Institution: UNIVERSITY OF BIRMINGHAM

Unit of Assessment: C26 Sport and Exercise Science, Leisure and Tourism

Title of case study: Influencing policy and practice for stair climbing to increase Lifestyle Physical Activity

1. Summary of the impact

Insufficient levels of physical activity are a major public health challenge. In the 1990s, approaches to meeting the challenge of increasing physical activity (PA) shifted to a focus on the accumulation of activity during daily living and interest in the potential effects of the built environment on lifestyle physical activity. Researchers from the University of Birmingham tested methods to encourage the increased use of stairs, rather than escalators and lifts, with the aim of increasing calorific expenditure during daily life. This research made a major contribution to the evidence base for NICE (UK), as well as CDC (USA), leading to recommendations to use signage as a public health message to increase stair use. Campaigns prepared for the Department of Health (Cataluyna, Spain) were rolled out nationally, with advice currently being extended to worksite campaigns. At a regional level, councils throughout the Midlands have employed the stair use campaigns, as have the police and commercial firms, with Unilever requesting them for use nationally and internationally and an improved campaign rolled out by National Car Parks Ltd.

2. Underpinning research

It is widely agreed that populations throughout the western world are insufficiently active for optimal health, and that low levels of PA are one factor in escalating rates of obesity. During the 1990s, there was a change in strategy to address this problem of low levels of PA. Recommendations for formal sessions of vigorous exercise were replaced by guidelines targeting the accumulation of moderate intensity PA as part of daily living (American College of Sports Medicine Position Statement, 1995). Additionally, the focus shifted to the influence of the built environment on lifestyle activity (e.g. Sallis et al., 2004). Concurrently, researchers from the University of Birmingham were testing methods to encourage the increased use of stairs as part of daily life. Stair climbing expends more energy per minute than jogging, is readily available to most of the population, and the activity can be accumulated throughout the day as part of work, leisure and home life. The University's research indicates that stair climbing interventions produce a 6.4% increase in usage of public access stairs, with a 12.3% increase recently reported in one workplace. An 'overweight' man for example, who climbs stairs in his home an extra ten times each day, expends energy equivalent to 3lbs of fat over a year. Stair climbing interventions can, therefore, contribute to obesity reduction efforts at a population level, and it has been estimated they are six times more cost-effective, i.e. value for money, than their nearest competitor.

Dr Eve's first publication on stair climbing (2000) was only the fifth in the field, followed by a further 34 peer-reviewed papers. All but two papers were first authored by Dr Eves or one of his PhD students [J. Kerr (1998-2001), O. Webb (2003-2007), E. Olander (2007-2010), A. Lewis (2007-2011)]. The selected papers below illustrate some of the translational issues for successful interventions to increase stair climbing addressed in this programme of research.

Output R1 explored effects of poster size, message content and context for public access interventions. It was the first report of a) differences in stair climbing frequency for different demographic groups and b) different intervention effects depending on context (shopping vs. travel).

Output R2 introduced a new intervention approach. Messages affixed to stair risers had twice the beneficial effect of posters. A companion paper demonstrated maintenance of effects three months after intervention removal. Subsequent research revealed that stair riser banners: a) are more effective because of enhanced visibility (2005), and b) are unsuitable for busy sites (2008, 2009). Follow-up research in Barcelona led directly to work for the Department of Health in Catalunya, Spain (2005-2014).

Output R3 was the first to emphasise that consistent success with public access interventions did not generalize to workplaces where the choice was between using stairs and a lift; a cautionary finding that was repeated in 2008 and 2010. Uncontrolled effects of building occupancy, minute-by-minute pedestrian traffic and time of day that influence lift availability are the likely explanations for this problem (2011).

Output R4 on a workplace intervention reported for the first time: a) the use of stair riser banners, b) a sustained, successful stair climbing intervention, and c) a demonstration of *greater* responsiveness in overweight individuals than those of healthy weight. This was a unique finding for population approaches to public health.

The letter to the editor (R5) corrected an error made by reviewers from the community interventions task force at CDC that assumed that choice between stairs and escalators was equivalent to choice between stairs and a lift at work. Reviewers for NICE made the same error.

Output R6 generalised the multi-component approach to workplace intervention developed in R4 to a public access setting (tram station). Uniquely in public health interventions, the effects of this new calorific expenditure campaign were only observed in overweight pedestrians.

3. References to the research

The evidence base for this impact case is located primarily in international, peer reviewed public health journals.

