

Children & Nature Network Research and Studies
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Annotated Bibliography
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All children deserve to grow up in an environment where they can flourish—where they can develop physically, socially, emotionally, and cognitively to reach their full, unique potential. The first volume of the Children & Nature Network (C&NN) Research and Studies (February 2007) highlighted the benefits to children and youth from experiences in nature. This second volume focuses on evidence of changes in children’s experience of nature.

The studies selected for this annotated bibliography are either reports of original research or syntheses of existing research. All meet criteria for scholarly excellence. It is important to recognize that research directly related to children’s experience of nature is limited and that every study has strengths and weaknesses. Studies included in this annotated bibliography are a valuable starting point and together suggest: 1) an overall decline in children’s opportunities to connect with nature on a daily basis, although individual children’s experiences may vary considerably; and 2) a number of possible reasons why this decline might be occurring. It is critical that research in this area moves forward to build a stronger, more cohesive evidence base. Improving our understanding of children’s experience of nature and the complex relationships that influence their experiences will help ensure that parents, policy makers, and practitioners have the information they need to create environments in which children can thrive.

This C&NN resource includes an executive summary of each research report; full citation; and information on its availability. While this listing includes many outstanding studies, it is by no means exhaustive and recommendations are welcome on additional research to include. Please send suggestions to the attention of Cheryl Charles, Ph.D, President, Children & Nature Network, cheryl@cnaturenet.org

Section 1: Children's Outdoor Play Experiences

There is very little information available on how children's daily lives and the use of their neighborhoods have changed over time. Without evidence, we tend to assume that many things were better in the past. *The studies highlighted below indicate that children's outdoor play experiences have changed over one or several generations and discuss how these changes are likely due to a complexity of interconnected factors, from changes in the physical environment to societal, technological, and economic changes.*

Children spend less time playing outdoors than their mothers did when they were young

In this study, Dr. Rhonda Clements surveyed over 800 mothers in the United States to explore the extent to which children in the early 2000s play outdoors as compared to a generation ago when the mothers interviewed were children. In analyzing the survey results, Dr. Clements found that children in the early 2000s, as compared to a generation ago: 1) spend less time playing outdoors; 2) participate in different activities outdoors (e.g., fewer street games and more organized youth sports); and 3) participate in more indoor than outdoor play activities. In her survey, Dr. Clements also asked mothers about obstacles to outdoor play and their thoughts regarding the benefits of outdoor play. She found that while almost all mothers recognized some of the diverse benefits of outdoor play, obstacles, such as television, computers, and concerns about crime, safety, and injury, prevented their children from participating in more outdoor play. This study provides important insights into the changing nature of children's outdoor play and is one of the few studies that explore this topic in the United States.

Clements, R. "An Investigation of the State of Outdoor Play." *Contemporary Issues in Early Childhood*, Vol. 5(1):68-80, 2004. This study is available online at: http://www.worlds.co.uk/pdf/viewpdf.asp?j=ciec&vol=5&issue=1&year=2004&article=7_Clements_CIEC_5_1_web&id=130.132.143.49

Children's use of space has changed from being primarily outdoors to indoors and has become increasingly adult supervised

In this study, Dr. Lia Karsten takes a detailed look at three different streets in Amsterdam to investigate children's use of space in 2003 as compared with children's use of space during the 1950s and early 1960s. She made numerous observations of the three streets and conducted over 90 extensive interviews with children and parents and with adults who lived on these streets in the 1950s and early 1960s. To validate information from her interviews, Dr. Karsten also conducted archival and statistical analyses of historical data. Dr. Karsten found a great deal of similarity in children's daily lives in the 1950s and early 1960s. Specifically, she found that in this generation "playing meant playing outside." This was often a

matter of both necessity, primarily due to small living spaces, and pleasure. She also found that children had considerable freedom to move around on their own, had a relatively large territory to roam, played with children from diverse backgrounds, and used urban public space for many of their activities. In contrast, Dr. Karsten found that children in 2003 did not play outside as much or for as long a period of time, had a more restricted range in which they could move freely, had fewer playmates from less diverse backgrounds, were more home-centered, and experienced many more parent-induced constraints. Importantly, Dr. Karsten documents how these changes from the 1950s and 1960s to 2003 have occurred within a spatial, social, and cultural context. She discusses contributing factors to many of these changes, such as the introduction of the car, which changed safety in the streets, and the trend toward bigger homes and fewer children, which made indoor space more readily available. She also documents how these changes are not universal and that neighborhoods differ in their support of children's activities. To capture this diversity, Dr. Karsten describes three primary types of children in the current generation — “outdoor” children, “indoor” children, and those she calls the “backseat generation” (i.e., children who are escorted many places and whose activities are largely driven by adults). Each type has benefits and drawbacks with regard to children's daily activities.

