DOES LIGHTING CONTRIBUTE TO THE REASSURANCE OF PEDESTRIANS AT NIGHT-TIME IN RESIDENTIAL ROADS?

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Abstract. One of the reasons why road lighting may be installed in residential areas is to increase pedestrian reassurance, their confidence when walking alone at night, which in past studies has been addressed under the label of *perceived safety* or *fear of crime*. This article reviews existing literature examining the possible effects of street lighting on pedestrian reassurance in residential streets. Such data would allow better understanding of whether lighting is effective, and of whether variations in lighting conditions such as illuminance and lamp type, are effective at improving reassurance. While several studies have suggested that lighting affects reassurance it is possible that fear of crime is exaggerated by the procedure with which it is measured. Placing lighting in the overall context of reassurance at night time, by the consideration of other attributes such as spatial features, familiarity and the presence of other people, gives a holistic picture of the pedestrian experience. This article presents an alternative method for determination of whether lighting can aid reassurance in residential roads, with the aims of understanding firstly what is important for pedestrian reassurance, and then assessing whether this affected by light. This should form a realistic basis from which to recommend design criteria for residential roads.

Keywords: pedestrian reassurance, residential streets

1. Lighting and reassurance studies

This article concerns road lighting in residential areas. A residential area is an area of a village, town or city which is suitable for or is occupied by private dwellings; a residential street is a street with the majority of frontages comprising private dwellings. In such areas it is normal to provide lighting that focuses more, but not exclusively, on the needs of pedestrians compared to those of drivers [1]. For pedestrians, road lighting is needed not only to provide a street which is safe for people to use but also is perceived to be safe. Reassurance is confidence when using a road and is used here as an alternative for the terms perceived safety and fear of crime that have been used in previous studies: lighting that promotes reassurance means a higher level of perceived safety and a lower level of fear of crime.

Following the introduction of light sources such as metal halide (MH) for exterior lighting, informal assessment of newly installed schemes in the UK led some lighting practitioners to the opinion that these lamps, having broader spectral power distribution (SPD) than traditional low pressure sodium (LPS) and high pressure sodium (HPS) lamps, presented benefits in visual perception and performance [2]. For example Bhatti [3] reported of CMH lamps replacing LPS and HPS lamps: "visual amenity … is now improved, and all road users are much safer as everybody can see much better and clearer."; Scott [4] and Bennett [5] report of a trial where the original 35 W LPS lamps were replaced with 35 W CMH and a survey found that the perceived risk of crime had decreased (73% women, 100% men). While these trials tend to identify positive effects of improved lighting on reassurance the articles do not sufficiently describe details of the lighting installations, the people who were asked to give their judgements, the method by which judgements were obtained (was it a fair trial of the different options?) or the numeric data collected and this means the findings cannot be considered as reliable evidence or extrapolated to other situations. A number of larger scale surveys (Table 1) have been carried out and while it would be expected that these provide more complete data, this is not always the case.

Atkins et al [6] report of surveys carried out in an urban area of the UK before and after relighting and these included questions related to reassurance. Households were selected randomly, and 248 responded to the survey in February 1990, approximately seven weeks before relighting. Of these respondents, 191 responded to the follow-up survey in June 1990 approximately seven weeks after relighting. Surveys using a smaller sample size were also carried out in a control area where re-lighting did not take place. The questionnaire included a question which asked about the feeling of safety when walking alone in the area in daylight, and after dark using a 9-point scale with ends labelled very safe and very unsafe. Note that the interviews were carried out in the afternoon and early evening and therefore the perception of safety after dark would have been made from memory rather than being a contemporaneous judgement as were the daylight responses. It was reported that there was no general increase in feelings of safety about going out after dark following relighting, but that there was a statistically significant increase in women's perceptions of security. However, being unable to find sufficient numeric results in the report nor details of the before and after lighting conditions, it is not possible to independently review these conclusions nor to generalise the findings to any other situation and the survey is, therefore, somewhat meaningless as to effects of lighting on reassurance.

Nair et al [7] carried out before and after surveys following improvements to street lighting in a residential area in Glasgow. They report the results of respondents from 33 households who participated in both the before and after surveys, these being one year apart and with the after survey taking place three months after relighting.

