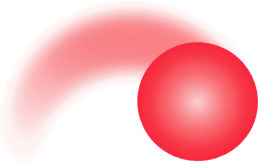


What the Research Says

About Physical Activity and the Early Years



There is an abundance of research describing the relationship between physical activity and health in adults, with an emerging focus on its effects during childhood and adolescence. This overview highlights some **key areas** related to physical activity and the early years (0 to 6 years).

What the Research says...

... about the benefits of physical activity

The early years are a critical period for growth and development (Active Healthy Kids Canada, 2010). Regular physical activity provides many short and long-term health-related and social benefits.

Regular physical activity:

- Encourages muscle growth and helps develop strong bones (PHAC, 2002; as cited in Department of Health and Human Services, 2009).
- Helps achieve and maintain a healthy weight (Health Canada, 2009; as cited in Active Healthy Kids Canada, 2009).
- Makes the heart and lungs stronger (Health Canada, 2009).
- Maintains a healthy blood pressure (PHAC, 2007; as cited in Active Healthy Kids Canada, 2009).
- Increases flexibility (PHAC, 2002).
- Improves coordination (PHAC, 2002).
- Is associated with improved self-esteem (Ekeland, Heian, & Hagen, 2005).
- Helps improve sleeping habits and relaxation (PHAC, 2002).
- Helps children feel good about themselves (PHAC, 2002; as cited in Active Healthy Kids Canada, 2009).
- Presents opportunities to practise self-discipline (Government of Nova Scotia, 2010).
- Helps increase creativity, learning and academic performance through improvements in cognitive function (e.g., concentration, memory, problem-solving skills/abilities), reduced misconduct behaviours, and increased attention span (as cited in Active Healthy Kids Canada, 2009).
- Provides opportunities to develop motor/sports skills and life skills (PHAC, 2002).
- Provides opportunities to socialize and make friendships (PHAC, 2002).
- Improves physical competency and global self-esteem, and is helpful in the short-term management of anxiety and depression in children and youth (Active Health Kids Canada, 2010).
- Plays a role in the prevention and risk management for type 2 diabetes, cardiovascular disease, and metabolic syndrome (as cited in Active Healthy Kids Canada, 2009).



What the Research Says

... about the relevance of physical activity for the young child.

According to Active Healthy Kids Canada (2010) physical activity and its importance to health in the early years represent a knowledge gap in Canada and around the world. However, we do know that:

- As little as an additional 60 minutes per week of physical activity has been associated with improved:
 - bone properties (Janz et al., 2001; Specker & Binkley, 2003);
 - aerobic fitness (Alpert, Field, Goldstein, & Perry, 1990); and
 - motor skills in young children (Alpert, Field, Goldstein, & Perry, 1990; Fisher et al., 2005; Haywood, & Getchell, 2005; Saakslanti et al., 1999).
- The majority of the evidence points to the role of physical activity during early years on improving motor skill development, a key factor in the likelihood of participation in physical activity during later childhood and adolescent years (Barnett, van Beurden, Morgan, Brooks, & Beard, 2009; Fisher et al., 2005; Okely, Booth, & Patterson, 2001).
- Movement is an important part of a child's physical, mental and emotional development and one of the important mediums through which young children form impressions about themselves and their surroundings (as cited in Active Healthy Kids Canada, 2009).
- Whatever the setting, children under five require adequate unstructured play and time outdoors for physical, cognitive and emotional development (as cited in Active Healthy Kids Canada, 2010).
- Activity satisfies a child's curiosity of movement (Eastman, 1997).
- Positive feelings are experienced when early childhood educators, parents, and children are involved in physical activity including active play (Eastman, 1997).
- Games and activities encourage interaction among children (as cited in Active Healthy Kids Canada, 2009; PHAC, 2002).
- Enjoyable physical activity experiences promote a positive attitude about active lifestyles (Eastman, 1997; Lawlis, Mikhailovich & Morrison, 2009).



