Does the built environment moderate individually-focused interventions?

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Place, Health and Liveability Program[1]
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Acknowledgements

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- Other members of the Be Active Evaluation team: Fiona Bull, Trevor Shilton, Clover Maitland, Justine Leavy

Presentation

- Background - Is it plausible that the built environment might be a moderator of interventions?
- Being opportunistic - Evaluation of the *Find Thirty every day*[®]
- A review of the evidence to date
- Lessons learnt from BE research
- Are studies

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Growing cross–sectional evidence base – built environment associated with physical activity - walking

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Odds of walking as recommended by joint influence individual & physical environmental factors[1]

Chart showing Odds ratios by Individual factors (Low, Medium, High) and Physical environmental factors (Low, Medium, High). Values shown: 1.00 (Low, reference category[2]), 4.55.

Legend: Low, Medium, High

Odds ratios (y-axis, 0–8)
Individual factors (x-axis: Low, Medium, High)
Physical environmental factors (Low, Medium, High)

[1] (adjusted for age, sex, children under 18 at home, education, household income, work outside home, SES of area of residence, social environmental factors). [2]Reference category.

Odds of walking as recommended by joint influence individual & physical environmental factors[1]

Giles-Corti (2006) J Sci Med Sport **9**(5): 357-366.
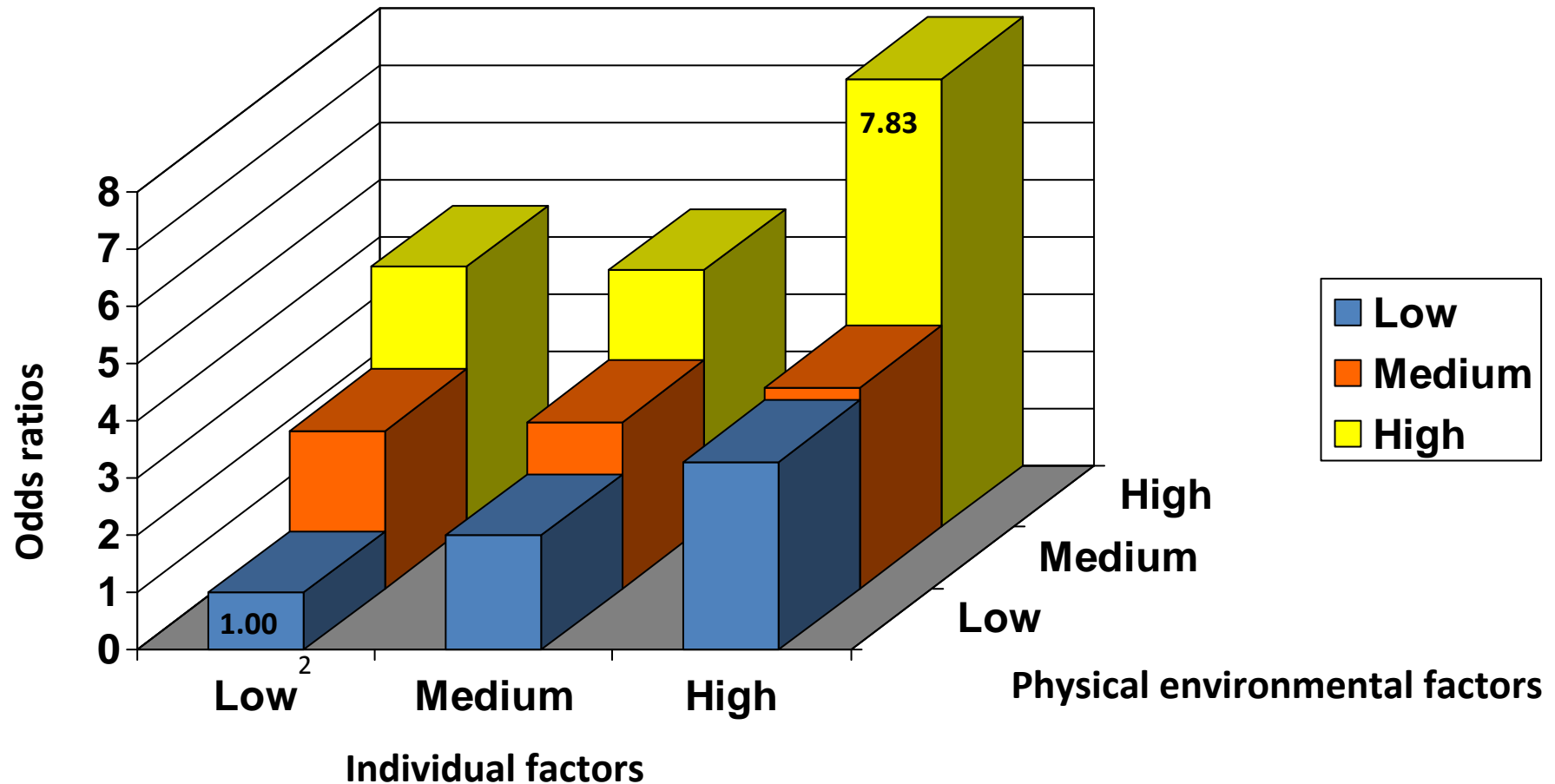
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Being opportunistic: Find Thirty every day®

State government funded campaign conducted by Heart Foundation (WA Division)

Objectives:

1. To increase awareness – type and frequency of physical activity required for good health

2. To increase awareness – specific benefits of physical activity (physical, mental, social)

3. To demonstrate how people overcome perceived barriers to participation in physical activity

4. To congratulate those already active

Target group: Adults 25-54 years

Speech bubbles:
- I want to do a PhD on Find Thirty…
- Great: Let's see if the built environment moderates campaign effects
- Sounds like fun…we'll help too

