Does Neighbourhood Walkability Moderate the Effects of Mass Media Communication Strategies to Promote Regular Physical Activity?

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ABSTRACT

Background: Mass media campaigns are widely used in Australia and elsewhere to promote physical activity among adults. Neighbourhood walkability is consistently shown to be associated with walking and total activity. Campaigns may have different effects on individuals living in high and low walkable neighbourhoods.

Purpose: The purpose of this study is to compare pre- and post-campaign cognitive and behavioural impacts of the Heart Foundation's Find Thirty every day® campaign, in respondents living in high and lower walkable neighbourhoods.

Methods: Pre- and post-campaign cross-sectional survey data were linked with objectively measured neighbourhood walkability. Cognitive and behavioural impacts were assessed using logistic regression stratified by walkability.

Results: Cognitive impacts were significantly higher post-campaign and consistently higher in respondents in high compared with lower walkable neighbourhoods. Post-campaign sufficient activity was significantly higher and transport walking significantly lower, but only among residents of lower walkable areas.

Conclusions: Cognitive impacts of mass media physical activity campaigns may be enhanced by living in a more walkable neighbourhood.

Keywords: Mass media, Intervention, Walkability, Built environment, Physical activity, Moderation.

INTRODUCTION

Use of social-ecological models, positing that physical activity is influenced at individual, social environmental, physical environmental and policy levels, are recommended when developing physical activity interventions [1]. In Australia, the US and the UK, mass media and social marketing

campaigns are used as a component of a public health approach to promote physical activity to individuals. These campaigns are designed to raise awareness and emphasise the need for behavioural change [2, 3], as well as influence social norms with regard to increasing physical activity [4].

In the last decade, a body of literature has demonstrated that features of neighbourhood environments are associated with physical activity behaviours. Walkability, a composite measure of 'pedestrian friendliness', is consistently associated with levels of active transport [5, 6]. Access to walking facilities, such as public open space [7] and sidewalks [7, 8], and neighbourhood aesthetics [8] are associated with recreational walking. It is therefore plausible, that an individual's neighbourhood environment may interact with mass media campaigns by facilitating or discouraging physical activity. To date, only a small number of studies have assessed how the effectiveness of interventions varies across different physical environments.

Eleven published studies have investigated how the environment moderates the impact of walking [9-14] or physical activity [15-19] interventions. These studies are primarily US-based, but include two Australian studies. Perceived safety [15, 17], aesthetics [10, 11] and lighting [11] have shown significant moderating effects on intervention adherence. Five studies tested for moderating effects of walkability, but only one was significant [15]. Contrary to expectations, Kerr and colleagues found that among overweight men who received the lifestyle intervention, overall walking increased significantly, if they were living in a lower walkable neighbourhood. The authors suggested that one possible explanation for the findings was that as all groups, particularly the intervention group, walked more in the high versus low walkable neighbourhoods at baseline, a possible ceiling effect occurred. On the other hand, possibly those not already walking at baseline learned ways to overcome environmental barriers if they were in the intervention group. Only one study tested a mass media intervention, and examined the moderating effects of the neighbourhood using a self-reported measure of walkability. This study set in Wheeling, West Virginia, found a non-significant moderating effect among insufficiently active older adults (aged 50 to 65 years), where those in the top half of self-reported walkability increased their walking more than those in the bottom half [10].

No published study to date appears to have tested a mass media physical activity campaign for moderation using an objective measure of neighbourhood walkability. Furthermore, none of the studies looked at potential impact on intermediary cognitive variables, such as intention to act on the campaign message. This omission has previously been criticised in the literature [20]. With a better understanding of the extent of campaign success (e.g. people were aware of the campaign but did not fully understand or accept the recommendation, or were motivated to do the behaviour but then did not act) it may be possible to plan more systematic and cost-effective interventions [20].