What the Research Says

- Young children solve problems and gain success through challenges and explorations (Eastman, 1997).
- Activities that enhance motor competence (more structured than free play opportunities) among very young children may have tremendous physical and emotional health benefits (as cited in Active Healthy Kids Canada, 2009; Eastman, 1997).
- There is a connection between physical activity and self-esteem among very young children (as cited in Active Healthy Kids Canada, 2009; Ekeland, Heian, & Hagen, 2005).
- Children who have not developed basic movement skills to a point where they are experiencing success are less likely to choose to be physically active. The best time for basic movement skill development is during the early years (as cited in University of Winnipeg, 2004).
- During the first five to seven years of life, children attain basic movement skills initially through maturational changes: e.g. postural adjustments, sitting, crawling, walking, running (Gallahue & Ozmun, 2006).
- Some aspects of activity and fitness levels early on in childhood may carry over into adulthood, when sedentary habits have their impact (Blair, 1992).
- In toddlers, the transition from crawling to standing and walking is a natural and normal part of growing and experiencing movement. Preschoolers explore a broader range of movement as they learn to run, jump, climb, and throw. Informal and friendly play will do much to nurture their love of physical activity (Canadian Fitness and Lifestyle Research Institute, 2005).
- Play and games provide an opportunity for children to learn the consequences of their behaviour (Schaefer & Reid, 2001).



What the Research Says

... about how active young Canadian children are.

Most of the statistics we have relate to children five and over, as it is difficult to assess the activity habits of children less than five years old. However, we do know the following:

- The National Longitudinal Survey of Children and Youth (NLSCY) indicates that only 36% of 2-3-year-olds and 44% of 4-5-year olds regularly engage in unorganized sport and physical activity each week (as cited in Active Healthy Kids Canada, 2010).
- A survey of Edmonton parents indicates that only 42% of preschoolers get 90 minutes of physical activity per day (as cited in Active Healthy Kids Canada, 2010).
- Less than half of Canadian children under five are getting regular physical activity as part of their daily routines (Active Healthy Kids Canada, 2010).
- Many studies suggest that young children are quite inactive and may be at risk for adverse health consequences (as cited in Temple, Naylor, Rhodes, & Higgins, 2009).
- Numerous studies demonstrate that adults and children are more active on warmer days and on days when it is not raining or snowing (as cited by the Canadian Fitness and Lifestyle Research Institute and ParticipACTION, 2010).
- Levels of physical activity decline in children between the ages of 3 and 4-5 years of age (Taylor et al., 2009).
- Nearly half of preschool-aged children do not engage in sufficient physical activity according to NASPE guidelines (Tucker, 2008).
- Various data sources show that children in lower socio-economic circumstances experience lower levels of physical activity and higher levels of inactivity (Active Healthy Kids Canada, 2009, 2010).
- There has been a steady increase in the percentage of children aged 4 to 5 years participating in organized sports at least once per week. However, the overall rate is still hovering around 15% (Active Healthy Kids, 2010, with data derived from the National Longitudinal Survey of Children and Youth).
- 50% of children aged 4 to 5 years participate in unorganized sport once per week. This trend decreased between the late 1990s and 2000; however, it appears to have rebounded in 2002-2003 and 2004-2005 (Active Healthy Kids, 2010, with data derived from the National Longitudinal Survey of Children and Youth).



What the Research Says

... about screen time:

- In 1971, the average age at which children began to watch TV was 4 years; today, it is 5 months (Zimmerman, Christakis, & Meltzoff, 2007).
- A review paper published in early 2009 argues that DVDs and TV shows aimed at infants may be doing more harm than good (as cited in Active Healthy Kids Canada, 2009).
- In today's society, more than 90% of children begin watching TV before the age of 2 in spite of recommendations that say screen time should be zero for children under two, and limited to 1 hour for children 2-4 (Christakis, 2009).
- Data from 2004-2005 indicate that 27% of children aged from 2 to 3 years, and 22% of children aged from 4 to 5 years, are watching more than 2 hours of TV per day. Researchers caution that the flashing lights, quick edits and auditory cuts used in TV shows may be over-stimulating developing brains and therefore negatively affecting language development, attention span and cognitive development (Christakis, 2009).
- Many parents are not concerned with the amount of screen viewing their preschool children engage in. Very few parents seem to appreciate the linkage between preschoolers' screen-viewing habits and their potential risk for obesity (He et al., 2005).
- Screen time, a proxy indicator of overall inactivity and sedentary behaviour, has been associated with reductions in physical health (as cited in Active Healthy Kids Canada, 2009).
- Screen time is associated with increased aggression, reduced academic achievement and cognitive functioning, reduced sleep time, and earlier initiation of high risk behaviours (Active Healthy Kids Canada, 2010).



