sweep
Investing in Nature for Health
RESOURCE

Evaluating interventions in green space: Derriford Community Park, Plymouth, Devon

This report was produced in collaboration with Plymouth City Council

PLYMOUTH CITY COUNCIL

Who should read this?

This information is relevant to individuals and organisations planning or implementing interventions in green spaces, whether they are from the environmental management, urban planning, public health or voluntary sectors. It will also be of interest to funders and policy makers working in this space.

Why this resource matters

The health benefits of people spending time in greenspace has become increasingly well evidenced (Wheeler et al. 2020). This has resulted in a growing number of environmental projects aimed at improving public health through a variety of interventions. Examples include enhancements to the quality of greenspace (whether ecological or in relation to the physical infrastructure), increasing availability and access to greenspaces, and the introduction of new programmes aiming to increase their use.

To understand the effectiveness of these projects, it is essential that appropriate measures are used to evaluate the benefits they deliver. Whilst improved health and wellbeing may be their ultimate aim, it is not always appropriate or achievable to measure health outcomes directly. This is due to a variety of factors such as the intangible nature of some health outcomes, the ethical issues involved in collecting and using sensitive personal health data, and the long-time frames often required to deliver interventions that lead to health outcomes. Alternative measures may need to be considered, therefore, such as the use of secondary, intermediate outcomes or proxies, where pathways between impacts of the intervention and health outcomes are known. A good example is between increased levels of physical activity and more immediate impacts to mental health (Hunter et al. 2017).

There is now a growing need, both from practitioners and funders, to draw on the best available evidence around evaluation metrics, and approaches, suitable for evaluating the impacts and outcomes of programmes that invest in the environment for health outcomes.

What is this resource about – and what is its value?

Using Plymouth City Council's Green Minds Derriford Community Park project as a case study, this resource draws on relevant available evidence to set out known pathways through which greenspace interventions may benefit human health. The resource uses a causal loop diagram to display the pathways between interventions and their intermediate and final outcomes, as well as the key influencing factors for success. Also included is a table of measures which could be used to evaluate the success of these interventions, and some case studies highlighting examples of where these measures have been used.

This resource is of direct value to Derriford Community Park but also has wider applicability to others working in this field.

"As manager of a strategic, new city greenspace we're committed to maximising the health and wellbeing outcomes for our local communities. This approach is already helping us identify and focus our resources on key intermediate health and wellbeing outcomes; and to ensure we have the most effective tools to capture our impact.'

Jerry Griffiths, Project Manager at Derriford Community Park

It introduces an approach that promotes a shared understanding of the complex connections between interventions and outcomes, which in turn supports the development and implementation of projects, programmes and partnerships that protect and improve the natural environment and human health and wellbeing. Crucially, the resource also examines some of the best evidence around how to measure and evaluate success.

Causal loop diagrams are used in many disciplines to help visualise how variables are related to one another. Through the use of shareable, online, visual tools, causal loop diagrams can be dynamic and responsive, and if developed collaboratively with projects stakeholders, have the potential to deliver multiple benefits such as:

- Engaging wider stakeholders - especially hard to reach groups.
- Enabling shared discussions and understanding.
- Supporting more effective and collaborative project planning and tracking.
- Acting as a visual communication tool to help strengthen funding applications and support decision making, by clearly showing the links between planned interventions, outcomes and influencing factors for success.
- Demonstrating value for money associated with interventions, especially where there are multiple benefits.

Plymouth City Council's Green Minds Derriford Community Park

Derriford Community Park is a 146-hectare green space in the northeast of Plymouth, South West England. As a high quality multi-functional greenspace, it aims to provide a new city-wide destination for environmental learning, recreation, and large-scale habitat restoration. The park will benefit the health and wellbeing of local residents, as well as visitors from further away.

There are three key interventions taking place at Derriford Community Park:

1. Physical infrastructure – a new 5.6 mile off-road cycling and footpath network; the construction of a community centre with space to view wildlife; signage; and interpretation boards.

2. Ecological enhancement – including nature-based solutions to reduce noise and air pollution; a whole ecosystem approach to habitat and biodiversity enhancement involving the use of climate resilient plant species; rewilding activities including beaver reintroduction.

3. Activities and engagement – practical groups and voluntary conservation activities; family engagement events and citizen science events such as Bioblitz.

