Links between natural environments and mental health

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NATURAL ENGLAND

Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Contents

Purpose of Briefing

This briefing note is one of a series that summarises evidence of the links between the natural environment and a range of outcomes. They are based on rapid reviews, not systematic reviews. Please refer to the Methodology (EIN069) document for further details on the method and search strategy. They build on the evidence but are not comprehensive and should be read together with the original notes:

- EIN015 Connection to Nature
- EIN018 Links between natural environments and mental health
- EIN019 Links between natural environments and physical activity
- EIN020 Links between natural environments and physiological health
- EIN021 Links between natural environments and obesity

This briefing focuses on the links between the natural environments and mental health. This is an update of EIN018 (2016): Dr Rebecca Lovell, University of Exeter. The notes are aimed at: policy makers, practitioners, practice enablers (including Natural England), local decision makers, and the wider research community. They highlight some of the implications for future policy, service delivery and research. It is intended that this note will help to inform practitioner planning, targeting and rationales, but not the identification of solutions or the design of interventions. Barriers to access or use of natural environments are not considered in this note. The notes consider evidence of specific relevance to the UK and outcomes for both adults and children. Please see EIN069 for methodology and glossary. Words marked with an asterisk are defined in the glossary.

Extent of the issue

Poor mental health* remains the leading cause of disability in the UK[1] with population rates continuously increasing.[2] Poor mental health is a contributory factor in poor physical health, difficulties in maintaining relationships, and acts as a barrier to full participation in education and the workplace. The Mental Health Foundation reports that 1 in 4 people in England will experience a mental health problem in any given year.[2] Fifty percent of long-term mental health problems are established by age 14, and 75 percent by age 24[3] and are usually lifelong conditions. The costs of mental health problems to the UK economy are estimated to amount to £70-£100 billion each year, around 4.5 percent of the UK GDP.[4] Anyone can have mental illness, but the evidence suggests some groups are more likely to experience these than others, this includes people who identify as LGBTIQ+,[5] some minority ethnic groups[2] and young women aged 16-24.[2] In the UK, the percentage of adults with depression doubled during the Covid-19 pandemic with rates increasing from 9.7% in March 2020, to 19.2% by June 2020.[6]

Evidence suggests that positive mental health is intrinsically related to access to green and blue space*.[7] A higher level of deprivation is correlated to lesser access to outdoor space.[8,9.] In England, one in eight people do not have access to a garden and Black

people are four times more likely to have no access to outdoor garden space at home, whether it be a private or shared garden, a patio or a balcony (37% compared to 10%).[10]

Summary statement

There is now a large body of research evidence reporting the benefits of the natural environment on mental health.[11] Much of this data looks at exposure to nature (i.e. proximity, time spent in nature, and quality of nature) and its impact on health. In addition, a new, emerging evidence base looks at the benefits of connection to nature* which can be defined as "a measurable psychological construct that moves beyond contact with nature to an individual's sense of their relationship with the natural world".[12] The evidence presented in this summary about mental health is mostly derived from nature *exposure* rather than nature *connection* – although the two concepts do tend to become conflated within the literature. For more evidence on the benefits of connection to nature please see EIN068.

Human wellbeing* and the natural environment are thought to be intrinsically linked. The increase in urbanisation of living environments is changing the relationship people have with nature in terms of reducing the likelihood of exposure (proximity or time spent in nature) or impacting feelings of connection to nature.[7] There is a growing, robust body of evidence[11] which shows a positive association between a) population level exposure to natural environments and b) individual use of natural environments, alongside a variety of positive mental health outcomes (e.g., perception of wellbeing and mood). Impacts appear to differ according to socio-economic status (SES) and access to nature. Several recent scoping* and systematic reviews* show that interventions* which make use of natural environments as settings for mental health promotion or therapy deliver positive outcomes.

