

# Links between natural environments and mental health: evidence briefing

## Purpose of briefing

This briefing note is part of a series that summarises evidence of the relationships between the natural environment and a range of outcomes. This briefing focuses on links between natural environments and mental health. The notes are aimed at: policy makers, practitioners, practice enablers (including Natural England, Natural Resources Wales etc.), local decision makers, and the wider research community. They highlight some of the implications for future policy, service delivery and research. It is intended they will inform practitioner planning, targeting and rationales, but not the identification of solutions or design of interventions. Barriers to access or use are not considered in these notes. The other briefings in the series published so far cover physical activity, obesity, physiological health, connection with nature, and learning. The notes consider evidence of relevance to the UK and outcomes for both adults and children. Please see [EIN016](#) for methodology, glossary and evaluation resources.

## Extent of the issue

- Poor mental health represents the largest cause of disability in the UK and rates are on the increase.
- It is a contributory factor in poor physical health and difficulties in maintaining relationships, and acts as a barrier to full participation in education and the workplace.
- The [Mental Health Foundation](#) highlights that 1 in 4 people in England will experience a mental health problem in any given year, and 50 percent of long-term mental health problems are established by age 14 and 75 percent by age 24.
- 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 GDP<sup>1</sup>.

## Summary statement

There is a growing body of evidence which tends to demonstrate a positive association between a) population level exposure to natural environments and b) individual use of natural environments, and a variety of positive mental health outcomes. Impacts appear to differ according to socio-economic status and other demographic factors such as age or gender. Interventions which make use of natural environments as settings for mental health promotion or therapy tend to show weak but positive outcomes and are found to be cost effective. Whilst there is an increasing amount of robust research, where confounding factors which may affect the relationship are controlled for, some of the existing evidence comes from the types of studies which may be subject to certain types of bias, and which can't tell us whether exposure

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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.



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### Review of the evidence

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

Most studies show spending time in or being active in natural environments is associated with positive outcomes for attention, anger, fatigue and sadness [1, 2], higher levels of positive affect and lower levels of negative affect (mood/emotion) [3] and physiological stress [4]. There is generally positive evidence relating to the impacts of activities in natural environments on children's mental health and their cognitive, emotional and behavioural functioning.

- A study found that regular use of natural environments has been shown to be associated with lower risk of poor mental health [5].
- A study of the behaviour of children with Attention Deficit Hyperactivity Disorder in different environments found better concentration in woodlands in comparison to urban places [6].

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

Most studies, which tend to have considered relationships at a population level, find greater amounts of natural environment around the home has a protective effect on self-reported mental health and is associated with reduced risk of stress, tendency to psychiatric morbidity, psychological distress, depressive symptoms, clinical anxiety, depression and mood disorders in adults [7-9].

- Analysis of longitudinal data from over 10,000 people in England suggests that people report lower mental distress and higher wellbeing when living in urban areas with more greenspace in comparison to when they lived in urban areas with less greenspace [10] further analysis showed that moving to greener urban areas was associated with sustained mental health improvements, however, the reverse effect was not found, i.e. moving to an urban area with less green space did not undermine mental health [11].
- A study carried out in deprived populations in urban Scotland found more green space was associated with lower levels of self-reported perceived stress and improved physiological stress (assessed using cortisol<sup>2</sup> concentrations) [12].
- In children, a greater quantity or proximity of natural spaces around the home or school is significantly related to improved cognitive performance [13] and reduced incidence of behavioural issues [14].
- Living environments with a greater amount of greenspaces are associated with reduced likelihood of depression and anxiety amongst older people [15].

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### 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 a) certain types of environment (coastal, mountain, woodlands), and b) better quality natural environments are associated with better mental health [16, 17].

- A study using longitudinal data to explore the effects of home relocations within rural areas found that mental health was higher in years when individuals lived in rural areas with a greater proportion of farmland, uplands, and coastal environments, compared to built elements [18].
- Qualitative research has found that first hand experiences of wildlife are meaningful and important, contribute to quality of life, and result in feelings that are 'beyond words' [19].

