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Review

A socio-ecological exploration of fear of crime in urban green spaces – A systematic review

Sreetheran Maruthaveeran[a,b,*,†], Cecil C. Konijnendijk van den Bosch[a,c]

[a] Institute of Geosciences and Natural Resource Management, University of Copenhagen, Rolighedsvej 23, 1958 Frederiksberg C, Denmark
[b] Forest Research Institute Malaysia (FRIM), 52109 Kepong, Selangor Darul Ehsan, Malaysia
[c] Department of Landscape Architecture, Planning and Management, Swedish University of Agricultural Sciences, Alnarp, Sweden

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ABSTRACT

Studies have pointed at the negative side of urban green spaces in terms of evoking fear of crime. However research on fear-provoking attributes suggests that there usually is no single attribute that influences fear but that rather a combination of attributes prevails. The aim of the paper is to systematically review those attributes that evoke fear of crime in urban green spaces and to highlight their complex interaction by adopting a social-ecological framework. Results include an overview of the reviewed literature with regard to authorship, journal, geographical distribution of the studies, types of urban green spaces studies, types of landscape stimulus used, applied methods, types of respondents involved and main study findings. Forty-eight studies met the authors' inclusion criteria. The majority of the studies highlighted that individual factors (such as gender and past experience) were more influential than social and physical factors in evoking fear of crime. A proposed socio-ecological framework highlights the attributes which evoke fear of crime in urban green spaces and its interactions and can help guide future research.

Introduction

The links between urban green space and humans have been studied extensively in various fields, including environmental psychology, human geography, urban studies, sociology, urban forestry, leisure sciences and tourism, and landscape architecture. This is true particularly in the Western world, where the benefits of urban green space are well documented and where there has been a search for more in-depth knowledge of the relationships between humans and their environment (e.g., Kaplan, 1987; Hartig et al., 1991; Ulrich, 1993).

The social and psychological services provided by urban green spaces are important for the quality of life and wellbeing of urban residents (Hartig et al., 1991; Chiesura, 2004). These services to humans include providing aesthetic experiences and recreational opportunities (Parsons and Daniel, 2002); promoting human health and well-being, e.g., by enabling restoration from stress and mental fatigue (Ulrich, 1984; Cooper-Marcus and Barnes, 1999; Hartig et al., 2003; Bowler et al., 2010); enhancing social interaction and stimulating social cohesion (Coley et al., 1997; Peters and Buijs, 2010); and providing opportunities for learning about nature and natural processes (Kahn, 1999). Although the many benefits of urban green space are usually stressed, these environments also provide some disservices (Lyytimäki and Sipilä, 2009). These include, for example, encounters with physical danger (e.g., bad weather, poisonous animals) which may evoke strong fears or other negative emotions in wild environments (Ulrich, 1993; Bixler and Floyd, 1997; Van den Berg and Ter Heijne, 2005). Very few studies have examined the negative emotions occurring in urban green spaces, particularly regarding social dangers (e.g., fear of crime). In this article, 'fear of crime' is used in a wider sense, referring to the emotion experienced (e.g., perceived safety, perceived risk, perceived threat) rather than the actual crime, risk, safety, or security.

Since the 1960s, 'fear of crime' has been a field of research interest for criminologists. It is now regarded as one of the leading research topics in the field of criminology (Farrall et al., 2000). Fear is an unpleasant emotional state triggered by the perception of threatening stimuli (Ruiter et al., 2001). According to Ferraro (1995, p. 8), fear of crime comprises "an emotional response or dread or anxiety to crime or symbols that a person associates with crime". It is recognised that fear of crime is often a larger problem than the crime itself (Bannister and Fyfe, 2001). People who are afraid of being victimised often change their habits (e.g., by tending to stay at home, avoiding some streets, not travelling on public transportation) (Skogan, 1986; Miethe, 1995). Such resulting anxieties are believed to erode quality of life and well-being, restrict

* Corresponding author at: Institute of Geosciences and Natural Resource Management, University of Copenhagen, Rolighedsvej 23, 1958, Frederiksberg C, Denmark. Tel.: +45 50 37 22 59; fax: +45 35 33 15 08.
E-mail addresses: sree@life.ku.dk, sreetheran@frim.gov.my (M. Sreetheran).
† Sreetheran Maruthaveeran holds a position as a Researcher at the Forest Research Institute Malaysia (FRIM). Currently he is pursuing his PhD at the University of Copenhagen, Denmark.

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movement, motivate costly precautions, encourage 'flight' from deprived areas, and harm social trust, inter-group relations, and the capacity of communities to exercise social control (Hale, 1996). Crime and fear of crime in urban green spaces were also recognised as potentially important influences on mental health and wellbeing (Madge, 1997; Lorenc et al., 2012; Foster et al., 2013). For example, fear of anti-social behaviour (teenage delinquency, vandalism, glue-sniffing, etc.,) resulted in people being unable to enjoy the pleasures of visiting urban green spaces (Burgess et al., 1988). However, fear of crime might not be just evoked by one or two single attributes but rather result from multiple attributes and their interactions. Thus, it is pertinent to look at not only the attributes that evoke fear of crime in urban green spaces but also at how these attributes interact.

A recent review of perceived personal safety in urban woodlands highlighted the environmental attributes, particularly vegetation character, maintenance and landscape design (Jansson et al., 2013). However, this review did not thoroughly investigate how other attributes (of personal and social nature) interacted with environmental attributes. This is important, as the reasons why people are afraid in an urban green space might not have environmental origins at all. In fact several studies in urban green spaces have mentioned a lack of social relations or absence of park personnel (Burgess et al., 1988; Brownlow, 2006), lack of prior information through media or friends (O'Brien, 2005; Jorgensen et al., 2007), and lack of social control in a neighbourhood (Brownlow, 2006; Fisher and May, 2009) as potentially important attributes related to physical environment. In addition, despite its important contribution to the literature, the review by Jansson et al. (2013) does not offer a comprehensive overview (e.g., geographical scope, methodological aspects) of the current state of research on fear of crime in urban green spaces. Such an overview may be important for the further advancement of the field.

Therefore, the current article aims to systematically review the evidence regarding the types of attributes that provoke fear of crime in urban green spaces as well as the connectivity between these attributes. This is achieved by addressing three objectives: (a) providing a comprehensive overview of the current state of research on fear of crime in urban green spaces with regard to geographical scope, types of urban green space, landscape stimulus, methodology, sample characteristics, and main findings; (b) synthesising the research findings on what types of attributes can evoke fear of crime in urban green spaces; and (c) developing a conceptual framework for future research within a social-ecological approach (Foster and Giles-Corti, 2008).

Methods

Search strategy

A literature search was conducted from August 2011 to December 2012 using three leading electronic journal databases (Web of Knowledge, Science Direct, and Scopus). The search was limited to peer-reviewed, English-language journals papers published between 1980 and 2012. The search analysed titles and abstracts for a number of related keywords and phrases: fear of crime, fear of violence, violence, danger, threat, perceived danger, perceived risk, perceived safety, safety, risk, scary, and security. The search was then refined to capture studies looking at urban green spaces using the following terms: forest, park, green space, public space, natural environment, green environment, nature settings, outdoor environment, woodland, woodlands, nature sites, wilderness, green corridor, parkland, courtyard, garden, university campus, landscape, jungle, vegetation, tree, street trees, and greenway. Search words were selected based on the previous literature on fear of crime or closely related topics, such as perceived safety, perceived risk, and perceived threat. Additional articles were identified from the reference list of those research articles found through the selected search engines ('snowballing').

Study selection

An article was included if it met the following criteria: (1) its focus was primarily on fear of crime/perceived personal safety/avoidance behaviour, (2) the area investigated included urban green spaces, and (3) it discussed attributes that evoke fear of crime in urban green spaces. Only peer-reviewed primary studies published in academic journals were included, resulting in the exclusion of literature reviews, conceptual articles, conference proceedings, Master's and doctoral theses, and government reports. Articles satisfying the above-mentioned criteria were scanned by the authors for additional studies that met the inclusion criteria for the review. Duplicate articles were removed, and articles were screened for relevance, primarily based on the title and abstract. The authors did not exclude any articles on methodological grounds, as the total number of articles meeting the inclusion criteria was small.

Data extraction

Selected articles were read thoroughly to extract key data and findings. Key data on each article that met the inclusion criteria were compiled into a Microsoft Excel spreadsheet. These key data included the (i) author(s), (ii) journal, (iii) year of publication, (iv) region, (v) sample characteristics (e.g., gender, age), (vi) landscape stimulus (e.g., slides, photographs, video), (vii) research methodology (e.g., data collection method, sample size, type of data), and (viii) key findings.

