## MEASURING HEALTH OUTCOMES from the NATURAL ENVIRONMENT in BEDFORDSHIRE

Health outcomes are an essential way in which physical and mental wellbeing can be measured as a result of a particular intervention. In this particular instance measuring health outcomes is essential for identifying whether participants in a particular green space project have benefited from taking part in this particular form of physical activity.

One of the difficulties for nature based projects is that there is not one standardised way of measuring health outcomes that is accepted across the board. As with any evaluation, what is measured and how depends on the type of intervention, the length of the study and a range of other factors. There is work underway nationally to pull together both the evidence available and the methodology used to measure health and wellbeing in nature based projects.

**There have been a number of studies demonstrating the benefits of exposure to green space. Two key reports, sponsored by RSPB, published in 2004 and 2007 outline the benefits to physical and mental health arising from contact with the natural environment. They detail the types of health issues that could be measured. These include the reductions in obesity, heart disease, diabetes, cancer, stress, ADHD, aggression and criminal activity, amongst others**[[1]](#endnote-1)**.** The Public Health Outcome Frameworks provides a good example of what to measure, the outcomes being chosen as key health aspirations by Public Health England for the population as a whole and also to identify ways in which the health of sectors of the population can be improved.

Choosing the right measurement outcomes is very important. It is also essential to note that both commissioning of exercise programmes or other interventions in green space and funding for projects might well require measurement of outcomes – either from existing projects or from the proposed intervention. Other reasons for measuring might be to improve access to existing underused green spaces or to improve the quality of green space or the type of programmes run there.

There are numerous toolkits available for both the health practitioner and the green space provider to use when designing a project. One of these is the Health Economic Assessment Tool for cycling and walking (HEAT), which measures the benefits of intervention projects such as green infrastructure or transport improvements to the population as a whole (rather than individuals). It is an important component that should be used by planners when considering a new proposal and must be integrated into the planning stage[[2]](#endnote-2).

This document summarises the process required to decide which health outcomes to measure for a particular project and lists some of the main health outcomes and measurements.

Measuring health outcomes – the main steps:

1. Identify the Local Authority priority health needs- review the JSNA, Health and Wellbeing strategy, Public Health Outcomes etc
2. Identify the resources available for the project- budget, time scale, people expertise, quality of space, etc.
3. Identify the outcomes that need to be measured to help with the priorities identified above
4. Match the outcomes with the methodology/ies available
5. Run the intervention
6. Measure the outcomes
7. Publicise findings

Some of the main health measurements by type of health outcome

## Physical

***What to measure***

* Physiological measures: Weight, Height, BMI, Resting Heart Rate, Blood Pressure, Waist Circumference
* Measurement of amount of exercise taken weekly.
* Diabetes

***How to measure***

* Boditrax, technology used to collect individual data regarding amount of time exercised and other physical wellbeing. <http://boditrax.com>. This is going to be used by the Bedfordshire County Council Physical Activity team to collect many of the physiological measures listed above.
* Questionnaires measuring the amount of physical exercise undertaken. Self reported or administered by someone.
* Create a questionnaire to include weight/ height and calculating BMI which allows comparison between amount of exercise undertaken in greenspace and weight.
* Active Wellness key (another method to be used by Bedfordshire County Council’s Physical activity team), another method of measuring physical outcomes from exercising. Used to measure and track intensity of activity

## Mental

* cognitive functioning (leads into memory problems / dementia)
* physiological process underpinning mental health.

***What to measure***

* Measuring stress (Gladwell et al 2012) which can lead to anxiety disorder http://www.hutton.ac.uk/sites/default/files/files/greenhealth/Jenny-Roe-Stress-and-the-City.pdf
* Mood rating (Akers et al 2012)
* Measuring self esteem (Barton et al 2012)
* Improved mental capacity, mental wellbeing and emotional wellbeing, economic well being and skill improvement (Natural Health Service, Paul Nolan)
* Stress reduction, Cortisol levels <http://www.mdpi.com/1660-4601/10/9/4086>
* Self rated health (Agyemang et al., 2007)
* Noise annoyance and stress-related psychosocial symptoms (whose methodology is used in Gidlof-Gunnarsson & Ohrstrom, 2007)