Hypothesis: Find Thirty every day® would be more effective for people living in high rather than low walkable neighbourhoods

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

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Find Thirty every day®

Find Thirty every day®
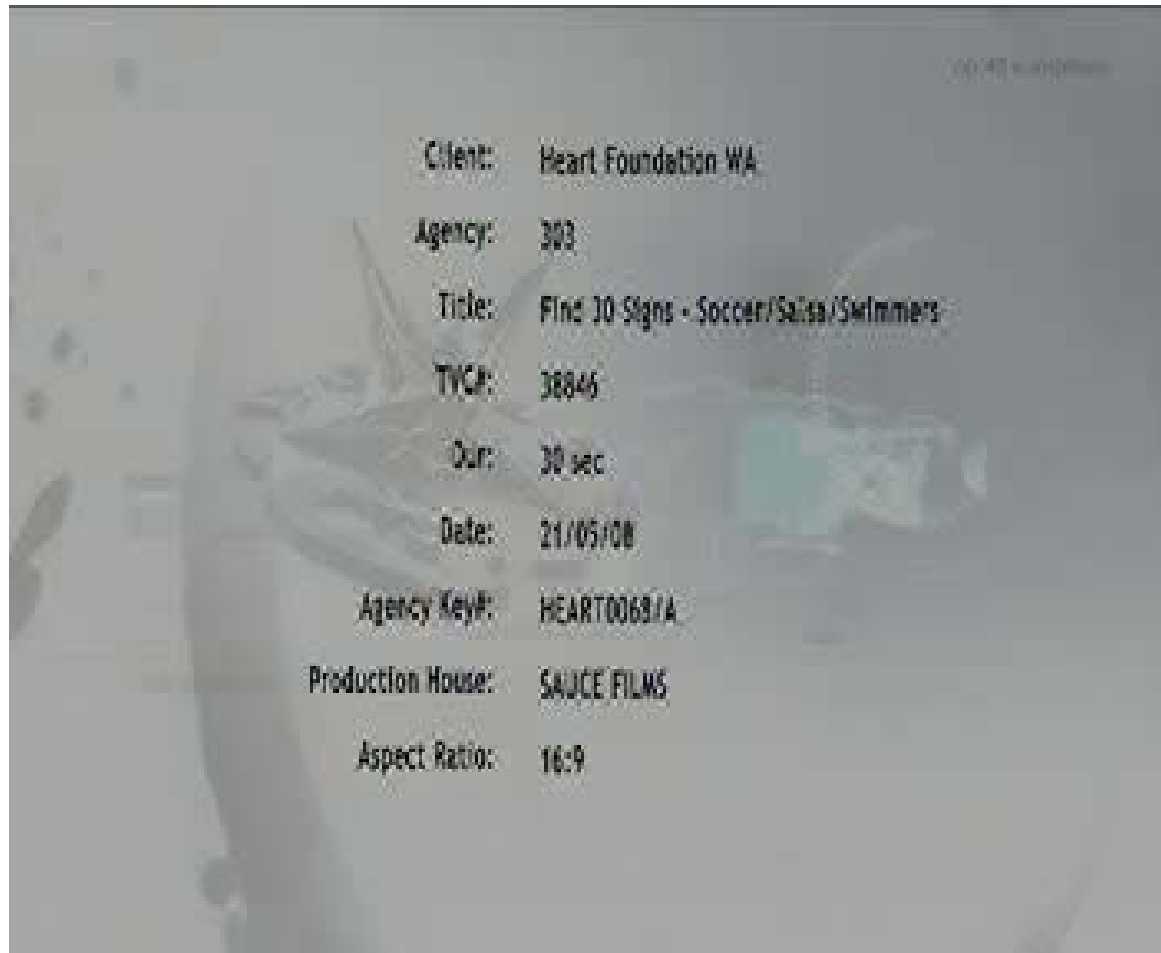
Study Aim and Hypothesis

Aim:

To compare pre- and post-campaign cognitive and behavioral impacts, of the National Heart Foundation's *Find Thirty every day®* campaign, in respondents living in high and lower walkable areas.

Hypothesis:

Cognitive and behavioral impacts will increase post-campaign but the effect sizes will be larger in respondents living in high, vs. lower, walkable neighborhoods.
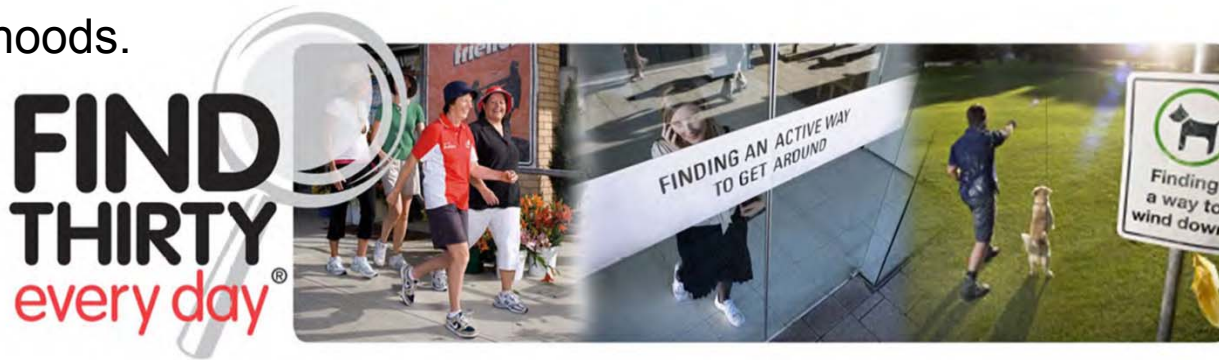
Methods – Evaluation Design