What the Research Says

... about physical activity in childcare:

- Children in the early years are increasingly spending a large proportion of their time in daycare settings where active play should be commonplace. One US study in a childcare centre setting showed that 89% of children's time was spent being sedentary (Brown et al., 2009).
- A Canadian study done in family childcare settings during the summer months using accelerometers found that the levels of moderate-vigorous physical activity were very low. Although the family childcare settings in the study offered good or very good physical environments for movement, it appears that little time was spent in play that was of moderate or vigorous intensity. The majority of physical activity was of light intensity and many children were sedentary for long periods of time during the day (Temple, Naylor, Rhodes, & Higgins, 2009).
- Additional studies indicated that physical activity levels in childcare settings are low and levels of sedentary behaviour are typically high with long periods physical inactivity common (Freedman et al., 2005; Brown, et al., 2009).
- A study examining the levels of physical activity for preschool children in Calgary found that only 14% of preschool children receive 60 minutes of physical activity per day at their childcare centre, the rest of the centres reported less than 60 minutes of physical activity a day. The questionnaire found that children receive much more unstructured (79%) physical activity compared to structured (42%) (as cited in Anderson, 2008).
- Research indicates that the childcare facility has a very strong influence on young children's physical activity levels (Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004; Trost, Ward, & Senso, 2010; Cosco, Moore, & Islam, 2010).
- Childcare is an important setting to help young children obtain adequate levels of daily movement (Murata, & Maeda, 2002; McWilliams, Ball, Benjamin, Hales, Vaughn, & Ward, 2009).



What the Research Says

... about gender differences

- Since the inception of the Report Card in 2005, Active Healthy Kids Canada has reported on the gender disparity in physical activity participation for children and youth. This gender disparity in physical activity levels has been demonstrated to be consistent over time from many surveys (Active Healthy Kids Canada, 2010).
- This gender difference may not be as noticeable in younger preschoolers however. One Canadian study done in family child care settings did not demonstrate that boys were more active than girls at age 3. It is suggested that differences in physical activity patterns may emerge during the preschool years and be more noticeable at age 5 (Temple et al., 2009).

... about obesity and fitness

- In Canada, 15.2% of 2-5-year-olds are overweight and 6.3% are obese. This combined percentage has remained virtually unchanged at around 21% in 1978/79 and 2004. However the rates increased dramatically for children aged 6-11 (from 13% in 1978/79 to 26% in 2004) and children ages 12 to 17 (14% in 1978/79 to 29% in 2004) (Shields, 2008).
- There may be some regional differences in the prevalence of preschool obesity. For example, research in Newfoundland and Labrador indicates that 26% of the preschoolers were overweight or obese (Canning et al., 2004)
- Obesity in infancy persists through the preschool years (Mei, Grummer-Strawn, & Scanlon, 2003).
- Children who become obese before the age of six are likely to be obese later in childhood (Quattrin, Liu, Shaw, Shine, & Chiang, 2005).
- An overweight child at any age is at risk of being overweight at 35 years of age (Guo, Huang, Maynard, Demereth, Towne, Chulea, et al., 2000).
- Childhood obesity is associated with an increased risk for metabolic, cardiovascular, respiratory, gastrointestinal, orthopaedic and psychological co-morbidities (as cited in Active Healthy Kids Canada, 2009).
- Studies support the premise that parents are receptive to and capable of some behavioural changes that may promote healthy weight in their young children (Campbell & Hesketh, 2007).
- More than 60 per cent of paediatricians and family doctors identified parents as key barriers to curbing the growing numbers of children who are growing up fat. Those parents are generally overweight themselves and become defensive when the topic of their child's weight is raised (Kirkey, 2010).
- Children 0-6 years of age represent a population subgroup where obesity prevention programs and evidence of effectiveness are limited. This is a concern because opportunities to prevent obesity in later life, through delaying the early and accelerated increase in BMI rather than the natural increase in BMI that occurs within this developmental phase (the "adiposity" rebound), are lost (Flynn, 2006).
- The New England Journal of Medicine reports that, for the first time in history, our children's lifespan could be 2-5 years less than our own (Olshansky, 2005).

