American Academy of Pediatrics
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POLICY STATEMENT

The Built Environment: Designing Communities to Promote Physical Activity in Children

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Committee on Environmental Health

ABSTRACT

An estimated 32% of American children are overweight, and physical inactivity contributes to this high prevalence of overweight. This policy statement highlights how the built environment of a community affects children's opportunities for physical activity. Neighborhoods and communities can provide opportunities for recreational physical activity with parks and open spaces, and policies must support this capacity. Children can engage in physical activity as a part of their daily lives, such as on their travel to school. Factors such as school location have played a significant role in the decreased rates of walking to school, and changes in policy may help to increase the number of children who are able to walk to school. Environment modification that addresses risks associated with automobile traffic is likely to be conducive to more walking and biking among children. Actions that reduce parental perception and fear of crime may promote outdoor physical activity. Policies that promote more active lifestyles among children and adolescents will enable them to achieve the recommended 60 minutes of daily physical activity. By working with community partners, pediatricians can participate in establishing communities designed for activity and health. *Pediatrics* 2009;123: 1591–1598

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Key Words
physical activity, youth, neighborhood, active transport, walk to school, parks, built environment, active living, urban design, pedestrian safety

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INTRODUCTION

A child's life is affected by the environment in which he or she lives. Relationships between health and the quality of air, water, and food are well recognized.[1–3] The physical environments of the home and school also influence health through exposures to lead,[4] mold,[5] noise,[6] or ambient light.[7] In addition, the overall structure of the physical environment of a child's community (referred to as the "built environment") can also affect health in diverse ways.

As cities have expanded into rural areas, large tracts of land have been frequently transformed into low-density developments in a "leapfrog" manner. The resultant urban sprawl can increase automobile travel, which increases air pollution[8] as well as passenger and pedestrian traffic fatalities.[9] Some urban areas may have few supermarkets, produce stands, or community gardens, thereby limiting access to fresh fruits and vegetables.[10] The physical environment of a community can support opportunities for play, an essential component of child development,[11] and for physical activity, a health behavior that not only reduces risk of excess weight gain[12,13] but also has many other benefits for overall well-being.

Many factors influence a child's level of physical activity, including individual-level psychosocial factors such as self-efficacy[14,15]; family factors such as parental support[16]; and larger-scale factors such as social norms.[17] Although these are all important contributors, this policy statement is limited to focusing on how the physical design of the community affects children's opportunities for physical activity. Opportunities for recreational physical activity arise with parks and green spaces. "Utilitarian" physical activity, such as walking or bicycling to school and to other activities, is an equally important part of a child's daily life. Environments that promote more active lifestyles among children and adolescents will be important to enable them to achieve recommended levels of physical activity.

BACKGROUND

The term "built environment" refers to spaces such as buildings and streets that are deliberately constructed as well as outdoor spaces that are altered in some way by human activity. This term may be unfamiliar to most clinicians, but with the high prevalence of childhood overweight and obesity,[18] the subject is increasingly relevant.

An individual's lifestyle and behaviors influence weight-gain patterns and physical fitness, and health education through clinicians and public health or community affiliates has long been recognized as important in influencing health behaviors. However, as the relationship between physical activity and obesity unfolds, it has become apparent that certain aspects of the environment influence the adoption of positive health behaviors. For example, a pediatrician's recommendation that a patient get regular physical activity loses its salience if this patient's everyday world lacks opportunities to walk, play, or run.

Physical activity has many health benefits.[12] As an important component of play,[11] physical activity contributes to children's organization and social skills[19] and promotes self-esteem and higher grade achievement among adolescents.[20] The American Academy of Pediatrics recommends that children be physically active for at least 60 minutes/day.[12] This can be met with structured activities, including sports and school-based physical education classes, or through an active lifestyle, including outdoor play and walking or biking for transportation. For preschool-aged children, outdoor play may be particularly important, because their highest levels of physical activity occur outside.[21,22] Environments that support recreational opportunities for children and adolescents also support the engagement of adults as they supervise, coach, and mentor youth.

The physical layout of communities can promote or limit opportunities for physical activity. There is growing research and policy interest in active living, defined as "a way of life that integrates physical activity into daily routines."[23] Under this principle, by establishing communities that support an active lifestyle, neighborhood design can promote physical activity patterns that are sustainable and important to health.

