Chapter 8
Youth Physical Activity and Considerations for Interventions

Karissa L. Peyer

University of Tennessee at Chattanooga, USA

Please cite as: Peyer, K. L. (2021). Youth physical activity and considerations for interventions. In Z. Zenko & L. Jones (Eds.), *Essentials of exercise and sport psychology: An open access textbook* (pp. 176–199). Society for Transparency, Openness, and Replication in Kinesiology. https://doi.org/10.51224/B1008

Chapter Overview

Child physical activities can include sports (with or without organization and supervision from adults), physical education classes and recess, active transportation, active free play (without direction from adults), chores, and other incidental bouts of physical activity. Children are more likely to obtain physical activity in short, unstructured bouts than are adults who often plan and structure daily workouts. While children may be more naturally inclined to be active than are adults, they may still need additional encouragement or opportunities to be active. This chapter will explore opportunities for physical activity across these contexts as well as the role of parents and possible approaches for increasing physical activity for children and adolescents.

For correspondence: karissa-peyer@utc.edu

Introduction

The development of physical activity habits should begin in childhood. The current World Health Organization physical activity guidelines call on children and youth ages 5–17 years old to obtain at least 60 minutes of moderate-to-vigorous physical activity per day, although additional health benefits are seen with additional physical activity (Bull et al., 2020). This can and should include aerobic exercises such as running, hopping and skipping, muscle-strengthening activities such as climbing trees and playing on equipment that requires children to climb and lift their body weight, and bone-strengthening activities such as jumping rope and hopscotch. Unfortunately, most children fail to reach these recommended physical activity levels. The Global Matrix 3.0 Report Card provides grades across various physical activity goals for children and youth from 49 countries. Of these, only two scored above a grade of C for overall physical activity (Slovenia A-, Zimbabwe C+; Aubert et al., 2018).

Contexts for Physical Activity in Youth

There is no universally agreed upon definition for ages that make up "youth," however the United Nations defines "youth" as those persons between 15 and 24 years of age, with children including those younger than 15 (United Nations, n.d.). Conversely, the United Nations Convention on the Rights of the Child defines "children" as persons up to the age of 18 (Office of the United Nations High Commissioner for Human Rights, 1989). For the purposes of this chapter, the term "youth" encompasses both children and youth and generally refers to those up to age 18 or until completion of high school/secondary school. Youth can be active in many different contexts and settings. This chapter will discuss Sport, Recess and Physical Education (school), Active Transportation, Free Play, and the Home Environment (family and peers).

Sport

Sport is perhaps the most thoroughly researched domain for youth physical activity, particularly in regard to psychological determinants of participation. In adults, there are commonly documented gender disparities in sport participation, with men generally engaging in more sport than women, a trend that likely has its roots in childhood and adolescence (Van Tuyckom et al., 2010). According to the U.S. Report Card on Physical Activity for Children and Youth, roughly 56% of 6- to 12-year-old children report playing an organized sport. This report showed disparities in sport participation with girls and individuals from low-income households participating at lower rates than boys and youth from high-income households. While the income disparities were also documented in Canada's national report card (ParticipACTION, 2018), the gap between boys and girls is not documented in Canada as it is in the United States. On a global level, participation in organized sport has been correlated with life expectancy, gross national income per capita, and global food security index (Aubert et al., 2018).

There is evidence that participation in youth sport, and specifically prolonged participation in youth sport, is a significant predictor of adult physical activity levels. Telama et al. (2006) examined the relationship between sport participation when participants were 9–18 years old and continued participation 3, 6, and 21 years later (covering years 1980–2001). They found that those who were active in sport in both 1980 and 1983, as well as those who were active in both 1980 and 1986, were significantly more likely to report high levels of physical activity in adulthood when compared to individuals who were not involved in sport at any time point. The type of competition at baseline (sport-club, regionally or nationally competitive) was not a significant predictor for adult activity level and the specific sport the individual participated in during youth was not necessarily indicative of the chosen sport in adulthood. These results suggest that exposure and experience, more than specific activities, help to build activity habits for a lifetime.

Benefits of sport participation include skill acquisition, social interaction and development, mental and physical health benefits, and weight management (Logan et al., 2019). Sport participation contributes to development of motor skills and coordination for movements such as running, throwing, catching, and kicking, and increased strength and speed (Christou et al., 2006; Hardy et al., 2014; Melekoglu, 2015). Sport participation may also help youth develop skills that benefit them academically and in other life areas outside of sport, such as planning and self-monitoring (Jonker et al., 2010), time management (Brettschneider, 1999; Durand-Bush & Salmela, 2002), emotional regulation, teamwork and leadership (Hansen et al., 2003; Holt et al., 2008; Larson et al., 2006). Sport participants have shown higher levels of stress resistance (Brettschneider, 2001), lower levels of depression, and higher confidence levels (Boone & Leadbeater, 2006; Eime et al., 2013). Positive sport experiences help to build self-esteem, which may be particularly important for body image and acceptance among girls who learn a broader definition of what it means to be female (Richman & Shaffer, 2000).

Motivations for participation in youth sport range from skill development, fitness, and status to challenge, release of energy and affiliation (being part of a team; McCullagh et al., 1993). Research has consistently shown that perceived competence is a key factor in a child's enjoyment of sport and their likelihood of staying involved in organized sport (McCarthy et al., 2008). When youth feel that they have the necessary skills to be successful in a given sport, they are more likely to enjoy playing that sport. There appears to be a changing relationship between effort and ability level as it relates to perceived competence in sport as children grow. Younger children (under 11 years old) general do not differentiate between effort and skill and therefore perceive themselves as competent (and therefore enjoy sport) if they feel that they have tried hard. Older children may be more likely to engage in comparison with their teammates and competitors and therefore require not only effort but playing well in order to view themselves as competent and report continued enjoyment (Scanlan et al., 2005).

Burnout, including from early specialization, and excessive competition may lead to eventual dropout from youth sport participation. Specialization refers to the concept of intense focus on a single sport, typically year-round, and often at the expense of participation in other sports and is associated with high levels of competition, burnout and increased risk for injury (Brenner & AAP Council on Sports Medicine and Fitness, 2016). Youth who start this specialization earlier in life, those with a lower total number of extracurricular activities, and those with lower levels of unstructured play, may be at highest risk for burnout and subsequent drop out from sport (Fraser-Thomas et al., 2008). While individuals who excel at sport at a young age may be seen by others as exceptional achievers, this intense focus and its associated time commitment can foster social isolation and limited social and problem-solving skills (Logan et al., 2019).

Implications for Interventions in Sport

Pre-School Children

In early childhood (3 to 5 years), children undergo dramatic changes to body composition and motor skills (Gomez, 2000). These young children have limited fundamental sport and balance skills, difficulty judging the speed of moving objects, and short attention spans (Purcell, 2005). During this period, focus should be placed on developing fundamental skills including running, throwing, catching, and riding a bicycle (Purcell, 2005). According to the Long-Term Athlete Development (LTAD) model, before age 6, the focus is on play and mastering basic movement skills (Balyi et al., 2013). The goals of participation should be to be active, have fun, and to have a positive sport experience through learning and practice of fundamental skills (Gould & Petlichkoff, 1988). Children should be introduced to a variety of activities with the mindset of exploration and experimentation (Purcell, 2005). Adults should reward effort and create a fear-free environment for trying new activities (Weinberg & Gould, 2019). During early years, competition should be avoided (Purcell, 2005).

