

Nature and psychological well-being

English Nature Research Reports



working today
for nature tomorrow

English Nature Research Reports

Number 533

Nature and psychological well-being

Linda Seymour
Policy & Research Development Manager
mentality
134-138 Borough High Street
London SE1 1LB

May 2003

You may reproduce as many additional copies of
this report as you like, provided such copies stipulate that
copyright remains with English Nature,
Northminster House, Peterborough PE1 1UA

ISSN 0967-876X
© Copyright English Nature 2003

Contents

1.	Introduction.....	7
2.	Aspects of nature which may promote mental health and psychological well-being....	7
3.	Risk and protective factors for positive mental health and well-being.....	9
4.	The impact of access to nature on psychological well-being	11
5.	UK social policy	12
6.	Recommendations – changing social policy discourse.....	14
7.	References.....	15

1. Introduction

Nature and access to it is often associated exclusively with the countryside and rural areas. In fact just over a fifth of the population of England live and work in rural areas and so access to nature is much more likely to be within urban or semi-urban surroundings. The natural world is made up of rocks and soils as well as plants and animals and their supporting habitats. Given the built-up, industrialised and technological context of many contemporary lives, it can be easy to forget that the natural world provides the physical and spiritual framework within which we exist.

As a consequence the natural world offers the potential for significant positive affect on individual and community psychological well-being.

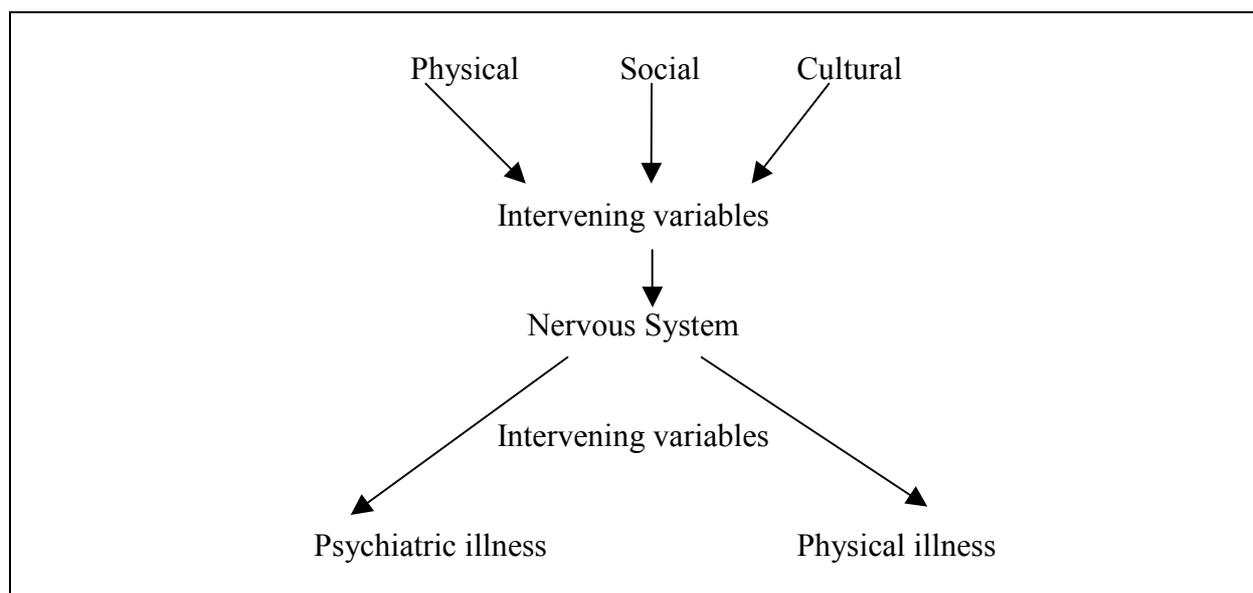
This briefing is designed to:

- identify the nature and extent of benefits to people's psychological well-being from contact with nature;
- describe risk and protective factors for positive mental health and well-being and how contact with nature impacts on these factors;
- outline the relevant UK social policy framework;
- Set out recommendations for English Nature on appropriate lines of action

2. Aspects of nature which may promote mental health and psychological well-being

Environmental effects on mental health and psychological well-being can be divided into physical, social and cultural properties (Freeman 1984):

Environmental effects on mental and physical health



Aspects of the physical environment which have been shown to have a negative impact on mental well-being include:

- high population density: stress, anxiety, aggression, increased sense of physical and emotional vulnerability (Freeman 1984, Brain 1984);
- noise: stress, anxiety (Tarnopolsky & Clark 1984);
- information/stimulus overload: stress, anxiety (Freeman 1984).

