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Promoting Physical Activity in Preschoolers: A Review of the Guidelines, Barriers, and Facilitators for Implementation of Policies and Practices

Line Tremblay, Céline Boudreau-Larivière, and Krystel Cimon-Lambert
Laurentian University

Promoting healthy physical activity (PA) behaviours in children between the ages of 0 to 5 years has immediate impacts on the health and well-being of children and serves as a powerful strategy to prevent or minimise the occurrence of chronic diseases in later life. Although children are naturally inclined to partake in active play, their PA levels generally fall below the current Canadian PA recommendations. Given that more than 50% of Canadian children spend 6 hours or more per day in day care settings (home and centres), implementing PA interventions through careful policy development within these settings represents a strategic way to help increase PA levels in young children. Parents and early childhood educators, through their perceptions and beliefs, play an important role in fostering healthy PA behaviours in preschoolers. The purpose of this review article is to summarise the PA guidelines for young children, to discuss the effects of PA and sedentary behaviours on several aspects of children's development and functioning, to describe the barriers and facilitators of PA and sedentary behaviours in preschoolers, and to present recommendations to increase opportunities for PA in the day care setting.

Keywords: preschool children, physical activity, determinants, guidelines, policies

There is an assumption among parents, early childhood educators, and even by some researchers that young children are sufficiently active and that the amount and intensity of their natural physical activities are adequate (Alpert, Field, Goldstein, & Perry, 1990; Timmons, Naylor & Pfeiffer, 2007). However, this assumption contradicts the trends in the increasing rates of overweight and obese children. For example, recent epidemiological data show that the percentage of Canadian children and adolescents classified as overweight or obese darted from 14% to 31% among boys, and from 14% to 25% among girls, during the past two decades, and results indicate this upward trend is likely to continue (M. S. Tremblay, Shields, Laviolette, Craig, & Janssen, 2010). Improving physical activity (PA) and nutrition behaviours of children and youth in the school setting in particular is regarded as a critical intervention strategy for enhancing population health in the long term. Although a number of studies have investigated proexercise and antiobesity initiatives implemented in primary and secondary school-based programs (see, for instance, the *Canadian Journal of Public Health*, 2010, Supplement 2, on school health and the references therein), there is a paucity of research aimed at determining the prevalence and effectiveness of PA programs targeting *preschool children in day care settings*. Given that over half of Canadian children are in some form of child care and that one quarter of these children attend day care centres (Statistics Canada, 2003), there is great potential to implement PA interventions aimed at developing healthy PA behaviours in early childhood, thereby enhancing children's health in the short term and fostering lifelong healthy PA behaviours to curtail the prevalence of chronic diseases in later life.

Accordingly, the objective of this article is to review research evidence for promoting and increasing PA in preschoolers and the need for policies, preschool PA programs, as well as training and education for parents and for early childhood educators.

Definitions and Guidelines

PA is defined as any physical movement resulting from skeletal muscle contraction and energy expenditure (Caspersen, Powell, & Christenson, 1985; Goran, 1998). The Canadian Society for Exercise Physiology recommends that infants aged less than 1 year be physically active several times daily through interactive floor-based play, and that children aged 1 to 4 years accumulate at least 180 min of PA at any intensity throughout the day to progress toward at least 60 min of energetic play by the age of 5 years (M. S. Tremblay et al., 2012a). In comparison, the National Association for Sport and Physical Education (2009) in the United States recommends that preschoolers accumulate at least 60 min of structured (organized) PA and 60 min of unstructured (informal) PA per day.

Sedentary behaviour is defined as any waking behaviour characterised by an energy expenditure equal or less than 1.5 metabolic equivalent (MET) while in a sitting or reclining posture (M. S. Tremblay et al., 2012b; M. S. Tremblay, Colley, Saunders, Healy, & Owen, 2010). Sedentary activities in young children include watching TV and videos; playing on the computer; playing video games; sitting; or reclining in a stroller, high chair, or car seat. TV- and video-viewing behaviours have been found to dominate, compared with other sedentary activities, during early to middle childhood. In fact, TV viewing is the most frequently studied sedentary

Line Tremblay, Department of Psychology, Laurentian University; Céline Boudreau-Larivière, School of Human Kinetics, Laurentian University; Krystel Cimon-Lambert, Department of Human Development, Laurentian University.

Correspondence concerning this article should be addressed to Line Tremblay, Department of Psychology, Laurentian University, Sudbury, Ontario, Canada, P3E 2C6. E-mail: ltremblay@laurentian.ca

activity among children and is commonly used as a proxy for sedentary behaviour (Must & Tybor, 2005). Of particular concern is that early exposure to TV viewing is associated with sedentary behaviours later in primary school (Pagani, Fitzpatrick, Barnett, & Dubow, 2010), as well as into adolescence and adulthood (Janz, Burns, & Levy, 2005; Kemper, Post, Twisk, & van Mechelen, 1999; Pate, Baranowski, Dowda, & Trost, 1996; Pate et al., 1999; Raitakari et al., 1994). Accordingly, the Canadian Society for Exercise Physiology recommends that parents of children less than 4 years of age minimise the time spent being sedentary to no more than 1 hr at a time, avoid screen time in children below the age of 2 years, and limit screen time of 2- to 4-year-old children to under 1 hr per day (M. S. Tremblay et al., 2012b) and to a maximum of 2 hr for 5- to 6-year-old children (Canadian Society for Exercise Physiology, 2012c).

