Children and Nature Initiative

National Environmental Education Foundation
Knowledge to live by

in partnership with

U.S. Forest Service
U.S. Fish & Wildlife Service
Audubon

Youth Great Outdoors
Children and Nature Initiative

- Goal: connect children with nature for health benefits
- Create Nature Champions: build capacity among pediatric health care providers to be leaders in prescribing nature
- Refer families to a park or nature center within economically, racially/ethnically, and culturally diverse communities
- Partners National Audubon Society and U.S. Fish and Wildlife Service provide active nature programming
Advisory Committee

Janet Ady - U.S. Fish and Wildlife Service
Sophie Balk, MD - Children’s Hospital at Montefiore
Stephanie Chalupka, EdD, RN, PHCNS-BC, FAAOHN - Worcester State College
Jean Sheerin Coffey, PhD, CPNP - Essex Pediatrics/University of Vermont; Representative, National Association of Pediatric Nurse Practitioners
Mark Cucuzzella, MD - West Virginia University/Harpers Ferry Family Medicine
Ruth Etzel, MD, PhD - George Washington University
Joel Forman, MD - Mount Sinai Medical Center
Catherine Karr, MD, PhD - University of Washington
Dee Merriam, FASLA - Centers for Disease Control and Prevention
Evelyn Montalvo Stanton, MD - Pediatric Pulmonary Medicine/University of Medicine and Dentistry of New Jersey; Representative, National Hispanic Medical Association
Advisory Committee

Deborah Pontius, RN, MSN, NCSN- Pershing County, NV School District; Representative, National Association of School Nurses

Chuck Remington- National Audubon Society

James Roberts, MD, MPH- Medical University of South Carolina; Representative, American Academy of Pediatrics

Bonnie Rogers, DrPH, COHN-S, LNCC- University of North Carolina at Chapel Hill

Safiya Samman- U.S. Forest Service

James Subudhi- WE ACT for Environmental Justice

Myrtis Sullivan, MD, MPH- Illinois Department of Human Services; Representative, National Medical Association

Lois Wessel, CFNP- Association of Clinicians for the Underserved

Nsedu Obot Witherspoon, MPH- Children’s Environmental Health Network
Overview: Burden of Obesity and ADHD in Childhood
Objectives

• Review the growing prevalence of obesity and related diseases
• Review the growing prevalence of mental health disorders such as ADHD
• Understand the relationship of changing lifestyles of US children to this change
• Understand the impact of these chronic conditions on adult disease burden
Obesity & Related Conditions

Obesity

- 16.9% of children ages 2-19 are obese (BMI ≥ 95%ile)¹
- 31.7% are overweight (BMI ≥ 85%ile)¹

Childhood obesity predicts adult morbidity
- 80% of obese youth become obese adults²

Related conditions
- Type-2 diabetes, hypertension (HTN)
- Metabolic syndrome

¹Ogden CL et al. JAMA 2010;303(3):242-249.
²Whitaker RC et al. NEJM 1997;337:869-73.
Type 2 diabetes mellitus (DM)

- Formerly known as adult-onset diabetes
- ~ 186,300 children had Type I and Type II DM in 2007\(^1\)
- 3,700 children diagnosed with Type II DM each year\(^1\)
- CDC estimates: 1 in 3 children born in 2000 will develop DM if present obesity trends are not reversed\(^2\)

\(^1\)CDC National diabetes fact sheet 2007
Obesity-Related Diseases

Hypertension

- BMI <85th %ile: 2.6% of children with HTN
- BMI ≥95th %ile: 10.7% with HTN

Cardiovascular disease

- High cholesterol levels, abnormal glucose tolerance, and HTN in children
- Overweight adolescents are at increased risk of coronary heart disease and early death

Asthma

- Overweight children at increased risk for developing asthma, other respiratory problems\(^1\), asthma hospitalizations\(^2\)

Possible relationships between asthma and sedentary lifestyles, including lack of physical activity and television viewing\(^3,4\)

\(^1\)Schachter LM. Thorax 2001;56:4-8.
Other Medical Issues

Vitamin D Deficiency
- 9% of US children are vitamin D deficient
- 61% are insufficient\(^1\)
- Physical activity associated with vitamin D levels\(^2\)