Table 1 Summary of the methods used in past studies of reassurance. Note that while these surveys may have included multiple questions this table reports only the perceived safety part

Study	Independent variables	Method	Measurement	Outcome: did lighting affect reassurance?
Akashi, Rea and Morante, 2004	Change from 3.4 lx HPS to 2.8 lx fluorescent lighting.	Before and after surveys of nearby residences.	5 point rating scale: strongly disagree (-2) to strongly agree (+2) with statement *I feel secure while walking on the sidewalk*	Yes. Significant increase in feelings of security after change from HPS to fluorescent lighting. ($p<0.01$)
Atkins et al, 1991	Unspecified *relighting*.	Before and after surveys.	Nine point rating scale: very safe to very unsafe.	Reported effect for women respondents may be capitalising on chance. Insufficient data to support statistics
Herbert and Davidson, 1994	Change from LPS to HPS lamps; change in illuminance unclear.	Before and after survey of householders	Not reported	Trend for an improvement in reassurance but no statistics
Knight, 2010	Change from HPS to MH lamps. Netherlands: 16.5 lx HPS to 14 lx MH. UK: 9.1/12.7 lx HPS to 8.9/12.6 lx MH.	Before and after surveys, and after only survey of nearby residents (not resident on actual street).	Five point rating scale: Very safe (1) to very unsafe (5). *Does the lighting here make you feel safe or not?*	Yes. Higher ratings of perceived safety after change from HPS to MH lighting ($p<0.01$)
Morante 2008	Change from HPS to induction and MH lamps. Street 1: HPS 8.7 lx to Induction 2.7 lx. Street 2: HPS 3.2 lx to 3.1 lx MH.	Before and after surveys of residents living on or near street.	5 point rating scale: strongly disagree (-2) to strongly agree (+2) with statement *I feel secure while walking on the sidewalk*	Yes. Higher perceived safety under MH and induction lighting
Nair et al, 1993	Unspecified *improvements* to lighting	Before and after survey of householders	Not reported	No
Painter, 1994	Change of lamp type and illuminance. Before, LPS, 3.0 lx. After, HPS, 10.0 lx.	Before and after survey of pedestrians on street	Yes/No response	Trend for an improvement in reassurance but no statistics

The results suggest a reduction by 6% in the number of people worried about assault and harassment, although an increase by 9% in the number of people who avoided going out at all and an increase by 9% in the number of people who would avoid certain areas; the results suggest negligible change in feeling of safety outside. There are a number of problems with this study: the reported changes in opinions are not statistically analysed and the changes are small (e.g. 6% means two of the 33 respondents changed opinion); the precise survey questions are not reported and perhaps most importantly the nature of the enhancement in lighting is not reported.

The results reported for one question serve to demonstrate the questionable validity of this survey; in the survey carried out before the lighting improvements had taken place, 17% of respondents reported recent improvement in lighting despite there being no such action (and in the after survey this was 18%). Painter [8] used before and after on-street surveys of pedestrians in three areas of London, UK, to investigate the effect of improving the existing lighting (LPS, average illuminance approx. 3.0 lx) to a higher illuminance and slightly broader SPD (HPS, average illuminance approx. 10 lx). The surveys were carried out across 10 days between the hours of 1700 and 2330 before, and approximately six weeks after, the relighting. One question in the survey asked "Do you worry about the possibility of (physical attack; threats pestering; sexual assault) happening at night when walking through here?" The results reported suggest a reduction in the percentage of 'yes' responses in the after surveys for both male and female respondents in all three areas, although the article does not present a statistical analysis of these data.

Herbert and Davidson [9] report a survey of households in Hull and Cardiff before and after changes to the street lighting. These changes were to replace existing LPS lamps with HPS; the concurrent changes in illuminance, if any, are not clear. In Hull, over 200 households participated in the survey, while in Cardiff approximately 150 households participated. The results suggest that improved street lighting improved reassurance, with an increase of 44% in Hull and 67% in Cardiff after the relighting, although there is no statistical analysis to confirm this.