Results

Overview of findings

The review generated a total of 48 original, peer-reviewed research articles on fear of crime or perceived personal safety in urban green spaces published between 1982 and 2012 (Table 1). These articles were published in 27 journals. *Landscape and Urban Planning* published the highest number of articles (10, 20.8%), followed by the *Journal of Environmental Psychology* (5, 10.4%), *Environment and Behaviour* and the *Journal of Arboriculture and Urban Forestry* (with both having published four articles, i.e. 8.3% of the articles). *GeoForum* and *Tijdschrift voor Economische en Sociale Geografie* both published two articles (4.2%). The other 21 journals published only one article each. A substantial increase was noted in the number of articles published on the topic of fear of crime in urban green spaces over time, with 22.9% of all articles published in the 1980s and 25% in the 1990s. This share increased to 41.7% from 2000 to 2009. From 2010 to December 2012, an additional five (10.4%) articles were published.

Synthesis of study findings

Studies on fear of crime in urban green spaces have been geographically limited. Judging from the articles, the majority of relevant research to date has been conducted in the USA (23 articles) and UK (13 articles). At some distance follow Canada and Turkey (two articles each) and Australia, Finland, Hong Kong, Japan, Malaysia, the Netherlands, Norway, Singapore, and Sweden (one article each). All studies provided information regarding sample characteristics. Several studies recruited respondents from specific neighbourhoods (47.9%) and students from university campuses and schools (33.3%). Five articles (10.4%) included a sample of park

Table 1
Journal distribution of the 48 research papers reviewed in this study.

Journal	No. of papers
Landscape and Urban Planning (formerly known as *Landscape Planning*)	10
Journal of Environmental Psychology	5
Environment and Behaviour	4
Journal of Arboriculture and Urban Forestry (formerly known as *Journal of Arboriculture*)	4
GeoForum	2
Tijdschrift voor Economische en Sociale Geografie	2
Area	1
Body and Society	1
Children, Youth and Environments (formerly known as *Children's Environments*)	1
Environment and Planning A	1
Forestry	1
GeoJournal	1
Journal of Applied Sciences	1
Journal of Contemporary Criminal Justice	1
Journal of Environmental Systems	1
Journal of Leisure Research	1
Journal of Urban Affairs	1
Journal of Urban Design	1
Landscape Research	1
Leisure Studies	1
Managing Leisure	1
Middle-East Journal of Scientific Research	1
The Professional Geographer	1
Urban Forestry and Urban Greening	1
Urban Studies	1
Women and Health	1
World Leisure Journal (formerly known as *World Leisure and Recreation*)	1
Total	48

users, while another four recruited the general public (8.3%). Almost all studies investigated the level of fear according to gender, with a few exceptions in which only female respondents were considered (Nasar and Jones, 1997; Yeoh and Yeow, 1997; Koskela and Pain, 2000; Wilbur et al., 2002; James and Embrey, 2001; Krenichyn, 2004). No studies focused solely on males. All of the studies recruited adults as their respondents, except for Woolley and Amin (1995, 1999), Castonguay and Jutras (2009) and James and Embrey (2001), who observed only children/adolescent fear of crime in urban green spaces.

In terms of data collection, 18 (37.5%) of the studies used a mixed method approach, 17 (35.4%) used quantitative methods, such as ratings or scoring systems, and 11 (22.9%) used qualitative methods (e.g., focus groups, individual interviews, observation). Only one study (by Maas et al., 2009) used secondary national-level datasets (from the Netherlands). All of these studies described their data collection protocol, except for Yokohari et al. (2006). A total of 26 studies (54.2%) used some form of landscape stimulus in their studies. The landscape stimuli used in the studies are basically presented through visualisation techniques such as photographs, still images on a screen, plans (maps), digitally manipulated photographs, line drawings, and simulations (walks through natural environments with varying amounts of greenery). Of these 26 studies, 16 studies (61.5%) reported using images of urban green spaces as stimuli. A considerable share of the studies (26.9%) exposed their respondents to real landscape, e.g., by means of various types of 'mobile' research conversation with the social scientist, such as 'walking interviews' (Skår, 2010) and guided walks in a woodland (Burgess, 1996; Jorgensen and Anthopoulou, 2007). Only three studies (11.5%) used a combination of images and real landscape for their studies (Fisher and Nasar, 1992; Nasar and Fisher, 1993; Kuo et al., 1998).

A total of 36 studies (75%) supplied information about the sampling procedure used. Out of these studies, 63.8% (23 studies) applied a non-probability sampling method (e.g., quota sampling, purposive sampling, snowball-sampling, convenient sampling, judgemental sampling). Only 13 studies applied probability sampling. Sample size ranged from 25 (Hung and Crompton, 2006) to 83,763 (Maas et al., 2009). Three studies did not provide information about the number of respondents (Burgess et al., 1988; MacNaghten and Urry, 2000; Brownlow, 2006). Thirty-four studies (70.8%) described the data analysis approach applied. Those studies utilising the probability sampling method used descriptive, factor, correlation, regression, ANOVA, t-test, and chi-square analyses, among others. The qualitative studies used grounded theory, content analysis, and thematic analysis. Two studies mentioned the use of computer software (e.g., QSR Nvivo) to assist with qualitative data analysis (Wilbur et al., 2002; O'Brien, 2005).

Attributes associated with fear of crime in urban green spaces

Personal attributes

Gender was found to be a significant and strong predictor of fear of crime in urban green spaces. Twenty-four (50%) studies investigated gender as an independent variable. The majority of the studies showed that females have significantly higher fear levels than their male counterparts, except for one study in Turkey (Özgüner, 2011). As one elderly lady mentioned: "I only stay there (park) for a while. You know, there are so many male elderly there. . ." (Hung and Crompton, 2006, p. 303). Indeed, fear of crime was also found among teenage girls in Australia, who perceive parks as unsafe areas after dark (James and Embrey, 2001). In addition, noticing too many males in urban green spaces was also observed to increase insecurity among elderly females in a study in Hong Kong (Hung and Crompton, 2006).

Similarly, research was undertaken with respondents from different age groups, with some mixed results. An increase in the degree and severity of fear with age was only observed in two studies (Burgess, 1996; Madge, 1997), while others indicated insignificant differences (Westover, 1985; Glaser, 1994; Yeoh and Yeow, 1997; Jorgensen and Anthopoulou, 2007; Maas et al., 2009). A weak association between age and fear was identified in two studies due to the small sample size and under-representation of different age groups (Westover, 1985; Jorgensen and Anthopoulou, 2007). Only two studies observed mainly elderly park users ($\geq$60 years old) (Hung and Crompton, 2006; Jorgensen and Anthopoulou, 2007).

Some studies considered differences in the level and intensity of fear according to ethnicity, particularly for ethnic minorities. The majority of these studies supported the connection between fear of crime and ethnic minority groups in urban green spaces, particularly among ethnic minority women in the UK and US (Burgess et al., 1988; Glaser, 1994; Burgess, 1996; Madge, 1997; Brownlow, 2006). One African American woman commented: "I have a park right across from my house, and I wouldn't go over there if you paid me" (Wilbur et al., 2011, p. 22). Another Asian woman in the UK mentioned: "I wouldn't go there (park) on my own with my little girl unless my husband's there or else somebody else is there with me . . . As has been said, they shout 'Oi Paki!' and they throw stones" (Burgess et al., 1988, p. 465). The intensity of fear was also significant among the African-Caribbean community compared to the white and Asian communities in the public parks of Leicester, UK (Madge, 1997). One study found minority men (African American) to be even more concerned about security issues in a park than white women (Glaser, 1994). This was also observed among young ethnic Pakistani teenagers in Sheffield, UK, who were uncomfortable with visiting open spaces based on past experiences of bullying and racism (e.g., Woolley and Amin, 1995, 1999). Nonetheless, these teenagers continued to use the green spaces in Sheffield. On the other hand, this finding was not supported by Westover (1985)

and Yeoh and Yeow (1997) who found no significant difference among minorities, although this was likely due to the small sample size.

Some studies considered socio-economic level as influencing fear of crime (Table 3). Only four studies showed significant results for this variable (Glaser, 1994; Madge, 1997; Brownlow, 2006; Maas et al., 2009). Fear of crime was even greater among lower-income ethnic minorities (Glaser, 1994; Brownlow, 2006). Furthermore, heightened fear was also noticed among young Pakistani teenagers whose fathers often were unemployed or held lower-income jobs (Woolley and Amin, 1999).

It seems that previous experience (direct or indirect victimisation) has a positive impact on the fear level in urban green spaces among the respondents. The psychological effects of criminal victimisation (direct or indirect) can range from non-existent to extreme and from short- to long-term (Wallace, 1998), depending on the type of victimisation, amount of loss incurred, and trauma suffered. Nine studies highlighted this issue in their findings (Table 3). For example, a study involving children (7–12 years old) from a relatively poor neighbourhood showed that the children avoided certain areas based on what they experienced themselves, reflected in one comment: "I got beat up" (Castonguay and Jutras, 2009, p. 106). A teenage girl from Philadelphia mentioned: "I will not go back there (park), because, I think it was last year, they found a dead body back there in the creek" (Brownlow, 2006, p. 234). In contrast, two studies found negative associations between previous victimisation and fear of crime in urban green spaces (Westover, 1985; Fisher and Nasar, 1992).