Mental Health – ADHD/ADD
- Variable estimates, but prevalence is increasing
- National Health Interview Survey estimates 9% of US children with ADHD/ADD\(^3\)
- Impairs school performance and socialization; may persist into adulthood

Active vs. Sedentary Lifestyle

Physical activity reduces risk for

- Coronary artery disease, HTN
- Diabetes, osteoporosis, colon cancer

The US is shifting to a sedentary lifestyle

Physical activity in adulthood begins in childhood

- 40% of adults report NO leisure physical activity¹
- Kids learn by watching their parents

Nationwide shift in physical activity

- Active teens become active adults
- In 2005, only 35% of HS students met recommended level of physical activity

Growth in electronic media

- 21% played videogames >3 hours daily
- Average child watches 3 hours TV daily
- 7.5 hours per day spent with all forms of e-media (TV, Internet, chats, games, etc)

¹CDC. Youth risk behavior surveillance 2005. MMWR 2006;55:SS-5
²AAP, Committee Public Ed. Pediatrics 2001;107:423-6
³Rideout VJ et al. Kaiser Family Foundation Report. 2010
Growth in electronic media

- 32% of 2-7 year-olds & 65% of 8-18 year-olds have TVs in bedrooms¹

Time spent in front of TV or computer = time not spent being physically active

Estimated 25% loss of play time and 50% loss in unstructured outdoor activity²

No Child Left Behind 2001

- Increased time for reading and math
- But at the expense of physical education³

Health Benefits of Nature & Outdoor Activity
Part I: Physical Health
Objectives

• Review the evidence surrounding health and activity levels of children, particularly as they pertain to natural environments

• Understand the benefits of outdoor play on children’s health and mental well being

• Understand the role that natural environments have in improving outdoor physical activity for children
Health Benefits of Nature

- Restorative/Therapeutic
- Increases physical activity
- Reduces childhood stress
- Coping tool for ADD/ADHD
- Developmental benefits:
  - Social, Cognitive, Emotional, Physical
Time Outdoors & Physical Activity

• Time spent outdoors usually equates to increased physical activity\(^1\)
• Study among 10-12 year olds\(^2\)
  • For every hour spent outside, physical activity increased by 27 minutes/week
  • Prevalence of overweight was 27-41% lower among those spending more time outdoors

Nature & Physical Activity

• Canadian emphasis on “green school grounds”
  • Diverse environmental features–trees, gardens, nature trails

• Survey of teachers, parents, administrators
  • 70% agreed it increased students’ light-moderate activity
  • 50% agreed it increased vigorous activity
  • Grounds supported wider variety of play

Nature & Physical Activity

• Associations between healthy weight & availability of ≥ 1 of 13 specific parks within 1 km of residence
  • No relationship found between BMI and simply living near a park
  • However, for children who lived within 1 km of park with a playground, children were 5 times more likely to have a healthy weight
  • Relatively small study of 108 children may limit ability to find significant relationships

Nature & Physical Activity

• Larger study of 8 parks in Los Angeles
• Parks in were predominantly African American or Hispanic neighborhoods
  - Poverty range 13.8% to 47.3%
• 2000 individuals counted in each park
  - Vigorous activity associated with sports courts and playgrounds
• Proximity of residence predicts park use and physical activity
  - Those living < 1 mile away were more likely to use the park and had 38% more exercise sessions than those living farther away

American Academy of Pediatrics (AAP)

2006 Policy Statement “Active healthy living: prevention of childhood obesity through increased physical activity”

- Lifestyle-related physical activity as opposed to aerobics linked to *sustained* weight loss

- Infants and toddlers should be allowed outdoor physical activity and unstructured free play and exploration

- Parents should encourage children to play outside as much as possible

Health Benefits of Nature and Outdoor Activity
Part II: Mental Health
Nature as a Restorative Mechanism

- Nature alone can influence recovery from surgery
  - Compared 23 matched pairs of patients who underwent a cholecystectomy
  - Randomly assigned the post-surgery patients to either rooms facing a brick wall or rooms with views of nature
  - Findings: those facing nature had shorter post-operative hospital stays, fewer negative comments from nurses, and took less analgesics
  - Suggests that viewing nature alone can aid in the path of recovery

