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Reduced street lighting at night and health: A rapid appraisal of public views in England and Wales

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ABSTRACT

Financial and carbon reduction incentives have prompted many local authorities to reduce street lighting at night. Debate on the public health implications has centred on road accidents, fear of crime and putative health gains from reduced exposure to artificial light. However, little is known about public views of the relationship between reduced street lighting and health. We undertook a rapid appraisal in eight areas of England and Wales using ethnographic data, a household survey and documentary sources. Public concern focused on road safety, fear of crime, mobility and seeing the night sky but, for the majority in areas with interventions, reductions went unnoticed. However, more private concerns tapped into deep-seated anxieties about darkness, modernity 'going backwards', and local governance. Pathways linking lighting reductions and health are mediated by place, expectations of how localities should be lit, and trust in local authorities to act in the best interests of local communities.

1. Introduction

Electric street lighting has been a feature of urban and suburban settlement since the end of the nineteenth century. Indeed, the electrification of lighting has in many ways defined the modern city, in extending the visibility of its public spaces, inhabitants and itinerants beyond the hours of natural daylight (Martland, 2002; Otter, 2002) and changing the meanings of the night for city dwellers (Schlör, 1998). However, in many areas of England and Wales, as in other countries, the taken-for-granted assumption that streets and public spaces will be lit at night has been disrupted in recent years. Many local authorities responsible for street lighting have reduced street lighting at night, a policy primarily driven by requirements to reduce costs and carbon emissions under the Climate Change Act 2008 (Department for Environment Food and Rural Affairs (DeFRA), 2011), but also with considerations of contributing to reductions in environmental light pollution (The Royal Commission of Environmental Light Pollution, 2009). A rapid growth of technological innovations over the last 20 years has enabled greater control over the colour, intensity and switching on schedules of public lighting stock (Shaw, 2014a), and local lighting authorities across England and Wales have adopted a wide range of interventions. These include: removing, or switching off lanterns in street light columns ('switch off'); reducing the number of hours that they are switched on ('part-night lighting'); replacing sodium lanterns by 'white' LED light; and 'dimming' lanterns through centrally managed systems. Some of these interventions reduce the amount, or duration of, artificial light at night. Switch off and part-night lighting result in dark streets which were once lit, at least for some of the night time hours.

Changes which reduce lighting, particularly 'switch off' and part-night lighting in urban areas, have attracted considerable public and media concern, centring on crime, fear of crime, perceptions of safety, and road safety. These are all important determinants of health and wellbeing: directly in the case of road safety; and indirectly, in that fear of crime, for instance, has multiple pathways that impact on mental health (Lorenc et al., 2012). To date, empirical research on fear of crime and perceptions of safety have focused largely on improvements to lighting, with the assumption that more lighting will improve security, and reduce fear of crime (Lorenc et al., 2013). However, empirical findings on the impact of improved lighting on perceptions of crime, personal security and road injury have been mixed, with no clear conclusions on how increased lighting does improve these health outcomes (Atkins et al., 1991; Painter and Farrington 1997; Pain et al., 2006). A systematic review of the effects of increased street lighting on crime (Welsh and Farrington, 2008), including 13 controlled before and after studies, concluded that improved street lighting in public spaces did not reduce crimes at night any more than was observed during the day. The authors suggest that the protective mechanism of street lighting may therefore act

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more through increasing pride in the locality or social control, rather than directly increasing surveillance to deter crime. As Koskela and Pain (2000), suggest, 'fear of crime' is a complex outcome of the political and social meanings of space, including gendered meanings, and is unlikely to be deterministically tied to isolated environmental conditions such as public lighting. On road traffic injuries, Beyer and Ker's (2009) systematic review also noted the poor methodological quality of research to date, and suggested more high quality evaluations were needed to adequately determine the effectiveness of street lighting for reducing the incidence of road traffic injury.