Intervention

The Find Thirty every day® campaign in Western Australia predominantly used a television mass media strategy to promote achieving a minimum of 30 minutes of daily moderate-intensity physical activity to adults. This campaign built on a previous campaign 'Find Thirty. It's not a big exercise', which ran from 2002 to 2005. Between 2008 and 2009, the new campaign consisted of three waves of media. Each 15 and 30 second television advertisement comprised several scenarios of adults engaging in various moderate- and vigorous-intensity physical activities including transport walking to work, recreational walking in the neighbourhood, walking in a group, cycling, playing team sport, dancing, gardening and swimming. The social benefits of physical activity were a strong focus of the campaign including encouraging being active with others (i.e., a spouse or dog, and children). Media wave one occurred between May and June, 2008, wave two from July to November, 2008, and wave three in March, 2009. The campaign waves delivered Target Audience Rating Points (TARPs) of 1465, 1156, and 916 across the three waves respectively. TARPs are commonly used in Australia and measure how many times someone in the target audience is likely to have viewed a television program during which the advertisement was aired [4]. TARPS for these waves were higher than other published Australian mass media campaign studies [21, 22].

The current study aimed to examine pre- and post-campaign cognitive and behavioural impacts among those living in high and lower walkable neighbourhoods. We hypothesised that the odds of

cognitive and behavioural impacts would increase post-campaign but that the effect sizes would be larger among respondents in high, compared with lower, walkable neighbourhoods.

METHODS

Data collection

Two computer-assisted telephone interviewing (CATI) cross-sectional surveys (n ≈ 1000) were conducted: April-May 2008 (pre-campaign wave one) and March-April 2009 (post-campaign wave three). Both surveys were conducted in the same season (Autumn/Fall) and timed to avoid the school holiday periods. The samples were randomly selected from an electronic version of the Western Australian White Pages telephone directory and eligibility criteria included English speaking, aged between 20 and 54 years, with no disease or disability that would prevent moderate intensity physical activity participation. These methods were approved by the Human Research Ethics Committee at The University of Western Australia (RA/4/1/4098). Response rates were 77% pre-campaign and 79% post-campaign wave three. Only those respondents who supplied a complete address, located in the Perth metropolitan area, were included in the current study (48% pre-campaign and 37% post-campaign). Objective land use and street network data for the Perth metropolitan area (2009) were used to derive the walkability index measure and is described below. Socioeconomic status (SES) was based on the Socio-Economic Indexes For Areas (SEIFA) disadvantage score, calculated using post code data, with tertile cut-offs from the National 2006 Census data (from the Australian Bureau of Statistics).

Cognitive impact measures

Cognitive impact measures were total *awareness*, message *comprehension*, message *acceptance*, behavioural *intention* and *action* and these were calculated according to the hierarchy proposed in McGuire's Hierarchy of Effects model [23]. The hierarchy is a framework for conceptualising the mechanisms through which communication campaign messages operate from creating initial

awareness through to behavioural action [24]. Respondents to each survey were asked if they had seen a physical activity advertisement in the past three months, and if so, they were asked to describe it. Those who described any of the Find Thirty every day® advertisement scenarios were categorised as having *unprompted awareness*. Respondents were subsequently read a description of the advertisement scenarios, and if they reported having seen them, were categorised as having *prompted recognition*. Respondents with unprompted awareness or prompted recognition were combined to create a total *aware* group. Those who were designated as aware were asked what they understood the message to mean and those with interpretations around promoting regular physical activity were categorised as having *comprehended* the campaign messages. Respondents who comprehended the message were asked how personally acceptable they found it, with 'very' and 'somewhat' acceptable characterised as *acceptance* of the message. Respondents who accepted the campaign message were asked what thoughts they had, if any, about doing something related to the message. Respondents who expressed an intention about increasing their physical activity participation or taking preliminary steps, such as seeking further information or purchasing sports equipment, were categorised as having formed an *intention.* Those with relevant intentions were asked what they actually did, if anything, and those who reported undertaking some physical activity were categorised as having taken *action*.