Apart from previous experiences, prior information regarding crime occurrences through the media or public also evokes fear or discourages people from using urban green spaces (Yeoh and Yeow, 1997; James and Embrey, 2001; Wilbur et al., 2002; O'Brien, 2005; Jorgensen et al., 2007; Castonguay and Jutras, 2009). As mentioned by a woman from Singapore: "I used to go to Marina South with my boyfriend . . . but since the newspapers reported on the molest and assault cases there, I try to avoid the area" (Yeoh and Yeow, 1997, p. 278). A teenage girl from Australia said: ". . . it is drilled into your head by the media and parents that little girls get raped after dark, so it kind of makes me edge" (James and Embrey, 2001, p. 48).

Factors that were least observed were educational level (Westover, 1985) and the vicinity an individual was raised (e.g., urban or rural) (Nasar and Fisher, 1993). Neither of these factors showed any strong correlation with fear of crime in urban green spaces.

Social attributes

Social attributes refers to a number of psychosocial processes (e.g. the social level between people, type of people one meets, etc.). Most findings related to social incivilities were associated with the presence of disorderly persons at a particular site (Table 3). Twenty-one studies (43.8%) found social incivilities to have significant impact on fear of crime in urban green spaces. Notably, the presence of youth gangs, beggars, homeless persons, strangers, drunkards, drug addicts, sexual offenders and thieves in urban green spaces were regarded the most intimidating. For example, the threat (e.g., of sexual violence) of strangers loitering played a key role in deterring women from using parks in Leicester, UK (Madge, 1997). This was also noted in the small Norwegian neighbourhood forest of Buttekvernskogen, where women generally expressed fear of rape and assault by men and loitering gangs of youths (Skår, 2010). In addition to adult females, parents were also concerned about the personal safety of children along the Chicago River corridor (urban greenway), which was considered a hang-out for youth gangs engaged in criminal activity, a place for drinking and drug use, and a habitat for the homeless (Gobster and Westpahl, 2004).

Women prefer to visit green spaces in the company of others or at least with their dogs rather than alone (Koskela and Pain, 2000; O'Brien, 2005). Slightly more than half of the reviewed articles (52.1%) reported a positive relationship between the presence of others and fear of crime in urban green spaces (Table 3). In addition, most women also felt safe in the close presence of others in the green space (e.g., rangers or other signs of organised activity) (MacNaghten and Urry, 2000).

The level of social cohesion or trust among the people in a neighbourhood also affects the level of fear. However, this result was weaker in Loewen et al. (1993) than in Brownlow (2006).

Familiarity with an area or people was also highlighted as a factor that could diminish the feeling of insecurity (Table 3). Familiarity could be achieved by regularly visiting an area (e.g., park) (Krenichyn, 2004). For example, the effect of interpersonal communication among "regulars" at the park may buffer the influence of their greater exposure to crime and incivility (Westover, 1985). Some people indicated their unfamiliarity with others deters them from visiting the park, as mentioned by a male non-park-user, aged 80 plus, in Hong Kong: ". . .I don't know many people in Tak Wah Park, but I know many people here, so I don't go to the park" (Hung and Crompton, 2006). However, Fisher and Nasar (1992) reported no significant differences in safety ratings by groups with differing frequencies of visits to the site (familiarity).

Physical attributes

Physical attributes refer to the physical environment (e.g. objects or structures of disorder which you could be observed). The overall physical appearance and signs of negligence or physical incivilities (e.g., abandoned cars, graffiti, vandalism) (Table 3) were noted as among the significant causal agents in evoking fear of crime in urban green spaces. Eight articles (16.7%) discussed the effect of social incivilities in evoking fear of crime in urban green spaces, as illustrated by the quote "Where there's sand at the park, I don't like to go there because of the needles" (girl aged 8; Castonguay and Jutras, 2009, p. 106). Other signs of incivilities, such as dirty toilets in Japanese greenways, were also considered a fear-inducing sight by users due to connotations with crime (Yokohari et al., 2006). Grass maintenance impacts residents' fear of crime; images showing well-maintained grass were given significantly higher ratings than images showing grass in its existing condition (Kuo et al., 1998). A woman in her late 40s made the following comment about maintenance in her neighbourhood park: "The grass isn't cut. You can't see because of all of the weeds. The weeds are out of control . . . That is so dangerous. Anything can happen. Kids can get stabbed, kidnapped, murdered" (Brownlow, 2006, p. 234).

Poor lighting was cited in 12 studies (24.4%) as an important safety-related issue in urban green areas. Loewen et al. (1993) reported that the respondents frequently cited lighting as an important feature in terms of creating an environment safe from personal victimisation. A retired 68-year-old woman said: "There is not enough lighting. It is in the winter it is very dark. So I find it uncomfortable" (Lindgren and Nilsen, 2012, p. 203). This was also the concern of Malaysian parents in the Sri Nibong Neighbourhood Park, who recommended increasing the lighting to better protect their children at the park from criminal activities (Mani et al., 2012).

Dark areas were also observed to heighten fear in urban green spaces, particularly among females. As a female student from Ohio State University said: ". . .it's not as bright . . . there's something about walking into the shadows. It's kind of creepy" (Nasar and Jones, 1997, p. 312). A contradictory statement came from a Norwegian female student in her 20s from the same study: "If I need to walk through a park I prefer to use the completely dark paths because it makes me less visible for potential attackers" (Nasar and Jones, 1997, p. 274).

Poor landscape design was also reported in six studies as a factor that contributes to fear of crime (Table 3). All of these papers regard poor landscape design in terms of improper species selection and lack of spatial arrangement. It is important to plant according to a design (even a simple one) to enhance attractiveness and improve perceived security (Anderson and Stokes, 1989). Similarly, Shaffer and Anderson (1985) reported that security generally was rated higher when the vegetation appeared to be well integrated into the landscape design. Spatial arrangement was also considered important in creating a sense of safety. Thus, more natural vegetation could be introduced into parks and green spaces without necessarily making the parks appear unsafe. However, tree placement (either formal or "natural" arrangements) had inconsistent effects on sense of safety in the courtyard of a housing scheme in Chicago (Kuo et al., 1998).

Slightly more than half of the reviewed articles (26) reported dense, unmaintained vegetation as a major cue evoking fear of crime in urban green spaces. This was the most investigated attribute among the reviewed articles. For example, the presence of too many trees and bushes was frequently mentioned as a specific point of concern (Talbot and Kaplan, 1984). As mentioned by a teenage girl: "It's like there's forest back there. Once you get past the playground, there's like a whole lot of trees and weeds and stuff. So once you get back there, once you get behind that part of the playground, anything can happen to you!" (Brownlow, 2006, p. 234). Shrubs were considered as a potential place to hide for perpetrators or obstructions of view (Lindgren and Nilsen, 2012). In another study, a woman talked about a place where sexual assaults were thought to have occurred. However, she mentioned: "I haven't been there for ages so I don't know how they are now, but no I don't think we should have to have that part cut, it was nice beauty spot, you see. No, I wouldn't cut a beauty spot away" (Jorgensen et al., 2007, p. 283). In contrast, some studies conducted in residential areas found that of the presence of vegetation was associated with a reduced fear of crime. For instance, a study in a Chicago housing scheme courtyard found that the presence of trees had strong positive effects on residents' sense of safety compared to a barren courtyard (Kuo et al., 1998). Brower et al. (1983) found that respondents rated line drawings of a property including trees and shrubs to be safer than those without (Brower et al., 1983). However, in both of these studies, the vegetation was well maintained.

Open view and view distance were also found to have strong positive associations with perceived security, as noted in 22 of the reviewed articles (Table 3). One woman in a Norwegian study stated: ". . .if it (woodland) had been more open, if people could see in, if you could see what was inside here, then perhaps I could have sent her (daughter) myself . . . Now, nobody can see inside here. . ." (Skår, 2010, p. 114). In another study (of a Swedish housing estate), the housing company manager said: ". . .there should be open, see-through surfaces. One should see who and what is moving a bit further away so that there are no large shrubs that make it impossible to view what is behind the shrubbery." (Lindgren and Nilsen, 2012, p. 202). Furthermore, a wide open area will not contain any ambiguous refuges – no 'hidey' places, as one respondent put it (Loewen et al., 1993).

The absence of built features or signs of development positively influence fear of crime in urban green spaces, as observed in seven studies (Table 3). For example, openness and the presence of playground features appear to have special importance in alleviating the fear of crime, something that was highlighted for some of the less manicured scenes (Talbot and Kaplan, 1984). This could also be seen in Schroeder and Anderson (1984) and Müderrisoğlu and Demir (2004), where developed park features were found to significantly enhance perceived security.

Insecurity tends to be lower in urban green spaces with more visible escape routes to nearby streets and buildings (Table 2). Nine studies looked into this factor. For example, the majority of the respondents in Müderrisoğlu and Demir (2004) associated parks with access to nearby streets and buildings to be associated with high security.

