ACTIVE LIVING RESEARCH

Promoting activity-friendly communities.

RESEARCH REVIEW

Creating places that promote physical activity: Perceiving is believing

ABSTRACT

The design and maintenance of neighborhoods, streets, and parks, and people's perceptions of those places based on qualities such as aesthetic appeal and perceived safety, can affect physical activity in youth and adults. Adults and children prefer to visit and spend time in appealing places (those that include certain physical features, such as natural elements, good upkeep, unobstructed vistas, sidewalks and seating) and avoid unappealing places. This review examines the evidence on perceived aspects of places that affect preference, and may attract children to be physically active.

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INTRODUCTION

We face an obesity epidemic that affects all demographic groups, and is especially severe among certain racial and ethnic groups and low-income populations.[1-3] The Institute of Medicine recommends moderate-intensity physical activity, such as walking, as a way to prevent obesity.[4] Moderate physical activity can improve health and reduce obesity risk,[5] and lowered obesity rates could save billions of dollars in medical costs and lost productivity.[6]

Walking is convenient, easy for most people to do, and requires no special equipment. The built environment can influence how much people walk. Youth and adults who live in walkable neighborhoods are more likely to be physically active.[8] For leisure walking in particular, the perceived aesthetics (defined in this review as the visual appeal or pleasantness of an environment) and safety from crime and traffic can affect walking.[7,10, 43-45]

Although individual and social factors affect physical activity,[8] research shows that a well-designed physical environment matters.[9-11] People notice visual qualities,[13,14] and appealing aesthetics are essential to creating places desirable for youth physical activity.[7,10] Children and adults prefer to be physically active in places they perceive as appealing, and parents also prefer to have their children walk in such places.[10,12]

Physical measures of the environment (e.g., "number of trees nearby" or "width of sidewalks"), though important, may not account for the other, perceived aspects of places that affect aesthetics and, consequently, physical activity.[13,15] For example, a physical count of the number of trees and shrubs on a street provides a less complete picture than assessing people's perceptions of "naturalness," which integrates the number, size, location and other qualities of the natural elements as they relate to the built elements. In this example, it is the perceived naturalness, rather than the actual number of trees, that would affect walking.

If communities want to design places where people are active, they need to consider evidence that links physical activity to environments' actual characteristics, perceived characteristics, and aesthetic appeal.

METHODOLOGY

This review examines evidence on the relationship of rates of physical activity to the perceived aesthetics, safety and comfort of public places, such as streets and parks. This review also provides evidence that improving appearances can make a place more appealing — both in general, and specifically as a place for physical activity for adults and youth.

The evidence for this review came from Google Scholar, Thompson Reuter Web of Knowledge, and the Active Living Research literature database focusing on terms related to physical activity, walking, playing, environment, perception, aesthetics, fear of crime, safety from crime, safety from traffic, and mechanisms for calming traffic.

Note: For many studies cited here, researchers used color photographs and slides, and asked people to rate various aspects of the places, or put images in groups based on degree of similarity for qualities like "walkability." Ratings of photographs have been shown to be similar to ratings made of actual places.[16]

KEY RESEARCH RESULTS

- **Parents' perception of neighborhood safety affects their children's activity levels.**
- **People view aesthetics, defined as the visual appeal or pleasantness of an environment, as important, and aesthetics may affect how far and where children walk.**
- **People, regardless of their socio-cultural characteristics, generally have similar perceptions of the aesthetics of an environment. Moreover, these perceptions are not just "in the eye of the beholder," but rather are linked to characteristics of the environment.**
- **Aesthetics and perceived safety from either crime or traffic seem to be most important for attracting people to places.**
- **Vegetation improves visual appeal.**
- **People prefer orderly, neat, and well-kept environments to disorderly, messy, poorly maintained environments or those having physical incivilities (such as graffiti, litter or boarded up buildings).**
- **People prefer open, unobstructed views.**
- **Physical elements, including sitting space, sculptures, food, deciduous trees, water elements, and access to the street, can attract people.**
- **Perceived safety from crime is associated with greater order and upkeep, unobstructed views, lighting, and the presence of others who might help.**
- **Perceived safety from traffic is associated with the presence of sidewalks, footpaths, pedestrian infrastructure, street connectivity, controlled intersections, clearly marked street crossings, and reduced traffic speed and volume.**
- **Playgrounds and parks are more attractive for physical activity when they provide amenities such as play equipment or seating.**