Effects of PA and Sedentary Behaviours

The benefits of PA are numerous and include several aspects of development, such as motor skill acquisition, psychosocial functioning, cognition, and physical health (M. S. Tremblay et al., 2012a).

Motor Skill Development

PA is part of any child's normal development. It manifests itself as play that can be described as enjoyable behaviour, seemingly purposeless, beginning in infancy, peaking during childhood, declining during adolescence, and taking three forms—rhythmic stereotypies, defined as purposeless, repetitive gross motor movements such as body rocking and foot kicking (infancy); exercise play (preschool years); and rough-and-tumble play in primary school (Pelligrini & Smith, 1998). If deprived of these natural physical activities, children tend to compensate when they have the opportunity to play (Pelligrini & Smith, 1998), which supports the contention that PA play is necessary for a child's development. A first aspect of development considered as primarily affected by PA is motor skills.

There is strong evidence that PA benefits gross motor skill development (Emck, Bosscher, Beek, & Doreleijers, 2009; Fisher et al., 2005; Sääkslahti et al., 2004; M. S. Tremblay et al., 2012a; Williams et al., 2008), which is critical for the development of higher level fine motor skills such as writing (Woodward & Swinth, 2002). Improvements in motor skills also show positive impacts on other aspects of the child's functioning. For example, a systematic review (Emck et al., 2009) of controlled studies and population studies of school-age children (6 to 12 years old) with emotional, behavioural, and developmental and psychomotor delays shows strong evidence of a relationship between motor skills and self-perceived competence (academic as well as athletic, Goodway & Rudisill, 1996).

Socioemotional Functioning

Improvement of motor and athletic skills, as well as practicing PA itself, also shows important positive outcomes on the social–emotional functioning and well-being of children (C. Branta, Haubenstricker, & Seefeldt, 1984; Emck et al., 2009; M. S. Tremblay et al., 2012a), which is likely to persist throughout development. For instance, a systematic review of the literature, including studies using both controlled and correlational methodologies for all ages, show that physically active adolescents show less emotional distress, irrespective of gender, class, or health status (Paluska, & Schwenk, 2000). Being physically active in groups and in games provides children the opportunity to learn new skills (Bailey, 2005), such as solving conflicts and cooperating, and to develop friendships (Hansen, Larson, & Dworkin, 2003), which, in turn, increase socioemotional adjustment and self-esteem (Emck et al., 2009; Wang & Veugelers, 2008; Wang, Wild, Kipp, Kuhle, & Veugelers, 2009). Some positive socioemotional outcomes of PA were also found in clinical populations such as children with attention-deficit hyperactivity disorder. In particular, PA led to improvements in athletic skills, which, in turn, increased social acceptance and more positive social interactions with peers (Lopez-Williams et al., 2005). This example illustrates the benefit of enhancing athletic skills in children with behavioural and emotional problems and encouraging their participation in team sports. In contrast, a prospective and longitudinal study of 1,314 children, using parents' and teachers' reports of TV exposure and academic and psychosocial functioning, shows that higher levels of early childhood TV exposure predicts greater chances of peer rejection experiences later in primary school, which is explained by the authors as being linked to more time spent alone and inactive during TV viewing, leaving less time for important social interactions (Pagani et al., 2010). In addition, childhood obesity, which is a by-product of inactivity, has negative consequences on psychosocial functioning, including negative stereotypes, peer rejection, and negative self-image (Dietz, 1998; Lobstein, Baur, & Uauy, 2004).

PA and physical education reportedly reduce antisocial and aggressive behaviours in children. For example, using direct observations, validated tests of motor development, interviews, and questionnaires administered to teachers, C. F. Branta and Goodway (1996) reported a significant reduction of aggressive behaviours in 192 at-risk prekindergarten and 101 fourth-grade children living in poor urban communities. The intervention took place in a 3-year period and was aimed to teach the children the notions of personal space and force control, which, in turn, increased their conflict resolution skills as well as physical skills (C. F. Branta & Goodway, 1996). Similarly, Bundy and colleagues (2009) found that their PA intervention targeting 150 5- to 7-year-old children, which consisted of adding purposeless material (such as tires, hay bales, or cardboard boxes) on the playground, resulted in a reduction of aggressive behaviours; an increase in children's cooperation, group play, and creativity; and resilience when experiencing minor injury, as measured by teachers' reports. Thus, keeping children active, teaching them the benefit of PA early, and thus permitting them to develop good habits may lead to a secondary benefit, which is to keep them away from socially undesirable behaviours such as bullying.