School-Aged Children

During ages 6 to 9, children's growth slows down as they continue to develop fundamental sport skills and begin developing transitional skills (e.g., throwing or kicking for distance). Children still have short attention spans during this age and have limited rapid decision-making skills (Purcell, 2005). During this stage, the focus should be on acquiring a wide range of skills necessary for multiple sports and early specialization should be avoided as this promotes one-sided physical, technical, and tactical development and increases the likelihood of injury and burnout (Balyi et al., 2013). Increasing perceived competence should be encouraged as those with low perceptions of their abilities to learn and perform successfully are likely to drop out from sport (Balish et al., 2014). Children will be more likely to continue with sport if they feel competent (Weinberg & Gould, 2019). Competition can be introduced at this age, but rules should be flexible with the major emphasis on further developing fundamental skills and beginning development of transitional skills. Age-appropriate activities include soccer, baseball, swimming, running, gymnastics, dancing, martial arts, and tennis.

During ages 10 to 12, transitional skills improve, and many children can master complex motor skills (e.g., layup in basketball; Purcell, 2005). Adults should reward correct technique and provide supportive, instructional feedback when teaching (Weinberg & Gould, 2019). With increased attention spans, children are now ready to learn strategy and more complex playing tactics. Coaches should emphasize continued skill development with increasing emphasis on strategy and playing tactics (Purcell, 2005). Encouraging children to focus on self-referenced standards will help them avoid focusing solely on the outcome of competition (Martens, 2012). Age-appropriate sports include football, basketball, and ice hockey (Purcell, 2005).

Adolescents and Teenagers

During ages 13 to 15, growth increases exponentially with gains in muscle mass, muscle strength, and cardiopulmonary endurance, but this age is also marked by a temporary decrease in coordination, balance, and flexibility. Varying onsets of puberty may affect sport performance during these ages. Teenagers have improved attention span and good memory skills allowing them to memorize and strategize with plays and game situations (Purcell, 2005). Concentrating on the process over outcome leads to better development and increased long-term involvement in the sport (Balyi et al., 2013). Athletes continue to grow and develop from 16 to 18, seeing increases in attention span and memory skills. All sports are appropriate at this age, but most self-select into sports that they are good at and enjoy (Purcell, 2005). Around age 16, teenagers have developed the physical, cognitive, social, emotional, and motor skills needed to specialize in a sport if desired (Côte et al., 2009).

Recess and Physical Education

The National Association for Sport and Physical Education (US, NASPE) recommends that all elementary school children receive at least one recess period per day of at least 20 minutes in length. While more than 90% of American elementary schools provide regular recess as part of the school day from Kindergarten (approximately age 5 years) to 5th grade (age 10–11 years), only 35% of 6th grade students have regularly scheduled recess (Centers for Disease Control and Prevention, 2015). In the European Union, 14 of 28 countries report schemes to promote active breaks during the school day (World Health Organization Regional Office for Europe, 2018). And when recess is available, children are not necessarily active the full time. Data suggest instead that students are active for only 23–31% (girls) to 32–38% (boys) of recess time (Mota et al., 2005; Ridgers et al., 2005).

Due to insufficient levels of activity during recess, approaches for increasing activity must be considered. A review of the impact of recess-focused interventions to improve youth physical activity levels found generally positive results, but few studies have examined long term impacts (Ickes et al.,

2013). Common intervention approaches include adding new equipment or materials to the playground, enhancing playground markings, creating specific play zones, teacher involvement, and planned activities, with largest impacts seen for structured recess and new playground equipment (Erwin et al., 2014). This study also found increases in physical activity to be associated with the duration of the intervention per session. In other words, it is important to give children enough time during a given recess period to become and stay active.

Photo by Lukas from Pexels

Physical Education (PE) differs from recess time in that there is more supervision and direction from trained teachers. The Society of Health and Physical Educators (SHAPE) America recommends that schools provide 150 minutes of instructional physical education per week for elementary school children and 225 minutes of instructional physical education per week for middle and high school students. While 97% of US schools require PE in 6th grade, this percentage drops below 45% for 11th-12th grade students (Brener et al., 2017). In the European Union, all Member States provide physical education in schools and most require at least two hours per week of instruction (World Health Organization Regional Office for Europe, 2018). Of the 28 reporting countries, 22 mandate PE in primary schools and 20 mandate PE in secondary schools.

Data evaluating the dose of physical activity provided by a PE class has shown that children are active for approximately 34% of the time they are in a PE class (Fairclough & Stratton, 2006). Contrary to much of the physical activity data in youth, no gender differences were found. CATCH (McKenzie et al., 1996) and SPARK (Sallis et al., 1997) are two physical education interventions that succeeded in increasing physical activity levels to around 50% of class time.

Child and Adolescent Trial for Cardiovascular Health (CATCH): CATCH is designed to be delivered over grades 3, 4, and 5 (ages 8–11) and uses a multi-component approach to behavioral health. CATCH consists of school food service, physical education, and classroom curricula approaches at school and

home curricula and family fun nights within the students' families. Physical activity is a specific focus of the program in Grades 4 and 5.

Sports, Play, and Active Recreation for Kids (SPARK): SPARK focuses on promoting lifelong well-being through high quality physical education with required teacher training. Although SPARK has adapted since its original development and evaluation, the original program consisted of in-school health-fitness activities (i.e., walking/jogging and jumping rope), skill-fitness activities (i.e., basketball and soccer), and self-management components including self-monitoring, goal setting, and problem solving.

Implications for Interventions in Recess and Physical Education

Pre-School Children

The World Health Organization suggests that children ages 1–4 years of age should spend at least 180 minutes per day in a variety of physical activities (World Health Organization, 2020). Considerations should be taken in the design and staffing of early childcare facilities to promote physical activity, including utilization of both fixed and portable equipment and training of staff to support and encourage physical activity (Coe, 2020). Interventions and programs in young children should be focused on development of motor skill competence, which may support increased physical activity later in life (Coe, 2020).

School-Aged Children

A whole-of-school approach is recommended to increase opportunities during PE, recess, and before, during and after school hours (National Physical Activity Plan Alliance, 2018). These programs often include physical activity breaks incorporated into the classroom and have been shown to effectively increase physical activity (Donnelly et al., 2009). In regard to physical education, interventions can include teacher training to increase the percentage of PE class time spent in moderate and vigorous physical activity (McKenzie et al., 1996; Sallis et al., 1997) as well as a shift in focus to activities that build lifelong physical activity habits such as in Estonia's "Schools in Motion" project (World Health Organization Regional Office for Europe, 2018). Enjoyment of PE may influence future adult physical activity levels, with memories of embarrassment, bullying and social-physique anxiety related to lower future activity levels (Ladwig et al., 2018). Because of this possible relationship, efforts should be made to increase enjoyment of PE for all students while avoiding embarrassment and bullying.

In addition to providing additional recess and PE opportunities, manipulation of the play space may also increase physical activity levels. New equipment, markings, and play zones may increase interest in novel physical activities (Ickes et al., 2013). Renovations of play spaces from traditional equipment to more natural designs (e.g., trees, rocks, water, logs and more) has also been shown to increase physical activity levels (Coe et al., 2014). Finally, allowing for longer recess periods may give school-aged youth more opportunities to engage in physical activity (Erwin et al., 2014).

Adolescents and Teenagers

Requirements for physical education drop in high school/secondary school compared to younger grades (Brener et al., 2017; World Health Organization Regional Office for Europe, 2018), so the first priority must be to increase physical education opportunities in this age group. While adolescents may not be as likely to engage in spontaneous physical activity during recess as younger children, this is an important time period for encouraging adoption of physical activity as a lifelong habit, particularly for females who experience sharper decreases in physical activity during the early teen years (Kimm et al., 2002). PE in this age group may focus less on games and sports and instead provide opportunities for exposure to new activities such as hiking, skiing, or other outdoor pursuits if resources allow. Programs

that address other risk behaviors at this age (e.g., cigarette smoking, teenage pregnancy) may also provide opportunities to encourage physical activity as part of a healthy lifestyle (Kimm et al., 2002).

