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LETTER

Infrastructure for supporting physical activity: a pilot survey of the quality of street-connecting walkways at night

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Improving the quality of walkways is one potential way to improve population health via facilitating physical activity (especially for commuting and walking to school and work). Walkways that facilitate such active transport also provide a means to reduce carbon emissions associated with commuting by vehicles and other associated problems (e.g., traffic congestion, local air pollution, and noise pollution). Walkable features may also help build social capital within neighbourhoods.[1]

There is a growing body of New Zealand-based research around such issues as walking to school (e.g., by Oliver et al[2]; and Hinckson et al[3]) and how the physical environment might impact on walkability (e.g., by Cerin et al[4]; and Witten et al[5]). But this New Zealand research generally does not go into much depth around walking at night, though some studies have touched on the provision of lighting,[6–9] perceptions around safety and crime at night,[7,10–12] dogs barking at night[13] and new research methods that include relevance to issues such as lighting.[14,15] In winter months, commuters can return home after dark and those using these walkways to walk from the bus-stop or their workplace, would have to negotiate them in the dark. Those using public transport or walking to avoid drink-driving may also use these walkways after dark. Therefore this pilot study specifically considered issues around the walking at night, with a focus on street-connecting walkways.

Methods—All of the street-connecting walkways in the suburb of Karori in Wellington City were identified from a previous walkway study (n=35).[6] Walkways were visited by two observers together on evenings when there was no moonlight (in the months of August to December 2014 and January 2015). The median time since sunset for commencing observations was one hour and 36 minutes (mean = 104 minutes; range = 49 – 169 minutes). Data were collected on lighting provision and visibility of walkway surfaces. Repeat sampling was conducted on walkways where there was disagreement between observers or uncertainty with visibility (i.e., to obtain the most dominant result after up to three different evening visits given varying conditions of light from adjacent housing and from varying levels of "skyglow" associated with cloud cover etc). The data collection form with additional methods notes is available online (at: http://www.otago.ac.nz/wellington/departments/publichealth/research/otago065896.html).

Results—The method of this observational study was found to be feasible and there were no safety concerns experienced by the two observers (one man, one woman). Nevertheless, a torch had sometimes to be turned on to allow for safe navigation along walkways. Initial experimentation with various light measuring apps (for the Apple iPhone) suggested that these were not very reliable and had limited face validity, and so use of these was abandoned. Similarly a hand-held ultrasonic measuring device ("SonicTape") was of fairly limited utility in measuring distance from street lights (probably due to the lack of large flat reflective surfaces next to the street lights and walkway entrances).

The findings are detailed in the table below. These indicate that overhead lighting was not typically ideal for walkway entrances (with only 27% of lights within 2 m from the entrances, and only 49% within 10 m from the entrances). Furthermore, such lighting was not typically angled to benefit the walkway (only 17%). Most walkways had some overhead lighting on route (57%), but for short walkways this was not always necessary. There were 6% of overhead lights not working – though one of these was found to be fixed on a subsequent visit.

In terms of visibility, both observers were unable to see the ground for at least one point along the walkway in 26% of walkways (and therefore had to turn on a torch). This was also the case where they could not see some step edges for 15% of the walkways with steps. For some of the remaining walkways, the observers considered that while navigable without a torch/flashlight, extra care was required to negotiate the walkway surface and/or steps (but this highly subjective aspect was not systematically recorded). Only one of the walkways with steps had the edges of the steps painted white to improve visibility.

There was no relationship with the census area unit (CAU) level of deprivation (NZDep2006) and visibility assessments. Although the distance of the overhead lights from walkway entrances was greater for walkways in medium tertile of deprivation CAUs than the low tertile deprivation ones (means: 15.3 m vs 9.2 m), this was not statistically significant (p=0.07).

Table 1. Quality of street-connecting walkways in one suburb in regard to night-time conditions (Karori, Wellington 2014, n=35 walkways unless otherwise stated)

Walkway characteristic	Number	Percentage
*Overhead lighting (out of n=70 entrances, unless otherwise stated)**		
- at <2 m from entrance	19	27.1
- at 2–9 m	15	21.4
- at 10–19 m	24	34.3
- at 20+ m	11	15.7
- no overhead light visible from the walkway entrance	1	1.4
Mean for all (distance from entrance)	10.8 m	-
Median for all (distance from entrance)	10.7 m	-
Overhead lights at entrances specifically angled to benefit walkway lighting (n=69)	12	17.4
Overhead lights along the walkway:		
- Nil	15	42.9
- 1–2	16	45.7
- 3+	4	11.4
Overhead lights not working (nearest to entrances or along the walkway) (n=110)	6	5.5
Assessment of visibility along the walkway		
Both observers unable to see ground (for at least one point) (specifically each observer couldn't see the outline of his or her dark-coloured shoes)**	9	25.7
As above but unable to see the edge of any steps (n=27 walkways with steps)	4	14.8
Other		
Edge of steps painted (n=27 walkways with steps)	1	3.7

* Distances were paced out in the field and then converted to metres based on the average stride length of the author. If a light that was on the walkway was closer to the entrance than a light on the street, then this was used in this analysis.

** Based on up to three repeat assessments if this was initially unclear – and excluding the situation where a light on the walkway was subsequently repaired. These nine walkways were: Donald St to Hurman St, Paparata St to Hawick St, Richmond Ave to Lynmouth Ave, Makara Rd to Paddington Grove, Ramsey Place to Woodhouse Ave, and Victory Ave to Victory Ave (all walkways visible on Google Maps).

Discussion—This pilot study suggests it is feasible to do such observational studies for assessing the quality of street-connecting walkways at night. The method used here requires no equipment (other than a torch for a minority of walkways), and so it could be easily used by "citizen researchers" wanting to monitor walkway quality in their neighbourhoods. Further refinements could consider assessing inter-rater reliability and combining such observational data with the use of supplementary methods (e.g., use of "Google Street View" as used in previous New Zealand-based studies[15,16] but in this case to document the presence of overhead streets lights at walkway entrances). While the simple approach taken to assessing visibility in this study (i.e., seeing one's shoes and step edges) makes it easier for citizen researchers to use, there might still be a role for using light meter apps on smartphones (but this would require further research).

The results suggest there is scope for local government (Wellington City Council in this case) to improve the quality of walkways in this large suburb. The extent to which such results are relevant to other walkways in New Zealand is unknown, particularly since Karori is a relatively wealthy suburb overall (albeit a mix of relatively low deprivation and medium deprivation census area units).

Local government could improve the night-time quality of the walkways they are responsible for, by the following such means: positioning of street lights closer to walkway entrances; giving more attention to angling this lighting for the benefit of the walkway; increasing the extent of lighting along the walkways to eliminate low visibility areas; and possibly more vigorous trimming of vegetation bordering and overhanging the walkways (i.e., to allow for more light from surrounding houses and ambient sources – including moonlight and skyglow).

LED lighting is already being used on some of the walkways in this suburb but its use could be expanded. Indeed, with the reducing cost of LED technology and its low running cost, such expansion could well be cost-effective. Painting a white stripe along step edges would also probably help to improve hazard visibility. A possible goal for local governments in New Zealand to consider would be to ensure that all street-connecting walkways have lighting to allow these to be easily navigated on moonless nights without use of a torch.

Acknowledgement: The author thanks Anne Tucker for assistance with data collection. (There was no funding for this study.)

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