Developing and understanding causal loop diagrams

These three interventions have been represented in the Green Minds Derriford Community Park Project Causal Loop Diagram (Fig 1). This is also available online in an interactive format. This casual loop diagram describes the different components of the greenspace interventions and how they interact with each other, highlighting the complexity of these interventions. The key elements shown in the map are:

- The three main types of intervention occurring in Derriford Community Park (as outlined above) - physical infrastructure, ecological enhancement, and activities and engagement.
- The outcomes these interventions are linked to - physical health, mental health, and nature connection.
- The key factors for intervention success - predominantly around community engagement and buy in.

(Fig.2) shows the physical infrastructure casual loop diagram. This has been extracted from the overall Green Minds Derriford Community Park Project Causal Loop Diagram (Fig 1) and shows how different sections of the causal loop diagram can be looked at separately to understand specific intervention and their intermediate outcomes.

It is important to note that the diagrams are simplified versions of reality; representing just the key interventions, connections, and outcomes at one point in time. To further enhance their value, additional connections could be added, as well as other potentially useful information such as on the strength and quality of the relationships.

These diagrams are best used iteratively. This resource can be complemented by use of a Dynamic Mapping resource (see SWEEP's resource, Understanding environmental investment for health in the South West), which illustrates the links and funding streams between stakeholder groups involved in nature-based health programme.

How to use the online Causal Loop Diagram

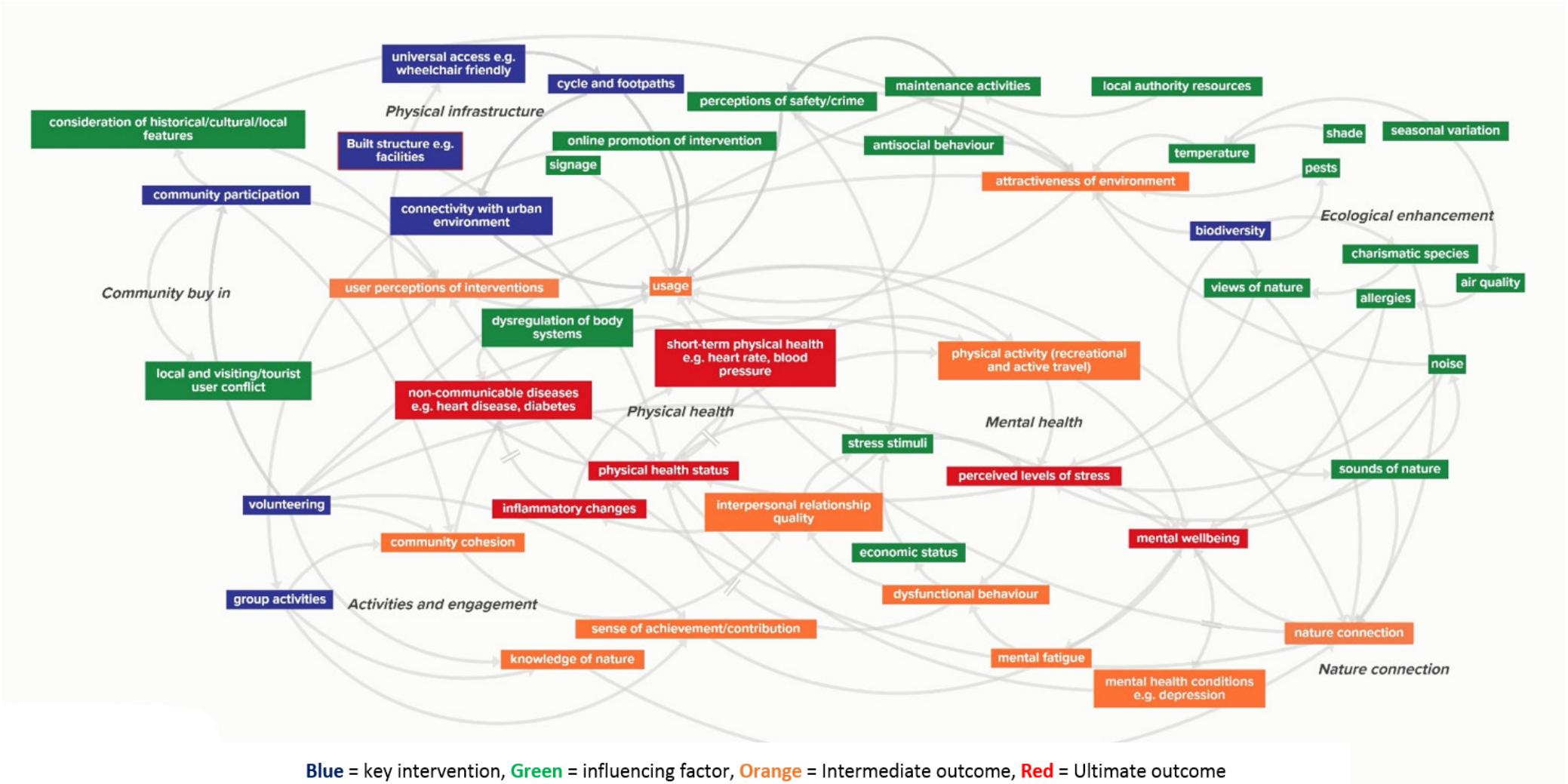
The Green Minds Derriford Community Park Project Causal Loop Diagram is available online in an interactive format.

