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NAON Position Statement: Promoting Musculoskeletal Health Through Physical Activity for All Children and Adolescents

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Introduction

Physical activity promotes health and fitness among all age groups, including children and adolescents. It helps develop strong bones and muscles and decreases the likelihood of obesity, type 2 diabetes, and other diseases, which can impact lifelong musculoskeletal and overall physical well-being. Physical activity helps to maximize bone mass during childhood and adolescence, which is a primary factor in determining the risk for osteoporosis later in life. It also helps children and adolescents maintain a healthy weight, which can carry over into adulthood and decrease weight-related wear to joints. Physical activity has other, nonmusculoskeletal benefits among youth, including improving overall physical and mental health, and possibly even enhancing academic performance.

NAON Position

The National Association of Orthopaedic Nurses (NAON) supports interventions that promote lifelong musculoskeletal health. Lifestyle choices, including physical activity and diet, affect bone and joint health beginning in childhood. Physical activity strengthens bone and muscles, is important in maintaining a healthy weight, and provides numerous other benefits. The NAON supports the position that children and adolescents engage in at least 60 minutes of moderate to vigorous physical activity daily, as recommended by the Centers for Disease Control (CDC), the U.S. Surgeon General, the World Health Organization (WHO), the American Academy of Pediatrics (AAP), the American Academy of Orthopaedic Surgeons (AAOS), the American Heart Association (AHA), and others. In addition, impact activities, such as running, jumping, and dancing, are necessary for optimal bone density. Healthcare providers, including orthopaedic nurses, should use their knowledge and position to positively impact skeletal health across the life span, beginning with children, by encouraging physical activity to patients, parents, relatives, friends, and school children.

Background and Significance

Fragility fractures associated with osteoporosis are a significant health burden. According to the National Osteoporosis Foundation (2015), 2 million fractures due to osteoporosis occur in the United States each year at a cost of $19 billion. By 2025 these numbers are expected to increase to 3 million and $23.5 billion, respectively. Bones are strengthened throughout childhood and adolescence, with peak bone mass attained between the ages of 20 and 30 years (Bostrom, 2008). The greater an individual's peak bone mass, the less likely he or she will develop osteoporosis and fragility fractures later in life. Physical activity, along with adequate calcium and vitamin D intake, is necessary in childhood and adolescence in order to attain optimal peak bone mass.

Obesity, which has reached epidemic levels, negatively impacts musculoskeletal health in children and adults. The incidence of overweight children in the United States has quadrupled in the past 25 years (Ogden, Carroll, Kit, & Flegal, 2012). According to the AAOS (2009), almost 37% of children ages 6 to 11 are obese. Obese children are at increased risk of developing Blount's disease and slipped capital femoral epiphysis due to excess weight and stress on the growth plates. Obese children tend to have lower self-esteem, impaired mobility and increased musculoskeletal pain, increased school absence, and frequent comorbidity, including asthma, sleep apnea, type 2 diabetes, and exercise intolerance (Mihalko, Bergin, Kelly, & Canale, 2014; Ogden et al., 2012). Up to 80% of obese children remain overweight as adults (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Obese adults are more likely to develop hypertension, atherosclerosis, type 2 diabetes, and other diseases (Booth, Roberts, & Matthew, 2012). Obesity increases strain on joints, and it is associated with higher complication rates with any type of surgery, including orthopaedic procedures (Mihalko et al., 2014).

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Although the etiology of obesity is multifactorial, with genetics and diet significant contributors, inactivity plays a significant role. Inactivity is a modifiable risk factor for obesity, yet according to the CDC in the first U.S. Surgeon General's report linking physical activity and health (1999), only 15% of U.S. adults engage in vigorous physical activity regularly (three times per week for at least 20 minutes). In 2013, although 77% of children aged 9–13 years reported engaging in some free-time physical activity in the previous 7 days, only 29% of high school respondents in the same survey engaged in 60 or more minutes of moderate to vigorous physical activity daily on *each* of the preceding 7 days. Worse yet, over 15% had not participated in the recommended amount of physical activity on *any* day in the week before the survey (Kann et al., 2014). Because activity levels in school-age children predict adult physical activity (Telama, Yang, Vikari, Wanna, & Raitakari, 2005), an active childhood can promote lifelong health.

