Supplementary Table 10a. Local Environmental Change to Improve Physical Activity (Community Settings)

Accessibility of Recreation or Exercise Spaces and Facilities

Children and Adolescents (Outcome: Physical Activity)

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
IOM Committee on Childhood Obesity Prevention Actions for Local Governments, 2009[147]	Systematic review, including 4 reviews, 1 longitudinal and 2 cross-sectional studies on the exposure-outcome relation in this section	Children or adolescents	Access to recreational facilities (general)	Physical activity	• On the basis of 2 reviews and a cross-sectional study, the authors concluded that availability and accessibility of parks or playgrounds in the neighborhood is positively associated with children's level of physical activity and may reduce sedentary time at home. • On the basis of 1 review and 1 prospective study, the authors concluded that access to recreational facilities is positively associated with physical activity and inversely associated with obesity. • On the basis of a cross-sectional study, it was concluded that access to well-maintained parks is a more important problem in high-density lower-SES neighborhoods.
Committee on Environmental Health, American Academy of Pediatrics, 2009[361]	Systematic review, including 5 studies on the exposure-outcome relation in this section	Children	Access to recreational facilities (density-inequalities in access)	Physical activity	• Density: Of 4 studies, all reported a significant positive association between density of parks and physical activity. Three studies used park area as the environmental variable, and 1 used number of recreational facilities. Epstein et al (2006) conducted a crossover experimental study among 58 children age 8-15 y. The study included 3 phases (baseline, increased sedentary behavior, and decreased sedentary behavior), with each phase lasting for 3 wk. In intervention phases, participants were encouraged to increase or decrease sedentary behaviors by 25%-50% and were provided with up to $475 for adherence to recommendations. In the decreased sedentary behavior phase, the extent of increase in time spent on physical activity was positively associated with accessible park land (hectares) within 0.8 km (P=0.01). Also, in this phase, living in an area with a large community park was positively associated with 38.9 min more MVPA per day. Roemmich et al (2006) studied the association of GIS-derived percentage of park area in the neighborhood with physical activity among 32 boys and 27 girls age 4-7 y. They found a significant positive association between percentage of park area and total physical activity (P<0.05). In a similar study, Roemmich et al (2007) studied the same relation among 44 boys and 44 girls age 8-12 y. After adjustment for age, sex, parental overweight, and time activity monitor worn, percentage of park area was associated with total physical activity (P<0.05). Also, among a nationally representative sample of US adolescents (N=20,745) in grades 7-12, Gordon-Larsen et al (2006) showed that the number of facilities in the neighborhood was positively associated with physical activity and

					inversely associated with overweight. After adjustment for population density, the presence of 1, 2, 3, 4, and 5 facilities in the neighborhood was associated with a 3%, 7%, 10%, 14%, and 18% increase in the odds of having 5 bouts of MVPA and with a 5%, 10%, 15%, 20%, and 24% decrease in odds of being overweight, respectively. • Inequalities in access: Gordon-Larsen et al (2006) also showed that living in a lower-SES area or areas with a higher percentage of minorities is associated with reduced access to physical activity facilities. Also, among 160 adolescents age 12-18 y, Humbert et al (2006) showed that those who lived in lower-SES areas were more likely than their affluent peers to report that a nearby recreation facility is important for their degree of physical activity.
Sallis and Glanz, 2009[28]	Narrative review, including 1 review on the exposure-outcome relation in this section	Children	Access to recreation facilities (distance)	Physical activity	• On the basis of a review by Davison et al (2006) (see below), the authors concluded that proximity to parks, playgrounds, and recreation areas was consistently associated with children's total physical activity.
Ferreira et al, 2007[344]	Systematic review of 150 studies, mostly cross-sectional, published from January 1980 to December 2004, including 45 independent samples in adolescents and 20 in children on the exposure-outcome relation in this section	Children (age 3-12 y) and adolescents (age 13-18 y)	Local environmental characteristics, including access/availability to physical activity equipment, facilities, or programs	Physical activity	• A wide range of physical, sociocultural, and economic variables were evaluated in these studies, but only a few were examined in >3 independent samples. • Of 20 independent samples in which the relation between access/availability to physical activity equipment, facilities, or programs and physical activity was assessed in children, 3 samples found a positive association and 17 found no significant association. • Of 45 independent samples in which the relation between access/availability to physical activity equipment, facilities, or programs and physical activity was examined in adolescents, 11 samples found a positive association, 2 found an inverse association, and 32 found no significant association. • On the basis of these findings, the authors concluded that the availability or accessibility of physical activity facilities was unrelated to physical activity.
Davison and Lawson, 2006[343]	Review of 33 cross-sectional studies, including 12 studies on the exposure-outcome relation in this section	Children age 3-18 y	Perceived or objectively measured environment, categorized into recreational infrastructure (eg, availability of parks/playgrounds),	Physical activity	General: • Carver et al (2004): Among 347 Australian girls and boys age 12-13 y, parental reports of the presence of good sporting facilities for their children nearby were associated with higher children's reports of walking or cycling in the neighborhood (for recreation, transport, exercise, or going to school). • Density: Of 10 studies, 9 reported a significant positive association: • Sallis et al (1993): Among preschool children, a significant positive association was seen between parental reports of the number of play areas within walking distance of home and observed levels of physical activity.

			transport infrastructure (eg, traffic speed/density, presence of sidewalks), and local conditions (eg, safety, crime)		• Sallis et al (2001): In a study of 137 physical activity areas in 24 public middle schools in San Diego County, California, a significant positive association was seen between the number of permanent area sport facilities (eg, tennis courts, soccer fields, baseball diamonds) and observed physical activity in each play area only in boys, not girls. • Timperio et al (2004): Among 919 Australian elementary school children, ages 5-6 and 10-12 y, only older girls (not older boys or younger children) who reported no park in the area had lower rates of walking and cycling (OR=0.5; 95% CI, 0.3-0.8, $P<0.01$). • Hume et al (2005): In a study of 127 children age 10 y, the children were instructed to draw pictures of their home and neighborhood. Girls who drew more opportunities for physical activity, eg, the presence of facilities such as gyms and swimming centers, had higher objectively measured physical activity. • Zakarian et al (1994): Self-reported number of facilities for sports and exercise in the area was correlated with adolescent self-reported vigorous activity (boys: $r=0.17$; $P<0.001$; girls: $r=0.10$; $P=0.002$). • Brodersen et al (2005): Among 4320 English boys and girls, the objectively measured number of sport pitches in the borough was associated with higher self-reported vigorous activity among girls ($\beta=-0.02$; $P=0.03$) but not boys. • Norman et al (2006): Among 799 US adolescents, the objectively measured number of private recreational facilities and parks within 1.6 km of home were associated with higher accelerometer-measured MVPA among adolescent girls (unadjusted $\beta=0.110$; $P=0.016$) but not boys. • Mota et al (2005): Among 1123 Portuguese students age 13-18 y, adolescents' reports of availability of facilities such as swimming pools, playgrounds, and parks were associated with higher self-reported activity ($P=0.03$). Fein et al (2004): Among 610 high school students in rural Alberta, Canada, a positive association was seen between perceived availability of convenient neighborhood recreation facilities and physical activity levels. • Dunton et al (2003): Among 87 US girls age 14-17 y, no association was seen between perceived exercise facilities in the community and self-reported physical activity. Distance: Of 2 studies, 1 found a significant association: • Gomez et al (2004): Among 177 US adolescents in 7th grade, a significant positive association was seen between objectively measured distance to the nearest play area and outdoor activity only in boys ($\beta=-0.317$; $P=0.006$), not girls. • Adkins et al: Among 52 US black girls age 8-10 y, no significant association was seen between parental and children's reports of

					distance to playgrounds and parks and children's objectively measured physical activity.
Children and Adolescents (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Carter and Dubois, 2010[356]	Systematic review of 27 studies published between1999 and 2009 including 4 studies on the exposure-outcome relation in this section	Children and adolescents age 2-18 y	Access to recreation facilities (general, density)	Adiposity, eg, skin-fold thickness, BMI, percentage of lean body mass, etc	Of 4 studies, 1 found a significant inverse association between access to recreational facilities and obesity, and 1 found a significant positive association between the number of locked schools in the neighborhood and BMI. • General: Veugelers et al (2008) studied the association of parental perception of access to playgrounds/parks and recreational facilities with overweight and obesity among 5471 students in 5th grade from urban and rural areas of Nova Scotia, Canada. After adjustment for child gender, parental education, and household income, children in the highest tertile of access to playgrounds/parks had significantly lower odds of overweight (OR=0.76; 95% CI, 0.62-0.95) and obesity (OR=0.71; 95% CI, 0.53-0.99). However, after stratification by residence (urban or rural), access to playgrounds/parks was significantly associated only with overweight in rural children (OR=0.68; 95% CI, 0.48-0.97). Also, being in the highest tertile of access to recreational facilities was inversely associated with overweight (OR=0.71; 95% CI, 0.56-0.90) and obesity (OR=0.58; 95% CI, 0.40-0.84). After stratification by residence, significant association was only observed between access to recreational facilities and obesity among rural children (OR=0.47; 95% CI, 0.23-0.95). • Density: Evenson et al (2007) studied the relation between self-reported number of physical activity facilities in the walking distance and overweight among 1554 girls in the 6th grade from 6 states. Participants were asked to report accessibility of 14 types of facilities from their home or school. These facilities included basketball court, beach/lake, golf course, health club, martial arts studio, playing field, park/recreation center/YMCA/YWCA, track, skating rink, swimming pool, walking/biking/hiking path, tennis court, and dance/gymnastic club. After adjustment for school, site, nonschool physical activity, neighborhood SES, no significant association was found with overweight and obesity. In another study using the same population, Scott et al (2007) did not find any significant association between the number of parks, number of unlocked schools, or having at least 1 school within a 0.8-km radius of home and BMI. However, they found a significant association between the number of locked schools in the neighborhood and BMI. • Distance: Burdette and Whitaker (2004) compared 7020 overweight

					(BMI ≥95th percentile) and nonoverweight children age 3-4 y and did not find any significant difference in mean distance to the nearest playground (kilometers) between overweight (0.31±0.21) and nonoverweight (0.31±0.22; *P*=0.77) children.
Dunton et al, 2009[350]	Systematic review, 15 studies published before May 2008 (14 cross-sectional and 1 longitudinal), including 6 studies on the exposure-outcome relation in this section	Children and adolescents age 3-18 y	Access to recreational facilities (general, density)	Obesity	• In this systematic review, studies were divided into 2 major groups based on the age range of the study populations (3-12 y and 13-18 y). • General: Among children age 3-12 y, 1 study found an inverse association and 1 found no association between access to physical activity facilities and obesity. Density: Among children age 3-12 y, 1 study found a positive relation between the number of locked schoolyards and obesity. Among children age 13-18 y, 1 study found an inverse relation between the number of physical activity and recreational facilities and obesity; 2 studies did not find any association between the number of private recreational facilities and obesity; and 2 studies did not find any association between the number of parks and obesity. • Distance: Among children age 3-12 y, 2 studies did not find any association between proximity to playgrounds, parks, and play areas and obesity. Among children age 13-18 y, 1 study did not find any association between distance to nearest private recreational facility and obesity; and 1 study did not find any association between areas of parks and distance to the nearest park and obesity.
Papas et al, 2007[349]	Review of 20 studies (18 cross- sectional, 2 longitudinal), including 3 studies on the exposure-outcome relation in this section among children	Children	Objectively measured access to recreational facilities (density, distance)	Direct measures of body weight (eg, BMI)	Density: • Among 20,745 US adolescents in the National Longitudinal Study of Adolescent Health, after adjustment for population density, Gordon-Larsen et al (2006) found that the number of physical activity facilities per census block group was inversely associated with overweight. Compared with no activity facilities in the block group, having 1, 2, 3, 4, 5, 6, or 7 facilities in the census block was associated with 0.95 (0.90-0.99), 0.90 (0.82-0.98), 0.85 (0.74-0.97), 0.80 (0.67-0.96), 0.76 (0.60-0.95), 0.72 (0.55-0.95), and 0.68 (0.49-0.94) lower odds of overweight, respectively. Distance: • Two studies (Liu 2002, Burdette 2004) found no relation between distance from home to the nearest playground and obesity. • Among 7020 low-income children age 3-4 y participating in WIC programs in Cincinnati, Ohio, Burdette and Whitaker (2004) found no significant relation between distance from the child's home to the nearest playground and obesity. • Among 2554 children age 4-18 y living in Indiana, Liu et al (2002) found no significant difference between mean distance to the nearest public play space among obese (567 m) vs nonobese

					children (571 m).
Adults (Outcome: Physical Activity)					
Author, y	**Design Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Frost et al, 2010[337]	Systematic review of studies published between 1994 and 2008, including 4 studies on the exposure-outcome relation in this section	Adults (age ≥18 y) in rural areas	Access to recreation facilities (general)	Physical activity	• Of 4 studies, 1 reported significant positive association between general access to indoor exercise facilities and regular walking. • Wilcox et al (2003) studied the relation between perceived access to exercise facilities and physical activity level (active/sedentary) among 1242 rural and 1096 urban US women (age ≥40 y). After adjustment for age, race, education, geographical region, neighborhood variables, and health-related behaviors, no significant association was found between access to facilities and sedentary behaviors in urban (OR=0.96; 95% CI, 0.65-1.42) or rural population (OR=1.09; 95% CI, 0.81-1.41). • Among 1000 rural midwestern white women age 25-50 y, Eyler (2003) did not find any significant association between knowing of a place to exercise in the neighborhood and meeting the recommendations for physical activity (OR=0.99; 95% CI, 0.99-1.00). • In a similar study among 567 black women in rural areas of Alabama, Sanderson et al (2003) found no significant association between knowing a place to exercise in the neighborhood and meeting the recommendations for physical activity (OR=0.86; 95% CI, 0.56-1.33). • Bronson et al reported a borderline significant association between access to indoor exercise facilities and regular walking among 1269 rural adults in southeastern Missouri (OR=1.3; 95% CI, 1.0-1.7).
Sallis and Glanz, 2009[28]	Narrative review, including 1 review about the exposure-outcome relation in this section	Adults	Access to recreational facilities (general, distance)	Physical activity	• On the basis of a review by Bauman and Bull (2007), the authors concluded that there is a positive relation between proximity to recreational facilities and physical activity.
Bauman and Bull, 2007[338]	Systematic review of reviews published between 2002 and 2007, including 8 reviews about the exposure-outcome relation in this section	Children and adults	Access to recreational facilities (general, distance)	Physical activity or walking	• All 8 studies on the relation between access to recreational facilities and physical activity found a positive association: • A narrative review by Badland and Schofield (2005) found a significant positive association between access to facilities within walking distance and parks and physical activity. • A systematic review by Cunningham and Michael (2004) reported a positive association between proximity to facilities or parks and physical activity. • A meta-analysis by Duncan et al (2005) showed a significant positive relation between availability of physical activity facilities and physical activity. (Please see below for Duncan et al, 2005.)

