Suburban neighbourhood design: Associations with fear of crime versus perceived crime risk

Sarah Foster PhD\textsuperscript{a*}, Matthew Knuiman PhD\textsuperscript{a}, Lisa Wood PhD\textsuperscript{a} & Billie Giles-Corti PhD\textsuperscript{b}

\textsuperscript{a}Centre for the Built Environment and Health
School of Population Health
The University of Western Australia
35 Stirling Highway
Crawley WA 6009
AUSTRALIA

\textsuperscript{b}McCaughey VicHealth Centre for Community Wellbeing
Melbourne School of Population Health
University of Melbourne
Melbourne Victoria 3010
AUSTRALIA

Sarah Foster: sarah.foster@uwa.edu.au
Matthew Knuiman: matthew.knuiman@uwa.edu.au
Lisa Wood: lisa.wood@uwa.edu.au
Billie Giles-Corti: b.giles-corti@unimelb.edu.au

Telephone: +61 8 6488 8730
Fax: +61 8 6488 1199

*Corresponding author
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Abstract

Strategies that reduce fear of crime may contribute to improved health outcomes; however interventions require a better understanding of the neighbourhood correlates of both emotional responses to crime (i.e., fear of crime) and cognitive assessments of crime (i.e., perceived crime risk). This study explored the association between objective measures of suburban design and two safety outcomes: perceived crime risk and fear of crime, for participants who lived in new suburban housing developments in Perth, Western Australia. The characteristics of a walkable neighbourhood, particularly retail land, were associated with less fear of crime, but greater perceived crime risk. One interpretation is that ‘strangers’, attracted to the neighbourhood by diverse land-uses, might influence the emotional and cognitive aspects of ‘fear of crime’ differently. Researchers interested in the impact of the built environment on ‘fear of crime’, and any subsequent influence of these perceptions on health, should be mindful that the environment appears to impact these constructs differently.
1. Introduction

There is growing interest in the impact of the built environment on health (Casagrande, Whitt-Glover, Lancaster, Odoms-Young, & Gary, 2009; Ding & Gebel, 2012; L. Frank, Engelke, & Schmid, 2003; Halpern, 1995), and the negative consequences that crime and fear of crime have on health behaviours and outcomes (Foster, Giles-Corti, & Knuiman, In press; Lorenc, et al., 2012; Loukaitou-Sideris & Eck, 2007; Stafford, 2007). However, while the environmental characteristics that contribute to lower crime rates are well documented (Cozens, Saville, & Hillier, 2005), less is known about how neighbourhood design impacts residents’ fear of crime or perceptions of crime. Improved understanding of these relationships is necessary because ‘crime’ may mediate the association between the built environment and health behaviours, such as walking (Foster & Giles-Corti, 2008; Lorenc, et al., 2012). Moreover, measures capturing perceived crime risk and fear of crime are often used interchangeably by researchers (Ferraro, 1995; Foster & Giles-Corti, 2008; Hale, 1996) but it’s plausible these constructs are enhanced or inhibited by different attributes of the built environment.

Different disciplines approach the relationship between neighbourhood design and crime with different assumptions. Planners typically argue that mixed-use neighbourhoods generate more pedestrian traffic, making streets safer through natural surveillance or ‘eyes on the street’ (Cozens, 2008; Duany, Plater-Zyberk, & Speck, 2000; Jacobs, 1961). By contrast, the criminological literature suggests that the safest neighbourhoods are characterised by residential housing, with few destinations to attract people to the area, and curvilinear street layouts (Brantingham & Brantingham, 1993; Cozens, 2008; Doyle, Kelly-Schwartz, Schlossberg, & Stockard, 2006; Greenberg, Rohe, & Williams, 1982; Poyner, 1983). This is further emphasised by studies connecting non-residential land-uses with the incidence of
crime (Beavon, Brantingham, & Brantingham, 1994; Bowes, 2007; Brantingham &
Brantingham, 1993; Brown, 1982; Gorman, Speer, Gruenewald, & Labouvie, 2001).
However, it is important that ‘crime’ not be regarded homogeneously – crime exists on a
continuum from minor nuisances to serious offences (Ross, Mirowsky, & Pribesh, 2002) and
different crimes can be either facilitated or inhibited by the presence or absence of people
(e.g., crowds conceal low-level crimes but can protect against serious offences) (Angel, 1968;
Loukaitou-Sideris, 1999).

