Building Capacity to Address Children’s Environmental Health

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Winner of

Climate for Change: A Call to Action
March 25, 2011
Environmental Health

Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social, and psychosocial factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling, and preventing those factors in the environment that can potentially affect adversely the health of present and future generations.

World Health Organization
• Private, non-profit organization chartered by Congress

• Provide knowledge to trusted and credible professionals who amplify messages to national audiences to solve everyday environmental problems. Together, we generate lasting positive change

www.neefusa.org
Goal: Advance environmental knowledge among health professionals to improve the public's health with a special emphasis on children and underserved populations.

Through development of national agendas, educational programs, and strategic partnerships, we facilitate the integration of environmental health into health care provider education and practice.

www.neefusa.org/health/index.htm
Environmental Health Initiatives

- Pediatric Environmental Health Initiative
  - Pediatric Environmental History Forms
  - Children’s Environmental Health Faculty Champions Initiative

- Pediatric Asthma Initiative
  - Environmental Management of Pediatric Asthma tools and resources
  - Pediatric Asthma Faculty Champions Initiative

- Pesticides Initiative
  - Implementation Plan
  - Competency and Practice Skills Guidelines

- Children and Nature Initiative

- Tools and Resources for Critical Environmental Health Topics
Children and Nature Initiative

- Preventing serious health conditions that are related to indoor sedentary lifestyle
- Reconnecting children to nature to promote good health, enjoyment and environmental stewardship
Children and Nature Initiative

- Educate pediatric health care providers about prescribing outdoor activities to children
  - Create **Nature Champions** who train other health care providers about prescribing nature

- Link this advice to nature programming at local nature sites in safe and easily accessible outdoor areas
  - Partner with US Fish and Wildlife Service, National Audubon Society, USDA Forest Service and National Park Service
Children and Nature Initiative

- Grounded in science
- Lead by an expert Advisory Committee
- Replicates NEEF’s Faculty Champions model to create Nature Champions
- Will train 1,200 of health professionals and reach tens of thousands of families and children within 2 years
Burden of Obesity and ADHD in Childhood
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 adults\(^2\)

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

\(^1\)Ogden CL et al. JAMA 2010;303(3):242-249. 
Obesity-Related Diseases

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

Other Medical Issues

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 may be 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

\(^1\)Kumar J, et al. *Pediatrics* 2009;124:e362-70
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\(^1\)
- Average child watches 3 hours TV daily\(^2\)
- 7.5 hours per day spent with all forms of e-media (TV, Internet, chats, games, etc)\(^3\)

\(^1\)CDC. Youth risk behavior surveillance 2005. MMWR 2006;55:SS-5
\(^2\)AAP, Committee Public Ed. Pediatrics 2001;107:423-6
\(^3\)Rideout VJ et al. Kaiser Family Foundation Report. 2010
Obesity & Physical Activity

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 an unstructured outdoor activity²

No Child Left Behind 2001

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

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Health Benefits of Nature & Outdoor Activity
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

School Grounds & 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

Parks & Physical Activity

• Associations between healthy weight & availability 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

Parks & Physical Activity

- Study of 1556 sixth grade girls across 7 cities in the U.S.
- Measured moderate-to-vigorous physical activity (MVPA) of girls over 6 days
- Girls who lived near 1 or more parks within 1/2 mile had higher levels of non-school MVPA than girls who did not
  - Higher levels of physical activity associated with park features such as walking paths, running tracks, playgrounds, basketball courts, streetlights and floodlights

Parks & Physical Activity

- Larger study of 8 parks in Los Angeles
- Parks were in 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

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

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.
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, arguing 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

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

Outdoor exercise brings more positive effects on mental wellbeing than exercising indoors

- 11 trials comparing mental wellbeing after a short walk or run outdoors and indoors
- 9 of 11 trials showed improved mental wellbeing following outdoor exercise
- Outdoor exercise associated with revitalization, decreases in tension, confusion, anger, depression, and increased energy
- Greater intent to repeat outdoor activity

Effects of Nature on ADD/ADHD

• Does contact with nature improve inattention?

• 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.
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

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

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
• Health care providers should consider “prescribing” outdoor play for physical and mental health benefits
National Movement

- We Can!

- Exercise is Medicine
  [www.exerciseismedicine.org](http://www.exerciseismedicine.org)

- America’s Great Outdoors Initiative

- Let’s Move
  [www.letsmove.gov](http://www.letsmove.gov)

- Let’s Move Outside
  [www.letsmove.gov/letsmoveoutside.php](http://www.letsmove.gov/letsmoveoutside.php)

- AAP and White House Obesity Initiative
  [www.aap.org/obesity/whitehouse/](http://www.aap.org/obesity/whitehouse/)
Pediatricians Urged to Help Fight Nature-Deficit Disorder

In a world where obesity is becoming more common among children who are tethered to televisions and computers, Richard Louv still goes to his special world in the woods — and he wants pediatricians to send their patients there to join him.

"In your practices, consider suggesting to parents that they get their kids into nature," Louv told a packed NCE plenary session Saturday. The author of Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder and chairman of the Children & Nature Network, Louv has become a leading advocate for helping children rediscover nature.

Over the past few generations, the world of children has gradually constricted from miles from the doorstep to the doorstep itself. In that time, children have stopped exploring the world of woods, streams and parks to building worlds of animated characters and social networks, leading to the development of "nature-deficit disorder."
AAP Prescription

Rx

for Healthy Active Living

Name ___________________________ Date __________________

Ideas for Living a Healthy Active Life

☐ Eat at least 5 fruits and vegetables every day.
☐ Limit screen time (for example, TV, video games, computer) to 2 hours or less per day.
☐ Get 1 hour or more of physical activity every day.
☐ Drink fewer sugar-sweetened drinks. Try water and low-fat milk instead.