R1) Kerr, J., Eves, F., & Carroll, D. (2001a). The influence of poster prompts on stair use: The effects of setting, poster size and content. *British Journal of Health Psychology*, **6**, 397-405. **[DOI:10.1348/135910701169296]**

R2) Kerr, J., Eves, F., & Carroll, D. (2001b). Encouraging stair use: Banners are better than posters. *American Journal of Public Health*, **91**, 1192-1193. **[DOI:10.2105/AJPH.91.8.1192]**

R3) Eves, F.F. & Webb, O.J. (2006). Worksite interventions to increase stair climbing; Reasons for caution. *Preventive Medicine*, 43, 4-7. **[DOI:10.1016/j.ypmed.2006.03.011]**

R4) Eves, F.F., Webb, O.J. & Mutrie, N. (2006). A workplace intervention to promote stair climbing: greater effects in the overweight. *Obesity* **14,** 2210-2216. **[DOI:10.1038/oby.2006.259]**

R5) Eves, F.F. (2010). Effects of point-of-decision prompts for stair use depend on the alternative. *American Journal of Preventive Medicine,* **38**, 573–574. **[DOI:10.1016/j.amepre.2010.02.004]**

R6) Lewis, A. & Eves, F.F. (2011). Specific effects of a calorific expenditure intervention in overweight pedestrians. *Annals of Behavioral Medicine,* **42**, 257-61. **[DOI:10.1007/s12160-011-9283-z]**

Research funding

R Masters, F Eves & A McManus. 'Development and validation of prompted stair climbing as an intervention to increase healthy lifestyle activity in Hong Kong.' Health & Health Services Research Fund, Hong Kong Government, 2004-2006. HK$ 460,333.

F Eves, & N Mutrie. 'Incremental stair climbing at a worksite; An assessment of the efficacy of a worksite intervention employing new point-of choice prompts and multiple messages on stair risers.' NHS Health Scotland, 2004-2005. £10,711

F Eves. 'Prompted stair-climbing; Worksite campaigns targeting heart health and obesity.' Heart of Birmingham Teaching PCT, 2005-2006. £26,550.

A Puig-Ribera, F Eves. 'Validation of messages to increase energy expenditure and prevent obesity.' AGAUR, Catalunya, Spain, 2006. €6430.

F Eves & A. Puig-Ribera. 'Testing of Stair Climbing Point-of-Choice Prompts in the Barcelona Metro.' Department of Health, Catalunya Spain, 2006-2007. €5335.

L Engbers, M Holewijn, F Eves, V Hildebrandt, PJ Mol, T Paulussen, W van Mechelen & M van Poppel. 'FoodSteps-2: Development of an innovation strategy for and trial-implementation of an intervention on stimulating physical activity and healthy eating by changing the work environment.' ZonMw Programme Prevention, The Netherlands, 2009-2013. €393,581.

F Eves, A Daley, D Carroll, S Greenfield & R Holder. 'Prompting Increases in Stair Climbing at Work to Promote Physical Activity. NPRI-3, MRC, 2010-2013. £236,934

F Eves, A Puig-Ribera, S Greenfield, T Puig-Reixarch, C Torgerson, A Tort-Bardolet et al.

'CLIMBS at Work: Calorie Labelling at Intake and Modified Behaviour for Stair choice.' Bupa Foundation Multi-Country Competition Grant. 2012-2016. £359,359.

4. Details of the impact

Providing the Evidence Base for Policy Guidelines

a) Stair climbing interventions for Public Health

This pioneering research on environmental prompts for physical activity contributed to the evidence base for policy guidelines on the use of signage for stair climbing as a means of increasing lifestyle physical activity at the population level. For example in the UK, NICE Public Health Guidance 13, 2008 recommends: '*putting up signs at strategic points to encourage them (employees) to use the stairs rather than lifts if they can*'. Dr Eves' research contributed nine out of the twenty three worldwide studies that formed the evidence base for this conclusion [1]. In the UK, these guidelines were the first to identify the effects of the environment on lifestyle physical activity. In the USA, Dr Eves' research contributed to both initial guidelines and the updated guidelines in 2010 (Centres for Disease Control reviews, Kahn et al., 2002; Soler et al., 2010: [2]). Dr Eves' interactions with Robin Soler (head of CDC Community Intervention Task Force in 2010) identified an error in the CDC's updated summary of effectiveness, and changed Soler's understanding of how prompts work and subsequent planning for implementation of policy guidelines in community interventions [3]. Dr Eves' research also contributed twenty three out of forty two effects to a systematic review of effectiveness, twenty one of which were successful (Nocon et al., 2010; [4]), a prominence in the field which contributed to the NICE (2008) and CDC (2010) guidelines for PA engagement in the general population. This systematic review relied heavily on Dr Eves work for its conclusions (R3, [4]).

b) Nudge Interventions for Public Health

To change stair climbing, Dr Eves' research uses point-of-choice prompts which are messages displayed in the environment where a healthy choice can be made. These interventions, first used in 1980, are predecessors to the recent interest in 'nudge' approaches to health. They predate the global prominence afforded to Nudge by Thaler and Sunstein's book, '*Nudge: Improving Decisions about Health, Wealth, and Happiness'* published in 2008 and the Behavioural Insights Team, known as the 'Nudge Unit' set-up by the Cabinet Office in July, 2010. Dr Eves was recruited as a consultant for the Behavioural Insight Team at the Cabinet Office because they were proposing to use messages he developed as nudges (paper R4 above; source [5]). His research contributed approx 7.2% of the total evidence base for a review on 'nudge' and 45.5% of the evidence base for physical activity nudges submitted to the Department of Health (UK) by the Behaviour Change Unit at Cambridge (2012). This provides further evidence of the way in which the research has informed the evidence base for decisions at government level. It is premature at this stage to calculate the hard end outcomes from this input into government decision making [6].