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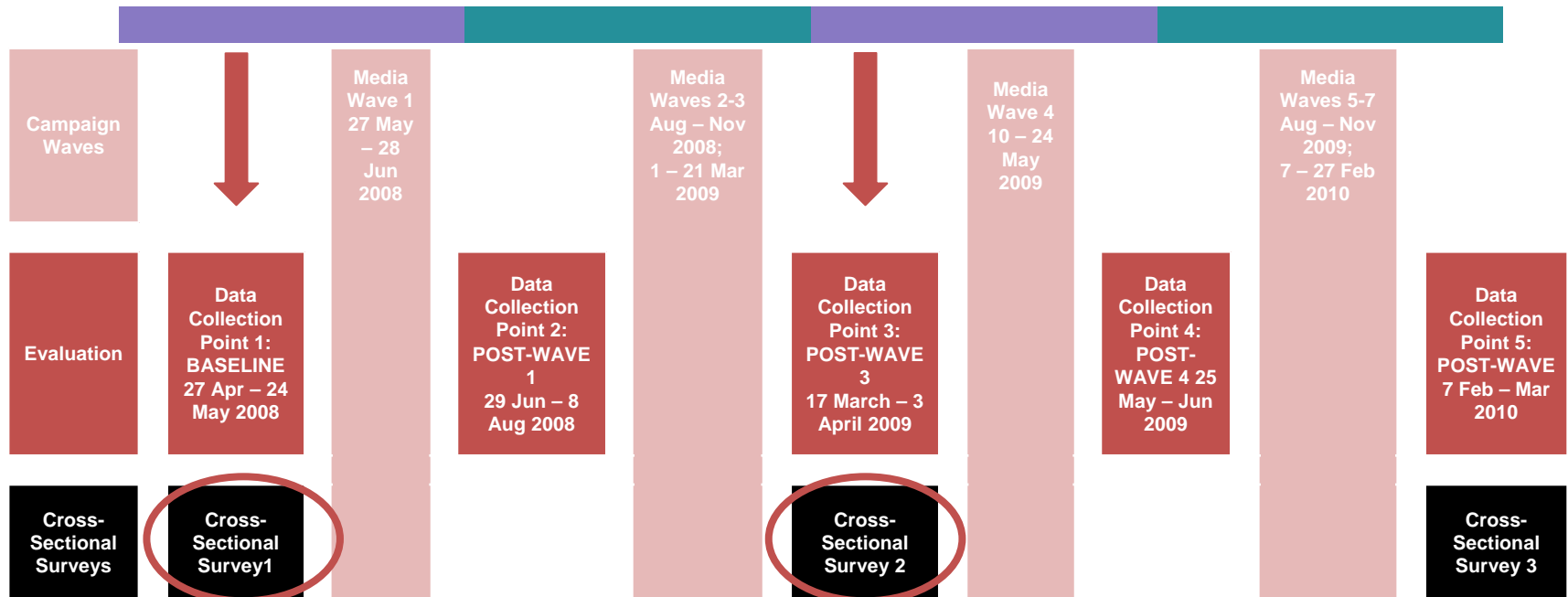
Methods – Behavioral Measures

- *Active Australia* measures
  - Frequency/duration walking last seven days
- Any transport walking, overall walking, total PA (Yes/No)
- Sufficient (Yes/No)
  - Transport walking (≥150 minutes)
  - Overall walking (≥150 minutes)
  - Total PA (≥150 minutes and ≥5 sessions)

Methods – Cognitive Measures

McGuire's Hierarchy of Effects Model

Stage	Percentage
Total awareness	100
Comprehension	50
Acceptance	25
Intention	12.5
Action	6.25
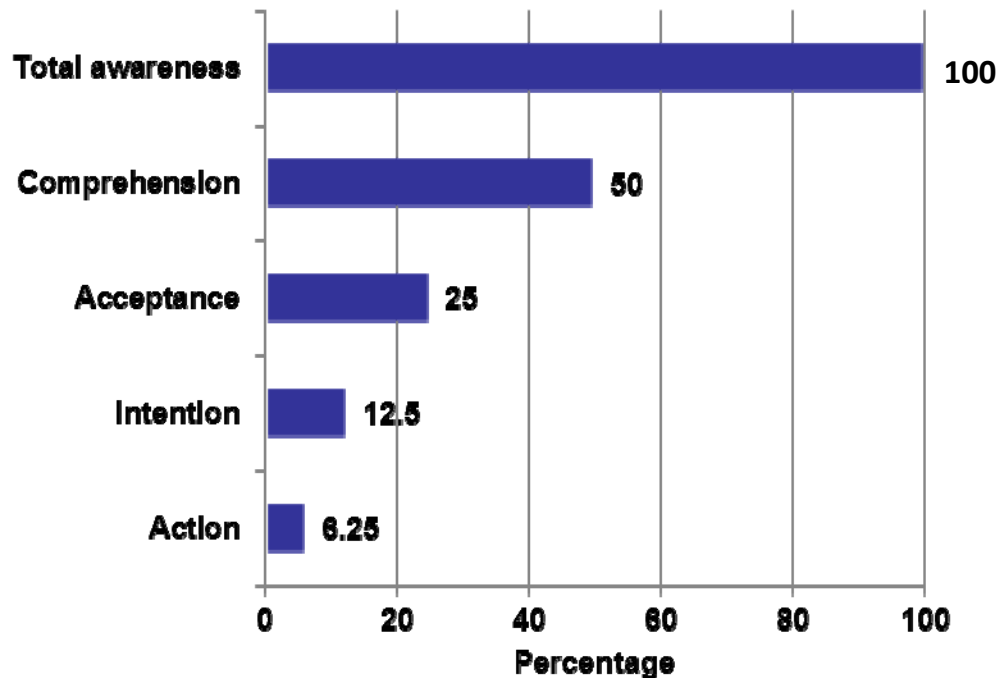
If 'Yes' to "As a result of seeing or hearing the campaign did you do anything, anything at all, related to the message?"