Active Transportation

Active transportation is defined as travel to and from school (or work or other destinations) which involves physical activity and often includes walking or cycling. Active transportation has been associated with overall higher physical activity levels in youth (Stewart, 2011). Mixed-mode commuting may also include some level of physical activity. Mixed-mode commuting involves multiple methods of transportation such as walking to and from a bus stop, train stop, or carpool pickup/drop off point. This is in contrast to inactive commuting which relies solely on motorized travel. Levels of active transportation have declined in the United States since the 1970s (Bassett et al., 2015; McDonald et al., 2011). Among children grades K-8th (4-14 years old), the percentage of youth using non-motorized transportation to get to and from school (i.e., walking or biking) has declined from 47.7% in 1969 to just 12.7% in 2009. Similar - though less drastic - declines have also been documented in Canada, Switzerland, and other countries (Buliung et al., 2009; Grize et al., 2010).

Photo by Mary Taylor from Pexels

Safety, functionality, aesthetics, and destinations influence active transportation behaviors (Panter et al., 2008). Due to elements pertaining to the home, the destination, and/or the route, active transportation may simply not be an option. For example, many rural children live too far from their schools for active transportation to be a realistic choice. Routes for children who do live near schools could include hilly and winding roads that may be unappealing. Safety considerations include road safety as well as safety of the overall environment. Lower speed limits for motorized traffic, safe street crossings, complete sidewalks, bike lanes and good visibility can all make a route safer. Youth and adults alike are more likely to engage in active transportation if there are destinations within walking distance without unnecessary barriers. Areas with higher land use mix and therefore more diversity in shops,

parks, schools, homes and other destinations are likely to encourage active transportation. Finally, an aesthetically pleasing environment will make active transportation more enjoyable.

Safe Routes to School (SRTS) programs encourage active transportation through the 4 Es: Engineering, Enforcement, Education, and Encouragement. Engineering refers to design changes in the environment such as improved sidewalks, crosswalks, and bicycle lanes. Enforcement efforts include collaborations with local police departments to enforce speed limits in school zones or installing real-time speed monitoring signs. Education programs often focus on classroom instruction to teach pedestrian and bicycle safety. Encouragement efforts create incentives and excitement around active transportation. An assessment of Safe Routes to School programs in New York City, US showed a 44% decrease in the rate of pedestrian injury for youth age 5-19 years for census tracts with these active transportation interventions compared to those without (Dimaggio & Li, 2013). A study comparing schools with and without SRTS programs found that rates of walking and bicycling to school increased with each year of participation in the SRTS program (McDonald et al., 2014). Similar positive impacts have been found by others (Boarnet et al., 2005; Stewart et al., 2014).

Implications for Interventions in Active Transportation

Pre-School Children

Depending on childcare arrangements, there may be few opportunities for young children to engage in active transportation. If children are not attending pre-school or daycare, they may not have regular opportunities to leave the house and travel to destinations close enough for active transportation, especially for young children. However, pre-schoolers may still be encouraged to walk or bike along with a parent when taking older siblings to school or completing other trips and tasks. They may also ride-along in bike carriers/trailers to begin exposure to active transportation.

School-Aged Children

Proximity is important for active transportation and so this may simply not be an option for youth who live too far from their school or other destinations. For younger age groups, travel choices may also be strongly influenced by traffic safety concerns of parents (Panter et al., 2008), but there are opportunities available to address these concerns and increase utilization of active transportation. A popular approach to increasing active transportation is the walking school bus. Walking school busses consist of a group of children that walk a set route to and from school with adult supervision, picking up children throughout the neighborhood along the route. These programs help to allay parent fears about safety by increasing adult supervision and teaching safety behaviors (Mendoza et al., 2011, 2012). Schools can also encourage active transportation by addressing their vehicle traffic patterns and designating specific car-free approaches to the school to reduce the chance for vehicle-pedestrian accidents.

Adolescents and Teenagers

Active transportation may appeal to adolescents because of the opportunity for independence. Walking or biking to school or other destinations may provide an additional opportunity for time away from parents and/or with friends. Females are less likely than males to engage in active transportation (National Physical Activity Plan Alliance, 2018), possibly suggesting continued need for safety improvements such as lighting along possible transit routes. Parents are encouraged to work with their teenagers to plan safe routes they can follow for active transportation as a way to find a compromise between the teen's desire for independence and parents' concerns about safety.

Free Play

Free play is the first introduction to physical activity for most young children. From first crawling across a room to explore new areas, to running, jumping, and climbing in parks and playgrounds with friends and classmates. Free play presents opportunities to develop motor skills as well as social skills. Guidance from the American Academy of Pediatrics states that most children are ready for organized sports at around age 6, but should engage in free play until (and after) that time (Logan et al., 2019). Free play is valuable for the physical activity it provides, but it has additional benefits not seen with other types of physical activity including imagination, creativity, and social skills. Free play, often referred to as unstructured play, gives children and youth a chance to create and enforce their own rules, without direct oversight from a parent, teacher, coach, or other adult. Play is so important for children that it is recognized by the United Nations as a universal human right (Office of the United Nations High Commissioner for Human Rights, 1989). There are few studies available examining the access for children to free play, although many barriers are known, including weather, safety, and lack of infrastructure in the surrounding built environment (Brockman et al., 2011; Veitch et al., 2006). The most commonly reported locations for physical activity include a home/apartment complex yard, park or playground, school grounds after school hours, and a friend or relative's home (Corder et al., 2011).

Outdoor Play

A special area of interest within free play is the exposure and opportunity it often presents for children to be outside. In fact, the amount of time spent outdoors has been found to be a significant predictor of a child's overall physical activity level (Sallis et al., 2000). Additionally, the higher variety of places to be active that a child visits is also associated with overall physical activity levels (Corder et al., 2011). Natural play spaces include unique terrain, plants, rocks, water and other natural elements that children can choose how to use, as opposed to traditional playsets where it is very clear what should be done with a swing or a slide. Renovation of play spaces from traditional to natural playgrounds has been shown to increase physical activity and may also increase engagement in "risky play" (Coe et al., 2014). Risky play refers to activities such as climbing, jumping, and fast running and has been shown to be associated with healthy child development (Brussoni et al., 2012).

Implications for Interventions in Active Free Play

Pre-School Children

Parental support for active free play is particularly important for young children who are not yet enrolled in school. Evidence suggests that children who attend pre-school are less active when at school than at other times in the day (O'Dwyer et al., 2013) but that family-focused education and activity can increase physical activity and decrease sedentary time in this age group (O'Dwyer et al., 2012). Some children may prefer—and be more active during—structured activities while others may prefer free play and so a variety of opportunities should be presented (Frank et al., 2018).

School-Aged Children

While development of motor skills is driven by physical activity in early childhood, this relationship may reverse in middle childhood as children with better motor skill development become and stay more active (Coe, 2020). Access to recess and other opportunities for free play must be maintained and improved in this age group, showing interaction of efforts to increase free play with other contexts such as school and family settings. More research is needed in this area to identify specific intervention characteristics that can successfully support free play, but safety and access are two likely factors. As suggested by the Protection Paradox, overprotection on the part of parents and teachers who are (understandably) trying to avoid injury, may result in reduced opportunity for children

to engage in challenging and appealing play. Long-term health, supported by appropriate physical activity levels, should be valued as much as safety (ParticipACTION, 2015). It is possible to increase the amount of time that families spend being active outside by providing education and information about local activity resources (parks and greenways) and empowering parents to act as physical activity role models (Flynn et al., 2017).

Photo by jonas mohamadi from Pexels

Adolescents and Teenagers

Parents can support active free play by providing transportation to recreational areas where adolescents can be active with friends. As teenagers build lifelong activity patterns, exploring a variety of outdoor hobbies can increase the likelihood of identifying physical activities that they enjoy, such as hiking, water activities, and other outdoor pursuits beyond organized sport. These activities may be particularly appealing for adolescents who have dropped out of organized sport due to disinterest in competition.