					• A systematic review by Humpel et al (2002) found a significant positive association between accessibility of facilities, including nearby parks and physical activity. • A systematic review by Lee and Moudon (2004) identified lack of access to facilities as a barrier to physical activity. • A systematic review by McCormack et al (2004) found a significant positive association between shorter distance to resources for activity and level of physical activity. • A systematic review by Trost et al (2004) reported a significant positive association between access to facilities and level of physical activity. • A systematic review by Wendel-Vos et al (2005) found significant positive association between proximity to recreational facilities and vigorous physical activity.
Duncan et al, 2005[340]	Meta-analysis: 16 studies published between January 1989 and February 2005. The number of studies on the exposure-outcome relation in this section was not reported.	Adults	Access to recreational facilities (general)	Physical activity as a binary factor, eg, any walking, sufficient walking, sufficient leisure-time activity	• In crude (unadjusted) analyses, no variables demonstrated a significant association with physical activity. • After adjustment for age, income, and educational level, the perceived presence of physical activity facilities was positively associated with physical activity (OR=1.20; 95% CI, 1.06, 1.34). Significant unexplained heterogeneity was present ($P<0.05$).
Humpel et al, 2002[339]	Review of 19 studies (18 cross-sectional, 1 longitudinal), including 6 studies on the exposure-outcome relation in this section	Adults	Perceived (16 studies) and/or objectively determined (4 studies) physical environment categorized to accessibility of facilities, opportunities for activity, weather, safety, and aesthetics	Physical activity	• Among 3392 Australian adults, Ball et al (2001) found that convenience (a park or beach within walking distance, accessible cycle path, shops within walking distance) was positively associated with walking for exercise (yes/no) in the past 2 wk (low vs high, OR=0.60 [0.46-0.77]), after adjustment for age, sex, and education. • Among 2374 older Australian adults, Booth et al found a positive association between access to recreational facilities (eg, recreation center, cycle path, golf course, gym, park) and being active (vigorous activities, walking for exercise, leisure, and moderate activities ≥800 kcal/kg per week) (OR=1.14; 95% CI, 1.03-1.26), after adjustment for sociodemographic, social-cognitive, and perceived environmental variables. • Among 413 adults, mean age 51 y, use of bikeways was evaluated in relation to perceived presence of sidewalks, heavy traffic, enjoyable neighborhood scenery, distance from bikeway, and having a busy street or steep hill to cross on the way to the bikeway. After adjustment for age and sex, several factors were inversely associated with bikeway use, including self-reported and GIS distance from the bikeway, a busy street to cross, and a GIS-measured steep-hill barrier. • Among 2053 adults in San Diego, California, no significant association was seen between perceived convenience of exercise facilities (eg, aerobic dance studio, bike lane, running track) and

					vigorous exercise (P=0.52). • When the preceding association was assessed prospectively, 24-mo changes in physical activity were predicted by the neighborhood environment but only in initially sedentary men (P=0.04). • Among 14,674 adults age 18-69 y who participated in the Canada Fitness Survey in 1983, women who reported no physical activity facility in their neighborhood were more likely to participate in physical activity. No significant association was seen in men.
Adults (Outcome: Obesity)					
Frost et al, 2010[337]	Systematic review of studies published between 1994 and 2008, including 1 study on the exposure-outcome relation in this section	Adults (age ≥18 y) in rural areas	Access to recreational facilities (distance)	Physical activity/obesity	• Boehmer et al (2006) studied the relation between time to walk from home to the nearest recreational facility and obesity among 1476 adults living in rural areas of Missouri, Tennessee, and Arkansas. After adjustment for age, gender, education, neighborhood variables, and health-related behaviors, the presence of a park that was more than a 20-min walk from home was positively associated with obesity (OR=1.53; 95% CI, 1.10-2.11).
Papas et al, 2007[349]	Review of 20 studies (18 cross- sectional, 2 longitudinal), including 3 studies on the exposure-outcome relation in this section among adults	Adults	Objectively measured access to recreational facilities (density, distance)	Direct measures of body weight (eg, BMI)	Density: • Of 2 studies, 1 found a significant inverse association: • Mobley et al (2006): Among 2692 women, the number of fitness facilities per 1000 residents was associated with 1.39 kg/m^2 lower BMI (P<0.05) and 15.1% lower calculated 1-y CHD risk (P<0.05). • Rutt and Coleman (2005): Among 996 Hispanic adults in Texas, there was no significant relation between the number of local resources for physical activity and BMI. Distance: • Of 2 studies, 1 found a significant positive relation between distance from home to the nearest recreational facility and obesity:Giles-Corti et al (2003): Among 1803 Australian adults age 18-59 y, there was a significant positive association between poor access (distance) to recreational facilities and obesity. • Rutt and Coleman (2005): Among 996 Hispanic adults in Texas, there was no significant relation between distance to local physical activity facilities and BMI.

Additional Original Articles, 2007-2010*

Author, y	Design and Duration	Population	Intervention/Exposure	Outcome	Major Findings
Coombes et al, 2010[341]	Cross-sectional, 2005	N=6803 residents age >16 y in Bristol, United	Distance by road from home to 5 types of green space, including those with organized layout (formal green spaces), informal design (informal	• Frequency of visiting green spaces • Engaging in at	After adjustment for age, sex, SES, self-rated health, and area deprivation: • People who lived farther from formal green space (>2250 m) compared with those living nearer (<830 m) had lower odds of visiting the

		Kingdom	green spaces), habitats such as woodland (natural green spaces), areas designed for children or teenagers (youth green spaces), and playing fields and tennis courts (sport green spaces)	least 5 sessions per week of >30 min of physical activity • Overweight or obesity	green space at least once a week (OR=0.64; 95% CI, 0.55-0.75), lower odds of doing ≥5 sessions per week of >30 min of physical activity (OR=0.76; 95% CI, 0.65-0.88), and higher odds of being overweight or obese (OR=1.27; 95% CI, 1.09-1.47). • People who lived farther from informal green space (>680 m) compared with those living nearer (<200 m) had lower odds of visiting the green space at least once a week (OR=0.80; 95% CI, 0.68-0.93) and lower odds of being overweight or obese (OR=0.83; 95% CI, 0.72-0.97). • People who lived farther from natural green space (>800 m) compared with those living nearer (<250 m) had lower odds of visiting the green space at least once a week (OR=0.80; 95% CI, 0.68-0.94); similar findings were seen for sport green space (OR=0.87; 95% CI, 0.74-1.02). No relation was seen between distance to these green spaces and activity or adiposity. • After further adjustment for multiple neighborhood variables (road density, number of junctions per kilometer of road, ratio of junctions to cul-de-sacs, percentage of population age >60 y, percentage of nonwhite population, percentage of population who actively transport to work, and percentage of population with limiting long-term illness), only the associations of formal green space with physical activity remained significant.
Witten et al, 2008[342]	Cross-sectional, 2002-2003	N=12,529 adults (age ≥15 y), nationally representative sample in New Zealand	Travel time (by car) to the nearest park derived from GIS	• Sedentary behavior (<30 min per week of physical activity) • Meeting activity guidelines (≥2.5 h on >5 days per week) • BMI	After adjustment for age, sex, race, individual SES, deprivation, and type of residence (urban/rural): • Distance to the park was not associated with BMI (β=−0.02; 95% CI, −0.08-0.05), sedentary behaviors (OR=0.84; 95% CI, 0.63-1.11), or meeting physical activity guidelines (OR=1.15; 95% CI, 0.96-1.37).
Boone-Heinonen et al, 2010[345]	Cross-sectional, 1994-1995	N=10,359 US adolescents, grades 7-12, nationally representative, in the National	Percentage of green space coverage and distance to the nearest neighborhood or major parks derived from GIS	Participation in wheel-based activities (eg, bicycling, roller skating); active sports; exercise; and ≥5 bouts per week of MVPA	After adjustment for individual and neighborhood SES variables: • Green space coverage was positively associated with MVPA in boys and girls (for 10%-20% vs <10% green space: OR=1.62; 95% CI, 1.10, 2.39) and with exercise participation in girls (OR=1.73; 95% CI, 1.21, 2.49) but not boys.

		Longitudinal Study of Adolescent Health			• Green space coverage was not significantly associated with wheel-based sports or active sports. • Distance to parks was associated with higher participation in active sports by boys and girls. • Distance to parks was associated with higher participation in wheel-based activities and MVPA in girls but not boys.
Boone-Heinonen et al, 2010[346-348]	Prospective cohort, 1994-1995 to 2001-2002	N=12,701 US adolescents, grades 7-12 at baseline, nationally representative, in the National Longitudinal Study of Adolescent Health	Number and population density of pay and public physical activity facilities (per 10,000 population) derived from GIS. Longitudinal analyses also assessed land-cover diversity, street connectivity, and crime rate.	Number of bouts of MVPA	In cross-sectional analyses, after adjustment for individual SES: • Number of physical activity facilities within 3 km was associated with MVPA but with some variation by urbanicity and sex. • Density of physical activity facilities was not significantly associated with MVPA. In longitudinal analyses, after adjustment for measured covariates and within-person time-invariant factors: • Greater density of pay facilities was positively associated with MVPA in boys but not girls. • Density of public facilities was not associated with higher MVPA. See Supplementary Tables 10b, 10c, and 10d for findings on land-cover diversity, street connectivity, and crime rate, respectively.

IOM indicates Institute of Medicine; SES, socioeconomic status; MVPA, moderate to vigorous physical activity; GIS, geographical information systems; BMI, body mass index; OR, odds ratio; CI, confidence interval; YMCA/YWCA, Young Men's Christian Association/Young Women's Christian Association; WIC, Women, Infants, and Children; and CHD, coronary heart disease.

*Given the array of smaller, cross-sectional, observational studies that were already captured in the published narrative and systematic reviews identified here, in the writing group's additional systematic searches for original articles published after 2007, performed by means of PubMed searches, evaluation of related articles, and hand searches of reference lists, the writing group focused on those additional studies that were randomized trials, quasi-experimental studies, longitudinal studies, or large (N>5000) cross-sectional studies.

Supplementary Table 10b. Local Environmental Change to Improve Physical Activity (Community Settings)

Land-Use Design (Locations and Accessibility of Destinations)*

Children (Outcome: Physical Activity)

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
Feng et al, 2010[351]	Systematic review, including 3 studies on the exposure-outcome relation in this section	Children/ adolescents	Land-use mix	Physical activity/travel mode to school	Of 3 studies, 1 found significant positive association between land-use mix and physical activity, and 1 found significant positive association between land-use mix and biking/walking to school: Overall land-use mix: • Kligerman et al (2007) studied the relation between land-use mix and objectively measured physical activity among 98 white or Mexican-American adolescents age 14-17 y living in San Diego County, California. Land-use mix was defined as the geometric mean of 5 land uses in 3 buffer sizes (0.4, 0.8, and 1.6 km) around the participant's home. After adjustment for age and ethnicity, land-use mix at a 0.8-km buffer around home was positively associated with physical activity (point estimate and 95% CI were not reported). • Norman et al (2006) studied the relation between land-use mix and objectively measured physical activity among 799 adolescents age 11-15 y living in San Diego County, California. Land-use mix was defined as the geometric mean of acreage for 5 types of land-use (residential, institutional, entertainment, retail, and office). The mean land-use mix for a 1.6-km buffer around participants' homes was 0.38. Given that no significant association was observed between land-use mix and physical activity in bivariate analysis, it was not included in the final model. The estimates of bivariate analysis were not provided. • Kerr et al (2006) studied the association of perceived and objectively measured land-use mix and parental report of mode of transport to school among 259 children age 5-18 y in Seattle, King County, Washington. Perceived land-use mix was computed using NEWS-Y, based on parental responses to questions about proximity to (land-use mix diversity) and accessibility of nonresidential destinations (land-use mix access). Objectively measured land-use mix was computed using the method described in Frank et al (2004) (see below). After adjustment for child age and gender, parental education, and parental concerns, only perceived land-use mix access was positively associated with active commuting to school (OR=1.8; 95% CI, 1.05-3.42). No significant associations were found between walking/biking to school and perceived

					land-use mix diversity (OR=1.9; 95% CI, 0.96-3.79) or GIS-measured land-use mix (OR=1.5; 95% CI, 0.85-2.77).
Galvez et al, 2010[355]	Systematic review of articles published between January 2008 and August 2009, including 2 articles on the exposure-outcome relation in this section	Children/ adolescents	Land-use mix/distance to school	Physical activity/travel mode to school	Both studies found significant positive association between land-use mix and active transport to school. One study found significant inverse association between distance to school and active travel to school. Overall land-use mix: • Rosenberg et al (2009) studied the relation between perceived land-use mix and physical activity among 171 adolescents (age 12-18 y) living in Boston, Massachusetts; Cincinnati, Ohio; and San Diego, California. The NEWS-Y was used to assess land-use mix. After adjustment for adolescent gender, race, and parental income, land-use mix access was positively associated with walking to shops (P=0.0001) and walking to school (P=0.002) once per week. No significant association was found between land-use mix access and meeting recommended physical activity levels (P=0.13). • Larsen et al (2009) studied the relation between GIS-measured land-use mix and self-reported mode of travel between home and school among 614 students age 11-13 y. Land-use mix was defined as evenness of distribution of 6 types of land uses (recreational, agricultural, residential, institutional, industrial, and commercial) in a buffer of 500 m around participants' homes and a buffer of 1.6 km around participants' schools. Land-use mix was calculated as $$\frac{\sum_u (p_u \, ln \, p_u)}{ln \, N}$$ (Note: u indicates land use classification; p, proportion of land dedicated to a particular land use; and N, total number of land uses). In a stepwise logistic regression, after adjustment for gender, household income, residential density, and distance to school, children living in areas in the upper quartile of land-use mix were more likely to actively travel between school and home compared with those living in the lower quartile (OR=3.46; 95% CI, 1.60-7.47). After adjustment for gender, street trees in the home neighborhood, and distance to school, children going to schools in the upper quartile of land-use mix were more likely to actively travel between school and home (OR=2.89; 95% CI, 1.63-5.12). Distance to school: • In 614 students age 11-13 y, after adjustment for gender, household income, residential density, and land-use mix, Larsen et al (2009) found significant inverse association between distance to school and active transport from school (OR=0.44; 95% CI, 0.35-0.56).

Dunton et al, 2009[350]	Systematic review: 15 studies published before May 2008, including 2 studies on the exposure-outcome relation in this section	Children/ adolescents	Land-use mix	Physical activity	Of 2 studies, 1 found significant positive association between land-use mix and physical activity. Overall land-use mix: • Kligerman et al (2007): See above. • Norman et al (2006): See above.
IOM Committee on Childhood Obesity Prevention Actions for Local Governments, 2009[147]	Systematic review, including 2 reviews and 4 cross sectional studies on the exposure-outcome relation in this section	Children or adolescents	Land-use mix/distance to school	Physical activity/active transport to school or other destinations.	• On the basis of a review by Badland and Schofield (2005) and a cross-sectional study by Frank et al (2004), it was concluded that living in a balanced land-use mix in the neighborhood is positively associated with physical activity. • On the basis of a review by Saelens and Handy (2008), it was concluded that proximity to destinations was positively associated with walking and bicycling to destinations. • On the basis of 3 cross-sectional studies by Tal and Handy (2008), Kerr et al (2006) (see above), and McDonald (2007) (see below), it was concluded that distance from home to school was associated with active transport to school.
Brownson et al, 2009[352]	Systematic review, including 4 studies on the exposure-outcome relation in this section	Children or adolescents	Land-use mix	Physical activity/travel mode to school	Of 4 studies, 1 found significant positive association between land-use mix and walking/biking to school and 1 found significant positive association between land-use mix and physical activity. Land-use mix: • Ewing et al (2004) studied the relation between land-use mix at the level of TAZ and mode of travel to school among 3815 students living in Alachua County, Florida. Land-use mix was defined as degree of land-use balance between jobs and residents at the TAZ level and was assessed by 2 indicators. No association was found between land-use variables and active mode of transport to school (estimates were not provided). • Kerr et al (2006): See above. • Norman et al (2006): See above • Kligerman et al (2007): See above.
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 2 studies on the exposure-outcome relation in this section	Children or adolescents	Land-use mix	Walking/travel mode to school	Of 2 studies, 1 found significant positive association between land-use mix and active transport to school and 1 found significant positive association between land-use mix and walking: Overall land-use mix: • Kerr et al (2007) studied the relation between land-use mix and self- or parent-reported walking among 3161 children age 5-18 y living in Atlanta, Georgia. Land-use data were obtained from county-level tax

					assessor's parcel data and census data (no further information was provided). After adjustment for sociodemographic variables, the presence of commercial, recreational, or open spaces in the neighborhood was positively associated with probability of walking at least once over a 2-d period among boys (OR=1.5; 95% CI, 1.1-2.1; *P*<0.01) and girls (OR=2.2; 95% CI, 1.5-3.1; *P*<0.001). • Kerr et al (2006): See above.
Davison et al, 2008[353]	Systematic review of studies published before June 2007, including 2 studies on the exposure of interest in this study	Children or adolescents	Land-use mix	Travel mode to school	Of 2 studies, both found significant positive association between land-use mix and active transport to school. Overall land use-mix: • McMillan (2007) studied the relation between objectively measured land-use mix and caregivers' reports of travel mode to school among children in grades 3-5 at 16 elementary schools in California. Land-use mix was defined as the proportion of street segments with land-use mix within a buffer of 0.4 km around the school. Data on land-use mix were obtained from environmental audits. After adjustment for sociodemographic variables, household transportation options, social/cultural norms and neighborhood safety (traffic, crime), land-use mix was positively associated with walking/biking to school (β=0.015; *P*=0.001). • Kerr et al (2006): See above.
Panter et al, 2008[354]	Systematic review of 24 studies published between 2002 and 2007, including 8 studies on the exposure-outcome relation in this section	Children or adolescents	Land-use mix/distance to school	Physical activity/travel mode to school or local destinations	Of 8 studies, 2 found significant positive association between land-use mix and walking; 2 found significant positive association between distance to school and walking/biking to school; and 1 found significant positive association between the presence of walkable destinations in the neighborhood and physical activity. Overall land-use mix: • Frank et al (2007) studied the relation between land-use mix and self-reported walking among 3161 US children age 5-20 y. Land-use mix was calculated based on the Frank et al (2004) method. After adjustment for sociodemographic variables, land-use mix was positively associated with walking at least once over 2 d (OR=1.8; 95% CI, 1.4-2.3; *P*<0.001) and walking >0.8 km per day (OR=1.9; 95% CI, 1.3-2.9; *P*<0.001). • Kerr et al (2007): See above. McDonald (2007) studied the relation between land-use mix and self-reported mode of travel to school among 614 US children age 5-18 y living in Alameda County, California. Land-use mix was defined as evenness of distribution of 5 types of land use (eg, single-family, multifamily, retail/service, manufacturing/trade/other) in a 1-km network buffer around a household residence and was calculated based on the