STUDIES SUPPORTING KEY RESEARCH RESULTS

Parents' perception of neighborhood safety affects their children's activity levels.

- A review of 33 quantitative studies on the physical environment and physical activity among children ages 3–18 found that children's participation in physical activity was associated with their parents' perception of safety from either crime or traffic.[31]
- Among 32 low-income black mothers participating in a study, 31 reported that they did not let their daughters play outdoors in the neighborhood during the school year because of fears related to safety from crime and violence.[17]

People view aesthetics, defined as the visual appeal or pleasantness of an environment, as important, and aesthetics may affect how far and where children walk.

- Parents' perception of neighborhood aesthetics had a positive association with their children's active commuting to school.[35] A study of 137 adolescents and 104 adults from three U.S. cities found that aesthetics was the one neighborhood variable that was significantly related to increased physical activity among adolescents.[34]
- Studies of large-scale environments have repeatedly found that pleasantness, along with related characteristics, are a major aspect of the way people evaluate environments.[13,21,32,33]

People, regardless of their socio-cultural characteristics, generally have similar perceptions of the aesthetics of an environment. Moreover, these perceptions are not just "in the eye of the beholder," but rather are linked to characteristics of the environment.

- Overall, most adults and children prefer attractive, natural, and safe environments.
- Meta-analyses of studies in which more than 19,000 people evaluated 3,200 environments found that individual differences in socio-economic status, race, ethnicity, attitudes and other socio-cultural characteristics did not affect ratings of environments very much.[20]
- The meta-analysis found that generally adults agree in their perceptions and evaluations of what makes environments appealing and pleasant, but that children and adults may have some differences in how they rated environments.[20]
- Other research shows that children, and particularly adolescents, of different genders and ethnic groups differ in their impressions of environments.[36,37] For example, unlike adolescents, young children are least likely to engage in physical activity when they perceive barriers.[36]

Aesthetics and perceived safety from either crime or traffic seem to be most important for attracting people to places.

- Studies have repeatedly shown that the aesthetic appeal of places enhances the desirability of those places for walking among both children and adults.[7,10] They also show higher levels of physical activity among children and adults in places perceived as pleasant.[38-40]
- Most studies show that people prefer places they perceive as safe from crime,[26,41,42] and studies also show that both children and adults are more likely to be physically active in places they judge as safe from crime.[43-45] Safety from crime is an especially important consideration for girls and women.[43,44,46,47]
- However, some studies disagree on the effects of perceived safety on physical activity.[44,46] One study observed that people in a higher density urban area walked more in areas "with more traffic, sidewalk defects, graffiti and litter, and less desirable property aesthetics."[48] Possible explanations for these findings are that high pedestrian traffic may lead to indicators of overuse or signs of disorder, and that, in some places, people may have to walk through unappealing areas to get to a destination.
- Children are less likely to walk in areas they perceive as unsafe from traffic, and their parents are also less likely to let their children walk in such areas.[49-52]
- Aesthetic quality is linked with perceived naturalness, order and upkeep, and unobstructed views.[13,22,13] Other elements, such as sitting spaces, food vendors, deciduous trees, water features like fountains or ponds, easy access to the street, and sculptures or other objects that serve as social ice-breakers also enhance the attractiveness of places.[23,24]

Vegetation improves visual appeal.