Karsten, L. “It All Used to be Better? Different Generations on Continuity and Change in Urban Children's Daily Use of Space.” *Children's Geographies*, Vol.3 (3), pp275-290, 2005. This study may be available in a library near you or can be purchased online through the publisher (Taylor & Francis Group) at: <http://www.tandf.co.uk/journals/titles/14733285.asp>.

Children's access to public play space has declined

Dr. Pamela Wridt spent over three years in a working-class New York City community conducting an historical analysis from the 1930s until the early 2000s of residents' spatial and environmental experiences between the ages of 11 and 13. In her study, she used a variety of research methods. In this particular paper, Dr. Wridt reports on her findings from extensive environmental autobiographies with residents by looking in-depth at three individuals whose experiences are representative of a particular time period. In her analysis, Dr. Wridt found that youth in this community in the 1940s spent a significant amount of time playing in the streets, which was an important space for adventure, meeting other children, and independence. By the 1950s, however, with the increased prevalence of automobiles and child death due to automobile accidents, numerous parks and playgrounds were built to protect children. As a result, children's play began to move off the streets into parks and playgrounds that, in many cases, offered structured, city-sponsored activities. By the 1970s and 1980s, with New York City's fiscal crises, many of the parks and playgrounds fell into disrepair and became unsafe. As a result, children's play began to move from the parks and playgrounds to indoor environments. Dr. Wridt found that in the 2000s, children in this

community have largely retreated indoors. Their activities take place in private or institutionalized settings and are often dominated by various forms of electronic media. Importantly, Dr. Wridt highlights disparities that can occur in children's access to both outdoor and indoor spaces based on race and economic status. She concludes that while today's children in this community still play in the streets, parks, and playgrounds, their play generally occurs in indoor spaces and consists of activities that are increasingly managed by adults and often take place in institutional settings.

Wridt, Pamela J. "An Historical Analysis of Young People's Use of Public Space, Parks and Playgrounds in New York City." *Children, Youth and Environments* 14(1), 86-106, 2004. This study is available online at: http://www.colorado.edu/journals/cye/14_1/articles/article3.pdf

The availability of supportive and diverse play environments and children's access to neighborhood space has declined

In this small, innovative study, Dr. Sanford Gaster interviewed 29 long-time residents in one New York City neighborhood to understand how children's use of their neighborhood changed between 1915 and 1976. He also analyzed U.S. Census data to understand demographic changes that occurred during this time period. While the small sample size prevented statistical analyses of the data, Dr. Gaster analyzed the content of the interviews, as well as the Census data, to understand changes in the physical, social, and economic landscape. With this information, he made inter-generational comparisons. Some of his key findings include: 1) the age at which children were allowed outside unsupervised increased over time; 2) children visited more places in their neighborhood when the outdoor opportunities were the most diverse and numerous; 3) the number of barriers to children's outdoor exploration has increased over time and the types of barriers have shifted from being more environmental (e.g., a river) to being more social; 4) the availability and level of participation in professionally-supervised activities increased significantly over time; and 5) even within the same neighborhood, children's experiences may differ due to racial and economic differences. Dr. Gaster's study highlights the multitude of forces that have likely shaped children's access to their neighborhood and provides important insights to present-day issues and questions.

Gaster, S. "Urban Children's Access to Their Neighborhood: Changes Over Three Generations." *Environment and Behavior*, 23(1), 70-85, 1991. This study may be available in a library near you or can be purchased through the publisher (SAGE Publications) at: <http://www.sagepub.com>

We are visiting U.S. national parks less often

Since 1988, per capita visits to U.S. national parks have declined by about 20%. In this study, Drs. Oliver Pergams and Patricia Zardic investigated some potential reasons for this decline. While there are many possible contributing factors, they focused on those related to how Americans spend their time and specifically time associated with electronic entertainment media (e.g., hours of television, video games, home movies, and Internet use). Drs. Pergams and Zardic note that since 1988 there has been a dramatic shift in Americans' time. For example, in 2003 the average person spent 327 more hours per year with entertainment media than in 1987. This shift in time clearly impacts time devoted to other activities, one activity of which could be national park visits. In their analysis, Drs. Pergams and Zardic found that a number of entertainment media variables, as well as inflation-adjusted oil prices, appeared to explain almost all of the decline in national park visits. While this study only looked at association between factors, and not causation, it is an important first step in beginning to understand why U.S. national park attendance has and is continuing to decline and what this might mean for children's exposure to nature.

