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How effective is the Forestry Commission Scotland's woodland improvement programme - 'Woods In and Around Towns' (WIAT) - at improving psychological wellbeing in deprived communities?

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How effective is the Forestry Commission Scotland's woodland improvement programme - 'Woods In and Around Towns' (WIAT) - at improving psychological wellbeing in deprived communities?

1. Aims/Objectives: The study's aim is to provide robust and generalisable causal evidence for impact on mental health within deprived communities that receive an intervention designed to increase their contact with natural environments.

Objectives to address the primary research question are as follows:

- i. What is the impact of the WIAT programme of interventions on mental health (as measured by patterns and levels of stress) in the community?
- ii. Is any impact on mental health associated with a change in levels of engagement with the woodland environment (physical and/or visual) after WIAT intervention?
- iii. What is the impact of the intervention on length and frequency of visits to local woods, experience of local woods, awareness of them (knowledge of their qualities and availability for use), activities undertaken there, visual contact with woodland, sense of connectedness to nature, community cohesion and connectedness, and physical activity levels?
- iv. Are changes to the physical woodland environment sufficient to have an impact on mental health and/or woodland awareness and use by the community or are organised activities such as led walks and other promotional initiatives also required?
- v. Are there gender differences in the impacts of the interventions?
- vi. Are there differences in patterns of woodland use, and in impacts of the interventions, according to distance of woodlands from participants' homes, and is there any distance threshold for impacts?
- vii. What are the cost consequences of each stage of the intervention (including time input from FCS rangers and community participants) in relation to the primary and secondary outcomes of the study?

2. Background: The project is designed to take advantage of a rare opportunity for a prospective study, where planned interventions to enhance urban populations' access to natural environments provide a 'natural experiment' and mental health impacts of the interventions can be evaluated at a community level, over time.

Forestry Commission Scotland (FCS) has an £8m/yr programme - Woods In and Around Town (WIAT) - focused on improving health and quality of life in towns and cities. WIAT works with deprived communities to regenerate local woods and promote them as safe and accessible places for enjoying the outdoors. Such interventions may be followed by other providers in future, if shown to be effective. The WIAT programme aims to increase contact with local woodlands by community residents, contributing to improved mental health and wellbeing.

This proposal aims to assess the impact of this environmental intervention on community-level health, mental wellbeing in particular. The WIAT scheme represents a rare and valuable opportunity to carry out a prospective evaluation of the health impacts of change in, and promotion of, woodland environments for recreation. Selected sites, matched to intervention sites, will be used as controls.

3. Need: The proposed study is highly policy relevant and timely. The recent Marmot Review of Health Inequalities (2010) has the creation of healthy and sustainable places and communities as a key policy objective to improve health and reduce health inequalities, and Scotland's pioneering 'Good Places, Better Health' policy (2009), sets out a public health agenda for Scotland with a social-ecological model of

health at its heart.

The evidence base for population level effects of access to natural environments is observational and subject to the biases and threats from confounders which characterise such designs. It also tells us little about how potential changes in access to natural environments improve health or, perhaps more importantly, how those changes should best be achieved. We do not know whether provision or promotion of opportunities to access natural environments matters more. This evidence gap provides our rationale.

The findings will be important for researchers, policy makers, planners and managers in public health, environmental studies, urban design, landscape architecture, forestry and natural resources, geography and economics. They will be of relevance to the NHS, local authorities, private and public sector and voluntary sector organisations

4. Methods:

a. Setting The setting will be a sample of six small, deprived communities within the Scottish Lowlands Forest District, which covers the central belt of Scotland (an area from the west to the east coast, including Glasgow and Edinburgh). All six communities will meet the WIAT criteria for investment: at least half the woodland must lie within 1km of a settlement of at least 2000 people; the woodland must cover a minimum of 1ha with at least 40% woodland cover within this area. Our own criteria will also specify that the community must be within the worst 30% of socio-economic deprivation in Scotland. Woodland sites will not have received investment or direct promotion within the last 2 years. Three intervention sites will receive the WIAT programme between 2012 and early 2015, three control sites will not (although they will receive it once the study is complete). Each control site will be paired with an intervention site to match on woodland and community characteristics.

b. Design: The design combines repeat, cross-sectional surveys of individuals resident in intervention and control communities, with three waves of data collection to assess health impacts. A longitudinal cohort of participants (seen at two or three waves) will be nested within the cross-sectional surveys. The size of this cohort will be determined by the extent to which we are able to obtain repeat responses. These data will form part of a longitudinal mixed-method study that also tracks the environmental changes in woodlands and promotional activities which take place.