- Most studies show that people prefer environments they perceive as natural, and that adding elements perceived as natural, such as vegetation or water, to an environment enhances preference.[22,56-59]
- Studies in two cities asked a total of 220 residents and 180 visitors to map the areas they liked most and disliked most, and explain the reasons why. Naturalness emerged as one of five variables that residents and visitors most often listed among their preferences, and this finding was supported by a study in a third city.[60] Other studies show that wide-canopied, narrow-trunked deciduous trees, which offer sunlight in the winter and protection from sun in the summer, are particularly desirable and may attract use.[13,22,61-65]
- Studies suggest naturalness may affect people's desire to be active in a setting. Children are more active in areas with vegetation.[66] Naturalness also attracts people, and people like to walk in places where they see other people.[12,67,68]

- In one study, African-American children and their parents were given photographs of streets to sort into groups, based on how walkable they seemed. Naturalness was positively associated with walkability, and was among the two most frequently-cited reasons children and their parents would include a photo in a "walkable" group of images. (Figure 1).[69]

FIGURE 1 **Frequency that participants mentioned a characteristic as a reason for sorting streets together for walkability (higher values suggest greater perceived prominence of the feature)**[69]

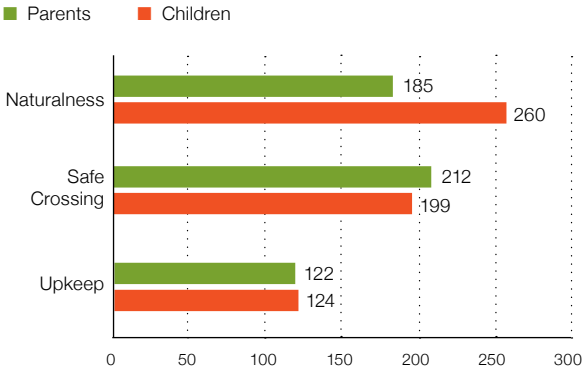
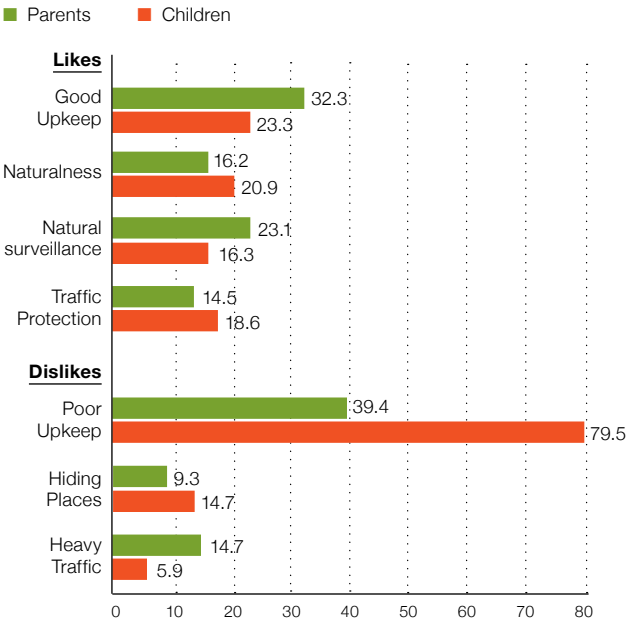


FIGURE 2 **Percentage of reasons given by children and their parents for why they chose streets or avoided streets to walk on or for their child to walk on (higher values are better)**[69]



- A second study asked a different sample of African-American children and their parents to choose between pairs of simulated streets: one they wanted to walk on (children) or wanted their children to walk on (parents). Vegetation was one of the top two reasons participants reported for their choice of where to walk (Figure 2).[69]

People prefer orderly, neat, and well-kept environments to disorderly, messy, poorly maintained environments or those having physical incivilities (such as graffiti, litter or boarded up buildings).