Morante [10] reports a survey of two streets in the US. In one street, HPS lighting providing an average illuminance of 8.7 lx was replaced by QL lighting providing 2.7 lx. In a second street HPS lighting providing an average illuminance of 3.2 lx was replaced by MH lighting providing 3.1 lx. In each street, the two lighting installations were matched for equal mesopic luminance as defined by Unified Luminance [11], these being 0.17 cd/m^2 in the first street and 0.05 cd/m^2 in the second street. Surveys of residents suggest that they found that the QL and MH lighting created environments that were considered to be safer and brighter than when using HPS lighting.

Akashi, Rea and Morante [12] compared HPS street lighting with that from a 6500 K fluorescent lamp. Lighting from the two lamps was balanced for equal mesopic luminance (0.22 cd/m^2) as defined by Unified Luminance [11]; these were average photopic illuminances of 3.4 lx for the HPS lamp and 2.8 lx for the fluorescent lamp. Lighting under the fluorescent lamp was considered to be brighter and create an environment that observers judged safer and more comfortable.

Knight [13] reported evaluations of the perception of brightness, safety and comfort of over 300 residents in the Netherlands, Spain and United Kingdom, before and after the street lighting in their neighbourhoods was changed from HPS to one of two types of CMH (2800 K and 4200 K). The average illuminance in the given areas was comparable before and after the change. Analysis of the results

using paired-sample t-tests suggests that when the lighting was changed from HPS to CMH 2800 K or CMH 4200 K, the perception of safety was improved ($p<0.05$). When the reverse change was done, i.e. from CMH 2800 K to HPS, there was a statistically significant reduction in the perception of safety.

2. Survey Methodology

Measurement of reassurance, as with any perceptual attribute, is prone to bias [14]. Questionnaire design and the mode of evaluation can affect the outcome [15].

Past studies have tended to use category rating scales to record reassurance, for example a 9-point response range with end points labelled very safe and very unsafe [6]. Response contraction bias is the tendency for respondents to avoid using the ends of a scale and ratings will thus converge toward the centre of the response range. This response contraction may be enhanced if the response range has an obvious middle value and can reduce the distinction between stimuli [14]. The presence or absence of the middle category in a survey question can make a significant difference in the conclusions that would be drawn about the distribution of public opinion on an issue, because such alternatives usually attract a substantial number of people who may be ambivalent about other alternatives offered to them [16]. Dawes [17] used judgements of price consciousness to demonstrate that changing the number of response categories (5-, 7- and 10-point response ranges) had significant effects on the mean rating.

Johansson et al [18] recorded perceived safety along a footpath in Sweden using 5-point rating scales. They did not change the type of lighting so this study says nothing about how lighting affects reassurance, but instead they compared responses from three user groups who were considered to react differently to an environment: young women, elderly people, and people with visual impairment. Their results did not suggest a difference between the three groups, in that the path was perceived as neither very unsafe nor very safe. One possible reason for this is the use of the 5-point response scale, where the middle neutral value may have enhanced response contraction bias. This could be examined by repeating the study but using different response ranges, e.g. a 4-point range.

Past studies of lighting and reassurance have tended to use either simultaneous studies on separate roads, or before-and-after studies at the same location. The problem with either approach is that there may be differences other than the intended difference in lighting.

With before-and-after studies there is a possibility that public opinion may change due to external events, for example widespread reporting in the media of disorderly behaviour. Lighting is usually installed with a high illuminance to account for the expected light losses with time (e.g. lamp lumen depreciation and dirt deposits on the luminaire surfaces) in order that the minimum average illuminance is maintained through the working life despite these deficiencies. Therefore, if the after judgements are recorded closely following the installation of new lighting,

then it is possible that these will be based on a higher illuminance and may thus inflate ratings of reassurance.

With simultaneous studies in different areas, there is a possibility that these different areas evoke different opinions of reassurance due to environmental and social differences beyond any effect of lighting. Table 2 defines environmental parameters that may affect reassurance; these tend to identify whether a potential attacker could be waiting un-seen and the possibilities for the potential victim to hide or escape.

Table 2 Environmental factors that may inform a judgement of reassurance [19].