					Cervero and Kockelman (1997) method. After adjustment for individual, social environmental, and other built-environment variables, no significant association was found between land-use mix and active transport to school. • Mota et al (2007) evaluated the relation between self-reported access to destinations and self-reported travel mode to school among 705 Portuguese girls age 11-18 y. No significant difference was observed between active and passive travelers in terms of their level of agreement with the statement, "many stores are within easy walking distance of my home" (P=0.91). • Among 480 US girls age 10-15 y, Evenson et al (2006) found a positive association between the presence of walkable destinations and physical activity above median (OR=1.78; 95% CI, 1.11-2.83). • Ewing et al (2004): See above. *Distance to school:* • Timperio et al (2006) studied the relation between objectively measured distance to school and parental report of walking/biking to school among 912 Australian children age 5-6 y and 10-12 y. After adjustment for sociodemographic and neighborhood variables, proximity to school was positively associated with active transport to school among children age 5-6 y (OR=5.2; 95% CI, 2.2-12.3), and 10-12 y (OR=10.2; 95% CI, 5.9-17.6). • Ziviani et al (2004) studied the relation between parental perception of distance to school and parental report of mode of transport to school among 164 children age 6-11 y living in Brisbane, Australia. Distance to school was inversely associated with walking to school at least once per week (OR=0.54; 95% CI, 0.35-0.74; P=0.001).
Children (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Feng et al, 2010[351]	Systematic review, including 3 studies on the exposure-outcome relation in this section	Children/ adolescents	Land-use mix	Adiposity	All 3 studies found no significant association between land-use mix and adiposity. Land-use mix: • Norman et al (2006) studied the relation between land-use mix and objectively measured BMI among 799 adolescents age 11-15 y living in San Diego County, California. Land-use mix was defined as the geometric mean of acreage for 5 types of land use (residential, institutional, entertainment, retail, and office). The mean land-use mix for a 1.6-km buffer around participants' homes was 0.38. Given that no significant association was observed between land-use mix and obesity in bivariate analysis, it was not included in the final model. The estimates of bivariate analysis were not provided.

					• Kligerman et al (2007) studied the relation between land-use mix and objectively measured BMI among 98 white or Mexican-American adolescents age 14-17 y living in San Diego County, California. Land-use mix was defined as the geometric mean of 5 land uses in 3 buffer sizes (0.4, 0.8, and 1.6 km) around participants' homes. After adjustment for age and ethnicity, land-use mix was not associated with BMI (point estimate and 95% CI were not reported). • Spence et al (2008) studied the association of GIS-measured land-use mix with objectively measured overweight among 501 Canadian children age 4-6 y living in Edmonton, Alberta. Land-use mix within a buffer of 1.5 km around participants' homes was estimated based on the density of 4 types of land uses (institutional, maintenance, dining, and leisure). After adjustment for child age, sex, physical activity, junk food consumption, neighborhood-level education, and proportion of employed women in the neighborhood, land-use mix was not associated with being overweight in girls (OR=0.80; 95% CI, 0.47-1.36) or boys (OR=0.87; 95% CI, 0.58-1.30).
Galvez et al, 2010[355]	Systematic review of articles published between January 2008 and August 2009, including 1 article on the exposure-outcome relation in this section	Children	Land-use mix	Overweight	• Spence et al (2008): See above.
Carter and Dubois, 2010[356]	Systematic review of 27 studies published between 1999 and 2009, including 1 study on the exposure-outcome relation in this section	Children/ adolescents	Land-use mix	Adiposity	• Spence et al (2008): See above.
Dunton et al, 2009[350]	Systematic review, 15 studies published before May 2008, including 2 studies on the exposure-outcome relation in this section	Children/ adolescents	Land-use mix	Adiposity	Both studies found no significant association between land-use mix and adiposity. • Spence et al (2008): See above. • Norman et al (2006): See above.
Adults (Outcome: Physical Activity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**

Feng et al, 2010[351]	Systematic review, including 2 studies on the relation between exposure and outcome of interest in this section	Adults	Land-use mix	Physical activity/walking	Of 2 studies, 1 found significant positive association between land-use mix and walking and 1 found significant correlations between land-use mix and physical activity: Land-use mix: • Li et al (2008) studied the association of land-use mix with self-reported physical activity among 1221 adults age 50-75 y living in Portland, Oregon. Land-use mix was defined as evenness of distribution of various land-use types and was computed based on the methods of Frank et al (2004). After adjustment for age, gender, race/ethnicity, employment status, home ownership, household income, health status, fruit and vegetable intake, fried-food consumption, BMI, and neighborhood factors, including residential density, median household income, and percentage of black and Hispanic residents, land-use mix was positively associated with neighborhood walking (PR=4.07; 95% CI, 2.29-7.23), walking for transportation (PR=5.76; 95% CI, 2.70-12.31), walking for errands (PR=1.50; 95% CI, 1.01-2.22), and meeting physical activity recommendations (PR=1.46; 95% CI, 1.05-2.04). • Frank et al (2005) studied the relation between land-use mix and accelerometer-measured physical activity among 357 adults age 20-69 y living in Atlanta, Georgia. Land-use mix was defined as evenness of distribution based on the area of 3 types of land uses (residential, commercial, and office) in a 1-km network-based street buffer around participants' homes and was calculated based on the method of Frank et al (2004). The mean calculated land-use mix was 0.38. After adjustment for age, education, and gender, land-use mix was significantly correlated with natural log of the minutes of moderate physical activity per day (r=0.145; P=0.01). However, the association of land-use mix and physical activity was not assessed in the final multivariate regression model.
Frost et al, 2010[337]	Systematic review of studies published between 1994 and 2008, including 3 studies on the exposure-outcome relation in this section	Adults	Presence of walkable destinations	Physical activity	Of 3 studies, 1 found significant positive association between perceived presence of walkable destinations and physical activity: *Land-use mix (presence of walkable destinations):* • Deshpande et al (2005) studied the association of perceived presence of walkable destination and self-reported physical activity among 274 adults with diabetes in rural areas from 12 communities in Missouri, Tennessee, and Arkansas. After adjustment for BMI, health status, and physical impairment, significant positive association was found between presence of walkable destinations and physical activity (OR=2.30; 95% CI, 1.25-4.23). • Sanderson et al (2003) studied the relation between perceived presence of walkable destinations and physical activity among 567 women age 20-50 y living in 3 predominantly black rural areas of Alabama. After adjustment for age, marital status, education, number of children, annual

					income level, employment status, and general health, no significant association was found between perceived presence of walkable destinations (yes/no) and meeting recommendations for physical activity (OR=1.06 [0.74-1.52]). • Eyler (2003) studied the relation between perceived presence of walkable destinations and self-reported physical activity among 1000 white women age 20-50 y in rural areas of Missouri and Illinois. No association was found between the presence of places within walking distance (yes/no) and meeting recommendations for physical activity (OR=0.91; 95% CI, 0.68-1.25). Adjustment for age, general health status, and self-efficacy did not change the results, and the adjusted OR was not reported.
Brownson et al, 2009[352]	Systematic review, including 3 studies about the exposure-outcome relation in this section	Adults	Land-use mix	Physical activity/walking	Of 3 studies, 1 found significant correlation between land-use mix and moderate physical activity, 1 found significant positive association between social land use and walking for transport, and 1 found significantly higher land-use access in high-walkable neighborhoods. Land-use mix: • Frank et al (2005): See above. • Forsyth et al (2008) studied the relation between percentage of social land use in the neighborhood and physical activity among 715 US adults living in the Twin Cities area of Minnesota. Percentage of social land use was calculated as total area in parcels, with social uses divided by total land area in parcels, with water area removed. Social uses included daycare centers, medical clinics and offices, theaters, bowling alleys, lodge halls and amusement parks, sports/public assembly facilities, tax-exempt community recreational facilities, library, exempt property owned by the board of education, and other exempt property. After adjustment for age, sex, race, education, marital status, home ownership, tenure, overall health, car ownership, total household members, and other neighborhood variables, social land use was inversely associated with walking for leisure and positively associated with walking for transport. • Saelens et al (2003) studied the association of self-reported measure of land-use mix with objectively assessed physical activity among 107 adults age 18-65 y living in 2 nonadjacent census tracts in San Diego, California. A NEWS questionnaire was used to obtain land-use data. Land-use mix diversity was assessed by a question about walking proximity to nonresidential land uses such as a small grocery store, restaurants, and post office (subscale score range: 1-5). To assess land-use mix access, participants were asked if they do most of their shopping at local stores and if they find it difficult to park in local shopping areas (subscale score range: 1-4). After adjustment for age and education, residents of the high-walkable neighborhood had significantly higher land-use mix access (3.2 vs 2.8; $P<0.05$); higher land-use mix diversity (3.5 vs 2.8; $P<0.05$); and higher total physical activity (210.5 vs 139.9 min per week; $P<0.01$).

Casagrande et al, 2009[357]	Systematic review of studies (population ≥ 90% black) published before August 2007, including 2 studies on the exposure-outcome relation in this section	Adults	Land-use mix	Physical activity	Of 2 studies, 1 found significant correlation between land-use mix and moderate physical activity. Land-use mix • Atkinson et al (2005) studied the relation between land-use mix and physical activity among 102 US adults (age 20-65 y). The NEWS questionnaire was used to obtained self-reported data on land-use mix diversity and land-use mix access. In bivariate analysis, land-use mix diversity was not significantly correlated with accelerometer-measured moderate-intensity (r=0.02; P=0.86) and vigorous-intensity (r=0.13; P=0.21) physical activity. Land-use mix access was not correlated with accelerometer-measured moderate-intensity (r=0.14; P=0.18), and vigorous-intensity (r=0.19; P=0.06) physical activity either. • Among 357 adults age 20-69 y living in Atlanta, Georgia, Frank et al (2005) found significant correlation between land-use mix and natural log of the minutes of moderate physical activity per day (r=0.145; P=0.01). This association was not assessed in the final multivariate regression model.
Chow et al, 2009[358]	Systematic review, including 2 studies on the exposure-outcome relation in this section	Adults	Land-use mix	Physical activity	Of 2 studies, 1 found significantly higher land-use access in high-walkable neighborhoods. *Land-use mix* • Eyler (2003): See above. • Saelens et al (2003: See above.
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 4 studies on the exposure-outcome relation in this section.	Adults	Land-use mix	Physical activity	Of 4 studies, 1 found significant positive association between land-use mix and walking, 1 found significant correlations between land-use mix and physical activity, 2 found significant positive association between neighborhood walkability and land-use mix, and 1 found significant positive association between count of nonresidential and specific destinations in the neighborhood and walking. Land-use mix: • Cerin et al (2007) studied the association of objectively assessed land-use mix and perceived access to destinations with self-reported weekly minutes of walking for transport among 2650 adults age 20-65 y living in 32 neighborhoods from 154 census collection districts in Adelaide, Australia. Land-use mix was defined as evenness of distribution of 5 types of land uses (residential, commercial, industrial, recreational, and other) in a 1-km network buffer around a participant's home and was calculated based on the Cervero and Kockelman (1997) method. Perceived land-use mix and proximity of destinations was assessed by a subscale of NEWS. After adjustment for sociodemographic factors, perceived proximity to commercial destinations was positively associated with transport-related walking (β=12.4; 95% CI, 0.2-28.8). However, after adjustment for type of neighborhood (residential,

					recreational, commercial/industrial), the association was no longer statistically significant (β=8.3; 95% CI, −4.4-21.0). Furthermore, after adjustment for sociodemographic factors and type of neighborhood, perceived proximity to commercial workplace was positively associated with transport-related walking (β=15.0; 95% CI, 3.3-26.7). No significant association was found between perceived proximity to schools and walking for transport; or between land-use mix and walking for transport. • Hoehner et al. (2005) studied the association of land-use mix with transportation and recreational physical activity among 1073 adult residents of Savannah, GA and St. Louis, MO. Perceived land-use mix was assessed through participants' response to questions about presence and count of specific destinations in their neighborhood. Objective measures of land-use mix included the count of nonresidential and specific destinations in the neighborhood and were assessed through environmental audits. After adjustment for age, gender, and, education, people who reported 7–13 destinations within 5-min walking distance from their home were more likely to be involved in any kind of walking for transport compared to those who reported no destination within 5-min walking distance from their home (OR=2.4; 95% CI: 1.3–4.3). Also, based on environmental audits, living in neighborhood with 43-131 nonresidential destinations (fourth quartiles) was associated with higher probability of walking for transport compared to living in the neighborhood with 0-10 nonresidential destinations (OR=3.5; 95% CI: 2.3–5.5). • Frank et al (2005): See above. • Saelens et al (2003): See above.
Saelens and Handy, 2008[359]	Systematic review of 13 reviews published between 2002 and 2006 and 29 original studies published between 2005 and 2006, including 3 reviews and 11 original studies on the exposure-outcome relation in this section (4 of which were included)	Children and adults	Land-use mix	Physical activity/walking	• On the basis of 3 reviews by Badland and Schofield (2005), Heath et al (2006), and Saelens et al (2003), it was concluded that living in an area with balanced land-use mix is positively associated with physical activity. • Among the 11 original studies, 2 were in children, both described elsewhere in this Table (see Kerr 2006 and McMillan 2007). Of the 9 in adults, 1 is described elsewhere in this Table (see Hoehner 2005) and another in the walkability Table, below (see Frank 2006). • Of the studies on the relation between proximity of nonresidential destinations and walking for transport, 8 found a positive association and 3 found a null or an unexpected association. • Of the studies on the relation between proximity of nonresidential destinations and walking for recreation, 3 found a positive association and 4 found a null or unexpected association. • Of the studies on the relation between proximity of nonresidential destinations and general walking, 3 found positive association and 1 found no association.