The intervention is guided by a woodland development plan, created in partnership with the community. In stage 1, physical changes will be made to improve access to and within the woods (e.g. clearing shrubs, creating paths and adding signage). In stage 2, activities designed to increase awareness and use of the woods by the local community (e.g. led-walk programmes, leafleting and event days) will take place. The same programme will be applied across the 3 intervention sites, though precise detail will be site-specific.

The intervention is, therefore, both physical and social/promotional. Our design will permit an assessment of the impact at each, successive stage and the programme collectively.

c. Data collection

The primary outcome will be a measure of mental wellbeing, assessed using the Perceived Stress Scale (PSS).

Secondary outcomes will be measured using well-tested measures of woodland use and experience, the Connectedness to Nature Scale, the International Physical Activity Questionnaire (IPAQ) Short-form, the General Health and Quality of Life scale and measures of social capital and cohesion.

Qualitative methods will also be used to offer an in-depth understanding of the nature and experience of the WIAT interventions, the practicalities of their implementation and any unexpected positive or negative outcomes. These will be sought both from the perspective of the communities and from the FCS staff and partners planning, managing and implementing the interventions. Consistencies and contradictions in findings will be sought by attempting to triangulate qualitative and quantitative survey data and to identify factors that appear to contribute to the success or otherwise of interventions.

d. Data analysis

Questionnaire data will be cleaned using range, consistency and logic checks. Analysis will first address the primary outcome: what is the impact of the WIAT programme of interventions on psychological health? The analyses for this part of the project will centre on regression models, testing for a differential impact associated with living in an intervention area (relative to a comparison area). The effect of the WIAT programme will be determined by the magnitude of the interaction between living in an intervention area and the wave of the survey, and will be assessed by comparisons of waves 1 and 2, waves 1 and 3, and waves 2 and 3. Analyses will adjust for key confounding variables (age, sex, SES, ethnicity, education level, employment status, financial strain, limiting illness and life events). The individuals sampled will be clustered within six sites (three intervention, three comparison). With only six sites it will not be possible to use multilevel modelling (random effects) to adjust for differences between sites. A fixed-effects approach will not work either since this would prohibit the inclusion of the intervention; for this reason the sites will be matched as closely as possible. If there are suitable clusters within sites (e.g., based on area of residence such as output area) then clustering will be taken into account using multilevel modelling. A proportion of the individuals will be interviewed at more than one wave, and this introduces a further hierarchy with observations nested within individuals. We will use multilevel modelling to account for the fact that observations made on the same individual at two different waves are likely to be correlated. There will be between one and three observations on each individual. All individuals will be included in the analysis regardless of the number of waves in which they participated. The correlation between repeated measures made on the same person will provide a slight increase in the power available for this study over the planned repeat cross-sectional design.

Analysis will also address the secondary outcome measures using a similar approach but with each outcome of interest forming the dependent variable of an appropriate form of regression across different waves of survey.

Health economics analysis will initially take a cost-consequence approach, costing each stage of the intervention and comparing those costs to the differences achieved in the intervention group over the control group on primary & secondary outcomes. In the second part, the overall cost-consequence analysis from the first exercise will be extended to a more formal economic appraisal, estimating the likely quality adjusted life year (QALY) benefits that might be expected from the programme.

A Grounded Theory approach will be used in the qualitative work, to explore how people experience and respond to the WIAT activities. Any unexpected positive or negative outcomes will be recorded both from the perspective of the communities and from the FCS staff and partners.

5. Contribution of existing research:

The applicants and collaborators offer a unique combination of experience, capacity and opportunity to conduct an interdisciplinary study to address the research

questions. The current evidence base for population level effects of living in proximity to accessible natural environments is largely observational and subject to the biases and threats from confounders which characterise many such approaches. This study aims to elucidate how changes in access to natural environments improve health and, perhaps more importantly, how those changes should best be achieved.