"What did you do?"

Methods – GIS Walkability Measures
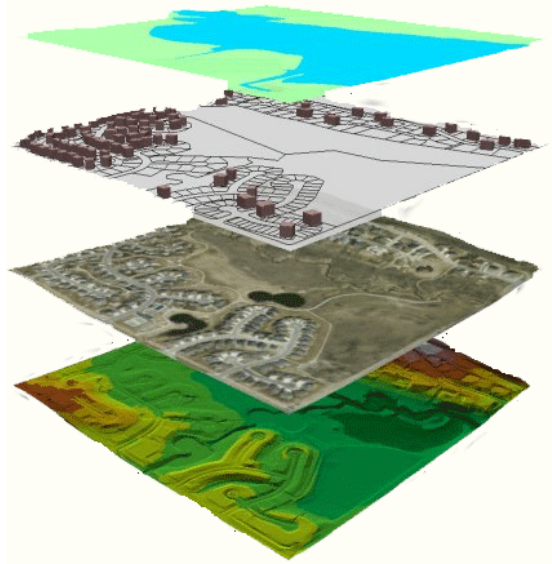
Two measures within 1600meter road network buffer

▪Transport walkability: Dwelling density, connectivity and land use mix[1]

▪Recreational walkability: Dwelling density, connectivity and land use mix including recreational space[2]

[1]Frank, L. D., Schmid, T. L., Sallis, J. F., Chapman, J. & Saelens, B. E. 2005. Linking objectively measured physical activity with objectively measured urban form: Findings from SMARTRAQ. *American Journal of Preventive Medicine,* vol. 28**,** no. 2, Supplement 2, pp. 117-125.

[2] Christian, H., Bull, F. C., Middleton, N. J., Knuiman, M. W., Divitini, M. L., Hooper, P., Amarasinghe, A. & Giles-Corti, B. 2011. How important is the land use mix measure in understanding walking behaviour? Results from the RESIDE study. *International Journal of Behavioral Nutrition and Physical Activity,* vol. 8**,** no. 55, pp. 1-12.

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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

Barnes et al. 2013

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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

Barnes et al. 2013

Results - Cognitive Impact Adjusted Models

	Awareness		Comprehension		Acceptance		Intention		Action	
	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)
Walkability **High**	1.00	3.02*** (1.69,5.53)	1.00	3.96*** (2.07,7.59)	1.00	3.51*** (1.85,6.71)	1.00	3.10*** (1.17,6.67)	1.00	4.42** (1.44,12.90)
Lower	1.00	1.96*** (1.45,2.77)	1.00	2.05*** (1.47,2.90)	1.00	2.05*** (1.47,2.90)	1.00	2.19*** (1.42,3.29)	1.00	2.44** (1.37,4.38)

***<0.001
**<0.01
*<0.05

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Results – Behavioral Impact Adjusted Models

	Any transport walking		Sufficient transport walking		Any overall walking		Sufficient overall walking	
	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)	Pre OR	Post OR (95%CI)
Walkability **High**	1.00	0.82 (0.44,1.51)	1.00	0.86 (0.48,1.56)	1.00	0.80 (0.36,1.76)	1.00	1.56 (0.89,2.76)
Lower	1.00	0.69* (0.49,0.99)	1.00	0.87 (0.62,1.22)	1.00	0.80 (0.50,1.27)	1.00	1.17 (0.85,1.61)

*<0.05

What does the literature tell us?

Location

	Number
USA	9
Australia	2
Scotland	1

(Top-right chart — Type population)

	Number
Adults	4
Adults >40	3
Inactive adults	3
Insuffiently active	1
Overweight or obese	1

Type of design

	Number
RCT	5
Quasi-experimental	3
Longitudinal	2
Pre and post test	1
Post test only	1