When the map has opened in your browser, use the navigation bar, top left to zoom in and out.

To see a section of the map, hover your mouse over a word (node) and it will show only the other areas directly linked to it. An example of this is included in this resource (Fig.2 and Fig.3).

Fig. 1 Green Minds Derriford Community Park Project Causal Loop Diagram

This diagram demonstrates the complexity of the relationships between community buy in, physical infrastructure, activities and engagement, physical health, ecological enhancement, mental health, and nature connection.



Blue = key intervention, **Green** = influencing factor, **Orange** = Intermediate outcome, **Red** = Ultimate outcome

// represents a delay in the relationship i.e. it may take a long time for an intervention to create change in a particular outcome.

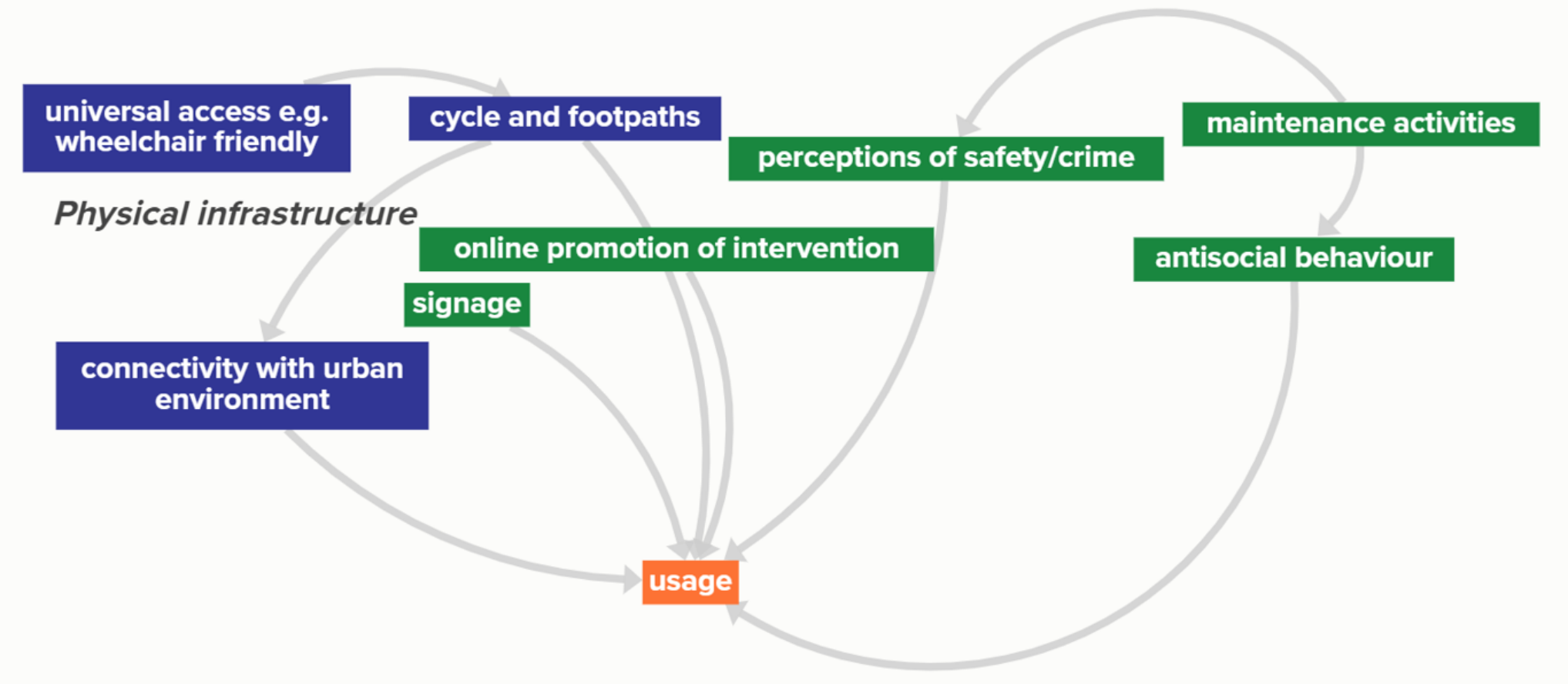
Arrows represent the direction of the relationship e.g. biodiversity affects the attractiveness of the environment to people.

