Introduction

Early childhood has been identified as a critical time for the development of healthy behaviours, such as physical activity. A rationale for promoting physical activity is that it provides the milieu for movement skills to develop, with movement, particularly physical activity play, being the substrate for physical activity during early years and subsequent years leading into adolescence and adulthood.

Subject and Research Context

Physical activity recommendations for children from birth to five years have been developed across a number of countries, with the majority of recommendations being “policy-oriented” statements providing anticipatory guidance for parents, health and educational professionals. These “statements” can be summarized as follows:

*Physical activity is a natural and life-long activity that should be encouraged from birth. Parents and/or caregivers are encouraged to be positive role models and provide daily physical activity opportunities incorporating developmentally-appropriate activities which promote motor skills. Both structured and unstructured physical activity opportunities should be provided in safe indoor and outdoor environments and the emphasis should be on “fun” and “participation” rather than competition.*

Although these general descriptive recommendations are potentially helpful they have several limitations, for example, the absence of a prescribed amount of daily physical activity. Quantitative prescriptive guidelines offer a number of advantages over descriptive guidelines including facilitation of ongoing monitoring and surveillance of physical activity levels in children.

Problems and Key Research Questions
To date, few countries have prescribed quantitative guidelines for physical activity in children younger than 5 years.\textsuperscript{3,4} The aim of this chapter is to summarize the empirical research supporting recently developed physical activity recommendations for children birth to 5 years of age.

The key research questions addressed in this chapter are:

1. Is there any evidence that physical activity is associated with health outcomes in early childhood?
2. Based on the evidence, how much time should young children spend in physical activity?

Recent Research Results

Over 140 cross-sectional, prospective cohort studies, quasi-experimental and experimental studies were reviewed.\textsuperscript{3,4} Studies were included if they met a specific inclusion criteria which was based on the Method of Critical Evaluation recommended by the Australian National Health and Medical Research Council.\textsuperscript{8} Identified studies were categorized according to the strength of evidence that they provided. Four domains of evidence were investigated: physical activity and related health outcomes; tracking of physical activity; descriptive epidemiology; and correlates of physical activity. (Similar approaches were used by Okely and Jones\textsuperscript{9}). The evidence for the health related outcomes are summarized in this review, with the others being summarized in subsequent reviews on the topic of physical activity.\textsuperscript{9-14}

Physical activity participation can provide important health benefits such as preventing unhealthy weight gain, reducing blood pressure and enhancing mental health.\textsuperscript{15,16} The association between physical activity and several health outcomes (adiposity, musculoskeletal health, motor development, blood lipids and social and emotional development) were investigated.

A moderate association between physical activity and body fatness was found. Thirty studies were identified, with all seven prospective cohort studies showing that those who were more active at baseline had smaller gains in fatness at follow-up.\textsuperscript{17-23} Of the 19 cross-sectional studies identified, 11 reported a significant inverse relationship between physical activity and adiposity.\textsuperscript{24-34} This relationship was much stronger when an objective measure of physical activity was used.

A limited association between physical activity and blood pressure, musculoskeletal healthand motor developmentwas found. Of the four studies reporting the relationship between physical activity and blood pressure, one prospective cohort study found that those with higher increases in physical activity had smaller increases in \textit{systolic and diastolic blood pressure}\textsuperscript{35} while two cross-sectional studies showed positive associations between physical activity and diastolic blood pressure.\textsuperscript{36,37} Five studies were identified that reported associations between physical activity and musculoskeletal health, however three involved a non-representative preschool population (pre-term infants with very low birth weight).\textsuperscript{38-40} A cross-sectional study by Janz et al\textsuperscript{41} showed that vigorous-intensity physical activity was significantly related to bone mineral content and bone mineral density (two indicators of bone health). Five cross-sectional studies reported associations between physical activity and motor development.\textsuperscript{42-46} Although all of these reported positive associations, the absence of potential cofounders such as developmental status and the variations in assessment procedures makes it difficult to draw robust conclusions.
There was inconclusive evidence of the associations between physical activity and blood lipids and social and emotional development. Three cross-sectional studies examined the relationship between physical activity and blood lipids. One found an inverse relationship with total cholesterol$^{37}$ and the other two reported a positive association with high-density-lipoprotein cholesterol (or “good cholesterol”).$^{47,48}$ Two studies (one cross-sectional and one experimental) investigated relationships between physical activity and social competence. In these studies, participation in a dance program or spending more time playing with same-sex peers improved social competence.$^{49,50}$ One study investigated the relationship between physical activity and emotional development and found that time spent in physical activity was related to teacher-rated emotional competence in boys but not girls.$^{50}$