Time of day

Findings from the reviewed studies found that time of day (day or night) and season (e.g., winter) were associated with fear of crime in urban green spaces, with night-time and dark winters enhancing fear (Table 2). This was noted by a woman from Finland: "I wouldn't go to the park at night, preferably not even during day-time. At night I wouldn't go to any park" (Müderrisoğlu and Demir, 2004, p. 274). The darkness in a Norwegian neighbourhood forest was feared among females (Skår, 2010), which is especially important in a country with dark winters. In contrast, another study found no significant gender differences in the daytime safety perceptions, but females reported feeling significantly less safe at night than males (Fisher and Nasar, 1992).

Park image

The role of the reputation of a certain park or the surrounding neighbourhood was also evident in evoking fear of crime (Schroeder, 1982; Koskela and Pain, 2000; Crew, 2001; Browlow, 2006). Isolated sites were also noticed to influence fear of crime among urban green space users. Fear was also a result of lack of surveillance. Women generally felt safer in areas where wardens or rangers were present or were known to be present at some point each day (Wilbur et al., 2002; O'Brien, 2005). Some studies indicated that an increase in foot patrols could create a place with less criminal activities (Glaser, 1994; Mani et al., 2012). However, one study found that the presence of police officers also increased the feeling of fear among female university students (Fisher and May, 2009).

Discussion

This literature review has synthesised research carried out from different parts of the world which has explored fear of crime in urban green spaces. Its primary goal was to directly and specifically examine the question of how urban green spaces can evoke fear of crime from the socio-ecological approach. In addition, the work aimed to give an overview of the state of research on fear of crime in urban green spaces.

Overview of the state of research on fear of crime in urban green spaces

Few studies have focused on fear of crime specifically in relation to urban green spaces. However, consistent results were found in most of the reviewed articles. In the light of a continuous increase in fear of crime in the USA (Warr, 2000), it is perhaps not surprising that US authors are predominant among the studies. However, studies show that fear of crime in the US has been far more prevalent than actual victimisation (Warr and Stafford, 1983). Countries such as the UK and Australia have also seen an increase in fear of crime research (Doran and Burgess, 2012). Research has so far been limited to industrialised non-English speaking countries. This could be due to factors such as differences in fear of crime trends, the review being limited to peer-reviewed English language journals, and more scholars addressing fear of crime in the USA and UK than elsewhere. Reviewing non-English journals would have broadened the search, but more than 75% of articles in the social science and humanities are written in English (Hamel, 2007).

Industrialising countries have been mostly absent from the research to date despite the high crime rates in cities in many developing countries. The lack of research is not surprising given

Table 2
Summary of findings from reviewed articles (n = 48).

Author	Region	Sample characteristics		Data collection		Sampling		Data analysis	Findings
		Respondent	Gender	Data collection methods	Landscape stimulus used	Sampling method(s) described	Sample size (N)	Data analysis approach described	
Nasar (1982)	USA	Residents in a neighbourhood	M + F	Quantitative (rating)	Slides	Yes (voluntary sampling)	47	Yes (regression)	Higher levels of vegetation were associated with less fear of crime
Schroeder (1982)	USA	University students + Visitors and volunteer workers at nature study centre	M + F	Mixed method (closed + open ended questions)	Photographs	No	96	No	Unmaintained vegetation and the surrounding areas stand out as an important factor for safety in recreation areas
Nasar et al. (1983)	USA	University students	M + F	Quantitative (interview)	Real landscape	Yes (quota sampling)	60	Yes (factor analysis)	Females were more feared than males. Open view was judged as safer than the closed one
Brower et al. (1983)	USA	Residents in a neighbourhood	M + F	Quantitative (interview)	Line drawings	Yes (random sample)	40	Yes (ANOVA and regression)	Properties appeared safer when trees and shrubs were included
Schroeder and Anderson (1984)	USA	University students	M + F	Quantitative (rating)	Colour slides	No	68	Yes (correlation)	High security is associated with open areas with long view distances, maintained and with signs of development and nearby populated areas Features reflecting maintenance problems and physical incivilities (e.g. graffiti litter) tend to be feared. Feeling of less safe in densely forested areas
Talbot and Kaplan (1984)	USA	Residents in a neighbourhood (African Americans)	M + F	Mixed method (interview)	Photographs	No	97	Yes (dimensional analysis techniques)	Well maintained areas incorporating built features were preferred over more untouched and densely wooded areas which were often associated with fears of physical danger
Shaffer and Anderson (1985)	USA	University students	M + F	Quantitative (rating)	Colour slides	No	109	No	Security rated higher only when vegetation was well maintained and appeared to be installed part of a landscape design The presence or implied presence of others was also related to higher security ratings
Schroeder and Green (1985)	USA	General public	M + F	Quantitative (rating)	Photographs	No	148	Yes (coding and correlations)	60–65 trees per acre (0.4 ha) was considered to be ideal against an open background, but the number dropped if the background was dense
Westover (1985)	USA	Park users	M + F	Quantitative (interviews)	–	Yes (systematic random sampling)	268	No	Females were more likely than males to report both fear and avoidance. Direct experience with park crime and incivility, perceptions of other park visitors, and familiarity with the park were not strongly associated with either feelings of safety or reported avoidance

Burgess et al. (1988)	UK	Residents in a neighbour-hood + Officers from local authority	M + F	Qualitative (focus group)	–	Yes (snowball sampling)	NA	Yes (transcribed and coded)	The presence of undesirable users of parks (e.g. drug users, loiterers), vandalism and male sexual violence against unaccompanied women were feared in more wooded areas Women from the minority group feared the most because of racial attack Respondents mentioned that it is much safer with the presence of law-enforcement/park keepers/wardens in urban green spaces
Anderson and Stokes (1989)	USA	University students	M + F	Quantitative (rating)	Colour slides	No	200	Yes (correlation, regression)	Sense of security enhanced by plantings only when the vegetation was well maintained or incorporated in a distinct landscape design. Visibility was especially important for security, calling for careful landscape design so that plantings do not obstruct the view of access routes to and from structures
Fisher and Nasar (1992)	USA	University students	M + F	Mixed method (survey + observations)	Study 1 = Site plan Study 2 = –Study 3 = real landscape	Yes (voluntary sampling)	Study 1 = 166 Study 2 = 27 Study 3 = 87	No	Fear of crime was highest in areas with refuge for potential offenders and low prospect and escape for potential victims
Nasar et al. (1993)	USA	University students	M + F	Mixed method (interview)	Site plan	Yes (random sampling)	84	Yes (multiple regression, Chi-square)	Fear of crime is high when vegetation provides concealments, low visibility and blocked escape
Nasar and Fisher (1993)	USA	University students	M + F	Mixed method (survey + observations)	Site plan + real landscape	Yes (systematic sampling procedure)	258	Yes (content analysis, *t*-test)	Both fear and crime increased in areas characterised by low prospect, high concealment and high boundedness
Loewen et al. (1993)	Canada	University students	M + F	Mixed method (rating + open ended questions)	Slide presentation	Yes (voluntary sampling)	Study 1 = 55 Study 2 = 100	Yes (mixed model ANOVA, *t*-test)	Three physical features of the environment most important to perceived safety are light, open space and access to real refuge (in decreasing order of importance)
Glaser (1994)	USA	Residents in a neighbourhood	M + F	Quantitative (survey)	–	Yes (stratified random sampling)	945	No	Low income and minority women fears more. This group also indicated the importance of security lightings in the parks
Woolley and Amin (1995)	UK	Students (Pakistani children 7–12 years old)	M + F	Mixed method (survey + observations)	–	Yes (purposive sampling)	171	No	Parks and playgrounds were popular and used frequently, although fear of bullying was the most frequently mentioned fear
Burgess (1996)	UK	Residents in a neighbourhood	M + F	Qualitative (focus group)	Real landscape	Yes (theoretical sampling + snowball sampling)	97	Yes (grounded theory)	Level of fear varies between groups of different age, gender and cultural background
Nasar and Jones (1997)	USA	University students	F	Qualitative (interviews)	Real landscape	Yes (convenient sampling)	26	Yes (transcribed and coded)	Concealment and entrapment evoked fear of crime
Madge (1997)	UK	Residents in a neighbourhood	M + F	Quantitative (survey)	–	Yes (quota sampling)	535	No	The intensity and cause of fear varied with social traits of gender, ethnicity and age and affected spatial behaviour regarding use of parks. Females are afraid of extensive undergrowth and trees

Table 2 (*Continued*)

