Public Health Applications for SenseCam in the field of Travel Research

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Introduction

Public health researchers and practitioners continue to promote physical activity and exercise in the fight against obesity and chronic disease such as Diabetes and cardiovascular disease. There is increasing awareness that active travel, predominantly walking and cycling, is a form of physical activity that holds great promise. It is easy and cheap, and is accessible to a great proportion of individuals, old or young, healthy or unwell.

Research into increasing walking and cycling level depends on accurate measurement to track trends in the population and detect the effect of interventions. The primary measurement technique has been self report (diary or interview) but this is known to have large and variable error, which limits the research conducted.

Why is SenseCam an exciting technology for travel research?

SenseCam (developed by the Sensors and Devices Group at Microsoft Research Cambridge) is ideally suited to travel research because the device is unique in its ability to simultaneously measure and verify;

- Mode of travel (e.g. car, bike, train, walking)
- Duration or time of travel
- Frequency of travel

Microsoft Research

Comparing SenseCam to traditional methods

I plan to use SenseCam to investigate the error on the traditional self-report method. This will allow any researcher using self-report data to adjust or correct their data accordingly.

This will be done by simultaneously collecting SenseCam and self-report travel data from individuals going about their usual daily lives.

Travel modes

SenseCam is able to detect the following travel modes:

Successfully identified

A. On a platform
B. On a train
C. Driving a car
D. Green-space walking
E. Town walking
F. Urban walking
G. London Underground
H. Underground train
I. Journey transition
J. Cycling
K. Boarding a bus
L. Riding a bus

What was missed?

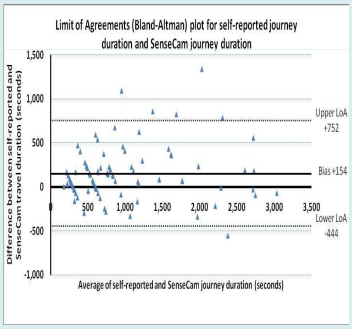
M. At night
N. Inside clothing or bag
O. Forget to wear

Results – Study 1

Using SenseCam with 20 adults for 1 day of travel we found a significant positive bias (over-reporting) of 2.5 minutes per journey.

Implications

Our adults over-reported time spent walking and cycling by almost 50 minutes per week (based on average journey frequency). Considering Government Guidelines are for 150 minutes exercise per week, this is a substantial amount.

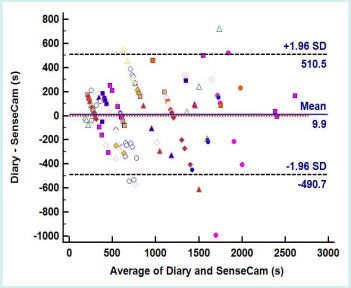


Results – Study 2

Using SenseCam with 17 children (aged 13-15 years) for 5 days of travel we found a positive bias (over-reporting) of 10 seconds per journey.

Implications

Children report journeys more accurately than adults. However, the large limits of agreement demonstrate low precision and mean that self-report will not be a good method to detect behaviour change.



Next steps

The next step will be to reproduce the pilot with a sufficiently powered (n=120), population-representative sample of participants.

I then plan to work with Sustrans and the Department for Transport to implement the technique in real life travel intervention work.

I would like to thank Dr Steve Hodges, Dr Emma Berry and the Sensors and Devices group at Microsoft Research Cambridge for their help and assistance.

Publications

P Kelly, M Murphy, P Oja, E Murtagh and C Foster; Estimates of the number of people in England who attain or exceed vigorous intensity exercise by walking at 3mph; Journal of Sports Sciences 2011 (15):1629-34.

P Kelly, A Doherty, E Berry, S Hodges, AM Batterham and C Foster; Can we use digital life-log images to investigate active and sedentary travel behaviour? Results from a pilot study; International Journal of Behavioural Nutrition and Physical Activity 2011 8(1):44

P Kelly, P Krenn, S Titze, P Stopher and C Foster; Quantifying the difference between self-reported and GP S measured journey durations: a systematic review; International Journal of Behavioural Nutrition and Physical Activity (Under submission)

P Kelly, A Doherty, A Hamilton, A Matthews, AM Batterham, M Nelson, C Foster and G Cowburn; Investigating the error on elf-reported journey durations in school children; American Journal of Preventive medicine (Under review)

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