What the Research Says

... about children with a disability?

- Approximately half of children with disabilities who participated in of the 2006 *Participation and Activity Limitation Survey (PALS)* took part in organized sports activities (with a coach or instructor) outside of school hours (as cited in Active Healthy Kids Canada, 2009).
- 60% of children with disabilities report that they seldom or never play games with friends (as cited in Active Healthy Kids Canada, 2009).
- Children with disabilities prefer more informal activities and participate in less formal activities than children with typical development. When children with disabilities participate in physical activities, they tended to participate at lower intensity levels than children with typical development. The top 5 most enjoyed activities for children with disabilities were:
 - 1) going to the movies,
 - 2) watching TV or a rented movie,
 - 3) going on a full-day outing,
 - 4) horseback riding, and
 - 5) doing snow sports (King, Petrenchik, Law, & Hurley, 2009).
- Canadian children with intellectual disabilities have lower cardiovascular fitness than Canadian children with typical development (as cited in Active Healthy Kids Canada, 2009).
- Canadian children with activity-limiting conditions visit health professionals more often (as cited in Active Healthy Kids Canada, 2009).



What the Research Says

Canadian Physical Activity Guidelines

FOR THE EARLY YEARS - 0 – 4 YEARS

For healthy growth and development:



Infants (aged less than 1 year) should be physically active several times daily – particularly through interactive floor-based play.



Toddlers (aged 1–2 years) and preschoolers (aged 3–4 years) should accumulate at least 180 minutes of physical activity at any intensity spread throughout the day, including:



A variety of activities in different environments;



Activities that develop movement skills;



Progression toward at least 60 minutes of energetic play by 5 years of age.



More daily physical activity provides greater benefits.

Being active as an infant means:

- Tummy time
- Reaching for or grasping balls or other toys
- Playing or rolling on the floor
- Crawling around the home

Being active can help young kids:

- Any activity that gets kids moving
- Climbing stairs and moving around the home
- Playing outside and exploring their environment
- Crawling, brisk walking, running or dancing

The older children get, the more energetic play they need, such as hopping, jumping, skipping and bike riding.

Being active can help young kids:

- Maintain a healthy body weight
- Improve movement skills
- Increase fitness
- Build healthy hearts
- Have fun and feel happy
- Develop self-confidence
- Improve learning and attention

All activity counts. Try these tips to get young kids moving:

- Create safe spaces for play.
- Play music and learn action songs together.
- Dress for the weather and explore the outdoors.
- Make time for play with other kids.
- Get where you're going by walking or biking.

**Any way, every day.
Get active together!**

What the Research Says

Canadian Sedentary Behaviour Guidelines

FOR THE EARLY YEARS - 0 – 4 YEARS



For healthy growth and development, caregivers should minimize the time infants (aged less than 1 year), toddlers (aged 1–2 years) and preschoolers (aged 3–4 years) spend being sedentary during waking hours. This includes prolonged sitting or being restrained (e.g., stroller, high chair) for more than one hour at a time.



For those under 2 years, screen time (e.g., TV, computer, electronic games) is not recommended.



For children 2–4 years, screen time should be limited to under one hour per day; less is better.

