

## PHYSICAL ACTIVITY

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# Physical Activity in Infants and Toddlers

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### Introduction

Globally, at least 20 million children under the age of five were estimated to be overweight in 2005.<sup>1</sup> The paediatric obesity epidemic has heightened interest in physical activity and sedentary behaviours during early childhood as correlates of energy balance and body composition. Physical activity participation in young children also plays an integral role in their overall development, including decreased likelihood of exhibiting cardiovascular disease risk factors and improved bone health, fundamental motor skills and social and psychological development.<sup>2</sup> Moreover, early childhood is one of the critical time periods for the establishment of sedentary and physical activity behaviours.<sup>3</sup> However, upon a review of the evidence by Reilly,<sup>4</sup> studies of objectively measured physical activity and sedentary behaviour in preschool children show that levels of physical activity are typically low and sedentary behaviour high.

### Subject

While the interest in physical activity in preschool children, incorporating ages 3–5 years, has increased over the past decade, studies of physical activity levels and sedentary behaviours in children under the age of three are very scarce.

### Problems

Data on physical activity levels and sedentary behaviours from 3 to 5 year old children may not be transferable to younger children since the age range 0–5 years encompasses three developmental periods, each of which is characterised by quite different physical activity patterns.<sup>5,6</sup>

The infant period generally encompasses the first 12 months of life. Activity or movement in the first 6 months is restricted to reaching and grasping objects, turning of the head toward a stimulus, and movement of the arms and legs. The second 6 months is characterised by the learning of rudimentary movement skills. The developmental stage from 1 to 3 years of age is often described as the toddler period. Around 1 year of age,

children commence walking. With this increased opportunity for exploration and learning, toddlers develop locomotor skills such as running, jumping and hopping. Further, manipulative skills emerge in the toddler years. The pre-school period incorporates ages 3–5 years and is characterised by further development of stability and locomotor and manipulative skills.

Next to differences in activity patterns between 3 to 5 year olds and younger children, estimates of daily physical activity in infants and toddlers are more likely to be influenced by daytime sleeping patterns than in preschool children.<sup>6</sup>

## **Research Context**

The literature was searched for studies evaluating physical activity levels and sedentary behaviours in healthy infants and toddlers, thus in children under the age of three.

## **Research Results**

Only two studies could be located, evaluating physical activity levels in this young age group. Gubbels et al.<sup>7</sup> observed 75 two-year-olds and 100 three-year-olds at nine Dutch child care centres with the Observational System for Recording Physical Activity in Children -- Preschool Version.<sup>8</sup> A large proportion of the observed activities (59.4% of the indoor and 31.2% of the outdoor observations) were classified as sedentary, while only 5.5% of the indoor and 21.3% of the outdoor observations were classified as moderate and vigorous physical activity. There were no significant differences in mean activity intensity level between boys and girls, or between 2- and 3-year-olds.

In the GENESIS study,<sup>9</sup> executed in Greece, physical activity data from 207 one- to two- year-olds and 500 two- to three-year-olds were collected by parental report. Parents reported 1.45 hours/week of light to vigorous physical activity in the infant boys and 1.05 hours/week in the infant girls. In the toddlers, 1.51 and 1.21 hours/week of light to vigorous physical activity were reported in the boys and girls respectively. Typical physical activities reported were playground recreational activities and taking walks with parents.

Since only two studies could be located and taking into account that parental report is of low accuracy for measurement of physical activity in young children,<sup>6</sup> evidence-based conclusions cannot be drawn. However it can be concluded that there are some indications that the low activity levels of preschoolers are also present in children under the age of three.

Similarly, only a few studies could be identified of sedentary behaviors in infants and toddlers. Zimmerman et al.<sup>10</sup> performed a telephone survey in 1009 parents of U.S. children aged 2 to 24 months to determine their television-, DVD- and video-viewing habits. By 3 months of age, about 40% of children regularly (on average 40 minutes per day) watched television, DVDs or videos. By 24 months, this proportion rose to 90%. The median age at which regular media exposure was introduced was 9 months. Vandewater et al.<sup>11</sup> reported survey data from a representative sample of U.S. parents of children aged 0 to 6 (N =1051) in 2005. They found that 63% of the 0- to 2-year-olds watched television on a “typical day,” for on average 1 hour and 15 minutes. Approximately 4% of 0- to 2-year-olds used the computer on a “typical day” and those who did, spent an average of 50 minutes at the keyboard.