***How to measure***

* Questionnaires monitoring perceived stress (Walk for Health, Brown and Gladwell 2012)
* Ask a series of questions assessing levels of mental wellbeing about how and why the individual uses the natural environment alongside standard questions around life satisfaction, happiness, and anxiety. (Natural England report on mental wellbeing 2013)
* Warwick Edinburgh Mental Wellbeing Scale[[3]](#endnote-3)
* Behaviour monitoring/ observations in children
* Satisfaction/ self esteem questionnaires
* Symptom scores
* Global functioning
* Social outcomes
* Patient reported outcomes
* Clinician reported outcomes
* Qualitative analysis
* Mood analysis

## General wellbeing and effectiveness of exercising in green space

***What to measure***

* Outcomes under physical and mental above
* Percentage of people using outdoor places for health/exercise reasons.
* Outcomes that you should be measuring include: improved lifestyles, healthy choices, reducing preventable conditions, improved fitness and mobility, prevention of obesity, reducing social isolation

***How to measure***

* Questionnaires
* Interviews
* Smart Cards in Birmingham to measure health (Intelligent Health)

## Other relevant measurements for determining usage of greenspace and its benefits on health and health inequalities

***What to measure***

* Disability, Ethnicity, Age, Male/ Female, Postcode, GP Practice, Where exercise is taken

***How to measure***

* Data measured through questionnaires and interviews on exercise teams

From this type of data we can tell. eg:

* how far people travel to use green spaces
* do men or women use green spaces more
* age ranges and ethnicity of those using green spaces
* areas where there are a high incidence of people with health issues resulting from social deprivation
* popular/unpopular areas for taking exercise

## Mental and Physical Health Outcomes: Examples in Practice

Benefits from taking part in Ecotherapy projects e.g. gardening: Mental health outcomes were measured through a series of questionnaires.

The results are detailed in the following document <http://www.mind.org.uk/media/273470/ecotherapy.pdf>

“Self esteem was measured using the Rosenberg Self Esteem Scale (Rosenberg 1989), Mood Change was measured with mood state questionnaire (POMS), mood disturbance was calculated using TMDS (Total Mood Disturbance Score). This involved summarising the POMS subscale T scores for depression, anger, confusion, fatigue, and tension subtracting the T score for vigour. Participants were also given the opportunity to add extra comments.”

Green Exercise: Measuring the physical and mental health benefits using questionnaires

This study measured physical activity in 10 different case studies and documented the improvements of this exercise on mental health of the individuals involved. A series of questionnaires were used to determine physical and psychological health.

Pretty J, et al. 2007. Green Exercise in the UK Countryside: Effects on Health and Psychological Well-Being, and Implications for Policy and Planning. *Journal of Environmental Planning and Management*. 50 (2) 211-231

“This study measured the effects of 10 green exercise case studies (including walking, cycling, horse-riding, fishing, canal-boating and conservation activities) in four regions of the UK on 263 participants. Even though these participants were generally an active and healthy group, it was found that green exercise led to a significant improvement in self-esteem and total mood disturbance (anger-hostility, confusion-bewilderment, depression-dejection and tension-anxiety all improving post-activity). Self-esteem and mood were found not to be affected by the type, intensity or duration of the green exercise, as the results were similar for all 10 case studies.”

“Data were obtained in the field by means of a composite questionnaire.

-Section 1 contained questions to determine the physical and mental health of a participant at the time of sampling.

-Section 2 was designed to determine any changes to psychological health brought on by participating in green exercise. Section 2 was completed twice: before and after taking part in the activity.”

Section 1 comprised three subsections:

* General physical health information was obtained using the Euroqol EQ-5D (2005) questionnaire which provides a simple descriptive profile and a single index value for health status. In the UK, a NHS Task Group has been set up to co-ordinate the testing of EQ-5D as an outcome measure for use by clinicians and managers.
* (2) General psychological health was measured using the General Health Questionnaire (Goldberg, 1978). This is the industry standard for measuring psychological health (Goldberg & Williams, 1991), and was originally designed for use in London, and since translated into 38 languages and validated in over 50 studies.

The level of physical fitness and lifestyle of respondents was evaluated using questions relating to the amount of physical activity at different levels undertaken daily, weekly, monthly, every six months or not at all. Light activities included using the stairs or walking for pleasure, moderate activity examples included gardening, housework and clay bowls, and vigorous activities included playing sports, running and swimming.