Pergams, O. R. W., & Zardic, P. A. "Is Love of Nature in the US Becoming Love of Electronic Media? 16-year Downtrend in National Park Visits Explained by Watching Movies, Playing Video Games, Internet Use, and Oil Prices." *Journal of Environmental Management*, 80(4), 387-393, 2006. This study is available online at Dr. Oliver Pergam's website: <http://www.pergams.com>

Section 2: How Children Spend Their Time

With only 24 hours in a day, examining how children spend their time can tell us a great deal about their lives, what parents and society value, and what changes may be occurring over different generations. Despite the importance of this topic, very few studies have been conducted in this area, and even fewer have been conducted using longitudinal techniques (i.e., looking at changes over time). *The studies highlighted below make an important contribution to this area and suggest that over the past twenty years (from the 1980s to 2000s) children's lives have become increasingly structured and media oriented.*

Children have less free time and spend more of the little free time they have in structured activities

In two studies, one released in 2001 and the other in 2006, Dr. Sandra Hofferth and colleagues look at changes in how American children spent their time between 1981 and 1997 and between 1997 and 2002/3. By collecting 24-hour time diaries (one for a school day and one for a non-school day) from thousands of parent/child

participants, they investigated time spent in 18 different activities during the school year* and analyzed the impact of various demographic variables on children's time (e.g., number of parents, employment status of parents, the number of children in the family, and the level of parental education). In their studies, Dr. Hofferth and colleagues present many interesting findings. A few of their overarching findings include: 1) children's discretionary time (i.e., time not spent in school, child care, etc.) declined 12% (7.4 hours a week) from 1981 to 1997 and an additional 4% (2 hours) from 1997 to 2002/3; and 2) the way children spend their discretionary time has changed—less time is spent in unstructured activities (e.g., free play) and more time is spent in structured activities (e.g., sports and youth programs). Other changes of interest include a doubling of computer use and substantial increase in time spent studying and reading, as well as an increase in participation and time spent in church activities and youth groups. In their analyses, they found that a number of these and other findings are associated with demographic changes in U.S. families, such as the increase in households headed by single parents and the increase in maternal employment.

*Please note that the activity categories used in this study are inclusive of many subsets of activities. For example, two categories of particular interest to this audience—play and the outdoors—are represented in a mix of activities. “Play” includes indoor and outdoor play, such as playing cards and board games, playing social games, and playing with toys, whereas “outdoors” includes gardening, boating, hiking, walking, and pleasure drives, among other activities. Descriptions of these two categories can be found in Hofferth, S. L., & Sandberg, J. F. (2001), “How American children spend their time.” *Journal of Marriage and the Family*, 63(2), 295-308. It is also important to note that these studies focus on activities at home; they do not describe activities that take place at school or other non-home settings.

Hofferth, S.L. & J.F. Sandberg. “Changes in American Children's Time, 1981-1997.” In S.L. Hofferth & T.J. Owens (Eds.), *Children at the Millennium: Where Have We Come From, Where Are We Going?* (pp. 1-7). New York: JAI, 2001. This study may be available in a library or bookstore near you.

Hofferth, S.L. & S.C. Curtin. *Changes in Children's Time, 1997-2002/3: An Update, 2006*. This study is available online at:
http://www.popcenter.umd.edu/people/hofferth_sandra/papers/kidstimefeb06.pdf

Children spend considerable time with media and multiple forms of media

In two studies, one released in 2006 and the other in 2005, Dr. Donald Roberts and colleagues and Victoria Rideout and colleagues investigate media in the lives of children 6 months to 6 years of age, as well as in the lives of 8 to 18 year olds. These studies were conducted in association with the Kaiser Family Foundation

and involved various research techniques. The first study of children 6 months to 6 years old involved both a nationally-representative telephone survey of over a thousand parents, as well as a series of small focus groups with parents in four different cities. The second study of 8 to 18 year olds involved having a national sample of over 2000 youth complete an anonymous written questionnaire, as well as having nearly 700 youth complete a detailed 7-day diary of their media use. Both studies took place during the school year and measured recreational (non-school) use of media, including TV and videos, music, video games, computers, movies, and print. A few of the key findings highlighted in these reports include:

- **Young people today experience a substantial amount of electronic media—** Children between the ages of 6 months and 6 years spend an average of 1.5 hours with electronic media on a daily basis, whereas children between the ages of 8 and 18 years spend an average of nearly 6.5 hours a day with electronic media.
- **Since 1999, there has been very little change in the amount of time 8 to 18 year olds spend using media—** This trend may indicate that young people have reached a limit with regards to how much time they can devote on any given day to media.
- **8 to 18 year old children are packing more media into the same amount of time—** When young people use media, about a quarter of the time they are using more than one medium at a time (e.g., reading and watching TV).
- **Children’s homes are filled with media—** Nearly one third of children from 6 months to 6 years of age live in households where the TV is on all or most of the time.
- **Television and music remain the dominant media to which children are exposed—** 8 to 18 year olds spend an average of 3 hours a day watching TV and about 1.75 hours a day listening to music.
- **Access to and use of computers and the Internet has increased dramatically since the last surveys were conducted—** Since 1999, 13% more 8 to 18 year olds have a computer at home (for a total of 86%); an additional 27% have Internet access (for a total of 74%); and 17% more spend over an hour online each day (for a total of 22%).
- **There are some important demographic differences with regards to the amount of time children and youth spend with different types of media—** Children whose parents have lower incomes or less formal education, for example, tend to watch more TV and play more video games than children whose parents have higher incomes and more formal education.
- **Parents play a critical role in determining children’s exposure to media—** Children who grow up in households where TV is more prominent, for example, spend more time watching TV than those children who grow up in households where TV is less prominent.

