

# Neighborhood Disorder, Perceived Safety, and Readiness to Encourage Use of Local Playgrounds

Rebecca Miles, PhD

**Background:** Knowledge of the association between the neighborhood physical environment and adults' readiness to encourage children's use of local playgrounds, and the extent to which perceived safety acts as a mediator, can inform efforts to increase children's physical activity.

**Methods:** Data were obtained from seven European cities based on a cross-sectional household survey conducted between 2001 and 2002. The sample included 2123 household informants (from a total of 2782 households) with a median age of 48 years; 65% were women, 66% were married, and 33% had achieved a secondary education. Indicators of local neighborhood physical disorder (litter, graffiti, lack of greenery), traffic volume, and land use were directly observed by trained surveyors. Perceived safety, encouragement of playground use, and physical activity levels were assessed with self-reported measures. Analyses were conducted in 2007.

**Results:** Respondents in neighborhoods showing signs of low or moderate physical disorder compared to high physical disorder had slightly over twice the odds of encouraging children to use local playgrounds ( $p < 0.01$ ). The percentage of the effect of neighborhood physical disorder accounted for by perceived safety was between 15% and 20%. Neighborhood physical disorder was associated only with adults' occasional involvement in sports or exercise and only among women ( $p < 0.05$ ); perceived safety was not significantly associated with physical activity for either men or women.

**Conclusions:** Neighborhood physical environments and perceived safety influence adults' readiness to encourage children's physical activity and women's occasional involvement in sports or exercise. Health promotion strategies designed to upgrade the environments near where children live and to address parental safety concerns merit further exploration. (Am J Prev Med 2008;34(4):275-281) © 2008 American Journal of Preventive Medicine

## Background

Increasing the levels of physical activity among children and youth remains a public health priority. There is evidence that neighborhood environments influence children's physical activity above and beyond individual factors.<sup>1</sup> One way that neighborhood environments may influence children's physical activity is through the environments' effect on adults as physical activity role models and as potential facilitators of children's activity. Many studies show a correlation between parents' levels of physical activity and those of their children.<sup>2</sup> Studies investigating the effect of parental encouragement and support on children's physical activity suggest that parents' attitudes and logistic support matter.<sup>2,3</sup> In addition, recent studies of chil-

dren's walk-to-school have highlighted the importance of parental attitudes and perceptions of safety in particular in influencing children's active travel to school.<sup>4</sup> This paper investigates the association between characteristics of the neighborhood environment and adults' readiness to encourage children to use local playgrounds and the extent to which perceived safety mediates the relationship; it also investigates possible links among neighborhood characteristics, perceived safety, and adults' own levels of physical activity.

The role of neighborhood environments in shaping physical activity levels among children remains understudied. A recent article found that low levels of neighborhood safety and high social disorder are associated with lower parental estimates of hours spent in recreational programming for Chicago youth.<sup>1</sup> Living in disorderly neighborhoods may also deprive children of time spent outdoors, which in turn is linked to levels of physical activity.<sup>5-7</sup>

Studies focusing on disadvantaged neighborhoods and physical activity among adults have shown mixed results. Some found that living in neighborhoods rated

From the Department of Urban and Regional Planning, Florida State University, Tallahassee, Florida

Address correspondence and reprint requests to: Rebecca Miles, PhD, Department of Urban and Regional Planning, Florida State University, Tallahassee FL 32306-2280. E-mail: [rebecca.miles@fsu.edu](mailto:rebecca.miles@fsu.edu).

high on a household income–based measure of deprivation is associated with lower rates of physical activity than living in less-deprived areas.<sup>8,9</sup> Others found an effect on leisure-time physical activity but not on walking.<sup>10</sup> Still others found no effect of neighborhood deprivation on the likelihood of exercising strenuously but did find it associated with more walking<sup>11</sup>; one study found that neighborhood physical disorder (a closely related concept reflecting the presence of litter, graffiti, signs of vandalism, loitering, public drunkenness, and gangs) had no effect on walking.<sup>12</sup>