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

Most studies show the impacts of natural environments on mental health outcomes differ according to health or socio-economic status, and according to demographic factors (e.g. age). However, these patterns vary between studies. The majority of evidence relates to adults, less is known about the impacts for children.

- A UK study found that the mental health benefits of greater amounts of natural environments around the home was most pronounced in men during their early to mid-adulthood [20].
- The restorative impacts of walking in natural environments appears to be most beneficial for those with poor health (in comparison to those with better health) [21].

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

There is some evidence that suggests that exposure to or use of natural environments is associated with reduced socio-economic inequalities in mental health.

- A study of residents of 34 European countries found socio-economic inequality in mental well-being was narrower among those reporting better access to recreational or green areas [22]. The mental health gap between those with the greatest and least financial strain (an indicator of affluence) was 40% lower in areas with the highest access to the natural environment compared to the areas with the lowest access.
- Higher proportions of greenspace in residential areas is associated with lower rates of depressive symptoms in pregnant women, with associations strongest for the most socio-economically deprived groups [23].

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

There is a small body 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. Our understanding of how and when interventions may be effective is limited, there are few robust evaluations and existing evidence may be prone to various sources of bias.

- Reviews of 'nature assisted therapies' and 'green care' have found some evidence to suggest the activities may positively affect outcomes such as mood state, depression, dementia related symptoms, frequency of negative thoughts and psychoticism [24, 25].

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Longer programmes appear to result in better outcomes [24].

- Reviews of the use of sensory gardens and horticultural activities in dementia care have found some evidence of improvements in sleep and general well-being, and reductions in the occurrence of agitation and disruptive behaviours [26-28].
- A Cochrane review of the benefits of conservation activities such as the TCVs Green Gym<sup>3</sup>, showed that exposure to natural environments, achievement, enjoyment and social contact were important pathways to positive mental health outcomes [29]

### What is the cost effectiveness of interventions?

The small number of studies to have estimated economic values associated with mental health 'green' interventions have typically shown them to be cost effective and to result in savings to society.

- The Ecominds<sup>4</sup> programme (nature based health interventions for mental health) was estimated to result in savings (through reduced NHS costs, benefits reductions and increased tax contributions) of around £7,082 per participant [30, 31]. 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<sup>5</sup> (where patients with mental health issues are prescribed a series of formal led woodland activities) found that based on 335 service users per year, the cost per Quality Adjusted Life Year gained (QALY) was £8600 [32]. In comparison to the NICE threshold of £30,000 per QALY, the Branching Out programme is cost-effective.



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## Implications for policy, service delivery and research

### Policy and service delivery

- The weight of evidence suggests that future policy and decision making should take account of the potential for good quality natural spaces in and around the living environment to promote better mental health.
- Planners and developers should be aware that the greening of urban areas could be considered to be a population health intervention [33, 34].
- As there is now some tentative evidence of therapeutic effectiveness and cost-effectiveness, those with responsibility for promoting or treating mental health could explore the potential of developing and trialling evidence led programmes of interventions suitable for commissioning.

### Research

- Whilst environmental interventions targeting mental health appear to be effective, many of the existing studies are small scale and do not follow people for long enough for us to understand how effective the activities are [35, 36]. Future reviews of environmental mental health interventions should seek to specify effectiveness in relation to health condition, population, intervention and outcome [24].

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- There is a need to better understand:
  - The impacts of greenspaces around the school, workplace and other spaces in which people spend significant proportions of their day [35].
  - 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.
- As many interventions are essentially complex and often part of wider programmes of activity, evaluators should consider application of the principles of the Medical Research Council's '*Complex Intervention Guidance*' to better define interventions and understand process and outcomes [37].
- Good quality evaluations, using robust methodologies with rigorous reporting, should be integrated into future greenspace interventions to help clarify 'what works, when and for whom' [38].
- There is potential to make links with the new [Centre for the Evaluation of Complexity Across the Nexus](#).