Roberts, D. F., Foehr, U., & Rideout, V. *Generation M: Media in the Lives of 8 to 18 Year Olds*. Kaiser Family Foundation, 2005. This study is available online at: <http://www.kff.org/entmedia/entmedia030905pkg.cfm>

Rideout, V. and E. Hamel. *The Media Family: Electronic Media in the Lives of Infants, Toddlers, Preschoolers, and Their Parents*. Kaiser Family Foundation, 2006. This study is available online at: <http://www.kff.org/entmedia/entmedia102803pkg.cfm>

Section 3: Children's Fitness

Health and weight is a complex issue, especially for children since they are growing. Maintaining a healthy weight, however, requires effectively balancing energy in (through food consumption) and energy out (through basal metabolism and physical activity). While more research is needed to explore the connections between access to natural areas and children's fitness, there have been a few studies that support the fact that natural areas may encourage physical activity and thus help people better maintain their energy balance. *The studies highlighted below indicate that there has been a dramatic increase in the number of overweight children since the 1980s and that many children do not get the physical activity they need.*

Over the past several decades, there has been a dramatic increase in the number of overweight children in the United States

Over the past 40 to 50 years, the Centers for Disease Control and Prevention has conducted large national surveys to measure and better understand nutrition and health in the United States. By looking at some of these measurements over time, we can track changes with regards to various health measures, such as the prevalence of children and adolescents who are overweight. Dr. Richard Troiano and colleagues investigated overweight prevalence and trends for children and adolescents from the 1960s to the early 1990s, and Dr. Cynthia Ogden and colleagues investigated prevalence and trends from the late 1990s to 2004. Together, these two studies show that the prevalence of overweight children and adolescents has increased dramatically. The prevalence of children (ages 6 to 11) who are overweight has increased from about 4% in the 1960s to almost 19% in 2003/4. Similarly, the prevalence of adolescents (ages 12 to 19) who are overweight has increased from about 4.5% in the 1960s to about 17.5% in 2003/4. This increase in overweight children and adolescents appears to have started in the 1980s. It is important to note, and the authors discuss, that there are variations within these trends. For example, the prevalence of children and adolescents who are overweight at any given time period is not the same for males and females or for different racial and ethnic groups.

Troiano, R. P., Flegal, K. M., Kuczmarski, R. J., Campbell, S. M., & Johnson, C. L. "Overweight Prevalence and Trends for Children and Adolescents: The National-Health and Nutrition Examination Surveys, 1963 to 1991." *Archives of Pediatrics & Adolescent Medicine*, 149(10), 1085-1091, 1995. This study may be available in a library near you or can be purchased through the publisher (American Medical Association).

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. "Prevalence of Overweight and Obesity in the United States, 1999-2004." *Jama-Journal of the*

American Medical Association, 295(13), 1549-1555, 2006. This study may be available in a library near you or can be purchased through the publisher (American Medical Association).

The Centers for Disease Prevention and Control provides information online regarding overweight trends for children and adolescents. This information is available at:
<http://www.cdc.gov/nccdphp/dnpa/obesity/trend/index.htm>

Additional information on childhood obesity can be found at:
<http://www.cdc.gov/nccdphp/dnpa/obesity/childhood/index.htm>

Not all children have recess and those that do have recess do not have it for very long periods of time

Recess is an important opportunity for children to be outdoors, to play and to be physically active. In this report, the National Center for Education Statistics (U.S. Department of Education) investigated food and physical activity in public elementary schools. This report is based on a survey of 1,198 public elementary schools in all 50 states and the District of Columbia. The survey covered a variety of topics, including whether schools provided recess, the number of days per week recess was provided, and the length of time for recess. A few of the report's findings include:

- Most public elementary schools have scheduled recess (87% to 93%), depending on the specific grade discussed, however, 7% to 13% of elementary schools do not have scheduled recess.
- Most schools have recess every day (83% to 88%), depending on the specific grade discussed.
- The majority of schools have recess once a day (55% to 66%), depending on the specific grade discussed.
- The average number of minutes per day or recess ranged from 23.8 to 27.8 (depending on the specific grade discussed).

There were differences with regard to whether a school provided recess, the frequency of recess, and the amount of recess, based on specific school characteristics (e.g., school size, location, region, percent minority enrollment, or percent poverty concentration). For example, schools with the highest poverty concentrations were more likely not to have scheduled recess than those with lower concentrations of poverty.