The extent to which adult's perceptions of safety mediate neighborhood effects on their own physical activity levels and their readiness to encourage children to spend time outdoors is unclear. Neighborhood physical disorder has been found to be associated with lower perceptions of safety among residents and is also associated with neighborhood disadvantage.<sup>13–16</sup> Residents of disorderly places may avoid public facilities, staying inside and trying to keep their children inside, and going out only when necessary.<sup>11,17</sup>

A recent study found lower perceived safety in neighborhoods with high physical disorder but not less walking; it also found that people who are afraid walk less.<sup>12</sup> A number of studies have investigated the link between perceived safety and physical activity among adults. A study based on a sample of Belgian adults found no association between fear of crime and walking or other moderate physical activity.<sup>18</sup> Another that focused on English adults and walking found perceived neighborhood safety to be significant for women but not for men.<sup>19</sup> A study of five states in the U.S. found that people who feel that their neighborhood is not safe from crime are more likely to be physically inactive.<sup>20</sup> The one study focusing on vigorous physical activity found a significant association between perceived safety of the neighborhood environment and activity levels for men but not women.<sup>21</sup>

Using data from a survey conducted by the WHO, this study investigated whether neighborhood physical disorder is associated with respondents' readiness to encourage children to use local playgrounds as well as the respondents' own level of physical activity, and the extent to which perceived safety mediates the relationships. Because of its correlation with neighborhood deprivation and fear of crime,<sup>13</sup> neighborhood physical disorder was expected to be associated with lower odds of both readiness to encourage playground use and adults' own physical activity. Because perceptions of safety tend to be lower in areas with high physical disorder, and may be related to levels of physical activity, perceived safety was expected to mediate all or a substantial proportion of the effect of physical disorder on both dependent variables.

This study also explored the effects of traffic volume and multi-family land uses. Traffic volume was expected to be associated with readiness to encourage children

to play on local playgrounds but not with adult leisure-time physical activity. As for land use, residential density has been found to predict walking for transportation for adults in most studies but this literature has been criticized on methodologic grounds.<sup>22</sup> It was unclear whether the relationship would hold for children's use of local playgrounds.

## Methods

### Data Source

Data from seven European cities—Angers, France; Bonn, Germany; Budapest, Hungary; Bratislava, Slovakia; Forli, Italy; Geneva, Switzerland; and Vilnius, Lithuania—were used. They were based on a household survey conducted by WHO in 2001–2002, the Large Analysis and Review of European housing and health Status (LARES).<sup>23</sup> Three survey instruments were used to assess housing conditions and their links to health. First, a questionnaire was administered to an informant from each household in a face-to-face interview. It included, among other items, the respondent's perception of safety and his or her readiness to encourage children to use local playgrounds. Then surveyors recorded their observations about housing conditions and the immediate environment on an inspection sheet.

To maximize validity, surveyors in all the cities received the same standardized 3-day training course provided by a WHO representative; in addition, surveyor teams were randomly assigned to household addresses to minimize bias in the estimates of housing conditions in particular neighborhood or housing types.<sup>23</sup> The environmental characteristics directly observed included neighborhood type; traffic volume on the street; and the presence or absence of litter, graffiti, and greenery. Finally, each member of the household was asked to complete a self-administered health questionnaire. This included a question about physical activity.

Households in the LARES were randomly selected from population registries except in Angers, where the tax registry of the city was used. Because the study investigated readiness to encourage use of local playgrounds, only households that reported having a playground nearby were included (2123 of 2782). Because other members were not asked about their feelings of safety, the analytic sample was limited to urban household informants.

### Measures

Readiness to encourage children's use of local playgrounds was assessed by a single item: "Would you encourage your children to play on the local playgrounds?" (Or "If you had children, would you encourage . . . ?") Response options included "Yes," "Only on some," and "No, not at all." Because the direction and magnitude of the associations with neighborhood physical disorder, land use, density, and perceived safety were the same, responses of "Only on some" and "No, not at all" were combined.