The Lowdown on the Slowdown: what counts as being sedentary

Sedentary behaviours are those that involve very little physical movement while children are awake, such as sitting or reclining:

- in a stroller, high chair or car seat
- watching television
- playing with non-active electronic devices such as video games, tablets, computers or phones

Spending less time being sedentary can help young kids:

- Maintain a healthy body weight
- Develop social skills
- Behave better
- Improve learning and attention
- Improve language skills

So cut down on sitting down. To reduce young children's sedentary time, you can:

- Limit use of playpens and infant seats when baby is awake.
- Explore and play with your child.
- Stop during long car trips for playtime.
- Set limits and have rules about screen time.
- Keep TVs and computers out of bedrooms.
- Take children outside every day.

There's no time like right now to get up and get moving!

What the Research Says

References

- Active Healthy Kids Canada. (2009). *Active kids are fit to learn*. Retrieved February 20, 2013, from http://dvqdas9jty7g6.cloudfront.net/reportcard2009/ahkc-longform_web_final.pdf.
- Active Healthy Kids Canada. (2010). *2010 Active Healthy Kids Canada Report Card on Physical Activity for Children and Youth*. Retrieved February 20, 2013, from <http://dvqdas9jty7g6.cloudfront.net/reportcard2010/2010ActiveHealthyKidsCanadaReportCard-longform.pdf>.
- Anderson, L. (2008). *Physical activity of preschool aged children in child care settings*. Retrieved February 20, 2013, from www.mtroyal.ca/wcm/groups/public/documents/pdf/conted_ihi_phedfinal.pdf.
- Alpert, B., Field, T., Goldstein, S., & Perry, S. (1990). Aerobics enhances cardiovascular fitness and agility in preschoolers. *Health Psychology, 9*, 48-56.
- Barnett, L., van Beurden, E., Morgan, P., Brooks, L., & Beard, J. (2009). Childhood motor skill proficiency as a predictor of adolescent physical activity. *Journal of Adolescent Health, 44*, 252-259.
- Blair, S. N. (1992). Are American children and youth fit? The need for better data. *Research Quarterly for Exercise and Sport, 63*(2), 120-123.
- Brown, W., Pfeiffer, K., McIver, K., Dowda, M., Addy, C., & Pate, R. (2009). Social and environmental factors associated with preschoolers' nonsedentary physical activity. *Child Development, 80*, 45-58. Retrieved February 20, 2013, from www.sph.sc.edu/USC_CPARG/pdf/Brown_childdev.pdf.
- Campbell, K. J., & Hesketh, K. D. (2007). Strategies which aim to positively impact on weight, physical activity, diet and sedentary behaviours in children from zero to five years: A systematic review of the literature. *Obesity Reviews, 8*(4), 327-338.
- Canadian Fitness and Lifestyle Research Institute. (2005). *Do as I do*.
- Canadian Fitness and Lifestyle Research Institute and ParticipACTION. (2010). *Seasonal variations in physical activity*. Retrieved February 20, 2013, from www.cflri.ca/media/node/306/files/ResearchFile_ENG_January_Final.pdf.
- Canning, P. M., Courage, M. L., & Frizzell, L. M. (2004). Prevalence of overweight and obesity in a provincial population of Canadian preschool children. *Canadian Medication Association Journal, 171*(1), 240-242.
- Christakis, D. (2009). The effects of infant media usage: What do we know and what should we learn? *Acta Paediatrica, 98*, 8-16.
- Cosco, N., Moore, R., & Islam, M. (2010). Behavior mapping: a method for linking preschool physical activity and outdoor design. *Medicine & Science in Sports & Exercise, 42*(3), 513-519.
- Department of Health and Human Services. (2009). *Call to activity: Getting kids moving in the great outdoors*. Retrieved February 20, 2013, from [ftp://www.co.missoula.mt.us/ruralftp/Parks/2008ChildrenNatureSummit-ResourceKit/Research and Reports/Call to Activity- Getting Kids Moving for the Great Outdoors.pdf](ftp://www.co.missoula.mt.us/ruralftp/Parks/2008ChildrenNatureSummit-ResourceKit/Research%20and%20Reports/Call%20to%20Activity-Getting%20Kids%20Moving%20for%20the%20Great%20Outdoors.pdf).
- Eastman, W. (1997). Active living: Physical activities for infants, toddlers, and preschoolers. *Early Childhood Education Journal, 24*(3), 161-164.
- Ekeland, E., Heian, F., & Hagen, K. B. (2005). Can exercise improve self esteem in children and young people? A systematic review of randomized controlled trials. *British Journal of Sports Medicine, 39*(11), 792-798.