Cognitive Functioning

Improved cognitive functioning and academic performance is another interesting benefit of PA, although the underlying mechanisms are not yet well understood. It is suggested that natural occurrence of exercise play can improve cognitive performance (Pelligrini & Smith, 1998). Furthermore, children who are more

physically active achieve better grades (C. Branta et al., 1984). A more recent large-scale study in a representative sample of U.S. children revealed that kindergarten and first-grade girls who were the least physically active (0 to 35 min of PA per week) performed significantly lower on standard math and reading tests compared with girls in the moderate and highly active categories (70 to 300 min per week; Carlson et al., 2008). These authors did not find any significant difference among boys. Evidence from longitudinal studies also suggests that TV viewing during the early years has a negative impact on cognitive development of children (Pagani et al., 2010; Schmidt, Rich, Rifas-Shiman, Oken, & Taveras, 2009). Schmidt and colleagues (2009) reported that TV exposure from birth to the age of 2 years negatively impacted cognitive functioning at the age of 3 years, but this effect disappeared when taking into account the mother's level of education and cognitive skills. Pagani and colleagues (2010) reported that early exposure to TV (29 and 53 months) predicted a more passive learning behaviour in the classroom and lower mathematical achievement later in the fourth grade. Increasing PA levels and limiting sedentary behaviour, TV viewing in particular, are therefore correlated with better cognition and academic performance. Although the studies we reviewed were conducted using large sample sizes with a good methodology, more research is certainly needed to better understand how sedentary behaviours and PA influence cognitive processes.

Physical Health

The most obvious beneficial effects of PA are those linked with physical health, and these health effects are observed in people of all ages, including young children. The first effect of PA that is well recognised and strongly supported by research is adiposity. Although there is no single cause of obesity, it is well accepted that healthy weight maintenance results from the balance between energy expenditure via PA and energy intake through healthy eating habits (Cameron, Norgan, & Ellison, 2006; Harris, Kuramoto, Schulzer, & Retallack, 2009; Hill & Peters, 1998; Wardle, Guthrie, Sanderson, & Rapoport, 2001). However, the relationship between PA and obesity in children is complex and not straightforward. This relationship is moderate and depends on the level or intensity of PA. It seems that high-intensity PA in preschool and primary schoolchildren who are overweight is necessary to achieve a reduction in body mass index (BMI; Moore et al., 2003; Moore, Nguyen, Rothman, Cupples, & Ellison, 1995). Considering that PA in young children is associated with lower body fat later in adolescence (Kemper et al., 1999; Moore et al., 1995, 2003), and that excess weight and obesity in young children is linked to increased risks of weight problems throughout childhood and into adulthood (Clarke & Lauer, 1993; Evers, Arnold, Hamilton, & Midgett, 2007; Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001; Magarey, Daniels, Boulton, & Cockington, 2003), focused efforts to increase PA levels in young children to regulate body composition are warranted.

The association between sedentary behaviours such as TV viewing and adiposity in preschoolers is less clear. Some researchers (DuRant, Baranowski, Johnson, & Thompson, 1994) found no association between TV viewing and BMI, whereas others identified that TV viewing became positively associated with BMI when children reached about 6 years of age (Jago, Baranowski, Baranowski, Thompson, & Greaves, 2005) and continued to increase in primary school (Pagani et al., 2010; Proctor et al., 2003). Inconsistencies in results may be explained by the evidence linking sedentary behaviours with unhealthy eating behaviours (J. E. Brown, Broom, Nicholson, & Bittman, 2010; Pagani et al., 2010; L. Tremblay & Rinaldi, 2010), that is, the negative impact of inactivity can be counterbalanced by providing children with a healthy diet. Research also suggests an additive effect of both PA and sedentary behaviours. For example, children who are highly active and who watch less TV have been found to have lower weight than children who combined low activity level with high TV viewing (Janz et al., 2005; Proctor et al., 2003).

In children and adolescents, PA improves other health parameters, such as blood pressure reduction and increased lean muscle mass and bone mineral density (Harris et al., 2009). Controlled studies assessing PA intervention programs (gross and fine motor skills training) in preschool children showed that a gross motor skills program, coupled with calcium supplements, increase bone mass and bone strength; however, this effect was not found to persist 2 years after the program completion (Binkley & Specker, 2004). More recently, Wosje and colleagues (2009) used accelerometer measures, as well as parents' reports, and found that limiting TV viewing to less than 2 hr per day, not PA, predicted greater gains in bone mass and bone mineral density of 3- to 7-year-old children, which was independent of children's adiposity levels, suggesting a direct effect of inactivity on bone development.