Evidence also indicates that nature-based interventions for mental health are cost effective. Whilst there is an increasing amount of robust research, where confounding factors are controlled for, some of the existing evidence comes from studies which may be subject to certain types of bias. Within these studies it is difficult to tell whether exposure to natural environments causes better mental health outcomes, or whether people with better mental health tend to visit nature more often or live in greener areas.

The impact of nature-based interventions on mental health for people from deprived communities needs to be systematically and longitudinally* studied. This is especially relevant in the context of Covid-19 and challenges to the cost of living impacting those that are most vulnerable in our society.

The below evidence base examined in this evidence briefing is occasionally contradictory and varies according to the nature of exposure assumed and population in which it is assessed. The evidence for most of the outcomes included in this briefing is indicative of a relationship; the types of studies used to investigate the relationships are not suitable to help us understand causal* linkages, instead we find indicative associations*. Pathways between an exposure (e.g., living near natural environments) and outcome (e.g., mental

wellbeing) are complex and likely to be affected by many factors (including lifestyle), without more robust studies it is difficult to identify exactly what role natural environments have in leading to improved mental health outcomes.

Review of the evidence

What are the impacts of activity or time spent in natural environments on mental health?

Most studies (for both adults and children/ young people) show that spending time in or being active in natural environments is associated with positive outcomes for mental health, stress, mood disorders and psycho-social wellbeing .[13–15] Literature looking at the impact of the natural environment on children's mental health also show positive results.[16,17] Research is beginning to develop theoretical models and mechanisms of the impacts of the natural environment on mental health.[18]

- Using data from the Monitor of Engagement with the Natural Environment (MENE) Survey (2014-16) modelling[19] has shown that spending at least 120 minutes a week in nature (either in one long or several shorter visits) was associated with self-reported estimates of good health and wellbeing (however, authors do call for prospective longitudinal studies to confirm this).
- A systematic review[14] of 43 papers looking at the quantitative measures of the impact of nature viewing, outdoor walks, outdoor exercise, and gardening, found reductions in the experience of stress, heart rate and blood pressure.
- A systematic review[13] of blue space interventions for health and wellbeing located 33 studies, and highlighted improvements in mental health and psycho-social wellbeing.
- A study investigating associations between types and quantities of green space and sales of mood disorder medication in Belgium, found that living in green environments (particularly woodland) may be beneficial for adult mental health.[15]
- A cohort* study [16] based in four European cities looked at childhood exposure to natural outdoor environments in relation to mental health risk. The research found that adults with low levels of childhood nature exposure had, when compared to adults with high levels of childhood nature exposure, significantly worse mental health.
- A longitudinal study with data collected from all children born in New Zealand found that rurality and increased minimum greenness (increasing the smallest amount of exposure to green space) were strongly and independently associated with a reduced risk of attention deficit hyperactivity disorder (ADHD).[17]

What are the impacts of living near natural environments on mental health?

Most studies, that have considered relationships at a population level, find greater amounts of natural environment around the home have a protective effect on a broad range of mental health outcomes, including self-reported mental health, and is associated with a reduced risk of stress, tendency to psychiatric morbidity, psychological distress, depressive symptoms, clinical anxiety, depression, and mood disorders in adults.

- A review of 50 case studies looking at the impact of nature-based solutions on health and wellbeing found that people's proximity to natural environments was associated with lower stress and faster recovery from psychological events.[20] This was confirmed by a meta-analysis*[21] finding that natural environments can lead to reductions in physical measures of stress such as salivary cortisol*, blood pressure and heart rate.
- A systematic review[22] of the relationship between proximity to green space and the mental wellbeing of adults pooled 50 studies. This work found a positive association with mental wellbeing (particularly hedonic* wellbeing, but not eudemonic* wellbeing), however authors note that findings were limited by the heterogeneity of the papers.
- A systematic review[23] of 24 longitudinal and cross-sectional studies looking at the urban environment's impact on adolescent mental health and wellbeing, found that being in green space, and neighbourhood quality, are associated with adolescent mental health and wellbeing, although the methodology did not find a causal relationship/mechanism.
- A cohort study of children and risk of ADHD showed that those in early childhood with less access to green space had a greater chance of developing this disorder.[17,24]
- Studies conducted during the Covid-19 pandemic have also found a positive benefit of green space, gardens, allotments, and houseplants, for mental health. A survey from Bulgaria[25] exploring whether greenery experienced indoors and outdoors supported mental health during quarantine periods due to COVID-19, found that houseplants abundance and garden access was associated with better mental health. This was supported by the findings of a UK study looking at the impact of allotments and green space on mental health.[26] Furthermore, a Scottish cohort study[27] found worse mental health outcomes for those living in an urban environment, with no access to outdoor space, or in deprived areas, and those that were younger, female, and/or shielding from Covid-19.