Parsad, B. and Lewis, L. *Calories In, Calories Out: Food and Exercise in Public Elementary Schools, 2005* (NCES 2006-057). U.S. Department of Education. Washington, DC: National Center for Education Statistics, 2006. This study is available online at:
<http://nces.ed.gov/Pubs2006/nutrition>

Not all youth participate in physical activities outside of school

In preparation for a youth media campaign to encourage physical activity, the Centers for Disease Control and Prevention (CDC) conducted the first nationally-representative investigation on the levels and types of physical activity among 9 to 13 year olds. Researchers conducted a telephone survey of 4,500 children (9 to 13 years of age) and their parents about their participation in after-school and weekend physical activities. In analyzing the data from their survey, the CDC found that 61.5% of children do not participate in any organized physical activity (an activity with an organized group) and 22.6% do not participate in any free-time physical activity. In addition, they found some significant differences based on race and ethnicity, such as that parental concerns regarding barriers to participation (e.g., transportation or expense) were reported more often by non-Hispanic black and Hispanic parents than by non-Hispanic white parents. The survey results indicated that baseball and softball, soccer, and basketball were the organized physical activities in which children participated most frequently, whereas riding bicycles and playing basketball were the most frequent free-time activities. The CDC recognizes that some of the survey results may have been influenced by the season in which the survey was conducted and that due to the nature of this survey they were not able to investigate the amount of time that children participated in these activities.

US Centers for Disease Control and Prevention (CDC). "Physical Activity Levels Among Children Aged 9 to 13 Years—United States, 2002. *MMWR Weekly*; 52(33):785-88, 2003. This study is available online at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5233a1.htm>

Section 4: Children's Experience of Biological Diversity

We are becoming an increasingly urban species: according to the United Nations Population Division, almost 50% of all people in the world live in urban areas and this is projected to increase to >65% by 2030. Even though we are becoming increasingly urban, we still know very little about what impacts this change has on our health and well-being, including children's experience of nature. *The study highlighted below suggests that children in urban areas may experience lower levels of biological diversity.*

Children playing in urban areas may experience lower levels of biological diversity

In this study, Dr. Will Turner and colleagues measured biodiversity in five diverse metropolitan areas by calculating species diversity (birds or ferns) in

neighborhoods, using the mean biological diversity of all neighborhoods as a baseline. They found that the majority of people in urban areas live with impoverished biodiversity. For example, of the 4.4 million people who lived in the four cities they investigated with bird data, 73.2% of them lived in areas that had biodiversity levels below the baseline. When Dr. Turner and colleagues used only native species in their analyses, the percentages of people exposed to lower levels of biodiversity increased. In addition, when they used historical neighborhood biological diversity (rather than the mean neighborhood biological diversity) the percentages of people exposed to lower levels of biodiversity also increased (for example, in Tucson it went from 71.2% to 90.8%). Dr. Turner and colleagues conclude that many people experience biological uniformity (i.e., they tend to experience the same species, rather than a diverse mix) in their urban neighborhoods. They also discuss the implications this work has for human health, child development, and how we design our built environment.

Turner, W. R., Nakamura, T., & Dinetti, M. "Global Urbanization and the Separation of Humans from Nature. *Bioscience*, 54(6), 585-590, 2004. This study may be available in a library near you or can be purchased through the publisher (American Institute of Biological Sciences) at: <http://www.aibs.org/bioscience>

Section 5: Children's Environmental Knowledge

The development of knowledge is complex; our knowledge about any given topic accumulates over time and is the result of numerous factors. Knowing about one's environment is an important foundation to being able to understand various issues and act in an informed and responsible manner. While research to date has not directly linked exposure to nature (or a decline in exposure to nature) to children's knowledge of the environment, it could be a reasonable and interesting indicator to further investigate. *The studies highlighted below indicate that today's children know very little about their environment.*

Children know more about Pokémon than common wildlife

In a small, innovative study, Dr. Andrew Balmford and colleagues surveyed 109 United Kingdom (UK) primary schoolchildren (ages 4 to 11) to investigate their knowledge of natural and non-natural objects. Each child was shown a set of 20 flashcards—10 of common British wildlife species (including plants, invertebrates, and mammals) and 10 of Pokémon characters. The authors found that while individual children's scores varied, children's overall identification success for common wildlife species rose from 32% at age 4 to 53% at age 8 and then fell slightly, whereas children's identification success for Pokémon characters rose from 7% at age 4 to 78% at age 8. Dr. Balmford and colleagues discuss the

possible implications of children's lack of knowledge of common wildlife types and the importance of reconnecting children with local nature.