In preschoolers, research has shown that naturally occurring exercise play can improve cardiorespiratory functioning and thermoregulation (Pelligrini & Smith, 1998). M. S. Tremblay and colleagues (2012a) reviewed evidence that higher levels of PA were associated with better cardiometabolic health during the early years. For example, an aerobic exercise training program led to improvements in children's cardiovascular fitness compared with a control group of children who engaged in playground free play (Alpert et al., 1990). Outdoor play in particular has been found to represent higher intensity PA and has been shown to correlate with better heart health, such as reduced risk of coronary heart disease as well as lower blood pressure and blood cholesterol levels (Sääkslahti et al., 2004). Sedentary behaviour in children, on the other hand, is associated with cardiovascular and metabolic risk factors, such as high blood pressure, dyslipidaemia, hyperinsulinemia, and/or insulin resistance (Reilly et al., 2003). Finally, we reviewed only one study positively linking PA and sleep in young children, supporting the belief that spending energy in active play helps children to fall asleep at night (Sääkslahti et al., 2004).

Finally, and similarly to M. S. Tremblay and colleagues (2012a), we did not find any study assessing the risks associated with increased PA in young children. However, in older children and adolescents, there are risks associated with exercise for those who partake in competitive sports. There is some evidence, mainly based on a small number of clinical studies, of higher risks of disordered eating, affect regulation problems, exercise addiction behaviours, and substance use/doping in children and adolescent athletes compared with nonathletes (Purper-Ouakil, Michel, Baup, & Mouren-Simeoni, 2002). Furthermore, excessive PA is sometimes linked to overtraining and has been documented to induce symptoms of depression (Paluska & Schwenk, 2000). There is certainly a great need for more research to clearly assess this risk.

The unanswered question is whether PA promotion in preschool children can lead to such unhealthy exercise-related behaviour later in development. To our knowledge, no study thus far has investigated this issue.

Facilitators and Barriers of PA and Sedentary Behaviours

There are two main sources of influence on young children's PA and sedentary behaviours. The first source is the parents and family environment and the second is the early childhood educators and school environment. Parents influence their children's involvement in PA through their own PA habits and by encouraging and supporting, or by discouraging, sport practices (L. Tremblay, Rinaldi, Cimon-Lambert, & Larivière, 2012; Zecevic, Tremblay, Lovsin, & Larivière, 2010). As many children spend a large proportion of their time in out-of-home care, such as preschool child care centres or home day cares, these settings offer an ideal opportunity for the early development of healthy behaviours, including PA (Bower et al., 2008; Eveline, Valery, Jessica, Ilse, & Greet, 2012). Several factors have been identified to influence PA and sedentary behaviours in day care settings. They include parents' and teachers' perceptions and attitudes, home and school environments, and policies.

Parents' Perception

Research findings suggest that parents hold several beliefs about their young children's PA levels, risks for obesity, gender differences, and their role and influence on their children's PA activity behaviours. Canadian data show that between 55% and 75% of parents believe that their preschoolers are sufficiently active, as they report that their child is engaged in at least 60 min of PA per day (Irwin, He, Bouck, Tucker, & Pollett, 2005; Tucker & Irwin, 2008; Zecevic et al., 2010). Zecevic and colleagues (2010) reported that parents' perceptions of their child's PA level were not different from their day care teachers, suggesting that this perception that children are sufficiently active is shared by some early childhood educators. Parents also report an average of 9 to 14 hr of weekly media consumption (TV, video games, and computer) in preschool-age children (Funk, Brouwer, Curtiss, & McBroom, 2009), with greater sedentary time spent in low-activity playing during the weekend (Pagani et al., 2010; Sääkslahti et al., 2004).

Data collected using objective measures of PA, such as direct observation and using accelerometers, tell a different story. It is estimated that preschool children spend most (from about 50% to 90%) of their free play time engaged in sedentary activity (Dowda, Pate, Trost, Almeida, & Sirard, 2004; Sallis, Patterson, McKenzie, & Nader, 1988) and are engaged in vigorous physical exercise for only a few minutes each hour (Benham-Deal, 2005; Carlson et al., 2008; Danner, Noland, McFadden, DeWalt, & Kotchen, 1991; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004). Research conducted in Canada and elsewhere using objective measures of PA (Alhassan, Sirard, & Robinson, 2007; Colley et al., 2011; Eveline et al., 2012), or direct behavioural systematic observations (Bower et al., 2008; W. H. Brown et al., 2009), consistently shows that children spend, in general, more than two-thirds of their waking time in sedentary activities, that only 4% to 17% engage in moderate to vigorous PA (MVPA), and that only a small proportion (4% to 13%) of children will accumulate the recommended 60 min of MVPA per day. In addition, according to a Statistics Canada report (2003), Canadian children between the ages of 2 and 11 years watched an average of 14.6 hr of TV per week, or approximately 2 hr every day, which is a full 1 hour more than the recommended daily allotment for this age group, as set by the Canadian Paediatric Society (2002) and the Canadian Society for Exercise Physiology (2012c, 2012d). There is strong evidence that activity levels of most children are therefore inadequate, and, accordingly, parents must not assume and trust that their children are accumulating enough PA to meet the daily recommendations.

