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Physical Inactivity in Childhood from Preschool to Adolescence

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Summary Statement

Preventing physical inactivity in youth starts in the preschool years and requires strategies targeting schools, caregivers and families that limit excessive screen time and improve participation in PE, organized sports and active play.

Keywords

Physical activity; physical education; sports; screen time; youth

Introduction

In 2008, the landmark physical activity guidelines for Americans was published. The youth guidelines specifically recommended that children and adolescents, aged 6 to 18 years, accumulate at least 60 minutes of moderate-to-vigorous intensity physical activity (MVPA) each day, with muscle strengthening physical activity included on at least 3 days per week. A decade later, the core guidelines remain, but updates were made to reflect the scientific advances made in the field (1). The 2018 updates for youth added bone strengthening physical activity on at least 3 days per week. And recommendations specifically for preschool-aged children (3 to 5 years) were added in 2018. However, despite guidelines being in place for over a decade, a high proportion of children and adolescents in the U.S. are physically inactive. Indeed, physical inactivity is highly prevalent in the U.S. and worldwide and represents a major public health problem (2).

The purpose of this article is to provide insight into physical activity in childhood from the preschool years to late adolescence. This is a broad and complex topic and we will focus five key areas: 1) screen time and the impact on physical activity levels in preschoolers; 2) re-emphasizing the important role of physical education; 3) the pros and cons of youth sports; 4) encouraging play; and 5) the role of the family unit in getting youth to be more physically active. While equally important, we will not spend dedicated time on the specific role of the fitness industry in helping to curb physical inactivity; and we will not be able to cover all key school-based strategies (*e.g.*, active community programs to school) and community strategies (*e.g.*, green space and parks) for physical activity promotion in youth.

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Conflicts of interest: None

Screen Time and Physical Activity in the Preschool Years

During the preschool years (2 to 5 years), there is great potential for children to rapidly improve their motor skills and become highly coordinated in their movements. Furthermore, with expanding language and social skills they should be able to play actively with their peers and adult caregivers. The 2018 U.S. Physical Activity Guidelines for Youth recommend that preschool children aged 3 to 5 years be active throughout the day for at least 3 hours through adults caring for children encouraging active play of light, moderate, or vigorous intensity (1). However, physical inactivity is common among preschoolers and excessive screen time is a primary risk factor.

The AAP recommends that screen time be limited to video-chatting for children younger than 18-months (3). High quality programming can be introduced between 18 and 24 months, and parents should watch the content with their child to help them understand the content (3). From ages 2 to 5, no more than 1 hour of screen time per day is recommended and the content should be high in quality and parents should co-view the media with their child (3). To help parents achieve these AAP recommendations, a Family Media Use Plan tool is available online for parents to complete (3).

Regular screen time is often introduced before age 2, and a large proportion of preschool aged children accumulate more than 1 hour of screen time per day. Excessive screen time can displace time spent in structured and unstructured play, thereby directly lowering physical activity levels and could even indirectly lower physical activity by impeding the development of motor skills and physical literacy (ability, confidence and desire to be physically active for life) (4). This problem has likely exacerbated in recent years due to the pervasive access to screen time. Traditionally, television shows for preschool-aged children were watched at a set time, on a dedicated television set at home. Preschool children today can watch shows on a number of fixed and mobile devices and many shows can be streamed online at any time of the day.

It is widely appreciated that multi-level interventions, based on ecological models, are needed to change screen time and physical activity behaviors. While it is important to inform parents and caregivers about recommended screen time and physical activity levels, it is clear that their ability to do so is reliant on external factors. For example, we need to consider the extent that parents have access to high quality primary care, where pediatricians effectively counsel on screen time and physical inactivity; their access to high quality daycare options, where preschools have screen time and physical activity policies (4); and their access to outdoor space, where it is safe for families to walk to parks and playgrounds. These are highly active areas of research and we can be optimistic that preschoolers will soon be routinely using screen time in a limited manner and will have more opportunities to be physically active.