Type intervention

	Number
Mass Media	2
Primary care	4
Walking program	5
Environmental	1
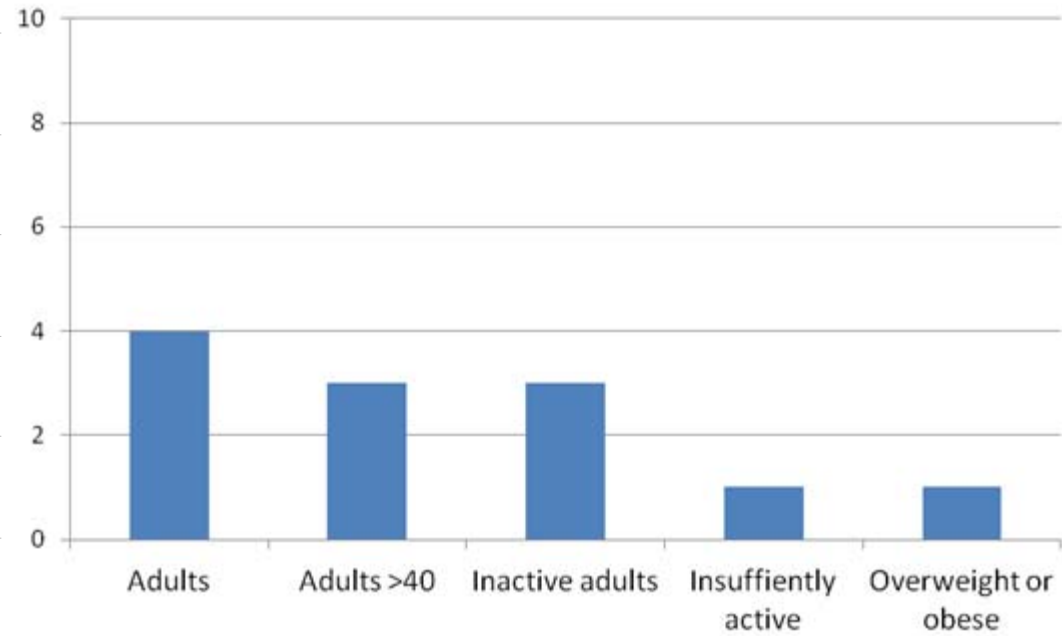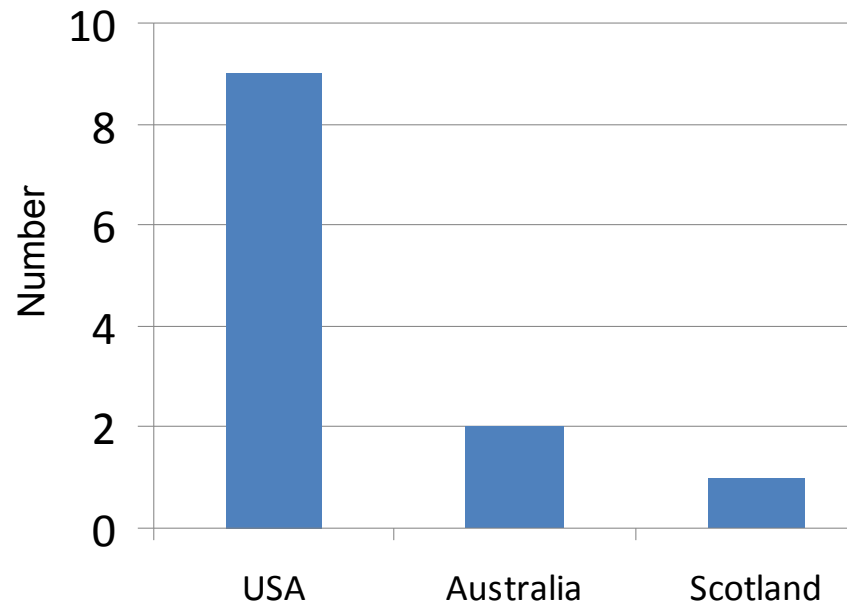