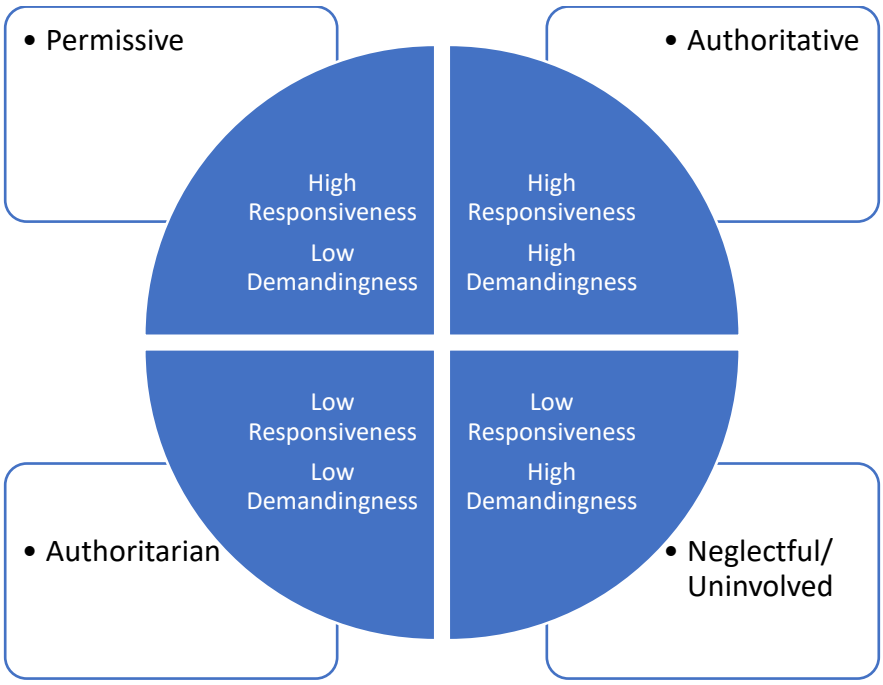
Home Environment: Parental Involvement and Modeling

There are no valid and internationally recognized instruments available to document the role of parents in encouraging and supporting physical activity for their children, despite the known importance of parents as "gatekeepers" (Aubert et al., 2018; National Physical Activity Plan Alliance, 2018). Parents exert a large amount of influence on child behaviors, including physical activity, both in providing or restricting access and as a role model. Parents can provide support for physical activity through many avenues: social and emotional support, financial support, transportation and investing time to play with or watch their child participate in organized sports.

Much of the research on parent influence has focused on parenting type. Traditionally, parenting types have been categorized as Authoritarian, Permissive, or Authoritative (Baumrind, 1966); although a fourth style (Neglectful/Uninvolved) is sometimes added. These styles are determined based

on Demandingness and Responsiveness (see Figure 8.1). The authoritarian parent attempts to control their child's behavior with high levels of restriction and authority and is often viewed as strict or stern. Children of parents who display this type of restriction may be less likely to engage in moderate to vigorous physical activity (MVPA) and active transportation (Carver et al., 2010). The permissive parent is acceptant and affirmative toward child desires and actions and consults his/her child about decisions while exerting little overt power. In the context of physical activity, this parent is less likely to insist on direct supervision and is likely to have few rules about where a child can go and what they can do. Authoritative parents attempt to direct their child's behavior while balancing reason and power to encourage both discipline and child autonomy. This parent is likely to have high expectations, but also clear rules and show high support for their child.

Figure 8.1
Aspects of Parenting Styles



There is some evidence that more active parents have more active children. One of these studies (Brouwer et al., 2018), found a sex-specific relationship with girls' physical activity more closely associated with that of their mother and boys' physical activity more closely associated with that of their father. However, a 30-year analysis as part of the Cardiovascular Risk in Young Finns study (Kaseva et al., 2017) did not find this gendered response. Other researchers have found stronger ties between parent sedentary behavior and low child physical activity than between parent and child high physical activity levels (Fogelholm et al., 1999), suggesting that modeling of sedentary behaviors and modeling of active behaviors may influence child behaviors differently.

Modeling is not the only way that parents can support physical activity for their children. Youth are more likely to achieve the physical activity guidelines if their parent(s) take the child to places where they can be active, take part in physical activities with their child, and encourage their child to be active outdoors with friends or family members (Pyper et al., 2016). Parental influence is usually stronger for younger children (under 12 years of age) as parents play a stronger role in promoting or inhibiting

opportunities for physical activity in younger children. There is also some evidence that youth from lower income families perceive less support in the form of being watched by family or friends, which has been associated with overall physical activity level (Duncan et al., 2005).

Implications for Interventions in Parental Involvement

Pre-School Children

Parents are integral at this age level as they provide opportunities and supervision for play, both structured and unstructured. Parents can provide support by exposing their pre-school children to a variety of activities. Young children can also be exposed to parent support by attending sporting events or other physical activity opportunities for older siblings with their families, creating a family-wide culture of physical activity support.

School-Aged Children

Parents serve as a major role model for this age group, as children still have little volitional control over aspects such as enrollment in organized sport and transportation to places to be active (Pyper et al., 2016). There is some evidence that interventions for parents should directly target behaviors and planning, rather than increasing positive attitudes towards physical activity. Parents are likely already believers that activity is important for their children but need more tangible information such as resources and approaches to planning (Flynn et al., 2017; Pyper et al., 2016). It is possible to increase the amount of time that families spend being active together by providing education and information about local places to be active and empowering parents to act as physical activity role models (Flynn et al., 2017).

Adolescents and Teenagers

Although adolescents exert more autonomy over their own activities than younger children, there is still a degree of influence from parents and other family members (Pyper et al., 2016). Parenting style may come into play in this age group as teenagers begin to explore their limits and strive to make more of their own decisions. Authoritative parenting – demanding yet responsive – will allow youth to explore physical activities to find what they enjoy while still being safe. Older children report lower levels of support from parents and siblings than do younger children – an opportunity to provide intervention; however, as children transition into adolescence, peers often become a stronger source of social support (Duncan et al., 2005).

Youth with Disabilities

Youth with disabilities often obtain lower levels of physical activity than those without disabilities. According to a report from the United States, 58% of boys between 5–11 years old that have long-term mobility limitations met the physical activity guidelines compared to 75% of boys in this age range without mobility limitations (National Physical Activity Plan Alliance, 2018). Additionally, less than 20% of children with cerebral palsy, autism spectrum disorder, or Down syndrome between ages 6–17 years met the guidelines. Similar discrepancies have been reported in Canada, where only 16% of children and youth with disabilities report at least 60 minutes of daily physical activity (ParticipACTION, 2018). The National Survey of Children's Health (US, NSCH) gathers data on noninstitutionalized youth ages 0–17 in the United States. A review of NSCH data from 2011-2012 demonstrated lower levels of physical activity among adolescents age 13–17 with severe visual impairments (2.4 days of MVPA per week) compared to those without impairments (3.93 days of MVPA per week; Haegele et al., 2019a). However, as similar review of NSCH data from 2016 found that visual impairment was not associated with the likelihood of meeting the physical activity guidelines either for children or adolescents (Haegele

et al., 2019b). These results suggest a need for additional research in this area along with consideration of the degree of severity of impairments.

Programs and opportunities that promote physical activity must consider different adjustments for youth with physical disabilities and intellectual and developmental disabilities. This may include considerations for equipment, space, group size, instruction, and safety. A systematic review of physical activity interventions for youth who use wheelchairs found that programs could achieve improvements in health, fitness, and well-being but that results were often not maintained during follow-up and that studies were generally of low quality (O'Brien et al., 2016). Parents of children with disabilities report many perceived benefits of physical activity participation for their child such as health and socialization. Unfortunately, they also report many barriers to physical activity participation including low motivation on the part of their children, overprotection, and lack of programs and professionals that address the specific needs of their children (Columna et al., 2020).

