Gardening for health: a regular dose of gardening

Author: Richard Thompson^A

ABSTRACT

There is increasing evidence that exposure to plants and green space, and particularly to gardening, is beneficial to mental and physical health, and so could reduce the pressure on NHS services. Health professionals should therefore encourage their patients to make use of green space and to work in gardens, and should pressure local authorities to increase open spaces and the number of trees, thus also helping to counteract air pollution and climate change.

There is anxiety that the NHS cannot cope now and in the future with the health needs of an increasing and ageing population. It is also realised that pharmaceutical drugs, transformative though they have been, are increasingly expensive and are not always as effective as they appear in the results of early, enthusiastically reported, clinical trials. Drugs are also prescribed at the cost of side effects, which are a leading cause of admissions to hospital, particularly for the elderly, who are poorly represented in trials.

Health depends on a range of social, economic and environmental factors, as is emphasised by the shaming disparity between the length of life in different areas of the country.¹ In addition to improving the information given to patients and health professionals on the true efficacy of drugs and on their risks, and thus empowering choices for patients, there are opportunities to treat some physical and mental conditions with alternative or complementary therapies, and to encourage changes in lifestyle. Such treatments could reduce the workload and financial pressure on the NHS, particularly in primary care, but they clearly must only be recommended by health professionals if there is good evidence that they are effective; many are without merit. Ten million of the UK population are defined as disabled, among them 6.9 million of working age. Can we do better for these people without using drugs?

Green care

One group of holistic therapies that aim to treat the whole person and has been well researched through surveys and randomised trials is so-called green care, or therapy by exposure to plants and gardening.^{2,3} Several trials have revealed the beneficial effects on mood and mental health of simply observing nature, or even images of natural scenes. In a Japanese study, viewing plants altered EEG recordings and reduced stress, fear, anger and sadness, as well as reducing blood pressure, pulse rate and

muscle tension.⁴ Another Japanese study simply found that it more beneficial physiologically to view a green hedge rather than a concrete fence.⁵ In a pioneering randomised study by the environmental psychologist Roger Ulrich,⁶ views of plants and trees from post-operative wards improved the mood of patients, and reduced analgesic use, surgical complications and length of stay. Similar beneficial results have been found for patients undergoing dental treatment,⁷ and viewing natural scenes together with natural sounds improved the experience of bronchoscopy.⁸ Another carefully controlled study showed that viewing sculpture gardens without any greenery through the windows of an oncology ward caused a negative reaction in many patients.⁹ Even randomly exposing post operative patients to pictures of countryside on the walls of their rooms can reduce pain and anxiety, while, perhaps not surprising to everyone, abstract images increased anxiety.^{10,11} It would be interesting to study the mental effects of visiting art galleries! Paintings on the walls of a Swedish psychiatric hospital were often vandalised, but only if they were of abstract images, not if they were landscapes.¹² The charity MIND compared short walks through a garden with walks in a shopping complex, and showed that the former improved mental health, whereas the latter made it worse.¹³ In a prison in Michigan, residents who had a view of the countryside from their cells used the prison medical services less than those with an internal courtyard view.¹⁴

In another randomised experiment, when post-operative patients were exposed to eight different species of indoor plants, both pain and length of stay were once again reduced and patients' satisfaction with their hospital rooms was improved.¹⁵ Exposing pictures of flowers in the dictator game, which is an economic game that questions whether individuals are solely driven by self interest, can change the decisions made by the players.¹⁶ In another study, putting plants in a computer room improved productivity and lowered blood pressure.¹⁷ Indoor gardening has been used to treat patients with mental health problems.¹⁸ It is not only the appearance of plants that is beneficial: their leaves remove toxins, dust and microorganisms from the air and they also produce the so-called negative ions from their leaves. The overall evidence that charged ions affect mood is, however, unconvincing,¹⁹ despite advertisements strongly recommending their benefits.

Many studies in the UK and other countries concur that higher proportions of green space, especially biodiverse habitats,²⁰ are associated with less depression, anxiety and stress, even after controlling for potential confounding factors such as deprivation.^{20–22} In Japan, green space has been linked with increased longevity.²³ Exposure to green space seems to reduce

Author: ^Apast president, Royal College of Physicians, London, UK

health inequalities related to deprivation,²⁴ but associations are not proof of an hypothesis and a few studies have disagreed.^{25,26} In reality, studies such as these suffer from embedded residual confounding correlations between green space and higher income, better housing, and healthier lifestyles (such as less smoking), which can be difficult to disentangle. Interestingly, the benefit of green space may not be simply related to physical activity,^{27,28} but might rely more on improved social interaction.²⁹

Gardens

Therapeutic gardens have been used in hospitals for thousands of years, and were strongly supported by Florence Nightingale; they improve the surroundings for patients, visitors and staff. Ulrich¹¹ has emphasised their beneficial effects on stress, especially if the spaces support biodiversity, with increased satisfaction reported by those who use them.