Author	Region	Sample characteristics		Data collection		Sampling		Data analysis	Findings
		Respondent	Gender	Data collection methods	Landscape stimulus used	Sampling method(s) described	Sample size (*N*)	Data analysis approach described	
Yeoh and Yeow (1997)	Singapore	Residents in a neighbourhood	F	Mixed method (survey + interviews)	–	Yes (voluntary sampling)	Study 1 = 228 (survey) Study 2 = 15 (interview)	No	Female respondents expressed that the frequency of crime often occurs in outdoor recreational grounds (e.g. parks, nature reserves, reservoirs, beaches) compared to other public spaces. Time between 11 pm and 7 am (sunrise) was perceived to be most dangerous
Kuo et al. (1998)	USA	Residents in a neighbourhood + Housing authority adminis-trators + police officers.	M + F	Mixed method (focus group + interviews)	Real land-scape + Photo simulation	Yes (voluntary sampling)	100	No	View obstructing vegetation such as shrubs and bushes, induces more fear than non-view obstructing vegetation such as mature trees. The more dense the tree planting the greater the sense of safety
Woolley and Amin (1999)	UK	Students (Pakistani teenagers 13–18 years old)	M + F	Quantitative (survey)	–	Yes (purposive sampling)	116	Yes (descriptive and Chi-square)	Open spaces were less frequently visited because of past experiences on being bullied (racism) or being alone (without friends)
Koskela and Pain (2000)	UK and Finland	General public	F	Mixed method (survey + interviews)	–	Yes (voluntary sampling)	Study in UK (survey = 389, interview = 45) Study in Finland (survey = 666, interview = 18)	Yes (transcribed and coded)	Badly placed bushes and shrubbery was considered factor which could evoke fear among women and the most frightening places were identified as forests, recreation areas and paths
MacNaghten and Urry (2000)	UK	General public	M + F	Qualitative (focus group)	Photographs	No	NA	No	People with different cultural and ethnic backgrounds may have different views about fear. Woodland was considered unsafe because of fears of physical or sexual assault, robbery or bullying and intimidation from young people
Coles and Bussey (2000)	UK	Residents in a neighbourhood	M + F	Mixed method (survey + interviews)	–	Yes (random sampling)	592		Open woodlands give positive image, whereas dense gloomy woodlands create negatives images with many places that might create hiding places for attacker, or poor sight lines which limit the view ahead
Crew (2001)	USA	Residents in a neighbourhood	M + F	Mixed method (interview)	Real landscape	No	111	No	Perception of park safety related strongly to its physical layout, time of the day and to the numbers of people assumed to be walking out at a given time
James and Embrey (2001)	Australia	Students (15 year-old-girls)	F	Mixed method (survey)	–	Yes (random sampling)	276	Yes (means, coding)	Parks were perceived the most unsafe and restricted by parents after dark. More girls would be physically active after dark if issues such as adequate lighting and suitable supervision could be resolved

Jorgensen et al. (2002)	UK	Residents in a neighbourhood	M + F	Quantitative (rating)	Digitally manipulated photographs	Yes (random sampling)	30	Yes ANOVA, post hoc analysis, paired sample T-test	Spatial arrangement was the most important factor in determining sense of safety but not preference
Wilbur et al. (2002)	USA	Residents in a neighbourhood (African American Women)	F	Qualitative (focus group)	–	Yes (voluntary sampling, Snowball sampling)	48	Yes (coding, QSR NUD*IST qualitative software)	Women were afraid to visit the parks in their communities because of the presence of social incivilities such as drug dealers, gangbangers, etc.
Gobster and Westpahl (2004)	USA	Residents in a neighbourhood + Urban greenway users	M + F	Mixed method (focus group + surveys + interviews)	–	Yes Study 1 = Random sampling Study 2 = Purposive sampling Study 3 = Judgemental sampling	Study 1 = 98 Study 2 = 582 Study 3 = 44	Yes (study 1 = descriptive and content analysis, transcribed and coded Study 2 = Chi-square and ANOVA Study 3 = Content analysis)	The urban greenway as a hang-out for youth gangs engaged in criminal activity, a place for drinking and drug use, and as habitat for the homeless has been the concern of the user's personal safety
Müderrisoğlu and Demir (2004)	Turkey	University students	M + F	Quantitative (rating)	Colour slides	No	105	Yes (correlation)	High security is associated with open areas with long distance, signs of development, nearby populated areas and maintained
Krenichyn (2004)	USA	Park user	F	Qualitative (inter-view + observation)	–	Yes (voluntary sampling, snowball sampling)	41	Yes (open, axial, selective coding)	It is much safer in the park if you are accompanied with friends and acquaintances. Familiarity among other park users and the area also decreases the fear. Having more women in the park makes safer
O'Brien (2005)	UK	Residents in a neighbourhood	M + F	Qualitative (focus group)	–	Yes (purposive sampling)	123	Yes (thematic analysis using QSR NVivo software)	Safety was an issue for women in all of the groups. Most people liked to visit woodland or forest in the company of other people, or at least with their dogs, as they felt uncomfortable on their own. This was particularly the case for women. High profile criminal activities which occurred in green spaces and how media sensationalised it have an impact on the respondents
Crow et al. (2006)	USA	Residents in a neighbourhood	M + F	Mixed method (survey)	Photographs	Yes (random sampling)	471	Yes (factor analysis, coding)	Respondents commented on the overgrown character of public parks and walkways and voiced concern about the safety of pedestrians walking along paths engulfed by shrubs
Yokohari et al. (2006)	Japan	Residents in a neighbourhood	M + F	NA	–	No	79	No	Fear of crime is high when there are few people, dark or where the path was restricted or where the vegetation was too luxuriant
Brownlow (2006)	USA	Residents in a neighbourhood + Government/park officials	M + F	Qualitative (interviews + focus group)	–	No	NA	Yes (transcribed and coded)	The pervasive trash, abandon autos, drug paraphernalia, graffiti, etc. become indicative of disorder and a perceived absence of social, spatial and ecological control, especially women whose primary fear concerns the risk of male violence. Absence of enforcement/guards in the parks was also a factor in inducing fear of crime

Table 2 (*Continued*)

Author	Region	Sample characteristics		Data collection		Sampling		Data analysis	Findings
		Respondent	Gender	Data collection methods	Landscape stimulus used	Sampling method(s) described	Sample size (*N*)	Data analysis approach described	
Hung and Crompton (2006)	Hong Kong	Park users and non-users (elderly people aged ≥60)	M + F	Qualitative (semi-structured interview)	–	Yes (purposive sampling)	25	No	Illicit behaviour in the park and lack of familiarity of people in the park were regarded major constrains
Jorgensen and Anthopoulou (2007)	UK	Park users (elderly people aged ≥65)	M + F	Quantitative (survey)	–	Yes (judgemental sampling)	39	Yes (Chi-square test)	The elderly respondents felt significantly more vulnerable in the event of an attack. However this was not statistically significant if compared to their younger counterparts (small sample group)
Jorgensen et al. (2007)	UK	Residents in a neighbourhood	M + F	Mixed method (survey + interviews)	–	Yes (random stratified sampling)	336 (39 of it volunteered for interview)	Yes (Mann–Whitney test, Chi-square test, interviews were transcribed and coded)	Both the physical environment and local histories contribute to fear of crime. Female respondents were significantly more likely to feel fearful than their male counterparts
Fisher and May (2009)	USA	University students	M + F	Quantitative (rating)	–	Yes (voluntary sampling)	607	Yes (descriptive statistics, independent sample t test, Spearman's rank order correlation, multivariate logit models, equality of coefficients test)	Overgrown or excessive shrubbery increased female students' fearfulness of theft, aggravated and sexual assault. Male students were fearful of aggravated assault
Maas et al. (2009)*	Netherlands	General public	M + F	*Data obtained from secondary data**	–	Yes (random sampling)	83,763	Yes (latent variable modelling)	More green space enhances the feelings of social safety except in very strongly urban areas where enclosed green spaces are associated with reduced feelings of social safety
Castonguay and Jutras (2009)	Canada	Residents in a neighbourhood (children 7–12 years old)	M + F	Mixed method (photo elicitation interview + rating)	Photographs	No	28	Yes (content analysis and Chi-square analysis)	Both social and physical factors contribute the safety issue of the children from poor neighbourhood. Prior information about crime and victimisation was also factors which fear the children
Andrews and Gatersleben (2010)	UK	University students and alumni members	M + F	Quantitative (rating)	Photographs	Yes (snowball sampling)	269	Yes (ANOVA and regression analysis)	Walks with high level of prospect refuge were perceived less dangerous and fearful and more preferred than walks with lower levels of prospect-refuge
Skår (2010)	Norway	Residents in a neighbourhood	M + F	Qualitative (interview)	Real landscape	Yes (quota sampling)	27	Yes (transcribed and coded)	Sense of fear and insecurity is high among women
Özgüner (2011)	Turkey	Park user	M + F	Quantitative (survey)	Real landscape	Yes (simple random sampling)	300	Yes (descriptive)	Majority of the park users felt safe in the park because they visit the park with the presence of other people and police in the parks. The parks were also considered safe for their children because they could always supervise them. The homogeneous social and cultural character of the city may also be another reason

