

Creating *the* Right Environments *for* Health

The Annual Report from the Director of Public Health



The Royal Borough of
Windsor and Maidenhead
July 2018



FOREWORD

We are shaped by our environment more than we may realise. Public health through the ages has always understood that environmental factors, from poor housing, lack of sanitation and poor air quality have an important role to play in determining our health; both as immediate threats to life and limb; and as long-term factors creating long-term exposure to potential harms. Other disciplines - and indeed many of our established arts - have sought refuge and inspiration in nature; however, it has taken some time for public health and medicine to identify the evidence base supporting what many of us had long felt; that nature and greenspace is good for us!

This report is intended for a wide audience. Since public health moved back into local government in 2013, we have reconnected with many of our valued colleagues in planning, leisure and sports development, parks and recreation, housing and highways (amongst others) to create place-based strategies and deliver actions which bind together these wider determinants of health with our local priorities. I hope that this report reaches a wide and diverse audience, most importantly to residents and to their representatives such as Councillors and GPs, who are poised to respond to the recommendations laid out herein.

With ever increasing demands for new housing in the South-East of England, and the need to improve and increase infrastructure; so the natural environment can come under pressure and its intrinsic values may be overlooked. Berkshire is as a whole, a green and pleasant place. From the areas of outstanding natural beauty of the North Wessex Downs; to the Green Flag accredited parks of Slough, communities live close by or surrounded by attractive green space. Rivers and waterways play an important part in our communities too – from the Thames at Windsor through to the reclaimed recreational parks and lakes of Dinton Pastures; these provide nature and people with nourishment, peace and pleasure. The new town planners who gave birth to Bracknell in the late 1940s planned a town where greenspace and recreation was

a defining generator of the town's layout; and in Reading, the Thames side open spaces at Richfield Avenue and at King's Meadow provide homes to two huge community events; the Reading Festival and Reading Pride respectively.

Berkshire's natural environment can be seen to provide opportunity for peace and tranquillity; gentle and boisterous play; sport, competition and spectacle; natural habitats and preservation of wildlife; and attractive places to walk, cycle and live amongst. That our communities are still able to live amongst and use a variety of natural environments freely for our recreation is testament to many who have fought for their preservation and enhancement. Improvement in and widening access to green and blue space must be a public health ambition in itself, and this report provides the evidence base to build that ambition.

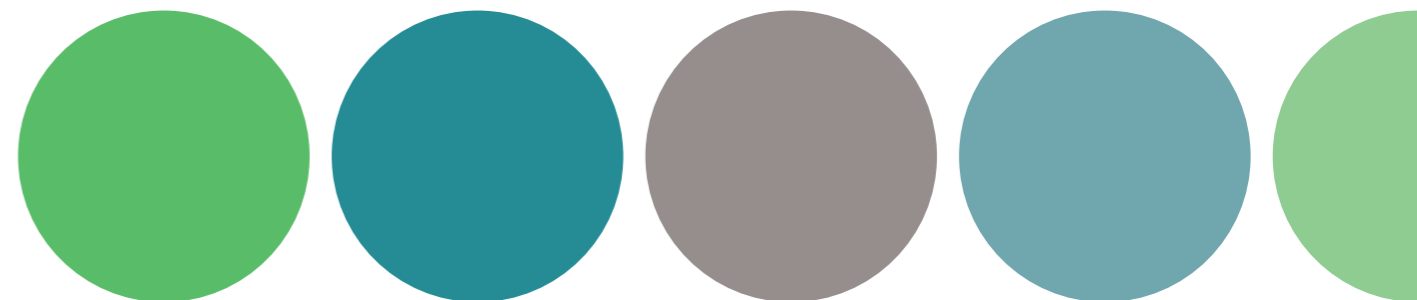
I truly hope that this report reconnects professions; communities and landowners who all have a duty to support the public's health through creating the right environments for health to thrive and benefit us all through the beauty of natural and green spaces.



Darrell Gale FFPH MSc BA (Hons)
Acting Strategic Director of Public Health for Berkshire

TABLE OF CONTENTS

About this Report	4	In our area	20
Introduction – the wider determinants of health	6	Case Study: Parkrun Maidenhead	22
The Natural Environment	8	Communities and health inequalities	23
Policy	8	Policy	23
Research	9	Research	24
How can we measure Green space?	10	In our area	25
Resources	11	Case study: Stand Out for Autism	26
Health Outcomes and Behaviours – Profiles	12	Opportunities and challenges	27
Mental Health	12	New developments and regeneration	27
In our area	13	Policy	27
Research	14	Case Study: The Maidenhead Waterway Project	29
Case Study: Boyn Grove Community Resource Centre Gardens	15	Increasing access	30
Children and Young people	16	Research	30
Research	16	Policy	31
In our area	17	Case Study: Dedworth All-weather football pitch	32
Case Study: The Daily Mile	18	Conclusions	33
Physical activity	19	Recommendations	34
Policy	20	Bibliography	35
Research	20		



ABOUT THIS REPORT

This report was developed and produced on behalf of the Acting Director of Public Health by Shared Public Health Services for Berkshire, and authored and coordinated by Dr Steffan Glaze (Foundation Doctor).

