AAOS American Academy of Orthopaedic Surgeons
American Association of Orthopaedic Surgeons

Position Statement

Children and Musculoskeletal Health

This Position Statement was developed as an educational tool based on the opinion of the authors. It is not a product of a systematic review. Readers are encouraged to consider the information presented and reach their own conclusions.

The American Academy of Orthopaedic Surgeons (AAOS) is committed to the best possible musculoskeletal health for every American at every age. Childhood is an especially critical time to appropriately prevent, assess and treat injuries and conditions affecting the bones, joints, ligaments, tendons and muscles. Early adulthood also is when bones reach their greatest size and strength. To reach optimal bone health, the bones require a diet rich in vitamin D and calcium, and regular physical activity. The more bone mass created during childhood and adolescence, the greater the chance of preventing osteoporosis (brittle bones) and related injuries later in life.

Childhood musculoskeletal injuries and conditions

Musculoskeletal conditions account for more than a half-million annual hospitalizations for children and adults younger than age 21, and resulted in more than 10.7 million physician visits in 2012 alone.[1,2] Conditions that require orthopaedic care range from genetic abnormalities such as clubfoot (foot deformities) and hip dysplasia (misalignment or dislocation), developmental conditions such as scoliosis (curved spine) and arthritis (loss of joint smoothness), and other diseases and infections. In addition, millions of children sustain fractures, sprains, strains and other injuries. In 2010, there were 12.9 million musculoskeletal trauma and sports injuries requiring a health care visit.[3]

Orthopaedic conditions and injuries have the potential to affect a child both physically and emotionally. Early and expert orthopaedic care can help cure or minimize these conditions, improve life quality, and reduce related costs to families and the health care system.

Healthy bones in childhood = healthy bones for life

As a child grows, bone is made and then constantly reshaped to keep its function. In the process of normal growth, much more bone is made than removed, allowing the skeleton to grow in size and density. As a result, up to 90 percent of peak bone mass is acquired in girls by age 18, and in boys by age 20, making childhood the absolute best time to invest in bone health through proper nutrition and exercise.[4] A diet rich in calcium helps build bone mass, and

appropriate levels of vitamins D and C allow the body to absorb calcium and create strong connective tissue. Unfortunately, most children and adolescents are not getting enough of these nutrients. According to a 2015 CDC survey, 22 percent of American teens had no milk intake during the previous seven days.

The absence of vitamin D can result in bone abnormalities. Children who lack vitamin D also may develop a condition called rickets, which causes bone weakness, bowed legs, and other skeletal deformities such as stooped posture. Children with rickets also can have more fractures throughout life and hip fractures as older adults.

Although everyone will lose bone with age, people who developed a higher peak bone mass when young are better protected against osteoporosis and osteoporosis-related fractures later in life.

Obesity and bone health

The percentage of children who are overweight or obese has more than doubled over the past 30 years, from 7 percent in 1980 to 18 percent in 2012.[6] A National Center for Health Statistics study found that the risk for obesity increases as a child ages, with obesity diagnosed in 9 percent of children ages 2 to 5 in 2014, compared with 18 percent of children ages 6 to 11, and 21 percent of teens ages 12 to 19.[7]

A child who is overweight may not consistently be eating foods rich in vitamin D, calcium and other important nutrients, and as a result, may be at risk for bone problems as they grow. In addition, the child's weight may prevent him or her from exercising and therefore building bone mass.

Obesity also places undue stress on the developing musculoskeletal system, especially due to the presence of growth plates—layers of cartilage responsible for longitudinal growth of the bone. Because growth plates are made of cartilage, or tissue, they easily can be damaged or deformed by excess body weight. Obesity also can cause other musculoskeletal conditions such as slipped capital femoral epiphysis (when the upper head of the thighbone slips due to weakness of the growth plate) and Blount's disease (severe bowing of the legs). These conditions can cause deformity, pain, early joint replacement surgery, and potentially, a lifetime of limited mobility and decreased life quality.

Obesity also complicates the healing of broken bones, especially in children with femur (thigh) fractures.

The AAOS supports daily physical activity for children to maximize strong bone and muscle potential, and to combat obesity. The AAOS also believes that additional research drawing from evidence-based medicine should be conducted to improve adolescent patient care and enhance the treatment and prevention of childhood musculoskeletal conditions.

In an effort to promote physical activity and minimize the risks of potential injuries and conditions among children, the AAOS recommends the following:

- Make physical activity a part of a child's schedule for at least 30 to 60 minutes per day, and reinforce the message that exercise is fun. Choose games, toys and gifts that involve activity.
- Model active behavior. Join children for a bike ride, ball game or long walk. Use physical activity—such as a family canoe trip or a walk to the park—as a reward for positive behavior.
- Encourage physical involvement based upon age and choose size-appropriate activities. This would include participation in team sports like soccer, baseball and basketball, or individual participation in activities like dancing, swimming, step aerobics, stair climbing, tennis and other racquet sports, skiing, skating, karate or bowling.
- Limit the number of teams a child plays on in one season. Kids who play on more than one team are at increased risk for overuse injuries. A well balanced fitness program includes a wide variety of activities and sports, using different muscles. Youth coaches should be cognizant of safe play practices (monitoring baseball pitch counts, for example), and prepared to limit play time to prevent further injury.
- Be prepared for emergency situations. Adults who supervise—especially during exercise and physical play—must have a plan to reach medical personnel to treat injuries such as concussions, dislocations, contusions, sprains, strains and fractures.
- Make sure children take the time to warm up before exercising. Research studies have shown that cold muscles are more prone to injury. Warm ups can include jumping jacks, jogging, walking or stationary cycling for 3 to 5 minutes.
- Encourage children to stay hydrated by drinking plenty of water before, during, and after activities.
- Do not encourage children to play through pain. Additionally, tell kids it is important to take a break if they are tired.
- Keep in mind that exercise alone is not enough to stay healthy. Adolescents also should consume a healthy diet to maintain strong bones and lower the risk of excessive weight gain.
- Make sure children get sufficient calcium to keep their bones strong. Children may have a medical condition that limits their vitamin D intake (children with allergies or food intolerance, for example), than can be obtained by diet. For these children, a multivitamin or vitamin D supplement is recommended. Speak to your family physician about an appropriate diet and vitamin dosing for your child, depending on their age and body size.
- Any child with an unexplained limp, or with an orthopaedic pain or discomfort, should be evaluated by a physician.

References:

1. HCUP Kids' Inpatient Database (KID), 2012.
2. National Ambulatory Medical Care Survey, 2008-2010.
3. The Burden of Musculoskeletal Diseases in the United States, Bone and Joint Initiative USA, accessed June 3, 2016: http://bmus.latticegroup.com/docs/By%20The%20Numbers%20-%20Children%20%26%20Adolescents.pdf.

4. NIH Osteoporosis and Related Bone Diseases National Resource Center, “Osteoporosis Peak Bone Mass in Women,” June 2015. Accessed June 3, 2016: http://www.niams.nih.gov/health_info/bone/osteoporosis/bone_mass.asp
5. NCHs, “Trends in Obesity Prevalence among Children and Adolescents in the United States, 1988-1994 through 2013-2014,” JAMA. 2016; 315 (21): 2292-2299.
6. CDC, “Childhood Obesity Facts.” Accessed June 3, 2016: https://www.cdc.gov/healthyschools/obesity/facts.htm.

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