Fig.2 Physical infrastructure casual loop diagram showing intermediate outcomes

This is one section of the Plymouth City Council's Green Minds Derriford Community Park Project Causal Loop Diagram.

It shows the direct variables linked to physical infrastructure and includes the key interventions, influencing factors and the intermediate outcomes. This diagram shows the intermediate outcomes, which are measurable, and that will lead to the associated ultimate outcomes (shown in Fig 3), which tend to be more difficult to measure.

The influencing factors show those aspects key for successful intervention delivery.



Blue = key intervention, **Green** = influencing factor, **Orange** = Intermediate outcome, **Red** = Ultimate outcome

Arrows represent the direction of the relationship e.g. biodiversity affects the attractiveness of the environment to people.

Fig.3 Physical infrastructure causal loop diagram showing ultimate outcomes

This diagram follows on directly from Figure 2 and shows how the intermediate outcome 'usage' of physical infrastructure links to the four ultimate outcomes (shown in red).

Blue = key intervention, **Green** = influencing factor, **Orange** = Intermediate outcome, **Red** = Ultimate outcome

Arrows represent the direction of the relationship e.g. biodiversity affects the attractiveness of the environment to people.

How has this been applied to the Derriford Community Park project?

The process of creating the causal loop diagrams has supported the project delivery group to:

- develop a shared understanding around the health and wellbeing links to the project.
- interrogate assumptions around health and wellbeing outcomes, identifying challenges and risks as well as opportunities.
- demonstrate the value of particular interventions and the use of appropriate and practicable measurement tools of the identified outcomes.

The map will also be used as a visual tool with funders and decision makers to demonstrate the multiple benefits being delivered by the project and how health and wellbeing can deliver real value for money.

How can we measure the health impacts of interventions?

There are many pathways to achieving physical and mental health through the delivery of greenspace interventions including physical activity, social interaction, and psychological factors such as personal restoration or enjoyment of the intervention (Fairbrass et al. 2020). Causal loop diagrams have the advantage of showing intermediate outcomes, that link interventions and ultimate health outcomes. These intermediate outcomes are usually more measurable than the longer-term goals of achieving and evidencing improvements in physical and mental health. As a result, they can offer a more realistic, short-term indication of how successful any particular intervention is.

Table 1 highlights some of the key evaluation measures and methods for both intermediate and ultimate health. Whether measuring health outcomes or intermediate steps, it is important to consider not just how the space is being used but also who is using it and their sociodemographic groups (Hunter et al., 2017).

Table 1. Key evaluation measures and methods for both intermediate and ultimate health