Nature as a Restorative Mechanism

• RCT - used distraction therapy during a flexible bronchoscopy (FB) while consciously sedated
  • Randomly assigned to either a normal FB or FB plus distraction therapy (nature sights and sounds)
  • Patients rated the level of pain experienced and anxiety

• Findings: Pain control was much better for the intervention group than the control groups [OR: 4.76]
  • Clinicians should supplement analgesic medications with an inexpensive, non-invasive method of distraction therapy

Effects of Nature on Crime

• How could vegetation decrease crime?
  • More eyes on the street
  • Well maintained vegetation can act as a ‘territorial marker’ – implied surveillance
  • Mitigation of Mental Fatigue Symptoms

• Compared crime rates for 98 Chicago Public Housing Buildings with different levels of vegetation

• Homogeneous population for Income, Education, Life Circumstances

• Controlled for
  • # of apartments per building
  • Building height
  • Vacancy rate
  • # of occupied units

Kuo et al. Environment and Behavior 2001; 33; 343-367.
Effects of Nature on Crime

Figure 3: Mean Number of Crimes Reported Per Building for Apartment Buildings With Different Amounts of Vegetation (each icon represents one reported crime)
Reduce Childhood Stress

- Study of 337 rural NY children in 3-5 grade
- Examined child’s self-worth and levels of psychological distress
- Identified whether they live in natural environment, using “Naturalness Scale”
- Lewis Stressful Life Events Scale
  - Questions about bullying, argue with parent, peer pressure, recent moves
  - Frequency of occurrences, not severity
- Rutter Child Behavior Questionnaire, Global Self-Worth subscale

Reduce Childhood Stress

Results

• Nature appeared to act as a buffer to decrease stress in rural children
• Lower levels of stress in the child were noted with increased amount of exposure to natural environments
• The nature exposure effect was especially pronounced for children with the highest levels of stressful events
• Higher nature associated with positive self worth

Physical Activity in Natural Environments
Effects on mood and blood pressure

Synergistic health effects between physical activity and exposure to nature (“green exercise”)

• Intervention: Subjects ran on treadmill while shown 4 different themes of pictures
  ▪ Rural pleasant, urban pleasant, rural unpleasant, urban unpleasant photographs

• Results: the rural and urban pleasant nature pictures showed a significant reduction in blood pressure and a more positive effect on mood than exercise alone
  ▪ Participants in the rural pleasant group had the largest reduction in blood pressure

Effects of Nature on ADD/ADHD

• Does contact with nature improve inattentiveness?
• Survey of parents compared child’s symptoms when engaging in various settings
  • Indoor setting– windowless room
  • Natural outdoor setting– park, farm, outdoor neighborhood public space

Taylor AF et al. Environment and Behavior 2001;33:54-77.
Effects of Nature on ADD/ADHD

- Outcome measure were 4 inattentive symptoms
  - Inability to stay focused on unappealing tasks
  - Inability to complete tasks
  - Inability to listen and follow directions
  - Being easily distracted

- Findings
  - Activities in natural settings were helpful in reducing inattentive symptoms
  - As tree cover in the setting increased, inattentive symptoms decreased

Taylor AF et al. Environment and Behavior 2001;33:54-77.
Effects of Nature on ADD/ADHD

Nationwide study examined if “green” settings reduced symptoms of ADHD

- Compared green outdoor after-school/weekend activities to activities in built indoor/outdoor settings
- Findings: “green outdoor activities reduced symptoms significantly more than did activities conducted in other settings, even when matched across all settings”

Critique: Not randomized, not controlled, “green activities” are not uniformly defined

Kuo FE & Taylor AF. Amer J Pub Health 2004;94:1580-86.
Effects of Nature on ADD/ADHD

- Prospective study of low income, urban children who relocated to new home
  - n = 17

- Compared 2 home environments to assess for natural environments
  - Pre move visit and post move visit several months later
  - Compared few natural elements and those with plants and views of nature

- Direct Attention Capacity was measured by Attention-Deficit Disorders Evaluation Scale