Feature	Definition
Prospect	Refers to how well a person in the setting can look ahead to anticipate whom or what he/she is likely to encounter.
Refuge (or, concealment)	Refers to the natural and design features alongside one's route that can block one's view and, more importantly, provide a place where a potential attacker can wait out of sight for a potential victim.
Escape vs. boundedness	Reflects the ease of exit at various points along a path or in a location; permitting a user to exit the path should a potential attacker appear.

Environmental features may have different effects on different individuals. The behaviour of an adult is determined by four factors: self-esteem, self-efficacy, continuity and distinctiveness [20], [21]. Who a person is, affects not only the extent of their reassurance when walking alone at night, but also how they respond to surveys. Van der Wurff et al [22] also recognised the possible effect of underlying psychology in a social psychological model of the fear of crime which identified ones attractivity and power, and expectations of evil intent and criminisable space as influencing factors. As social animals, the human species cannot be isolated from social or political context, both of which can cause fear [23]. What an individual knows matters to their judgement as much as what they see and that knowledge is socially, politically and culturally constructed.

The time of day can affect how people assess their environment. For example, Hanyu [24] found that affective/emotional appraisals differ after dark. Warr [25], [26] suggests that darkness transfers the world into lurk lines and Box et al [27] found that darkness may have a negative on affective/emotional appraisals of places. These studies indicate a psychological effect of "darkness" which cannot be measured with an illuminance meter. There may be temporal variations which have a direct effect on the amount and spatial distribution of light, for example the presence or absence of leaves on trees can block road lighting luminaires to different degrees.

Thus a judgement of reassurance is made by a person, in a place, at a particular time; in this framework, lighting forms a part of 'place' (Figure 1). There are two challenges for investigations of lighting, and these are to identify the size of any effect of lighting on reassurance whilst these extraneous variables are controlled and also to identify the contribution of lighting to reassurance in real-world

situations when these environmental and societal effects are also present. This latter challenge is effectively determination of the size of the circle representing lighting in Figure 1.

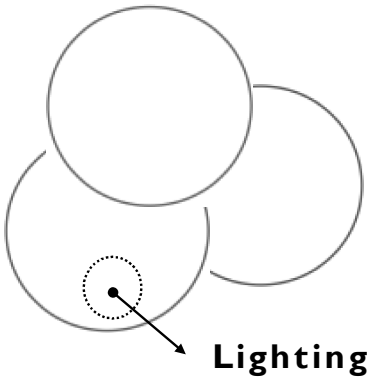

Figure 1 Lighting in the context of environmental and societal impacts.

3. What is being measured?

One problem associated with the measurement of whether lighting effects reassurance is that there are many ways in which fear of crime is manifest and it is often unclear what is actually being measured [28]. There are many reasons for this. Test participants are often asked whether they are very, fairly or not very worried (or afraid) of becoming a victim of crime, but they are not asked how often they worry, nor when they worry, nor what effects these worries have on their everyday lives. Using standard measures, some people report being worried without having worried recently [28]. Researchers do not typically have access to people when they are actually afraid but instead have focussed on anticipated rather than actual fear [28]. Test participants will make an expression of opinion even if they have no real opinion, for example because the survey appears to be for the common good and will thus give an opinion which they hope will be helpful [28]. There may be bias due to the retrieveability of instances [29], the subjective probability of crime may rise when one experiences evidence of crime. The effect of methodology on reassurance measures can be seen from a review where in only 15 of 64 sets of interviews was there no mismatch – different answers were obtained depending on the nature of the methodology [28].

It is possible that fear recorded in surveys is as much a methodological artefact as an empirical reality. Poor question wording, the desire to cooperate with surveys, and media and political interest in the fear of crime have contributed to a scenario in which the fear is continually recreated both socially as a topic for debate and at the individual level: surveys in this situation may not merely measure fear, they may actually create and recreate it. The traditional methods consistently over-emphasise the levels and extent of fear of crime [28].