- Good upkeep (clean without litter, weeds or other signs of disorder) has particular importance, because of both its impact on perceptions and the ease of improving it.[13,22,70] Research confirms the importance of order and upkeep to adult perception and preference in cities,[58] streetscapes,[42] signscapes,[71] and natural settings.[72]
- In studies of how children and adults made decisions about places for children to be active, upkeep emerged as a key dimension in both sorting photographs of streets for similarities, and in selecting among pairs of simulated streets to walk on (Figures 1 and 2).[69] Good upkeep also emerged as among the most cited reasons in the selection of playgrounds as good places for children to play.[30]

People prefer open, unobstructed views.

- Open views allow individuals to see and predict what's ahead, and many studies confirm that adults prefer environments that offer open views.[13,22,42,58,69,69,73] In maps of their physical activity, children often mapped open spaces and parks as places where they were physically active.[74]
- Open views may have particular relevance to playground design. A study of playgrounds found that openness was often considered as children and parents made decisions about playground preferences.[69]

Physical elements, including sitting space, sculptures, food, deciduous trees, water elements, and access to the street, can attract people.

- An observational study of 16 plazas and three small parks in Manhattan, New York, identified six factors that attract people, and make for places that are considered lively and good to visit.[23] Other studies have confirmed the desirability of seats, food vendors, trees, water features such as fountains, and elements such as sculptures that serve as social ice-breakers.[24,75,76] Figure 3 shows improvements in visitability (the degree to which adults want to visit, spend time in, or meet a friend in a particular place) from adding seats, sculptures, food, or both seats and sculptures. Figure 4 shows plazas (with seats and sculptures) that received high visitability scores.

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FIGURE 3 **Mean ratings from 1 (not at all visitable) to 10 (completely visitable)**[24]

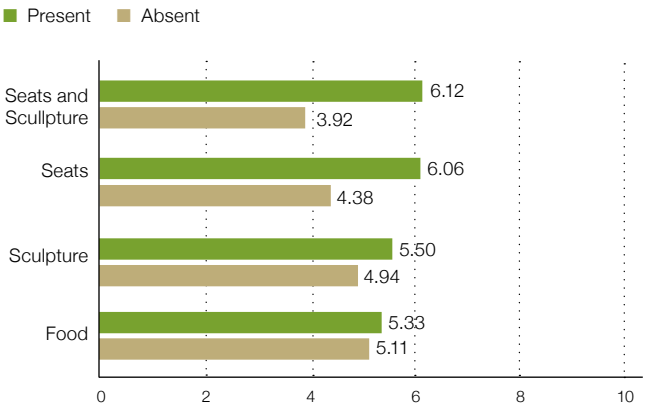

FIGURE 4 **Plazas with seats and sculpture received the highest scores for visitability**[24]

Perceived safety from crime is associated with greater order and upkeep, unobstructed views, lighting, and the presence of others who might help.

- Perceived safety from crime relates to preference and may affect physical activity.[26,41,42] Elevated fear of crime may decrease physical activity, such as walking or playing, for children as well as adults,[43,44] though studies are not consistent.[10,46] Perceived safety from crime may have larger effects among groups whom research shows feel more vulnerable, such as girls, women, older people, and people living in low-income areas.[46]
- Fear of crime relates to many non-physical factors, but studies have found that it increases for three kinds of physical factors: disorder; hiding places or concealment ahead; and lack of "eyes on the street" nearby.
  - **Disorder.** Disorder in the form of physical incivilities (such as graffiti, litter, shuttered stores, and abandoned buildings) and social incivilities (such as criminal activity) are correlated with perceived incivilities, fear of crime, crime, and reduced neighborhood satisfaction.[27,78,83]

    A study that manipulated physical characteristics of virtual streets supported an effect of upkeep: Better upkeep improved the likelihood of a child or adult reporting that they would choose the street for a walk.[69] Of the three variables tested, upkeep had the largest and most consistent effect on walking choice. Children were about eighteen times more likely to pick a best-kept street over a worst-kept street to walk on, and their parents were about five times more likely to pick a best-kept street over a worst-kept street for their child to walk on.