Overall, mixed evidence for the association of physical activity with health benefits in preschool aged children was found.$^{3}$ The difficulty in accurately measuring physical activity within this age group; the small and underpowered samples in many studies; and the fact that children are generally healthy and free from risk factors for chronic disease (as such, one would not expect to see variations in many of the health outcomes, certainly not enough to be influenced by behaviours such as physical activity) are possible explanations for the mixed evidence.$^{3,4}$ Although the evidence with younger children is limited, there is strong evidence showing associations between physical activity and health outcomes in older children and adults, therefore physical activity habits established within the early years are likely to promote later physical activity and health.

Based on these finding and those described in the other reviews,$^{9-14}$ the following recommendations were synthesized (Table 1).

Table 1: Physical activity recommendations for children under five from Australia and United Kingdom.

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<th><strong>Australia</strong>$^{3}$</th>
<th><strong>United Kingdom Draft Guidance</strong>$^{4}$</th>
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<td>For healthy development in infants (birth to 1 year), physical activity should be encouraged from birth, particularly supervised floor-based play in safe environments.</td>
<td>Infants should be encouraged from birth to be physically active daily, particularly through floor-based play in safe environments.</td>
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<td>Toddlers (1 to 3 years of age) and preschoolers (3 to 5 years of age) should be physically active every day for at least THREE hours, spread throughout the day.</td>
<td>Children of preschool age who are capable of walking unaided should be physically active daily for at least THREE hours.</td>
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While the empirical evidence does not suggest a prescribed amount of time, most of the observational and intervention studies reviewed suggested that “more physical activity is better” thus, the recommendations from Australia and the United Kingdom reflect more than the typical amount of daily movement (of around two hours per day of a typical 12-hour day). The recommendation of three hours of physical activity per day is based on expert opinion and existing healthy outcome literature (as detailed above). The recommendations highlight that large amounts of time should be set aside daily for physical activity. Further, three hours allows for a possible decline in physical activity levels once young children attend primary school. It should also be noted that the recommendations do not specify any intensity of physical activity (i.e., whether the activity is light, moderate or vigorous), which aligns with young children’s natural intermittent and sporadic physical activity patterns.

Research Gaps

With the development of prescriptive physical activity recommendation from children aged birth to five, a number of research gaps remain. Future research could include:

- Establishment of surveillance systems for assessing compliance with recommendations;
- Monitoring the awareness and uptake of the recommendations by stakeholders such as health professionals, child care workers and parents; and
- Development, implementation and evaluation of simple well-designed interventions to promote physical activity in young children.

Conclusions

The development of prescriptive evidence-based physical activity recommendations for children under 5 years is imperative as it will facilitate monitoring and surveillance of the health and development of children. It will also help early years educational settings foster an inclusive and comprehensive educational environment from an early age, which arguably provides the best possible start for children. Establishing healthy physical activity habits from a young age, through implementation of evidence-based physical activity recommendations, will only be beneficial.

Implications for Parents, Services and Policy

The development of physical activity recommendations for children from birth to 5 years will have several notable implications for parents, services and policy makers. Prescriptive physical activity recommendations which are based on solid empirical evidence will:

1. Assist key stakeholders to understand the importance of physical activity for health benefits among young children;
2. Inform government policy in relation to health-promoting physical activity for children birth to 5 years of age;
3. Assist consumers, childcare workers and other health professionals to understand the importance of physical activity for health in children; and
4. Underpin and support health promotion activities and intervention by workers across a range of sectors and all levels of government.

References