RECREATIONAL PHYSICAL ACTIVITY: PARKS AND RECREATIONAL FACILITIES

Although parks do not guarantee physical activity among nearby residents, they offer the opportunity.[24] In an experimental study in which children were made to decrease their time spent being sedentary, they increased the time spent engaged in physical activity, and the extent of increase was associated with proximity to a park.[25] The same research team has shown that as the percentage of park area within a child's neighborhood increases, so does the physical activity among children 4 to 7 years of age[26] and nonoverweight children 8 to 12 years of age.[27] Park space may vary considerably between neighborhoods. In Los Angeles, California, park acreage within neighborhoods ranges from 0.6 to 31.8 acres per 1000 people.[28,29]

Children living in low-income or predominantly minority neighborhoods may have less access to parks or other recreational facilities. In a national sample, access to a physical activity or recreational facility (including parks) was most often found for adolescents living in areas with higher percentages of the population having a college education. In areas where ≤25% of the population had a college education, higher proportions of minority population were associated with a lower likelihood of having a recreational facility.[30] Youth with low socioeconomic status are more likely than their affluent peers to report that a nearby recreation facility is important for their degree of physical activity,[31] possibly because they have limited access to more remote (or more expensive) opportunities for physical activity.

Examples of successful strategies to promote public space exist. Local communities have created parks and playgrounds in previously unused areas. Nonprofit organizations, such as the Trust for Public Land, have helped communities by assisting them in tasks ranging from park siting to development of funding strategies. Between 1971 and 2002, the Trust for Public Land's work in US cities resulted in the acquisition of 532 properties totaling 40 754 acres of newly created public land.[28] Legislative efforts are also an important mechanism to fund park development and maintenance. Proposition K, enacted in 1996 in Los Angeles, generates funds to provide $25 million annually to the improvement, construction, and maintenance of city parks. In the November 2002 elections, voters in 93 communities in 22 states approved ballot measures that committed $2.9 billion to acquire and restore land for parks and open space.[28] In addition to parks, community gardens are also being created.[32] (Community gardens provide a space for generation of food and the opportunity for gardening, a beneficial physical activity in its own right.)

"INCIDENTAL" PHYSICAL ACTIVITY

An important component of a healthy lifestyle is participation in activities for which exercise is not the primary goal. This might be a "purposeful walk"—an errand to buy groceries or a trip to school. Such incidental physical activities (also known as "utilitarian trips"[33]) play an important role in energy balance and can be influenced by neighborhood design.[34]

Neighborhood Design

The positioning of homes, schools, businesses, parks, and sidewalks within a neighborhood can influence physical activity. Neighborhood design typically considers 4 land uses: residential, industrial, green space, and institutional (eg, schools). Sprawling urban design has less mixing of these types (or less "land-use mix"). Figure 1 illustrates this distinction. Houses and apartments in the lower section of the diagram (the traditional neighborhood) are closer to other types of destinations such as the school or the mall, and the houses in the upper section (suburban sprawl) are more isolated. This figure also demonstrates a second core concept from urban planning known as "connectivity," or the ease of moving between origins (eg, home and work).[35] Street grids with many intersections provide many options for navigating to a destination.[36] In the low-density upper part of the diagram, although there are houses that are not far from the school "as the crow flies," getting to the school requires winding out of the enclave of houses to a busy main road. Thus, a child who lives close to school may still find walking to school prohibitive.