Balmford, A., Clegg, L., Coulson, T., & Taylor, J. "Why Conservationists Should Heed Pokémon." *Science*, 295(5564), 2367-2367, 2002. This study is available online at: http://www.sciencemag.org/cgi/content/full/295/5564/2367b?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=pokemon&searchid=1141908863643_6399&FIRSTINDEX=0&journalcode=sci

Biology students know very few common plants

In this study, Anne Bebbington tested nearly 800 advanced-level biology students (secondary school students in the United Kingdom (UK) who are generally 16-17 years of age) on their ability to identify 10 common wildflowers that were illustrated in color on a sheet of paper. Interestingly, she found that none of these students could name all 10 wildflowers and the vast majority of students (86%) could not name more than three common wildflowers. Ms. Bebbington also tested Post Graduate Certificate of Education students and teachers, but the sample sizes for both of these groups were too small to conduct comparative analyses. In closing, Ms. Bebbington discusses how science is taught in primary and secondary schools in the UK and what implications this study may have for education. Importantly, she highlights the role of identification and how it is not an end in itself—in fact it is just the beginning. Knowing the name of organisms (in this case wildflowers) can prompt students to ask questions and learn about organisms and their environments.

Bebbington, A. "The Ability of A-level Students to Name Plants." *Journal of Biological Education*, 39(2), 62-67, 2005. This study is available online at: <http://www.iob.org/downloads/234.pdf>

Section 6: Children's Independent Mobility

Independent mobility is an important part of healthy child development. Parents often struggle to provide both safety and opportunities for independence for their children. Exploring what drives parental decisions regarding their children's activities is a critical component to understanding children's opportunities to play freely outside and how these opportunities may be changing. *The studies highlighted below suggest that children's independent mobility has become increasingly restricted and that parental concerns play a fundamental role in determining children's mobility.*

Children are walking and bicycling to school less than they used to

The Centers for Disease Control and Prevention (CDC) has compiled statistical information from a number of sources that document changes in children's active transportation to and from school over the past thirty years. The data indicate that the percent of children who live within a mile of school and who walk or bike to school as their primary means of transportation has declined almost 25% over the past thirty years (from 87% to 63%) and that children who walk or bike from any distance has declined 26% (from 42% to 16%). The CDC also provides statistical information regarding four common barriers to children's active transportation and how they have changed over time: distance to school, adverse weather conditions, traffic dangers, and crimes against children. The data indicate that distance to school and traffic volume have increased over the past thirty years (for example, 34% of children in 1969 lived within 1 mile of their school, whereas just 21% of children live within 1 mile of their school today), whereas adverse weather conditions, crimes against children, and traffic-related accidents have not increased and in the case of crimes against children (12 to 19 years of age) and traffic accidents (from 1995 to 2002) rates have actually decreased. In looking at this data, it is important to recognize that these are broad, general statistics and while providing important information, they do not explain why some of these changes may be occurring (for example, the reduction in traffic-related accidents may be due to the fact that there are less people on the street). In addition, they do not capture local and regional variations that may exist. In closing, the CDC offers strategies for moving forward and overcoming each of these barriers, such as changing school siting policies, increasing education related to the risk of neighborhood crime, and reducing traffic dangers.

Kids Walk-to-school: Then and Now—Barriers and Solutions. Center for Disease Control and Prevention, 2006. This information is available online at:
http://www.cdc.gov/nccdphp/dnpa/kidswalk/then_and_now.htm

Schools are too far away for children to walk or bike to

In 2003, Beldon Russonello and Stewart Research and Communications conducted a survey to investigate American's attitudes toward walking. In this national, random sample telephone survey of 800 adults, they found that while 71% of adults indicated that they walked or rode a bike to school when they were young, only 22% of children do so today. The primary reason reported for more children not walking or biking was because schools were too far away.

Beldon Russonello and Stewart Research and Communications. "Americans' Attitudes toward Walking and Creating Better Walking Communities." *Surface Transportation Policy Project Report*. Washington: Beldon Russonello & Stewart Research and Communications, 2003. This report is available online at: www.transact.org/report.asp?id=205

In two decades children's independent mobility has dramatically declined

This article summarizes some of the results of a study conducted by Dr. Mayer Hillman and colleagues in 1990 of almost 4,500 children and parents to explore junior (7 to 11 years of age) and senior (11 to 15 years of age) schoolchildren's travel patterns and levels of independence in England and Germany. This particular article focuses on the results of the survey in England of junior schoolchildren and their parents, as compared to a 1971 survey that was implemented in the same schools. Some of the key findings highlighted in this article include:

- In 1971, 80% of 7 to 8 year olds could go to school on their own, whereas just 9% could do so in 1990.
- In 1990, only half as many 7 to 11 year olds as in 1971 could go to places other than school by themselves.
- In 1971, 66% of children who owned bicycles could use them on roads, whereas just 25% of children could do so in 1990.
- There were large increases in the proportion of children being driven to school by car (from about 9% in 1971 to about 32% in 1990) and the proportion of children being accompanied by adults (from about 30% of 7 year olds in 1971 to 92% in 1990).
- The age at which children are granted specific freedoms increased—the freedom permitted to a 7 year old in 1971 was permitted to the average 9.5 year old in 1990.
- Parents' primary concern was danger of traffic.
- Parents thought they had far more freedom than their children have.