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

Healthy Active Living

An initiative of the American Academy of Pediatrics

Rx

Para una Vida Saludable y Activa

Nombre ___________________________ Fecha __________________

Ideas para una Vida Saludable y Activa

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

Mis metas (escoge una meta en la cual trabajas 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 el padre/custodio

Firma del doctor

American Academy of Pediatrics

Healthy Active Living

An initiative of the American Academy of Pediatrics

www.neefusa.org/health/children_nature/resources.htm
Children and Nature Initiative
Tools & Resources

- Children’s Health and Nature Fact Sheet
- Health Care Provider Kits: Prescription Pads, Patient Brochures, Pediatric Environmental History Form in English and Spanish
- Training PowerPoint
- Peer-reviewed Publications
  - Using nature and outdoor activity to improve children’s health—McCurdy, Winterbottom, Mehta, Roberts. *Current Problems in Pediatric and Adolescent Health Care* 2010;40
- Webpage with links to Additional Resources
Pediatric Environmental History Screening Forms

### The Screening Environmental History

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where does your child live and spend most of his/her time?</td>
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<tr>
<td>What is the age condition and location of your home?</td>
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<tr>
<td>Do you have a cat or a dog?</td>
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<tr>
<td>Do you have any indoor furry pets?</td>
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<td>What type of heating/air system does your home have?</td>
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<td>What is the source of your drinking water?</td>
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<tr>
<td>Is your child protected from excessive sun exposure?</td>
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<tr>
<td>Is your child exposed to any toxic chemicals which you are aware of?</td>
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<td>What are the occupations of all adults in the household?</td>
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<tr>
<td>Have you tested your home for radon?</td>
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<tr>
<td>Do you or anyone else in your household watch TV or use a computer or video game system more than two hours a day?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
</tbody>
</table>

### Follow-up/Notes

The screening Environmental History is designed to capture most of the common environmental exposures to children. The screening history can be administered regularly during well-child visits as well as to assess whether an environmental exposure poses a risk in a child's symptoms. If positive responses are given to one or more of the screening questions, the primary care provider should consider asking questions on the topic provided in the Additional Categories and Questions to Supplement the Screening Environmental History, accessible at http://www.neefusa.org/pdf/PEHhistory.pdf.

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Historia Pediátrica Ambiental (0-18 Años de Edad)

### La Historia Ambiental Exploratoria

<table>
<thead>
<tr>
<th>Question</th>
<th>Sí</th>
<th>No</th>
<th>No está seguro</th>
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</thead>
<tbody>
<tr>
<td>¿Dónde vive su hijo(a) y dónde pasa la mayor parte del tiempo?</td>
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<tr>
<td>¿Cuál es la antigüedad, condición y ubicación de su casa?</td>
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<tr>
<td>¿Hay algún familiar en la familia?</td>
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<td>¿Tiene un detector de monóxido de carbono?</td>
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<td>¿Tiene alguna maraña peligrosa dentro de su casa?</td>
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<td>¿Qué tipo de calefacción/aire acondicionado tiene en su casa?</td>
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<td>¿Qué fuente de agua potable usa?</td>
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<tr>
<td>¿Agua de pozo? ¿Agua de la ciudad? ¿Agua embotellada?</td>
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<tr>
<td>¿Protege o suministra la exposición al sol adecuada?</td>
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<tr>
<td>¿Está el niño(a) expuesto(a) a algún químico tóxico que usted saquea?</td>
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<tr>
<td>¿Cuáles son las ocupaciones de los adultos de la casa?</td>
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<tr>
<td>¿Ha investigado si su casa está libre de radón?</td>
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<tr>
<td>¿Podrá su niño(a) comprender los juegos de video más de dos horas al día?</td>
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<tr>
<td>¿Cuántas veces a la semana toma un baño libre de broma por los menos 30 minutos?</td>
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</table>

### Seguimiento/Notas

La Historia Ambiental Exploratoria está tomada de varios documentos. Elaboró la historia ambiental exploratoria puede ser aplicada o, de manera similar, durante los autoexaminadores del niño, así como también para evaluar otras exposiciones ambientales pasando por una tabla y una densidad de alturas. Si se determina una respuesta positiva a unas más de dos preguntas, el programa de autoexamen del niño, así como también para evaluar otras exposiciones ambientales pasando por una tabla y una densidad de alturas. Si se determina una respuesta positiva a unas más de dos preguntas, el programa de autoexamen del niño, así como también para evaluar otras exposiciones ambientales pasando por una tabla y una densidad de alturas.
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:

Place label listing local nature sites in your area here

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

www.neefusa.org/health/children_nature/resources.htm
La naturaleza le rodea.
Está en su vecindario, en un árbol, un parque, o el patio de la escuela—jáun en su patio trasero!
Dónde Puede Ir en Su Área:

La National Environmental Education Foundation anima a los padres y cuidadores a crear 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

Para buscar un refugio nacional de vida silvestre, un centro nacional de pesca, un parque, un campo de recreo, o un centro de naturaleza cerca de usted, visite:
www.neefusa.org/health/children_nature.htm

www.neefusa.org/health/children_nature/resources.htm
Children’s Health and Nature Fact Sheet

• Summarizes key scientific studies on the health benefits of nature for children

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


www.cppah.com
Children and Nature Initiative
Nationwide
Nature Sites

- Tracking Nature Prescriptions
- Club Card & Incentives Program
Evaluation

Medical Centers:
- Tracking # prescriptions given out by health care providers

Nature Sites:
- Tracking # prescriptions turned in to Nature Sites and return visitation

Research Studies led by Nature Champions and Faculty:
- Evaluating health outcomes
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**Sophie Balk, MD**- Children’s Hospital at Montefiore
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www.neefusa.org