Indicators of mental well-being, for example trust, tolerance, participation and feelings of safety, are directly influenced by environmental factors, notably population density? For example the probability of helping a stranger is inversely related to the level of environmental stimulation, which includes density of pedestrians and motor traffic (Freeman 1984). Noise decreases the sense of connection between people and decreases the probability that people will help each other (Walter 1982).

In a major study, Lewis and Booth found that while those living in rural areas had a much lower prevalence of mental disorder, people living in built up areas *with access to gardens or green, open spaces* had a lower prevalence than people in built up areas with no such access (Lewis & Booth 1994).

Other evidence shows that improving the urban environment leads to reductions in overall psychiatric morbidity. Dalgard and Tambs for example, challenge the view that the quality and proximity of social support is the key factor influencing mental health and argue that changes in the environment are more significant. Unfortunately, their research does not identify the specific significance of individual environmental changes, so it is not possible to assess whether parks and green, open spaces had a greater impact on mental well-being than other environmental improvements (Dalgard & Tambs 1997).

There is an extensive literature concerned with trying to explain why cities are bad for mental health: key factors include higher stress and less stable social conditions. In England, based on the results of a survey of 6000 adults, stress appears to be a major health problem. (Rainford *et al* 2000). In 1998 24% of men and 29% of women reported having suffered 'a large amount of stress' in the past 12 months. Reported stress levels have risen steeply since 1995, when the overall percentage was 21%, but now appear to have stabilised. Stress is highest in the age group 25-54, peaking at 35-44. Self-reported general health, which includes people's own perceptions of their stress levels, has been shown to be a strong predictor of mortality (*ibid*). This illustrates the potential value of research that explores people's own perceptions of how access to nature promotes psychological well-being.

Generally, the health of people living in rural areas is better than that of people in urban areas (Watt *et al* 1994). Urban residence is associated with a higher prevalence of neurotic disorders and those living in built up areas have a much higher prevalence of psychiatric morbidity, alcohol and drug dependence (Paykel *et al* 2000). For young people, rates of mental disturbance in children and adolescents are lower in rural areas than in urban areas. The figures for conduct disorders (eg truancy, vandalism, drunkenness, delinquency, anti-social behaviour) for example, are 4% in rural areas and 9% in urban areas.

However in recent years, the romanticised image of the countryside as a place of peace and respite, seems to have been replaced by a growing awareness of the problems associated with

living in rural areas. Much of the literature on rural issues argues that idealised views of the country obscure the extent of rural disadvantage, aptly summed up in titles like *Not seen, not heard* and *You can't eat the scenery* (ACRE *et al* 1999)

It may be that the countryside is no longer idealised. Extensive media coverage of for example foot and mouth and the plight of farmers, the closure of rural shops, schools, pubs and banks and rural homelessness and unemployment have combined to create an impression of rural life under stress. A number of organisations have been established to draw attention to stress in rural areas and to highlight aspects of rural life which damage mental health including ACRE, the Rural Stress Information Network, the Institute of Rural Health and ruralMinds.

A national survey on public attitudes undertaken in 1995 demonstrated that nine in ten people value the countryside and that there is a very strong desire for greater opportunities to access rural areas (Countryside Commission 1997). The most important benefit from visiting the countryside was the sense of relaxation and well-being. Fresh air and peace and quiet were also valued.

Henwood (2002) provides several explanatory frameworks for the mental health benefits of contact with nature. These include:

- 'stress recovery' – immediate psychological benefits from contact with nature (Ulrich 1979, 1983, Ulrich *et al* 1991);
- 'attention restoration' – longer term psychological benefits from contact with nature (Kaplan and Kaplan 1989, 1995).