Bauman and Bull, 2007[338]	Systematic review of reviews published between 2002 and 2007, including 5 reviews on the exposure-outcome relation in this section	Children and adults	Land-use mix	Physical activity/walking	Land-use mix: • Of 6 reviews, 5 found sufficient evidence to conclude that land-use mix was positively associated with physical activity. One of these studies was a meta-analysis by Duncan et al (2005) (see below). • Of 3 reviews, 2 reported positive association between land-use mix and walking.
Duncan et al, 2005[340]	Meta-analysis: 16 studies published between January 1989 and February 2005. The number of studies on the exposure-outcome relation in this section was not reported.	Adults	Various environmental characteristics, including neighborhood shops and services	Physical activity as a binary factor, eg, any walking, sufficient walking, sufficient leisure-time activity, etc	• In crude (unadjusted) analyses, no variables demonstrated a significant association with physical activity. • After adjustment for age, income, and education level, the perceived presence of shops and services was positively associated with physical activity (OR=1.30; 95% CI, 1.14, 1.46).
Adults (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Feng et al, 2010[351]	Systematic review, including 3 studies on the relation between exposure and outcome of interest in this section	Adults	Land-use mix	Adiposity	All 3 studies found an inverse association between land-use mix and obesity. Land-use mix: • Frank et al (2004) used data from SMARTRAQ to study the relation between land-use mix and self-reported measure of obesity (BMI ≥30) among 10,878 adult residents of Atlanta, Georgia. Land-use mix was defined as evenness of distribution based on areas of 4 types of land use (residential, commercial, office, and institutional) in a 1-km network buffer around a household residence. A land-use mix formula was calculated that could take values between 0 (single land-use environment) and 1 (even distribution of square footage across all 4 land uses). The mean land-use mix in this study was 0.15. After adjustment for age, income, and educational attainment, land-use mix was inversely associated with obesity (OR=0.88; 95% CI, 0.84-0.92; $P<0.000$). • Li et al (2008) studied the association of land use with objective measure of overweight/obesity (BMI ≥25) among 1221 adults age 50-75 y living in Portland, Oregon. Land-use mix was defined as evenness of distribution of various land-use types and was computed based on the Frank et al (2004) method (see above). After adjustment for age, gender, race/ethnicity, employment status, home ownership, household income, health status, fruit and vegetable intake, fried-food consumption, and neighborhood factors, including residential density, median household

					income, and percentage of black and Hispanic residents, land-use mix was inversely associated with risk of being overweight or obese (PR=0.75; 95% CI, 0.62-0.90). • Mobley et al (2006) studied the relation between land-use mix and BMI among 2692 women enrolled in the CDC WISEWOMAN program. Land-use mix was defined as evenness of distribution based on square areas of 5 types of land use (residential, commercial, office, institutional, rural) in ZIP codes of each participant's residence and computed based on the Frank et al (2004) method. The mean land-use mix was 0.49 (0.00-0.96). After adjustment for demographic, socioecological and other built-environment variables, land-use mix was inversely associated with BMI (β=–2.60; $P<0.05$).
Frost et al, 2010[337]	Systematic review of studies published between 1994 and 2008 including 1 study on the effect exposure-outcome relation in this section.	Adults in rural areas	Presence of walkable destinations	Obesity	• Boehmer et al (2006) studied the association of perceived proximity to destinations with self-reported measure of obesity (BMI ≥30) among 2210 adults in rural areas from 13 counties in Missouri, Tennessee, and Arkansas. After adjustment for gender, age, and education, participants who disagreed/strongly disagreed that there were many destinations to go within easy walking distance from their home did not have a significantly different risk of obesity compared with those who agreed/strongly agreed with this statement (OR=1.25; 95% CI, 0.99-1.57). Those who reported no destination within a 10-min walk from home did not have a significantly different risk of obesity compared with those who reported 7-11 destinations within a 10-min walk from their home (OR=1.38; 95% CI, 0.99-1.92).
Brownson et al, 2009[352]	Systematic review, including 2 studies about the exposure-outcome relation in this section	Adults	Land-use mix	Adiposity	Both studies found significant inverse association between land-use mix and adiposity. Land-use mix • Rundle et al (2007) studied the relation between land-use mix in the census tract of residence and objectively assessed BMI among 13,102 adults living in New York City. Land-use mix was defined as the balance between commercial and residential land uses and was calculated by multiplying the ratio of residential building area by the ratio of commercial building area for each tract. The product was then scaled by a factor of 4. The calculated index ranged from 0 to 1 and had a mean of 0.34. After adjustment for individual- and neighborhood-level sociodemographic characteristics, land-use mix was inversely associated with BMI (β=–0.55; $P<0.01$). Further adjustment for other built-environment variables (subway stop, bus stop, population, and intersection densities) did not greatly alter results (β=–0.46; $P<0.05$). • Frank et al (2004): See above.
Lovasi et al, 2009[334]	Systematic review of 45 US studies	Adults	Land-use mix/prese	Adiposity	Of 4 studies, 2 found significant positive association between land-use mix and adiposity.

	(sample size >100) published between January 1995 and January 2009, including 4 studies on the exposure-outcome relation in this section		nce of walkable destinatio ns		Land-use mix*:* • Rundle et al (2007): See above. • Frank et al (2004): See above. • Boehmer et al (2006): See above. • Boehmer et al (2007) studied the association of perceived presence of walkable destinations and obesity among 1032 adult residents of high- and low-income areas of Savannah, Georgia, and St Louis, Missouri. After adjustment for age, gender, education, and other environmental variables, people who strongly disagreed that "there are many destinations to go to within easy walking distance from my home" did not have a significantly different risk of obesity compared with those who agreed with this statement (OR=1.5; 95% CI, 0.8-2.6).
Additional Original Articles 2007-2010*					
Author, y	**Design and Duration**	**Population**	**Intervention/Exposur e**	**Outcome**	**Findings**
Rodríguez et al, 2009[271]	Cross-sectional, 2000-2002	N=5529 adults age 45-84 y in Baltimore, Maryland; Chicago, Illinois; Forsyth County, North Carolina; Los Angeles, California; New York City, NY; and St Paul, Minnesota	Land-use (evenness of distribution of residential, institutional, retail, and office in a 200-m buffer around participants' homes) calculated using the Cervero and Kockelman (1997) method. Self-reported presence of all destinations, stores, and schools or YMCAs within walking distance (20 min)	Self-reported walking (minutes per week) for transport (level 1: none; level 2: from 0 to 150 min per week; level 3: ≥150 min per week) Self-reported minutes per week of walking for exercise (level 1: none; level 2: from 0 to 90 min per week; level 3: ≥90 min per week).	After adjustment for age, gender, education, race/ethnicity, family income, and proportion of 400-m buffer from home accessible via roads: Walking for transport: • People who lived in the areas in the 4th quartile of land-use mix did not have significantly different odds of walking for transport (level 2 vs 1: OR=1.26; 95% CI, 0.71-2.24 and level 3 vs 1: OR=1.36; 95% CI, 0.63-2.96). • Perceived presence of walkable destinations was positively associated with walking for transport (level 2 vs 1: OR=1.13; 95% CI, 1.03-1.24 and level 3 vs 1: OR=1.26; 95% CI, 1.06-1.50). • Perceived presence of stores within walking distance was positively associated with walking for transport >150 min per week (level 2 vs 1: OR=1.13; 95% CI, 0.98-1.30 and level 3 vs 1: OR=1.29; 95% CI, 1.07-1.55). • Perceived presence of schools and YMCA within walking distance was positively associated with walking for transport (level 2 vs 1: OR=1.06; 95% CI, 0.83-1.35 and level 3 vs 1: OR=1.18; 95% CI, 0.87-1.60). Walking for exercise: • People who lived in the areas in the 4th quartile of land-use mix were more likely to walk for exercise >90 min per week (level 2 vs 1: OR=1.05; 95% CI, 0.87-1.27 and level 3 vs 1: OR=1.29; 95% CI, 1.08-1.54). • Perceived presence of walkable destinations was positively associated with walking for exercise (level 2 vs 1: OR=1.12; 95% CI, 1.07-1.18 and

					level 3 vs 1: OR=1.30; 95% CI, 1.20-1.41). • Perceived presence of stores in walking distance was positively associated with walking for exercise >90 min per week (level 2 vs 1: OR=1.04; 95% CI, 0.95-1.13 and level 3 vs 1: OR=1.18; 95% CI, 1.07-1.29). • Perceived presence of schools and YMCA within walking distance was positively associated with walking for exercise >90 min per week (level 2 vs 1: OR=1.08; 95% CI, 0.98-1.18) and level 3 vs 1: OR=1.18; 95% CI, 1.05-1.32).
Wells and Yang, 2008[360]	Observational, longitudinal, 2003-2006	N=32 low-income, primarily black women (age 23-60 y) living in 4 southeastern US towns	• 1 group moved to neotraditional neighborhoods and 1 group moved to conventional suburban neighborhoods • Land-use mix was assessed by multiple different metrics without control for multiple testing. • Population density	Number of steps walked per week, assessed by pedometer	After adjustment for race, household size, and premove steps: • Unexpectedly, 1 metric of greater land-use mix, an increase in service-jobs population density after the move, was associated with fewer steps walked per week (P=0.013). • Most land-use mix variables were not associated with walking in this small sample.
Boone-Heinonen et al, 2010[346]	Observational, longitudinal, 1994-1995 to 2001-2002	N=12,701 US adolescents, grades 7-12 at baseline, in the nationally representative National Longitudinal Study of Adolescent Health	Neighborhood land-cover diversity, street connectivity, physical activity facilities, and crime rate derived from GIS	Bouts of MVPA	In longitudinal analyses, after adjustment for measured covariates and within-person time-invariant factors: • Land-cover diversity was not significantly associated with higher MVPA. See Supplementary Tables 10a, 10c, and 10d for findings on physical activity facilities, street connectivity, and crime rate, respectively.

CI indicates confidence interval; NEWS-Y, Neighborhood Environment Walkability Scale–Youth; OR, odds ratio; GIS, geographical information systems; IOM, Institute of Medicine; TAZ, traffic analysis zone; BMI, body mass index; PR, prevalence ratio; SMARTRAQ, Strategies for Metro Atlanta's Regional Transportation and Air Quality; WISEWOMAN, Well-Integrated Screening and Evaluation for Women Across the Nation; CDC, Centers for Disease Control and Prevention; YMCA, Young Men's Christian Association; and MVPA, moderate to vigorous physical activity.

*Given the array of smaller, cross-sectional, observational studies that were already captured in the published narrative and systematic reviews identified here, in the writing group's additional systematic searches for original articles published after 2007, performed by means of PubMed searches, evaluation of related articles, and hand searches of reference lists, the writing group focused on those additional studies that were randomized trials, quasi-experimental studies, longitudinal studies, or large (N>5000) cross-sectional studies.

Supplementary Table 10c. Local Environmental Change to Improve Physical Activity (Community Settings)

Street and Sidewalk Design

Children (Outcome: Physical Activity)

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
IOM Committee on Childhood Obesity Prevention Actions for Local Governments, 2009[147]	Systematic review including 4 reviews, 1 quasi-experimental, and 1 cross-sectional study on the exposure of interest in this section	Children or adolescents	Pedestrian infrastructure (sidewalk availability) and street design (street connectivity)	Physical activity	Pedestrian infrastructure: • On the basis of 3 reviews by Davison and Lawson (2006) (see below), Badland and Schofield (2005), and Saelens et al (2003), it was concluded that the presence of sidewalks is positively associated with walking or biking for transportation or recreation. • On the basis of a review by Booth et al (2005), it was concluded that availability of sidewalks might be associated with obesity. • In a quasi-experimental analysis, Boarnet et al (2005a) studied the relation between parental reports of presence of a SR2S construction project on the way to school and change in the mode of transport to school among 862 children in grades 3-5 in California. Children whose route to school included a newly installed sidewalk were more likely to increase their active transport to school than children whose route did not include a new sidewalk ($P<0.01$). Street design: • On the basis of a review by Badland and Schofield (2005) and a cross-sectional study by Frank et al (2004), it was concluded that street connectivity is positively associated with physical activity.
Committee on Environmental Health, American Academy of Pediatrics, 2009[361]	Systematic review, including 1 quasi-experimental study on the exposure of interest in this section	Children	Pedestrian infrastructure (sidewalk availability)	Physical activity	Pedestrian infrastructure: • Boarnet et al (2005a): See above
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 1	Children or adolescents (age 10-15 y)	Pedestrian infrastructure (availability of sidewalk and walking trail)	Physical activity	Pedestrian infrastructure: • Evenson et al (2006) studied the association of self-reported presence of walking or biking infrastructure with self-reported physical activity and mode of transport to school among 480 US girls age 10-15 y. After adjustment for site, race/ethnicity, and grade, presence of neighborhood

	study on the exposure of interest in this section				bicycle or walking trails was positively associated with physical activity above the median (OR=1.68; 95% CI, 1.16-2.44) and active commuting to school (OR=1.59; 95% CI, 1.05-2.40). The presence of sidewalks was not associated with physical activity (OR=1.34; 95% CI, 0.89-2.02) or active commuting (OR=1.05; 95% CI, 0.66-1.67).
Panter et al, 2008[354]	Systematic review of 24 studies published between 2002 and 2007, including 5 on the exposure of interest in this section	Children (4-11 y) or adolescents (12-18 y)	Pedestrian infrastructure (sidewalk availability) and street design (street connectivity).	Walking or cycling to school or other local destinations	Pedestrian infrastructure: Of 5 studies, 3 reported significant positive association between the presence of sidewalks and active mode of transport, and 1 study reported the same between the presence of bicycle or walking trails and physical activity. • Mota et al (2007) evaluated the relation between self-reported presence of infrastructure for walking and self-reported travel mode to school among 705 Portuguese girls age 11-18 y. No significant difference was observed between their level of agreement with the statement "there are pavements on most of the streets in my neighborhood " and active vs passive commuting (P=0.19). • Kerr et al (2006) evaluated the association of parental perception of neighborhood characteristics with travel mode to school among 259 US girls and boys age 4-18 y. After adjustment for sociodemographic and other perception variables, significant positive association was observed between perceived presence of walking or cycling infrastructure (eg, sidewalks and pedestrian/bike trails) and active commuting to school (OR=2.5; 95% CI, 1.30-4.67). • Evenson et al (2006): See above. • Among 726 US youth age 10-15 y, Evenson et al (2004) found significant positive association between the presence of sidewalks on main roads (higher sidewalk coverage) and active travel to school. • Among 1395 US boys and girls age 8-18 y, Fulton et al (2003) found significant positive association between parental report of presence of sidewalks and walking to school. Street design: Both studies showed significant positive association between street connectivity and active commuting to school. • Mota et al (2007): See above. • Kerr et al (2006): See above.
Davison et al, 2008[353]	Systematic review of studies published before June 2007, including 3 on the exposure of interest in this section	Children or adolescents	Pedestrian infrastructure (sidewalk availability) and street design (street connectivity)	Active commuting	Pedestrian infrastructure: All 3 studies found significant positive association: • Kerr et al (2006): See above. • Boarnet et al (2005a): See above. • In a quasi-experimental study evaluating California's SR2S program, Boarnet et al (2005b) showed a significant increase in children's observed walking after completion of the sidewalk gap closure projects.