Self-reported physical activity was measured by a single item: "Which statement do you think best describes your amount of sports or physical exercise?" The responses "I have never done sports/physical exercise" and "I used to do sports/physical exercise" were grouped into a category indi-

**Table 1.** Percent distribution of the characteristics of residents' local neighborhood, readiness to encourage use, level of physical activity, and perceived safety, by city (N=2782; n=2123)

	Total	Forli	Vilnius	Bonn	Geneva	Angers	Bratislava	Budapest
<b>Neighborhood disorder (%)</b>								
Low	32	55	8	47	41	24	22	39
Moderate	51	43	57	46	44	70	53	43
High	17	2	35	7	15	6	25	18
<i>n</i>	2098	262	367	293	290	270	286	330
<b>Land use (%)</b>								
Single-family	11	11	1	26	2	21	6	13
Small MF	46	81	34	63	36	59	21	33
Mostly large MF	43	8	65	11	62	20	73	54
<i>n</i>	2119	265	371	298	290	274	288	333
<b>Residence on quiet street (%)</b>								
	53	55	49	63	42	48	61	59
<i>n</i>	2123	265	371	299	291	276	288	333
<b>Encourage children's use of playgrounds (%)</b>								
	67	86	51	83	85	66	47	57
<i>n</i>	2123	265	371	299	291	276	288	333
<b>Level of physical activity (%)</b>								
No current	39	50	50	17	22	30	38	58
Occasional	36	18	38	42	41	41	39	31
Frequent	25	32	12	41	37	29	23	11
<i>n</i>	2096	260	367	295	287	268	287	332
<b>Perceived safety (%)</b>								
Not at all	20	5	39	10	7	12	30	25
To some extent	24	18	29	18	23	22	33	25
Feel safe	56	77	32	72	70	66	37	50
<i>n</i>	2096	259	365	297	286	273	287	329

MF, multifamily.

cating no current physical activity. The response "I now occasionally do sports/physical exercise" indicated occasional physical activity, and the responses "I frequently do sports/physical exercise on a moderate level" and "I frequently do sports/physical exercise on an intense level" were grouped as an indicator of frequent physical activity.

Perceived safety was assessed by a single item: "Do you feel safe returning to your home when it is dark?" Response options included "Yes," "To some extent," and "No, not at all." A similar item was used in another European survey and found to be consistently associated with health status.<sup>24</sup>

The measure of extent of local neighborhood physical disorder is an additive index based on inspectors' observations of three indicators of neighborhood disorder: the presence of graffiti; the presence of litter; and the absence of vegetation voluntarily displayed on outside walls, balconies, or windows.<sup>25</sup> Households that scored high on the neighborhood disorder index were located in residential environments with either two or three of these conditions; those with a moderate score had one of the three conditions; and those with a low score showed no signs of either litter or graffiti, and featured voluntary displays of greenery.

Other indicators of the local neighborhood environment included a proxy for residential density (whether the household was located in an area with mostly large multifamily residences [five or more floors], mostly small multifamily residences [four floors or fewer], or single-family residences) and whether the household was on a busy street; all were directly observed by the inspectors.

The respondent's age, gender, marital status, educational achievement, disability status, years lived in the neighborhood, household size, and tenure of dwelling were included in the model as possible confounders. A site variable indicating city of

residence was included to account for unmeasured city-level influences such as cultural attitudes toward physical activity or threats to personal safety perceived throughout the city.

### Statistical Analysis

Logistic regression and the odds ratio (OR) were used to estimate associations between readiness to encourage use of playgrounds and characteristics of local neighborhood environments, and multinomial logistic models and relative risk ratios (RRR) were used to estimate associations with perceived safety and respondents' level of physical activity, in models including the site variable and a set of individual-level covariates. Because of gender-related differences identified in some prior studies, interactions between neighborhood environments and gender were investigated, as well as interactions between perceived safety and gender. Because the places observed were unique to individual households, multilevel models were not appropriate. To explore the possible mediating role of perceptions of safety, models with and without perceived safety were compared.<sup>26</sup> Analyses were also run investigating whether living in a household with children aged <18 (*n*=681) made a difference in adults' readiness to encourage use of local playgrounds; this was not significant and therefore was left out of the analyses.