If research on how *improved* lighting impacts on health outcomes is inconclusive, that on *reduced* lighting is almost non-existent. There are no good grounds for assuming that the removal of a public good will have the reverse effects to those of providing or improving it. In addition, there are some rather different health outcomes that become the focus of reductions in artificial lighting. These relate to how reductions might mitigate the negative health impacts some have claimed from a growth in, and changing frequencies of, artificial light in the environment (Hölker et al., 2010; Falchi et al., 2011). Although the evidence base to date is weak (Vohra, 2013), a growing concern with light pollution as a potential hazard to health draws on studies of animals (Shuboni and Yan, 2010) and shift workers to identify disruptions in circadian rhythms and endocrine processes, which can affect sleep (Navara and Nelson, 2007) and, theoretically, health outcomes such anxiety, depression, obesity and even cancer incidence (Pauley, 2004; Fonken et al., 2009; McFadden et al., 2014). Broader public health concerns also include the more existential wellbeing effects of being able to see the night sky, and longer term environmental impacts of reduced carbon emissions (Claudio, 2009). The amount, and quality, of light at night has thus become a public health as well as political issue.

There have been some qualitative studies of public views of street lighting, identifying mixed and reflective views on the relationship between light and fear of crime, for instance (Pain et al., 2006). To date, though, there has been little research that directly addresses public views on the possible relationships between street lighting reductions and health more generally. To address this gap, this study therefore aimed to explore public views of the potential health and wellbeing impacts of reduced street lighting. We aimed to explore public understanding of the possible pathways through which street lighting might impact on health and wellbeing, and how reductions in street lighting were understood as impacting on health and wellbeing outcomes.

2. Methods

To map a range of views, we used a rapid appraisal design (Trotter et al., 2001; Beebe, 1995) to collate different sources of data across eight local authorities in England and Wales. Local authorities were purposively chosen to reflect a range of lighting authorities, geographical regions, populations and types of implemented or planned intervention (see Table 1). These interventions included those which were likely to have noticeably reduced lighting at night (such as the introduction of switch off and part-night lighting) and also those (largely in more urban areas) which were less likely to be noticeable, such as replacing sodium with LED lighting. The aim was not to evaluate these interventions, but rather to use the context of changes to explore what health and wellbeing concerns the public had, and to use this in combination with evidence from the literature to inform a model of the pathways that link street light reductions and wellbeing.

2.1. Ethnographic data

Within each area, we interviewed key informants (including local authority lighting professionals, councillors); collected documentary evidence (including local authority plans, blogs, emails and letters to residents' associations, local newspapers and local authorities); reviewed local authority consultations (if available) and conducted focused ethnographic visits. The data from these visits included fieldnotes from 'walk arounds' of areas with street light reductions, including informal intercept interviews, and in-depth individual and group interviews (which were recorded and transcribed) with a mix of residents, visitors and workers. Fieldwork was conducted between April 2013 and December 2014. We used a mix of recruitment strategies to identify a range of groups and individuals to interview. This included contacting groups such as sports clubs, choirs, youth organisations and workplaces in each locality, and then snowballing from these contacts and local authority staff. We deliberately included workers likely to be using the streets at night, such as police officers, hospitality and transport workers. In total, the dataset included formal individual or group interviews with 57 local residents or workers and 14 key informants; 61 informal intercept interviews; 112 documents; and fieldnotes from locations across the case study areas. After initial fieldwork had generated the main domains of interest to the public, we carried out a household survey in one area to estimate the prevalence of reported negative and positive wellbeing impacts of reduced street lighting,

2.2. Household survey

We identified one area in Shropshire where part-night lighting had been introduced in selected streets, and was scheduled for other streets. Using data provided by the local authority on implemented and planned lighting changes, the roads were divided into 12 strata based on whether lighting reductions had been introduced (yes/no), tertile (low/med/high) of deprivation of the census lower super output areas (LSOA) in which the roads were

Table 1
Case study areas.

Local authority area	Street lighting intervention	Fieldwork settings
Hertfordshire County Council	Part-night lighting approved, trialled and implemented from November 2010 with about 70% lights operating on this basis; also trimming and white light.	Rural/suburban towns and villages in London's commuter belt
Buckinghamshire County Council	Switch off selected street lights at midnight from Aug 2007; extended to more areas in April 2008.	Suburban towns and villages
Shropshire Council	Part-night lighting scheme to convert 70% lights in progress since 2012; also trialled dimming and white light.	Shrewsbury city, and Town and Parish councils in surrounding towns and villages.
Wakefield Council	Trials of dimming, and some white light	City centre and suburbs
Swansea Council	Around 1000 lights switched off; also dimming and white light	City centre, suburbs and surrounding rural areas
London Borough of Hackney	White light.	Inner London borough
London Borough of Southwark	White light, trimming.	Outer London borough
City of Westminster	White light only policy since 2004.	London borough with large numbers of visitors