Bauman and Bull, 2007[338]	Systematic review of reviews published between 2002 and 2007, including 1 on the exposure of interest in this section	Children or adolescents	Pedestrian infrastructure (sidewalk availability) and street design (street connectivity)	Physical activity	Pedestrian infrastructure: • Davison and Lawson (2006): See below. The authors thought there was adequate evidence to conclude that sidewalk availability was positively associated with physical activity. Street design: • Davison and Lawson (2006): See below.
Davison and Lawson, 2006[343]	Systematic review of 33 studies, including 7 on the exposure of interest in this section	Children or adolescents	Pedestrian infrastructure (sidewalk availability and conditions) and street design (street connectivity)	Physical activity or active commuting	Pedestrian infrastructure: Of 4 studies, 2 studies found significant association between the presence of sidewalks and physical activity, and 1 study found significant association between sidewalk characteristics and physical activity. • Ewing et al (2004) found that the proportion of street kilometers with sidewalks was positively associated with children's rates of walking or cycling to school (β=1.480; *t* statistic: 2.09). • Mota et al (2005) studied the relation between perceived presence of sidewalks on streets in the neighborhood and self-reported physical activity among 1123 adolescents. No significant relation was found between their level of agreement with the statement "there are sidewalks on most of the streets in my neighborhood" and activity (*P*=0.15). • Jago et al (2005) studied the relation between objectively assessed sidewalk conditions and physical activity among 210 Boy Scouts. Sidewalk characteristics such as distance from sidewalk to curb, average height of trees, sidewalk material, and sidewalk type were positively associated with objectively measured light-intensity physical activity (β=0.20; *P*=0.003). • Boarnet et al (2005a): See above. Street design: Of 4 studies, 2 found significant positive association between street connectivity and physical activity. • Among 105 US students age 9-11 y, Braza et al (2004) found a positive relation between street connectivity (objectively measured number of intersections per street kilometer) in a 0.8-km buffer around schools and active commuting (walking or biking to school) by students. • Among 799 US boys and girls age 11-15 y, Norman et al found a positive association between intersection density and objectively measured MVPA in girls but not boys. • Mota et al (2005) found no relation between perceived street connectivity and self-reported physical activity among Portuguese adolescents in grades 7-12. • Timperio et al (2006) studied route directness (connectivity) and parental reports of walking or riding to school for 912 Australian children. Greater route directness was associated with less walking and cycling to school in older children (10-11 y) but not in younger children (5-6 y).

Children (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Carter and Dubois, 2010[356]	Systematic review of 27 studies published between1999 and 2009, including 1 on the exposure of interest in this section	Children and adolescents	Street design (street connectivity)	Obesity	Street design: • In a study of a nationally representative sample of US children age 5-18 y, Grafova (2008) found no association between street connectivity and obesity. However, children living in neighborhoods built after 1969 were more likely to be obese than those living in neighborhoods built before 1969.
Papas et al, 2007[349]	Review of 20 studies, including 1 study on the exposure of interest in this section	Adolescent	Street design (street connectivity)	Obesity	Street design: • In a study of 20,745 US adolescents, Nelson et al (2006) did not find a significant association between street connectivity and obesity.

Additional Original Articles (Children)*					
Author, y	**Design and Duration**	**Population**	**Intervention/Exposure**	**Outcome**	**Findings**
Boone-Heinonen et al, 2010[348]	Observational, cross-sectional, 1994-1995 National Longitudinal Study of Adolescent Health	N=17,659 US adolescents, grades 7-12, nationally representative	Street connectivity measures, including intersection density and link-node ratio, within 1, 3, 5, and 8.05 km of home, derived from GIS	Participation in MVPA	After adjustment for age, race, household income, parental education, census tract poverty, county level crime, and population density within the neighborhood buffer: • Intersection density within 1 km was most consistently associated with MVPA. • Relations appeared to vary by urbanicity and sex.
Boone-Heinonen et al, 2010[346]	Observational, longitudinal, 1994-1995 to 2001-2002 National Longitudinal Study of Adolescent Health	N=12,701 US adolescents, grades 7-12 at baseline, nationally representative	Neighborhood land-cover diversity, street connectivity, physical activity facilities, and crime rate derived from GIS	Bouts of MVPA	In longitudinal analyses, after adjustment for measured covariates and within-person time-invariant factors: • Street connectivity was not significantly associated with higher MVPA. See Supplementary Tables 10a, 10b, and 10d for findings on physical activity facilities, land-cover diversity, and crime rate, respectively.
Carver et al, 2010[362]	Observational, prospective,	Children (age 8-9 y; N=170) and	Objectively measured characteristics of	• Change in frequency of parent-reported (for	In crude (unadjusted) analyses: Age 8-9 y:

	2001-2004 Children Living in Active Neighborhoods Study	adolescents (age 13-15 y; N=276) from 19 government primary schools in high- (n=10) and low- (n=9) SES neighborhoods of Melbourne, Australia	neighborhood (a radius of 800 m around children's homes), including • Total lengths of walking tracks • Total numbers of intersections per neighborhood (intersection density)	children age 8-9 y) or self-reported (by adolescents age 13-15 y) walking or cycling to/from 15 neighborhood destinations between 2004 and 2006 • Change in MVPA measured by accelerometer in 4-6 complete consecutive days in 2001, 2004, and 2006	• Active commuting increased over follow-up in both boys and girls. • In crude analyses, total length of walking tracks was positively associated with change in active commuting in girls (β=0.0016; *P*=0.015) but not boys. Age 13-15 y: • Active commuting tended to decrease over follow-up in both boys and girls. • Total length of walking tracks was positively associated with change in active commuting in girls (β=0.0016; *P*=0.002). • Intersection density was positively associated with change in active commuting among boys (β =0.03; *P*=0.030).
Hume et al, 2009[363]	Observational, prospective, 2004-2006 Children Living in Active Neighborhoods Study	Children (age 8-9 y, N=121) and adolescents (age 13-15 y, N=188) from 19 government primary schools in high- (n=10) and low- (n=9) SES neighborhoods of Melbourne, Australia	Parents' self-reported satisfaction with neighborhood characteristics, including number of pedestrian crossings (strongly agree/agree=1; others=0)	Change in frequency of parent-reported (children age 8-9 y) or self-reported (children 13-15 y) walking or cycling to/from school between 2004 and 2006 dichotomized into 2 groups (increased, not changed)	After adjusting for gender, maternal education, and clustering of children by school: • Parents' satisfaction with the number of pedestrian crossings was associated with increased frequency of active commuting to school over 2 y (OR=2.4; 95% CI:1.1-5.4; *P*=0.03).

Adults (Outcome: Physical Activity)

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
Feng et al, 2010[351]	Systematic review, including 5 reviews on the exposure of interest in this section	Adults	Street design (street connectivity)	Physical activity	Street design: • On the basis of a review by Frank and Engelke (2003), it was concluded that street networks are associated with mode of transportation. • On the basis of a review by Saelens et al (2003) and a review by Sallis et al (2004), it was concluded that street connectivity is associated with ease of active travel between places. • On the basis of 3 reviews by Saelens et al (2003), Frank et al (2004), and Ewing and Cervero (2001), it was concluded that street connectivity is positively associated with active transport by reducing trip distance and providing alternate routes.
Frost et al, 2010[337]	Systematic review of studies published	Adults (age ≥18 y) in rural areas	Pedestrian infrastructure (availability of	Physical activity	Pedestrian infrastructure: Of 7 studies, 3 studies found significant positive association between presence of

	between 1994 and 2008, including 7 studies on the exposure of interest in this section		sidewalk, shoulder, and walking trail)		sidewalks and physical activity, 1 found positive association between presence of shoulders on streets and physical activity, and 1 found positive association between presence of walking trails and physical activity. • Deshpande et al (2005) studied the association between neighborhood sidewalks and walking among 274 adults with diabetes in rural areas from 12 communities in Missouri, Tennessee, and Arkansas. After adjustment for BMI, health status, and physical impairment, no significant association was found between presence of sidewalks and physical activity (OR=1.28; 95% CI, 0.71-2.29), but positive association was seen between presence of shoulders on streets and physical activity (OR=2.4; 95% CI, 1.3-4.5). • Eyler (2003) found no association between perceived presence of sidewalks and meeting recommendations for physical activity among white women age 20-50 y in rural areas of Missouri and Illinois (OR=0.99; 95% CI, 0.97-1.01). • Among 1194 adults in rural areas of a southeast county, Addy et al (2004) found positive association between perceived presence of sidewalks and occasional walking (OR=2.23; 95% CI, 1.27-3.92) but not regular walking (OR=1.39; 95% CI, 0.77-2.51). • Parks et al (2003) studied the association between perceived presence of walking trails and meeting the recommendations for physical activity among 1818 adults in a nationally representative sample of US rural areas. After adjustment for age, race, education, and gender, a positive association was seen in lower-income urban participants (OR=1.89; 95% CI, 1.06-3.41) but not rural or higher-income urban participants. • Among 1148 adults from a southeastern US rural community, Reed et al (2006) found positive association between perceived presence of sidewalks and meeting recommended physical activity levels (OR=3.59; 95% CI, 1.05-12.24) only among white participants. • Sanderson et al (2003) studied the relation between perceived presence of sidewalks and physical activity among 567 adults from rural areas of Alabama. After adjustment for age, marital status, education, number of children, annual income level, employment status, and general health, no significant association was found between presence of sidewalks and meeting recommendations for physical activity (OR=1.28; 95% CI, 0.82-2.01). • Among 102 black and white women age ≥50 y in rural areas of South Carolina, Wilcox et al (2003) found an inverse association between perceived absence of sidewalks and physical activity (β=–0.21, P<02).
Committee on Environmental Health, American Academy of Pediatrics, 2009[361]	Systematic review, including 2 studies that evaluated the exposure of interest in this section	Adults	Pedestrian infrastructure (sidewalk availability and conditions)	Physical activity	Pedestrian infrastructure: Of 2 studies, 1 found positive association between availability of sidewalks and physical activity and 1 between sidewalk conditions and physical activity. • Giles-Corti studied 1803 Australian adults age 18-59 y stratified by SES. After adjustment for age and sex, participants from lower-SES areas were more likely to feel there was availability of sidewalks in their neighborhood (OR=1.88; 95% CI, 1.31-2.71; P=0.001). After adjustment for age, sex, number of children age <18 y at home, education, household income, and

					work status, sidewalk availability was positively associated with walking for transport (OR=1.65; 95% CI, 1.12-2.41; *P*=0.011), trend toward walking for recreation (OR=1.41; 95% CI, 0.99-2.03; *P*=0.058), and meeting recommended levels of walking (OR=1.65; 95% CI, 0.95-2.87; *P*=0.077). In similar analyses, presence of sidewalks was positively associated with both performing vigorous exercise (OR=1.52; 95% CI, 1.05-2.21; *P*=0.027) and meeting recommended levels of vigorous exercise (OR=2.73; 95% CI, 1.39-5.37; *P*=0.003). • Hoehner et al (2005) studied perceived availability of sidewalks and objective measures of sidewalk conditions and physical activity among 1068 adult residents of a low-walkable city (St Louis, Missouri) and high-walkable city (Savannah, Georgia). More than 90% of participants strongly agreed or agreed with the presence of sidewalks on most streets in their community. No association was found between sidewalk availability and meeting the recommendations for transportation activity (OR=0.9; 95% CI, 0.4-1.7) or recreational activity (OR=0.9; 95% CI, 0.5-1.7). Sidewalk levelness (percent of street segments with sidewalks with little or no unevenness) was inversely associated with meeting recommendations for transportation activity (OR=0.5; 95% CI, 0.3-0.8) but not recreational activity (OR=0.8; 95% CI, 0.6-1.2).
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 2 studies on exposure of interest in this section	Adults	Pedestrian infrastructure (availability of sidewalks and walking trails)	Physical activity	Pedestrian infrastructure: Of 2 studies, 1 found positive association between presence of walking/bicycling trail and physical activity. • King et al (2000) evaluated presence of sidewalks and inactivity in a nationally representative US sample of 2912 women age ≥40 y from different racial/ethnic groups. After adjustment for age, race, employment, marital status, location, education, neighborhood, personal barriers characteristics, physical health, and preference for home-based exercise, no significant association was found between presence of sidewalks and being inactive (OR=1.08; 95% CI, 0.87-1.34). • Among 1194 low- and high-SES residents of a rural southeastern US county, Wilson et al (2004) evaluated self-reported and objectively assessed sidewalk availability and walking. Objective data showed similar rates of sidewalk availability in low- vs high-SES areas, although low-SES participants perceived lower availability. Sidewalk availability was not significantly related to walking in either group. Low-SES residents had less access to objectively assessed walking and bicycling trails (3.2 vs 59.2 km). After adjustment for age, sex, race, education, and BMI, compared with not having access, those who both had access and used walking/bicycling trails were more likely to meet physical activity guidelines among low-SES (OR=2.81; 95% CI, 1.38-7.93; *P*=0.05) but not high-SES participants. Access alone, without use, was not associated with meeting physical activity guidelines (OR=1.17; 95% CI, 0.53-2.55).

Casagrande et al, 2009[357]	Systematic review of minority studies (population ≥90% black) published before August 2007, including 6 studies on the exposure of interest in this section	Black adults (age ≥18 y)	Pedestrian infrastructure (sidewalk availability)	Physical activity	Pedestrian infrastructure: Of 6 studies, 2 found positive association between presence of sidewalks and physical activity. • King et al (2000): See above. • Eyler (2003): See above. • Wilcox et al (2003): See above. • Sanderson et al (2003): See above. • Ainsworth et al (2003) studied perceived presence of sidewalks and meeting recommendations for physical activity among 917 black women age 20-50 y in South Carolina. Most (77.2%) women reported no sidewalks in their neighborhood. After adjustment for education and county of residence, sidewalk availability was positively associated with meeting recommendations (OR=1.57; 95% CI, 1.14-2.17). • Young et al (2003) studied perceived presence of sidewalks and meeting recommendations for physical activity among 234 black women age 20-50 y in Baltimore, Maryland. Most (94%) women reported availability of sidewalks in their neighborhood. No significant association was seen between sidewalk availability and meeting recommendations for physical activity (OR=0.30; 95% CI, 0.04-2.32).
Saelens and Handy, 2008[359]	Systematic review of 13 reviews published between 2002 and 2006 and 29 original studies published between 2005 and 2006, including 6 reviews and 10 original studies on the exposure of interest in this section	Children and adults	Pedestrian infrastructure (sidewalk availability) and street design (street connectivity)	Walking	Pedestrian infrastructure: • On the basis of 4 reviews by Handy (2005), Heath et al (2006), McCormack et al (2004), and McMillan (2005), the authors concluded that presence of sidewalks is associated with walking. • Of 8 studies, 2 found positive association between pedestrian infrastructure and walking for transportation. • Of 6 studies, 4 found positive association between pedestrian infrastructure and walking for recreation. • Of 4 studies, 2 found positive association between pedestrian infrastructure and walking in general. Street design: • On the basis of 2 reviews by Badland and Schofield (2005) and Saelens et al (2003), the authors concluded that street connectivity is associated with walking. • Of 7 studies, 3 found positive association between street connectivity and walking for transportation. • Of 4 studies, none found positive association between street connectivity and walking for recreation. • Of 6 studies, 3 found positive association between street connectivity and walking in general.
Bauman and Bull, 2007[338]	Systematic review of reviews published	Adults	Pedestrian infrastructure (sidewalk	Physical activity or walking	Pedestrian infrastructure: Of 6 reviews, 3 found significant positive association between sidewalk

	between 2002 and 2007, including 6 reviews about the exposure of interest in this section		availability) and street design (street connectivity)		availability and physical activity, and 3 found positive association between sidewalk availability and walking. • A review by Trost et al (2002) did not find sufficient evidence to conclude that sidewalk availability is associated with physical activity levels. • A meta-analysis by Duncan et al (2005) showed presence of sidewalks was positively associated with physical activity (see below). • A systematic review by Humpel et al (2002) concluded that presence of safe sidewalks was positively associated with physical activity. • A systematic review by McCormack et al (2005) concluded that sidewalk safety was positively associated with physical activity and walking for recreation. • A systematic review by Owen et al (2004) found significant positive association between presence of sidewalks and walking for transport. • A review by Wendel Vos Droomers et al (2005) concluded that presence of sidewalks was positively associated with walking. Street design: Three studies found positive association between street connectivity and physical activity. One study found positive association between street connectivity and walking. • Badland and Schofield (2005) found positive association between street connectivity and the number of intersections and physical activity. • Vojnovic (2006) found positive association between street connectivity and physical activity. • Wendel Vos et al (2005) found positive association between street connectivity and active commuting. • McCormack et al (2004) found positive association between street connectivity and physical activity and walking.
Duncan et al, 2005[340]	Meta-analysis of 16 studies published between January 1989 and February 2005. The number of studies that evaluated the exposure of interest in this section was not reported.	Adults	Pedestrian infrastructure (sidewalk availability)	Physical activity	Pedestrian infrastructure: • After adjustment for age, income, and education, the perceived presence of sidewalks was positively associated with physical activity (OR=1.29; 95% CI, 1.17-1.41). The presence of sidewalks explained 6% of physical activity variance.
Adults (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**