Problems within the approach to measuring fear of crime can generate the impression of a large proportion of the population who fear crime [28]. According to Matsui [30] 85% of females always fear that they may be involved in street crimes. Other studies have also commented on the differences between males and females when making judgements of reassurance [18], [5]. Similarly young people give lower fear ratings than do older people, despite the higher risk of victimisation

[19]. One reason why men are more likely than women to under-report their concerns about becoming a victim of crime is socially desirable responding; when this is taken into account, men's fears can outstrip women's fears [31], [28]. Similarly some responses may be exaggerated by perceptually contemporaneous offenses [32]. For example, women may give higher levels of fear of burglary than do men because when a woman is asked about burglary, she gives an answer about rape, since most people wrongly assume that they will be in a house when it is burgled, and that the burglar would attempt to harm them. Such responses are inadvertently not to do with how worried they are about the likelihood of assault happening but rather, if it did happen how much would it affect them.

While these concerns raise much doubt about past work, there is some evidence that lighting matters for reassurance.

4. Does Light Matter?

4.1 Does the presence of light contribute to reassurance?

Loewen et al [33] used two procedures to examine perceived safety in urban environments. The first study sought spontaneous comments as to what features of an environment contributed to making them feel safe or dangerous, and this was done without reference to any real or simulated locations. Three environmental features were mentioned most frequently, with light (either daylight or artificial light) being the most frequent (42 of the 55 test participants) followed by open space (30) and access to refuge (24). In the second study, test participants were presented with 16 images of outdoor scenes and asked to rate them using a 5-point response scale ranging from not at all safe (1) to very safe (5). These 16 images were two different scenes for the eight combinations of the three critical safety features found in the first study. The images were presented in a random order and each was observed for 30 seconds.

The results of the second study are shown in Figure 2. It can be seen that in all four situations regarding the presence or absence of open space and refuge that lighting increases mean ratings of perceived safety. The presence or absence of light had a larger effect on mean ratings than did the absence or presence of either open space or refuge. The presence of either light, open space or refuge in a scene lead to higher ratings of safety than when they were absent. However, Figure 3 suggests that lighting alone provides an approximately equal perception of safety than do open space and refuge together in the absence of light. It is of course possible that the presence or absence of light was the most obvious component of the images on which these judgements were made.

From Loewen et al it might be concluded that the addition of lighting to a previously un-lit area will improve reassurance. A further question is whether different qualities of lighting also improve reassurance. Mansfield and Raynham [34] surveyed visitors and local businesses in a small town centre in the UK (Swinton) following re-lighting of the town centre. These data suggest that factors which might contribute to a high fear of crime, such as vandalism, graffiti, groups of

young people loitering and acting rowdily, were not improved by the new lighting. Regardless of relighting, some areas will still feel unsafe: what lighting can do is to allow you to see better, but if what can be seen is disturbing then this will not alleviate the fear of crime.

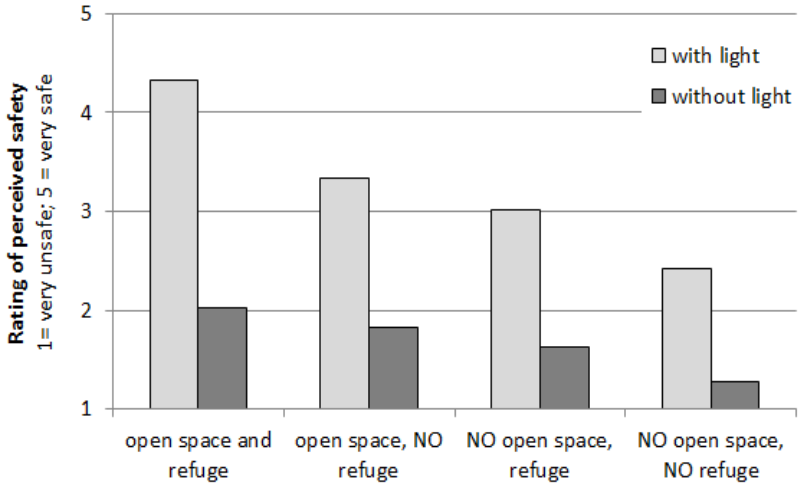

Figure 2 Mean ratings of perceived safety of images of outdoor scenes as reported by Loewen et al [33].

4.2 Does an increase in illuminance increase reassurance?

The findings from two studies suggest that an increase in illuminance will improve reassurance.