Lindgren and Nilsen (2012)	Sweden	Residents in a neighbourhood + HOUSING company staff	M + F	Qualitative (interview)	–	Yes (voluntary sampling)	38	Yes (transcribe and code the data)	Good lighting and not view obstructing vegetation are important elements for feeling safe because it improves the views. Knowing and recognising people in the area also make you feeling safe
Mani et al. (2012)	Malaysia	Residents in a neighbourhood (parents with children under 15 years old)	M + F	Mixed method (survey)	Real landscape	Yes (systematic sampling)	173	Yes (descriptive and principle component analysis)	Majority of the parents were concern about children being at risk of victimisation by various social incivilities (e.g. kidnapping, teenagers hanging around causing problem, drug use and gang activity) at the park in their neighbourhood

the limited number of studies on fear of crime in general in these countries, with some exceptions, including Adu-Mireku (2002), Dammert and Malone (2006), Johnson (2006), and Karakus et al. (2010). The lack of studies from outside the US and UK is problematic, as cross-cultural understanding of fear of crime is important (as also shown in this study's theoretical frame), and most of the research from these countries is probably not easily transferable (Adu-Mireku, 2002; Dammert and Malone, 2006; Johnson, 2006). Consequently, the validity of existing fear of crime models (e.g., vulnerability hypotheses) and related findings is questionable, as current knowledge may be limited or even biased because of the near exclusive focus on the West (Adu-Mireku, 2002). Future work should include comparative studies in different social and political contexts as well as studies comparing fear of crime in urban green spaces versus fear of crime in general.

Most studies recruited residents from specific neighbourhoods or the general public. This provides results that are reliable representations of the public at large. Moreover, most of the studies considered gender, age, and ethnicity. This was important because different socio-demographic groups experience different levels of fear (Warr, 2000), with, for example women and the elderly typically tending to have higher levels of fear despite not being statistically likely to experience actual victimisation (Madriz, 1997). There are also few studies which focus on the women only (e.g. Nasar and Jones, 1997; Yeoh and Yeow, 1997; Koskela and Pain, 2000; James and Embrey, 2001; Wilbur et al., 2002; Krenichyn, 2004). In contrast, no studies were conducted on males only. This should be conducted in the future because using general socio-demographic predictors to account for fear of crime masks potentially significant individual psychological factors that should be considered (Farrall et al., 2000).

Most studies applied a mixed method approach, which is in line with a wider trend in the social sciences, where combining quantitative and qualitative methods can help enrich study results (e.g., Tashakkori and Teddlie, 2003). This is also pertinent for studies regarding emotions, such as fear of crime. Although most of the studies have mainly relied on a quantitative approach, qualitative methods might help explain inconsistencies found through the quantitative method (McCormack et al., 2010). In terms of sampling approaches, the majority of the studies applied non-probability sampling. Non-probability samples should not be used to make inferences about the overall population, as they may introduce bias. Moreover, researchers are restricted in their ability to determine the accuracy of non-probability estimates (Salant and Dillman, 1994). However, non-probability samples are useful for exploratory studies that may generate new ideas to later test systematically using probability sampling techniques (Vaske, 2008). After collecting data from non-probability samples, researchers may examine the demographic characteristics of their sample and conclude that respondents are similar to those in the larger population (Vaske, 2008).

Visualisation techniques (e.g., photographs, site map) were used as the stimulus in many of the reviewed studies. This is not surprising, as visualisation techniques have proved to be useful in the studies of the role of vegetation and other features on people's preferences, e.g., on street environments and city parks (Schroeder and Anderson, 1984; Fraser and Kenny, 2000). Kaplan and Kaplan (1989) stated that the advantages of using photographs include the ease of conducting tests and comparing scenes. In addition, photographs in landscape research have first and foremost been justified on the basis of cost, as it is expensive to bring significant numbers of interviewees to various sites (Daniel and Meitner, 2001). Nevertheless, slides and photographs must be used cautiously. Kroth and Gimblett (1992) found, for example, that people do not respond similarly to an on-site landscape experience because of the multi-sensory stimuli impact; thus, the validity

of photographic simulation is only limited to static landscapes. In addition to the broad use of visual information in landscape assessment research, some basic understanding of the factors influencing the visual perception is needed (Mambretti, 2011). Apart from using images, a substantial amount of the reviewed studies exposed respondents to real landscapes (e.g., Skår, 2010). The perception of a real landscape is based on the experience of the five senses, although which senses are the most involved has not been defined specifically (Mambretti, 2011). Moreover, field visits do not ensure that the respondents will focus their attention on the subjects of interest (Mambretti, 2011). Future studies should be designed to combine more than one stimulus by taking into account the interplay of material surroundings, symbolism and embodiment (Mykhalovskiy et al., 2004).

Attributes associated with fear of crime in urban green spaces

Personal factors

Adapting the social-ecological model, the authors identified common attributes in evoking fear of crime in urban green spaces. These attributes seem to partially overlap, impacting one another positively as well as negatively. Results demonstrate that personal characteristics, especially gender, are indeed a significant predictor of fear of crime in urban green spaces, with women being more fearful in green spaces than their male counterparts. Gender has also been seen as a consistent predictor in past research on fear of crime. Although traditional victimisation surveys demonstrate that young men are at the highest risk for victimisation, women consistently report a fear of crime that is three times higher than males on average (Stanko, 1992). Women's fear actually stems from a general fear of sexual assault at the hands of men (Pain, 1997). However, for males, their fear is typically based on non-sexual victimisations (e.g., robbery, assault) (Schafer et al., 2006). Statistics indicate that men are approximately eleven times less likely than women to experience sexual assault over their lifetime (Tjaden and Thoennes, 1998). According to Ferraro (1996), this fear of sexual assault among women increases their fear of all crime.

Age was also observed as a common personal attribute evoking fear of crime, relating to the physical, social, and economic vulnerability of the elderly (Ferraro, 1995). Studies have also shown that the elderly tend to be more fearful despite being less likely to be victimised than younger individuals. However, there were some mixed findings from the review, which might stem from the small sample size representing each age group.

Similarly, being an ethnic minority affects feeling insecure in urban green spaces. From the reviewed studies it seems that those minority respondents who feared visiting parks or playgrounds had experienced previous direct or indirect victimisation in the urban green space in their neighbourhood. In addition, it was also noted that the majority of ethnic minority groups with a high feeling of insecurity originated from lower-income neighbourhoods. According to Hale (1996), this was because the lower-income neighbourhood tends to fear more because of their fewer financial resources to protect themselves or their homes against crime.

Direct experience of victimisation was also observed to heighten fear of crime in urban green spaces, as supported by past work by e.g., Skogan and Maxfield (1981), Mesch (2000) and Crank et al. (2003). Direct victimisation concerns those victims who have been directly affected by the actions of an offender or incur some immediate loss following victimisation (Mesch, 2000). Past victims have an increased likelihood of defining situations as dangerous and perceiving the risks of victimation as greater (Mesch, 2000). However, two of the reviewed articles did not show a positive relationship between direct victimisation and fear of crime (e.g., Westover, 1985; Fisher et al., 1995). This could be because individuals who visit the park are more likely to be exposed to these types of behaviours (e.g. threat, theft, vandalism etc.) and, considering that they continue to return on a regular basis, seem not to feel threatened by them (Westover, 1985). Conversely, it should be noted that those who have been exposed to behaviour they found threatening have not returned and are therefore under-represented in the park visitor sample (Westover, 1985). It was also noted that those that had been victimised recently (e.g., during the past year) reported higher levels of fear. This suggests that recent victimisation is more of an important predictor of fear than more remote victimisation (Fox et al., 2009).

Likewise, people's feeling of fear towards urban green spaces was also heightened through indirect victimisation (e.g., as reported in the media and learned through interpersonal communication). People can experience victimisation vicariously and may experience the same emotions that result from direct victimisation when they hear of others' crime encounters (Hanson et al., 2000; Clark, 2003). It is presumed that knowledge about crime attained through interpersonal communication adds a crime multiplier and therefore increases the perceived risk of victimisation (Taylor and Hale, 1986). A few articles highlighted the apparent positive relationship between fear of crime and media exposure. Generally, the media aggravates perceptions of risk of victimisation and therefore induces fear of crime (Lene and Meeker, 2003). Other attributes that were less significant were educational level and level of urbanisation. Both of these attributes showed a weak association with fear of crime in urban green spaces. However, only a small number of papers highlighted these issues.

Social factors

Poor social integration in a community was found to lead to increased fear of crime (Crank et al., 2003). Social networks within neighbourhoods provide a protective effect regarding fear; as social networks increase, fear of crime decreases (Scarborough et al., 2010). This social integration is enhanced through the frequency of contact residents have with one another, the amount of help they provide to one another and how satisfied they are with that support (Thompson and Krause, 1998). Although this review does demonstrate an association between social cohesion and fear of crime, only a few studies examined it.