Physical activity measures

The frequency and duration of participating in at least 10 minutes of transport walking, overall walking, moderate activity (not including walking) and vigorous activity in the last seven days, were measured using standard items from the adult state-wide physical activity [25] and Active Australia [26] surveys. These are shown to have adequate reliability [27]. Total weekly minutes were calculated by multiplying the frequency and duration of activity. Total physical activity minutes combined total walking, moderate- and vigorous-intensity activity minutes. Vigorous activity minutes were doubled to account for additional benefits of vigorous-intensity activity [26]. A binary variable for deriving 'sufficient' levels of transport walking (yes/no), overall walking (yes/no) and physical activity (yes/no) was created by dichotomising total minutes for that behaviour at ≥150 minutes and

<150 minutes. As in previous studies [25, 28, 29], these variables assessed whether participants achieved 'sufficient' levels of physical activity by walking and/or physical activity overall. 'Any' transport walking, overall walking and physical activity were dichotomised at none and >0 total minutes.

Walkability measure

Respondents' street addresses were geocoded using geographic information systems (GIS). Three walkability components were measured for a walkable neighbourhood scale of a 1600 metre road network distance service area, around the home, using an automated script tool. In this study we used a recreational walkability index [28]. This was calculated as the sum of the z-scores for dwelling density, street connectivity and land use mix, adapted from methodology by Frank et al. [30]. Dwelling density was measured as the number of dwellings per residential area. Street connectivity was measured as the number of three or more way intersections (nodes). Land use mix (heterogeneity of land uses in the area) was measured using the equation:

$$H = -1(\sum_{i=1}^{n} pi * \ln(pi)) / \ln(n)$$

Where H is land use mix, pi is the proportion of the area covered by land use i against the summed area for land use classes of interest (including i), n is the number of land use classes of interest. The land use classes included retail, offices, health / welfare / community, entertainment / culture / recreation, primary land uses, public open space, sporting infrastructure and residential. Due to issues of low environmental variability identified in previous studies [31], the continuous index variable was dichotomised to compare high walkability (quartile four) to lower walkability (quartiles one, two and three). Environmental data were originally sourced from the Department of Planning, (for dwelling density and the road network used for the connectivity measure) and the Valuer General's Office (for land use) (Perth, Western Australia 2009).

Statistical analysis

Chi square tests were used to compare respondents with and without address data in terms of demographic characteristics, cognitive impacts and behavioural impacts and test for demographic confounders. Chi square tests were then used to compare pre- and post-campaign data among respondents in high and lower walkable neighbourhoods. Logistic regression was used to examine pre- and post-campaign cognitive and behavioural impacts. An interaction term between time point (pre- or post-campaign) and walkability was tested for significance in each overall model before a stratified approach was taken. The sample was stratified by high (quartile four) and lower (quartiles one, two and three) walkability and the models for each of the 11 outcomes were adjusted for gender, age group and household income, with all variables entered simultaneously. As some respondents had missing data for age group and socioeconomic status (n=1), transport walking variables (n=25) and overall walking variables (n=5), they were removed from all analyses leaving a final analytical sample of 466 adults pre-campaign and 360 adults post-campaign.

RESULTS

Demographic and environmental characteristics

Apart from household income, there were no significant demographic differences by gender, age group, education, area-level SES, dwelling density, connectivity or land use mix, between pre- and post-campaign cross-sectional samples for the high and lower walkable neighbourhoods (Table 1). Amongst respondents in a lower walkable neighbourhood there was a significant difference in combined household income between pre- and post-campaign samples. Household income was found to be a confounder for most outcomes and was therefore adjusted for in the multivariate models.

Compared with respondents without street address data, significantly more respondents with address data lived in a high SES area (in both pre- and post-campaign samples) or had a combined household income of more than $100,000 (in the post-campaign sample only), however there were no differences by gender, age group or education (data not shown). Of the cognitive impacts, post-

campaign awareness, comprehension and intention were significantly higher among those with, rather than without, address data, but there were no significant differences for the behavioural impacts (data not shown).