Evaluation measure	Description	Method	Resources
Use of green space			
Visit frequency/time in nature	Spending time in nature is associated with mental well-being (White et al. 2019). Nationally representative surveys such as the Monitor of Engagement with the Natural Environment (MENE) survey ask visitors to self-report how often they visit nature and the duration of their last visit to nature.	Survey	MENE technical report, including survey questions
Evaluation of site quality and experience	Use of various measures to assess the quality of a green/blue space, and user experience of the space. May typically be done via longitudinal methods i.e. before and after a change to the site (environmental intervention).	Environmental audit (professional and/or community); Survey questionnaire	Protocol for WIAT questionnaire and audit tool Report: overview of WIAT
WIAT (Woods in and around Towns) Environmental Audit Tool	Combines an environmental audit and survey questionnaire to assess woodland site interventions. Inc. measures of wellbeing, physical health, perceived stress, nature connectedness, general health, social capital, and perceptions of environment.		
System for Observing Parks and Recreation in Communities (SOPARC)	A validated tool for assessing activities within parks, involving observation of users' physical activity levels, type of use, and demographics e.g. gender. It also collects information on the area's characteristics e.g. accessibility.	Observation	SOPARC App (online app no longer available but guides are) SOPARC User Guides
SOPARNA	An adaptation of SOPARC for measuring recreation- and physical activity-related behaviour in natural open spaces. Measures level of physical activity in relation to specific environmental features	Observation	SOPARNA description and procedures manual
Physical activity			
World Health Organisation Health Economic Assessment Tool (HEAT)	HEAT calculates the reduction in mortality, and value of this reduction, resulting from walking and cycling. It can assess current levels and changes over time, as well as evaluating projects. Data is needed on the size of the population and the amount of time people walk or cycle in the space being assessed.	Observation	HEAT HEAT Methods and User Guide
International Physical Activity Questionnaire (IPAQ) *See also SOPARC*	Measures health-related physical activity in populations. Long and short versions. Can be self-administered.	Survey	IPAQ questionnaire and scoring guide

Table 1. Key evaluation measures and methods for both intermediate and ultimate health (continued)

Evaluation measure	Description	Method	Resources
Mental wellbeing			
WHO-5	A measure of current wellbeing, consisting of five statements which are rated on a scale.	Survey	WHO-5 questionnaire Review showing validity of WHO-5
ONS-4	As with the WHO-5, the ONS-4 are four statements that are rated on a scale. They measure three aspects of wellbeing: life satisfaction, feeling that life is worthwhile, and wellbeing in the moment (feelings of happiness and anxiety)	Survey	ONS Personal well-being user guidance
WEMWBS	A measure of mental wellbeing with two scales, a 14-item and shorter 7-item scale (SWEMWBS). Applied widely and in various settings. Good for evaluating interventions/projects	Survey	WEMWBS Overview and guide to use Paper: Wetlands for Wellbeing Paper: Social prescription referrals to Wellbeing Garden NBS Appendix, section 21
Other relevant scales e.g. Perceived Stress Scale, Perceived Restorativeness Scale			
Social Media	Use of social media platforms to record sentiment as a measure of wellbeing	Quantitative analysis of tweets	Paper: Twitter sentiment to measure wellbeing of public park users
Nature connection			
Connection to nature	Nature connection is associated with health outcomes such as happiness and wellbeing as well as pro-environmental behaviours e.g. (Capaldi et al. 2014; Pritchard et al. 2019). There are several validated scales which can be used to measure nature connection e.g. Nature Connection Index (NCI); Connectedness to Nature Scale (CNS), Inclusion of Nature in Self Scale (INS)	Survey	Paper: Connectedness to Nature Scale Connectedness to Nature Scale survey questions Paper: Nature Connection Index Paper: 30 Days Wild evaluation for Wildlife Trusts UK government NCI dataset NBS Appendix, p1038

Table 1. Key evaluation measures and methods for both intermediate and ultimate health (continued)

Evaluation measure	Description	Method	Resources
Nature connection			
NEAR Health toolkit	Incorporates several measures (ONS-4, NCI, MENE) in a before and after questionnaire to assess how blue and green nature-based activities impact on changes in various aspects of people's lives. A 5-point scale version for children was also produced..	Survey	Research 348 Toolkit: Connecting with Nature for Health and Wellbeing
Engagement with nature	A simple measure of nature connection which ask about activities e.g. smelling wildflowers.	Survey	Paper: Engagement with nature
Pro-nature Conservation Behaviour Scale	A validated scale which measures active behaviours that support the conservation of biodiversity e.g. volunteering, litter-picking.	Survey	Pro-nature Conservation Behaviour Scale Paper: Pro-nature Conservation Behaviour Scale Blog: Pro-nature Conservation Behaviour Scale
Community cohesion			
Nature Prescriptions	Green prescribing, such as gardening, can be used as a non-medical asset-based approach by health professionals working in the community as a way to promote health and wellbeing.	Green prescription	Community wellbeing
See also SOPARC	One pathway for connecting physical health and public parks is through collective efficacy where neighbourhood parks act as a hub for social cohesion.	Observation	SOPARC App (online app no longer available but guides are) SOPARC User Guides
See also WIAT	The protocol followed for environmental audit of a green space in this case focuses on a community-level evaluation of WIAT interventions aimed at improving woodlands so as, ultimately, to improve people's quality of life.	Environmental audit	
Acceptability of intervention			
Sense of empowerment		Survey	NBS Appendix, p834
Trust		Survey	NBS Appendix, p848
Transparency of co-production		Survey	NBS Appendix, p881

Case studies - where have some of these evaluations been applied?