Frost et al, 2010[337]	Systematic review of studies published between 1994 and 2008, including 1 on the exposure of interest in this section	Adults (age ≥18 y) in rural areas	Pedestrian infrastructure (sidewalk availability)	Obesity	Pedestrian infrastructure: • Boehmer et al (2006) studied the association between perceived presence of sidewalks and obesity among 2210 adults in rural areas from 13 counties in Missouri, Tennessee, and Arkansas. After adjustment for gender, age, and education, no significant association was found between sidewalk availability and obesity (OR=1.19; 95% CI, 0.95-1.48).
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 2 studies on the exposure of interest in this section	Adults	Pedestrian infrastructure (sidewalk availability and conditions)	Obesity	Pedestrian infrastructure: Of 2 studies, 1 found significant inverse association between sidewalk availability and obesity. • Boehmer et al (2006): See above. • Boehmer et al (2007) evaluated perceived presence and observed conditions of sidewalks and obesity among 1032 adult urban residents of high- and low-income areas of Savannah, Georgia, and St Louis, Missouri. After adjustment for age, gender, education, and other environmental variables, people who strongly disagreed that "there are sidewalks on most of the streets in my community" had significantly greater odds of obesity compared with those who agreed with this statement (OR=2.2; 95% CI, 1.1-4.3). Poor condition of sidewalks was also positively associated with obesity (OR=2.1; 95% CI, 1.3-3.6). This association was stronger among lower-income participants.
Papas et al, 2007[349]	Review of 20 studies, including 3 studies on the exposure of interest in this section	Adults	Pedestrian infrastructure (sidewalk availability) and street design (street connectivity)	Direct measures of body weight (eg, BMI)	Pedestrian infrastructure: Of 2 studies, 1 found inverse association between sidewalk availability and odds of overweight. • Giles-Corti et al (2003) evaluated sidewalk availability and obesity among 1803 Australian adults age 18-59 y. After adjustment for age, gender, education, occupation, SES, smoking status, time spent watching TV, leisure-time physical activity, physical activity level compared with peers, and other environmental variables, living on a street with no sidewalks or sidewalks on only 1 side of the street was positively associated with overweight (OR=1.35; 95% CI, 1.03-1.78). A nonsignificant trend was seen between sidewalk availability and obesity (OR=1.62; 95% CI, 0.98-2.68). • Rutt and Coleman (2005) did not find significant association between sidewalk availability and BMI among 996 Hispanic adults in Texas. Street design: • In a study of 10,878 US adults age 18-100 y, Frank et al (2004) did not find significant association between the number of intersections within a 1-km radius of home and obesity.
Booth et al, 2005[367]	Narrative review of 9 studies, including 1 on the exposure of	Adults	Pedestrian infrastructure (sidewalk availability)	Overweight /obesity	Pedestrian infrastructure: • Giles-Corti et al (2003): See above.

	interest in this section				

Additional Original Articles 2007-2010 (Adults)*

Author, y	Design and Duration	Population	Intervention/Exposure	Outcomes	Findings
Cleland et al, 2008[364]	Observational, prospective, 2004-2006	N=357 mothers of children in the Children Living in Active Neighborhoods study in Melbourne, Australia	Self-reported characteristics of neighborhood, including infrastructure	Self-reported time spent on walking for leisure (low: <90 min per week; high ≥90 min per week) or for transport (low:<30 min per week; high ≥90 min per week) in the local neighborhood	• After adjustment for highest level of schooling and corresponding baseline walking variables, no significant association was found between sidewalk availability and walking for leisure or transport.
Hou et al, 2010[365]	Observational, prospective, 1985-1986 to 2000-2001	N=5115 young US adults in the CARDIA cohort	Time-varying street network data within 1 km of home, derived from GIS	Self-reported walking, bicycling, and jogging	After adjustment for time-varying individual-level and census-level covariates: • Neighborhood street density was positively associated with walking, bicycling, and jogging in low-urbanicity areas. • In middle- and high-urbanicity areas, street density had no relation to activity in men and was inversely associated with activity in women.
Fitzhugh et al, 2010[366]	Quasi-experimental, 2005-2007	Residents of 3 neighborhoods in Knoxville, Tennessee (1 intervention and 2 control neighborhoods)	Construction of an urban greenway/trail in a neighborhood that lacked connectivity of the residential pedestrian infrastructure to nonresidential destinations	2-h counts of directly observed (1) total physical activity in the general neighborhood and (2) active commuting to school	• At follow-up, total physical activity was significantly higher in the intervention neighborhood (P=0.028). • During follow-up, total physical activity significantly increased in the intervention neighborhood (median difference=+8.5; P<0.001) and decreased in control neighborhoods (median difference=−1; P<0.001). • Active transport to school was not significantly changed in either intervention or control neighborhoods.

IOM indicates Institute of Medicine; SR2S, Safe Routes to School; OR, odds ratio; CI, confidence interval; GIS, geographical information systems; MVPA, moderate to vigorous physical activity; SES, socioeconomic status; BMI, body mass index; and CARDIA, Coronary Artery Risk Development in Young Adults.

*Given the array of smaller, cross-sectional, observational studies that were already captured in the published narrative and systematic reviews identified here, in the writing group's additional systematic searches for original articles published after 2007, performed by means of PubMed searches, evaluation of related articles, and hand searches of reference lists, the writing group focused on those additional studies that were randomized trials, quasi-experimental studies, longitudinal studies, or large (N>5000) cross-sectional studies.

Supplementary Table 10d. Local Environmental Change to Improve Physical Activity (Community Settings)

Neighborhood Safety and Crime

Safety and Physical Activity in Children and Adolescents (Reviews)

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
Galvez et al, 2010[355]	Systematic review of articles published between January 2008 and August 2009, including 8 articles about the exposure-outcome relation in this section	Children or adolescents age ≤18 y	Safety: overall, traffic-related, crime-related	Physical activity	Overall safety: • Five studies found positive association between parental perception of safety and children's physical activity. Wen et al found that parental perception of neighborhood safety was positively associated with time spent playing outdoors in children age 10-12 y (*P*=0.06). Veugelers et al found positive association between parental perception of neighborhood safety and playing sports without a coach (OR=1.23; 95% CI, 1.04-1.46). Beets et al found parental perception of a neighborhood's safety for children to play outside fully mediated the effect of neighborhood quality on parental reports of children's activity. Carver et al found positive association between parental perceptions of safety and adolescent boys' physical activity after school. They found no associations between parental perceptions of neighborhood safety and children's physical activity outside school hours. Kerr et al found that perceived safety was positively associated with use of indoor exercise equipment in girls age 11-15 y. Traffic safety: • Two studies found significant association between subjective measures of road safety and physical activity. Rosenberg et al found positive association between parental perception of road safety and parental reports of children's (age 5-11 y) activity in parks (*P*=0.047). They also found positive association between adolescents' perception of road safety and walking to a park (*P*=0.003). Carver et al found inverse association between self-reported concerns about road safety and physical activity during evenings and outside school hours among adolescent girls. Crime safety: • Among 3 studies that evaluated neighborhood crime, 1 found significant inverse association with walking, 1 found significant positive association with sedentary behaviors, and 1 found no association. Rosenberg et al found an inverse association between adolescents' concerns over crime safety and walking to shops (*P*=0.03). Brown et al found positive association between sex offenders per capita (IRR=2.35; 95% CI, 1.27, 4.34) and burglaries per 100 capita (IRR=1.25; 95% CI, 1.05, 1.47) in the school area and playing video games among boys. Also, they found positive association between burglaries (IRR=1.19; 95% CI, 1.038, 1.356) and larcenies (IRR=1.05; 95% CI, 1.00,

					1.10) in the school area and hours of television watching among the girls. Martin and McCaughtry did not find any significant association between self-reported crime attributes of the neighborhood (eg, crime, litter, gangs) and physical activity among black children.
IOM Committee on Childhood Obesity Prevention Actions for Local Governments, 2009[147]	Systematic review, including 2 reviews, 2 longitudinal studies, and 1 cross-sectional study on the exposure-outcome relation in this section	Children or adolescents	Safety (overall, crime)	Physical activity	Overall safety: • On the basis of a review by Carver et al[368] (see below), a longitudinal study by Cleland et al[364], and a cross-sectional study by Weir et al,[369] the committee concluded that perceived safety significantly affects walking in both children and adults. Crime safety: • On the basis of a review by Ferreira et al[344] and a longitudinal study by Gordon-Larsen et al,[370] the committee concluded that safety from crime was associated with physical activity.
Carver et al, 2008[368]	Narrative review, including 11 studies about the exposure-outcome relation in this section	Children or adolescents (United States, Australia, New Zealand, United Kingdom, and Europe)	Safety (traffic, crime)	Physical activity	Traffic safety (perceived measures): • On the basis of the descriptive findings of 6 studies, road safety is a common concern among both parents and children. Three studies found significant inverse association between parental concerns about road safety and children's physical activity. Among 2 studies on the relation between adolescents' perceptions of road safety and physical activity, 1 reported positive association and 1 reported no association. Also, 1 study compared perceptions of parents and their children and found that children age 10-12 y were less concerned about road safety than their parents were. However, parental perception of road safety was a stronger predictor of children's walking and cycling in the neighborhood. Traffic safety (objective measures): • A study that used objective measure of road safety found significant inverse association between GIS-derived need to cross a busy road on the most direct route to school and walking or cycling to school among children age 5-6 y and 10-12 y. Crime safety (perceived measures): • On the basis of the descriptive findings of 3 studies, harm from strangers is a common concern among parents. For instance, 1 study reported 88% of parents of 5–6-y-olds and 81% of parents of 10–12-y-olds reported stranger danger as a concern. However, the only study on the relation between parental perception of stranger danger and physical activity did not find any significant association, which the authors thought could relate to high prevalence of the concern. Another study found no associations between adolescents' perception of stranger danger and walking or cycling in their neighborhood. Crime safety (objective measures): • Most studies reviewed used a subjective measures of crime safety. However, 2 studies that used objective measures reported significant associations. A study of Mexican-American adolescents found significant inverse association

					between the number of violent crimes committed within a radius of 0.8 km of home during the past year and outdoor physical activity, although only among girls. Another study, after adjusting for SES, sex, age, BMI, and ethnicity, found that objectively measured social disorder was inversely associated with time spent on recreational physical activity among children and adolescents age 11-16 y. However, this study did not find a significant association between physical disorder (eg, wrecked vehicles) and physical activity.
Panter et al, 2008[354]	Systematic review of 24 studies published between 2002 and 2007, including 13 studies about the exposure-outcome relation in this section	Children (age 5-11 y) or adolescents (age 12-18 y) in the United States, Australia, and Europe	Safety (traffic, crime)	Walking or cycling to school or other local destinations	Traffic safety: • All 5 studies that evaluated the relation between road safety and active travel reported significant association; however, the characteristics of the road evaluated in the studies were to some extent different. For example, 1 study found significant inverse association between parental reports of no lights or crossings in the neighborhood and parental perception that children had to cross busy roads to get to school and active travel to school. Another study found significant positive association between self-perception of safety and walking among the girls. This study found inverse association between parental concerns about traffic and walking or cycling among the boys. Another study found inverse association between unsafe roads and walking regardless of the child's or parents' perception of safety. Crime safety: • Among the 8 studies on the relation between parental perception of personal safety and active commuting, 3 reported significant inverse association. For instance, 1 study[371] found lower parental concern of safety was associated with 5.2 higher odds of active commuting to school (OR=5.2; 95% CI, 2.71-9.96). However, 5 other studies did not find any significant association between parental concerns about personal safety (eg, stranger danger) and walking or cycling among children and adolescents.
Davison et al, 2008[353]	Systematic review of studies published before June 2007, including 8 studies on the exposure-outcome relation in this section	Children or adolescents (age <18 y)	Safety (traffic, crime)	Active commuting	Traffic safety: • Among the 4 studies on the relation between perceived traffic safety and mode of transport to school, only 1 study found significant inverse association between parental concerns about traffic safety and active commuting to school. Crime safety: • Among the 4 studies on the relation between concerns about crime or strangers and children's mode of transport, only 1 study found significant positive association between parental perception of safe neighborhood and active commuting to school. • On the basis of the finding of the studies on the exposure-outcome relation in this section and studies about other environmental characteristics, the authors concluded that parental perception of environmental attributes is a stronger predictor of children's active commuting compared with objectively measured characteristics.
Ferreira et al,	Systematic review	Children and	Safety (crime)	Physical	Crime safety:

2007[344]	of 150 studies published from January 1980 to December 2004, including 3 cross-sectional studies on the exposure-outcome relation in this section	adolescents (age ≤18 y)		activity	• Among the studies on the relation between crime incidence (measured objectively) and adolescents' physical activity, 2 found significant inverse association. This finding was at odds with the lack of association between adolescents' physical activity and the neighborhood safety estimates they perceived. • Although a wide range of potential correlates at the physical, sociocultural, and economical levels were identified in this study, only a few were examined in >3 independent samples.
Davison and Lawson, 2006[343]	Systematic review of 33 studies, including 12 studies on the exposure-outcome relation in this section	Children or adolescents age <18 y	Safety (traffic, crime)	Physical activity	Crime safety: • Among 9 studies that examined the association between perceived safety and children's physical activity, 7 found no association. Only studies by Molnar et al and Gomez et al found significant association. Traffic safety: • All 3 studies that examined the relation between road safety and physical activity reported an inverse association. Timperio et al reported that parental perception that their children had to cross many roads to get to a play area was associated with significantly lower rates of walking and cycling among children. Also, in a second study, Timperio et al, using the same sample but using an objective assessment of the environment, found that the presence of a busy road barrier was associated with lower rates of active commuting to school among children age 5-6 y and 10-12 y. Also, Carver et al reported that parental concerns about traffic were associated with lower rates of walking or cycling among girls and boys.
Safety and Obesity Among Children and Adolescents (Reviews)					
Dunton et al, 2009[350]	Systematic review, including 15 studies (14 cross-sectional), with a few studies on the exposure-outcome relation in this section	Children and adolescents	Physical environment characteristics	BMI	• Positive associations with obesity outcomes were found for number of neighborhood hazards (low-SES areas) and parental perceptions of heavy traffic (older children).
Galvez et al, 2010[355]	Systematic review of articles published between January 2008 and August 2009, including 8 articles on the exposure-outcome relation of interest in this section	Children and adolescents age ≤18 y	Safety (overall, crime, traffic, physical disorder)	Obesity	• Among 3 studies evaluating parental perception of safety, 2 found significant association with healthy weight among 5th grade girls and children age ≥11 y, and 1 reported no association. • Among 2 studies that examined adolescents' perception of safety and BMI, 1 found an inverse association only in racial groups other than blacks and whites (a combined group of Hispanics, Asians, American Indians, and other racial groups). • Among 3 studies that evaluated neighborhood conditions or physical disorder, 1 found positive association, 1 found inverse association, and 1 found no association. • In 2 studies, there was no associations between crime and obesity.