    In reporting reasons for these choices, children and parents most often mentioned poor upkeep elements (such as litter, dirty or cracked sidewalks, weeds, or dead grass) as reasons they avoided a street, and good upkeep elements (such as clean or smooth sidewalk, or well-kept lawns) as reasons they chose one.[69]

    The perceived upkeep of sidewalks also affects the likelihood that a child walks to school.[84]
  - **Hiding places or concealment:** Although theory and research suggests that the promise of new information ahead (such as a sidewalk curving around a bend) is preferred and should invite people to explore,[85,86] in some situations it can lead to uncertainty and fear. Thus, for example, people rate curved alleys as less liked and more fearful than straight ones.[87] Studies consistently show that blocked views ahead evoke fear and lead to avoidance. The studies have used different methods (including surveys and observation of behavior), different environments, and different types of participants,[26,55,81] and all of them show that fear of crime is lower in places with open views.

Blocked views and potential hiding places ahead may decrease walking among children. It emerged as one of the most frequently cited reasons by children and adults for grouping streets in terms of walkability and as a salient aspect of their perception of streets.[69] When the researchers added blocked vistas to virtual streets, the analysis revealed that for apartment settings, children were about seven times more likely to walk on the street with no hiding places than on the one with a hiding place in the foreground and close to the sidewalk.[69]

- **"Eyes on the street":** Physical activity is associated with better lighting,[31,88,89] and children and parents both often cited factors related to "eyes on the street" (such as lighting, lamps, cars, houses on both sides of the street, and houses or people around) as reasons for sorting photos of streets for walkability.[69] Though not a manipulated test variable, it was also the third most-cited reason for choosing a street for walking.[69]

Perceived safety from traffic is associated with the presence of sidewalks, footpaths, pedestrian infrastructure, street connectivity, controlled intersections, clearly marked street crossings, and reduced traffic speed and volume.

- Young children are less likely to walk, and parents are less likely to have their children walk, in areas they perceive as exposed to, or unsafe from, vehicular traffic.[49-52] Studies show decreased walking is associated with the number of road crossings required, and traffic speed and volume.[10,31]
- A meta-analysis of 1,721 results from 103 papers found that for children ages 3 to 12, physical activity was related to actual and perceived pedestrian safety structures, such as crosswalks and traffic lights, and that physical activity or walking for transport was related to sidewalks and traffic speed and volume. For adolescents, the findings were less consistent.[10]
- Another meta-analysis of 33 studies of physical activity among children ages 3 to 18 found that children's physical activity was positively associated with the presence of sidewalks and controlled intersections, and access to destinations and public transportation, and negatively associated with number of road crossings required, and traffic density and speed.[31]
- A meta-analysis of 16 studies found that people were more likely to engage in physical activity if they reported presence of sidewalks (versus those reporting absence of sidewalks) and if they reported heavy traffic was not a problem (versus those reporting heavy traffic was a problem).[29] A study that manipulated street characteristics in virtual environments found that parents were more than five times more likely to choose the narrowest streets (where crossing would be safest) than the widest streets (where crossing would be least safe).[69] Among reasons for choosing a street for walking, perceived safety from traffic emerged as the second most-frequently cited reason by parents and the third most-frequently cited reason by children (Figure 2).

Playgrounds and parks are more attractive for physical activity when they provide amenities such as play equipment or seating.

- Studies have found that physical activity on playgrounds relates to the presence and diversity of play equipment. In the study that had children and their parents sort photos of playgrounds, seats (present or not) and the type of playground (play equipment or not) emerged as two of the three prominent dimensions of perception for each group.[30]
- In response to the manipulation of virtual playgrounds for play equipment, seats, and fences, parents were 4.9 times more likely, and their children 3.6 times more likely, to pick a playground with play equipment than one without it. Parents were also more likely to choose a playground with seats, and children were more likely to select a playground with a fence.[30]
- Observations of physical activity of 229 children (106 girls and 123 boys) in 14 playgrounds found that physical activity on the playgrounds increased with the presence of play equipment, seats or fences,[30] and that there was more sedentary behavior in playgrounds lacking seats or play equipment.[93,94] Interventions confirmed the importance of equipment: Adding activity-friendly equipment and artwork to a playground for 3- to 5-year-olds increased activity, measured by accelerometer,[95] and redesigning 11 school playgrounds with multicolor markings and physical equipment also led to increased physical activity for children during recess.[96]
- As with other environments, shade trees are important, but studies also point to the importance of other amenities specific to parks and playgrounds.[90] One study found that in addition to aesthetics, playground use was related to amenities such as drinking fountains, picnic areas, and restrooms.[91] Another study centering on adolescent girls found that more minutes of moderate-to-vigorous physical activity were associated with streetlights and floodlights,[92] and a meta-analysis found that physical activity was related to the perceived presence of physical activity facilities.[29]