Causal Loop Diagrams

Where? Bradano River, Italy

What? Enhanced decision-making on sustainable management solutions to flooding of the river

Data collection and measures Interviews with stakeholders were used to build individual CLDs, these were integrated into a single CLD by the researchers which was discussed in a workshop with stakeholders. This CLD was then simplified for use in decision-making by the researchers, with this version given final approval by stakeholders. particularly communication between stakeholders and authorities.

Findings

Stakeholders felt the CLD:

- Facilitated stakeholder discussion e.g. helped bridge the communication gap between policymakers and local stakeholders such as farmers
- Improved the role of stakeholders in decision-making, incorporating their specific and local knowledge.
- Developed an integrated perspective on a complex issue, increasing awareness of the problem and interaction between system components, improving understanding of socio-economic and environmental interactions

https://www.sciencedirect.com/science/article/pii/S0022169419310893?via%3Dihub#s0065

Other successful examples include the construction of a CLD linking housing, energy and wellbeing, involving 50 UK stakeholders. By the end of the process stakeholders were discussing policy options https://ehjournal.biomedcentral.com/articles/10.1186/s12940-016-0098-z

World Health Organisation Health Economic Assessment Tool (HEAT)

Where? Wales

What? Assessment of the value of walking on the coast path (Cavil et al. 2014)

Data collection and measures Used the World Health Organization's Health Economic Assessment (HEAT) tool to conduct an economic assessment of the health benefits arising from people walking regularly on the Wales Coast Path. Used data from counters on the path, and user surveys

Findings

- 23,688 people walked on the path every week. On average they walked 4.38 miles per week (spread over a mean of 1.6 visits per week).
- This level of walking prevented 7 deaths per year among the walking population, compared to people who do not walk regularly.
- An economic value can be calculated in relation to the number of deaths prevented, using 'statistical life'. Based on this, the economic value of the health benefits of walking on the Wales Coast Path is £18.3m per year.

- £3.5m of benefit per year can be directly attributed to the existence of the Wales Coast Path.

https://www.euro.who.int/en/health-topics/environment-and-health/Transport-and-health/activities/guidance-and-tools/health-economic-assessment-tool-heat-for-cycling-and-walking/examples-of-applications-of-the-health-economic-assessment-tool-heat-for-walking-and-cycling/united-kingdomwales-affirming-the-value-of-walking-on-the-wales-coast-path

System for Observing Parks and Recreation in Communities (SOPARC)

Where? Barcelona, Spain

What? Evaluation of an urban riverside regeneration project which aimed to improve access for pedestrians and cyclists (Vert et al. 2019)

Data collection and measures Used data from Barcelona local authorities and meta-analysis assessing physical activity and health outcomes to develop and apply the "Blue Active Tool".

Findings

- Estimated that 5753 adult users visited the riverside park daily and performed different types of physical activity
- Estimated an annual reduction of 7.3 deaths and 6.2 cases of diseases, corresponding to 11.9 DALYs and an annual health-economic impact of 23.4 million euros.

This project was part of BlueHealth which has measured the impact of a range of interventions.

Mental health and wellbeing

Where? UK

What? A case study based on the example of gardening as a nature-based social prescription provided by the RHS Bridgewater Wellbeing Garden.

Data collection and measures 47 people were referred to the Wellbeing Garden. The participants' mental wellbeing was scored and recorded before and after attending the Wellbeing Garden using a short version of the validated Warwick-Edinburgh Mental Well-being Scale (SWEMWBS).