### Results

The analytic sample included 2123 respondents with a median age of 48 years; 65% were women, 66% were living with a spouse or significant other, and 33% had a secondary or higher level of educational achievement. As shown in Table 1, 67% of respondents reported that

**Table 2.** ORs associated with effects of neighborhood physical disorder, residence on quiet street, land use, and perceived safety on readiness to encourage children's playground use

	No mediator OR (95% CI)	With perceived safety OR (95% CI)
<b>Age (years)</b>	1.01* (1.00–1.01)	1.01** (1.00–1.01)
<b>Gender</b>		
Female versus male	0.71** (0.61–0.82)	0.82* (0.71–0.96)
<b>Level of sports/exercise</b>		
Occasional versus not at all	1.19 (0.98–1.44)	1.19* (1.02–1.39)
Frequent versus not at all	1.20* (1.00–1.43)	1.17 (0.99–1.38)
<b>Neighborhood physical disorder</b>		
Low versus high	2.14** (1.54–2.97)	1.99** (1.39–2.84)
Moderate versus high	2.09** (0.65–2.64)	1.89** (1.40–2.55)
<b>Residence on quiet street</b>		
Yes versus no	1.24 (0.97–1.59)	1.23 (0.95–1.60)
<b>Land use</b>		
Small versus large MF	1.18 (0.84–1.65)	1.18 (0.85–1.64)
Single/detached versus large MF	1.25 (0.66–2.35)	1.18 (0.61–2.28)
<b>Perceived safety</b>		
To some extent versus not at all		1.60** (1.27–2.01)
Feel safe versus not at all		2.83** (2.29–3.49)

Note: City of residence, marital status, educational achievement, disability status, household size, dwelling tenure, and years lived in the neighborhood included in both models.

\* $p < 0.05$ ; \*\* $p < 0.01$ .

MF, multifamily.

they would encourage children to use the local playground. Thirty-six percent reported occasional involvement in sports or exercise, and 25% reported frequent involvement. The percentage of respondents who encouraged use of playgrounds ranged from 86% in Forli to 47% in Bratislava. The percentage involved in occasional exercise ranged from 42% in Bonn to 18% in Forli; involvement in frequent exercise ranged from 41% in Bonn to 11% in Budapest. The percentage of respondents reporting they felt safe walking home at night ranged from 77% in Forli to 32% in Vilnius. There were also substantial differences in prevalence of neighborhood physical disorder across the cities, ranging from 35% in Vilnius to 2% in Forli.

In the analysis of readiness to encourage use of local playgrounds, the respondent's age, gender, and physical activity level were significantly associated with the odds of encouraging use; older and male respondents had higher odds of encouraging use, as did respondents who exercised frequently compared to not at all (Table 2, model without mediator). As for the effect of local neighborhood environments, respondents in neighborhoods with signs of low or moderate physical disorder compared to high physical disorder had slightly more than twice the odds of encouraging use of local playgrounds (OR=2.14 and 2.09, respectively). Neither living on a quiet street nor in an area with predominantly single-family residences was significantly associated with readiness to encourage use of local playgrounds.

Furthermore, the ORs associated with the effect of local neighborhood characteristics on readiness to encourage use of playgrounds were only somewhat reduced when perceived safety was introduced into the model (Table 2, model with potential mediator). The

percentages of the effect of low or moderate neighborhood physical disorder compared to high neighborhood physical disorder that were accounted for by perceived safety were 15% and 20%, respectively.<sup>26</sup> Perceived safety, on the other hand, showed a significant independent effect: Those who responded that they felt safe had more than twice the odds of reporting that they would encourage the use of playgrounds compared to those who indicated they did not feel safe (OR=2.83); the odds of encouraging use among those who reported feeling somewhat safe were 60% higher than among those who reported feeling unsafe (OR=1.60). The interaction between gender and perceived safety on readiness to encourage use was not statistically significant.

Living in a neighborhood with signs of low or moderate physical disorder was also significantly associated with greater feelings of safety, as was living on a quiet street (Table 3). Living in a neighborhood with signs of low or moderate physical disorder compared to high physical disorder increased the risk of feeling safe compared to not at all by 74% and 118%, respectively (RRR=1.74 and RRR=2.18), and of feeling somewhat safe compared to not at all by 52% and 56% respectively (RRR=1.52 and RRR=1.56). Living on a quiet street was associated with a 38% increase in the risk of feeling somewhat safe versus not at all (RRR=1.38).