More recently the Countryside Agency has taken a forward look at the state of the countryside by 2020 and various likely scenarios (Countryside Agency 2003). They describe a future where countryside areas will be under more stress in terms of increased households, changes in land use and economic generation and the impact these changes will have on quality of life. They also offer four possible ways forward which will demand resource and planning input from central and local government.

3. Risk and protective factors for positive mental health and well-being

Mental health is more than the absence of mental illness and has been described as the emotional and spiritual resilience which enables us to enjoy life and to survive pain, disappointment and sadness - a positive sense of well-being and an underlying belief in our own worth and the dignity and worth of others (HEA 1997).

Mental health and psychological well-being influences how we think and feel, about ourselves and others and how we interpret events. It affects our capacity to learn, to communicate, and to form and sustain relationships. It also influences our ability to cope with change, transition and life events.

Mental health may be central to all health and well-being because how we think and feel has a strong impact on physical health. There is a growing body of research that demonstrates the impact of mental health on physical health. Much of the research in this area is concerned

with how the social environment acts on biology to cause disease (Marmot & Wilkinson 1999).

What has been called 'stress biology' looks at the relationship between chronic stress and the nervous system, the cardio-vascular and the immune systems, influencing cholesterol levels, blood pressure, blood clotting and immunity. Chronic anxiety, insecurity, low self esteem, social isolation and lack of control over work appear to undermine mental and physical health. Perceived low control beliefs, such as powerlessness and fatalism, accounted for more than half the mortality risk for people of low socio-economic status (Bosma *et al* 1997).

The power of psycho-social factors to affect health makes biological sense. The human body has evolved to respond automatically to emergencies. This stress response activates a cascade of stress hormones that affect the cardio-vascular and immune systems. The rapid reaction of our hormones and nervous system prepares the individual to deal with a brief physical threat. But if the biological stress response is activated too often and for too long, there may be multiple health costs. These include depression, increased susceptibility to infection, diabetes, high blood pressure and accumulation of cholesterol in blood vessel walls, with the attendant risks of heart attack and stroke (Brunner & Marmot 1999).

Sustained stress or trauma increases susceptibility to viral infection and physical illness by damaging the immune system (Stewart-Brown 1998, Cohen *et al* 1991 and 1997, Marucha *et al* 1998, Vedhara *et al* 1999). Depression has a significant impact on health outcomes for a wide range of chronic physical illnesses, including asthma, arthritis and diabetes (Turner & Kelly 2000) and is a risk factor for stroke (Jonas & Mussolino 2000, Ostir *et al* 2001). Depression increases the risk of heart disease fourfold, even when other risk factors like smoking are controlled for (Hippisley-Cox *et al* 1998). Lack of control at work is associated with increased risk of cardiovascular disease (Bosma *et al* 1997, Marmot *et al* 1991, Niedhammer *et al* 1998).

Conversely emotional well-being is a strong predictor of physical health. Men and women who scored highest in a survey on emotional health were twice as likely to be alive at the study's end. The link between subjective feelings of happiness and good health held even after controlling for chronic disease, smoking, drinking habits, weight, sex and education (Goodwin 2000).

The social environment can also act to promote mental and physical well-being. Recent research on social capital and inequality suggests that how individuals and communities feel - levels of trust, tolerance and participation - may be a critical factor in determining health. (Wilkinson 1996 and 2000, Cooper *et al* 1999, Kawachi *et al* 1997, Kawachi & Kennedy 1999).

Social capital consists of the informal and formal networks, customs and relationships that make up our individual and community interactions. The key elements of social capital have been summed up into four broad themes:

- social resources, eg informal arrangements between neighbours or within a faith community;
- collective resources, eg self-help groups, credit unions, community safety schemes;
- economic resources, eg levels of unemployment, access to green, open spaces;

- Cultural resources, eg libraries, art centres, local schools
(adapted from Cooper *et al* 1999)

Mental health promotion – or public mental health - covers a very wide range of activities concerned with strengthening the mental and psychological well-being of individuals, families, organisations and communities. It can be seen as a kind of immunisation, working to strengthen the resilience of individuals, families, organisations and communities – as well as to reduce conditions which are known to damage mental well-being in everyone, whether or not they currently have a mental health problem (HEA 1998).

