidobacteria (Bif) contents of the gastrointestinal flora differ according to socioeconomic status.<sup>1</sup> The authors suggest a relation between nutritional status and gastrointestinal flora, since a low number of Lb and Bif was associated with a low body mass index.<sup>1</sup> Whether this association should be regarded as "causal" or more as a "consequence" is not clear. Children living in favelas have an increased risk to develop environmental enteropathy. Although the volume of stools may be an influencing factor (children in favelas producing significantly larger volumes of stools, and therefore resulting in smaller amounts of colony forming units per gram of stool), the fact that Lb and Bif were absent in about 10% of the stools of children living in favelas but present in all upper-class children is a strong argument against this hypothetical bias.

The hygiene hypothesis suggests that "Western style" living conditions favor immune-mediated diseases, such as diabetes, atopic disease, inflammatory bowel disease, and many others, whereas an increased contact with endotoxins protects against the development of atopic manifestations.<sup>2</sup> A decrease in frequent viral infectious diseases such as hepatitis A was associated with an increased incidence of atopic disease.<sup>3</sup> Decreased numbers of Lb and Bif have been shown to predispose to atopic disease when comparing gastrointestinal flora in Estonia and Sweden<sup>4</sup>: children living in Estonia presented a decreased incidence of atopic disease and higher counts of Lb and

Bif. Moreover, atopy is reduced in children of families with an anthroposophic lifestyle.<sup>5</sup> In comparison with a control population, these children experienced a reduced use of antibiotics (52 vs. 90%), a reduced vaccination rate for measles, mumps and rubella (18 vs. 93%), and an increased consumption of fermented foods (63 vs. 4.5%).<sup>5</sup> Lifestyle factors related to an anthroposophic way of life influence the composition of the gut flora in infants, increasing the number of Lb.<sup>6</sup>

A superficial interpretation of the evidence found in the literature may seem to suggest that the Western lifestyle predisposes to immune-mediated diseases and that this is at least in part related to a decreased incidence of Lb in the gastrointestinal flora; in addition, it may seem to

suggest that a non-Western lifestyle, as occurs in the favelas, will stimulate the predominance of Lb and Bif in the gastrointestinal flora. However, dietary intake will substantially determine gastrointestinal flora composition. The intake of fermented foods and prebiotic oligosaccharides is (or was) reduced in Western dietary habits.<sup>7</sup> On the other hand, dietary intake in very poor living conditions as is the case in the favelas also seems to reduce the numbers of Lb and Bif.<sup>1</sup> Prebiotic oligosaccharides stimulate the development of Lb in the gastrointestinal flora. And Lb have been shown to adhere to the gastrointestinal mucosa, to cause a steric hindrance for pathogens to adhere, and to stimulate immune development by an increased IgA secretion and mucin production. Probiotic

**See related article  
on page 307**

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