INSERT TABLE 1

Cognitive impacts

The interaction terms between time point and walkability were not significant in any of the overall models for cognitive and behavioural impacts (data not shown). Nevertheless, the cognitive impact odds were consistently higher among adults living in high walkable [odds ratio (OR) range = 3.02-4.42] compared with lower walkable (OR range = 1.96-2.44) neighbourhoods (Table 3). In particular, the odds of comprehending the message and taking action post-campaign were around four times higher than pre-campaign, among those in high walkable neighbourhoods, and only twice as high among those in lower walkable neighbourhoods.

In both the unadjusted and adjusted results, irrespective of the type of neighbourhood in which respondent's resided, the proportion of the samples at post-campaign showed significantly higher ($p<0.05$) levels of campaign awareness, message comprehension and acceptance, behavioural intention to act and action compared with pre-campaign (Tables 2 and 3).

INSERT TABLES 2-3

Behavioural impacts

The unadjusted results (see Table 2) showed that among respondents in lower-walkable neighbourhoods participating in sufficient physical activity was significantly higher post-campaign than pre-campaign. After adjustment, the odds of any transport walking, any overall walking, any physical activity and sufficient transport walking were lower post-campaign than pre-campaign, but this was only statistically significant for 'any' transport walking among respondents in lower walkable neighbourhoods (Table 4). However, as hypothesised, the odds of sufficient overall walking and sufficient total physical activity were higher post-campaign than pre-campaign but contrary to our hypothesis only the latter reached statistical significance among respondents in lower walkable neighbourhoods.

INSERT TABLE 4

DISCUSSION

Post-campaign results on cognitive impact were significantly larger than pre-campaign, across all neighbourhoods, but the effect sizes were larger among respondents in high walkable neighbourhoods. This suggests that the campaign might have been more effective in residents living in high walkable neighbourhoods, however, any differences were not statistically significant and further studies that are suitably powered to address this question are required. One explanation for the findings is that residents of compact higher density neighbourhoods characterised by a variety of land uses and higher street connectivity providing more walking routes may have found the scenarios advertised more relevant and attended more to the campaign messages. This provides initial support for the social ecological model in terms of the premise that optimising environmental conditions for physical activity may support strategies aimed at individual factors [32].

Pre-campaign 'awareness' was around 30%. This substantial proportion could be due in part to the ongoing health promotion efforts in Western Australia. In particular, the continuation of the 'Find Thirty' brand from the previous campaign, and similarities between the two campaigns' advertisements, may have influenced responses to the 'new' campaign.

As expected, the odds of sufficient overall walking and total physical activity increased post-campaign, with sufficient total physical activity reaching statistical significance in those living in lower walkable areas, possibly due to the larger group size. However, contrary to our expectations, the odds of transport walking (any or sufficient), 'any' overall walking and 'any' total physical activity were lower post-campaign, although this only reached statistical significance for 'any' transport walking in residents of lower walkable neighbourhoods. There was little difference in the temperature and rainfall during and in the week prior to data collection periods for pre- and post-campaign, so it is unlikely that weather influenced the lower post-campaign levels of activity. Although the campaign included adverts promoting transport walking, this was not the major focus of the campaign and, in any event, representative state-wide data suggests that most Western Australians walk for recreational purposes [25]. This may help explain the unexpected transport walking results. In addition, the prevalence of doing 'any' transport walking appeared higher than the state-wide survey data [25]. However, the current study used a question that prompted walking done for transport purposes, asking the frequency and duration of this activity in the past week, from which 'any' participation was assessed by dichotomising the variable at minutes > 0. In contrast, the Western Australian Adult Physical Activity Survey Report presents results of participation in 'any' transport walking measured from a question asking respondents to list what activities they had done in the past week [25]. On further examination, the prevalence of any overall walking (80%) and sufficient physical activity (66%) in the state wide survey [25], measured using the same items, are similar to the current study sample.