Preliminary analyses showed that the effects of neighborhood physical disorder on adult physical activity were significantly different for men and women, so models were run separately. For men, neither neighborhood disorder nor perceived safety showed significant associations with the respondent's current involvement in sports or exercise (Table 4). For women, however, living in a neighborhood with signs of low

**Table 3.** Relative risks associated with the effects of neighborhood characteristics on perceived safety

	<b>“Feel safe” versus “not at all” RRR (CI)</b>	<b>“Somewhat” versus “not at all” RRR (CI)</b>
<b>Age (years)</b>	0.98** (0.97–0.99)	0.98* (0.97–1.00)
<b>Gender</b>		
Female versus male	0.31** (0.25–0.38)	0.56** (0.45–0.70)
<b>Neighborhood physical disorder</b>		
Low versus high	1.74** (1.21–2.49)	1.52* (1.07–2.15)
Moderate versus high	2.18** (1.80–2.63)	1.56** (1.30–1.88)
<b>Residence on quiet street</b>		
Yes versus no	1.19 (1.00–1.41)	1.38** (1.20–1.59)
<b>Land use</b>		
Small versus large MF	1.21 (0.70–1.79)	0.90 (0.63–1.29)
Single/detached versus large MF	1.39 (0.98–1.98)	0.88 (0.44–1.77)

Note: City of residence, age, gender, marital status, educational achievement, disability status, household size, tenure, and years lived in the neighborhood included.

\* $p \leq 0.05$ ; \*\* $p \leq 0.01$ .

MF, multifamily.

versus high physical disorder was associated with a significant increase in the risk of occasional versus no sports or exercise (RRR=1.28). The relative risks remained virtually the same whether perceived safety was in the model or not, suggesting the latter does not mediate the neighborhood physical disorder effect (data not shown and available from the author). Neither living on a quiet street nor in areas of high residential density was associated with men and women's levels of involvement in sports or exercise.

## Conclusion

The relationship among characteristics of the neighborhood's physical environment and adults' own physical activity and their readiness to encourage children

to use local playgrounds, and the extent to which the effects are mediated by perceived safety, were the focus of this study. The key findings were threefold. First, adults living in neighborhoods with signs of high physical disorder (i.e., the presence of litter and graffiti and the absence of voluntarily displayed greenery) reported significantly less readiness to encourage children's use of local playgrounds. The adult respondent's own lack of involvement in sports or exercise was also significantly associated with less readiness to encourage use. These findings shed light on some of the determinants of parental support for children's physical activity<sup>2,3</sup> and on possible mechanisms for the neighborhood disorder effect on children's physical activity identified in a previous study.<sup>1</sup>

**Table 4.** Relative risks associated with neighborhood physical disorder and perceived safety on adults' level of sports/exercise—men and women separately

	<b>Level of sports/exercise</b>	
	<b>“Occasional” versus “none” RRR (95% CI)</b>	<b>“Frequent” versus “none” RRR (95% CI)</b>
<b>Men only</b>		
<b>Neighborhood physical disorder</b>		
Low versus high	1.25 (0.76–2.06)	1.34 (0.63–2.87)
Moderate versus high	1.16 (0.70–1.92)	1.11 (0.63–1.96)
<b>Perceived safety</b>		
“To some extent” versus “not at all”	0.75 (0.41–1.37)	0.7 (0.36–1.37)
“Feel safe” versus “not at all”	1.08 (0.58–2.02)	0.98 (0.59–1.62)
<b>Women only</b>		
<b>Neighborhood physical disorder</b>		
Low versus high	1.28* (1.03–1.60)	1.31 (0.73–2.37)
Moderate versus high	1.17 (0.78–1.76)	1.35 (0.71–2.57)
<b>Perceived safety</b>		
“To some extent” versus “not at all”	1.00 (0.70–1.43)	0.94 (0.71–1.23)
“Feel safe” versus “not at all”	0.95 (0.59–1.53)	1.56 (0.84–1.60)

Note: City of residence, age, gender, marital status, educational achievement, disability status, household size, dwelling tenure, years lived in the neighborhood, residence on a quiet street, and land use included.

\* $p \leq 0.05$ .