CONCLUSIONS AND RECOMMENDATIONS

When it comes to changing environments to encourage physical activity, the most promising strategies involve making aesthetic changes that are strongly associated with the perceived desirability of environments for walking and with increased physical activity, and prioritizing the characteristics that both children and adults view as attractive.

Physical measures of features of the environment do not always match people's perceptions of those features.[13,15,97] Thus, when choosing environmental changes to prioritize, it makes sense to target those characteristics of places shown as likely to foster physical activity and/or that people perceive positively (which are, in turn, linked to physical activity).

To plan places that foster physical activity, communities should couple the findings from physical and perceptual measures with knowledge of how those characteristics affect visual appeal and physical activity, such as walking. In theory, appealing places should attract people, and the presence of other people would strengthen their appeal which would, in turn, further strengthen their draw as places for physical activity. Here is a summary of strategies to improve the appeal of places.

1. Add vegetation, and choose and locate plants that keep views open.
2. For nighttime, plan lighting to avoid dark places of concealment.
3. Maintain the environment to keep it orderly, neat and well-kept, and remove (or screen from view) poor upkeep and incivilities, such as vacant and dilapidated buildings, broken windows, litter, or cracked sidewalks.
4. As people like to watch people, and feel safer with others present who can help, plan certain streets or areas for more intense pedestrian activity. Add features such as seats, sculptures, food vendors, and water features to attract people.
5. Add amenities to playgrounds such as equipment, seats, fences, and water fountains.
6. Because a parent's perception of the environment may affect his or her child's physical activity,[17,98] it makes sense to attend to the parent's perception, and to pay special attention to the qualities where parents and children agree, such as physical upkeep.

FUTURE RESEARCH NEEDS

1. Research on environmental perceptions can provide information about how to improve the quality and appeal of communities, streets, and parks.
2. For aesthetics, most findings are often cross-sectional, fragmentary and often based on evaluations of only one item. We need controlled experiments and longitudinal studies to test effects of perceived physical characteristics such as unobstructed views alone in combination with other perceived physical characteristics, and in relation to multi-item scales for different aspects of positive perceptions and likelihood of visiting to be physically active.
3. For perceived physical characteristics, we need a better understanding of the physical factors that matter. Studies need to obtain both physical and perceptual measures of the same characteristics. For example, for perceived traffic safety, studies could attempt to find the relative importance of sidewalks, sidewalk separation, different kinds of crossing markings, and other traffic calming methods.
4. In light of evidence of differences in physical activity by age, gender, socio-demographic characteristics, trip type, and physical setting, research should continue to compare environmental perceptions and the relation to physical activity between different age children, between adults and youth, and for different kinds of activities and settings.
5. For environmental interventions to improve aesthetics and physical activity, researchers need to measure activity levels and the actual and perceived character of the environment before and after the intervention to track effects of changes for different settings and populations. Specifically, they should test effects of adding vegetation, improving upkeep and order, opening vistas, and adding sidewalks and pedestrian infrastructure on parent and child perceptions, perceived aesthetic evaluations, and physical activity in different kinds of climate zones, environments, and populations.
6. The development of a visual tool-box of specific environmental manipulations is needed, to enable researchers and communities to evaluate preferences.

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