Section 2 measured two aspects of mental health: (1) Self-esteem was measured pre- and post-activity using the Rosenberg Self Esteem Scale (Rosenberg, 1989). According to Fox (2000), this is the best validated and most conservative measure of self-esteem and has been used in various studies of the relationship between self-esteem and exercise (Mactavish & Searle, 1992; Desharnais et al., 1993; Palmer, 1995). (2) Mood status was measured pre- and post-activity using the standardised, short form version of the Profile of Mood States test (POMS) questionnaire (McNair et al., 1984). According to Biddle (2000), the POMS is the dominant instrument for measuring mood in studies examining the relationship between mood and exercise. A meta-analysis by McDonald & Hodgedon (1991) examined the relationship between physical activity and mood, and demonstrated a clear relationship between exercise and lack of negative mood. The short version of POMS was used to minimise the amount of time required of participants. Reliability and validity of the shortened edition of POMS for use in sports settings was established by Grove & Prapavessis (1992). The six POMS subscales measured were anger-hostility, confusion-bewilderment, depression, dejection, fatigue-inertia, tension-anxiety and vigour-activity.”

Viewing green space pictures: Measuring mental and physical health using questionnaires, blood pressure monitors, heart rate monitor and measuring weight and height.

The health of participants in this experienment were measured on viewing scenes of nature whilst exercising. Measurements were taken of blood pressure, self esteem and mood (the latter two with questionnaires).

Pretty J, Peacock J, Sellens M and Griffin M. 2005. The Mental and Physical Health Outcomes of Green Exercise*. International Journal of Environmental Health Research* 15(5), 319-337

“Both physical activity and exposure to nature are known separately to have positive effects on physical and mental health. We have investigated whether there is a synergistic benefit in adopting physical activities whilst being directly exposed to nature (‘green exercise’).

Five groups of 20 subjects were exposed to a sequence of 30 scenes projected on a wall whilst exercising on a treadmill. Four categories of scenes were tested: rural pleasant, rural unpleasant, urban pleasant and urban unpleasant. The control was running without exposure to images.

Blood pressure and two psychological measures (self-esteem and mood) were measured before and after the intervention. There was a clear effect of both exercise and different scenes on blood pressure, self-esteem and mood. Exercise alone significantly reduced blood pressure, increased self-esteem, and had a positive significant effect on 4 of 6 mood measures”

“Initially subjects completed and signed an informed consent and the PAR-Q General Health Questionnaire. A Polar heart rate monitor and Cardiosport transmitter belt were used to record heart rate at five second intervals. Weight (kg) and height (m) were recorded and then a series of profile building questions were asked about the subject’s exercise habits and their perspectives on the natural environment. On completion (5 minutes), subjects relaxed in a supine position, with eyes closed on the massage table for a further three minutes. Heart rate was monitored throughout this period and the lowest value attained was considered to represent the resting heart rate. Resting systolic and diastolic blood pressure was measured at the end of this period using an Omron Digital blood pressure monitor. Subjects then completed the POMS and self-esteem questionnaires, which were rotated at random.”

Exercise in Green space: Measuring Stress using cortisol.

This study measured the cortisol levels (through their saliva) of participants who were undertaking exercise in green space finding that stress levels were reduced in deprived communities when accessing green space.

Ward Thompson et al., 2012, *More green space is linked to less stress in deprived communities: evidence from salivary cortisol patterns*. Landscape and Urban Planning

105, 221-229.

This presentation lists some of the research undertaken at the Hutton Institute. One way in which stress is measured is through measuring Cortisol, the “stress hormone” which is secreted by the adrenal glands. This is measured through participants measuring saliva (put into a small tube which is taken away from the lab and analysed. © [www.scimart.com](http://www.scimart.com) )

**“Study 1**: exploratory cortisol study, January 2010 (n=23) Ward Thompson et al., 2012

**Primary outcome measures:** salivary cortisol (collecte dover 2 days/4 times per day),perceived stress (PSS). **Secondary outcome measures**:perceived mental wellbeing,levels of physical activity.

**Demographic measures**: gender, age, level of deprivation (Carstairs 2001), no. of children, having a garden, incoming coping.”

1. Bird, W (2004) ‘Natural Fit’, RSPB - [www.rspb.org.uk/Images/natural\_fit\_full\_version\_tcm9-133055.pdfBird](http://www.rspb.org.uk/Images/natural_fit_full_version_tcm9-133055.pdfBird), W (2007) ‘Natural Thinking’, RSPB - [www.rspb.org.uk/Images/naturalthinking\_tcm9-161856.pdf](http://www.rspb.org.uk/Images/naturalthinking_tcm9-161856.pdf) [↑](#endnote-ref-1)
2. http://www.heatwalkingcycling.org/index.php?pg=walking&act=introduction [↑](#endnote-ref-2)
3. Warwick Edinburgh Mental Health Scale <http://www.healthscotland.com/documents/1467.aspx> [↑](#endnote-ref-3)