Role of Physical Education

Almost all U.S. children will receive some form of regular PE during their schooling. Ideally, PE should be provided daily and the Centers for Disease Control (CDC) and the

Institute of Medicine (IOM) recommend that children and adolescents accumulate at least 225 minutes of PE per week, with 50% of that time spent in MVPA. If these standards are achieved, children and adolescents would accumulate at least 20 minutes of MVPA per day during the school-term, which represents one-third of their recommended daily level of physical activity. Furthermore, PE is needed to help children to improve their motor skills and physical literacy by developing fundamental movement skills at the youngest school ages (*e.g.*, 5 to 8 years) before developing complex skills when ready at older ages (*e.g.*, 8 to 12 years). This will ultimately facilitate higher physical activity levels in class and will prepare children to be more physically active outside of school (*e.g.*, youth sports) and across their lifespan (5). Unfortunately, few children attend schools that offer daily PE and standards for providing MVPA and physical literacy are variable across states with few children meeting the PE standards recommended by the CDC and the IOM (6).

School-based PE is one of the few options we have available that can effectively increase physical activity in children and adolescents (7). However, we could be using higher doses of PE to help prevent physical inactivity in youth. A key reason that PE is limited in schools is the concern that academic achievement will be impaired. However, there is no evidence that PE detracts from students reaching their academic potential. In fact, there is growing evidence that physical activity improves cognition, which could enhance academic achievement (1). Therefore, re-emphasizing PE at this time would be timely. School administrators should be highly receptive to expanding the frequency and quality of PE so that children and adolescents can be more physically active, and thereby improve their physical fitness and help students achieve their full academic potential. Indeed, schools that routinely withhold PE as punishment or replace PE for direct academic pursuits should reconsider such policies and cultures.

There are certain characteristics associated with higher quality PE (7). The teachers should be PE specialists and aim to organize and manage class time to help all students reach the 50% time spent in MVPA criterion (7). Curriculums should be designed to maximize inclusion by adjusting activities (this is especially key to address difference in physical activity levels) (7). Curriculum should also be designed to increase the intrinsic motivation in students, which will increase their enjoyment and engagement during class time (7). To achieve these characteristics, schools do need to invest significant resources. However, it would be a sound investment to ensure PE classes are of high quality to optimize physical activity levels and improve the fitness and academic levels of their students. There is even potential for schools to partner with the fitness industry to improve the overall quality and instruction of PE, and this could be especially important for schools in lower resource communities that may not have an optimal PE curriculum in place.

Youth Sports: The Pros and Cons

Outside of school, children spend their time in organized and discretionary activities that may or may not involve physical activity. Participating in organized sports should provide opportunities for youth to be physically active outside of the school setting. It is estimated that 50% to 60% of youth aged 6 to 12 years participate in organized sports on a regular basis, with the participation rate higher in boys (61%) versus girls (52%) (8). Children who

do participate in organized sports are typically involved in 1 to 2 organized sports (8). However, there has been a declining trend in the percentage of children aged 6 to 12 years that participate in high-calorie burning sports (*e.g.*, cycling, running, and basketball) (8).

It is expected that organized sports should directly increase physical activity levels among youth (9). However, there is debate regarding the indirect effect organized sports have on physical activity levels outside of sports participation (10). The gateway effect posits that organized sports increases fitness and motor skills and leads to higher physical activity levels during discretionary time (*e.g.*, more active play) (10). However, the overscheduled hypothesis, in the context of youth sports, posits that participation is driven by parental pressure and can have a negative effect on physical activity during discretionary free time (10). There is no firm consensus if the gateway effect or the overscheduled hypothesis operate to influence physical activity levels during discretionary time. However, a recent study tested for both competing hypotheses and the data supported the gateway effect (*i.e.*, higher participation in organized sports associated with more physical activity during free play) (10).

The time and resource burdens needed to participate in organized sports typically fall upon the families. It can be challenging for families to schedule the time needed for their children to participate in organized sports. In addition, each sport can require specialist equipment and protective clothing that will have to be bought and replaced as children grow and develop. These are major drawbacks that can impact long-term participation in organized sports. The potential for injury should also be considered when participating in organized sports. Improving the coaching standards, so that children are being led by adults who have training in sport skills and tactics and safety needs is a high priority. Plus, addressing the shortage of female coaches may help to engage and retain females in youth organized sports (8).

Encouraging Play

Active play is gaining increasing attention as an additional way to promote physical activity levels in youth. In 2013, the Aspen Institute launched Project Play to solve the problem of physical inactivity due to declining sports participation. Project Play outlines 8 strategies, or “8 Plays”, to address this problem: *Ask What Kids Want, Reintroduce Free Play, Encourage Sport Sampling, Revitalize In-Town Leagues, Think Small, Design for Development, Train All Coaches and Emphasize Prevention*. The Project Play framework provides a roadmap to help children enter into organized sports, centered on the developmentally appropriate needs of children, and remain engaged throughout childhood. The framework also emphasizes the importance of unstructured, free play for preventing physical inactivity.