Findings 12% increase in those recorded as having high wellbeing after intervention; 20% decrease in those recorded as having low wellbeing after intervention.

https://www.magonlinelibrary.com/doi/full/10.12968/bjcn.2020.25.6.294

Nature Connection

Where? UK

What? Evaluation of the Wildlife Trust's 30 Days Wild campaign effectiveness in improving public engagement with nature

Data collection and measures University of Derby evaluated survey responses from more than 1,000 people over five years

Findings

- 30 Days Wild resulted in very significant increases in nature connectedness for those who began with a weak connection to nature – their nature connectedness rose by 56%
- 30 Days Wild boosted the health of participants by an average of 30%.
- 30 Days Wild made people, particularly those who started with a relatively weak connection to nature, significantly happier
- 30 Days Wild inspired significant increases in pro-nature behaviour

doi:10.1108/JPMH-02-2018-0018.

doi:10.3389/fpsyg.2018.01500.

https://www.wildlifetrusts.org/30-days-wild-5-year-review

Green/Blue Prescriptions

Where? UK

What? A case study based on the example of gardening, as a nature- based social prescription, provided by the RHS Bridgewater Wellbeing Garden.

Data collection and measures Questionnaire using short WEMWBS scale following referral to therapeutic gardening activity.

Findings Made a case for gardening as a social prescription. Illustrates the scope, reach and impact of non-medical, salutogenic approaches for community practitioners.

https://www.magonlinelibrary.com/doi/full/10.12968/bjcn.2020.25.6.294?rfr_dat=cr_pub+
+0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

References

Association for Consultancy and Engineering (2020). Measures for successful outcomes: the five capitals approach - A discussion paper. https://www.acenet.co.uk/media/5151/ace-five-capitals-report-2020.pdf

Capaldi, C. A., Dopko, R. L., Zelenski, J. M. (2014) The relationship between nature connectedness and happiness: a meta-analysis. Frontiers in Psychology, 5, 976. https://doi.org/10.3389/fpsyg.2014.00976

Carlin, C., Kindermann, G., Britton, E., Cormican, M., Domegan, C., Gormally, M. & O'Donovan, D. (2020). Research 348 Toolkit: Connecting with Nature for Health and Wellbeing. Report prepared for the Environmental Protection Agency by the NEAR Health Project Team, NUI Galway.

Cavil, N., H. Rutter, and R. Gower (2014) Economic assessment of the health benefits of walking on the Wales Coast Path. http://publications.naturalengland.org.uk/publication/4513819616346112

Fairbrass A, Chatterjee H, Jones K, Osborn D. Human responses to nature- and culture-based non-clinical interventions: a systematised review. Perspectives in Public Health. December 2020. doi:10.1177/1757913920967036

Howarth, M., Griffiths, A., da Silva, A. & Green, R. (2020). Social prescribing: a 'natural' community-based solution. British Journal of Community Nursing, 25:6, 294-298.

Hunter and colleagues for World Health Organization (2017) Urban green space interventions and health. A review of impacts and effectiveness. WHO:Geneva. http://www.euro.who.int/en/health-topics/environment-and-health/urbanhealth/publications/2017/urban-green-space-interventions-and-health-a-review-of-impacts-andeffectiveness.-full-report-2017

Husk K, Lovell R, Cooper C et al. Participation in environmental enhancement and conservation activities for health and well-being in adults: a review of quantitative and qualitative evidence. Cochrane Database Syst Rev 2016;5:CD010351

International Physical Activity Questionnaire (IPAQ). (nd). Website for open access to questionnaire and scoring protocol. https://sites.google.com/site/theipaq/

Jenkinson, C.E., Dickens, A.P., Jones, K. et al. Is volunteering a public health intervention? A systematic review and meta-analysis of the health and survival of volunteers. BMC Public Health 13, 773 (2013). https://doi.org/10.1186/1471-2458-13-773

Maund, P., Irvine, K., Reeves, J., Strong, E., Cromie, R., Dallimer, M. & Davies. (2019). Wetlands for Wellbeing: Piloting a Nature-Based Health Intervention for the Management of Anxiety and Depression. International Journal of Environmental Research and Public Health. 16. 4413. 10.3390/ijerph16224413.

Mygind L, Kjeldsted E, Hartmeyer RD, Mygind E, Bølling M and Bentsen P (2019) Immersive Nature-Experiences as Health Promotion Interventions for Healthy, Vulnerable, and Sick Populations? A Systematic Review and Appraisal of Controlled Studies. Front. Psychol. 10:943. doi:10.3389/fpsyg.2019.00943

Plunz, R., Zhou, Y., Vintimilla, MIC., McKeown, K., Yu, T., Uguccioni, L. & Sutto, MP. (2019). Twitter sentiment in New York City parks as measure of well-being. Landscape and Urban Planning, 189, 235-246. https://doi.org/10.1016/j.landurbplan.2019.04.024.