Another well-documented parental perception regarding PA and health behaviours pertains to body size perception. Research consistently shows that a large proportion (75% to 85%) of parents of overweight children believe that their child is of normal weight (for a review, see L. Tremblay et al., 2012; L. Tremblay, Lovsin, Zecevic, & Larivière, 2011) and therefore are not likely to consider the need for changing lifestyle habits, such as increasing PA for their child and their family (Maynard, Galuska, Blanck, & Serdula, 2003; L. Tremblay et al., 2012; West et al., 2008). The reason for these misperceptions is not yet fully understood, but it is suggested that adults tend to perceive chubbiness in young children as normative and healthy (L. Tremblay et al., 2011, 2012). However, this perceived "baby fat" (which is, in reality, a surplus of weight) that parents and adults believe goes away on its own only appears to decrease with growth. In fact, although the child's weight to height ratio (BMI) slightly decreases until about 6 years of age, it begins to increase again and continues to climb throughout the remainder of childhood. This phenomenon is known as the adiposity rebound (Heelan & Eisenmann, 2006). Findings from a large-scale study showed that children who had an early versus late adiposity rebound were 6 times more likely to be obese in adulthood (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997), which demonstrates that excess weight gain during the early years may put children at a greater risk of becoming obese as adults. Thus, it is important to acknowledge parents' and adults' misperceptions related to recognising their child's unhealthy weight and, furthermore, to convince parents of the importance of PA as a means to regulate their child's body composition.

A third well-documented perception associated with PA behaviours takes its origins in gender stereotypes. Parents tend to perceive that, compared with boys, girls are less physically active (Zecevic et al., 2010) and that they need less PA (Hinkley, Salmon, Okely, Crawford, & Hesketh, 2011). Parents also tend to be more concerned about good motor skill development in boys than in girls (Toftegaard-stoeckel, Groenfeldt, & Andersen, 2010), suggesting a double standard regarding athletic skills development. One consequence of these findings is that boys tend to perceive themselves as more physically competent than girls, which may be a contributing factor as to why girls are indeed less physically active than boys (Colley et al., 2011; Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008; Sallis et al., 1993). It has been suggested that the underlying biological differences between boys and girls (i.e., male hormones such as testosterone determine activity level and aggressiveness) explains this gender difference in PA levels (Pelligrini & Smith, 1998). However, several findings call into question the biological hypothesis. First, there is no difference between boys and girls in the amount of early gross motor rhythmic stereotypies, and differences appear only later, when compar-

ing levels of exercise play and rough-and-tumble play, which are higher in boys than in girls (Pelligrini & Smith, 1998) but independent of motor skill development as assessed by teachers (Toftegaard-stoeckel et al., 2010). Second, gender differences in PA levels are most prominent at high levels of activity. For instance, gender differences are only evident in moderate- and vigorous-intensity PA (Finn, Johannsen, & Specker, 2002; Pate et al., 2004) and not in low-intensity PA and sedentary activities (Pate et al., 2004; Taylor et al., 2009). Higher levels of moderate- to vigorous-intensity PA in boys compared with girls (Finn et al., 2002; Pate et al., 2004), however, appear to have little impact on curtailing the increased rates of obesity in boys (31% for boys compared with 25% for girls; M.S. Tremblay et al., 2010), suggesting that other factors, including genetics, eating habits, and environments promoting obesity and sedentary behaviours (Cameron et al., 2006; Hill & Peters, 1998; L. Tremblay et al., 2012), for which there is no gender differences, may be contributing factors. Third, gender differences disappear when measures of PA are made in a context of structured play compared with unstructured play such as recess (Eveline et al., 2012). Fourth, lack of parental support for PA and role modelling is a stronger predictor of low PA for girls than for boys (Dowda, Dishman, Pfeiffer, & Pate, 2007; Thompson, Humbert, & Mirwald, 2003). As a whole, there is no consistent evidence or theoretical basis to imply that PA and motor skills would be more important for the physical development of boys than for girls.

Altogether, these findings support the alternative social hypothesis in explaining gender differences in PA. As low-activity playing is related to higher BMI in girls and not in boys (Sääkslahti et al., 2004), and because structured activity appears to be a more important determinant of PA levels in girls (Eveline et al., 2012), there is a need to address parents' perceptions and education about gender stereotypes as related PA, considering that parental and adult feedback is a main determinant of a young child's perception about him/herself (L. Tremblay et al., 2012).

The last parental perception on PA relates to their role as a model for their child's PA behaviours. Although parents recognise their role in providing opportunities for PA through structured activities, such as taking children to swimming class (Hinkley et al., 2011), some parents believe that support is enough to facilitate PA in their preschoolers and that being physically active themselves is not required (Irwin et al., 2005). However, research shows that parents' PA levels, objectively measured using accelerometers, is positively and significantly associated with children's PA levels (Oliver, Schofield, & Schluter, 2010). Children are 4 times more likely to be highly active if their parents support their child's PA and 2 times more likely to be more active if parents are physically active themselves (Zecevic et al., 2010). Effective intervention strategies aimed at increasing PA should therefore not only target children but also their parents' PA habits and attitudes toward sport and PA.