If youth are to be engaged and participate in a sport and physical activity it needs to be considered fun and enjoyable. A focus on fun and enjoyment, from the child’s perspective, has not been the primary consideration of adults who developed organized sports programs. Rather than focusing on adult-desired outcomes (*e.g.*, winning and practicing with specialty coaches), Project Play aligns with the fact that children would be more engaged if there was more active play time, positive reinforcement for trying your best and playing well as a

team. Project Play also underscores the importance of sampling multiple sports so children can find an activity that they enjoy, rather than being encouraged to specialize early based on their talent. The framework also promotes “think small” to seek affordable and scalable approaches to encourage play (*e.g.*, install reduced sized courts/fields for small-sided play). Appreciating the stage of development is also a key component of the Project Play framework; too often adult caregivers and coaches do not appreciate the physical and emotional developmental stage of youth and often expect too much physically and emotionally of children when participating in organized sports.

One of the earliest play-based interventions developed was by the American Heart Association (AHA) and the National Football League (NFL): The Play 60 Challenge (Play60). This is a 4-week curriculum directed at educators and students, with the education materials delivered in the classroom setting. The content provides opportunities to learn basic exercise physiology and is interactive and includes active breaks during class time. Students complete “GAME Planners” to help track their activities. The teachers also can upload student physical activity levels in an online database, and physical activity performance can be compared across other schools. Interestingly, a study found that certain fitness levels, measured by use of Fitnessgram, were higher among schools that completed Play60: higher aerobic capacity and greater proportion of children with a healthy fitness zone body mass index (11).

It will be of great interest to see the development of play-based interventions strategies in the coming years. The Play60 program has set a benchmark and it will be important to conduct high-quality studies to evaluate the effectiveness of play-based intervention so we can direct resources to those that are optimized for increasing youth physical activity levels.

Families and Physical Activity in Youth

Physical inactivity and related health problems are not limited to children. A high proportion of parents and grandparents are also physically inactive. However, the vast majority of research on physical activity promotion has been completed in pediatric and adult silos. It is worth considering the family unit when seeking to increase physical activity levels in youth and adult caregivers. It is known that physical activity levels of children and among youth and parents are correlated; therefore, inactive parents will more likely have inactive children. Furthermore, parental factors such as encouragement and support of physical activity associate with higher physical activity among youth (12). Indirect parent factors such as facilitating child sports participation and time spent outdoors also associate with higher youth physical activity levels (12). The next step will be to use these parent and family level correlates of physical activity and continue to design effective family-based interventions.

A review article recently concluded that the initial family-based interventions developed can effectively increase physical activity levels¹³. The content of the family-based interventions reviewed did vary between studies, but distinct intervention components were identified as being particularly effective. Encouraging families to set physical activity goals (*e.g.*, steps per day) and use reinforcing strategies (*e.g.*, using a log book to self-monitor progress) are key components of family-based physical activity interventions (13). Importantly, the review

article also identified that family-based interventions are more effective at increasing physical activity levels if health-outcomes are not used as the focus of being physical activity (13). For example, framing family-based physical activity intervention as a way to enjoy time together and learn a new skill is more effective than highlighting the weight loss benefits of physical activity.

As we seek to improve the effectiveness of family-based interventions, there are key knowledge gaps that need to be considered. We do not know if goal setting and reinforcing strategies need to be tailored for specific cultural preferences. We still need to investigate if both parents need to be targeted and if the interventions approach will work for both male and female family members. We should also investigate if family-based interventions work equally well for single-parent, two-parent, and/or grandparent family structures. Despite these unanswered questions, using family-based intervention to address child and adult physical inactivity in parallel represents a highly promising public health approach.

Bridging the Gap

In summary, a large proportion of youth are physically inactive in the U.S. and this problem starts in the preschool years. We need to help caregivers to limit screen time and provide more opportunities for preschoolers to be physically active so they can develop fundamental movement skills and physical literacy. In childhood and adolescence, high quality school-based PE is needed to help prevent physical inactivity and careful consideration needs to be taken to ensure youth have time outside of school for organized sports and active play. Raising a physically active generation will create a positive feedback loop; families are more likely to be physically active if the parents are active and are supportive of their children participating in organized sports and active play.