What is the impact of the type or quality of natural environment on mental health?

There is a small amount of evidence which suggests that engagement with certain types of environments (i.e. coastal, mountain, woodlands) are associated with better mental health.[28,29]

- A scoping review[30] assessing 77 intervention studies found significant effects of gardens and gardening in the context of social prescribing on mental wellbeing, physical activity and reduced social isolation.
- A meta-analysis of 40 studies[31] found that exposure to forest environments was associated with several health benefits including, reduced systolic and diastolic blood pressure, heart rate, sympathetic nervous activity*, salivary cortisol and increased parasympathetic nervous activity*.
- A systematic review[32] of the physical and mental health benefits of rambling in nature found empirical evidence of the connections between wildlands and human health.
- A randomised control trial of adults assessing the benefits of 20-minute walks (4 days a week for 3 weeks) in blue spaces, urban space and control sites found benefits of improved wellbeing and mood measures in blue spaces compared to the other sites of walking.[33]
- A study in Belgium looking at type of green exposure (woodland, urban low-green, grassland, and garden) and mood disorder medication levels[15] found that exposure to woodland space may be the most beneficial type of natural environment for mental health support.

Do the mental health impacts of natural environments vary between different groups of people?

It is important to know how different groups of people are impacted by the natural environment. The findings from the two identified studies are listed below, but more research is needed in this area.

- A longitudinal study[34] of over 35,00 women and 29,000 men in the UK found that green space was associated with better mental health among men in mid-adulthood, but not women at a similar age.
- A surf therapy intervention[35] was found to have several benefits for adolescents, and a qualitative exploration of this intervention found some potential protective mental health factors.

Do natural environments have an impact on mental health related health inequalities?

Exposure to or use of natural environments is thought to be related to reduced socio-economic inequalities in mental health; however more needs to be understood about direction of this relationship and the many confounding and inter-related factors at play.

- A systematic review of World Health Organisation data from Europe found 14 studies and concluded that the most economically deprived countries have less available good quality public green space compared to more affluent countries.[36]
- Public health data[37] from Portugal showed that mean distance to green space increased with neighbourhood deprivation, therefore limiting access.
- The Born in Bradford longitudinal cohort study[38] looked at 4-year-olds' mental wellbeing in relation to availability of green space. This study found that amongst South Asian children, green spaces were associated with fewer behavioural difficulties. The authors state that public health and urban planning need to focus on the quantity and quality of green space access for ethnic minority groups.
- A survey of 2,000 people during Covid-19 lockdown in Scotland[27] found that people in urban, deprived areas with no access to, or sharing residential outside space, had worse mental health distress in response to the pandemic.

What are the outcomes of mental health interventions using or taking place in natural environments?

There is a growing and strong body[11] of evidence to suggest that using the natural environment as a setting or resource for the prevention or treatment of poor mental health might be effective in treating specific conditions in some groups. Longer term programmes appear to be more effective than short term. Understanding of how and when interventions may be effective is limited due to methodological quality of studies and lack of homogeneity of studies for systematic reviews or meta-analyses to quantify effectiveness. Longitudinal data is also lacking. There are few robust evaluations and existing evidence may be prone to various sources of bias.