What the Research Says

- Fisher, A., Reilly, J., Kelly, L., Montgomery, C., Williamson, A., Paton, J., et al. (2005). Fundamental movement skills and habitual physical activity in young children. *Medicine & Science in Sports & Exercise*. 37, 684-688.
- Flynn, M. A., McNeil, D. A., Maloff, B., Mutasingwa, D., Wu, M., Ford, C., et al. (2006). Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. *Obesity Reviews*, 1, 7-66. Retrieved February 20, 2013, from www.health-evidence.ca/articles/show/16889.
- Freedman, D., Kettel, K. L., Serdula, M., Dietz, W., Srinivasan, S., & Berenson, G. (2005). The relation of childhood BMI to adult adiposity: the Bogalusa Heart Study. *Pediatrics*. 115, 22-27.
- Government of Nova Scotia. (2010). *Active kids, healthy kids*. Retrieved February 20, 2013, from www.gov.ns.ca/hpp/pasr/akhk-intro.asp.
- Gallahue, D. L. & Ozmun, J. C. (2006). Motor development in young children. In B. Spokek and O. N. Saracho (Eds.). *Handbook of research on the education of young children (2nd Ed.)*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Guo, S. Huang, C., Maynard, L., Demereth, E., Towne, B., Chulea, W., et al. (2000). Body mass index during childhood, adolescence and young adulthood in relation to adult overweight and adiposity: the Fels Longitudinal Study. *International Journal of Obesity*, 24, 1628-1635.
- Haywood, K., Getchell, N. (2005). *Life Span Motor Development*. Champaign, IL: Human Kinetics.
- He, M., Irwin, J. D., Sangster Bouck, L. M., Tucker, P. & Pollett, G. L., (2005). Screen-viewing behaviors among preschoolers parents' perceptions. *American Journal of Preventive Medicine*, 29(2), 120-125.
- Health Canada. (2009). *Healthy living: Physical Activity*. Retrieved February 20, 2013, from www.hc-sc.gc.ca/hl-vs/physactiv/index-eng.php
- Janz, K., Burns, T., Torner, J., Levy, S., Paulos, R., Willing, M., et al. (2001). *Physical activity and bone measures in young children: the Iowa bone development study*. *Pediatrics*. 107, 1387-1393.
- King, G., Petrenchik, T., Law, M., & Hurley, P. (2009). The enjoyment of formal and informal recreation and leisure activities: a comparison of school-aged children with and without physical disabilities. *International Journal of Disability, Development and Education*. 56, 109-130.
- Kirkey, S. (2010). Parents of fat kids refuse to see problem: doctor survey. *Postmedia News*. September 26, 2010. Retrieved February 20, 2013, from www.childhoodobesitydeerpark.com/?p=128.
- Lawlis, T., Mikhailovich, K. & Morrison, P. (2009). *Physical activity programs in long day care and family day care settings*. Retrieved February 20, 2013, from www.earlychildhoodaustralia.org.au/australian_journal_of_early_childhood/ajec_index_abstracts/physical_activity_programs_in_long_day_care_and_family_day_care_settings.html.
- McWilliams, C., Ball, S., Benjamin, S., Hales, D., Vaughn, A., Ward, D. (2009). Best-practice guidelines for physical activity at child care. *Pediatrics*, 124, 1650-1659.
- Mei, Z., Grummer-Strawn, L. & Scanlon, K. (2003). Does overweight in infancy persist through the preschool years? An analysis of CDC Pediatric Nutrition Surveillance System data. *Sozial- und Präventivmedizin/Social and Preventive Medicine*, 48, 161-167.
- Murata, N., Maeda, J. (2002). Structured play for preschoolers with developmental delays. *Early Childhood Education Journal*, 29, 237-240.