A small central garden between buildings at St Thomas' Hospital was created for the millennium; another at St George's Hospital was successfully commissioned by Harold Lambert FRCP. Gardens that are attached to hospices, such as Maggie's cancer centres,³⁰ and care homes are now widespread and provide that important view from the rooms and an area to visit. Recently, impressive gardens for wheelchair users and those confined to beds have been designed around spinal injury units; these are known as Horatio's gardens and have been set up in memory of Horatio Chapple, who died in an accident in the Arctic.³¹ They can include facilities for therapy and training in gardening skills.

Gardens around prisons have a long history of improving the lives of the prisoners and offering training towards employment in the horticulture industry. At the urban prison in Wandsworth, a collaboration with The Conservation Foundation has seen green areas introduced into the prison and an exercise yard dug up to make way for a vegetable garden where produce can be grown.³² In the First World War, British prisoners in the civilian internment camp at Ruhleben in Germany were sent seeds and plants by the Royal Horticultural Society in London to help them to develop a successful garden.³³

A recent survey by Mintel for the charity Thrive,³⁴ which enables social and therapeutic horticulture, showed that among people with disabilities, a quarter listed gardening as a hobby. Two-thirds of the respondents owned a garden and 87% had access to a garden that they thought was beneficial to their health. Surveys in the general population have given similar results,³⁵ with a large majority believing that gardens were beneficial to health. Numbers of visitors to garden centres and private gardens, such as those in the National Garden Scheme or run by the National Trust, are increasing. Gardening has been associated with a lower prevalence of dementia and with positive health effects in several countries,^{36,37} and economic benefits have been shown, for instance, for mental health services.³⁸

In northern Europe, Green Care Farms have proved popular and have grown in number so that there are now hundreds of such facilities in Norway and in the Netherlands. Patients who have impaired mental health, learning disabilities or drug dependency, as well as older people, are referred for a period of work in functioning farms, often involving animals.³⁹ In England, the University of Essex has set up the National Care Farms network. By 2012, the network included 180 farms, which were visited by 3000 patients a week;⁴⁰ their positive benefits have been independently reviewed.⁴¹ The charity Thrive has identified 800 therapeutic horticulture projects across England and Wales.

The effects of gardening on body and mind

Why does gardening seem to be so beneficial to health? It combines physical activity with social interaction and exposure to nature and sunlight. Sunlight lowers blood pressure as well as increasing vitamin D levels in the summer,⁴² and the fruit and vegetables that are produced have a positive impact on the diet. Working in the garden restores dexterity and strength, and the aerobic exercise that is involved can easily use the same number of calories as might be expended in a gym. Digging, raking and mowing are particularly calorie intense;⁴³ there is a gym outside many a window. The social interaction provided by communal and therapeutic garden projects for those with learning disabilities and poor mental health can counteract social isolation. Furthermore, it has also been reported that the social benefits of such projects can delay the symptoms of dementia⁴⁴ (an effect that might be partly due to the beneficial effects of exercise). Patients who are recovering from myocardial infarction or stroke find that exercise in a garden, using constraint therapy of a paretic limb, for example,⁴⁵ is more effective, enjoyable and sustainable than therapy in formal exercise settings. For some patients, gardening can even lead to employment. There are also successful schemes that involve volunteers to help older people who cannot manage their gardens, with both the volunteer and the owner benefitting from the social interaction and from the produce and a shared interest.

Intelligent Health points out that the pandemic of physical inactivity is the fourth leading cause of premature death, and contributes to preventable physical and mental disorders.⁴⁶ The Department of Health calculates that an increase of only 10% in average exercise by adults would postpone 6000 deaths and save £500 million annually.⁴⁷ Regular moderate intensity exercise may reduce the risk of dementia,⁴⁸ mental health problems, cardiovascular disease, diabetes, and cancer of the breast and colon, and in an Australian study, gardening was found to be more effective than walking, education or maintaining alcohol intake at moderate levels in protecting against dementia.⁴⁴ It enhances self esteem and alters the EEG.⁴⁹ Similarly, moderate exercise in leisure time is associated with increased longevity, regardless of weight,^{50–52} particularly if combined with exposure to natural scenes,⁵³ although some studies have suggested that exercise declines with reduced cognition; a reverse causation bias.

Thankfully, high intensity exercise is not needed to obtain these benefits,^{51,52} which is perhaps as well given that the uptake of cycling- and gym-based exercise is poor in the older population, and that these activities can be expensive. Gardening or simply walking through green spaces could therefore be important in preventing and treating ill health. The Five Year Forward Plan for the NHS⁵⁴ emphasises the potential importance of prevention in reducing the mounting pressure on the NHS and on social services. There are 152,000 strokes annually and a total of 1.2 million stroke survivors in the UK.⁵⁵ Also in the UK, a quarter of a million patients are admitted to psychiatric hospitals each year and dementia is predicted to affect a million people by 2025.