Mental health promotion works at three levels: and at each level, is relevant to the whole population, to individuals at risk, vulnerable groups and people with mental health problems.

- **Strengthening individuals** - or increasing emotional resilience through interventions designed to promote self-esteem, life and coping skills, eg communicating, negotiating, relationship and parenting skills.
- **Strengthening communities** – this involves increasing social inclusion and participation, improving neighbourhood environments, developing health and social services which support mental health, anti-bullying strategies at school, workplace health, community safety, childcare, self-help networks and so on.
- **Reducing structural barriers to mental health** - through initiatives to reduce discrimination and inequalities and to promote access to education, meaningful employment, housing, services and support for those who are vulnerable.

4. The impact of access to nature on psychological well-being

Can access to nature enhance the protective factors for positive mental health and diminish the risk factors for poor mental health? Programmes known from the research literature to protect mental health are sometimes delivered in natural settings, although this briefing is unable to draw any conclusions about increased efficacy of mental health promotion programmes offered in a natural setting rather than any other situation.

They can also be delivered at three levels of prevention:

- **universal** interventions for an entire population, eg all young people of a certain age or all residents of a particular community;
- **selective** interventions for those groups deemed to be high-risk, eg lower socio-economic groups or women from ethnic communities;
- **indicated** interventions for groups where a problem has already occurred, eg people with an existing mental ill health problem.

Universal and selective approaches are proactive whereas indicated ones are reactive (Nelson *et al* 1999)

Exercise has been shown to reduce anxiety, enhance recovery from brief psychosocial stressors (Taylor 2000) and reduce clinical depression (Mutrie 2000). Exercise schemes are regularly offered within a natural setting, for example the ‘Island Health Walk Scheme’ in the Isle of Wight was established by the West Wight Primary Care Group in 1999. Short volunteer-led walks are offered for those who lack confidence or physical ability to walk alone. While targeted at people with mental health problems and learning disabilities, these walks are particularly beneficial for older people and have been very successful in enabling older people to make new friends and forge community links. User feedback has demonstrated enhanced self-confidence, self esteem, improved physical fitness and increased independence. (Contact: Health Promotion, Isle of Wight Healthcare NHS Trust, St Mary’s Hospital, Newport, Isle of Wight. Email: rosie.rae@iow.nhs.uk)

A recent review of diet and physical activity which supports the ‘biophilia hypothesis’ – closeness to nature increases well-being – advocates the adoption of physical activities within nature. The authors have described this synergy ‘green exercise’ (Pretty *et al* 2003).

‘Green Gyms’ are emerging as a national movement which offers people a way of meeting others, getting physically fit and improving the natural environment. Local evaluations have demonstrated a range of physical and mental health benefits, including reductions in symptoms on the Hospital Anxiety and Depression Scale and improvements in quality of life.

‘Play in the Parks’ is an initiative within the Nottingham Social Action Research Project (SARP) which uses play programmes for children in a deprived area to build social capital. Key features include the employment of local people as play workers, building networks between parents and different groups of young people (as opposed to running one off sessions), involving young people in planning activities, building reciprocity into the project and celebrating cultural diversity. (Nottingham SARP 2002)

It must be noted that although there are some examples of universal, proactive mental health promotion offered within natural settings these are in the minority. In the main, initiatives target those at high risk or already in receipt of mental health services. However two illustrations from English Nature programmes provide a more proactive model.

For example the work in school grounds which develops wildlife gardens and ponds, run through English Nature’s ‘People and Nature’ initiative, (English Nature 2002) is coherent with what is known about mentally health promoting schools. School mental health promotion programmes that promote positive mental health are more effective than brief class-based programmes designed to prevent mental illness and changes to the school’s climate and ethos are crucial to successful outcomes (Wells *et al* 2001).

Another English Nature programme which encourages the participation of volunteers (*ibid*) also supports broad mental health promotion aims and outcomes. A systematic review of volunteering has shown that it increases opportunities for social participation and decreases social isolation (Wheeler *et al* 1998).