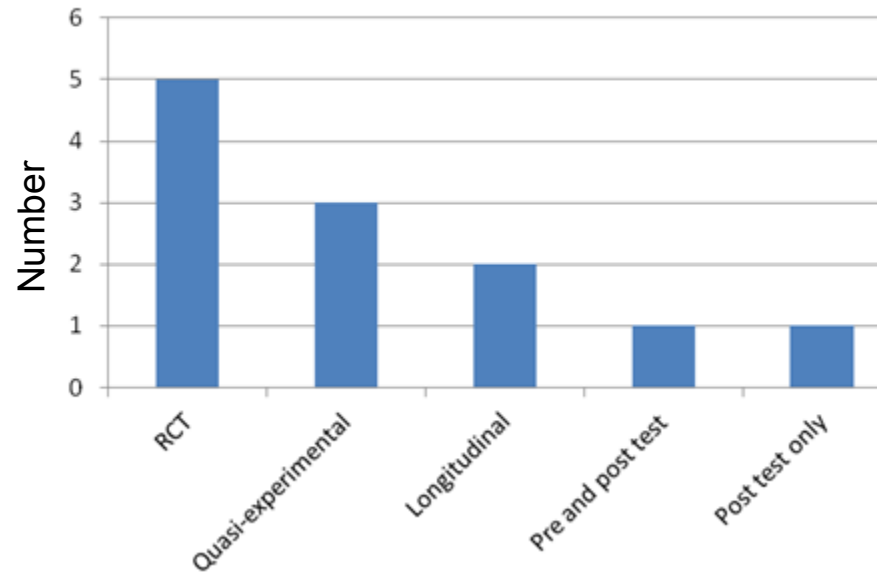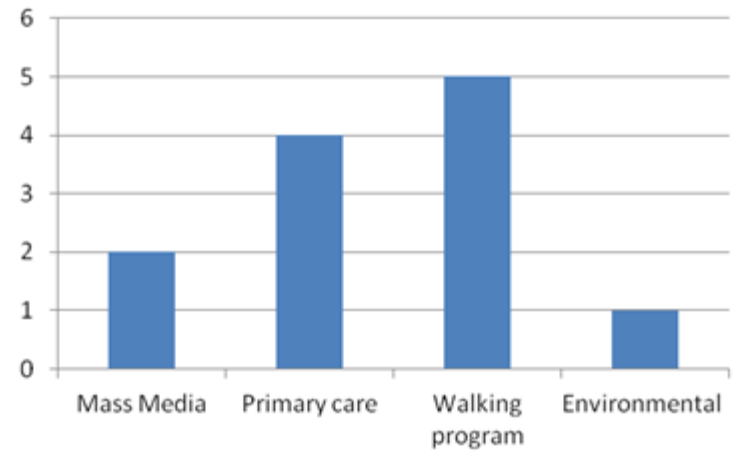
Outcome
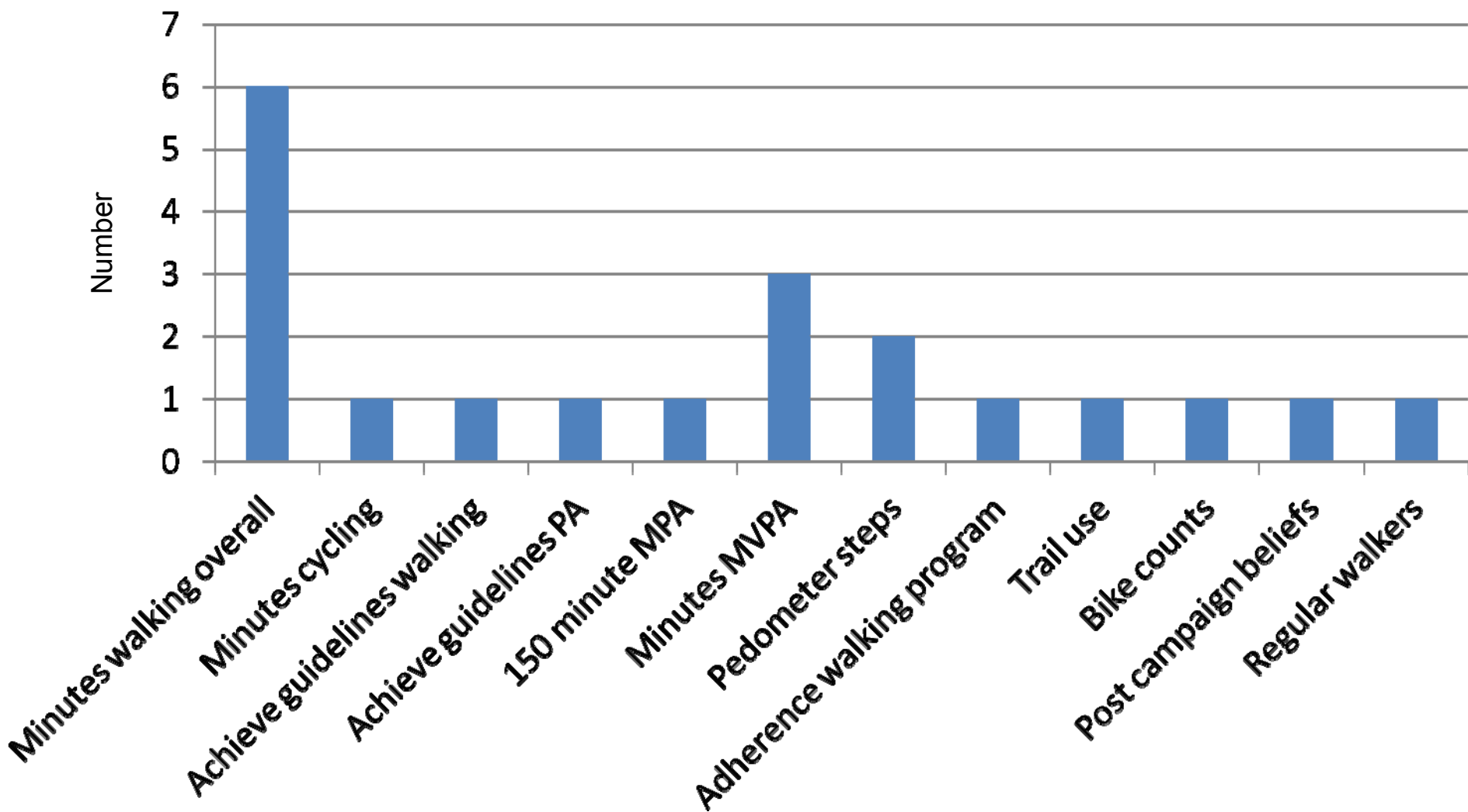
Environmental Measures