## References

1. Bowler, D., et al., A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 2010. 10: p. 456.
2. Thompson Coon, J., et al., Does Participating in Physical Activity in Outdoor Natural Environments Have a Greater Effect on Physical and Mental Wellbeing than Physical Activity Indoors? A Systematic Review. *Environmental Science & Technology*, 2011. 45(5): p. 1761-1772.
3. McMahan, E.A. and D. Estes, The effect of contact with natural environments on positive and negative affect: A meta-analysis. *The Journal of Positive Psychology*, 2015. 10(6): p. 507-519.
4. Haluza, D., R. Schonbauer, and R. Cervinka, Green Perspectives for Public Health: A Narrative Review on the Physiological Effects of Experiencing Outdoor Nature. *International Journal of environmental Research & Public Health*, 2014. 11(5): p. 5445-5461.
5. Mitchell, R., Is physical activity in natural environments better for mental health than physical activity in other environments? *Soc Sci Med*, 2013. 91: p. 130-4.
6. van den Berg, A.E. and C.G. van den Berg, A comparison of children with ADHD in a natural and built setting. *Child: Care, Health And Development*, 2011. 37(3): p. 430-439.
7. James, P., et al., A Review of the Health Benefits of Greenness. *Current Epidemiology Reports*, 2015: 2(2) p. 1-12.
8. van den Berg, M., et al., Health Benefits of Green Spaces in the Living Environment: A Systematic Review of Epidemiological Studies. *Urban Forestry & Urban Greening*, 2015. 14(4): p.806-816.
9. Völker, S. and T. Kistemann, The impact of blue space on human health and well-being – Salutogenetic health effects of inland surface waters: A review. *International Journal of Hygiene and Environmental Health*, 2011. 214(6): p. 449-460.
10. White, M.P., et al., Would You Be Happier Living in a Greener Urban Area? A Fixed-Effects Analysis of Panel Data. *Psychological Science*, 2013. 6: p. 920-928.

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11. Alcock, I., et al., Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas. *Environmental Science & Technology*, 2014. 48(2): p. 1247-1255.
12. Roe, J., et al., Green space and stress: evidence from cortisol measures in deprived urban communities. *Int J Environ Res Public Health*, 2013. 10(9): p. 4086-103.
13. Dadvand, P., et al., Green spaces and cognitive development in primary schoolchildren. *Proceedings of the National Academy of Sciences*, 2015. 112(26): p. 7937-7942.
14. Markevych, I., et al., Access to urban green spaces and behavioural problems in children: Results from the GINIplus and LISApplus studies. *Environ Int*, 2014. 71: p. 29-35.
15. Wu, Y.-T., et al., Older people, the natural environment and common mental disorders: cross-sectional results from the Cognitive Function and Ageing Study. *BMJ Open*, 2015. 5(9).
16. Dean, J., K. van Dooren, and P. Weinstein, Does biodiversity improve mental health in urban settings? *Medical hypotheses*, 2011. 76(6): p. 877-880.
17. Lovell, R., et al., A systematic review of the health and well-being benefits of biodiverse environments. *J. Toxicol. Environ. Health Part B*, 2014. 17: p. 1-20.
18. Alcock, I., et al., What accounts for 'England's green and pleasant land'? A panel data analysis of mental health and land cover types in rural England. *Landscape and Urban Planning*, 2015. 142: p. 38-46.
19. Curtin, S., Wildlife tourism: the intangible, psychological benefits of human-wildlife encounters. *Current Issues in Tourism*, 2009. 12(5/6): p. 451-474.
20. Astell-Burt, T., R. Mitchell, and T. Hartig, The association between green space and mental health varies across the lifecourse. A longitudinal study. *Journal of Epidemiology and Community Health*, 2014. 68(6): p. 578-583.
21. Roe, J. and P. Aspinall, The restorative benefits of walking in urban and rural settings in adults with good and poor mental health. *Health & Place*, 2011. 17(1): p. 103-113.
22. Mitchell, R.J., et al., Neighborhood Environments and Socioeconomic Inequalities in Mental Well-Being. *American Journal of Preventive Medicine*, 2015. 49(1): p. 80-84.
23. McEachan, R.R.C., et al., The association between green space and depressive symptoms in pregnant women: moderating roles of socioeconomic status and physical activity. *Journal of Epidemiology and Community Health*, 2015. ISSN 1470-2738 (In Press).
24. Annerstedt, M. and P. Wahrborg, Nature-assisted therapy: systematic review of controlled and observational studies. *Scandinavian Journal of Public Health*, 2011. 39(4): p. 371-88.
25. Bragg, R. and G. Atkins, A review of nature-based interventions for mental health care. 2016, Natural England Commissioned Reports, Number 204.
26. Gonzalez, M.T. and M. Kirkevold, Benefits of sensory garden and horticultural activities in dementia care: a modified scoping review. *J Clin Nurs*, 2014. 23(19-20): p. 2698-715.
27. Whear, R., et al., What is the impact of using outdoor spaces such as gardens on the physical and mental well-being of those with dementia? A systematic review of quantitative and qualitative evidence. *J Am Med Dir Assoc*, 2014. 15(10): p. 697-705.