5. UK social policy

There are a range of social policies relevant to nature and well-being from health, social care and health and other government agencies. *The National Service Framework for Mental Health* (NSFMH) (Department of Health 1999) includes a mental health promotion standard -

Standard One - which aims to ensure that health and social services promote mental health and reduce the discrimination and social exclusion associated with mental health problems.

This standard includes mental health promotion across whole populations, as well as programmes for individuals at risk and vulnerable groups, for example black and minority ethnic groups, people in prison, who sleep rough and people with drug and alcohol problems. Key settings for mental health promotion are schools, workplaces and neighbourhoods. Performance will be assessed nationally, by a long term improvement in the psychological health of the population, measured via surveys of psychiatric morbidity among adults aged 16-64 living in private households in Great Britain, and a reduction in suicide rates. Local Development Plans must demonstrate action to promote good mental health.

The *National Suicide Prevention Strategy* (Department of Health 2002) has as one of its seven goals the promotion of mental well-being for the entire population. Degraded physical environments are known to be deleterious to positive mental health and increase risks for vulnerable individuals and populations.

The Social Exclusion Unit has recently announced a review on mental health (SEU 2003). At the launch event Barbara Roche, Minister for Inequality and Social Inclusion, announced that the focus would be on employment opportunities and social networks for people with mental health problems who are some of the most socially excluded people. She also emphasised that *“The Government is committed to building thriving, sustainable communities - environments in which we would all like to live. They will only be sustainable if they are fully inclusive and cut to the core of social exclusion and poverty. This new programme of work is vital to realising that goal.”* The Neighbourhood Renewal Unit will shortly be embarking upon a similar area of work.

Quality of life seems to be impacted by exposure to nature (Henwood 2002) and this issue has moved up the policy agenda. The Local Government Act 2000 placed a duty on local authorities to produce long-term community strategies with their partners to improve the quality of life in their local area (HMSO 2000). Since the International Earth Summit in 2002 there has been increasing pressure on local authorities and their partners to ensure that their activities and plans are based on the principles of sustainable development. The Audit Commission piloted a series of ‘Quality of Life’ indicators in local councils during 2001 (Audit Commission 2002). There are a range of social, community involvement and environmental indicators, many of which can provide measures of the impact of nature on psychological well-being.

The Forestry Commission is the government department for forestry in Great Britain. The Commission manages all state-owned woodlands in Britain but since the 1980s their objectives have widened considerably. Greater emphasis is now placed on the potential environmental and social contribution of woodlands, as well as forestry’s role in sustaining rural communities (Gillam 2002). The Commission produced a new range of 40 indicators of sustainable forestry in 2002 and these included information about people and forests.

The Urban Parks Forum (UPF) is a not-for-profit organisation set up to help those committed to the planning, design, management and use of public parks and open space (www.urbanparksforum.co.uk). UPF first came into being to promote the regeneration of public parks and open spaces in towns and cities throughout the UK and to support the investment being made in our parks by the Heritage Lottery Fund.

They also aim to provide a network for the exchange of experience and information: to identify and promote best practice through events, research, networking and publications; to provide a channel of communication between local and central groups and other organisations; and to promote the sustainable future of public parks and public open spaces.

This brief overview is by no means comprehensive but what seems clear is that, although a range of mental health and other policy has relevance for programmes on nature and psychological well-being, no agency, with perhaps the exception of the Audit Commission, has yet made the essential link between the potential positive impact nature could have on psychological well-being as a discrete outcome.

Most existing mental health policy focuses on improving access to and quality of service provision for people who use services. The NSFMH does have a standard on mental health promotion but this also tends to concentrate on existing service users. Universal proactive programmes are largely missing.

The newly established National Institute of Mental Health (England) (www.nimhe.org.uk) has developed a devolved regional structure but its goals are tied into national policy. So for example social inclusion and mental health promotion have been conflated into one programme and the primary aim for the next financial year is to enable implementation of the national suicide strategy (Appleby 2003). Even in areas of England where the natural landscape is more widespread, such as in the northeast or southwest, the focus is not on the inherent health promoting benefits of nature, rather on ameliorating the stresses associated with rural life or the delivery of a health promotion programme within a natural setting..