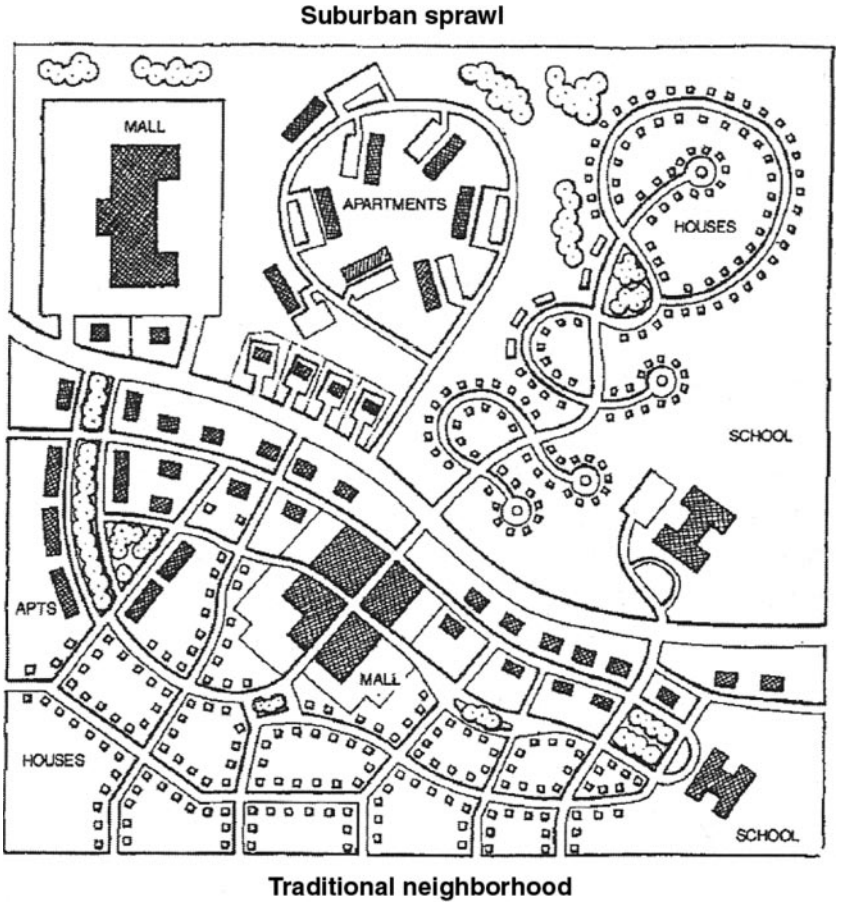

FIGURE 1
Comparison of street networks and land use in sprawled (upper) and traditional (lower) neighborhoods. Source: Drawing by Duany Plater Zyberk as shown in Spielberg F. The traditional neighborhood development: how will traffic engineers respond? *ITE J.* 1989;59:17.

Building new communities that are less car dependent and making existing communities more dense are 2 strategies that can make it easier for people to walk to their destinations of daily life. Higher land-use mix encourages more utilitarian trips among residents and increases their ability to reach their destinations on foot rather than by automobile. Proximity of neighborhood shops to residences promotes trips on foot or by bicycle.[37–39] In addition to mixed-land use, other measures, such as higher residential density, smaller street blocks,[40,41] and access to sidewalks,[42,43] have been reported to translate to increased walking in adults. Increased urban sprawl, by which farther distance between destinations decreases walkability, has been associated with less physical activity and with more obesity in adults,[44,45] as well as higher automobile passenger and pedestrian fatality rates.[9]

Air pollution exposure has been associated with the development and exacerbation of asthma in children.[46–48] Although physical activity is a positive aspect of outdoor play, it is important to recognize that time spent outdoors can make a child more vulnerable to ambient air pollution. Direct exposure to vehicle exhaust can affect a child's health, and higher urban density theoretically can increase one's daily exposure to vehicle exhaust and street traffic. Conversely, low-density sprawl promotes vehicle dependence and long-distance commuting, thus threatening air quality of the population at large. Children will benefit from planning that actively promotes outdoor play and walking while addressing the negative health effects of traffic and air pollution.

Higher housing density with increased land-use mix is a design strategy that promotes more physical activity among residents. However, there are other hybridized approaches that include creative design solutions that blend the benefits of connected streets with green space that is protected from automobile traffic. A street block plan can have "shared outdoor space,"[49] set aside within the heart of a cluster of residences. In this plan, front entrances of homes face the street and the back entrances face the shared outdoor spaces, which are accessible only to the residents. This design promotes a separation of outdoor recreational areas from traffic and an increased sense of ability to supervise children while preserving the community's ability to fit well onto a traditional grid of streets, which promotes walking to nearby destinations.

Walking to School

The most universal opportunity for incidental physical activity among children is in getting to and from school. Walking or biking to school has not yet been documented to lower BMI,[50] but it is a valuable opportunity for activity[51] and promotes higher levels of physical activity in boys.[52] Among middle-school girls in the Trial of Activity for Adolescent Girls (TAAG) study, every mile

that a girl lived farther from school translated to significantly fewer minutes of metabolic activity per week.[53] Closer proximity to school also provides the opportunity for use of school grounds for physical activity in after-school hours, and researchers have shown that provision of an open (supervised) school yard led to increased levels of physical activity and less television and video game use.[54]

In 1969, 40.7% of all American children walked to school. Currently, approximately 12.9% of all American children walk to school,[55] and in some areas as few as 5% of children walk to school.[56] Two national telephone surveys, HealthStyles in 1999[57] and ConsumerStyles in 2004,[58] queried parents about what barriers prevented their children from walking to school. The most commonly cited reason from those surveys and from the National Personal Transportation Survey from 1969–2001[55] was that the school was too far away.