Pritchard, A., Richardson, M., Sheffield, D., & McEwan, K. (2019) The relationship between nature connectedness and eudaimonic well-being: A meta-analysis. Journal of Happiness Studies.

References

Sasidharan, V. & McKenzie, T. (nd). SOPARNA: System for Observing Physical Activity and Recreation in Natural Areas - Description and Procedures Manual. San Diego State University, US.

Shanahan DF, Astell-Burt T, Barber EA, Brymer E, Cox DTC, Dean J, Depledge M, Fuller RA, Hartig T, Irvine KN, Jones A, Kikillus H, Lovell R, Mitchell R, Niemelä J, Nieuwenhuijsen M, Pretty J, Townsend M, van Heezik Y, Warber S, Gaston KJ. Nature-Based Interventions for Improving Health and Wellbeing: The Purpose, the People and the Outcomes. Sports (Basel). 2019 Jun 10;7(6):141. doi: 10.3390/sports7060141. PMID: 31185675; PMCID: PMC6628071.

Twohig-Bennet, C., & Jones, A. (2018). The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. Environmental Research, 166, 628–6237. https://doi.org/10.15124/CRD42015025193

van den Bosch, M., Ode Sang, A. Urban natural environments as nature-based solutions for improved public health – A systematic review of reviews, Environmental Research, 158, 2017, p373-384. https://doi.org/10.1016/j.envres.2017.05.040.

Vert, C., Carrasco-Turigas, G., Zijlema, W., Espinosa, A., Cano-Riu, L., Elliott, L.R., Litt, J., Nieuwenhuijsen, M.J., Gascon, M. Impact of a riverside accessibility intervention on use, physical activity, and wellbeing: A mixed methods pre-post evaluation, Landscape and Urban Planning, 190, 2019, 103611. https://doi.org/10.1016/j.landurbplan.2019.103611.

Ward Thompson, C. & Roe, J. (2010). Tools for evaluating the impact of WIAT (Woods in and Around Towns) Intervention sites: Protocol to be followed when using the WIAT Questionnaire and Environmental Audit Tools. Report for Forestry Commission Scotland. OPENspace: Edinburgh College of Art.

Ward Thompson, C., Roe, J. & Aspinall, P. (2010). Woods In and Around Towns (WIAT): a longitudinal study comparing perceptions and use of woodlands pre and post□intervention (2006□2009). Report for Forestry Commission Scotland. OPENspace: Edinburgh College of Art.

Ward Thompson C, Silveirinha de Oliveira E, Tilley S, Elizalde A, Botha W, Briggs A, et al. Health impacts of environmental and social interventions designed to increase deprived communities' access to urban woodlands: a mixed-methods study. Public Health Res 2019;7(2)

Warwick Medical School (2020). The Warwick-Edinburgh Mental Wellbeing Scales – WEMWBS. Website with background and guidance to use of tools. https://warwick.ac.uk/fac/sci/med/research/platform/wemwbs/

Wheeler, W., Gordon-Brown, H., Lovell, R., (2020) Making the Most of Green Space for People's Health. European Centre for Environment and Human Health, University of Exeter

White, M.P. et al. (2019) Spending at least 120 minutes a week in nature is associated with good health and wellbeing. Scientific Reports, 9, 7730. https://doi.org/10.1038/s41598-019-44097-3

WHO (no date) Examples of applications of the health economic assessment tool (HEAT) for cycling. Available from https://www.euro.who.int/en/health-topics/environment-and-health/Transport-and-health/activities/guidance-and-tools/health-economic-assessment-tool-heat-for-cycling-and-walking/examples-of-applications-of-the-health-economic-assessment-tool-heat-for-walking-and-cycling [Accessed 22 April 2021]

WHO ( ) Health economic assessment tool (HEAT) for walking and for cycling. Available from: https://www.euro.who.int/__data/assets/pdf_file/0010/352963/Heat.pdf [Accessed 22 April 2021]

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De Bell, S., Hind, K., Abrahams, R., Lovell, R.& Wheeler, B. (2021) *Evaluating interventions in green space: Derriford Community Park, Plymouth.* This SWEEP resource was produced as part of the Investing in Nature for Health project.

SWEEP is a partnership between the University of Exeter, the University of Plymouth and Plymouth Marine Laboratory.

Funded by NERC, it brings together experts and stakeholders to solve key challenges faced by those working with our natural resources.

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