Social exclusion agencies are beginning to target people with mental health problems. They are concentrating on opportunities for employment as a way out of social exclusion. There is also an emphasis on social networks and opportunities to participate, both of which are offered by programmes that access nature or are delivered in natural settings. However this connection has not yet been made.

Policy from agencies more directly concerned with the natural world focus more on environmental sustainability or biodiversity. They have not yet identified the purely mental health promoting elements of access to nature in either urban, semi-urban or rural settings.

Perhaps only the Audit Commission with its voluntary 'Quality of Life' indicators has come closest to marrying two complementary sets of policy goals.

6. Recommendations – changing social policy discourse

The significant issue is to shift social policy discourse so that it recognises the contribution of nature to social objectives and therefore to protect and enhance biodiversity and healthy ecosystems. There is a desire to demonstrate the synergy between the social and environmental spheres of sustainable development (Hanna 2003). Three areas of activity necessary to drive the change in discourse have emerged from the information in this review and although they are not necessarily sequential, the first underpins the second and third:

- consolidation of the evidence base through systematic review and collation of qualitative and quantitative data from current initiatives;
- development of demonstration projects trying out and evaluating established and new approaches that bring together nature and social objectives.
- work in partnership: health and nature organisations need to share and exchange expertise to develop mutually credible initiatives and policy discourse.

7. References

ACRE/RURAL MINDS, 1999. Rural poverty initiative *You can't eat the scenery* (video) (www.acre.org.uk)

APPLEBY, L., 2003. Mental health priorities for the coming period. Presentation at the launch of the SE Development Centre of NIMH(E), 29 April 2003.

AUDIT COMMISSION, 2002). *Quality of life: Using quality of life indicators*. London: Audit Commission (www.audit-commission.gov.uk/pis/quality-of-life-indicators.shtml).

BOSMA, H., MARMOT, M.G. & HEMMINGWAY, H., 1997. Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *British Medical Journal*, **314**: 558.

BRAIN, P.F., 1984. Human aggression and the physical environment. In: Freeman, H. (ed) *Mental Health and the Environment*, 97-120.

BRUNNER, E. & MARMOT, M., 1999. Social organisation, stress and health. In: Marmot, M. and Wilkinson, R.G. (eds) *The social determinants of health*. Oxford: Oxford University Press.

COHEN, S., TYRRELL, D.A.J. & SMITH, A.P., 1991. Psychological stress and susceptibility to the common cold. *New England Journal of Medicine*, **325**:606-612.

COHEN, S., DOYLE, W.J., SKONE, D.P., RABIN, B.S. & GWALTNEY, J.M., 1997. Social ties and susceptibility to the common cold. *Journal of the American Medical Association*, **277**: 1940-44.

COOPER, H., ARBER, S., FEE, L. & GINN, J., 1999. *The influence of social support and social capital on health*. London: Health Education Authority.

COUNTRYSIDE AGENCY, 2003. *The state of the countryside 2020*. Wetherby, W.Yorks: Countryside Agency Publications (www.countryside.gov.uk).

COUNTRYSIDE COMMISSION, 1997. *Public attitudes to the countryside*. Northampton: Countryside Commission.

DALGARD, O.S. & TAMBS, K., 1997. Urban environment and mental health: a longitudinal study. *British Journal of Psychiatry*, **171**: 530-6

DEPARTMENT OF HEALTH, 1999. *National Service Framework for Mental Health*. London: Department of Health.

DEPARTMENT OF HEALTH, 2002. *National Suicide Prevention Strategy*. London: Department of Health.

ENGLISH NATURE, 2002. *People and wildlife – working together: working today for nature tomorrow*. Peterborough: English Nature.

FREEMAN, H., editor, 1984. *Mental Health and the Environment* London: Churchill Livingstone.

GILLAM, S., 2002. If you go down to the woods... *Horizon*, Issue No. 23. December 2002.

GOODWIN, J.S., 2000. Glass half full attitude promotes health in old age. *Journal of the American Geriatrics Society*, **48**: 473-478.

HANNA, J. 2003. Social policy goals: links to nature conservation (unpublished).