					• The findings from 1 longitudinal study suggested TV as a mediator of the relation between neighborhood safety and obesity.
Carter and Dubois, 2010[356]	Systematic review of 27 studies published between 1999 and 2009, including 7 studies on the exposure-outcome relation in this section	Children and adolescents (age 2-18 y) living in the United States, Canada, Australia, United Kingdom, and Germany	Safety	Adiposity (skin-fold thickness, BMI, percentage of lean body mass, etc)	• Among the 7 studies that examined the relation between neighborhood safety and child adiposity, only 1 found significant relation and only in 1 age group. Timperio et al (2004) evaluated the relation between parental and children's perceptions of neighborhood environment and overweight and obesity among 291 children age 5-6 y and 919 children age 10-12 y in Melbourne, Australia. After adjustment for gender, family SES, school area SES, and number of cars owned adjusted for clustering by school, parents' perception of heavy traffic in local streets was associated with overweight or obesity among children age 10-12 y (OR=1.4; 95% CI, 1.0-1.8). Also, among children of this age group, parents' perception of lack of road safety in the neighborhood was associated with obesity (OR=3.9; 95% CI, 1.0-15.2).

Safety and Physical Activity Among Children and Adolescents (Original Articles)*

Author, y	Design, Duration	Population	Intervention/Exposure	Outcome	Major Findings
Boone-Heinonen et al, 2010[346]	Observational, prospective, 1994-1995 to 2001-2002	N=12,701 US adolescents, grades 7-12 at baseline, in the nationally representative National Longitudinal Study of Adolescent Health	Neighborhood land-cover diversity, street connectivity, physical activity facilities, and crime rate derived from GIS	Bouts of MVPA	In longitudinal analyses, after adjustment for measured covariates and within-person time-invariant factors: • Higher crime rates were associated with significantly lower MVPA. See Supplementary Tables 10a, 10b, and 10c for findings on physical activity facilities, land-cover diversity, and street connectivity, respectively.
Carver et al, 2010[362]	Observational, prospective, 2001- 2006	Children (age 8-9 y; N=170) and adolescents (age 13-15 y; N=276) from 19 government primary schools in high- (n=10) and low- (n=9) SES neighborhoods of Melbourne, Australia (Children Living in Active Neighborhoods Study)	Objectively measured neighborhood characteristics in 800-m radius around home: • Total length of local roads and unsealed (unpaved) roads suitable for vehicles (GIS derived) • Local road index calculated by dividing total length of all local roads and unsealed (unpaved) roads suitable for vehicles by total length of all roads in the neighborhood (GIS derived) • Total numbers of speed	Change in frequency of parent-reported (for children age 8-9 y) or self-reported (adolescents age 13-15 y) walking or cycling to/from 15 neighborhood destinations between 2004 and 2006 Change in MVPA measured by accelerometer in 4-6 complete consecutive days in 2001, 2004, and 2006	Age group 8-9 y: • Number of traffic/pedestrian lights and total length of walking paths were positively associated with changes in active transport among girls (β=0.45, *P*=0.004 and β=0.0016, *P*=0.015, respectively).Slow points were associated with change in physical activity before school (β=1.55, *P*=0.021) among boys. Age group 13-15 y: • Among boys, speed bumps were positively associated with change in physical activity after school (β=0.23, *P*=0.015). • Among girls, total length of local roads (β=0.49, *P*=0.005), intersection density (β=0.05, *P*=0.036), and number of speed bumps (β=0.33, *P*= 0.020) were associated with change in physical activity during nonschool hours.

			bumps, gates/barriers on roads, slow points or sections of road narrowing, and traffic/pedestrian lights (obtained from street directory data)		• Among boys, intersection density was positively associated with change in active transport (β=0.03, *P*=0.030). • Among girls, total length of walking paths was positively associated with change in active transport (β=0.0016, *P*=0.002).
Crawford et al, 2010[372]	Observational, prospective, 2001-2006	Children (age 10-12 y at baseline; N=301) from 19 government primary schools in high- (n=10) and low- (n=9) SES neighborhoods of Melbourne, Australia (Children Living in Active Neighborhoods Study)	Objectively measured characteristics of neighborhood (a radius of 2 km around home) in 2004 and 2006, including: • Number of accessible public open spaces • Number of public open sports venues • Total length of walking and cycling tracks • Distance to school • Number of intersections and cul-de-sacs • Total length of "access" paths • Total length of "busy" roads and "local" roads Also assessed, parental perceptions of local environment in 2001, 2004, 2006, including perception of heavy traffic, road safety lights/crossings, sporting venues, and public transport	Change in MVPA measured by accelerometer in 4-6 complete consecutive days in 2001, 2004, and 2006 Change in BMI *z* score from objectively measured height and weight in 2001, 2004, and 2006	• After adjustment for age and clustering by school, baseline BMI, and other covariates significantly associated with outcome, no significant associations were seen between these neighborhood factors and 5-y changes in physical activity or BMI *z* score.
Hume et al, 2009[363]	Observational, prospective, 2004-2006	Children (age 8-9 y in 2004; N=121) and adolescents (age 13-15 y in 2004; N=188) from 19 government primary schools in high- (n=10) and low- (n=9) SES neighborhoods of Melbourne, Australia (Children Living in Active Neighborhoods	• Parent-reported concerns over heavy traffic, stranger danger, road safety, and traffic lights or pedestrian crossings in area of residence • 6-point Likert-type responses were dichotomized to strongly agree/agree (=1) vs others (=0).	Change in frequency of parent-reported (for children age 5-6 y) or self-reported (children age 10-12 y) walking or cycling to/from school between 2004 and 2006, dichotomized into 2 groups (increased, not changed)	After adjusting for gender, SES, and clustering by school: • Parental perception of no traffic lights or pedestrian crossings for child use was associated with lower frequency of increased active commuting to school: over 2 y, OR=0.4; 95% CI, 0.2, 0.8; *P*=0.01. • No significant associations were seen between parental concerns about heavy traffic, stranger danger, or road safety and outcome (OR or *P* value not reported).

		Study)			
Safety and Physical Activity Among Adults (Reviews)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Duncan et al, 2005[340]	Meta-analysis, 16 studies published between January 1989 and February 2005. The number of studies on the exposure-outcome relation in this section was not reported.	Adults	Various environmental characteristics	Physical activity as a binary factor, eg, any walking, sufficient walking, sufficient leisure-time activity	• In crude (unadjusted) analyses, no variables demonstrated a significant association with physical activity. • After adjustment for age, income, and education level, absence of heavy traffic as a problem was positively associated with physical activity (OR=1.22; 95% CI, 1.08, 1.37).
Ferreira et al, 2007[344]	Systematic review of 150 studies published from January 1980 to December 2004, mostly cross-sectional, including several on the exposure-outcome relation in this section	Youth	Environment characteristics	Physical activity	• Although a wide range of potential correlates at the physical, sociocultural and economic level was identified in this study, only a few were examined in > 3independent samples. • Within the sociocultural environment, crime incidence (measured objectively) was inversely associated with adolescents' physical activity in 2 of 3 studies available, a finding that was at odds with the lack of association between adolescents' physical activity and neighborhood safety estimates they perceived.
Foster et al, and Giles-Corti 2008[373]	Systematic review of 41 quantitative studies published before July 2007 on the exposure-outcome relation in this section	Adults	Neighborhood safety (traffic, crime)	Physical activity	• Among the 11 studies that examined the effect of perceived neighborhood safety (traffic, crime) and physical activity exclusively among women, 4 found significant positive association between feeling safe and physical activity. • Among 25 studies on the subjective measure of safety (traffic, crime) in both women and men, 20 studies found significant positive association between perception of safety and physical activity. • Among 7 studies on the objective measure of safety in both women and men, 5 studies found significant positive association between safety and physical activity. • Among 6 studies on perceived safety in older adults (age >50 y), 5 studies found significant positive association between perception of safety and physical activity.
Saelens and Handy, 2008[359]	Systematic review of 13 reviews	Children and adults	Safety (traffic, crime)	Walking	• All 4 reviews concluded that significant associations exist between attributes of safety and walking.

	published from 2002 and 2006 and 29 original studies published between 2005 and 2006, including 4 reviews and 15 original studies on the exposure-outcome relation in this section				• Traffic safety: Among 8 original studies that examined the relation between traffic and walking for transportation, 2 found inverse association. Among 6 studies the examined the relation between traffic and recreational walking, none found inverse association. Among 2 studies that examined the relation between traffic and walking in general, 1 found inverse association. • Crime safety: Among 7 original studies that examined the relation between personal safety and walking for transportation, 3 found positive association. Among 5 studies that examined the relation between personal safety and recreational walking, 1 found positive association. Among 4 studies that examined the relation between personal safety and walking in general, 2 found positive association.
Frost et al, 2010[337]	Systematic review of studies published from 1994-2008, including 17 on the exposure-outcome relation in this section	Adults age ≥18 y in rural areas	Safety (traffic, crime)	Physical activity	• Traffic safety: Among 8 studies that evaluated traffic safety (perceived or objectively measured), 4 studies reported significant positive associations between light traffic or perceived safety from traffic and physical activity. • Crime safety: Among 9 studies that evaluated crime safety (perceived or objectively measured), 4 reported significant association with physical activity and 2 reported significant association with walking.
McCormack et al, 2010[374]	Systematic review of studies published before 2009, including 19 studies on the exposure-outcome relation in this section	Children and adults	Safety (traffic, crime)	Park use or park-based physical activity	• All 19 studies found association with safety attributes and park use or park-related physical activity. Safety attributes were categorized into 2 major groups: safety from crime and safety from injury. • Crime safety: – 3 studies found positive association between the presence of lighting and park use. – 4 studies found positive association between the presence of law enforcement and increased security and park use; however, 2 studies found inverse association between police presence and park use. – 3 studies found an inverse association between the presence of the homeless in the park and park use. • Safety from injury: – 3 studies found an inverse association between the presence of glass, syringes, and debris and park use. – 3 studies found an inverse association between heavy traffic and park use.

OR indicates odds ratio; CI, confidence interval; IRR, incidence rate ratio; IOM, Institute of Medicine; GIS, geographical information systems; SES, socioeconomic status; BMI, body mass index; and MVPA, moderate to vigorous physical activity.

*Given the array of smaller, cross-sectional, observational studies that were already captured in the published narrative and systematic reviews identified here, in the writing group's additional systematic searches for original articles published after 2007, performed by means of PubMed searches, evaluation of related articles, and hand searches of reference lists, the writing group focused on those additional studies that were randomized trials, quasi-experimental studies, longitudinal studies, or large (N>5000) cross-sectional studies.

Supplementary Table 10e. Local Environmental Change to Improve Physical Activity (Community Settings)

Aesthetic Conditions*

Children

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
Carter and Dubois, 2010[356]	Systematic review of 27 studies published between 1999 and 2009, including 4 studies (3 cross-sectional, 1 prospective) on the exposure-outcome relation in this section	Children and adolescents (age 2-18 y) living in the United States, Canada, Australia, United Kingdom, or Germany	Aesthetics (enjoyable scenery, greenness, physical disorder)	Adiposity (skin-fold thickness, BMI, percentage of lean body mass, etc)	Of 4 studies, 2 found inverse association between greenness and adiposity; 1 found positive association between physical disorder and adiposity; and 1 did not identify significant association between enjoyable scenery and adiposity. Greenness: • Liu et al (2007) studied greenness and adiposity among 7334 children age 3-18 y who were visited for routine well-child care in a network of primary care clinics in Marion County, Indiana. Satellite imagery of the amount of plant life quantified NDVI within a 2-km circular buffer of each home. After adjustment for age, race, gender, and median neighborhood family income, NVDI was inversely associated with odds of obesity in children who lived in areas with high population density (OR=0.90; $P<0.01$) but not in areas with low population density (OR=1.13; $P=0.31$). • In a prospective study, Bell et al (2008) evaluated 3831 children age 3-16 y who received well-child care from a clinic network in Marion County, Indiana. After adjustment for age, sex, race, health insurance status, and baseline weight, mean NDVI in a 1-km circular and network buffer around the home was inversely associated with BMI *z* score 2 y after the first visit (β=−0.06; 95% CI, −0.09, −0.02). Physical disorder: • Among 2482 US children age 5-18 y, Grafova (2008) evaluated neighborhood physical disorder (eg, garbage, broken glass on the streets) and obesity. After adjustment for age, gender, race, ethnicity, family wealth, income-to-needs ratio, mother's BMI, primary caregiver's level of education, number of children in the household, sex of household head, mother's annual hours of work, and region, living in areas with no physical disorder was associated with lower odds of obesity (OR=0.5; 95% CI, 0.4-0.8). Enjoyable scenery: • Evenson et al (2007) evaluated children's perceptions of enjoyable neighborhood scenery among 1554 US 6th grade girls. After adjustment for school, site, nonschool physical activity, neighborhood SES, percentage receiving a free or reduced-price lunch, and race, no association was observed with overweight (OR=0.9; 95% CI, 0.7-1.3).

Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 2 on the exposure-outcome relation in this section	US children of low SES, black race, or Hispanic ethnicity	Aesthetics (enjoyable scenery, greenness, physical disorder)	Physical activity/obesity	Of 2 studies, 1 found significant inverse association between greenness and adiposity in areas of high population density, and 1 did not identify significant association between physical disorder and adiposity. • Green space: Liu et al (2007): See above. • Physical disorder: Molnar et al evaluated objectively measured neighborhood physical disorder and parent-reported recreational physical activity among 1378 boys and girls age 11-16 y in 80 neighborhood clusters in Chicago, Illinois. After adjustment for age, sex, race, BMI, family SES, and neighborhood education, no significant association was found between a composite score of neighborhood physical disorder and physical activity.
Panter et al, 2008[354]	Systematic review of 24 studies published between 2002 and 2007, including 4 cross-sectional studies on the exposure-outcome relation in this section	Children (age 5-11 y) or adolescents (age 12-18 y)	Aesthetics (general, enjoyable scenery, physical disorder, greenness)	Walking or cycling to school or other local destinations	Of 4 studies, 3 found significant associations. • General aesthetics: Among 259 parents of children age 5-18 y, after adjustment for child age, gender, and parental education, Kerr et al (2006) found positive association between parental perception of neighborhood aesthetics and children's actively commuting to school at least once per week (OR=2.5; 95% CI, 1.33-4.80). • Enjoyable scenery: In a cross-sectional study of 480 US girls age 10-15 y, Evenson et al (2006) found significant positive association between presence of enjoyable scenery and physical activity level above the median (OR=1.91; 95% CI, 1.17-3.11). No significant association was seen with active commuting to school. • Greenness: Evenson et al (2006) did not find any significant association between presence of trees and active commuting. • Physical disorder: Evenson et al (2006) found inverse association between reporting bad smells in the neighborhood and walking or cycling to school (OR=0.43; 95% CI, 0.24-0.75). No association was seen between presence or absence of litter and active commuting.
Adults					
Frost et al, 2010[337]	Systematic review of studies published between 1994 and 2008, including 4 cross-sectional studies on the exposure-outcome relation in this section	Adults age ≥18 y in rural areas	Aesthetics (enjoyable scenery, greenness, physical disorder)	Physical activity/obesity	General aesthetics: 1 study found an association with physical activity. • Deshpande et al (2005) evaluated neighborhood aesthetic quality and physical activity in 278 persons with diabetes. After adjustment for BMI, health status, and physical impairment, a positive association was seen between perception of the community as pleasant for physical activity and being regularly physically active (OR=2.27; 95% CI, 1.07-4.81). Enjoyable scenery: Among 4 studies, 2 found associations with physical activity and 1 with obesity. • Wilcox et al (2000) found that after adjustment for age, race, education, neighborhood characteristics, region, psychosocial factors, and health variables, presence of enjoyable scenery was associated with leisure-time physical activity among rural (OR=1.71; 95% CI, 1.16-2.53) but not urban (OR=1.29; 95% CI, 0.88-1.89) middle-aged women. • Kirby et al (2007) found positive association between presence of enjoyable scenery and total minutes per week of walking (β=0.186; $P<0.05$) but not with overall physical activity or subtypes of strenuous,