Interventions for youth with disabilities are likely to vary greatly depending on the age group and the specific disability. For example, interventions for youth with visual impairments need to consider different factors than physical activity programs for youth with intellectual disabilities or those who have experienced an amputation. While the validity of activity monitors among wheelchair users has been studied (Learmonth et al., 2016; Sonenblum et al., 2012), much more work is needed to develop and evaluate physical activity promotion programs for this population. Despite a call for more research on youth with disabilities being issued over 20 years ago (Cooper et al., 1999), additional data is still needed in this area.

Considerations for Measurement of Physical Activity in Youth

An important consideration when evaluating youth physical activity behaviors and subsequent interventions is in how physical activity is measured. Self-report tools that rely on recall or memory are limited by our ability to accurately recall our behaviors. Self-report tools that are completed in real-time (e.g., logs, diaries) often create a high amount of burden on the participant to continually track their activities. For children, self-report measures often rely on parents serving as a proxy and reporting activity levels for their child. These reports are limited to the time which the parent spent with their child and parent perceptions of the child's activity level while they were apart (e.g., at school, sport practices, after-school programs). Children tend to be more sporadic in their physical activity than adults are. If you have ever observed children, especially young children, playing on a playground or in a park, this quickly becomes apparent. A child may play for a few minutes on the swings before sprinting to the slide to play with a friend, take a break to play in the sandbox and then join a stop-and-go game of soccer. These short bursts of activity are harder to record or recall.

In recent years, devices have been designed that can capture physical activity, including pedometers and accelerometers. Pedometers measure step count and are a cheap and easy way to capture the volume of physical activity performed by an individual. Accelerometers, on the other hand, measure the amount of acceleration, and can therefore capture intensity. When accelerometer data is processed, it can identify not only the volume of physical activity performed by a participant, but also the intensity and the length of specific bouts of exercise. Accelerometer software from device manufacturers produce data referred to as "counts" with more counts per minute indicating higher intensities of physical activity. There have been many studies done to determine appropriate cut points to separate sedentary, light, moderate, and vigorous activity based on counts per minute. However, rather than arriving at a consensus, this has resulted in a multitude of different sets of cut points that researchers must choose from. To do so, the setting, age of participants, and activities included in development and validation of those cut points should be considered.

Conclusion

There are many contexts for children and adolescents to engage in physical activity, but in many of these areas, opportunities are lacking. Interventions should address safe and practical ways to increase physical activity levels while exposing youth to an array of different activities that allow them to identify their own interests. Policies are needed to support physical activity in schools as well as in the larger community environment through education, built environment, and utilization of proven curricula and programs. Parents serve as important role models and gatekeepers for physical activity and should be encouraged to identify easy and practical ways to provide more opportunities for physical activity for their child. Healthy physical activity patterns built in childhood may lead to healthy physical activity habits maintained throughout the lifespan.

Learning Exercises

1. Develop a 6–10 question survey about youth sport participation and adult physical activity levels that could be distributed online. What details would you want to know about sport participation that you believe might predict adult physical activity levels? Distribute the survey to at least 15 classmates, family members or friends and review for trends.

2. Imagine that you have been tasked with writing the requirements for recess time for a school district/school system. What guidelines would you write for elementary/primary schools and for middle/high/secondary schools? Criteria may include rules for number of recesses per day/week, length of recess, equipment provided, supervision, space requirements, bad weather contingencies and other considerations.

3. Using Google Maps or another similar program, design at least three walking school bus routes through surrounding neighborhoods to your nearest elementary school. Use the Street View tool to make note of any segments of the route without sidewalks or with dangerous traffic crossings that could be improved with a Safe Routes to School project.

4. Visit a local park and complete the Community Park Audit Tool (CPAT). After completing the tool, reflect on three positive aspects of the park highlighted by the tool and three areas for possible improvement.

5. Create a community guide that provides information about at least five places in your community where parents could be active with their school-aged children. Create a table that could be provided as a handout to families about these resources. Be sure to include the address and name of the park, trail, or other resource as well as information about parking, accessibility, and what activities can be done at that location.

Further Reading

Aubert, S., Barnes, J. D., Abdeta, C., Nader, P. A., Adeniyi, A. F., Aguilar-Farias, N., Tenesaca, D. S. A., Bhawra, J., Brazo-Sayavera, J., Cardon, G., Chang, C. K., Delisle Nyström, C., Demetriou, Y., Draper, C. E., Edwards, L., Emeljanovas, A., Gába, A., Galaviz, K. I., González, S. A., … Tremblay, M. S. (2018). Global Matrix 3.0 Physical activity report card grades for children and youth: Results and analysis from 49 countries. *Journal of Physical Activity and Health*, *15(Suppl 2),* S251–S273. https://doi.org/10.1123/jpah.2018-0472

Donnelly, J.E., Greene, J.L., Gibson, C.A., Smith, B.K., Washburn, R.A., Sullivan, D.K., DuBose, K., Mayo, M.S., Schmelzle, K.H., Ryan, J.J., Jacobsen, D.J., & Williams, S.K. (2009). Physical Activity Across the Curriculum (PAAC): A randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Preventive Medicine*, *49(4),* 336–341. https://doi.org/10.1016/j.ypmed.2009.07.022

Logan, K., Cuff, S., & AAP Council on Sports Medicine and Fitness. (2019). Organized sports for children, preadolescents, and adolescents. *Pediatrics*, *143(6),* e20190997. https://doi.org/10.1542/preds.2019.0997

McKenzie, T. L., Nader, P. R., Strikmiller, P. K., Yang, M., Stone, E. J., Perry, C. L., ... & Kelder, S. H. (1996). School physical education: effect of the Child and Adolescent Trial for Cardiovascular Health. *Preventive Medicine, 25(4),* 423–431. https://doi.org/10.1006/pmed.1996.0074

National Physical Activity Plan Alliance. (2018). *NPAP.* The 2018 United States report card on physical activity for children and youth. https://www.physicalactivityplan.org/projects/PA/2018/2018_USReportCard_UPDATE_12062018.pdf?pdf=page-link

ParticipACTION, A. (2015). *The biggest risk is keeping kids indoors.* The 2015 ParticipACTION report card on physical activity for children and youth. https://www.participaction.com/sites/default/files/downloads/Participaction-2015ReportCard-FullReport_2.pdf

Sallis, J. F., McKenzie, T. L., Alcaraz, J. E., Kolody, B., Faucette, N., & Hovell, M. F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. Sports, Play and Active Recreation for Kids. *American Journal of Public Health, 87(8),* 1328–1334. https://doi.org/10.2105/AJPH.87.8.1328

Stewart, O. (2011). Findings from research on active transportation to school and implications for safe routes to school programs. *Journal of Planning Literature, 26(2),* 127–150. https://doi.org/10.1177/0885412210385911

Acknowledgements

Thank you to Dr. Elizabeth Hathaway for her contributions to guidance for interventions in Sport.