Multiple reasons for decreased activity among youth have been identified: increased "screen time" (television, computers, video games, cell phones), decreased walking or biking to school and elsewhere, and decreased time dedicated to recess and physical education class in schools. Jago, Baranowski, Thompson, and Greaves (2005) found that TV viewing and physical activity measures in a prospective study of 3-year-old children were more predictive of body mass index at age 6 than eating habits. A study involving more than 11,000 kindergarteners from 2011 to 2012 found that children who watched 1–2 hours of television per day were 1.5 times more likely to be obese compared to children who watched less than an hour per day (Peck, Scharf, Conaway, & DeBoer, 2015). Reliance on formal physical education class as a source of activity is insufficient, as only 29% of high school students attended physical education class daily in 2013, compared with 42% in 1991 (Kann et al., 2014).

Short-term benefits of physical activity among children and adolescents include controlling weight, reducing feelings of depression and anxiety (United States Department of Health and Human Services, 2008), and improving classroom performance, including academic achievement, concentration, and attentiveness (CDC, 2010). In contrast, Roberts, Freed, and McCarthy (2010) found obesity and low fitness levels were associated with lower standardized test scores. Over a lifetime, regular physical activity reduces the risk of chronic conditions such as diabetes, cardiovascular diseases, osteoporosis, osteoarthritis, colon cancer, and even premature death (US DHHS, 2008).

Physical activity during childhood and adolescence is necessary to attain optimal peak bone mass. Up to 90% of peak bone density is achieved by age 18 in females and age 20 in males (National Institutes of Health, 2015), highlighting the importance of regular exercise during this time. Bradney et al. (1998) found that 10-year-old boys who performed weight-bearing exercise for 30 minutes three times a week increased their bone mineral density twice as much as controls over an 8-month period.

Recommendations

NAON recommends that children and adolescents participate in at least 60 minutes of moderate to vigorous physical activity every day. This can be broken up into segments during the day, and ideally should include impact or weight-bearing activities in order to improve bone density and promote optimal peak bone mass. Examples of weight-bearing activities include running, jumping rope, dancing, hiking, soccer, and basketball. These activities should be enjoyable, developmentally appropriate, and varied. Even many children and adolescents with orthopaedic limitations can participate in physical activities that are rewarding, including something as simple as walking the dog (Vitzum & Kelly, 2015), the key is to focus on the abilities of this population rather than activity limitations. In contrast, noneducational "screen time" (television, computers, video games) should be limited to no more than 2 hours per day, as recommended by the AAP (2011). Evidence exists for decreasing screen time to less than an hour a day for optimal health (Peck et al., 2015).

Modeling of physically active lifestyles by parents and other adults can strongly influence activity levels in children and adolescents. Parents and other family members should provide children with opportunities for increased physical activity. Healthcare providers should inquire about physical activity as part of any pediatric or adolescent health assessment, and anticipatory guidance should include the importance of physical activity and limited screen time at each health supervision visit.

Organizational emphasis on physical activity throughout the life cycle, including childhood and adolescence, is important. Position statements from healthcare organizations such as NAON, AAOS, the Pediatric Orthopaedic Society of North America (POSNA), AAP, AHA, and the CDC provide guidance to the public. Marketing campaigns that promote physical activity can be highly effective. For example, the AAOS developed public service campaign announcements that directly addressed the harmful effects of physical inactivity, especially among children. These brief videos, including "Lazy Bones" (AAOS, 2004) and "Sedentary" (POSNA & AAOS, 2012), utilized humorous vignettes and were aired nationally. In one vignette, an overweight boy playing computer games uses his cell phone to call his elderly, cane-dependent grandma in the next room and says, "Hey grandma! How about another grape soda?" (POSNA & AAOS, 2012;). Other marketing campaigns, such as Michelle Obama's "Let's Move" (White House, Office of the First Lady, 2011) and the NFL Play 60 program (National Football League, 2009), reach out to children, adolescents, and families to highlight the benefits of a physically active lifestyle and specifically encourage youth to be active 60 minutes a day. Nurses and parents alike can be actively involved in petitioning schools to allow time for daily physical activity within the curriculum. Orthopaedic nurses and all healthcare team members can become involved in local government, neighborhood, and grass-root efforts to provide safe areas for exercise, including parks, bicycle trails, and playgrounds within their local communities.

Conclusions

Physical activity during childhood and adolescence is necessary to achieve optimal musculoskeletal health which can persist into adulthood. Physical activity improves bone mass, strengthens muscles, decreases the risk of osteoarthritis, and improves overall well-being at all ages. In addition, exercise is important in decreasing the likelihood of obesity and its comorbidities, including diabetes, cardiovascular disease, and premature death. Children and adolescents should participate in at least 60 minutes of moderate to vigorous physical activity daily, and limit screen time to less than 2 hours per day.

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