This report is the joint effort of all Consultant-led Public Health teams in Berkshire to produce the statutory annual report of the Director of Public Health both as a pan-Berkshire document, celebrating the history of shared working across the six Unitary Authorities; and also as a unique report for each individual authority.

Case studies were provided by a variety of individuals from local authority public health teams or other groups, such as voluntary organisations who are acknowledged below and with their contributions.

Finally, we acknowledge Judith Wright who was Interim Strategic Director of Public Health for Berkshire from April-December 2017, who conceived of the topic and encouraged us all to find the right environments for health.

Berkshire Lead Consultants in Public Health

Shared Public Health Services for Berkshire

Dr Jo Jefferies

Bracknell Forest

Dr Lisa McNally

Reading

Dr Marion Gibbon

Royal Borough of Windsor & Maidenhead

Teresa Salami-Oru

Slough

Dr Liz Brutus

West Berkshire

Matthew Pearce

Wokingham

Darrell Gale and Julie Hotchkiss

Public Health Services for Berkshire

Lynne Brett

Sarah Shildrick

Sam Claridge

Joy Smith

Trevor Keable

Becky Taylor

Emma Moule

Nana Wadee

Royal Borough of Windsor and Maidenhead Council

Colleagues in Public Health and other departments of local government, as well as collaborators from other groups, contributed to the case studies found throughout this report or its design and administration.

Public Health Lead for Annual Report

Catherine Williams

Contributors

Steph James

Helen Preedy

Debbie Dickenson

Mark Jordan



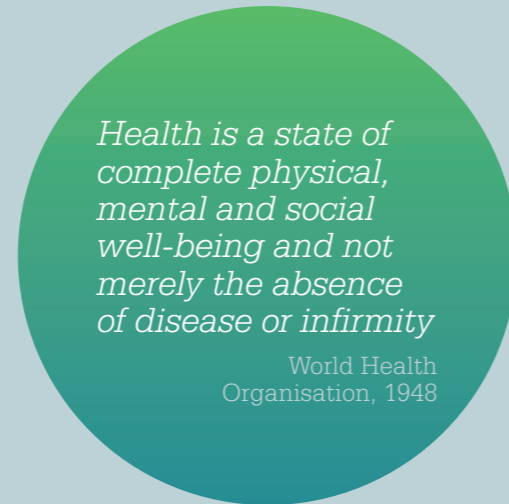
Credit: Doug Harding

INTRODUCTION – The Wider Determinants of Health

There are many factors, or determinants, that come together to affect our health. There are some we cannot change – chiefly, our genes. Of the modifiable factors, some are individual and personal choices such as taking up smoking or choosing to exercise. On a population level, there are the wider determinants of health: a diverse range of economic, environmental and social factors that affect people's health and influence their choices and lifestyles. Difficult to quantify, many of these determinants are shaped by national and local government policies, our environment and the distribution of wealth - things not quickly changed. They include:

- Income and social status
- Educational attainment
- Quality of housing
- Community and social networks
- Activity – the way we live

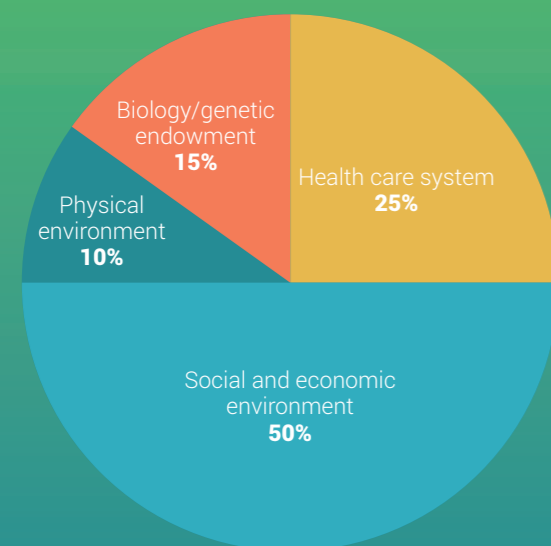
It is generally agreed that these wider determinants of health overall have a more significant impact on the health of individuals than direct interventions in health



care. Estimates vary, but it seems that health care contributes less than 25% of our overall health, with these wider determinants contributing to the majority.