In the context of urban green spaces, the more frequent the visitation to a particular area (e.g., a park), the more familiar one tends to be with the surroundings and other users. Environmental psychologists also have linked fear to unfamiliar places (Kaplan and Kaplan, 1982; Herzog, 1984). Knowing where one is in space and time is regarded as a basic human need in terms of safety and security (Maslow, 1968). Besides getting familiarised with the environment, getting familiarised with the people in the environment is another aspect. For example, the effect of interpersonal communication among regulars in a park may reduce the influence of their greater exposure to crime and incivility in this setting by making these problems seem more predictable and less threatening (Westover, 1985). The more people in a neighbourhood recognise one another, the more likely they are to be looking out for each other and the more likely they are to intervene or at least call the police if a crime is being observed (Scarborough et al., 2010).

In addition, Whyte (1980) observed that well-used public spaces were populated with people engaging in what was termed "mutual acceptable use". That is, the presence of people can encourage safe use. However, this also depends on the variety of people present, as the presence of other people might either increase or decrease fear, as highlighted by a number of studies in this review. Most urban green space users tend to feel safe when accompanied by family members and acquaintances or when visiting a place where many people are engaged in activities (e.g., picnic) or at least with their dogs. For example, the majority of the Turkish women from Isparta found urban parks to be safe for themselves and their children, as

most of them (93%) tended to visit the parks in groups (with their family, friends, and neighbours), this in contrast to other (Western) countries where the use of urban parks in groups is not common (Özgüner, 2011). On the other hand, green space users also fear the presence of disorderly people, i.e., those violating social norms or official laws or acting in an unpredictable and threatening manner (Ross and Mirowsky, 1999; Skogan, 1999). However, past studies emphasised the effects of the presence of socially threatening others but have not investigated the ways in which the presence of certain others might lower fear (Warr, 1990).

Physical factors

The reviewed articles support the direct relationship between the presence of physical disorder and fear in urban green spaces and the surrounding neighbourhood. Physical disorder refers to a neighbourhood's (or green space's) overall physical appearance and signs of negligence, which trigger fear of crime (Ross and Mirowsky, 1999). This includes abandoned buildings, graffiti, unmaintained vegetation, trash, and damaged property (Nasar et al., 1993; Loewen et al., 1993; Skogan, 1999). Physical disorder or incivilities generate fear because they are perceived to be warning signs of crime and criminal threat (Lewis and Maxfield, 1980; Tulloch, 2000). When incivilities are not remedied quickly, people nearby may interpret them as indicative of neighbourhood decline, which increases concern about crime and generates more fear (Skogan, 1990). However, the findings do not determine whether the frequent visits and familiarisation with places with disorder could reduce the level of fear.

Poor lighting also contributes to evoking fear of crime in urban green spaces. Improved lighting is not only favoured by many crime prevention professionals, it is also one of the most common suggestions made by people fearful of using of public open spaces as a means of both crime prevention and fear reduction (Atkins et al., 1991). It is argued that improved lighting will encourage people to notice suspicious activity, increase opportunities for surveillance, and therefore act as a deterrent (Painter, 1996). At the same time, given that fear is greatest after dark, it is assumed that, by reducing darkness, fear will also be reduced. The lighting issue needs to be balanced with the role of parks as 'dark reserves' in cities with high levels of artificial lighting.

In the context of urban green spaces, discussion of how vegetation affects fear of crime is unavoidable. A considerable number of articles have addressed the relationship between urban vegetation and fear of crime, with mixed results. Several articles have suggested that view-blocking, dense, and unmaintained vegetation is positively associated with a higher fear of crime because it allows perpetrators to hide (Table 3). It has been suggested that park managers remove view-blocking dense vegetation, especially shrubs and low canopy trees to reduce crime and fear (Abrams et al., 1993), as these could offer a refuge for perpetrators, thus contributing to crime. Dense vegetation was also considered a common characteristic of rape sites (Stoks, 1983). Conversely, other studies have shown that visibility-preserving vegetation may actually reduce fear of crime (Nasar, 1982; Brower et al., 1983; Kuo et al., 1998) or even crime occurrence (Kuo and Sullivan, 2001; Donovan and Prestemon, 2012). This issue needs to be clarified, focusing on situations where vegetation is not a causal factor for fear of crime in urban green spaces. There is a need to study how the vegetation appears in a spatial context, in terms of landscape design, vegetation density, and vegetation character, and how maintenance might influence the fear levels (Jansson et al., 2013). From the reviewed articles, amount of vegetation appears to be positively related to fear of crime under the condition of unmaintained vegetation and poor landscape design, where vegetation reduces visibilities or creates dark places. There is also a need to conduct further studies on the effect of vegetation towards fear of crime in different contexts, neighbourhoods, urban parks, and woodland settings, as most studies conducted in a residential setting have shown a negative relationship between vegetation and fear of crime. That is, the greener the residential setting, the safer it is perceived. Furthermore, more studies need to be conducted on fear of crime in urban green spaces in a residential context (e.g., courtyards, gardens around apartments) compared to such settings as urban parks or woodlands. This is because studies on personal safety aspects in public space such as parks cannot be directly transferred to a residential context (Lindgren and Nilsen, 2012).

Other factors

Time of day (i.e., day or night) was found to be strongly related to fear of crime. Moreover, in areas that are socially or physically disordered, the fear level is even higher at night. Future research should develop models for daytime and night-time fear of crime separately, consistent with existing research suggesting that different causal processes are dependent on the time of day (Fox et al., 2009). Furthermore, there is a need to conduct investigations on fear of crime in urban green spaces during different seasons, as there will be variations in the vegetation (e.g., in terms of density, view obstruction, colour, structure) and amount of light, which could impact the level of fear.

In addition, future studies need to ask respondents about their fear of specific types of crime (Ferraro, 1995; Wilcox et al., 2007). This is because daytime fear is associated with certain types of crime victimisation (e.g., stalking, sexual assault, and theft), while night-time fear is primarily associated with sexual assault (Fox et al., 2009). According to Fox et al. (2009), daytime and night-time fears may have very distinctive causal process.

Conceptual framework

To summarise the main findings from this review and guide further research in this area, a conceptual framework was developed, linking the attributes associated with urban green spaces and the surrounding neighbourhoods with fear of crime (Fig. 1). This framework adopts a socio-ecological approach and integrates the numerous, inherently multidisciplinary aspects of the issue.

As mentioned, individual factors significantly influence fear of crime (Scarborough et al., 2010). These are the factors (box 1 in Fig. 1) that generally dominate fear of crime in urban green spaces. There are certain groups of people (e.g., elderly, women, ethnic minorities) who tend to be more fearful because of their vulnerability or past experiences of crime despite being less likely than other groups to be victims of crime. These factors are important for providing an understanding of the nature of public fear of crime, which is valuable for many fear reduction initiatives (Doran and Burgess, 2012).

The social factors suggest that poor social integration in a neighbourhood leads to increased fear of crime (Crank et al., 2003) (box 2 in Fig. 1). Social integration is further supported by many other concepts, such as social support, social capital, and collective efficacy. All of these concepts focus on how often people in a neighbourhood meet each other, how well they know each other, how actively they get together through community networks or associations, how much they trust each other, and the level of social cohesion among them. Low levels of any of these aspects may lead to fear of crime (Markowitz et al., 2001). Some social behaviours (e.g., visiting parks alone or with others or the frequency of visitation) were also found to have an effect on the feeling of insecurity.

The physical environment (box 3 in Fig. 1) addresses visual cues of disorder or 'incivilities' (e.g., litter, graffiti, unmaintained grass/shrubs). According to Skogan and Maxfield (1981), signs of disorder will deter people from spending time in areas, as they generate suspicion and distrust. Poor maintenance and design of a place will also influence crime and perceived safety, e.g., by resulting in

Table 3
Studies reporting attributes that were investigated in evoking fear of crime/perceived threat in urban green spaces.