While evidence about the impact of the built environment on actual crime has been
usefully translated into guidelines such as Crime Prevention through Environmental Design
(CPTED) (Cozens, et al., 2005), less is known about how the physical environment impacts
perceptions of crime. The evidence primarily focuses on links between the condition of the
environment (e.g. litter, graffiti and vandalism) and perceived crime or fear of crime (Hale,
1996; Pitner, Yu, & Brown, 2012), whereas the impact of broader planning influences are not
well understood. For example, studies examining the association between residents’ access to
commercial land-uses and perceived crime and safety have produced mixed results (McCord,
Ratcliffe, Garcia, & Taylor, 2007; McCrea, Shyy, Western, & Stimson, 2005; Schweitzer,
Kim, & Macklin, 1999; Wood, et al., 2008), although on balance, they indicate that mixed
land-uses detract from feelings of safety. Moreover, Wood et al. (2008) found that,
consistent with the criminology literature, residents in a conventional suburb (i.e., low density
housing, curvilinear street layout) felt safer than those in other suburb designs (e.g., a
traditional neighbourhood with a gridded street layout).

However, there is some evidence to the contrary suggesting that diverse land-uses
might enhance perceived safety. A recent study examined the association between suburban
design and resident’s fear of crime using an objective scale that combined the planning and
land-use characteristics that would: (1) encourage more people into the public realm (i.e.,
retail land, public open space); (2) facilitate their movement (i.e., street connectivity); and (3) ensure the presence of territorial guardians (i.e., residential density, residential land; less vacant land) (Foster, Giles-Corti, & Knuiman, 2010). This ‘neighbourhood form’ index was negatively associated with fear of crime, where for every additional attribute, the odds of being fearful reduced (Foster, et al., 2010). The authors interpreted these findings as providing support for the notion that ‘eyes on the street’ can help minimise fear of crime in suburban neighbourhoods.

The inconsistencies in the literature examining the built environment and ‘crime’ may stem from different outcome measures. Perceived crime and fear of crime are related, but distinct concepts (Ferraro, 1995; Hale, 1996). Perceived crime is a cognitive assessment, weighing up potential threats and judgements about whether they will occur. In contrast, fear of crime captures an emotional response to crime (Ferraro, 1995), and can be influenced by a myriad of factors including media reporting of victimisation, previous experiences, perceived vulnerability to crime, and physical neighbourhood cues (e.g., physical incivilities, poor upkeep) (Hale, 1996). Indeed, Lorenc et al. (2012) conceptualise ‘fear of crime’ as one overarching concept that comprises a cognitive (i.e., perceived crime risk) and an affective dimension (i.e., fear of crime). Notably, in the literature examining commercial land-uses and perceived safety, studies with outcomes best conceptualised as cognitive assessments (or judgements) about crime appear to indicate that mixed land-uses lessen perceived safety (McCord, et al., 2007; McCrea, et al., 2005; Schweitzer, et al., 1999; Wood, et al., 2008). Conversely, those using an ‘emotional’ fear of crime outcome indicate that mixed land-uses may actually enhance perceived safety (Foster, et al., 2010).

In this study, we examined the association between the objective ‘neighbourhood form index’, developed previously (Foster, et al., 2010), and residents’ perceived crime risk.
Furthermore, we explore whether the built environment attributes that minimise fear of crime are consistent with those that minimise perceived crime risk.

2. Methods

2.1 Study context

The RESIDential Environments (RESIDE) Project was a five-year longitudinal study evaluating the impact of urban design on health in Perth, Western Australia. All people building new homes in the study areas were invited to participate (response rate 33.4%). Participants completed a self-report questionnaire before they moved into their new home, and on three subsequent occasions after they relocated (at 12, 36 and 48 months). Geographic Information Systems (GIS) was used to generate individual-level objective measures for each participant’s neighbourhood (i.e., 1600m road network distance from each participant’s house). This paper presents cross-sectional results based on participants (n=1195) who had lived in their new homes for about 36 months. The study setting is predominantly suburban, with most participants living in single family detaching housing, typically located in new greenfield developments on the urban fringe. RESIDE was approved by The University of Western Australia’s Human Research Ethics Committee and is fully described elsewhere (Giles-Corti, et al., 2008).