					moderate, or light physical activity. • Deshpande et al (2005) saw a trend between presence of enjoyable scenery and being regularly physically active (OR=1.76; 95% CI, 0.96-3.21). • After adjustment for age, gender, and education, Boehmer et al (2006) found that not having enjoyable community scenery was associated with obesity (OR=1.8; 95% CI, 1.3-2.6) among 2210 adults in rural Missouri, Tennessee, and Arkansas. Greenness: 1 study found no association with physical activity. • Deshpande et al (2005) (see above) did not find significant association between tree-lined streets and physical activity (OR=0.66; 95% CI, 0.26-1.70). Physical disorder: Of 2 studies, neither found significant associations. • Deshpande et al (2005) (see above) found only nonsignificant trends between being regularly physically active and living in a well-maintained community (OR=1.58; 95% CI, 0.78-3.22) or community free from garbage (OR=1.87; 95% CI, 0.90-3.91); sample size was small (N=278). • After adjustment for age, gender, and education, Boehmer et al (2006) did not find significant association between living in a well-maintained community or a community free from garbage and odds of being obese in 2210 adults living in rural Missouri, Tennessee, and Arkansas.
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published from January 1995 to January 2009, including 6 studies on the exposure-outcome relation in this section	US children or adults of low SES, black race, or Hispanic ethnicity	Aesthetics (enjoyable scenery, greenness, physical disorder)	Physical activity/obesity	Enjoyable scenery: Among 4 studies, 2 found association with physical activity and 1 with obesity; and 1 did not find any significant association with obesity. • Brownson et al (2001) evaluated perceived neighborhood aesthetics and physical activity among 1818 US adults. After adjustment for age, sex, race, income, and education, presence of enjoyable scenery was positively associated with meeting recommendations for physical activity (OR=1.46; 95% CI, 1.13-1.88). • King et al (2000) evaluated the influence of enjoyable scenery in a nationally representative sample of 2912 US women age ≥40 y from different racial/ethnic groups. After adjustment for age, race, employment, marital status, location, education, neighborhood, personal barriers characteristics, physical health, and preference for home-based exercise, absence of enjoyable scenery was associated with being physically inactive (<20 min activity) (OR=1.42; 95% CI, 1.12-1.79). • Boehmer et al (2007) assessed perceived neighborhood aesthetics and obesity in 1032 urban residents of high- and low-income areas of Savannah, Georgia, and St Louis, Missouri. After adjustment for age, gender, education, and other environmental variables, people who strongly disagreed that “there are many interesting things to look at while walking in my neighborhood” had greater odds of obesity than those who strongly agreed with this statement (OR=2.6; 95% CI, 1.2-5.6). • Boehmer et al (2006) (see above) found no significant association between enjoyable scenery and odds of obesity. Physical disorder: Of 2 studies, 1 found positive association with obesity.

					• Boehmer et al (2007) found significant positive association between observed physical disorders and obesity (OR=3.6; 95% CI, 1.8-7.2). • Boehmer et al (2006): See above.
Humpel et al, 2002[339]	Review including 19 studies (18 cross-sectional, 1 longitudinal), including 3 cross-sectional studies on the exposure-outcome relation in this section.	Adults	Perceived (16 studies) and objectively assessed (4 studies) local environment, including accessibility of facilities, safety, and aesthetics	Physical activity	Among variables pertaining to aesthetics, friendly neighborhood, attractive local area, pleasant scenery, and living environment were positively associated with physical activity: • Ball et al (2000) found perceived lower neighborhood attractiveness associated with less walking for exercise (10+ min) in 3392 adults after adjustment for age, sex, and education (OR=0.57; 95% CI, 0.41-0.79). • King et al (2000): See above. • Sallis et al (1997) found no significant relation of enjoyable scenery with walking for exercise or strength/vigorous exercise in young adults, mean age 20.6 y, after adjustment for age, sex, race, and SES, but sample size was very small (N=110).
Adults and Children					
Sallis and Glanz, 2009[28]	Narrative review, including 1 review on the exposure-outcome relation in this section	Children and adults	Aesthetics (general)	Physical activity	• On the basis of the finding of a systematic review of systematic reviews by Bauman and Bull (2007) (see below), the authors concluded that the aesthetic quality of a neighborhood was associated with physical activity.
Saelens and Handy, 2008[359]	Systematic review of 13 reviews published between 2002 and 2006 and 29 original studies published between 2005 and 2006, including 6 reviews and 9 original studies on the exposure-outcome relation in this section	Children and adults	Aesthetics (general)	Walking	• On the basis of findings of 6 reviews, the authors concluded that aesthetic qualities were associated with walking. • Of 9 original studies, 4 found positive associations: 1 of 5 studies for aesthetics and walking for transportation; 2 of 2 studies for aesthetics and recreational walking; and 1 of 2 studies for aesthetics and overall walking.
Bauman and Bull, 2007[338]	Systematic review of reviews published between 2002 and 2007, including 6 reviews on the exposure-outcome relation in this	Children and adults	Aesthetics (general)	Physical activity or walking	Of the 6 reviews, all focused on adults, and 5 concluded that the aesthetic quality of a neighborhood was associated with physical activity or walking. • A narrative review by Vojnovic (2006) found positive association between aesthetics of environment and walking or cycling. • A narrative review by Badland and Schofield (2005) reported positive association between aesthetic factors and nonmotorized transport use. • A systematic review by Wendel Vos et al (2005) did not find consistent relation between aesthetics and walking.

	section				• A systematic review by Owen et al (2004) concluded that there was positive association between an aesthetically pleasant environment and walking. • A narrative review by McCormack et al (2004) found positive relation between cleanliness, scenery, varied building designs, and greenery and physical activity. • A systematic review by Humpel et al (2002) found positive association between perception of pleasant neighborhood and physical activity.

BMI indicates body mass index; NDVI, normalized difference vegetation index; OR, odds ratio; CI, confidence interval; and SES, socioeconomic status.
*Given the array of smaller, cross-sectional, observational studies that were already captured in the published narrative and systematic reviews identified here, in the writing group's additional systematic searches for original articles published after 2007, performed by means of PubMed searches, evaluation of related articles, and hand searches of reference lists, the writing group focused on finding any additional studies that were randomized trials, quasi-experimental studies, longitudinal studies, or large (N>5000) cross-sectional studies. No such studies not already included here were identified.

Supplementary Table 10f. Local Environmental Change to Improve Physical Activity (Community Settings)

Walkability (Composite Indicators)*

Children (Outcome: Physical Activity)

Author, y	Design and Number of Studies	Population	Exposure	Outcome	Findings
Feng et al, 2010[351]	Systematic review, including 2 studies on the exposure and outcome of interest in this section	Children/ adolescents	Walkability	Physical activity	Of 2 studies, 1 found positive association between walkability and physical activity and 1 found positive association between walkability and active transport to school. • Kligerman et al (2007) evaluated a GIS-based walkability index and accelerometer-measured physical activity among 98 white or Mexican-American adolescents (age 14-17 y) in San Diego County, California. Walkability was defined as the weighted sum of *z* scores for land-use mix, intersection density, residential density, and retail density. After adjustment for age and ethnicity, the walkability index up to a 0.8-km buffer around home was positively associated with physical activity (β=0.278; *P*=0.008). • Kerr et al (2006) evaluated a GIS-based walkability index and parent-reported mode of transport to school among 259 children age 5-18 y in Seattle, Washington. The Frank et al (2005) method (see below) was used to calculate a walkability index for each block (subunit of census tract). After adjustment for child age, gender, and parental education and concerns, living in a neighborhood with a high walkability index was positively associated with active commuting to school (OR=1.9; 95% CI=1.04-3.59).
Brownson et al, 2009[352]	Systematic review, including 4 studies about the exposure of interest in this section	Children/ adolescents	Walkability	Physical activity	Of 4 studies, 1 found association with physical activity, 1 with sedentary behaviors, and 1 with active commuting to school. • Kligerman et al (2007): See above. • Kerr et al (2006): See above. • Merchant et al (2007) evaluated walkability in 160 children from 2 public elementary schools in Hamilton, Ontario, Canada. Walkability was assessed as the sum of the scores from questions in each domain of the NEWS questionnaire, including parental perceptions of population density, street connectivity, land-use mix, walking/cycling infrastructure, aesthetics, traffic safety, and crime safety. Children at the school with less walkability spent substantially more time watching TV (107 vs 6 min per day; *P*<0.05) and on the computer (102 vs 18 min per day; *P*<0.05) but also slightly less time sitting on weekends (43 vs 61 min per day; *P*<0.05). • Norman et al (2006) assessed walkability and physical activity among 799 adolescents age 11-15 y in San Diego, California. The Frank et al (2005) method (see below) was used to calculate a GIS-based walkability composite measure for a 1.60-km buffer around the home. After adjustment for age,

					ethnicity, and household education, no association was found between walkability index and MVPA. The authors felt that variability in walkability was fairly small in this study.
Sallis and Glanz, 2009[28]	Narrative review, including 1 study on the exposure of interest in this section	Children	Walkability	Physical activity	• Kerr et al (2006): See above.
Lovasi et al, 2009[334]	Systematic review of 45 US studies (sample size >100) published between January 1995 and January 2009, including 1 study on the exposure of interest in this section	Children	Walkability	Physical activity	• Kerr et al (2006): See above.
Saelens and Handy, 2008[359]	Systematic review of 13 reviews published between 2002 and 2006 and 29 original studies published between 2005 and 2006, including 1 original study on the exposure of interest in this section	Children	Walkability	Physical activity	• Kerr et al (2006): See above.
Children (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Feng et al, 2010[351]	Systematic review, including 1 study on the exposure of interest in this section	Children	Walkability	Overweight	• Spence et al (2008) evaluated walkability and overweight in 501 children age 4-6 y in Edmonton, Alberta, Canada. Walkability was defined as the weighted sum of *z* scores for intersection density, dwelling density, and land-use mix. After adjustment for age, gender, physical activity, junk-food consumption, neighborhood-level education, and proportion of employed women in the neighborhood, the walkability index was inversely associated with overweight in girls (OR=0.78; 95% CI, 0.66-0.91) but not boys

					(OR=0.90; 95% CI, 0.79-1.03).
Galvez et al, 2010[355]	Systematic review of articles published between January 2008 and August 2009, including 1 on the exposure of interest in this section	Children	Walkability	Overweight	• Spence et al (2008): See above.
Brownson et al, 2009[352]	Systematic review, including 1 study on the exposure of interest in this section	Children/ adolescents	Walkability	BMI	• Among 799 adolescents age 11-15 y in San Diego, California, Norman et al (2006) (see above) found no association between a GIS-based walkability index and BMI. The authors felt that variability in walkability was fairly small in this study.
Dunton et al, 2009[350]	Systematic review, 15 studies published before May 2008, including 2 on the exposure of interest in this section	Children/ adolescents	Walkability	Overweight/ BMI	Of 2 studies, 1 found inverse association between walkability and physical overweight but only among girls. • Spence et al (2008): See above. • Norman et al (2006): See above.
Adults (Outcome: Physical Activity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Feng et al, 2010[351]	Systematic review, including 1 study on the exposure of interest in this section	Adults	Walkability	Physical activity	• Frank et al (2005) assessed walkability and physical activity in 523 adults age 20-69 y in metropolitan Atlanta, Georgia. Walkability was defined by weighted sum of *z* scores for intersection density, dwelling density, and land-use mix. After adjustment for age, sex, education, and ethnicity, people in the highest quartile of walkability had higher odds of meeting physical activity guidelines than those in the 1st quartile (OR=2.40; 95% CI, 1.18-4.88).
Brownson et al, 2009[352]	Systematic review, including 2 studies about the exposure of interest in this section	Adults	Walkability	Physical activity	Of 2 studies, both found significant association between walkability and physical activity. • Saelens et al (2003) evaluated walkability and BMI in 107 adults age 18-65 y in 2 nonadjacent neighborhoods in San Diego, California. Walkability was quantified using the NEWS questionnaire, based on mean scores on reported accessibility of nonresidential destinations, street connectivity, walking/cycling infrastructure, aesthetics, traffic safety, and crime safety. After adjustment for age and education, residents of the low-walkable

					neighborhood had significantly lower objectively measured physical activity (130.7 vs 194.8 min during the past week; $P<0.01$). • Frank et al (2005): See above.
Saelens and Handy, 2008[359]	Systematic review of 13 reviews published between 2002 and 2006 and 29 original studies published between 2005 and 2006, including 1 original study on the exposure of interest in this section	Adults	Walkability	Physical activity	• Among adult residents of King County, Washington, Frank et al (2006) examined the relation between walkability index in a 1-km network buffer around home and time spent walking/cycling for transport. After adjustment for demographics, the walkability index was positively associated with time spent walking/cycling for transport.
Bauman and Bull, 2007[338]	Systematic review of reviews published between 2002 and 2007, including 7 reviews on the exposure of interest in this section	Adults	Walkability	Physical activity or walking	Of 7 reviews, 3 reported significant positive association between walkability and overall physical activity, and 4 between walkability and walking: • A narrative review by Badland and Schofield (2005) found positive association between walkability and physical activity. • A systematic review by Lee et al (2004) found positive association between walkability (based on self-reported data) and meeting recommendations for physical activity. • A systematic review by McCormack et al (2005) found positive association between walkability and physical activity. • A narrative review by Saelens et al (2003) found positive association between walkability and transport-related physical activity. • A systematic review by Sallis et al (2004) found positive association between walkability and walking trips. • A systematic review by Owen et al (2004) found positive association between walkability score and walking for transport. • A review by Wendel Vos Droomers et al (2005) found positive association between walkability indexes and walking.
Adults (Outcome: Obesity)					
Author, y	**Design and Number of Studies**	**Population**	**Exposure**	**Outcome**	**Findings**
Brownson et al, 2009[352]	Systematic review, including 1 study on the exposure of interest in this section	Adults	Walkability	BMI	• Among 107 adults in San Diego, California, Saelens et al (2003) (see above) found no significant difference in BMI of residents of higher vs lower walkable neighborhoods (27.3 vs 25.4, $P=0.097$)

Chow et al, 2009[358]	Systematic review, including 1 study on the exposure of interest in this section	Adults	Walkability	BMI	• Saelens et al (2003): See above.
Saelens and Handy, 2008[359]	Systematic review of 13 reviews published between 2002 and 2006 and 29 original studies published between 2005 and 2006, including 1 original study on the exposure of interest in this section	Adults and children	Walkability	BMI	• Among adult residents of King County, Washington, Frank et al (2006) (see above) found walkability to be inversely associated with BMI. • Using NHANES III data, Doyle et al (2006) evaluated county-level walkability and BMI among 9229 US adults. Walkability was defined by ***z*** scores of average block size, percentage of all blocks having areas <0.03 km^2, and intersection density. After adjustment for demographics, walkability index was inversely associated with obesity (β=–0.054; P<0.05).
Papas et al, 2007[349]	Review of 20 studies, including 2 studies on the exposure of interest in this section	Adults	Walkability	BMI	Of 2 studies, 1 found significant association between walkability and obesity. • Saelens et al (2003): See above. • Doyle et al (2006): See above.

GIS indicates geographical information systems; OR, odds ratio; NEWS, Neighborhood Environment Walkability Scale; MVPA, moderate to vigorous physical activity; CI, confidence interval; BMI, body mass index; and NHANES, National Health and Nutrition Examination Survey.
*Given the array of smaller, cross-sectional, observational studies that were already captured in the published narrative and systematic reviews identified here, in the writing group's additional systematic searches for original articles published after 2007, performed by means of PubMed searches, evaluation of related articles, and hand searches of reference lists, the writing group focused on those additional studies that were randomized trials, quasi-experimental studies, longitudinal studies, or large (N>5000) cross-sectional studies. No such studies not already included here were identified.

Note: Reference numbers (eg, Sallis and Glanz, 2009[28]) appearing in Supplementary Table 10a through 10f correspond with those listed in the reference section of the statement. For the purposes of this supplementary table, these meta-analyses or systematic reviews (see "Author, y" column) are considered the primary citation. Additional studies mentioned in the primary citation may be included in the "Intervention/Exposure" and "Findings" columns. The additional studies can be accessed through the primary citation.