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28. Detweiler, M.B., et al., What Is the Evidence to Support the Use of Therapeutic Gardens for the Elderly? *Psychiatry Investigation*, 2012. 9(2): p. 100-110.

29. Lovell, R., et al., Understanding how environmental enhancement and conservation activities may benefit health and wellbeing: a systematic review. *BMC Public Health*, 2015. 15(1): p. 864.

30. New Economics Foundation, *The Economic Benefits of Ecominds: A case study approach*. 2013: London.

31. *Mind, Feel better outside, feel better inside: Ecotherapy for mental wellbeing, resilience and recovery*. 2013: London.

32. Wilson, N.W., et al., Green shoots of recovery: the impact of a mental health ecotherapy programme *Mental Health Review Journal*, 2010. 15(2): p. 4-14.

33. Sonntag-Öström, E., et al., "Nature's effect on my mind" – Patients' qualitative experiences of a forest-based rehabilitation programme. *Urban Forestry & Urban Greening*, 2015. 14(3): p. 607-614.

34. Beyer, K.M.M., et al., Exposure to neighborhood green space and mental health: evidence from the survey of the health of Wisconsin. *International Journal of Environmental Research & Public Health* [Electronic Resource], 2014. 11(3): p. 3453-72.

35. Gascon, M., et al., Mental Health Benefits of Long-Term Exposure to Residential Green and Blue Spaces: A Systematic Review. *International Journal of Environmental Research and Public Health*, 2015. 12(4): p. 4354-4379.

36. Bratman, G.N., J.P. Hamilton, and G.C. Daily, The impacts of nature experience on human cognitive function and mental health.

*Annals of the New York Academy of Sciences*, 2012. 1249(1): p. 118-136.

37. Craig P., D.P., Macintyre S., Michie S., Nazareth I., Petticrew M., *Developing and evaluating complex interventions: new guidance*. 2008. MRC.

38. Pawson, R. and N. Tilley, *Realistic Evaluation*. 1997, London: Sage.

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<sup>1</sup> For more information of patterns of poor mental health see [The Mental Health Foundation](#) fact sheets.

<sup>2</sup> Cortisol is a hormone and is released in response to stress and low blood-glucose.

<sup>3</sup> [Green Gyms](#) are outdoor sessions where participants are guided in practical activities such as planting trees, sowing meadows and establishing wildlife ponds.

<sup>4</sup> [Ecominds](#) was a Mind led programme of [ecotherapy](#) projects across England. Over 12,000 people participated in the project, undertaking activities such as gardening, farming, food growing, exercise, art and craft, or environmental conservation work, they were supported by trained professionals.

<sup>5</sup> [Branching Out](#) is a programme for adults who use mental health services in Scotland. For each client, the service consists of around three hours of activities per week in a woodland setting, over 12 weeks.