2.2 Outcomes

Perceived crime was measured using a modified version of the Neighbourhood Environment Walkability Scale (NEWS) (Sallis, 2002). Items included: (1) there is a lot of petty crime in my local area; (2) there is a lot of major crime in my local area; (3) the level of crime in my local area makes it unsafe to go on walks during the day; (4) the level of crime in my local area makes it unsafe to go on walks at night; and (5) I would feel safe walking home from a bus or train stop at night (reversed). Factor analyses indicated that these items all loaded highly on one factor (Cronbach’s alpha 0.79). Participants rated each item on a Likert
scale (1=strongly disagree, 5=strongly agree). Items were added to create a composite scale which was dichotomised for consistency with a previously published fear of crime outcome (Foster, et al., 2010). Participants with an average score greater than three were classified as perceiving crime risk.

Fear of crime was derived from the question: In your everyday life, how fearful, or not, are you about the following situations? Items were: (1) being approached on the street by a beggar or homeless person; (2) being cheated or conned out of your money; (3) having someone break into your house while you’re not at home; (4) having someone break into your house while you’re at home; (5) being attacked by someone with a weapon; (6) having your car stolen; (7) being robbed or mugged on the street; (8) having your property damaged by vandals; (9) having someone loiter near your home at night; and (10) having a group of juveniles disturb the peace near your home (Cronbach’s $\alpha=0.93$) (Ferraro, 1995; Warr & Stafford, 1983). Participants rated each item on a Likert scale (1=not at all fearful, 5=extremely fearful), and consistent with previous research (Foster, et al., 2010), those with an average score of three or higher (i.e., at least somewhat fearful) were categorised as fearful.

2.3 Independent variables

The neighbourhood form index (Foster, et al., 2010) captured the planning characteristics and land-uses present in each participants individual 1600m neighbourhood. The proportion of land allocated to retail land, residential land, public open space, developed land (i.e., the absence of vacant land) were calculated from Landgate (the Western Australian State Government’s land information agency) Planning Land Use Categories. Street connectivity (i.e., the ratio of the count of three way intersections to the total service area) and residential density (i.e., the ratio of the area in residential use to the number of residential dwellings within the service area) were based on a methodology developed by Frank et al.
(Frank, Schmid, Sallis, Chapman, & Saelens, 2005). All six elements were dichotomised on the median into higher and lower groupings, and added to create the index. Thus, participants with the highest neighbourhood form score lived in areas with (relatively) higher street connectivity and residential density, less vacant land, and more residential land, retail land, and public open space. The resulting index was further dichotomised into 0-2 and 3-6 characteristics, as analyses indicated there were no differences between 0, 1 and 2 characteristics, or 3, 4, 5, and 6 characteristics.

2.4 Adjustment variables

Individual variables included gender, age, education, household income, and previous victimisation. Participants were asked whether they (or someone they personally knew) had been the victim of crime in their current neighbourhood in the last two years. Crimes included household burglary, harassment or threatening behaviour, or a physical attack or mugging.

The neighbourhood problems items were similar to those used elsewhere (Ferraro, 1995; Hill, 2005; Latkin & Curry, 2003; Perkins, Meeks, & Taylor, 1992; Ross, et al., 2002), but had a greater focus on neighbourhood presentation and upkeep. Participants were asked to rate different problems on a four-point scale (1=not a problem, 4=significant problem), and factor analysis was used to collapse items into themes. Neighbourhood maintenance included: (1) unkempt lawns and gardens; (2) houses and fences not looked after; (3) unkempt nature strips, parks and open spaces; (4) upkeep of children’s playgrounds; (5) littering and dumping of rubbish in public areas; and (6) poor street lighting (Cronbach’s α=0.89). Social incivilities included: (1) using or selling drugs; (2) harassment, intimidation or threatening behaviour; (3) discarded needles/syringes; (4) gang-related criminal activity; (5) abandoned vehicles; (6) uncontrolled pets; and (7) noisy neighbours (Cronbach’s α=0.91). Graffiti and vandalism included: (1) graffiti on public property; (2) graffiti on private
property; and (3) vandalism (Cronbach’s $\alpha=0.92$). All scales/items were dichotomised, with respondents that averaged greater than two (i.e., one or more items in the scale was ‘a moderate problem’) classified as perceiving a problem.