Second, consistent with the work of others,<sup>13–16</sup> the current study showed that feelings of safety were significantly lower among those living in neighborhoods showing signs of litter, graffiti, and lack of greenery than among those in more orderly areas. Perceived safety, however, mediates only a small proportion of the effect of neighborhood physical disorder on readiness to encourage children's use of local playgrounds. Both neighborhood physical disorder and perceived safety showed substantial independent effects on adults' support for children's use of local playgrounds.

Third, this inquiry found that neighborhood physical disorder was associated only with adult respondents' occasional involvement in sports or exercise and only among women. Perceived safety, however, was not associated with sports or exercise for men or for women. This finding is at odds with the positive association between perceived safety and sports/exercise reported in another study based on a different analytic sample of the LARES.<sup>27</sup> The main difference between the two studies was their use of the informant's perceived safety as a proxy for the perceptions of other respondents in the same household. Because perceived safety is systematically lower for women and older adults compared to men and younger adults both in the LARES and elsewhere,<sup>28</sup> the analyses reported here were limited to the responses of those who were specifically asked the perceived safety question, that is, the household informants.

Limitations include the survey's focus on sports and exercise in general rather than sports or exercise taking place near home. People often prefer, however, to use public open spaces close to home for exercise,<sup>29</sup> so any underestimate is not likely to be substantial. Another limitation is the exclusion of walking for transportation. Also, the perceived safety item included in the LARES captures perceptions of safety when returning home in the dark, and is likely to underestimate its effect on readiness to encourage children's use of playgrounds. The lack of variation in perceived safety in some of the cities may explain the minimal mediation effect identified.

A strength of these findings is that they include direct observations of neighborhood physical disorder and traffic volume taken by housing inspectors who received the same training across all the cities, rather than relying on informants' perceptions of their neighborhood environments. The LARES also provides measures of a range of individual-level covariates that are important to control for in order to specify true place effects. Another strength is this study's ability to investigate neighborhood effects across a range of European cities. The inclusion of a site variable accounts for unmeasured city-specific influences, and therefore the findings of this study point to relationships that may be broadly applicable to Europe as a whole.

Results indicate that health promotion strategies designed to upgrade the environments near where children live and to address parental safety concerns merit further exploration. When residents show they care about the community and are willing and able to protect their youth and the quality of public spaces, neighborhoods are more likely to be places that enhance feelings of safety and facilitate healthy choices.

These outcomes suggest that neighborhood-based health promotion efforts should explore other possible correlates of neighborhood physical disorder such as stress levels, which have been found to be higher in disadvantaged neighborhoods<sup>30</sup>; stress may constrain both adults' own physical activity and their readiness to support children's activity. Parents who experience severe stress are likely neither to model a physically active lifestyle nor to facilitate the activity of their children; indeed, in the LARES, adults' own physical activity (or lack thereof) is significantly associated with their readiness to encourage children's use of local playgrounds. If relevant factors related to neighborhood disorder or perceived safety can be identified at the local level, further efforts would most likely involve partnerships with other city officials and programs.

---

The author expresses her appreciation to Xavier Bonnefoy of the World Health Organization for supporting this study by providing data from the LARES project.

No financial disclosures were reported by the author of this paper.

---

## References

1. Molnar BE, Gortmaker SL, Bull FC, Buka SL. Unsafe to play? Neighborhood disorder and lack of safety predict reduced physical activity among urban children and adolescents. *Am J Health Promot* 2004;18:378–86.
2. Trost SG, Sallis JF, Pate RR, Freedson PS, Taylor WC, Dowda M. Evaluating a model of parental influence on youth physical activity. *Am J Prev Med* 2003;25:277–82.
3. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc* 2000;32:963–75.
4. McMillan TE. Urban form and a child's trip to school: the current literature and a framework for future research. *Journal of Planning Literature* 2005;19:440–56.
5. Baranowski T, Thompson WO, DuRant RH, Baranowski J, Puhl J. Observations on physical activity in physical locations: age, gender, ethnicity, and month effects. *Res Q Exerc Sport* 1993;64:127–33.
6. Sallis JF, Nader PR, Broyles SL, Berry CC, Elder JP, McKenzie TL, Nelson JA. Correlates of physical activity at home in Mexican-American and Anglo-American preschool children. *Health Psychol* 1993;12:390–8.
7. Klesges RC, Eck LH, Hanson CL, Haddock CK, Klesges LM. Effects of obesity, social interactions, and physical environment on physical activity in preschoolers. *Health Psychol* 1990;9:435–49.
8. Kavanagh AM, Goller JL, King T, Jolley D, Crawford D, Turrell G. Urban area disadvantage and physical activity: a multilevel study in Melbourne, Australia. *J Epidemiol Community Health* 2005;59:934–40.
9. Sundquist J, Malmstrom M, Johansson S. Cardiovascular risk factors and the neighbourhood environment: a multilevel analysis. *Int J Epidemiol* 1999;28:841–5.
10. van Lenthe FJ, Brug J, Mackenbach JP. Neighbourhood inequalities in physical inactivity: the role of neighbourhood attractiveness, proximity to local facilities and safety in the Netherlands. *Soc Sci Med* 2005;60:763–75.
11. Ross CE. Walking, exercising, and smoking: Does neighborhood matter? *Soc Sci Med* 2000;51:265–74.