References

Aubert, S., Barnes, J. D., Abdeta, C., Nader, P. A., Adeniyi, A. F., Aguilar-Farias, N., Tenesaca, D. S. A., Bhawra, J., Brazo-Sayavera, J., Cardon, G., Chang, C. K., Delisle Nyström, C., Demetriou, Y., Draper, C. E., Edwards, L., Emeljanovas, A., Gába, A., Galaviz, K. I., González, S. A., … Tremblay, M. S. (2018). Global Matrix 3.0 Physical activity report card grades for children and youth: Results and analysis from 49 countries. *Journal of Physical Activity and Health, 15(Suppl 2),* S251–S273. https://doi.org/10.1123/jpah.2018-0472

Balish, S. M., McLaren, C., Rainham, D., & Blanchard, C. (2014). Correlates of youth sport attrition: A review and future directions. *Psychology of Sport and Exercise, 15(4),* 429–439. https://doi.org/10.1016/j.psychsport.2014.04.003

Balyi, I., Way, R., & Higgs, C. (2013). *Long-term athlete development*. Human Kinetics. https://doi.org/10.5040/9781492596318

Bassett, D. R., John, D., Conger, S. A., Fitzhugh, E. C., & Coe, D. P. (2015). Trends in Physical Activity and Sedentary Behaviors of United States Youth. *Journal of Physical Activity and Health, 12*, 1102–1111. https://doi.org/10.1123/jpah.2014-0050

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child Development, 37(4),* 887–907. https://doi.org/10.2307/1126611

Boarnet, M. G., Anderson, C. L., Day, K., McMillan, T., & Alfonzo, M. (2005). Evaluation of the California Safe Routes to School legislation: urban form changes and children's active transportation to school. *American Journal of Preventive Medicine, 28(2 Suppl 2),* 134–140. https://doi.org/10.1016/j.amepre.2004.10.026

Boone, E. M., & Leadbeater, B. J. (2006). Game on: diminishing risks for depressive symptoms in early adolescence through positive involvement in team sports. *Journal of Adolescent Research, 16(1),* 79–90. https://doi.org/10.1111/j.1532-7795.2006.00122.x

Brener, N., Demissie, Z., McManus, T., Shanklin, S., Queen, B., & Kann, L. (2017). *School health profiles 2016: Characteristics of health programs among secondary schools.*

Brenner, J. S., & AAP Council on Sports Medicine and Fitness. (2016). Sports specialization and intensive training in young athletes. *Pediatrics, 138(3),* e20162148. https://doi.org/10.1542/peds.2016-2148

Brettschneider, W. D. (1999). Risks and opportunities: adolescents in top-level sport: growing up with the pressures of school and training. *European Physical Education Review, 5(2),* 121–133. https://doi.org/10.1177/1356336X990052004

Brettschneider, W. D. (2001). Effects of sport club activities on adolescent development in Germany. *European Journal of Sport Science, 1(2),* 1–11. https://doi.org/10.1080/17461390100071201

Brockman, R., Jago, R., & Fox, K. R. (2011). Children's active play: Self-reported motivators, barriers and facilitators. *BMC Public Health, 11*, 461. https://doi.org/10.1186/1471-2458-11-461

Brouwer, S. I., Küpers, L. K., Kors, L., Sijtsma, A., Sauer, P. J. J., Renders, C. M., & Corpeleijn, E. (2018). Parental physical activity is associated with objectively measured physical activity in young children in a sex-specific manner: The GECKO Drenthe cohort. *BMC Public Health, 18,* 1033. https://doi.org/10.1186/s12889-018-5883-x

Brussoni, M., Olsen, L. L., Pike, I., & Sleet, D. A. (2012). Risky play and children's safety: Balancing priorities for optimal child development. *International Journal of Environmental Research and Public Health, 9,* 3134–3148. https://doi.org/10.3390/ijerph9093134

Buliung, R. N., Mitra, R., & Faulkner, G. (2009). Active school transportation in the Greater Toronto Area, Canada: An exploration of trends in space and time (1986-2006). *Preventive Medicine, 48(6),* 507–512. https://doi.org/10.1016/j.ypmed.2009.03.001

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., Carty, C., Chaput, J. P., Chastin, S., Chou, R., Dempsey, P. C., Dipietro, L., Ekelund, U., Firth, J., Friedenreich, C. M., Garcia, L., Gichu, M., Jago, R., Katzmarzyk, P. T., … Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine, 54,* 1451–1462. https://doi.org/10.1136/bjsports-2020-102955

Carver, A., Timperio, A., Hesketh, K., & Crawford, D. (2010). Are children and adolescents less active if parents restrict their physical activity and active transport due to perceived risk? *Social Science and Medicine, 70(11),* 1799–1805. https://doi.org/10.1016/j.socscimed.2010.02.010

Centers for Disease Control and Prevention. (2015). Results from the school health policies and practices study 2014. *US Department of Health and Human Services, Centers for Disease Control and Prevention,* 60–74. https://www.cdc.gov/healthyyouth/data/shpps/results.htm

Christou, M., Smilios, I., Sotiropoulos, K., Volaklis, K., Pilianidis, T., & Tokmakidis, S. P. (2006). Effects of resistance training on the physical capacities of adolescent soccer players. *Journal of Strength and Conditioning Research, 20(4),* 783–791. https://doi.org/10.1519/R-17254.1

Coe, D. P. (2020). Means of Optimizing Physical Activity in the Preschool Environment. *American Journal of Lifestyle Medicine, 14(1),* 16–23. https://doi.org/10.1177/1559827618818419

Coe, D. P., Flynn, J. I., Wolff, D. L., Scott, S. N., & Durham, S. (2014). Children's physical activity levels and utilization of a traditional versus natural playground. *Children, Youth and Environments, 24(3),* 1–15. https://doi.org/10.7721/chilyoutenvi.24.3.0001

Columna, L., Prieto, L., Elias-Revolledo, G., & Haegele, J. A. (2020). The perspectives of parents of youth with disabilities toward physical activity: A systematic review. *Disability and Health Journal, 13*, 100851. https://doi.org/10.1016/j.dhjo.2019.100851

Cooper, R. A., Quatrano, L. A., Axelson, P. W., Harlan, W., Stineman, M., Franklin, B., Krause, J. S., Bach, J., Chambers, H., Chao, E. Y., Alexander, M., & Painter, P. (1999). Research on physical activity and health among people with disabilities: a consensus statement. *Journal of Rehabilitation Research & Development, 36(2),* 142–154.

Corder, K., Sallis, J. F., Crespo, N. C., & Elder, J. P. (2011). Active children use more locations for physical activity. *Health and Place, 17(4),* 911–919. https://doi.org/10.1016/j.healthplace.2011.04.008

Côte, J., Lidor, R., & Hackfort, D. (2009). ISSP position stand: To sample or to specialize? Seven postulates about youth sport activities that lead to continued participation and elite performance. International *Journal of Sport and Exercise Psychology, 7(1),* 7–17. https://doi.org/10.1080/1612197X.2009.9671889

Dimaggio, C., & Li, G. (2013). Effectiveness of a safe routes to school program in preventing school-aged pedestrian injury. *Pediatrics, 131(2),* 290–296. https://doi.org/10.1542/peds.2012-2182

Donnelly, J. E., Greene, J. L., Gibson, C. A., Smith, B. K., Washburn, R. A., Sullivan, D. K., DuBose, K., Mayo, M. S., Schmelzle, K. H., Ryan, J. J., Jacobsen, D. J., & Williams, S. L. (2009). Physical Activity Across the Curriculum (PAAC): a randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Preventive Medicine, 49(4),* 336–341. https://doi.org/10.1016/j.ypmed.2009.07.022

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2005). Sources and types of social support in youth physical activity. *Health Psychology, 24(1),* 3–10. https://doi.org/10.1037/0278-6133.24.1.3

Durand-Bush, N., & Salmela, J. H. (2002). The development and maintenance of expert athletic performance: perceptions of world and olympic champions. *Journal of Applied Sport Psychology, 14(3),* 154–171. https://doi.org/10.1080/10413200290103473

Eime, R. M., Young, J. A., Harvey, J. T., & Charity, M. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity, 10*, 98. https://doi.org/10.1186/1479-5868-10-98

Erwin, H. E., Ickes, M., Ahn, S., & Fedewa, A. (2014). Impact of recess interventions on children's physical activity-A meta-analysis. *American Journal of Health Promotion, 28(3),* 159–167. https://doi.org/10.4278/ajhp.120926-LIT-470