Collective efficacy (i.e., the belief that other residents will act for the common good) combined two scales: (1) informal social control; and (2) social cohesion and trust (Sampson, Raudenbush, & Earls, 1997). Informal social control included the expectation that their neighbours would intervene if: (1) they noticed children spraying graffiti on a local building; (2) children were showing disrespect to an adult; (3) they noticed children wagging school and hanging out in the local park; (4) a fight broke out in front of their house; and (5) the nearest police station was threatened with closure (1=very unlikely, 5=very likely) (Cronbach’s $\alpha=0.78$). Social cohesion and trust included: (1) people in this neighbourhood do not share the same values (reversed); (2) most people in this neighbourhood can be trusted; (3) people in this neighbourhood generally do not get on with each other (reversed); (4) this is a close knit neighbourhood; and (5) I believe my neighbours would help in an emergency (1=strongly disagree, 5=strongly agree) (Cronbach’s $\alpha=0.70$). Individual-level collective efficacy was recoded into low, medium and high.

Area socio-economic status was sourced from the Australia Bureau of Statistics 2006 census (Pink, 2008). Objective crime data was supplied by the Western Australia Police, and comprised the count of crimes against the person in public space and home burglaries committed within 1600m of each participant’s home for the calendar year.

2.5 Data analysis

Statistical analyses were conducted in SPSS version 19 using logistic regression with generalised estimating equations (GEE) to account for clustering within residential development. Analyses examined the association between the neighbourhood form index
and: (1) fear of crime; and (2) perceived crime. Index components were also examined separately for associations with the outcomes.

3. Results

Using continuous variables, there was a modest but significant positive correlation between perceived crime and fear of crime ($r=0.298$, $n=1211$, $p=0.000$). As binary variables, those who perceived more crime had twice the odds of being fearful of crime (OR 2.01, CI=1.25-3.24, $p=0.004$).

Table 1 presents the association between the neighbourhood form index and the two outcomes. Participants living in neighbourhoods that rated higher on 3-6 characteristics were almost half as likely to be fearful of crime (Model 2: OR 0.59, CI=0.41-0.85, $p=0.005$), yet twice as likely to perceive crime (Model 2: OR 2.06, CI=1.16-3.67, $p=0.014$).

Table 2 presents the association between the index components and the study outcomes. Although few individual components were statistically significant, each characteristic tended to be associated with lower odds of being fearful, while the reverse association was generally observed for perceived crime risk. The most notable land-use category was retail land, which was associated with lower odds of being fearful of crime (OR 0.66 CI=0.48-0.92, $p=0.014$) and greater odds of perceiving crime risk (OR 2.04, CI=2.18-3.51, $p=0.010$).

4. Discussion

Our results indicate that the assumptions made by both planners and criminologists about what constitutes a 'safe' neighbourhood are accurate – that mixed-use neighbourhoods are both safer (in terms of fear of crime) and less safe (in terms of perceived crime risk). These findings underscore that ‘perceived crime risk’ and ‘fear of crime’ are different constructs, and that the built environment may impact them differently. Perceived crime risk is a cognitive assessment of the incidence or risk of crime (Ferraro, 1995), and residents
appear to judge neighbourhoods that promote the presence and circulation of people as generating more crime. In contrast, these same neighbourhood characteristics appear to lessen fear of crime (i.e., an emotional response) (Ferraro, 1995; Lorenc, et al., 2012). Thus, while residents may recognise that crime is more likely in neighbourhoods with more pedestrians, they appear comforted by their presence. This is consistent with the notion that ‘eyes on the street’ can help minimise fear of crime (Jacobs, 1961), and suggests that the presence of ‘others’ in the neighbourhood will be a source of comfort rather than a threat (Hillier, 2004).

The association between the neighbourhood form index and perceived crime risk is largely consistent with the criminology literature, which asserts that neighbourhoods that attract more outsiders and aid their movement throughout the network, will generate more crime (Brantingham & Brantingham, 1993; Cozens, 2008; Doyle, et al., 2006; Greenberg, et al., 1982; Poyner, 1983). Indeed, when examining the index components separately, the strongest independent association was between retail land and perceived crime, which is consistent with evidence linking non-residential land-uses with actual crime (Beavon, et al., 1994; Bowes, 2007; Brantingham & Brantingham, 1993; Brown, 1982; Gorman, et al., 2001). Given the alignment of residents’ perceptions of crime risk with the associations documented in the criminology literature, it appears that residents’ may be accurate judges of crime in their local neighbourhoods.