School Sprawl

Suburbanization and decisions about school siting are important determinants of why children now live so far from school. Historically, small neighborhood schools served as "anchors" within the community and places for after-school programs, for social and recreational gathering, and as disaster shelters.[59] However, after the 1950s, many states established policies on the size and location of school buildings that influenced school siting. According to those guidelines, to receive state funding, schools had to have a minimum acreage (eg, elementary schools needed to be on at least 10 acres), and more students translated to larger required school-grounds size (eg, an extra acre for every 100 students).[8,60] Because untapped acreage sufficient to meet these standards is most often at the edge of an urban area, neighborhood schools (typically only 2–8 acres in size)[60] were frequently demolished or closed in favor of "big-box schools" at the outskirts of cities. Recommendations on school size from the Council of Education Facilities Planners International (CEFPI) were revised in 2004[61] and no longer recommend a minimum acreage. There is increasing interest in supporting smaller schools,[62] but change to policies on school land size occurs slowly. It is also important to acknowledge that there may be some trade-offs to consider regarding school size and physical activity. There is some research suggesting that larger school campuses, buildings, and play areas may promote youth physical activity during the school day.[63]

Distance is, of course, not the only barrier preventing children from walking or biking to school. A recent nationally representative study found that even among children who lived within 1 mile of school, less than half walk to school even 1 day/week. The proportion of children walking to school was the lowest among those living in the South, those living in a rural area, or those whose parent had an advanced degree.[64] The ConsumerStyles survey determined that parents' foremost concern was distance from school, followed by concerns about danger from traffic and crime, weather, and other miscellaneous factors.[58] These barriers are important, because they may prevent children not only from walking and biking to school but also from getting other physical activity in their neighborhood. To address these concerns about children's commutes to school, schools and parents in many US cities have organized a "walking school bus."[65] A walking school bus is created when groups of schoolchildren, supervised by volunteer adults, walk together through the neighborhood to "pick up" other children waiting with a parent at designated "bus stops." These programs represent an example of practical solutions to address concerns about environment and safety.

THEMES IMPORTANT FOR BOTH RECREATIONAL AND INCIDENTAL PHYSICAL ACTIVITY

Roads and Traffic

When parents are asked what prevents their children from walking to school, the second most commonly mentioned factor is traffic danger.[57,58] In addition, parental concern about traffic is a major barrier to children having opportunities for active free play.[66] "Traffic calming" refers to a variety of modifications and engineering techniques that can be applied to roads to slow driver speed. For example, road-design interventions can force cars to slow as they pass through undulations of the road surface.[67] A meta-analysis involving studies from multiple countries has shown that traffic calming reduces traffic injuries,[68] and research from the United Kingdom has shown that area-wide traffic-calming programs decreased pedestrian injuries in both affluent and poor areas.[69] There are traffic-calming programs in cities in 39 states, in cities such as Seattle, Washington, and Austin, Texas.[70] Research in Oakland, California, showed that children living near speed humps are less likely to be struck by an automobile in their neighborhood.[71] Measures that facilitate pedestrian crossing, such as single-lane roundabouts and islands in roadways, are effective countermeasures against pedestrian injury.[72] Taken together, there are many existing tools that address this very important parental concern about traffic danger.