There was also no evidence of any additional behavioural impact of the campaign on those living in a more walkable neighbourhood. This finding is similar to four other studies that found no significant moderating effect of walkability [10-12, 14], but is in contrast to one other study [15]. Contrary to

expectations, Kerr and colleagues [15] found that overweight males in the intervention group living in low walkable neighbourhoods versus high walkable neighbourhoods, increased their walking significantly more following a lifestyle intervention. The authors concluded that the intervention may have helped overcome inequalities in the environment. This did not appear to be the case in the current study where the intervention involved mass media, as higher cognitive impacts were observed in higher rather than lower walkable neighbourhoods, suggesting that the mass media intervention had not helped overcome environmental inequalities. This may be because mass media does not cater to an individual's specific environmental barriers, whereas the lifestyle intervention evaluated by Kerr and colleagues included a phone counselling opportunity, where participants could report environmental and other barriers they encountered and receive advice [15].

The current study is limited by its design because the comparisons over time, are between two randomly selected cross-sectional samples, and are not changes in the same individuals. The sampling method was not designed to maximise the environmental variability, but rather, was a random selection via telephone numbers listed in the telephone directory. Using the telephone directory may have introduced bias, by excluding those who register for a private number. However, both mobiles and landlines can be listed in the Western Australian White Pages. Nevertheless, greater environmental variability in recruited survey samples may also be required to better detect moderation [10]. Furthermore, there may be environmental and other differences between those that did and did not agree to participate in the study. Finally, the sample appeared to be relatively affluent and not representative of the Western Australian population for annual household income with 25%-40% earning more than $100,000. Considerably fewer Western Australians have household incomes greater than $88, 000 (derived from Australian Bureau of Statistics 2006 weekly family income data).

There are also some limitations in measurement. Firstly, self-reported physical activity was used which can be over reported [25]. Further, we also did not measure the context of the physical activity i.e., if it was done locally, in other neighbourhoods or work-places. People sufficiently motivated by the campaign may, for example, act on the message near their workplace. In addition, the availability of transit was not addressed in this study and future studies should consider assessing transit as it has

been associated with forms of active transport in the literature [33]. And finally, self-selection of neighbourhoods was not measured in this study, although in another longitudinal study undertaken in Perth, the effects of self-reported self-selection factors appeared to be modest (Giles-Corti et al., under review). As the campaign highlighted the social benefits of physical activity, an alternative explanation for why higher cognitive impacts were observed in more walkable neighbourhoods could be that those who value social capital self-selected walkable environments. Walkable environments have been found to have higher levels of social capital and sense of community [34-37]. This is a limitation of the study and future studies should address self-selection.

It is early in the exploration of moderation of campaign effects by the built environment, and the most appropriate measures to use are not yet understood. Previous studies have only measured overall walking, without measuring the relative contributions of transport and recreational walking and this was identified as a limitation [10]. The current study measured transport walking but did not specifically measure recreational walking. However, the campaign appeared to have a more positive effect on overall walking than on transport walking, suggesting that the impact may have been greater on recreational rather than transport walking. Future studies of moderation by neighbourhood walkability may need to use walking measures specific to 'walking in the neighbourhood' to detect moderating effects. In addition, measures specific to the campaign may show more consistent post-campaign results. In terms of relevant aspects of the environment, only perceived safety and aesthetics have previously positively and significantly moderated behaviour change in response to physical activity interventions. This study found some evidence for walkability, but only in moderating cognitive impacts and not behavioural responses. Nevertheless, this is the first study to test for moderation of cognitive campaign effects, which precede behavioural effects, using the Hierarchy of Effects model [23]. Given the study's limitations, further exploration is warranted. The impact of walking campaigns may be more likely to be enhanced by walkability than more general physical activity campaigns. Walkability was examined in this study because of its consistent relationship with walking in the literature and because recreational walking was the most promoted activity in the campaign. Hypothesised environmental correlates of total physical activity on the other hand have had

far more mixed results [38]. Although one other study did look at a walking-specific campaign and did not find a significant moderating effect by walkability [10], only self-reported walkability was measured, without objective verification which is recommended for environmental studies on walking [39]. More studies on moderation are needed to understand if it is the measures that are leading to unexpected or null findings in the evidence to date.