One of the paradoxes emerging from this study is that the neighbourhood design features known to positively influence walking (i.e., mixed land-uses, higher residential densities, and gridded street layouts) (Handy, Boarnet, Ewing, & Killingsworth, 2002; Owen, Humpel, Leslie, Bauman, & Sallis, 2004; Saelens & Handy, 2008), may yield mixed outcomes in relation to fear of crime and perceived crime. For example, the presence of retail is vital to promoting walking (McCormack, Giles-Corti, & Bulsara, 2008), yet this was
significantly associated with perceived crime risk in our study. This may partly explain the inconsistent findings of studies examining the impact of the built environment and crime-related safety on walking (Foster & Giles-Corti, 2008), as residents in more walkable environments may both walk more and, as a result of being ‘out and about’, perceive more crime.

Given the importance of retail to promote walking, it is vital to minimise any negative consequences that retail may have on local communities. One pathway through which retail might impact perceived crime risk is via physical disorder, as non-residential land-uses correlate with more physical disorder (Taylor, Koons, Kurtz, Greene, & Perkins, 1995) and residents interpret disorder as a reflection of crime (Perkins, et al., 1992). Our findings indicate a direct association between retail and perceived crime, however there was some minor attenuation after controlling for perceived disorder and maintenance. While our analyses focused on the adjusted results (i.e., models controlled for individual factors, collective efficacy, crime, and perceived neighbourhood problems), additional tests showed the association between retail and perceived crime risk attenuated slightly from OR 2.36 ($p=0.002$) to OR 2.04 ($p=0.010$) after accounting for incivilities and maintenance, suggesting that neighbourhood presentation may, in part, explain the pathway. Thus, neighbourhoods with proximate access to retail require local municipal services to proactively manage the upkeep of public areas (e.g., removal of physical incivilities) to prevent any further amplification of residents existing safety concerns.

Our findings also highlight a potential trade off, as the neighbourhood attributes that promote walking may inadvertently have a negative impact on residents’ perceptions of crime risk. Given both ‘physical activity’ and ‘crime’ are conceptualised as public health issues (Jackson & Stafford, 2009; Middleton, 1998), which should take precedence? A considerable body of evidence highlights the importance of the built environment to walking (Saelens &
Handy, 2008), and the health benefits of physical activity (Australian Institute of Health and Welfare, 2006; World Health Organization, 2002), whereas comparatively few studies address the health impacts of crime (Jackson & Stafford, 2009; Lorenc, et al., 2012; Stafford, 2007), perhaps due to the complex nature of this relationship (Lorenc, et al., 2012). To better understand the possible implications of prioritising neighbourhood designs that promote walking over, for example, those that appease residents’ perceptions of crime risk, there needs to be a greater understanding of the connection between crime and health. For example, there may be a threshold number of destinations that enhance walking without adversely impacting residents perceived crime risk. However, this hypothesis is speculative and warrants further research, including consideration of the distinction between the cognitive and affective dimensions of fear of crime. Just as our findings revealed a contradiction between suburban design, perceived crime risk and fear of crime, these different dimensions may also have different implications for residents’ health.

This study has several limitations. First, the findings may not be generalisable to other populations as the sample comprised new suburban homeowners living in neighbourhoods that were generally perceived to be safe. Indeed, the study neighbourhoods were typical of new greenfield developments, where residential housing precedes other infrastructure, and consequently many study participants had few proximate services and facilities (Foster, et al., 2010). Nonetheless, the findings may have implications for other community settings. For instance, if retail is associated with perceived crime risk, it follows that rural populations with limited access to shops and services, and therefore fewer ‘strangers’, would perceive similar (or lower) levels of risk. Conversely, urban populations, with more retail and more strangers, perceive more crime risk. This may, at least in part, contribute to differences in ‘fear of crime’ observed between inner city, suburban and rural residents (Hale, 1996). Second, we examined the cognitive and affective dimensions of fear
as separate outcomes, yet there are inter-relationships between these measures that should be acknowledged. Consistent with other studies (Ferraro, 1995; Hale, 1996), perceived crime risk was associated with increased fear of crime; however the direction and complexity of the relationship between cognitive judgements and emotional responses requires further attention to better understand their interconnections and influences (Jackson, 2006). Third, there was limited environmental variability and this may have resulted in an underestimation of the association between neighbourhood design and our outcomes. Fourth, the cross-sectional study design means causality cannot be inferred, and finally, the binary outcomes limited variability but were necessary for comparison with previous work.