Evidence from nature contact or exposure studies

- A systematic review[39] looking at people's nature connectedness grouped data from 20 studies and concluded that people with a greater sense of connection to nature had greater eudemonic wellbeing and self-reported personal growth.
- A systematic review of 51 studies[40] looking at the mental health benefits of nature recreation found that 90% of the articles reported at least one positive finding, including aspects of affect, cognition, restoration, wellbeing, decreases in anxiety and depression. This was confirmed by another systematic review[41] of 5 studies showing benefit for nature exposure and people with somatic disease.

- Three scoping reviews have found indications of improved mental health due to exposure to natural environments. However, all three[42–44] state that the studies pooled have methodological limitations and heterogeneity, and further research is needed to be conducted to make clearer conclusions.
- A pilot study*[45] of nature-based therapy and eating disorders has shown initial positive results to help people complete their treatment.
- A review[46] found that some emerging evidence exists to show that caregivers for people living with cancer experience benefits from natural environment exposure, although recommended more research is needed to confirm this association.
- A systematic review[47] of evidence for long-term exposure to nature in terms of healthy aging and mental health found limited and inadequate data and called for more longitudinal studies. This was also confirmed by a systematic review[48] of the relationship of green and blue spaces and mental health.

Evidence from connection to nature studies

- A survey using data collected from 18 countries from over 16,000 respondents, looked at the benefits of blue and green spaces on wellbeing. Nature connectedness was positively associated with positive wellbeing and negatively associated with mental distress. Green spaces were associated with a lower likelihood of using medication for depression and inland-blue space visits were associated with a lower likelihood of using anxiety medication.[49]
- A Cochrane review of the benefits of nature connection via conservation activities such as The Conservation Volunteers' Green Gym (volunteer nature conservation), showed that exposure to natural environments, achievement, enjoyment and social contact were important pathways to positive mental health outcomes.[50]

What is the cost effectiveness of interventions?

The small number of studies that have estimated the economic value associated 'green' interventions for mental health, have typically shown them to be cost effective and to result in savings to society.

- A Social Return on Investment (SROI) study by The Wildlife Trust found that environments rich in wildlife may result in better mental health for people with low wellbeing at baseline. The SROI found a return of – between £4.20 and £11.94 for every £1 invested.[51]
- An evidence review commissioned by Natural England found that SROI analyses for nature-based initiatives for people with mental health issues ranged from £2.35 to £10.70 per £1 invested.[52]
- The 'Ecominds' programme delivered by the charity Mind, provided nature-based health interventions to support mental health to 12,000 people across England. Projects included horticultural and agricultural schemes, walking groups and regeneration projects in local parks. Ecominds was estimated to have resulted in

savings (through reduced NHS costs, benefits reductions, and increased tax contributions) of around £7,082 per participant.[53] It was estimated the programme would result in savings of £1.46m for 246 people who had found full-time work following participation.

- The Scottish 'Branching Out' programme (where patients with mental health issues are prescribed a series of formally led, woodland activities) found that based for 335 service users per year, the cost per Quality Adjusted Life Year gained (QALY) was £8,600[54] In comparison to the NICE threshold of £20-30,000 per QALY.

Implications for policy, service delivery and research

Policy and service delivery

- The strong weight of good evidence that natural spaces, in and around the living environment to promote better mental health, has enabled the recent introduction of green social prescribing in the health and social care system.[55,56]
- As there is now tentative evidence of therapeutic and cost effectiveness, those with responsibility for promoting or treating mental health could explore the potential of developing and trialling evidence-led programmes of non-medical interventions suitable for commissioning. This would perhaps be suitable for patients with mental health conditions who cannot be treated by green social prescribing.
- Planners and developers should be aware that the greening of urban areas could be considered to be a population health intervention which may improve mental health.[57.]
- Evidence from the experience of Covid-19 has shown the importance of connection with the natural environment for mental health.[58]
- Nature-based interventions should be offered to those most in need in terms of lack of access to outdoor space.[9,59]

Research gaps

Whilst environmental interventions targeting mental health appear to be effective, many of the systematic reviews and the studies contained within them do not have enough heterogeneity to confirm clear results, and do not track people over enough time to confirm the long-term effective impacts of nature-based interventions on mental health. Future reviews of environmental mental health interventions should seek to specify effectiveness in relation to health condition, population, intervention, and outcome.