Few complementary therapies have been convincingly shown to be effective, but gardening and nature, which are alternative therapies, offer a proven, cheap and nearly universally available means to improve the nation's health. Although there is evidence that knitting can also help!⁵⁶

The green environment

The 2016 RCP report on pollution⁵⁷ underlined the deleterious effects of air pollution on respiratory and cardiovascular health globally, with an estimated 8000 premature deaths a year in the UK alone being linked to this issue. The House of Lords has reported specifically on the poor air quality in London.⁵⁸ Poor air quality can be associated with higher mortality in acute medical wards.⁵⁹ Not only larger forests⁶⁰ but also urban forests⁴⁷ can offset this, as can plants in buildings, gardens, parks, and roadways. Trees, for instance, remove large quantities of toxins and particulates through their leaves,⁶¹ transmitting toxins to the soil where microorganisms metabolise them, or trapping them in hairs on leaves that later fall.⁶¹ Roadside trees reduce the indoor concentration of particulates.⁶² Although evergreen trees have smaller leaf areas than their deciduous cousins, they are more effective in the winter months. Trees themselves do emit varying amounts of volatile compounds,⁶³ but overall they reduce the levels of pollutants close to roads.^{64–66} For instance, a single maple tree can remove 48 lb (22 kg) of particulates and 100 lb (45 kg) of carbon each year, as well as toxic metals, nitrogen oxides and sulphur dioxide. The link between residence close to roads and dementia and other problems⁶⁷ could be due to exposure to the many pollutants emitted by vehicles, such as nitrogen oxides, carbon dioxide, ozone, metals, organic compounds and differently sized particulates.

Trees, hedges, and other plants counter climate change by trapping carbon and emitting oxygen; and worldwide, forests may offset a quarter of man-made carbon dioxide. They also improve the environment by reducing noise, heat, glare, wind, water runoff, erosion and dust. Cooling from shading and the evaporation of water from leaves can reduce the need for air conditioning in buildings, and cooling also reduces the formation of some pollutants, such as ozone. Even lawns and turf are helpful,^{68,69} also trapping pollutants and passing them on to soil microorganisms, in addition to providing recreational space for exercise. Plants may also help to solve the problem of polluted soils in industrial areas. Architects are reluctant to preserve old trees or add them to their developments, and so trees must be protected or included in planning consent conditions, and later properly maintained.

What can health professionals do?

Health professionals should encourage their patients not to see danger in exercise in the garden, green spaces, parks and the countryside. Instead, they should emphasise the potential benefits to patients' health,⁷⁰ such as improvements in strength, balance and dexterity. When appropriate, patients can be referred to local community and therapeutic gardening projects, where occupational therapists trained in horticulture help them to manage and treat their medical issues.⁷¹ This is part of what has become known as social prescribing⁷² or community referral, which has the potential to improve the physical and mental health of the population by preventing illness or by ameliorating the effects of established disability. Gardens can also help to improve parity between the treatments for mental and physical disabilities.

The particular benefit of gardening to veterans of the armed services has been fully reviewed.⁷³ Both mental conditions, such as post traumatic stress disorder, and the effects of physical injuries can be improved,⁷⁴ and there are opportunities to train for a new career in the expanding horticulture industry. Health professionals

should encourage the development of gardens in hospitals, hospices, schools⁷⁵ and prisons. They should try to influence the design of new health service buildings by insisting that there are views of outside nature from every patient and staff room, and by placing internal plants in atria, communal areas, surgeries, clinics and staff rooms, even if they are misguidedly banned from wards. Even window boxes and balconies can be used. Health professionals should also encourage the teaching of the skills and benefits of gardening in schools.⁷⁵

In addition, health professionals should encourage local authorities to plant more trees; the Greater London Authority alone plans to plant two million more trees by 2025.⁷⁶ Green spaces, parks, gardens and allotments will improve the environment,^{77–79} particularly where gardens are in short supply, as in deprived urban areas. Despite the apparent density of buildings in our towns, they do contain gardens and green areas, with an average of one fifth of the land in UK towns being given over to green space. Even in the most crowded cities, such as New York and Singapore, roof gardens, green walls and hanging containers are popular. A well-kept local environment improves local pride and can reduce crime and social isolation. Urban planners must be convinced of the importance of including green space,^{79,80} as they are in Holland.⁸¹

I endorse Buck's proposal² that gardens and gardening should be incorporated in NHS England's programmes for improving public health, and hope that health professionals will be in the vanguard of the campaign. They should also support the long-standing charity Fields in Trust (previously the National Playing Fields Association), which campaigns to preserve and increase public green spaces. ■

Conflicts of interest

The author is a trustee of the National Garden Scheme, and past trustee, now patron, of the charity Thrive. He is a member of the Royal Horticulture Society's Health and Horticulture Forum, and he gardens in London.

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**Address for correspondence: Sir Richard Thompson,
36 Dealtry Road, London SW15 6NL, UK.
Email: richard@rpht.co.uk**