

Pilot 1 – Working Paper

Methodological issues in the study of the role of greenspace in the promotion of physical activity and mental well-being

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Note: Some of this report refers directly to the previously unpublished PhD studies of Justine Geyer. Please do not cite this material without prior reference to the authors.

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1 Introduction

Any holistic investigation of a complex phenomenon such as the role of greenspace in physical activity and well-being requires a cross-sectional, mixed methods research design to include both quantitative and qualitative methods (Cresswell & Plano-Clark, 2007). This brief review does not seek to address the philosophical issues associated with each approach, but rather to comment on the necessity of both and provide a brief review of relevant techniques. It will also provide an example of a novel 'mixed-methods approach' currently being employed to investigate the role of greenspace for adolescents.

2 Quantitative methods

Traditionally in the social sciences *quantitative methods* include the use of closed questions in questionnaires, whilst in a study such as this in the medical sciences monitors that measure physical activity (accelerometers) may well be employed. The former is in such widespread use that it will not be reviewed here.

However, *accelerometers* are rapidly becoming the method of choice in both small and large scale research on free-living physical activity behaviour in youth (Dollman *et al.*, 2009, Corder *et al.*, 2008). The many advantages of accelerometers such as: being low in burden to participants; having a lower technical error than methods such as self-report on questionnaires and the ability to detail the intensity and timing of physical activity are frequently determined to outweigh the disadvantages such as complexity in data

handling. The lack of contextual information such as type of activity and where it takes place can be problematic and cost is often a disadvantage. The use of other quantitative and qualitative methods are often necessary to attempt to overcome this problem.

GPS (global positioning system) receivers built into mobile phones are able to track geospatial movement and enhances data-gathering in four significant ways:

1. The GPS data can be made into visual maps that demonstrate a participant's use of their local area which can then be used in interviews to stimulate discussion about attitudes and behaviours. This is similar in principle to the use of photographs in interviews, known as photo-elicitation interviewing (Rose, 2007). It has been successfully used for this purpose by several researchers (Wiehe *et al.*, 2008, Bamford *et al.*, 2008).
2. The GPS data may allow quantification of the amount of weekly physical activity that takes place in greenspace compared to other settings. This can provide more precise information on the relationship between greenspace and physical activity.
3. The GPS data may assist characterisation of a type of greenspace user when a whole week's worth of data is mapped simultaneously and taken into consideration alongside other methods (e.g. interviews, surveys and questionnaire data).
4. For some, the loan of a state-of-the-art mobile phone may also act as an incentive to take part in what could be perceived as research that is markedly intrusive to privacy and without immediate tangible benefits to the participants.

3 Qualitative methods

Most of the qualitative methods appropriate for 'greenspace' studies are of 'standard' type, such as questionnaires and semi-structured interviews, and will not be reviewed in detail here. However, there are several 'creative' approaches to these standard techniques that are worth mention.

In the study outlined briefly below Geyer has capitalised on the fact that her respondents had been loaned mobile phones, by administering a '*mobile-text daily minisurvey*' about their activities. This allowed her to gather feedback and clarification at the end of days when the participants had been monitored using GPS and accelerometers whilst the day was still clear in their minds.

One other method worthy of note here, and mentioned above in relation to GPS data, is *photo-elicitation* (Rose, 2007); using photographs and images to encourage respondents to show, point and tell. This is often used to encourage and enable a better expression of the child's view of their places (de Connick-Smith & Gutman, 2004). Visual techniques such as these that are used within a qualitative approach are considered well suited to overcome expression difficulties (Ramussen, 2004). In a recent 'greenspace and health' study Christie, Higgins & Nicol, (2010) used cartoon-type diagrams during group interviews with adolescents to explore the concept of 'connectedness to nature' and to encourage a clearer understanding of the issues being discussed. This helped to introduce an ambiguous and tricky concept ('connectedness to nature') by stimulating discussion, and individual interpretation which in turn helped to overcome expression difficulties amongst the respondents. Dell Clark (1999) and Morrow (2004) have noted that the use of certain techniques within a qualitative approach has been shown to encourage child engagement with the research process. Moreover children have expressed a preference for the inclusion of a variety of methods aimed at being fun and engaging (Hill, 2006).

The BeWel network based within Aberdeen University is exploring research techniques that use both visual images and sounds. <http://www.bewel.net/>. One of the focuses of the network is to understand more about 'how exposure to forms of sensory contact with nature (such as visual images and sounds from nature) affects brain function, other physiological responses and feelings of personal well-being'.