Certain et al.<sup>12</sup> reported survey data from a large sample of U.S. parents (N=3556). According to the parental reports, 17% of 0- to 11-month-olds and 48% of 12- to 23-months-olds watched television, while the American Academy of Pediatrics recommends that children younger than 2 watch no television.<sup>13</sup> In the 24- to 35-month-olds 41% watched more than two hours per day, while the American Academy of Pediatrics recommends that children, 2 years and older, limit their time with entertainment media (television, video games, the Internet) to two hours per day.<sup>13</sup>

Common media use at very young age was also confirmed in a non-U.S. sample. In the GENESIS study<sup>14</sup> it was found that 11.1 % of the 1- to 2-year-old children view television longer than two hours/day.

From the different studies reviewed here it can be concluded that TV viewing is already common in infants and toddlers. This behaviour may displace light physical activity, it is often also associated with snacking, posing a double risk for children.<sup>15</sup>

## Research Gaps

To gain a comprehensive understanding of physical activity and sedentary behaviour during the toddler and infant years more research is needed in children under the age of three. Due to the short intermittent bursts of activities of young children,<sup>6,16</sup> only direct observation or objective measures, like *accelerometers*, should be used to define activity levels in infants and toddlers. However, although the validity and feasibility of accelerometers have been examined in preschoolers, similar studies are lacking in toddlers and infants.<sup>6</sup> Two pilot studies examined the use of accelerometers in 1-year-olds. Cardon et al.<sup>17</sup> showed that accelerometer-based physical activity measurements are already feasible in 1-year-olds. Trost et al.<sup>18</sup> determined *Actical and ActiGraphcut-points* for sedentary, light and moderate-to-vigorous physical activity in toddlers by videotaping 22 toddlers (eight boys, 14 girls) while wearing an accelerometer during a randomly selected 15-minute free-play period at child care. Studies comparing the accuracy of different types of accelerometers, differing monitor placements, accelerometer count thresholds and preferable time sampling intervals also seem critical for understanding how best to measure movement in young children. Such analyses might also consider the characterisation of movement during the different stages of development (infant, toddler or preschooler).<sup>6</sup> Moreover, the utility of *accelerometry* systems capable of detecting body posture (e.g., time spent sitting or standing) should be investigated in young children. These monitors may help evaluate sedentary behaviour in infants and toddlers as they can provide information, beyond the capabilities of conventional accelerometers.<sup>19</sup>

## Conclusions

While there is evidence that physical activity is important for infants and toddlers, it can be concluded that very little is known about their (in)activity levels. The limited evidence shows that very young children spend a large proportion of time sedentary, that television viewing is already common in infants and toddlers and that the time spent in moderate to vigorous physical activity is limited.

Further research is advocated to improve understanding of basic aspects of physical activity and sedentary behaviours in infants and toddlers. Meanwhile, efforts to promote physical activity and to minimize sedentary behavior (e.g., media use) in infants and toddlers are advocated.

## Implications for Parents, Services and Policy

If policies are to be designed and disseminated for the purpose of increasing physical activity and decreasing sedentary behaviour among infants and toddlers, then those policies should be developed on the basis of an improved understanding of basic aspects of physical (in) activity in these age groups.

Young children spend the greater part of their time at home, with their parents. Consequently, parents can have a strong influence on their child's health behaviour. Parents control the exposure to physical activity opportunities, act as role models and can use specific parenting practices, such as rules on television viewing.

Besides the home environment, the child care environment may play an important role in achieving adequate physical activity levels for young children since in many countries most children spend extensive time in child-care settings. Recently Gubbels et al.<sup>20</sup> showed that child care attendance at the age of 1 and 2 years was positively associated with body mass index (BMI) at 2 years, and a greater increase in BMI between these ages. Benjamin et al.<sup>21</sup> also found that infants who attended child care in someone else's home during their first 6 months of life, had greater measures of adiposity at 1 and 3 years of age.

Moreover Gubbels et al.<sup>7</sup> showed in 2- and 3-year-olds that activity opportunities in the physical environment and prompts by staff and peers were positively related to physical activity intensity in child care, while group size negatively related to activity intensity. These results indicate a need for additional exploration of physical activity practices in child care and identification of opportunities for intervention.

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