HEALTH EDUCATION AUTHORITY, 1997. *Mental Health Promotion: a quality framework*. London.

HEALTH EDUCATION AUTHORITY, 1998. *Community Action for Mental Health*. London.

HENWOOD, K. 2002. *Issues in health development: Environment and health: Is there a role for environmental and countryside agencies in promoting benefits to health?* London: Health Development Agency (www.hda-online.org.uk).

HMSO, 2000. *Local Government Act 2000 Part 1*. London: HMSO.

HIPPISLEY-COX, J., FIELDING, K. & PRINGLE, M., 1998. Depression as a risk factor for ischaemic heart disease in men: population based case control study. *British Medical Journal*, **316**: 1714-1719.

JONAS, B.S. & MUSSOLINO, M.E., 2000. Symptoms of depression as a prospective risk factor for stroke. *Psychosomatic Medicine*, **62**(4): 463-472.

KAPLAN, R. & KAPLAN, S., 1989. *The Experience of Nature: a psychological perspective*. Cambridge: Cambridge University Press.

KAPLAN, S., 1995. The restorative effects of nature: toward an integrative framework. *Journal of Environmental Psychology*, **16**:169-82.

KAWACHI, I., KENNEDY, B. & LOCHNER, K., 1997. Social capital, income inequality and mortality. *American Journal of Public Health*, **87**: 491-498.

KAWACHI, I. & KENNEDY, B.P., 1999. Income inequality and health: pathways and mechanisms. *Health Services Research*, **34**: 215.

- LEWIS, G. & BOOTH, M., 1994. Are cities bad for your mental health? *Psychological Medicine*, **24**: 913-915.
- MARMOT, M. & WILKINSON, R., 1999. *Social determinants of health*. Oxford: Oxford University Press.
- MARUCHA, P.T., KIECOLT-GLASER, J.K. & FAVAGEHI, M., 1998. Mucosal wound healing is impaired by examination stress. *Psychosomatic Medicine*, **60**: 362-365.
- MATARASSO, F. 1997. *Use or Ornament: the social impact of participation in the arts Comedia*. London.
- MELTZER, H., GILL, B., PETTIGREW, M. & HINDS, K., 1996. *The prevalence of psychiatric morbidity among adults living in private households OPCS surveys of psychiatric morbidity in Great Britain*. Report 1. London: HMSO.
- MENTAL HEALTH FOUNDATION, 2000. *Strategies for living: report of user led research into people's strategies for living with mental distress*. London: Mental Health Foundation.
- MUTRIE, N., 2000. The relationship between physical activity and clinically defined depression, *In*: S.J.H. Biddle, K.R. Fox & S.H. Boutcher, eds. *Physical activity and psychological well-being* London: Routledge.
- NELSON, G., PRILLELTENSKY, I. & PETERS, R. DEV, 1999. Mental health promotion and the prevention of mental health problems in the community. *In*: Marshall, W. & Firestone, P. (eds). *Abnormal Psychology Perspectives*. Scarborough, ON: Prentice-Hall.
- NIEDHAMMER, I. & GOLDBERG, M. 1998. Psychosocial work environment and cardiovascular risk factors in an occupational cohort in France. *Journal of Epidemiology and Community Health*, **52** (2): 93-100.
- NOTTINGHAM SARP, 2002. Social Action Research Programme (www.sarpnet.org.uk).
- OSTIR, G.V., MARKIDES, K.S., PEEK, M.K. & GOODWIN, J.S., 2001. The association between emotional well-being and the incidence of stroke in older adults. *Psychosomatic Medicine*, **63**: 210-215.
- PAYKEL, E.S., ABBOTT, R., JENKINS, R., BRUGHA, T.S. & MELTZER, H., 2000. Urban-rural mental health differences in Great Britain: findings from the National Morbidity Survey. *Psychological Medicine*, **30**:269-280
- PRETTY, J., GRIFFIN, M., SELLENS, M. & PRETTY, C., 2003. Green exercise: Complementary roles of nature, exercise, diet in physical and emotional well-being and implications for public health policy. CES Occasional Paper 2003-1. University of Essex. (www2.essex.ac.uk/ces)
- RAINFORD, L., MASON, V., HICKMAN, M. & MORGAN, A., 2000. *Health in England 1998: investigating the links between social inequalities and health*. London: The Stationary Office.