Boyce et al [35] carried out field surveys of 24 car parks in urban and suburban areas in New York and Albany in the US to investigate how the amount and SPD of light effected the perception of safety at night. Test participants were transported to the sites in four vehicles and these visited the sites in different orders at both daytime and night-time. The car parks had mean horizontal illuminances of up to 50 lx. At each site they were asked to walk around and then describe lighting using questionnaires comprising a series of semantic differential ratings scales and open questions. One question sought ratings of perceived safety when walking alone. Two interesting findings were reported. Firstly, walking at daytime was perceived to be safer than walking at night-time: lighting at night was able to bring the perception of safety close to that of daytime in a small number of sites but did not exceed it. Secondly, as illuminances increased, the difference in ratings of perceived safety for daytime and night-time tended to decrease (Figure 3). The relationship between illuminance and perceived safety appears to be non-linear. At low illuminances (0-10 lx) a small increases in illuminance produced a large increase in perceived safety; at high illuminances (≥50 lx) increases in illuminance have negligible effect on perceived safety; and in the intermediate range (10-50 lx) the increase in perceived

safety with increases in illuminance follows the law of diminishing returns.

A study carried out in Japan installed lighting that was normally dimmed to 30% output but would increase to 100% when a person approached the area [30]. This increase in light output was chosen according to a pilot study to find an increase that would be noticeable but not uncomfortable. A survey was distributed to residents (n=44) of whom 82% reported that the higher illuminances gave them more sense of security. This study suggests that higher illuminance promotes higher perceived safety, but the absence in the report of the survey instrument and details of the installation, such as average illuminance, mean that little confidence can be placed in this work alone.

In both of these studies the test participants were able to observe changes in illuminance; in the Boyce et al study the repeated measures design means that all test participants saw all lighting conditions, and in the Matsui study the residents reported that they had seen the automatic change in illuminance. Therefore the potential to improve reassurance by means of higher illuminance must be considered with caution because it may be that the improvement to reassurance is obtained only when higher illuminance is noted by respondents: this could be addressed in further research by making less apparent changes in illuminance, for example by using independent samples to make judgements of lighting of different illuminance.

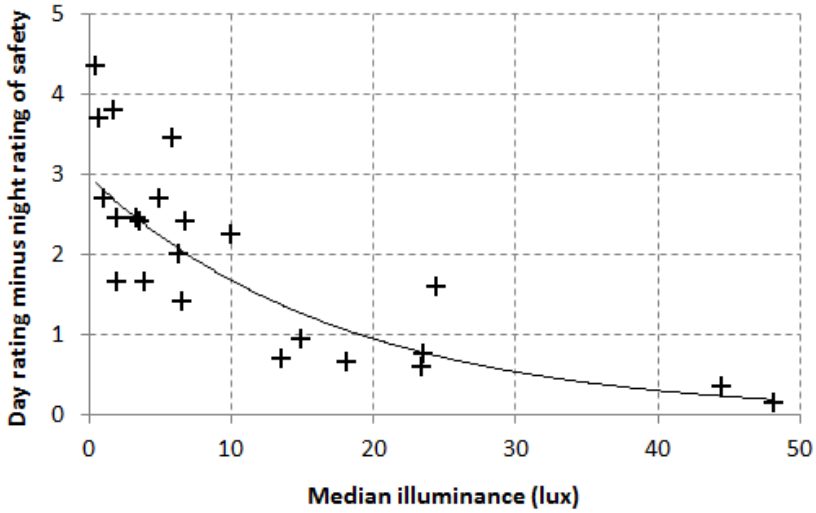

Figure 3 Difference between daytime and night-time ratings of perceived safety of car parks plotted against median illuminance, after Boyce et al [35].

5. Pilot Study

Further work is being carried out with two aims: firstly to confirm whether road lighting contributes to an improvement in reassurance, and, if so, then secondly to investigate how variations in the amount and spectrum of light affect reassurance.

In a pilot study, test participants were asked to take photographs of roads where they would, or would not, be happy to walk alone at night-time: these photographs were then used as discussion aids during a follow-up interview. This approach is similar to that used by Wang and Taylor [19] except that they used this procedure only to identify a target location and then used a different sample of test participants to make judgements of reassurance; this was adopted to avoid priming test participants with the assumption that lighting would influence reassurance. Figure 4 shows two of the photographs received.