This study provides some evidence that the walkability of individuals' local areas can affect who responds to the campaign. Where possible, improvements to neighbourhood environments by local councils may assist in the overall success of mass media campaigns. Mass media remains an attractive strategy for reminding and encouraging large numbers of individuals to achieve regular physical activity. However, future planning of state-wide campaigns should prioritise low walkable suburbs and include strategies that might overcome environmental inequalities impinging on individuals' responses, for example, not only promoting use of local facilities for walking and other physical activities but also recognisable public facilities across the state that individuals can access in daily life, such as using images of large, regional parks and lakes. Providing tailored support as part of a multilevel approach, may also reduce disparities, for example, local councils providing enhanced 'on the ground' events in highly suburban areas or provision of free physical activity classes in disadvantaged areas.

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CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

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Table 1: Demographic and environmental characteristics

Characteristic	Lower walkable[a]			High walkable[a]		
	Pre (n=348) % / mean (SD)	Post (n=272) % / mean (SD)	p	Pre (n=118) % / mean (SD)	Post (n=88) % / mean (SD)	P
Gender						
Male	49.1	50.7	0.693	57.6	50.0	0.277
Female	50.9	49.3		42.4	50.0	
Age group						
20-34 years	25.6	22.1		27.1	22.7	
35-45 years	36.5	43.4	0.213	35.6	29.5	0.323
46-54 years	37.9	34.6		37.3	47.7	
Education						
Less than TEE	25.3	22.4		21.2	18.2	
TEE/Diploma	42.8	43.0	0.654	33.9	39.8	0.670
University	31.9	34.6		44.9	42.0	
Socio-economic status (area level)						
Low	19.3	16.9		13.6	13.6	
Medium	37.6	32.7	0.198	21.2	23.9	0.895
High	43.1	50.4		65.3	62.5	
Household income						
Less than $50000	22.4	13.2		22.9	17.0	
$50000 - $100000	42.0	43.0	**0.005**	33.9	35.2	0.774
$100001 or more	25.0	34.9		36.4	39.8	
Refused	10.6	8.8		6.8	8.0	
Dwelling density[b]	13.8 (6.6)	14.4 (6.1)	0.221	28.3 (44.0)	26.9 (48.8)	0.531
Connectivity[c]	52.4 (16.5)	53.2 (15.9)	0.725	77.8 (18.6)	78.7 (24.1)	0.839
Land use mix[d]	0.4 (0.1)	0.4 (0.1)	0.760	0.6 (0.1)	0.6 (0.1)	0.516

SD = Standard Deviation. TEE = Tertiary Entrance Examinations. [a]Walkability index includes dwelling density, count of three or more way intersections (nodes) and mix of land uses. [b]Number of dwellings per residential area. [c]Count of three or more way intersections (nodes). [d]Mix of land uses (retail, offices, health / welfare / community, entertainment / culture / recreation, public open space, sporting infrastructure, residential). Bolded values indicate $p<0.05$.

Table 2: Cognitive and behavioural impact

Characteristic	Lower walkable[a]			High walkable[a]		
	Pre (n=348) %	Post (n=272) %	p	Pre (n=118) %	Post (n=88) %	p
Cognitive						
Awareness[b]	35.1	50.7	**<0.001**	28.0	52.3	**<0.001**
Comprehension[c]	26.4	41.5	**<0.001**	18.6	44.3	**<0.001**
Acceptance[d]	25.9	40.8	**<0.001**	18.6	42.0	**<0.001**
Intention[e]	12.9	23.2	**0.001**	7.6	19.3	**0.012**
Action[f]	5.5	12.1	**0.003**	4.2	14.8	**0.008**
Behavioural						
Any transport walking	74.4	67.3	0.051	71.2	68.2	0.642
Sufficient transport walking	36.5	33.5	0.432	34.7	31.8	0.660
Any overall walking	87.4	84.6	0.317	85.6	85.2	0.941
Sufficient overall walking	39.4	43.0	0.360	39.8	50.0	0.146
Any total physical activity	93.1	91.2	0.373	93.2	92.0	0.748
Sufficient total physical activity	62.1	69.9	**0.043**	63.6	73.9	0.117