Streetscapes, Esthetics, and Crime

Sidewalks and the perceived attractiveness of a neighborhood have effects on walking behaviors that are independent of socioeconomic status.[42] In addition, sidewalk presence seems to be protective for pedestrian safety in urban, residential, and mixed-use settings.[72,73] Although many new housing developments are encouraged to install sidewalks, installation is often waived with the substitution of other amenities.[62]

Safety concerns play an important role in how people respond to the built environment, with perception and fear of crime an important contributor to inactivity. Signs of disorderliness, such as broken windows, cue children to feel unsafe at school.[74] Children of parents who report anxiety about neighborhood safety get less physical activity.[75–77] A recent study that examined data on crime incidents showed that adolescent girls living near high-crime areas participate in less outdoor physical activity.[78] Urban design strategies may be able to foster "eyes on the street" to reduce fears by achieving

natural surveillance with storefronts that face the street or transit facilities (such as bus stops) that can be seen by shop owners or residents.[79] Living in a neighborhood considered "walkable" by objective methods was associated with more walking to school but only among neighborhoods with higher-level socioeconomic status.[80] This disparity may be attributable to the higher levels of concern about child safety found among parents in neighborhoods with lower socioeconomic status.

In 1999, California passed Safe Routes to School legislation, which funded improvements such as pedestrian crossings, sidewalks, and bicycle routes. Subsequent data have demonstrated that children walked to school more frequently after the improvements were made.[81] Because of the proven success of the California program, legislation established the Federal Safe Routes to School (SRTS) program in 2005, permitting communities to compete for funds administered by state departments of transportation.[82] This program funds a range of different approaches to increasing the number of children who walk to school, ranging from programs such as a walking school bus (groups of children walking to school under the supervision of volunteer adult) to traffic-calming engineering interventions or sidewalk improvements.[83]

Built Environment and Physical Activity: Translating Opportunity to Action

Research on relationships between the built environment and physical activity is an emerging field. Most studies are limited in that they are cross-sectional or focus only on adults. Nonetheless, the studies suggest that the built environment has a facilitative role in promoting child physical activity.[84–86] Furthermore, understanding relationships between the built environment and adult physical activity behaviors is important. Urban patterns that lengthen parents' time spent commuting to work may limit the time they have to engage in physical activity with their children. Factors that affect adult physical activity also affect the degree to which parents can serve as positive role models for their children. Ultimately, an environment in which physical activity is prohibitive will mean that our youth inherit a society in which sedentary behavior is the social norm.

Many communities are working to make their communities more walkable and bikeable and to make these activities more accessible and safe. These efforts provide timely research opportunities to examine the effects of built environment changes on children's physical activity.[86] However, the path from inactivity to activity is complex. Research will need to account for attitudes, beliefs, and social factors that influence behavior change, and interventions will require multifaceted approaches to overcome barriers that foster the status quo. Providing opportunities for physical activity through the built environment is only 1 of many important steps toward an active lifestyle.

RECOMMENDATIONS FOR PEDIATRICIANS

1. Ask patients and families about opportunities for recreational and incidental physical activity in nearby parks, playgrounds, or open spaces. Identify barriers that could be preventing children from using community locations and offer suggestions, when possible.
2. Encourage patients to advocate on behalf of their children and their schools for relevant environmental improvements, such as Safe Routes to School programs or a walking school bus. When present in their communities, encourage families to participate and use these programs. Encourage families who are considering a move of residence to consider the opportunities for physical activity at the new location.
3. Advocate for environmental improvements that will promote physical activity in children. Become involved in local community planning processes to encourage cities and local governments to prioritize space for parks. Emphasize the need for built structures, such as playgrounds, which will provide more opportunities for physical activity. Advocate for safe routes for incidental activity opportunities, including walking or biking to school.

RECOMMENDATIONS FOR GOVERNMENT

1. Pass and promote laws and regulations to create new or expand existing efforts to promote active living. Federal programs can incentivize states to incorporate these principles into planning and zoning standards. State and local governments should examine planning and zoning efforts to ensure that children's ability to walk, play, and get to school safely are a top priority.
2. Create and maintain playgrounds, parks, and green spaces within communities as well as the means to access them safely. Prioritize resources to low-income neighborhoods to ensure that all children and adolescents have access to safe and desirable opportunities for play and active lifestyles. Funding should also be prioritized to support specific evidence-based goals, such as building sidewalks in new and existing neighborhoods to create safe corridors to schools and neighborhood parks.
3. Promote legislation and fund programs that allow communities to create programs and environmental improvements to neighborhoods that can support children's active commuting to school. Consider children's ability for active transportation to school in the process of determining the location of a school.
4. Fund research on the impact of the built environment at neighborhood and community levels on the promotion of overall health and active lifestyles for children and families.
5. Serve as a model for communities. Whenever possible, new government buildings should be sited within walking distance of public transportation, walking trails, and residential areas to promote active living.

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