Figure 4 Sample of images received from the pilot study test participants, presenting areas considered to be safe (left) and not safe (right) in which to walk alone at night-time.

The interviews (lead by author JU) followed three stages. Firstly, without any visual cues, they were asked to describe in general terms what made them happy to walk down one street and not another – this follows the first method (study 1) reported by Loewen et al. [33]. In the second stage, the photographs provided by the test participants were used as references and they were asked to describe location specific reasons for their choices. This involves evaluation of real roads familiar to the test participants rather than the images used by Loewen et al.

In the final stage, participants were presented with four photographs of outdoor scenes at night-time, these being provided by the interviewer, and asked to state, with reasons, whether they would be happy to walk in the areas depicted on the photographs. This follows the second method (study 2) reported by Loewen et al These photographs are shown in Figure 5 and they were presented separately in a random order.

Farrall et al [28] asked whether if we let test participants speak in their own language would they use the term fear?

Figure 5 Photographs of night-time scenes presented by the interviewer. The same set of photographs were shown to all test participants.

Therefore these interviews were conducted in a manner that attempted to avoid priming test participants with the notion of fear. Similarly the use of photographs provided by test participants would also allow for environmental impacts beyond lighting to gauge the relative impact of lighting.

The pilot study was carried out during summer 2011 and used 9 test participants. The interview transcripts have been analysed using two methods. Firstly, following Loewen et al [33] a frequency count was made for the usage of key terms. This was done by allocating the expressions used by test participants to one of four categories: light, spatial features, familiarity and presence of others. For example, the phrase *"big streets, they are wide"* was included in the Spatial Features category. Table 3 shows the results of the pilot study. It can be seen that 28% of the reasons given for being happy or not happy to walk on a particular street were in the category spatial features; 19% of reasons given indicated the presence or absence of light and 9% of reasons were related to familiarity. 44% of reasons were related to the presence of others, which included judgements about the 'type' of area based on direct and indirect experience (personal and media), likely occupancy and signs of incivilities due to actions of others.

The interview transcripts were also analysed using Hierarchical Cluster Analysis (HCA) following the investigation of gloom carried out by Zhang and Julian [36]. HCA examines word frequency counts and was performed on all words used by interview participants. Interpretation is made by association of words that have been used a similar number of times. Two sets of words that were linked on the basis of

frequency were *area, happy, walk, safe, see* and *day, light*. The association of these words on the basis of frequency suggests they carry a similar weighting when an individual chooses whether to walk down a particular street or not.

The pilot study was carried out primarily to gain experience of methodology in preparation for the principal study which will be carried out during winter 2011/2012. This will target 45 test participants drawn from three groups: (i) people unfamiliar with the area (this will be overseas students who have newly arrived in the UK [19]), (ii) elderly people (aged 65+), and (iii) people who are young (under 45) and familiar with the area. This grouping follows previous work [18] and each will comprise both males and females. The principal test will follow the same approach as the pilot study but will be modified in a number of ways, for example, the interviewer's photographs used in stage 3 will be assessed also using category rating scales and a discrimination procedure.

Table 3 Frequency of reasons described in interviews.

	Positive attribute (reassured)	**Negative attribute (not reassured)**	**Total**
Spatial features	16	37	53
Light features	21	16	37
Presence of others	35	49	84
Familiarity	17	1	18

6. Conclusion

Previous studies of road lighting and reassurance (i.e. perceived safety or fear of crime) in residential areas have presented mixed findings as to the effect of lighting. In some cases this may be due to weaknesses in the experimental design and incomplete reporting. Furthermore, although the installation of lighting in a previously unlit street, or the replacement of lighting in a previously lit street, has been found to improve reassurance in some situations, what is not yet known is the weight of this improvement within the wider range of environmental and societal influences on reassurance. This article has presented the findings of the first stage in a project which intends to analyse the extent to which lighting is a behaviour influencing factor in the urban environment. Not emphasising fear in the procedure may lead to a more realistic understanding of the effect of lighting on reassurance.

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