Specific Environmental Measures

SO WHAT IS GOING ON?

Signs of moderation

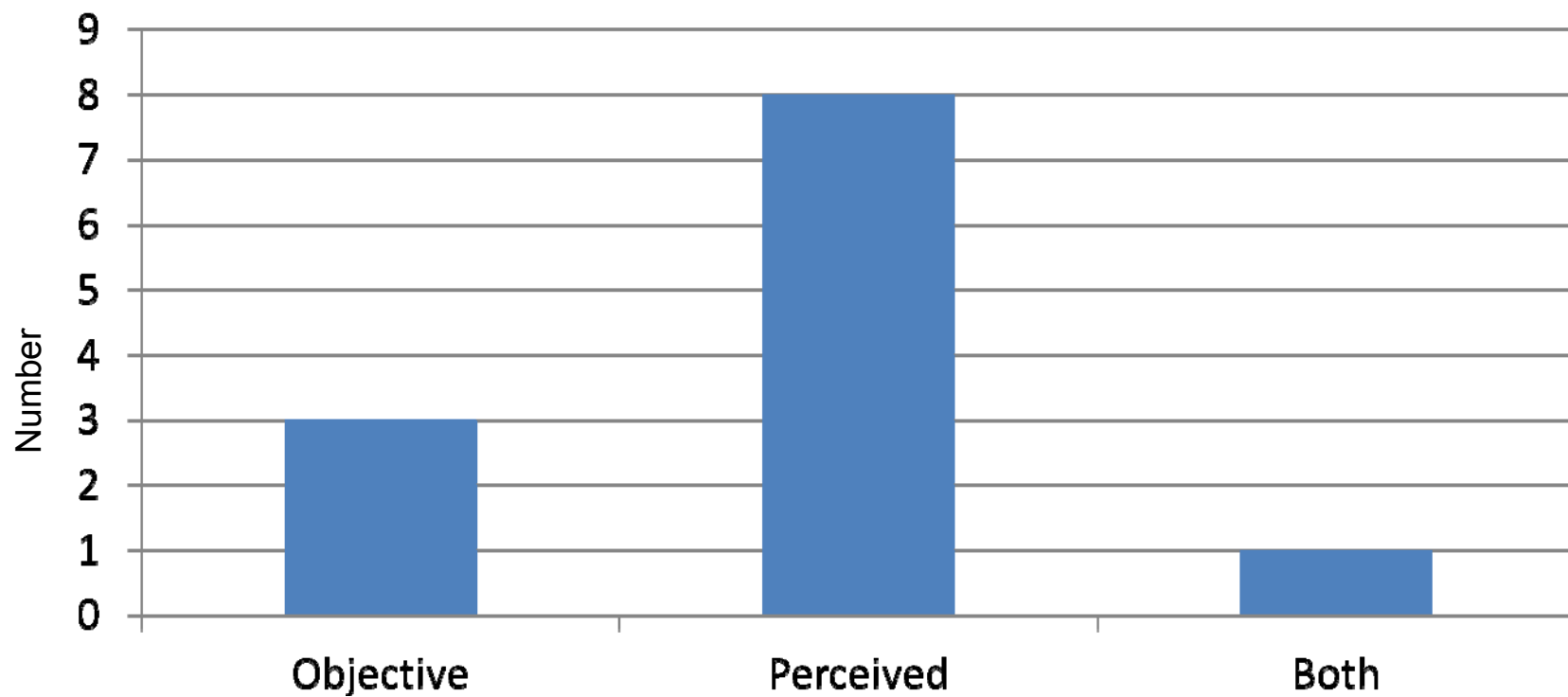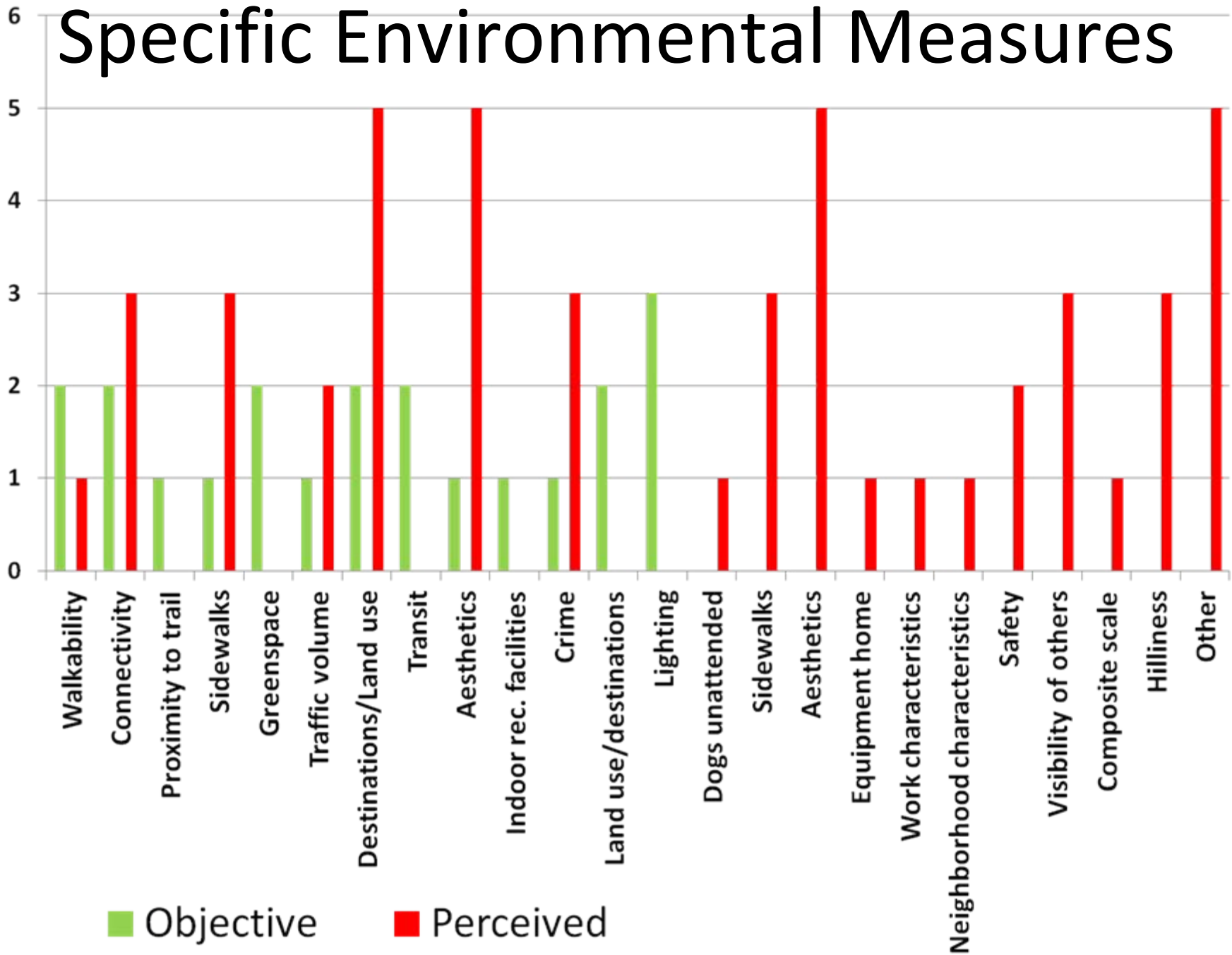|	Published literature Number/12	Comments
Formally tested for moderation		
Media studies (2)	0/2	No formal testing, but insufficiently active appeared to respond
Primary care studies (4)	3/4	1 +ve, 1 –ve, 1 no interaction
Environmental intervention studies (1)	0/1	Those closer to rail trail responded more than those further away
Walking program studies (5)	3/5	1 –ve, 2 no interaction: some indication that over time, the environment became more important (longitudinal study, no formal interaction tested)
Size of studies		
Powered to examine interactions	3/12	

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Conclusions?

- Evidence based is mixed

- Mismatch between outcome measures and focus of campaign (e.g., walking focus intervention but measured PA)

- Some evidence that those less active living in low walkable areas may respond more to individually-focussed campaigns

- Overall inconclusive – why?