Fairclough, S. J., & Stratton, G. (2006). A review of physical activity levels during elementary school physical education. *Journal of Teaching in Physical Education, 25(2),* 240–258. https://doi.org/10.1123/jtpe.25.2.240

Flynn, J. I., Bassett, D. R., Fouts, H. N., Thompson, D. L., & Coe, D. P. (2017). Active Families in the Great Outdoors: a program to promote family outdoor physical activity. *Journal of Adventure Education and Outdoor Learning, 17(3),* 227–238. https://doi.org/10.1080/14729679.2017.1291355

Fogelholm, M., Nuutinen, O., Pasanen, M., Myöhänen, E., & Säätelä, T. (1999). Parent-child relationship of physical activity patterns and obesity. *International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity, 23(12),* 1262–1268. https://doi.org/10.1038/sj.ijo.0801061

Frank, M. L., Flynn, A., Farnell, G. S., & Barkley, J. E. (2018). The differences in physical activity levels in preschool children during free play recess and structured play recess. *Journal of Exercise Science and Fitness, 16(1),* 37–42. https://doi.org/10.1016/j.jesf.2018.03.001

Fraser-Thomas, J., Côté, J., & Deakin, J. (2008). Examining adolescent sport dropout and prolonged engagement from a developmental perspective. *Journal of Applied Sport Psychology, 20(3),* 318–333. https://doi.org/10.1080/10413200802163549

Gomez, J. (2000). *Growth and maturation*. In J. Sullivan & S. Anderson (Eds.), Care of the Young Athlete (pp. 25–32). American Academy of Orthopaedic Surgeons and American Academy of Pediatrics.

Gould, D., & Petlichkoff, L. (1988). Participation motivation and attrition in young athletes. *Children in Sport, 3*, 161–178.

Grize, L., Bringolf-Isler, B., Martin, E., & Braun-Fahrländer, C. (2010). Trend in active transportation to school among Swiss school children and its associated factors: Three cross-sectional surveys 1994, 2000 and 2005. *International Journal of Behavioral Nutrition and Physical Activity, 7.* https://doi.org/10.1186/1479-5868-7-28

Haegele, J. A., Aigner, C. J., & Healy, S. (2019a). Physical activity, body mass index, and health status among youth with severe visual impairments aged 13-17 years in the United States. *Disability and Health Journal, 12(1)*, 24–28. https://doi.org/10.1016/j.dhjo.2018.07.001

Haegele, J. A., Aigner, C. J., & Healy, S. (2019b). Prevalence of meeting physical activity, screen-time, and sleep guidelines among children and adolescents with and without visual impairments in the United States. *Adapted Physical Activity Quarterly, 36(3),* 399–405. https://doi.org/10.1123/apaq.2018-0130

Hansen, D. M., Larson, R. W., & Dworkin, J. B. (2003). What adolescents learn in organized youth activities: a survey of self- reported developmental experiences. *Journal of Adolescent Research, 13(1),* 25–55. https://doi.org/10.1111/1532-7795.1301006

Hardy, L. L., O'Hara, B. J., Rogers, K., St George, A., & Bauman, A. (2014). Contribution of organized and nonorganized activity to children's motor skills and fitness. *Journal of School, 84(11),* 690–696. https://doi.org/10.1111/josh.12202

Holt, N. L., Tink, L. N., Mandigo, J. L., & Fox, K. R. (2008). Do youth learn life skills through their involvement in high school sport? A case study. *Canadian Journal of Education, 31(1),* 281–304. https://doi.org/10.2307/20466702

Ickes, M. J., Erwin, H., & Beighle, A. (2013). Systematic review of recess interventions to increase physical activity. *Journal of Physical Activity and Health, 10(6),* 910–926. https://doi.org/10.1123/jpah.10.6.910

Jonker, L., Elferink-Gemser, M. T., Toering, T. T., Lyons, J., & Visscher, C. (2010). Academic performance and self-regulatory skills in elite youth soccer players. *Journal of Sports Science, 28(14),* 1605–1614. https://doi.org/10.1080/02640414.2010.516270

Kaseva, K., Hintsa, T., Lipsanen, J., Pulkki-Raback, L., Hintsanen, M., Yang, X., Hirvensalo, M., Hutri-Kahonen, N., Raitakari, O., Keltikangas-Jarvinen, L., & Tammelin, T. (2017). Parental physical activity associates with offspring's physical activity until middle age: a 30-year study. *Journal of Physical Activity and Health, 14(7),* 520–531. https://doi.org/10.1123/jpah.2016-0466

Katzmarzyk, P. T., Denstel, K. D., Beals, K., Carlson, J., Crouter, S. E., McKenzie, T. L., ... & Wright, C. (2018). Results from the United States 2018 report card on physical activity for children and youth. *Journal of Physical Activity and Health, 15*(s2), S422–S424. https://doi.org/10.1123/jpah.2018-0476

Kimm, S. Y. S., Glynn, N. W., Kriska, A. M., Barton, B. A., Kronsberg, S. S., Daniels, S. R., Crawford, P. B., Sabry, Z. I., & Liu, K. (2002). Decline in Physical Activity in Black Girls and White Girls During Adolescence. *New England Journal of Medicine, 347(10),* 709–715. https://doi.org/10.1056/NEJMoa003277

Ladwig, M., Vazou, S., & Ekkekakis, P. (2018). "My Best Memory Is When I Was Done with It": PE Memories Are Associated with Adult Sedentary Behavior. *Translational Journal of the American College of Sports Medicine, 3(16),* 119–129. https://doi.org/10.1249/TJX.0000000000000067

Larson, R. W., Hansen, D. M., & Moneta, G. (2006). Differing profiles of developmental experiences across types of organized youth activities. *Developmental Psychology, 42(5),* 849–863. https://doi.org/10.1037/0012-1649.42.5.849

Learmonth, Y. C., Kinnett-Hopkins, D., Rice, I. M., Dysterheft, J. L., & Motl, R. W. (2016). Accelerometer output and its association with energy expenditure during manual wheelchair propulsion. *Spinal Cord, 54(2),* 110–114. https://doi.org/10.1038/sc.2015.33

Logan, K., Cuff, S., & AAP Council on Sports Medicine and Fitness. (2019). Organized sports for children, preadolescents, and adolescents. *Pediatrics, 143(6),* e20190997. https://doi.org/10.1542/peds.2019-0997

Martens, R. (2012). *Successful coaching*. Human Kinetics.

McCarthy, P. J., Jones, M. V., & Clark-Carter, D. (2008). Understanding enjoyment in youth sport: A developmental perspective*. Psychology of Sport and Exercise, 9(2)*, 142–156. https://doi.org/10.1016/j.psychsport.2007.01.005

McCullagh, P., Matzkanin, K. T., Shaw, S. D., & Maldonado, M. (1993). Motivation for participation in physical activity: A comparison of parent–child perceived competencies and participation motives. *Pediatric Exercise Science, 5(3),* 224–233. https://doi.org/10.1123/pes.5.3.224

McDonald, N. C., Brown, A. L., Marchetti, L. M., & Pedroso, M. S. (2011). U.S. School travel, 2009: An assessment of trends. *American Journal of Preventive Medicine, 41(2),* 146–151. https://doi.org/10.1016/j.amepre.2011.04.006

McDonald, N. C., Steiner, R. L., Lee, C., Smith, T. R., Zhu, X., & Yang, Y. (2014). Impact of the safe routes to school program on walking and bicycling. *Journal of the American Planning Association, 80(2),* 153–167. https://doi.org/10.1080/01944363.2014.956654