Wells NM. Environ Behav 2000;32:775-95
Effects of Nature on ADD/ADHD

- New home was more likely to have greater number of natural elements than old one

- The change in the natural environment was a significant predictor of the improvement in their attention score

- While the general quality of the housing also improved after the move, this was not a predictor of improved attention

Wells NM. Environ Behav 2000;32:775-95
Effects of Nature on ADD/ADHD

- Children completed a series of puzzles designed to create mental fatigue.
- Children with ADHD guided through 20 minute walk in 3 different environments:
  - A city park
  - An urban area
  - A residential area
- Children next completed tests of concentration and impulse control:
  - Concentration significantly better after a walk in the park, compared to other 2 settings.

Taylor AF, Kuo FE. J Atten Disord 2009;12:402
AAP Clinical Report: importance of play in a child’s social, emotional, cognitive, and physical development

- Benefits of play – develop healthier cognition, a more developed imagination, dexterity, emotional strength, and physical strength
- Play builds active healthy children
- Advice for pediatricians: children should get free unstructured play outside

Environmental Considerations
National Movement

• *Last Child in the Woods* by Richard Louv

• Let’s Move Outside
  www.letsmove.gov/outside/

• AAP and White House Obesity Initiative
  www.aap.org/obesity/whitehouse/

• Exercise is Medicine
  www.exerciseismedicine.org
Prescribing Exercise

- Swedish study measured effectiveness of issuing 6300 physical activity referrals over 2 years
  - Half of the patients reached reported increased physical activity at 3 months and 12 months¹

- Program in Spain recruited 4000 physically inactive patients and provided exercise referrals to half
  - 6 months later, patients who received the referrals were more active²

What Pediatricians Can Do

• Recognize that families may use the Internet as a primary source of information
  • Emphasize appropriate sites for information (ie AAP, CDC, etc)
  • [www.aap.org/healthtopics/nutrition.cfm](http://www.aap.org/healthtopics/nutrition.cfm)
• Promote healthy eating habits
• Decrease screen time to ≤ 2 hours/day
• Promote appropriate activity levels in children (1 hour per day)
What Pediatricians Can Do

• Encourage that at least some of this activity occur in the outdoor, natural environment
  • May be particularly relevant for patients with ADHD and other mental health issues
• Particular emphasis should be on unstructured, exploratory play
• Become advocates in the school to support physical education in the schools
Prescribing Nature

• Ample evidence attributing improved health with physical activity
• Some evidence that nature specifically can improve attention and other psychosocial aspects of health and reduce stress
• Children should be encouraged to play outside
• Physicians should consider “prescribing” outdoor play for physical and mental health benefits
Children and Nature Initiative
Tools & Resources
Pediatric Environmental History
Forms (English & Spanish)

www.neefusa.org/health/children_nature/resources.htm
AAP Prescription (English & Spanish)

**Rx for Healthy Active Living**

Name __________________________ Date ________________

**Ideas for Living a Healthy Active Life**

1. Eat at least 5 fruits and vegetables every day.
2. Limit screen time (for example, TV, video games, computer) to 2 hours or less per day.
3. Get 1 hour or more of physical activity every day.

**My Goals (choose one you would like to work on first)**

- [ ] Eat ________ fruits and vegetables each day.
- [ ] Reduce screen time to ________ minutes per day.
- [ ] Get ________ minutes of physical activity each day.
- [ ] Reduce number of sugared drinks to ________ per day.

Patient or Parent/Guardian signature ______________________________

Doctor signature ______________________________

American Academy of Pediatrics

**Para una Vida Saludable y Activa**

Nombre __________________________ Fecha ________________

**Ideas para una Vida Saludable y Activa**

1. Come por lo menos 5 frutas y vegetales al día.
2. Limita el tiempo que pasa frente a una pantalla (por ejemplo, televisión, video juegos, computadora) a 2 horas o menos al día.
3. Haz 1 hora o más de actividad física al día.
4. Reduce la cantidad de bebidas azucaradas que tomas. Reemplázalas por agua y leche baja en grasa.

**Mis metas (escribe una meta en la cual trabajarás primero)**

- [ ] Come ________ frutas y vegetales al día.
- [ ] Reduce el tiempo frente a una pantalla a ________ al día.
- [ ] Haz ________ minutos de actividad física al día.
- [ ] Reduce el número de bebidas azucaradas a ________ al día.