12. Ross CE, Mirowsky J. Neighborhood disadvantage, disorder, and health. *J Health Soc Behav* 2001;42:258–76.
13. Skogan WG. *Disorder and decline*. New York: Free Press, 1990.
14. Perkins DG, Taylor RB. Ecological assessments of community disorder: their relationship to fear of crime and theoretical implications. *Am J Community Psychol* 1996;24:63–107.
15. LaGrange RL, Ferraro KF, Supancic M. Perceived risk and fear of crime: role of social and physical incivilities. *Journal of Research in Crime and Delinquency* 1992;29:311–34.
16. Austin DM, Furr LA, Spine M. The effects of neighborhood conditions on perceptions of safety. *J Crim Justice* 2002;30:417–27.
17. Kelling GL, Coles CM. *Fixing broken windows: restoring order and reducing crime in our communities*. New York: Free Press, 1996.
18. De Bourdeaudhuij ID, Sallis JF, Saelens BE. Environmental correlates of physical activity in a sample of Belgian adults. *Am J Health Promot* 2003;18:83–92.
19. Foster C, Hillsdon M, Thorogood M. Environmental perceptions and walking in English adults. *J Epidemiol Community Health* 2004;58:924–8.
20. Neighborhood safety and the prevalence of physical inactivity—selected states. *MMWR Morb Mortal Wkly Rep* 1999;48:143–6.
21. Sallis JF, Hovell MF, Richard Hofstetter C. Predictors of adoption and maintenance of vigorous physical activity in men and women. *Prev Med* 1992;21:237–51.
22. Forsyth AJ, Oakes M, Schmitz KH, Hearst M. Does residential density increase walking and other physical activity? *Urban Stud* 2007;44:679–97.
23. Bonnefoy X, Braubach M, Davidson M, Robbel N. A pan-European housing and health survey: description and evaluation of methods and approaches. *International Journal of Environment and Pollution* 2007;30:363–83.
24. Green G, Gilbertson JM, Grimsley MFJ. Fear of crime and health in residential tower blocks: a case study in Liverpool, UK. *Eur J Public Health* 2002;12:10–5.
25. Miles R. Neighborhood disorder and smoking: findings of a European urban survey. *Soc Sci Med* 2006;63:2464–75.
26. MacKinnon DP, Dwyer JH. Estimating mediated effects in prevention studies. *Eval Rev* 1993;17:144–58.
27. Shenassa ED, Liebhaber A, Ezeamama A. Perceived safety of area of residence and exercise: a pan-European study. *Am J Epidemiol* 2006;163:1012–7.
28. Toseland RW. Fear of crime: Who is most vulnerable? *Journal of Criminal Justice* 1982;10:199–209.
29. Giles-Corti B, Donovan RJ. The relative influence of individual, social and physical environment determinants of physical activity. *Soc Sci Med* 2002;54:1793–812.
30. Hill TD, Ross CE, Angel RJ. Neighborhood disorder, psychophysiological distress, and health. *J Health Soc Behav* 2005;46:170–86.

**Have you seen the *American Journal of Preventive Medicine* Web site lately?**  
**Visit [www.ajpm-online.net](http://www.ajpm-online.net) today to see what's new online!**