- SEU, 2003. Scoping Note on Mental health and Social Exclusion. (www.odpm.gsi.gov.uk).
- STEWART-BROWN, S., 1998. Emotional well-being and its relation to health. *British Medical Journal*, **317**: 1608-1609.
- TARNOPOLSKY, A. CLARK, C., 1984. Environmental noise and mental health. *In*: Freeman, H. (ed), *Mental Health and the Environment*, 250-270.
- TAYLOR, A., 2000. Physical activity, anxiety and stress. *In*: Biddle, S.J.H., Fox, K.R. & Boutcher, S.H. (eds) *Physical Activity and Psychological Well-Being*. London: Routledge.
- TURNER, J. & KELLY, B., 2000. Emotional dimensions of chronic disease. *British Medical Journal*, **172**: 124-128.
- ULRICH, R.S., 1979. Visual landscapes and psychological well being. *Landscape Research*, **4**: 17-23.
- ULRICH, R.S., 1983. Aesthetic and affective response to natural environment. *In*: Altman I & Wohlwill, J.F. (eds) *Human Behaviour and Environment: advances in theory and research*. Vol 6 *Behaviour and the Natural Environment*. New York: Plenum Press.
- ULRICH, R., 1984. View through a window may influence recovery from surgery. *Science*, (4) 20-1.
- ULRICH, R.S., SIMONS, R.F., LOSITO, B.D., FIORITO, E., MILES, M.A. & ZELSON, M., 1991. Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, **11**: 201-30.
- VEDHARA, K., COX, N.K. & WILCOCK, 1999. Chronic stress in elderly carers of dementia patients and antibody response to influenza vaccination. *Lancet*, **353** (9153): 627-631.
- VILLENEAU, L. 2000. *On our Doorstep*. London : Sainsbury Centre for Mental Health.
- WALTER, J.A., 1982. *The Human Home: The myth of the sacred environment*. Tring: Lion.
- WATT, I.S., FRANKS, A.J. & SHELDON, T.A., 1994. Health and health care of rural populations in the UK: is it better or worse? *Journal of Epidemiology and Community Health*, **48**:16-21
- WELLS, J., BARLOW, J. & STEWART-BROWN, S., 2001. *A systematic review of universal approaches to mental health promotion in schools*. Oxford: Health Service Research Unit, University of Oxford, Institute of Health Sciences.
- WHEELER, F.A., GORE, K.M., GREENBLATT, B., 1998. The beneficial effects of volunteering for older volunteers and the people they serve: a meta-analysis. *International Journal of Aging and Human Development*, **47**(1): 69-79.
- WILKINSON, R., 1996. *Unhealthy Societies: The afflictions of inequality*. London: Routledge.

WILKINSON, R., 2000. Inequality and the social environment: a reply to Lynch *et al.* *Journal of Epidemiological Community Health* **54**: 411-413.



English Nature is the Government agency that champions the conservation of wildlife and geology throughout England.

This is one of a range of publications published by:
External Relations Team
English Nature
Northminster House
Peterborough PE1 1UA

www.english-nature.org.uk

© English Nature 2002/3

Cover printed on Character Express, post consumer waste paper, ECF.

ISSN 0967-876X

Cover designed and printed by Status Design & Advertising, 2M, 2M.

You may reproduce as many copies of this report as you like, provided such copies stipulate that copyright remains with English Nature, Northminster House, Peterborough PE1 1UA

If this report contains any Ordnance Survey material, then you are responsible for ensuring you have a license from Ordnance Survey to cover such reproduction.

Front cover photographs:

Top left: Radio tracking a hare on Pawlett Hams, Somerset.

Paul Glendell/English Nature 23,020

Middle left: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.

Paul Glendell/English Nature 24,888

Bottom left: Using a home-made moth trap.

Peter Wakely/English Nature 17,396

Main: Co₂ experiment at Roudsea Wood and Mosses NNR, Lancashire.

Peter Wakely/English Nature 21,792



Awarded for excellence