Early Childhood Educators' Perceptions and Attitudes

Parental perceptions of PA, as it relates to themselves and to preschool children, can be partly explained by the confidence expressed by some parents that their child's day care provides higher quality and more structured PA experience than what is provided at home (Irwin et al., 2005). As already discussed, over 50% of preschoolers spend most of their awake time being sedentary, in both home day cares and day care centres, and are therefore not meeting the Canadian Society for Exercise Physiology PA recommendations. The issue is whether the role of day care settings in providing opportunities for MVPA is acknowledged and, if so, why this goal is not met.

Some research findings highlight the effect of teachers' perceptions, attitudes, and personal preferences to explain the failure to meet PA guidelines. Copeland, Kendeigh, Saelens, Kalkwarf, and Sherman (2012) found that children's outdoor playground time depends solely on the teacher's decision, which is based on the individual teacher's own preference, such as not liking cold weather, an intolerance to noise and chaos outdoors, or on the amount of work involved in preparing children to go outside. In addition, it was found that teachers rarely assume their role as a facilitator for children's PA and even often disengage themselves on the playground by sitting, standing by the fence, or socializing with other teachers (W. H. Brown et al., 2009; Copeland et al., 2012). One possible explanation for such behaviours is teachers' concerns for safety issues and a duty to protect the children. A study conducted by Bundy and colleagues (2009), which consisted of scattering loose parts or material within the school ground, such as car tires and boxes, demonstrated that teachers' anxiety and concerns for safety increased, despite the fact that the frequency or severity of physical injury was unaltered during the intervention compared with pretest measures. Finally, teachers' training and competency in physical education was pointed out as a possible limitation to increasing PA in children; however, the number of studies testing this hypothesis is limited and contradictory. For example, Bower and colleagues (2008) found that PA training and education were associated with better PA promotion and encouragement by teachers. On the other hand, the type of lesson or intensity of PA was not different whether the activity was taught by a regular classroom teacher or a teacher specialized in physical education (Eveline et al., 2012). Interestingly, to reduce the time that children are sedentary, it was recommended that teachers should both reduce the time spent on teaching rules and techniques and permit pupils to free play or help the teachers set up the equipment. Regardless of a teacher's training, higher proportions of MVPA seem to occur when the teacher offers opportunities for structured PA (W. H. Brown et al., 2009).

Home and School Environments

For parents, the most significant barriers to increasing PA in their children are associated with time (having to cope with work, home schedule, and demands), family composition (having several children of different ages), weather and seasons, financial resources (fees to use facilities), access (having to drive to bring the family to the community facilities), and safety issues (strangers in parks; Hinkley et al., 2011; Irwin et al., 2005). Both parents and teachers recognise that gathering and group activities increase PA in children compared with when children are alone (Hinkley et al., 2011). However, such activities require more space, such as big backyards and large school playgrounds, which were also identified as increasing PA (Hinkley et al., 2011), whereas smaller indoor rooms were associated with less MVPA (Eveline et al., 2012). Larger outdoor spaces that foster group play may explain why outdoor activities are found to be associated with higher

levels of MVPA compared with indoor play (W. H. Brown et al., 2009; Eveline et al., 2012; Hinkley et al., 2011). However, simply increasing outdoor play is not sufficient to increase PA levels in preschool children (Alhassan et al., 2007). Adding structured activity seems to specifically increase MVPA, at least in girls (Eveline et al., 2012). In addition, the types of equipment and toys available can help to increase PA levels (Bower et al., 2008; W. H. Brown et al., 2009; Hinkley et al., 2011). For example, obstruction equipment, such as tunnels or soft blocks, increases locomotion behaviour, as they allow for more activity, whereas throwing equipment, such as balls, are related to lower levels of MVPA (W. H. Brown et al., 2009). In addition, Bundy and colleagues (2009) showed that loose equipment with no specific function, such as boxes, increases PA by facilitating creativity and pretend play in preschoolers.

Effect of Policies

A PA policy is defined as a formal statement or decision related to PA within organisations that define the priorities and the set of actions to be carried out to fulfill those priorities. The school setting is recognised as a key strategic milieu for implementing policies aimed at improving the health of children through improved nutrition and increased PA. In 2008, the World Health Organization published the School Policy Framework to implement the Global Strategy on Diet, PA, and Health. Within this document, policy options that support healthy eating and PA in schools are described (World Health Organization, 2008). The majority of Canadian provinces and territories have nutrition policies and guidelines for schools and many have structured daily PA or physical education for kindergarten through Grade 12 (Veugelers & Schwartz, 2010). The development and evaluation of PA programs targeting preschoolers in day care settings has been identified by the World Health Organization (2008) as a priority area requiring focused attention as well as further research to determine the long-term effectiveness of PA programming in this target age group. A similar objective was developed by the Ontario Ministry of Health and Long-Term Care (2005) through their Active 2010 program.

PA policies of day care and preschool facilities refer to child care written statements and guidelines related to active/inactive time, such as TV use, a statement supporting PA, play environment use, and education (Bower et al., 2008).