Principles for built environment research

1. **Sampling:** Maximise heterogeneity of exposure variable (i.e., built environment)
2. **Context-specific behavioral outcomes** (e.g., walking in the neighborhood)
3. **Behavior-specific outcomes** (e.g., walking for recreation and walking for transport)
4. **Behavior- and context-specific models** (e.g., walking for transport and transport-related environment)
5. Use of **both objective and perceived** environmental exposures
6. **Power:**
   - ❑ Size of the main effect
   - ❑ Sample size required detect an interaction

Adherence with built environment research principles

Principles	Published literature Number/12	Find 30
Sampling: Maximised heterogeneity of built environment	1/12	
Study powered to determine main effects	3/12	
Context-specific outcome measures	1/12	
Recreational and transport walking measured separately	0/12	
Behavior and context-specific models	2/12	
Used both perceived and objective	2/12	
Study powered to study interactions	3/12	
Outcome behavior, environmental measures *and* behavior in intervention matched	2/12	

Adherence with built environment research principles

Principles	Published literature Number/12	Find 30
Sampling: Maximised heterogeneity of built environment	1/12	No
Study powered to determine main effects	3/12	No
Context-specific outcome measures	1/12	No
Recreational and transport walking measured separately	0/12	No/Yes
Behavior and context-specific models	2/12	Yes/No
Used both perceived and objective	2/12	No
Study powered to study interactions	3/12	No
Outcome behavior, environmental measures *and* behavior in intervention matched	2/12	No

Other methodological problems observed in literature

- Methods for assessing built environment assessed
  - E.g., Euclidian distance (i.e., radii rather than road network buffers) (Zenk et al 2008)
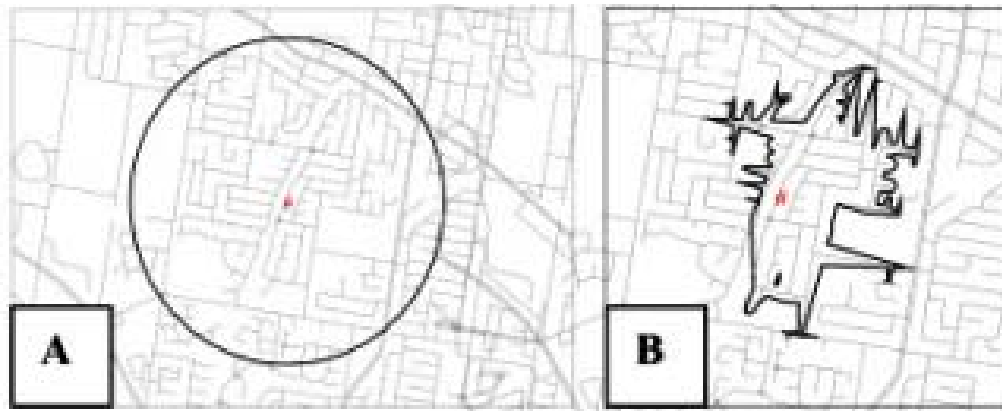
- Scales of built environment (e.g., indoor facilities = facilities with indoor tracks in neighbourhood AND/OR shopping mall within 5 miles)

What might the future hold?

- No purpose designed suitably powered studies yet undertaken

- What might be some of the design issues we need to consider?

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Some closing thoughts – different strategies for different segments

TABLE 1
A Typology of Strategy Mix For Planned Social Change

	Attitude	
	Positive	**Negative**
Engaged	**Cell 1** Reinforcement Process 1. Behavioral Reinforcement 2. Psychological Reinforcement	**Cell 2** Rationalization Process Attitude Change
Relevant Behavior		
Non-engaged	**Cell 4** Inducement Process Behavioral Change	**Cell 3** Confrontation Process 1. Behavioral Confrontation 2. Psychological Confrontation

Sheth and Frazier

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Who is our target for our interventions?

Table 2 Distribution of attitude towards the process of undertaking physical activity by exercising as recommended[a]

Physical activity level	Attitude towards process of activity undertaking physical activity[b]	
	Positive %[a] (n = 1453)	Negative %[a] (n = 271)
Sufficiently active	52.0	7.5
Insufficiently active	32.2	8.2

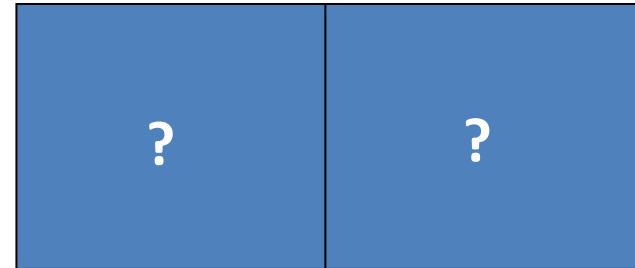[a] Defined as equivalent to 30 min of moderate physical activity ≥ 6 or more days/week.
[b] Percentage of total sample.

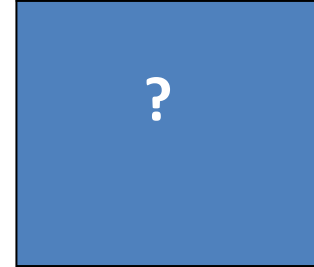Journal of Science and Medicine in Sport (2006) 9, 357—366

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HIGH ENVIRONMENT

	Positive attitude	Negative attitude
Active, as recommended	?	?
Insufficiently active	?	?

LOW ENVIRONMENT

	Positive attitude	Negative attitude
Active, as recommended	?	?
Insufficiently active	?	?

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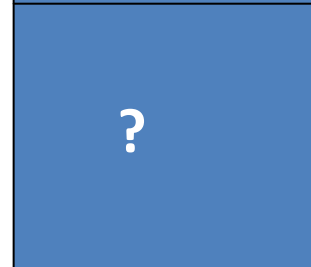
Factors to consider

- Is there alignment between the intervention intervention, the ??? being assessed and the behaviour being measured?

E.g., Focus of intervention: swimming; environment assessed= transport walking; and overall PA being measured

- Who is the target group for the intervention?

- What types of intervention likely to be most effective for the target groups?

- Assessment of social support and how this might affect campaign impacts and sample sizes

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Thanks for listening

VicHealth

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