Influencing Physical Activity Strategies

Examples that predate the current REF period illustrate that Dr Eves was one of the first researchers worldwide to investigate the promotion of stair climbing and offer insights into the genesis of the impacts reported. Dr Eves' research provided the evidence for nine out of ten successful stair interventions in the UK at the time of the NICE review and is the primary source of evidence that applies this field to a UK population. In Catalunya (Spain), the Department of Health was developing a lifestyle physical activity strategy and they sought advice from Dr Eves who was working on a stair climbing intervention there with Dr Puig-Ribera (2005). This resulted in commissioned research, the outcomes of which directly influenced the content and method of intervention for the Catalunya Department of Health's PA campaigns that were launched in 2010 [7]. Dr Eves is currently advising these policy makers on a new approach to worksite campaigns (2013-2015) to be made available throughout Catalunya, Spain, in which stair climbing prompts are combined with food-related prompts in canteens.

Changing practice at a regional level

Dr Eves designed and installed stair climbing interventions that changed employers' practice in local authorities in Birmingham (2008, 2011), Coventry (2011), Walsall (2012), Dudley (2012),

Nottingham (2013) and Worcester (2013), as well as Severn Trent (2008), the West Midlands police (2009), Pilkingtons (2011) and the Birmingham Chamber of Commerce (2011). A combined workforce of 6,650 was exposed to stair climbing campaigns over this period, as well as a significant number of uncounted visitors to the targeted buildings. A published research paper on these workplace interventions reported a 12.3% increase in stair climbing, demonstrating that such campaigns can change employees' behaviour towards a health-enhancing alternative. This paper also prompted Unilever to request use of Dr Eves' campaigns for their workforce nationally and internationally. In Nottingham, the public health department was alerted to Dr Eves' research by academics in the national PA field. In addition, he was recruited by John Lloyd, the regional manager for Heart Research UK, to offer expert comment on a planned stair climbing intervention for use by National Car Parks Ltd (2010). The modified campaign that was rolled out was 'very well received' by end users of the car parks in Birmingham, Walsall, Stratford-upon-Avon and Manchester. Use of this campaign is currently being extended within the UK [8].

Influencing Society

More broadly, this research has been picked up by individuals who are not directly involved in public health and the implementation of physical activity strategies, thus leading to the potential for even wider impacts. For example, Rob Koelewijn from KLM Health services requested a paper on the effects of stair climbing as a means of 'designing the working environment to prevent health risks' (2008) for summary in the Dutch Egonomics Journal (Tijdschrift voor Ergonomie); a US school requested permission to use our stair climbing campaign (iv) in their school (2011); Chris Hammer from a 'green' architect's collective in the US used our research (ii) to illustrate the potential for reduced carbon footprints for lifts (2010); and a website, InformeDesign, that translates research for use by architects and housing specialists amongst others, disseminated a paper on potential effects of station design on stair usage.

Additionally, Dr Eves informs public debate about the benefits of stair climbing. He is on the British Psychological Society expert panel and is regularly requested to comment on research in this area. He provides information for journalists preparing articles on stair climbing/physical activity/weight loss (e.g., *Self*, 2008; *Country Walking*, 2008; *Men's Health Magazine*, 2009; *Slimming World*, 2012) and has given radio interviews in the UK, Australia and the US on the topic.

5. Sources to corroborate the impact

[1] http://www.nice.org.uk/niceMedia/pdf/Physical_activity_Evidence_Review_FINAL.pdf
[2] http://*www.thecommunityguide.org/pa/pa-ajpm-evrev.pdf*
[3] Factual statement provided by Evaluation Team Leader, Division of Adult and Community Health National Center for Chronic Disease Prevention and Health Promotion.
[4] Nocon, M., Müller-Riemenschneider F., Nitzschke, K., & Willich, S.N. (2010) Increasing physical activity with point-of-choice prompts – a systematic review. *Scandinavian Journal of Public Health*, 38, 633-638. [DOI:10.1177/1403494810375865].
[5] Factual statement provided by Public Health Specialty Registrar, Department of Health.
[6] Factual statement provided by Behaviour and Health Research Unit, Insitute of Public Health.
[7] Factual statement provided by Deputy Director of Health Promotion, Catalunya.
[8] Factual statement provided by Heart Research, UK.