This has become the focus on one of their pilot projects – 'Well-being from nature and physiological and neuropsychological responses to elements of nature'. The BeWel website describes the two stage project as:

[The first stage] ... focuses on using physiological measurements and self-reported scores of personal well-being to explore how people of different ages respond to different environments, ranging from more to less 'natural' in ecological terms. Images and sounds recorded by our participants will then be used in the second stage of the project which will use brain imaging (an MRI scanner) to investigate which areas of the brain are activated by environmental images and sounds, separately and in combination, and any association with feelings of well-being.

4 An example of a mixed-methods study on the role of greenspace for adolescents

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In parallel to the work of the OHN, Justine Geyer of the University of Edinburgh has been conducting an ESRC/Scottish Government supported PhD on 'the role of greenspace in the promotion of physical activity and mental well-being in adolescents in Scotland'¹. This study, which began in September 2009, is clearly highly relevant to the OHN and has employed 'cutting-edge' research methods using GPS-enabled mobile phones. In addition to its contribution to the knowledge base on the role of greenspace for adolescents this study should add to methodological development in this topic area. The study is using a combination of quantitative and qualitative methods in a 'mixed methods' approach.

4.1 Methods

The mixed methods approach includes:

- *National level questionnaire* –greenspace-use questions were developed to be placed in the national component of a WHO collaborative cross-national study (Health Behaviour in School Aged Children - HBSC) surveying Scottish secondary school pupils in year 2 (S2) and year 4 (S4). This will provide nationally representative data on how much greenspace is used by these age groups and can be related to physical activity levels, mental well-being and pupil characteristics *via* other measures included in the survey.
- *Local level questionnaire - Greenspace and Health Fife questionnaire* – This questionnaire will be administered within a local setting (Fife Region, Scotland) and is primarily employed as a recruitment and screening tool. It will also allow comment on the ecological validity of the local samples and thus how widely applicable any findings from the smaller survey are to the wider population of Scottish 13 and 15 year olds.
- *GPS (global positioning system) receivers* that are inbuilt to mobile phones are provided temporarily for a week to a sample of volunteers recruited through the local-level questionnaire. GPS tracks geospatial movement and is included in the study because of the advantages noted above.
- *Accelerometers* - Physical activity monitors (accelerometers) are used to provide objective, quantitative data on physical activity levels although they involve complex data handling. The use of other complementary methods was intended to overcome the problem of the lack of contextual information such as type of activity and where it takes place.
- *Daily questionnaire (minisurvey)* - A short questionnaire with closed and open questions is administered once a day *via* the participant's mobile phone. This provides qualitative data on activity types, locations of activities, social interactions and greenspace use. This is a form of ecological momentary assessment (EMA) (Stone & Atienza, 2007), and is an attempt to provide contextual information to the accelerometers and reduce memory recall bias as a check on information

¹ Supervised by Candace Currie and Peter Higgins of the School of Education, University of Edinburgh

provided in interviews. It also provides information that can be used to direct questioning in interviews.

- *Semi-structured interviews* – Interviews are conducted with all those who take part in the monitoring phase. These will explore the adolescent's attitudes and experiences in greenspace and their neighbourhood; how well greenspace meets their needs; how they value and use greenspace.

4.2 Pilot Study - Results

This research is still in the early stages and to date only one pilot study has been carried out (2009). There were two aspects to the pilot study firstly to test out greenspace use questions designed for a national level study and secondly to trial the mixed method approach. Early results suggest that the use of the GPS-enabled mobile phones as an incentive appeared to be very successful. Positive comments during questionnaire administration suggested this. Also 13 out of 19 pupils filled in details for more information about taking part and almost half of those contacted returned completed consent forms. This and other comments also demonstrated the acceptability of the research methods to this age group.

The GPS phones were very successful for generating visual maps to stimulate discussion during interviews. However, the volunteers still had difficulty in expressing themselves about greenspace and their local environments.

The quality of the GPS data appeared to be precise in locating individuals and their environmental routes. However there was a significant problem with missing data and uncertainty about identifying in each instance the source of error.

The mobile administered questionnaire offered great potential for gathering data on daily activities without memory recall issues that were evident in the interviews. However, several technical problems were encountered during its administration that reduced overall response rates. It is anticipated that these can be overcome readily for the larger study.

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