McKenzie, T. L., Nader, P. R., Strikmiller, P. K., Yang, M., Stone, E. J., Perry, C. L., Taylor, W. C., Epping, J. N., Feldman, H. A., Luepker, R. V, & Kelder, S. H. (1996). School physical education: Effect of the Child and Adolescent Trail for Cardiovascular Health. *Preventive Medicine, 25(4),* 423–431. https://doi.org/10.1006/pmed.1996.0074

Melekoglu, T. (2015). The effects of sports participation in strength parameters in primary school students. *Procedia Social and Behavioral Sciences, 186*, 1013–1018. https://doi.org/10.1016/j.sbspro.2015.04.124

Mendoza, J. A., Watson, K., Baranowski, T., Nicklas, T. A., Uscanga, D. K., & Hanfling, M. J. (2011). The walking school bus and children's physical activity: a pilot cluster randomized controlled trial. *Pediatrics, 128(3)*, e537-44. https://doi.org/10.1542/peds.2010-3486

Mendoza, J. A., Watson, K., Chen, T.-A., Baranowski, T., Nicklas, T. A., Uscanga, D. K., & Hanfling, M. J. (2012). Impact of a pilot walking school bus intervention on children's pedestrian safety behaviors: a pilot study. *Health & Place, 18(1),* 24–30. https://doi.org/10.1016/j.healthplace.2011.07.004

Mota, J., Silva, P., Santos, M. P., Ribeiro, J. C., Oliveira, J., & Duarte, J. A. (2005). Physical activity and school recess time: Differences between the sexes and the relationship between children's playground physical activity and habitual physical activity. *Journal of Sports Sciences, 23(3),* 269–275. https://doi.org/10.1080/02640410410001730124

National Physical Activity Plan Alliance. (2018). *NPAP*. The 2018 United States report card on physical activity for children and youth. https://www.physicalactivityplan.org/projects/PA/2018/2018_USReportCard_UPDATE_12062018.pdf?pdf=page-link

O'Brien, T. D., Noyes, J., Spencer, L. H., Kubis, H.-P., Hastings, R. P., & Whitaker, R. (2016). Systematic review of physical activity and exercise interventions to improve health, fitness and well-being of children and young people who use wheelchairs. *BMJ Open Sport & Exercise Medicine, 2(1),* e000109. https://doi.org/10.1136/bmjsem-2016-000109

O'Dwyer, M. V, Fairclough, S. J., Knowles, Z., & Stratton, G. (2012). Effect of a family focused active play intervention on sedentary time and physical activity in preschool children. *International Journal of Behavioral Nutrition and Physical Activity, 9,* 117. https://doi.org/10.1186/1479-5868-9-117

O'Dwyer, M. V, Fairclough, S. J., Ridgers, N. D., Knowles, Z. R., Foweather, L., & Stratton, G. (2013). Effect of a school-based active play intervention on sedentary time and physical activity in preschool children. *Health Education Research, 28(6),* 931–942. https://doi.org/10.1093/her/cyt097

Office of the United Nations High Commissioner for Human Rights. (1989*). General Assembly Resolution 44/25*. Convention on the Rights of the Child. http://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx

Panter, J. R., Jones, A. P., & van Sluijs, E. M. F. (2008). Environmental determinants of active travel in youth: A review and framework for future research. *International Journal of Behavioral Nutrition and Physical Activity, 5(1),* 34. https://doi.org/10.1186/1479-5868-5-34

ParticipACTION. (2015). ParticipACTION. *The Biggest Risk is Keeping Kids Indoors.* The 2015 Report Card on Physical Activity for Children and Youth. https://www.participaction.com/sites/default/files/downloads/Participaction-2015ReportCard-FullReport_2.pdf

ParticipACTION. (2018). ParticipACTION. *The Brain + Body Equation: Canadian kids need active bodies to build their best brains.* The 2018 ParticipACTIOn report card on physical activity for children and youth. www.participACTION.com/reportcard

Purcell, L. (2005). Sport readiness in children and youth. *Paediatrics and Child Health, 10(6),* 343–344. https://doi.org/10.1093/pch/10.6.343

Pyper, E., Harrington, D., & Manson, H. (2016). The impact of different types of parental support behaviours on child physical activity, healthy eating, and screen time: A cross-sectional study. *BMC Public Health, 16(1),* 568. https://doi.org/10.1186/s12889-016-3245-0

Richman, E. L., & Shaffer, D. R. (2000). If you let me play sports: how might sport participation influence the self-esteem of adolescent females? *Psychology of Women Quarterly, 24(2),* 189–199. https://doi.org/10.1111/j.1471-6402.2000.tb00200.x

Ridgers, N. D., Stratton, G., & Fairclough, S. J. (2005). Assessing physical activity during recess using accelerometry. *Preventive Medicine, 41(1),* 102–107. https://doi.org/10.1016/j.ypmed.2004.10.023

Sallis, J. F., McKenzie, T. L., Alcaraz, J. E., Kolody, B., Faucette, N., & Hovell, M. F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health, 87(8),* 1328–1334. https://doi.org/10.2105/AJPH.87.8.1328

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity. *Medicine & Science in Sports & Exercise, 32(5),* 963–975. https://doi.org/10.1097/00005768-200005000-00014

Scanlan, T. K., Babkes, M. L., & Scanlan, L. A. (2005). *Participation in Sport: A developmental glimpse at emotion.* In J. L. Mahoney, R. W. Larson & J. S. Eccles (Eds), Organized activities as contexts of development: Extracurricular activities, after-school and community programs (pp. 275–309).

Sonenblum, S. E., Sprigle, S., Caspall, J., & Lopez, R. (2012). Validation of an accelerometer-based method to measure the use of manual wheelchairs. *Medical Engineering and Physics, 34(6),* 781–786. https://doi.org/10.1016/j.medengphy.2012.05.009

Stewart, O. (2011). Findings from research on active transportation to school and implications for safe routes to school programs. *Journal of Planning Literature, 26(2),* 127–150. https://doi.org/10.1177/0885412210385911

Stewart, O., Vernez Moudon, A., & Claybrooke, C. (2014). Multistate evaluation of Safe Routes to School programs. *American Journal of Health Promotion, 28(3 Suppl),* S89–S96. https://doi.org/10.4278/ajhp.130430-QUAN-210

Telama, R., Yang, X., Hirvensalo, M., & Raitakari, O. (2006). Participation in organized youth sport as a predictor of adult physical activity: A 21-year longitudinal study. *Pediatric Exercise Science, 17(1),* 76–88. https://doi.org/10.1123/pes.18.1.76

United Nations. (n.d.). *Youth*. https://www.un.org/en/sections/issues-depth/youth-0/

Van Tuyckom, C., Scheerder, J., & Bracke, P. (2010). Gender and age inequalities in regular sports participation: A cross-national study of 25 European countries. *Journal of Sports Sciences, 28(10),* 1077–1084. https://doi.org/10.1080/02640414.2010.492229

Veitch, J., Bagley, S., Ball, K., & Salmon, J. (2006). Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health and Place, 12(4),* 383–393. https://doi.org/10.1016/j.healthplace.2005.02.009

Weinberg, R., & Gould, D. (2019). *Foundations of Sport and Exercise Psychology*. Human Kinetics.

World Health Organization. (2020). *WHO Guidelines on physical activity, sedentary behaviour*. World Health Organization, 104. https://apps.who.int/iris/bitstream/handle/10665/325147/WHO-NMH-PND-2019.4eng.pdf?sequence=1&isAllowed=y%0Ahttp://www.who.int/iris/handle/10665/311664%0Ahttps://apps.who.int/iris/handle/10665/325147

World Health Organization Regional Office for Europe. (2018). *Promoting physical activity in the education sector*. https://www.euro.who.int/__data/assets/pdf_file/0006/382335/fs-education-eng.pdf

This Page is Intentionally Left Blank

This Page is Intentionally Left Blank

This Page is Intentionally Left Blank