Dr. Hillman and colleagues primarily attribute the large decline in children's independent mobility to increased motorized traffic. They discuss how road accident statistics are not an adequate or comprehensive measure of road safety and that the primary reason why there have been reduced accident rates in England is due to the fact that children have been pulled off the streets and are no longer exposed to traffic. Children's lack of freedom to move about their neighborhoods is not currently accounted for in the costs of transportation and the authors propose other possible measures of road safety that go beyond mere accident statistics.

Hillman, M., & Adams, J. G. U. "Children's Freedom and Safety." *Children's Environments*, 9(2), 12-33, 1992. This study is available online at:
http://www.colorado.edu/journals/cye/9_2/9_2article2.pdf

Hillman, M., Adams, J., and Whitelegg, J. *One False Move: A Study of Children's Independent Mobility*. London: Policy Studies Institute, 1990. This report may be available in a library near you or can be purchased online at: <http://www.centralbooks.co.uk>

Many children do not go out by themselves

This report presents findings from a 2003 survey of over 2,500 children and young people conducted by England's Office of National Statistics. The survey was designed to collect data on children's (8 to 10 years old) and young people's (11 to 15 years old) views on a variety of topics, including their social networks,

participation in their communities, and attitudes about their neighborhood. A few of the findings for children (8 to 10 years of age) include:

- 89% of children said they enjoyed living on their street and block a lot or quite a lot; 11% said they did not enjoy living on their street and block.
- 66% of children said they felt very safe or fairly safe walking or playing alone during the daytime; 34% said they did not feel safe.
- For those who felt unsafe walking or playing alone, the fear of abduction or kidnapping by strangers was the most cited reason at 59%, followed by cars and traffic at 23%.
- 33% of children said they went to local shops or parks on their own; 67% said they did not go to local shops or parks on their own.
- 51% of children said their friends played in their home or garden at least once a week.
- When meeting friends outside of their home, 21% of children were accompanied by an adult all of the time and another 52% were accompanied by an adult some of the time.
- 67% of children said they went to clubs outside of school—sports clubs were the most frequently cited at 57%.
- 89% of children are usually transported in the car to go places during evenings and weekends.

In the report, the authors note important variations in responses to this survey by age as well as economic status. For example, older children were more likely to feel safe and to venture out to local shops and parks by themselves. In addition, children in more affluent areas tended to be more positive about their neighborhood than children in more deprived areas.

Farmer, C. *Home Office Citizenship Survey: Top Level Findings from the Children and Young People's Survey*. Home Office and the Department for Education and Skills, 2005. This report is available online at: <http://www.dfes.gov.uk/research/data/uploadfiles/RW29.pdf>

Children do not play outside as much as they would like to

Playday is a national campaign, based out of the United Kingdom (UK), to celebrate children's right to play. As part of an annual celebration, the Children's Play Council, often in partnership with other organizations, commissions a survey related to children's play. For their 2005 survey, the British Market Research Bureau interviewed 671 children age 7 to 14 in Great Britain to investigate children's opportunities for outdoor play and the barriers they encounter. In addition, for their 2006 survey, the British Market Research Bureau interviewed 543 7 to 14 year olds across the four UK nations to investigate where children play. Some of the key findings from these two surveys include: 1) a number of children do not play outside very often (20% of children play outside for an hour or less a week), 2) 39% of children do not play outside as much as they would like to, 3) children generally prefer to play in natural spaces over non-natural spaces, 4) safety and the quality of their environment (e.g., the places to play outside) are the biggest factors that impact how much children play outside, and 5) outdoor and indoor activities (e.g., computer games, TV, and homework) seem to compete against one another for children's time.

Playday 2005 and 2006 Survey Reports. British Market Research Bureau for the Children's Play Council, 2005, 2006. These survey results are available online at:
2005 Survey Results: <http://www.playscotland.org/pdfs/Playdayresearchreport1.pdf>
2006 Survey Results: http://www.playday.org.uk/Upload/2121522_play-survey-summary-playday-2006.pdf

Parental concerns are more influential than the availability of play spaces in determining children's play opportunities

In this study, Drs. Gill Valentine and John McKendrick discuss the results of a research project they conducted in Northwest England with parents from diverse socio-economic backgrounds who had an 8 to 11 year old child. They conducted a survey with 400 parents and an in-depth interview with 70 of these parents to investigate their opinions about public facilities and play spaces, as well as specific concerns (e.g., safety) that might be influencing children's access to these spaces. In analyzing their data, Drs. Valentine and McKendrick found that most parents were dissatisfied with public play facilities in their neighborhoods and that there were differences in parents' opinions about these facilities based on social class, family status (e.g., single or two parent household), and geographic area (urban vs. rural). Despite this overall perceived lack of opportunity, however, Drs. Valentine and McKendrick found that parental restrictions play the largest role in determining children's play opportunities and that even if there were enough adequate play facilities, many parents would not allow their children to use them based on their concerns about safety related to traffic and strangers. Additionally, they found that family status (e.g., single or two parent household) impacts children's play experience and that social interactions between mothers play an important role in determining what is acceptable regarding children's outdoor play.