Attributes	Personal attributes									Social attributes				
	Age	Gender	Socio economic level	Ethnic/ race	Education level	Urban/ rural	Previous crime experience	Prior information about crime	Knowledge about your neighbours	Frequency of visit/familiarity	Alone/ with others	Social cohesion/ trust	Social incivilities	Too many male visitors
Nasar (1982)														
Schroeder (1982)										+				
Nasar et al. (1983)		+												
Brower et al. (1983)											+			
Schroeder and Anderson (1984)											+			
Schroeder and Green (1985)														
Talbot and Kaplan (1984)														
Shaffer and Anderson (1985)		+									+			
Westover (1985)	–	+	–	–	–		–			+	+			
Burgess et al. (1988)		+		+			+				+		+	
Anderson and Stokes (1989)														
Fisher and Nasar (1992)		+					–			–				
Nasar et al. (1993)		+									+			
Nasar and Fisher (1993)		+				+	+			+			+	
Loewen et al. (1993)		+									+	+		
Glaser (1994)	–	+	+	+										
Woolley and Amin (1995)				+									+	
Burgess (1996)	+	+		+							+		+	
Nasar and Jones (1997)											+			
Madge (1997)	+	+	+	+							+		+	
Yeoh and Yeow (1997)	–	+	–	–			+	+			+		+	
Kuo et al. (1998)														
Woolley and Amin (1999)				+			+				+		+	
Koskela and Pain (2000)							+				+			
MacNaghten and Urry (2000)		+									+		+	
Coles and Bussey (2000)														
James and Embrey (2001)		+						+			+		+	
Crew (2001)											+			
Jorgensen et al. (2002)		+												
Wilbur et al. (2002)		+		+				+					+	
Gobster and Westpahl (2004)											+		+	
Müderrisoğlu and Demir (2004)											+			
Krenichyn (2004)		+								+	+			
O'Brien (2005)		+						+		+	+			
Crow et al. (2006)														
Yokohari et al. (2006)											+		+	
Brownlow (2006)		+	+	+			+				+	+	+	
Hung and Crompton (2006)	+									+			+	+
Jorgensen and Anthopoulou (2007)	–												+	
Jorgensen et al. (2007)		+						+			+		+	
Fisher and May (2009)		+											+	
Maas et al. (2009)	+	+	+		+									
Castonguay and Jutras (2009)							+	+		+			+	
Andrews and Gatersleben (2010)														
Skår (2010)		+									+		+	
Özgüner (2011)		–									+			
Lindgren and Nilsen (2012)									+	+			+	
Mani et al. (2012)													+	
Total	8	24	6	10	2	1	9	6	1	9	25	2	21	1

Table 3 *(Continued)*

Attributes	Physical attributes										Time of the day/season	Reputation/ image of the area
	Physical incivilities	Lighting	Landscape design	Vegetation	Open view	Signs of development	Location	Escape routes	Dark areas	Lack of surveillance		
Nasar (1982)	+			–								
Schroeder (1982)							+					+
Nasar et al. (1983)					+							
Brower et al. (1983)				–								+
Schroeder and Anderson (1984)				+	+	+						
Schroeder and Green (1985)				+	+							
Talbot and Kaplan (1984)				+	+	+			+			
Shaffer and Anderson (1985)			+	+	+	+		+			+	
Westover (1985)											+	
Burgess et al. (1988)	+									+		
Anderson and Stokes (1989)			+	+	+			+				
Fisher and Nasar (1992)				+	+			+			+	
Nasar et al. (1993)		+		+	+			+			+	
Nasar and Fisher (1993)		+			+			+	+		+	
Loewen et al. (1993)		+			+			+		+		
Glaser (1994)		+								–		
Woolley and Amin (1995)												
Burgess (1996)									+			
Nasar and Jones (1997)		+		+	+			+	+			
Madge (1997)				+	+						+	
Yeoh and Yeow (1997)	+	+					+				+	
Kuo et al. (1998)	+		–	–	+	+						
Woolley and Amin (1999)												
Koskela and Pain (2000)		+	+				+		–		+	+
MacNaghten and Urry (2000)						+				+	+	
Coles and Bussey (2000)				+	+							
James and Embrey (2001)		+								+		
Crew (2001)		+	+				+		+		+	+
Jorgensen et al. (2002)			+	+	+							
Wilbur et al. (2002)										+		
Gobster and Westpahl (2004)												
Müderrisoğlu and Demir (2004)	+				+	+		+				
Krenichyn (2004)												
O'Brien (2005)				+						+		
Crow et al. (2006)				+								
Yokohari et al. (2006)				+	+				+		+	
Brownlow (2006)	+			+	+	+			+	+	+	+
Hung and Crompton (2006)												
Jorgensen and Anthopoulou (2007)				+			+					
Jorgensen et al. (2007)				+							+	+
Fisher and May (2009)		+		+						+		
Maas et al. (2009)				–	+							
Castonguay and Jutras (2009)	+											
Andrews and Gatersleben (2010)				+	+			+				
Skår (2010)				+	+				+		+	
Özgüner (2011)										+		
Lindgren and Nilsen (2012)	+	+		+	+				+			
Mani et al. (2012)		+		+						+		
Total	8	12	6	26	22	7	5	9	10	11	14	6

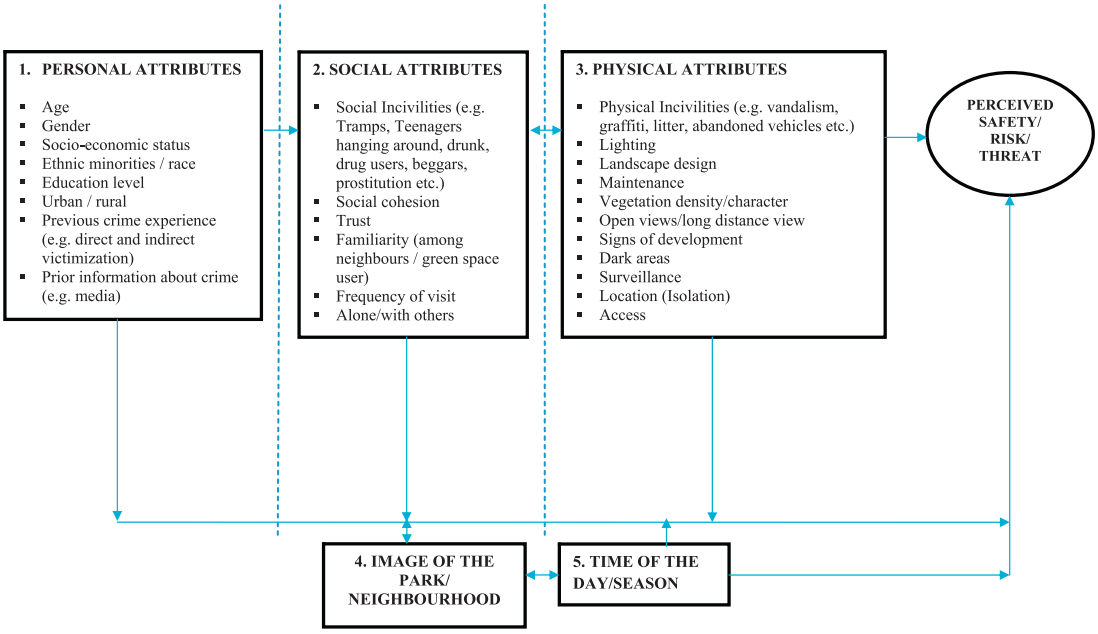

Fig. 1. A conceptual framework for analysing "fear of crime" in urban green spaces based on socio-ecological approach.

more signs of disorder, less visual access, and lower social control (Zelinka and Brennan, 2001).

The above-mentioned physical environmental and social factors represent a two-way interaction, as signs of disorders not only evoke fear of crime but also indicate to criminal offenders the absence of social cohesion among people or that an area is not managed or cared for (Crank et al., 2003). Apart from all of these factors, there are also other factors that could affect the perceived personal safety in urban green spaces, such as the image of the area (box 4) and season or time of day (box 5). The image of a park could represent a two-way interaction with the physical environment and social factor components. Time of day (day or night) or season, which were not highlighted in most studies, were also considered important contributors to fear of crime. The framework does not make assumptions about causality but rather demonstrates the complexity of the associations among factors that can affect perceived personal safety in urban green spaces.

Limitations of the review

To our knowledge, this is the first study to synthesise factors affecting people's fear towards crime or perceived personal safety in urban green spaces from a socio-ecological perspective. This work is also an initial attempt to provide a more comprehensive overview on the current state of research on fear of crime in urban green spaces. However, several limitations should be considered when interpreting the findings of this review. Although this has been the case for most review articles, publication bias is likely to exist (McCormack et al., 2010). Although we have used wide inclusion criteria, we may still have missed significant articles by neglecting some relevant keywords during the search process. Our restriction to include only peer-reviewed English-language journal articles may have resulted in some limitations because a few studies on fear of crime in urban green spaces have, for example, been performed in Japan (e.g., Amemiya and Yokohari, 2002, 2003; Kimura and Kumasi, 2006) but not been translated to English. Additionally, it was not possible to conduct a meta-analysis because of the variety of variables and statistical analyses used in the reviewed articles. In addition, given the limited number of studies, a meta-analysis would have been considered inappropriate. With this in mind, the authors adopted a more descriptive approach.

Conclusions

Fear of crime has been regarded as a significant social problem in urban areas. This has urged scholars to devote significant attention to the causes of such fear in general as well as those related to the settings of urban green spaces in particular. However, research to date has had a poor geographical distribution. Although some common attributes may apply across different cultures based on evolutionary principles, it is essential to conduct more studies in different parts of the world. In addition, it is also pertinent to further investigate the interactions of the attributes that evoke fear of crime in urban green spaces. Although it is important to investigate how physical/environmental aspects, such as vegetation character, density, and maintenance, may evoke fear of crime in urban green spaces, it is important to be aware that these attributes do not cause fear by themselves. Rather, fear is evoked by a complex interaction of the environment with other attributes (e.g., individual, social). Therefore, a more in-depth understanding of the cumulative effect on fear of crime in urban green spaces should be sought through future research on fear of crime in urban green spaces.

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