Despite these limitations, the study highlights that researchers interested in the impact of the built environment on residents’ safety perceptions, and any subsequent influence of those perceptions on health and wellbeing outcomes, should be mindful that the built environment appears to impact the cognitive and emotional components of fear of crime differently. Our study appears unique, in that a single sample of participants was used to compare associations between objective measures of the built environment and both the cognitive and affective dimensions of ‘fear of crime’. However, this makes it difficult to compare with other studies and ascertain whether other attributes of the built environment have similarly conflicting associations with risk and fear. Our findings underscore the need for further research in different settings and populations to either support or refute our observed associations.

5. Conclusion

Within public health, perceived crime and fear of crime have been largely used interchangeably; however these constructs may be influenced differently by the built environment. Our findings indicate that the attributes of a more walkable neighbourhood, particularly the presence of retail land, may help mitigate against fear of crime, but are
associated with greater perceived crime risk. One interpretation is that the role of ‘strangers’ influences the emotional and cognitive aspects of ‘fear of crime’ differently. Perceived crime risk may simply be a function of living in a diverse walkable neighbourhood, but if walkable environments are able to diminish fear of crime, they may enhance both walking and other health outcomes that can be aggravated by fear. Importantly, the findings suggest that researchers from diverse disciplines (such as planning, criminology and public health) need to be mindful that the association between the built environment and subjective measures of ‘crime’ can be very different, depending on the measures applied.
References


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A better understanding of the neighbourhood influences on crime perceptions is needed.

‘Fear of crime’ and ‘perceived crime’ are often used interchangeably by researchers.

We examined associations between the built environment and both ‘crime’ constructs.

Retail land was associated with less fear of crime, but greater perceived crime.

Land-uses may impact the emotional and cognitive facets of fear of crime differently.
Acknowledgements

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Table 1: Association between the neighbourhood form index and: (1) fear of crime and (2) perceived crime risk

<table>
<thead>
<tr>
<th>Neighbourhood form index</th>
<th>Fear of crime</th>
<th>Perceived crime risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td></td>
<td>OR (CI)</td>
<td>OR (CI)</td>
</tr>
<tr>
<td>3-6</td>
<td>0.65 (0.47-0.89)*</td>
<td>0.59 (0.41-0.85)*</td>
</tr>
<tr>
<td>0-2</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*p < 0.05

Model 1: adjusted for gender, age, education, household income, area SES and clustering within residential development

Model 2: Further adjusted for previous victimisation, collective efficacy, perceptions of neighbourhood problems (physical incivilities, social incivilities, maintenance) and objective crime.

Table 2: Components of the neighbourhood form index and their associations with: (1) fear of crime and (2) perceived crime risk

<table>
<thead>
<tr>
<th>Components*</th>
<th>Fear of crime</th>
<th>Perceived crime risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR CI p</td>
<td>OR CI p</td>
</tr>
<tr>
<td>Developed land</td>
<td>0.87 0.63-1.20 0.395</td>
<td>1.70 1.04-2.79 0.035</td>
</tr>
<tr>
<td>Residential land</td>
<td>0.72 0.54-0.97 0.029</td>
<td>1.33 0.75-2.35 0.334</td>
</tr>
<tr>
<td>Retail land</td>
<td>0.66 0.48-0.92 0.014</td>
<td>2.04 2.18-3.51 0.010</td>
</tr>
<tr>
<td>Public open space</td>
<td>0.76 0.56-1.04 0.086</td>
<td>1.10 0.66-1.85 0.719</td>
</tr>
<tr>
<td>Street connectivity</td>
<td>0.82 0.57-1.17 0.266</td>
<td>0.87 0.52-1.45 0.597</td>
</tr>
<tr>
<td>Residential density</td>
<td>0.75 0.51-1.11 0.154</td>
<td>1.24 0.73-2.11 0.428</td>
</tr>
</tbody>
</table>

*Dichotomous components (e.g., relatively more of each specified land-use or attribute compared with less)

All models adjust for age, sex, education, income, area SES, previous victimisation, collective efficacy, objective crime and perceived neighbourhood problems (i.e., neighbourhood maintenance, social incivilities, and physical incivilities)