Specifically, there is a need to better understand:

- The impacts of green spaces around the school, workplace and other spaces in which people spend significant proportions of their day.[60]
- The causal pathways and contributory mechanisms linking mental health outcomes to natural environment exposure.
- The cost-effectiveness, variation in any outcomes, and potential to ameliorate or exacerbate health inequalities of natural environment interventions.
- The impact of people from deprived communities' access to nature on their mental health needs to be systematically studied. This is especially relevant in the context of Covid-19 and challenges to the cost of living impacting those who are most vulnerable in society.
- As many interventions are complex and often part of wider programmes of activity, evaluators should consider applying the principles of the Medical Research Council's 'Complex Intervention Guidance' (a new framework for developing and evaluating complex interventions) to better define interventions and understand process and outcomes.[61]

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Glossary

Please see EIN069 for a full glossary

Association(s)	See Correlation.
Blue space	Outdoor environments–either natural or manmade–that prominently feature water and are accessible to people, e.g., the collective term for rivers, lakes or the sea.
Causal, causality, causation	When something has an actual effect on something else- and is not simply correlated with it.
Cohort	Cohort studies are a type of longitudinal study—an approach that follows research participants over a period of time (often many years).
Connection to nature	The term 'connection to nature' is frequently used to describe our enduring relationship with nature, including emotions, attitudes and behaviour. Research shows that people with a greater connection to nature are more likely to behave positively towards the environment, wildlife and habitats.
Cortisol	A stress hormone.
Eudemonia/ Eudemonic	Eudemonic wellbeing refers to the type of happiness or contentment that is achieved through self-actualisation and having meaningful purpose in one's life.
Green space	Green space refers to land that is partly or completely covered with grass, trees, shrubs, or other vegetation. Green space includes parks, community gardens, and cemeteries.
Hedonic wellbeing	Hedonic wellbeing is based on the notion that increased pleasure and decreased pain leads to happiness. Hedonic concepts are based on the notion of subjective wellbeing. Subjective well-being is a scientific term that is commonly used to denote the 'happy or good life'.
Intervention	An external variable that comes between someone and an outcome, that changes someone's eventual outcome as a result.
Longitudinal	A long-term study in which as Cohort is visited at different time points to get a long-term understanding of an effect.

Mental health	Mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make choices. Mental health is important at every stage of life, from childhood and adolescence through adulthood.
Meta-analysis	Meta-analysis is a research process used to systematically synthesise or merge the findings of single, independent studies, using statistical methods to calculate an overall or 'absolute' effect.
Parasympathetic nervous activity	The parasympathetic nervous system predominates in quiet “rest and digest” conditions while the sympathetic nervous system drives the “fight or flight” response in stressful situations. The main purpose of the PNS is to conserve energy to be used later and to regulate bodily functions like digestion and urination.
Pilot study	A pilot study, also called a 'feasibility' study, is a small-scale preliminary study conducted before any large-scale quantitative research in order to evaluate the potential for a future, full-scale project.
Scoping review	A review that is less rigorous than a Systematic review or Meta-analysis.
Sympathetic nervous activity	The sympathetic nervous system directs the body's rapid involuntary response to dangerous or stressful situations. A flash flood of hormones boosts the body's alertness and heart rate, sending extra blood to the muscles.
Systematic review	A systematic review is a summary of all of the literature on a particular topic, that meets pre-defined eligibility criteria.
Wellbeing	The extent to which a person is in a state of being comfortable, healthy or happy.

About Natural England

Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

Further Information

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