Valentine, G. and McKendrick, J. "Children's Outdoor Play: Exploring Parental Concerns About Children's Safety and the Changing Nature of Childhood. *Geoforum*, 28(2), 205-220, 1997. This study may be available in a library near you or can be purchased through the publisher (Elsevier) at: http://www.elsevier.com/wps/find/homepage.cws_home

Parents identify safety as the biggest barrier to children's independent play

In this study, Dr. Jenny Veitch and colleagues interviewed 78 parents from five primary schools in Melbourne, Australia to investigate children's free-play and their perceptions about what influences children's free-play. The interviews provided rich, in-depth information regarding individual, social, and physical influences on children's play. In their analysis, Dr. Veitch and colleagues found that children primarily engaged in free-play in their yard at home, with a smaller percentage of parents reporting that their child often played in the street and public open spaces.

The most important influence on a child's mobility was safety, with 94% of parents stating that safety was their biggest concern. Parents' safety concerns centered around strangers, teenagers and gangs, and road traffic. Other influences on mobility included a child's independence (for example, older children had greater independence than younger children); a child's attitude towards free-play (for example, parents often described their children as being "indoor" or "outdoor"); social networks (such as the absence of young people nearby to play with); and play facilities (almost 50% of parents complained about the lack of age-appropriate play equipment available in parks and playgrounds).

Veitch, J., Bagley, S., Ball, K., & Salmon, J. "Where Do Children Usually Play? A Qualitative Study of Parents' Perceptions of Influences on Children's Active Free Play." *Health & Place*, 12(4), 383-393, 2006. This study may be available in a library near you or can be purchased through the publisher (Elsevier) at : http://www.elsevier.com/wps/find/homepage.cws_home

Parental constraints have always been present, but in this generation they seem to exert much greater control on children's play

In this study, Dr. Christine Tandy surveyed 421 children (ages 5 to 12) and 165 parents from suburban primary schools in Newcastle, New South Wales, Australia to investigate changes in children's independent mobility over time by comparing play patterns of schoolchildren in the late 1990s with play patterns of their parents. Dr. Tandy found that children in the late 1990s spent their time predominantly playing at home and in activities that were monitored or controlled by adults as compared to children a generation ago. Despite the dominance of home-based play, children's drawings, however, indicated a strong preference for outdoor activities. Dr. Tandy also found that while children in both generations had parental constraints placed on their activities out of concern for their safety, children a generation ago still had a high degree of mobility and freedom (33.1% of children a generation ago had only a few restrictions with regard to their play space as compared to just 3.1% of children in the late 1990s). Parents themselves recognized this difference and a number indicated that society had changed from one in which it was safe for children to freely play, to one where it is not safe and thus there was a greater need for supervision to ensure children's safety.

Tandy, C. "Children's Diminishing Play Space: A Study of Intergenerational Change in Children's Use of Their Neighborhoods." *Australian Geographical Studies*, 37(2), 154-164, 1999. This study may be available in a library near you or can be purchased through the publisher (Institute of Australian Geographers) at: <http://www.iag.org.au/index.html#IAGPubs>

Parents' perceptions about their neighborhood influence children's mobility

In this study, Dr. Anna Timperio and colleagues investigated how parents' perceptions of their local neighborhood might be related to their child's walking and cycling behaviors. They surveyed 1,210 families with children (5 to 6 years old or 10 to 12 years old) from 19 state primary schools in high and low socioeconomic areas in Melbourne, Australia. With the collected data, Dr. Timperio and colleagues conducted multivariate analyses and found that a number of parental perceptions about the neighborhood were associated with children's walking or cycling patterns. For example, parental concern about road safety (e.g., lack of traffic lights or the number of roads that must be crossed) had a negative influence on children's walking and cycling. They also found that older children (10 to 12 years old) who perceived that they had poor access to parks, cycled and walked less than other children. Interestingly, Dr. Timperio and colleagues found discrepancies between children's and parent's perceptions of their local neighborhood—children, for example, were less concerned than their parents about heavy traffic, road safety, and strangers—however, parental perceptions were a bigger driver of children's behavior than children's perceptions. This study highlights the importance of the perceived neighborhood environment and its impact on parent and child behaviors.

Timperio, A., Crawford, D., Telford, A., & Salmon, J. "Perceptions About the Local Neighborhood and Walking and Cycling Among Children." *Preventive Medicine*, 38(1), 39-47, 2004. This study may be available in a library near you or can be purchased through the publisher (Elsevier) at : http://www.elsevier.com/wps/find/homepage.cws_home

Texas Parks and Wildlife Department has provided funding to the Children & Nature Network (C&NN) in order to have C&NN "research and provide an executive summary of 20 premier research reports providing evidence of the decline in children's and family's direct experience of nature and the potential detrimental effects of this disconnect between children, families and nature." The information is made available on the Children & Nature Web site, www.cnaturenet.org.

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