The Day Nurseries Act (1990) indicates that children over 30 months of age that are in attendance for 6 hours or more in a day should play outdoors for at least 2 hours each day, weather permitting, and that day care facilities should offer activities designed to promote the development of gross and fine motor skills. This Act also stipulates that activities should foster language, cognitive, social and emotional development, and should also provide opportunities for active and quiet play. The policies and protocols for the implementation of these day care guidelines are generic, rather than specific, and therefore do not take into account variations from one day care setting to another in areas such as physical resources, community support, and socioeconomic factors. Although new guidelines for increasing activity levels in young children are now available (Canadian Society for Exercise Physiology, 2012a, 2012b), there is a need to provide clear guidance to day care settings on specific methods for implementing these recommendations. Providing inexpensive as well as easy-to-implement and effective strategies for increasing activity levels for this age group, as well as tools for measuring the effectiveness of these strategies on health fitness and movement skills, is necessary. The horizontal integration of PA health initiatives and services (Pan Canadian Joint Consortium for School Health, 2010) is likely the best course of action for assisting day care providers in maximizing opportunities for PA in preschool-age children. In particular, focused efforts in increasing stakeholder engagement (parents, early childhood educators, nongovernmental organisations) are important elements in the development and/or refinement and implementation of PA policies in day care settings in offering support and advocacy for the benefits of PA (Pan Canadian Joint Consortium for School Health, 2010). Clearer policies are required for programming, the physical environment, and the training of early childhood educators, day care staff, and parents that collectively foster PA in young children.

There is some evidence that PA policies positively influence PA and reduce sedentary opportunities in preschoolers (Bower et al., 2008). The decision to implement PA policies in preschools, as well as defining the objective of these policies, depend on the way society sees its role as well as the roles of adults involved with children. Early childhood educators and day care providers are concerned with child safety, nutrition, as well as cognitive and socioemotional development of children. Accordingly, providing the best possible PA opportunities may not be high on their list of priorities, despite their best intentions. Furthermore, according to Bundy and colleagues (2009), society's contemporary discourse is to protect children from all risks of physical injury to the extent that we do not tolerate even minor injuries, such as bruises, that are a natural and universal part of growing up, thus creating what is called "surplus safety." The consequence of this well-intended position is indeed to increase the risk of childhood obesity by reducing children's active and independent play, as well as depriving them of opportunities for emotional, intellectual, and social development (Bundy et al., 2009).

Recommendations and Conclusions

Parents and early childhood educators play a pivotal role in fostering healthy PA behaviours in children. Effective intervention strategies aimed at increasing PA in day care settings should therefore not only target children but also their parents' and day care providers' PA habits and attitudes toward sport and PA. Policies around parental and teacher education and training should therefore be at the forefront. PA policies related to day care programming should also provide more specific guidelines related to structured outdoor play to help reach target PA levels for preschoolers. This process can be facilitated through the horizontal integration of community-based PA services and resources.

Based on the information reviewed herein, we recommend the steps outlined in the following sections to day care managers, parents, early childhood educators, and preschool program developers.

Policies on Increasing PA Activity Levels in Preschool Children

Based on strong evidence provided by studies using objective, direct measures, as well as correlational research designs showing that preschool children are not sufficiently active, and based on the recognition by the World Health Organization, the Canadian Society for Exercise Physiology, and the Ontario Ministry of Health and Long-Term Care of the importance of PA programs targeting this age group, the following recommendations are made:

1. PA recommendations should be clearly stated and made a priority within the day care program curriculum, that is, to implement a minimum of 1 hr of structured and 1 hr of unstructured PA per day in the regular curriculum (for example, two 30-min blocks of structured play and two 30-min blocks of unstructured play).

2. Both structured and unstructured activity periods should each include at least a total of 30 min of MVPA. Examples of MVPA to increase strength and endurance include dancing or exercising with music, mini-Olympic games where children must go through a series of obstacles such as tunnels, throwing balls to a target, running, or fast walking (i.e., continuous movement to increase, then maintain, a higher heart rate).

Benefits of PA in Preschool Children

Literature reviews, controlled studies, and population studies provide strong evidence of the positive effect of PA on motor skills development and socioemotional development. Therefore, the following recommendations are made:

1. Structured and unstructured PA should be planned and prepared according to the following objectives: (a) increase gross motor skills and athletic skills, (b) develop psychomotor coordination, (c) develop endurance and strength, (d) provide opportunity for social interaction and problem solving, and (e) familiarize children with competition and games role-playing.

2. The types of PA should be diverse, playful, and engaging for young children.

Examples of activities to develop motor skills, athletic skills, and psychomotor coordination include throwing, catching, and bouncing a ball varying in size; jumping and kicking using obstacles varying in difficulty level; and galloping, hopping, and jumping. Using a mat, children can learn different rolling movements. Walking on a line traced on the floor helps to increase balance. Activities that increase social interaction include group or team games such as ball games. Children can also participate in small teams. Indoor or outdoor play time with loose materials permits unstructured and group activity.