Firma del paciente o del padre/guardiano ______________________________

Firma del doctor ______________________________

American Academy of Pediatrics

www.neefusa.org/health/children_nature/resources.htm
Nature is all around you. It's in your neighborhood, in a tree, park, or school yard or even in your backyard!

Where to Go in Your Area:

To find a national wildlife refuge, national fish hatchery, park, playground, or nature center near you, go to:
www.neefusa.org/health/children_nature.htm

The National Environmental Education Foundation encourages parents and caregivers to create opportunities for children to play outside in a natural environment or in a safe neighborhood space. Together we can teach them how to appreciate the environment and protect their health!

To learn more, visit:
www.neefusa.org/health/children_nature.htm
La naturaleza le rodea.
Está en su vecindario, en un árbol, un parque, o el patio de la escuela—jaun en su patio trasero!

Dónde Puede Ir en Su Área:

La National Environmental Education Foundation anima a los padres y cuidadores a que creen oportunidades para que los niños jueguen al aire libre en un ambiente natural o en una parte segura del vecindario. ¡Juntos, podemos enseñarles a apreciar el ambiente y cuidar la salud!

Para aprender más, visite:
www.neefusa.org/health/children_nature.htm
Children’s Health and Nature
Fact Sheet

FACT SHEET
CHILDREN’S HEALTH AND NATURE

Current State of Children’s Health

Our children may be the first generation at risk of having a shorter lifespan than their parents [1]. Sedentary lifestyle and physical inactivity have contributed greatly to the numerous health problems plaguing today’s children. Chronic conditions such as childhood obesity, asthma, attention-deficit disorder, and vitamin D deficiency have all increased over the past few decades [2, 3]. These conditions may lead to pulmonary, cardiovascular, and mental health problems in adulthood, and disadvantaged children are most at risk. Low-income and minority children are often more cut-off from nature due to the “built environment” around them: poor housing conditions, high-volume traffic, and a lack of parks and green space [4]. Outdoor activity in the natural environment has taken a back seat to television, video games, the computer, and a demanding schoolwork and extracurricular schedule. While losing contact with the natural environment, today’s youth are missing key opportunities for physical activity, stress reduction, attention restoration, and healthy development.

Childhood Obesity

The national prevalence of childhood obesity grew significantly, from 14.5% in 2003 to 16.4% in 2007. The combined prevalence of overweight and obesity among U.S. children ranges from a low of 23% in Utah and Minnesota to a high of 44% in Mississippi [5]. According to the Institute of Medicine, childhood obesity has doubled over the past 30 years for preschoolers and adolescents, and more than tripled for children aged 6 to 11 years old [6].

Disparities in childhood obesity are also rising. The prevalence of combined overweight and obesity in children living in poverty increased from 39.8% in 2003 to 44.3% in 2007 compared with children living in higher income households (22.5% in 2003; 22.2% in 2007). In Hispanic children, prevalence of childhood overweight and obesity rose from 37.7% in 2003 to 41% in 2007, compared with non-Hispanic children (25.5% in 2003; 26.6% in 2007). Prevalence of overweight and obesity was 41.1% for black children in 2007, compared to 26.3% in white children [5].

Overweight BMI ≥ 85th percentile and ≤ 95th percentile, childhood obesity – BMI ≥ 95th percentile. BMI = Body mass index, calculated using the formula: weight (lb) / (height (in))² × 703. To calculate BMI, visit http://www.ncest.cpm/children/CalculateBMI.html

www.neefusa.org/health/children_nature/resources.htm

www.cppah.com
Acknowledgments

This presentation was designed by:

**James Roberts, MD, MPH** - Medical University of South Carolina; Representative, American Academy of Pediatrics

**Joel Forman, MD** - Mount Sinai Medical Center

**Sophie Balk, MD** - Children’s Hospital at Montefiore
Contact Information

Leyla Erk McCurdy
Senior Director, Health & Environment
National Environmental Education Foundation
Email: lmccurdy@neefusa.org
Phone: 202-261-6488

www.neefusa.org