[a]Walkability index includes dwelling density, count of three or more way intersections (nodes) and mix of land uses. [b]Unprompted recall + prompted recognition of television advertisements. [c]Understood campaign message. [d]Accepted campaign message. [e]Formed an intention to act on campaign message. [f]Acted on campaign message.

Table 3: Adjusted odds ratios for cognitive impacts

	Awareness[b]			Comprehension[c]			Acceptance[d]			Intention[e]			Action[f]		
	Pre	Post		Pre	Post		Pre	Post		Pre	Post		Pre	Post	
	OR	OR (95% CI)	p	OR	OR (95% CI)	p	OR	OR (95% CI)	p	OR	OR (95% CI)	p	OR	OR (95% CI)	p
Walkability[a]															
High	1.00	3.02 (1.66,5.50)	**<0.001**	1.00	3.96 (2.06,7.61)	**<0.001**	1.00	3.51 (1.83,6.72)	**<0.001**	1.00	3.10 (1.29,7.46)	**0.012**	1.00	4.42 (1.48,13.23)	**0.008**
Lower	1.00	1.96 (1.40,2.73)	**<0.001**	1.00	2.05 (1.45,2.91)	**<0.001**	1.00	2.05 (1.44,2.91)	**<0.001**	1.00	2.19 (1.42,3.39)	**<0.001**	1.00	2.44 (1.34,4.45)	**0.004**

Odds ratio and 95% confidence interval are adjusted for gender, age group and household income. [a]Walkability index includes dwelling density, count of three-way or more nodes and mix of land uses (retail, offices, health / welfare / community, entertainment / culture / recreation, public open space, sporting infrastructure, residential). [b]Unprompted recall + prompted recognition of television advertisements. [c]Understood campaign message. [d]Accepted campaign message. [e]Formed an intention to act on campaign message. [f]Acted on campaign message.

Table 4: Adjusted odds ratios for behavioural impacts

	Any transport walking			Any overall walking			Any total physical activity			Sufficient transport walking			Sufficient overall walking			Sufficient total physical activity		
	Pre	Post		Pre	Post		Pre	Post		Pre	Post		Pre	Post		Pre	Post	
	OR	OR (95%CI)	p	OR	OR (95%CI)	p	OR	OR (95%CI)	p	OR	OR (95%CI)	p	OR	OR (95%CI)	p	OR	OR (95%CI)	p
Walkability[a]																		
High	1.00	0.87 (0.45,1.70)	0.692	1.00	0.92 (0.41,2.04)	0.828	1.00	0.75 (0.26,2.20)	0.599	1.00	0.90 (0.48,1.66)	0.730	1.00	1.47 (0.84,2.60)	0.180	1.00	1.57 (0.84,2.95)	0.159
Lower	1.00	0.69 (0.48,0.99)	**0.042**	1.00	0.80 (0.50,1.27)	0.339	1.00	0.76 (0.41,1.39)	0.368	1.00	0.88 (0.63,1.24)	0.466	1.00	1.17 (0.84,1.62)	0.362	1.00	1.43 (1.01,2.02)	**0.046**

Odds ratio and 95% confidence interval are adjusted for gender, age group and household income. [a]Walkability index includes dwelling density, count of three-way or more nodes and mix of land uses (retail, offices, health / welfare / community, entertainment / culture / recreation, public open space, sporting infrastructure, residential).