What the Research Says

- Okely, A., Booth, M., Patterson, J. (2001). Relationship of physical activity to fundamental movement skills among adolescents. *Medicine & Science in Sports & Exercise*, 33, 1899-1904.
- Okely, A., Salmon, J., Trost, S., & Hinkley, T. (2008). *Discussion paper for the development of physical activity recommendations for children under five years*. Canberra, ACT, Australia: Australian Department of Health and Ageing, Government of Australia.
- Olschansky, S. J., Passaro, D. J., Hershov, R. C., Layden, J., Carnes, B. A., Brody, J., et al. (2005). A potential decline in life expectancy in the United States in the 21st Century. *The New England Journal of Medicine*, 352, 1138-1145.
- Pate, R., Pfeiffer, K., Trost, S., Ziegler, P., & Dowda, M. (2004). *Physical activity among children attending preschools*. *Pediatrics*, 114, 1258-1263.
- Public Health Agency of Canada. (2002). *Family guide to physical activity for children*. Retrieved February 20, 2013, from www.phac-aspc.gc.ca/hp-ps/hl-mvs/pag-gap/cy-ej/resources-ressource-eng.php.
- Public Health Agency of Canada. (2007). *The benefits of physical activity*. Retrieved February 20, 2013, from www.phac-aspc.gc.ca/alw-vat/intro/key-cle-eng.php.
- Quattrin, T., Liu, E., Shaw, N., Shine, B. & Chiang, E. (2005). Obese children who are referred to the pediatric endocrinologist: characteristics and outcome. *Pediatrics*, 115, 348-351.
- Saakslahti, A., Numminen, P., Niinikoski, H., Rask-Nissila, L., Viikari, J., Tuominen, J., et al. (1999). Is physical activity related to body size, fundamental motor skills, and CHD risk factors in early childhood? *Pediatric Exercise Science*, 11, 327-340.
- Schaefer, C. E., & Reid, S. E. (2001). *Game play: Therapeutic use of childhood games* (2nd ed). New York: John Wiley & Sons.
- Shields, M. (2008). *Measured obesity – Overweight Canadian children and adolescents*. Retrieved February 20, 2013, from www.statcan.gc.ca/pub/82-620-m/2005001/article/child-enfant/8061-eng.htm.
- Specker, B., & Binkley, T. (2003). Randomized trial of physical activity and calcium supplementation on bone mineral content in 3- to 5-year-old children. *Journal of Bone and Mineral Research*, 18, 885-892.
- Taylor, R. W., Murdoch, L., Carter, P. H., Gerrard, D. F., Williams, S. M., & Taylor, B. J. (2009). Longitudinal study of physical activity and inactivity in preschoolers: The FLAME study. *Medicine & Science in Sports & Exercise*, 41(1), 96-102.
- Temple, V. A., Naylor, P-J., Rhodes, R. E., & Higgins, J. W. (2009). Physical activity of children in family child care. *Applied Physiology, Nutrition, and Metabolism*.
- Trost, S., Ward, D., & Senso, M. (2010). Effects of child care policy and environment on physical activity. *Medicine & Science in Sports & Exercise*, 42(3), 520-525.
- Tucker, P. (2008). The physical activity levels of preschool-aged children: A systematic review. *Early Childhood Research Quarterly*, 23(4), 547-558.
- University of Winnipeg. (2004). *Daily physical education and health enhancing physical activity: Position Statement*. Retrieved February 20, 2013, from <http://kinesiology.uwinnipeg.ca/kah/webpages/positionstatement.htm>.
- Zimmerman, F., Christakis, D., & Meltzoff, A. (2007). Television and DVD/video viewing in children younger than 2 years. *Archives of Pediatrics & Adolescent Medicine*, 161, 473-479.