In particular, the study will explore whether provision of opportunities to access natural environments through environmental change, or through publicity and promotion activities within the community, make more difference to wellbeing as measured by stress levels. The study's aim is to provide robust and generalisable causal evidence for impact on mental health within deprived communities that receive an intervention designed to increase their contact with natural environments.

The findings will be important for researchers, helping to explain the pathways by which access to natural environments affect health and wellbeing. They will also be important for policy makers, planners and managers in public health, environmental studies, urban design, landscape architecture, forestry and natural resources, geography and economics. In particular, the results will inform future investment in woodland and natural areas close to deprived communities, with recommendations on interventions most likely to be beneficial for mental health. They will be of relevance to the NHS, local authorities, private and public sector and voluntary sector organisations.

7. Project Management:

The study will be directed by the PI and co-applicants, who will meet at least quarterly (either in person or via Skype, to minimise unnecessary travel), and to whom research staff and project manager will report, and via Academic Management Group meetings at least once every 6 months as per the study timetable. We will convene a Study Steering Committee (SSC) as outlined in PHR guidance. Our collaborating partners in Forestry Commission Scotland will assist in identifying appropriate study sites and communities from those eligible under WIAT, and will plan and programme FCS activities on these sites to comply with the research project timetable. They will dedicate staff time and other resources to carry out the necessary interventions, including environmental improvements, forestry management and community outreach work as required.

Team expertise:

Professor Catharine Ward Thompson directs OPENspace, research centre for inclusive access to outdoor environments. Her research covers environmental design and salutogenic environments, with recent support from EPSRC, Scottish Government, Commission for Architecture and the Built Environment, Forestry Commission, Countryside Council for Wales and Natural England. She is a member of the Scottish Government's Good Places, Better Health Evaluation Group. She directs the I'DGO (Inclusive Design for Getting Outdoors) EPSRC research consortium, whose latest, £1.6m project focuses on older people's quality of life and collaborates with colleagues in the USA, Canada and Europe.

Professor Richard Mitchell engages in research focused on the positive and negative health impacts of physical environments, including epidemiological studies of associations between natural environments and mental and physical health in the UK, Europe and USA. He has undertaken evaluation of interventions designed to improve population health, including central heating schemes and Healthy Living Centres.

Professor Steven Cummins works in epidemiology and public health. His expertise is in the socio-environmental determinants of health and the evaluation of community interventions to improve physical activity and psychological wellbeing. He will assist in the collation of relevant environmental data

Professor Peter Aspinall has expertise in quality of life measures, environmental psychology and inclusive design. He will contribute to development of conceptual models relating experience of natural environments, response and psychological restoration.

Professor Andrew Briggs has extensive experience in health economic evaluation, in particular in modelling studies and evaluations in public health intervention. He was part of the Glasgow team that developed a 'capability' based measure for public health interventions, and has been involved in NICE's Programme Development Group for population-based approaches to prevent cardiovascular disease.

Dr Jenny Roe, undertakes research on the restorative health benefits of natural and built environment, using qualitative and quantitative methods to explore relationships between green space and health. Research skills include project management and engaging deprived communities in stress and wellbeing research.

Professor Alastair Leyland, [Professor of Population Health Statistics and Associate Director of the MRC/CSO Social and Public Health Sciences Unit](#), University of Glasgow, will act as consultant on key elements of the statistical design and analysis.

Expert Advisors:

Dr Terry Hartig, Professor of Applied Psychology, Institute for Housing and Urban Research and Department of Psychology, Uppsala University, an expert in research on restorative environments and the value of nature experience for health.

Dr Liz O'Brien, Deputy Head, Social & Economic Research Group, Forest Research, with expertise in the human well-being benefits from trees, woodlands and green spaces.

8. Service users/public involvement:

The WIAT programme of intervention will follow Forestry Commission Scotland requirements and good practice for engaging local communities in the projects, as set out in their WIAT guidance. Both intervention and control sites will have had some level of community involvement in considering eligibility and preparing proposals for WIAT. Once the intervention sites are chosen, community engagement in developing the two-staged programme of work will continue for these sites. Members of the public will thus be involved to an extent in the specification and design of the intervention. They will also be involved in the study via representatives of local community-based organisations sitting on the study steering committee, and through engagement with past communities that have previously benefited from WIAT

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