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Biography

Jonathan Mitchell, Ph.D., is a research assistant professor of Pediatrics at the University of Pennsylvania and the Children's Hospital of Philadelphia. His research aims to explain variations in childhood growth patterns that are related to the cause and prevention of chronic diseases in later life. He is particularly interested in promoting physical activity and sleep to help prevent excess weight gain and insufficient bone accretion in childhood.

References

1. U.S. Department of Health and Human Services. Physical Activity Guidelines for Americans, 2nd edition. Washington, DC: U.S. Department of Health and Human Services; 2018.
2. Kann L, McManus T, Harris WA, et al. Youth risk behavior surveillance - United States, 2017. *MMWR Surveill Summ.* 2018;67(8):1-114.
3. Council On Communications and Media. Media and young minds. *Pediatrics.* 2016;138(5).

4. Staiano AE, Webster EK, Allen AT, Jarrell AR, Martin CK. Screen-time policies and practices in early care and education centers in relationship to child physical activity. *Child Obes.* 2018;14(6):341–8. [PubMed: 30199286]
5. Belanger K, Barnes JD, Longmuir PE, et al. The relationship between physical literacy scores and adherence to Canadian physical activity and sedentary behaviour guidelines. *BMC Public Health.* 2018;18(Suppl 2):1042. [PubMed: 30285783]
6. Clennin MN, Demissie Z, Michael SL, et al. Secular changes in physical education attendance among U.S. high school students, 1991–2015. *Res Q Exerc Sport.* 2018;89(4):403–10. [PubMed: 30152728]
7. Slingerland M, Borghouts L. Direct and indirect influence of physical education-based interventions on physical activity: a review. *J Phys Act Health.* 2011;8(6):866–78. [PubMed: 21832303]
8. The Aspen Institute. Project Play: State of Play, Trends and Developments, 2018. 2018 Available from: https://assets.aspeninstitute.org/content/uploads/2018/10/StateofPlay2018_v4WEB_2-FINAL.pdf.
9. Hardie Murphy M, Rowe DA, Woods CB. Sports participation in youth as a predictor of physical activity: A 5-year longitudinal study. *J Phys Act Health.* 2016;13(7):704–11. [PubMed: 26800567]
10. Cairney J, Bulten R, King-Dowling S, Arbour-Nicitopoulos K. A longitudinal study of the effect of organized physical activity on free active play. *Med Sci Sports Exerc.* 2018;50(9):1772–9. [PubMed: 29621121]
11. Bai Y, Saint-Maurice PF, Welk GJ, Russell DW, Allums-Featherston K, Candelaria N. The longitudinal impact of NFL PLAY 60 programming on youth aerobic capacity and BMI. *Am J Prev Med.* 2017;52(3):311–23. [PubMed: 27919454]
12. Pate RR, Dowda M, Dishman RK, Colabianchi N, Saunders RP, McIver KL. Change in children's physical activity: predictors in the transition from elementary to middle school. *Am J Prev Med.* 2019;56(3):e65–e73. [PubMed: 30655084]
13. Brown HE, Atkin AJ, Panter J, Wong G, Chinapaw MJ, van Sluijs EM. Family-based interventions to increase physical activity in children: a systematic review, meta-analysis and realist synthesis. *Obes Rev.* 2016;17(4):345–60. [PubMed: 26756281]

Apply It!

- Adult caregivers should limit screen time in preschoolers to provide more opportunities for physical activity.
- Schools should hire specialized PE teachers and aim to meet PE standards: daily, 225 minutes per week, of which 50% of time is spent in MVPA.
- Organized sports should be redesigned so they are fun and enjoyable for children to enhance their active play time.
- Families should set physical activity goals and record progress to increase physical activity levels.

Pulled Text

- Excessive screen time can displace time spent in structured and unstructured play, thereby directly lowering physical activity levels and could even indirectly lowering physical activity by impeding the development of motor skills and physical literacy.
- There is growing evidence that physical activity improves cognition, which could enhance academic achievement.
- The Project Play framework provides a roadmap to help children enter into organized sports, centered on the developmentally appropriate needs of children, and remain engaged throughout childhood.