Adults as Facilitators and as Role Models

Parents and educators are regarded as having a significant influence on shaping young children's PA habits, though further studies are required to better understand the intricacies of this impact. Based on our current knowledge, we recommend the following:

1. Teachers' should actively participate to maximize children's engagement in PA.

2. Whenever possible, organise activities that include parents and other family members.

3. Parents should view themselves as PA role models. Being active will encourage their children to imitate their healthy behaviours.

Home and Day Care Environments

Based on a small number of studies, there is some evidence that the day care and family home environment has an impact on the frequency and the intensity of children's PA, which leads us to recommend the following:

1. The day care environment should include larger spaces, both indoor and outdoor. When outdoor play is not possible because of weather conditions, using a large indoor space such as a gymnasium is recommended. Day cares housed within schools should be given access to such spaces. Communities should support day cares located near recreation centres or schools by creating a framework to provide access to gymnasiums at no cost or reduced cost.

2. Materials that increase locomotion and MVPA for structured and unstructured activities, such as tunnels, soft blocks, slides with stairs, and any safe type of obstruction equipment, should be available. Furthermore, loose equipment with no specific purpose such as cardboard boxes, which facilitate spontaneous group play and creativity, should also be made available.

3. Day care curricula should include workshops delivered by PA specialists outlining the benefits of PA and healthy lifestyle and strategies to increase PA levels, supplemented with books, videos, or stories portraying physically active children and their parents.

Addressing Parents' Attitudes and Perceptions

There is strong evidence of parental misperceptions about their young children's PA activity levels, as well as their child's weight status and needs for change in lifestyle, as demonstrated by a large number of both controlled and correlational studies converging with similar results. This suggests that day care program developers need to take into account parents as important facilitators of their child's health and PA habits. Therefore, information should be provided to parents about the following:

1. The importance of an objective assessment of their child's health and weight status by a paediatrician or family doctor, as well as an objective assessment of their child's PA levels compared with the Canadian Society

for Exercise Physiology's recommendations for PA and sedentary behaviours.

2. The importance and benefits of PA for their children, as well as strategies to help increase PA of the family, such as making safe space at home for the children to be active (such as mats in the basement), family play time at the park or in the backyard, walking after meals, parking at a distance from shopping mall doors, and so forth. For families living in Canada, wintertime can be perceived as problematic for achieving the recommended levels of PA; parents may consider bringing their children to the local shopping malls, playgroups, indoor recreation facilities, or community centres where they can run and walk. Preschoolers can be initiated to outdoor winter activities such as skating and skiing.

3. Community resources for PA. Some parents are unaware of programs or falsely believe that the costs for access to such facilities or programs are too high, which is often not the case.

In brief, the lifelong practice of PA and active behaviours takes root during early childhood, underscoring the importance of fostering healthy PA behaviours early in development (Oliver et al., 2010). The most active children tend to stay active, whereas the least active children tend to remain the least active (Pate et al., 1996, 1999). Taken together with the evidence that sedentary behaviours are more stable than PA behaviours over time (Janz et al., 2005; Pate et al., 1999; Raitakari et al., 1994; Sääkslahti et al., 2004; Taylor et al., 2009), it is clearly apparent that early PA intervention programs targeting young children within day care settings and in general have great potential to help develop healthy PA behaviours in young children, leading to sustained health and wellness benefits throughout life.

Résumé

Favoriser l'adoption de comportements sains axés sur l'activité physique (AP) parmi les enfants de 5 ans et moins a des effets immédiats sur leur état de santé et leur bien-être, et constitue une stratégie efficace pour prévenir et réduire au minimum l'incidence des maladies chroniques dans les phases ultérieures de leur vie. Bien que les enfants aient une tendance naturelle à prendre part à des activités physiques, leur niveau d'AP se situe généralement au-dessous des recommandations canadiennes actuelles en matière d'AP. Étant donné que plus de la moitié des enfants canadiens passent 6 heures ou plus par jour dans des garderies (à domicile ou dans des centres), la mise en œuvre de mesures axées sur l'AP dans ces installations, par l'élaboration minutieuse de politiques, constitue un moyen stratégique d'accroître le niveau d'AP parmi les jeunes enfants. Par leur perspicacité et leurs convictions, les parents et les éducateurs de la petite enfance jouent un rôle important dans l'adoption de comportements sains basés sur l'AP parmi les enfants d'âge préscolaire. Cet article a pour objectif de résumer les lignes directrices sur l'AP parmi les jeunes enfants, de décrire les effets de l'AP et des comportements sédentaires sur plusieurs aspects du développement et du comportement des enfants, de décrire les facteurs favorisant et défavorisant les comportements actifs (AP) et sédentaires parmi les enfants d'âge préscolaire et de présenter des recommandations pour augmenter l'AP dans les milieux de garde.

Mots-clés : enfants d'âge préscolaire, activité physique, déterminants, lignes directrices, politiques.

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