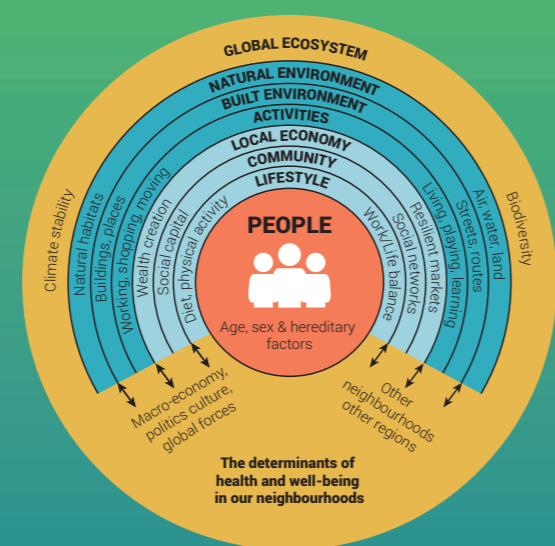
Public health, as a responsibility of local authority, has the opportunity to influence these determinants for the improvement of the health and wellbeing of the population it serves. The benefits may not be quickly realised, but are potentially vast and wide reaching, and could reduce the inequalities in our society and improve health and wellbeing for all of us.

[1] Estimated impact of determinants on health status of the population



Source: Canadian Institute for Advanced Research, Health Canada, Population and Public Health Branch AB/NWT 2002

[2] Barton and Grant, "A health map for the local human habitat", 2006



The health map: Barton and Grant 2006 developed from a concept by Dahlgren and Whitehead 1991

This report will focus on one of the wider determinants of health – the natural environment – and how this could be used to improve our health. We will begin by describing the natural environment and its relationship to other determinants of health, then go on to examine particular health dimensions in this context. Finally, we will consider the challenges – and opportunities – to the natural environment that we can adjust to improve the wellbeing of our communities and from these build recommendations to act on.

Throughout the report, you will find case reports and research. We want to make effective changes, such that investments made will reap benefits for our communities. The research is included to discuss the scientific factual evidence available, and local case studies highlight the ways in which local communities are already using the natural environment to stay healthy or improve their health.

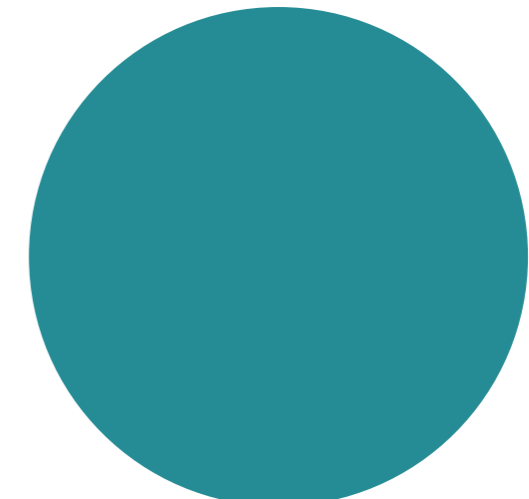
RESEARCH

Most of the research described in this report comes from scientific journals. Researchers conduct their studies, and then publish their results only after a body of other scientists have reviewed their work for accuracy. It can be difficult to get evidence on a population scale because there are so many things that can contribute to health and wellbeing, making it hard to measure the amount caused by a single aspect. The studies selected are considered to be of good quality, but reflect only a small proportion of the data available.



CASE STUDY

All of the case studies are examples of the work going on in this local authority in line with the theme of the report. We are pleased to highlight a variety of council, voluntary and national initiatives that are contributing to improving our health.



THE NATURAL ENVIRONMENT

The natural environment can encompass many parts of our surroundings. We often think of wide open fields, quiet forests or flowing rivers as the truly natural environment, but our urban environments can include natural elements. Often termed 'green space', this includes many things, from sports fields to decorative gardens. The natural environment can also encompass 'blue spaces' such as rivers and lakes, which are features of our area that can enable exercise, time in nature, leisure and relaxation. There is evidence that this natural environment has an influence on health in a variety of ways.

The ways in which the natural environment can improve health are complex and intertwined with many other factors. There are broad themes that have appeared from the research in this field, namely [3]:

- Stress reduction
 - It has been known for a long time that spending time in nature can have restorative effects, through relaxation.
- Improved environmental quality
 - Green spaces are more likely to be biologically diverse, and contribute to improving air quality and reducing the effect of heat concentration in cities.
- Greater social cohesion
 - Areas of natural environment are places that people can socialise and congregate, places of pride in the community and as a result improve the cohesion of neighbourhoods.
- Increased physical activity
 - Green spaces are appealing to visit, and typically need to be walked, cycled or played in to appreciate them.

We will see throughout this report how scientific research has found evidence from an individual to a population level that green spaces and the natural environment can have positive effects on our health and wellbeing. Although the exact mechanism isn't clear, there is still the opportunity to increase the availability, quality and use of natural elements in our communities.

Policy

The Department for Communities and Local Government published a consultation paper [4] in 2010 on planning policy and shaping healthy environments. Within the paper, the government defined a wide range of green spaces.

- parks and gardens – including urban parks, country parks and formal gardens
- natural and semi-natural urban green spaces – including woodlands, urban forestry, grasslands, common land, wetlands, areas of open and running water, wastelands, derelict open land and rock areas
- green corridors – including canal and river banks, cycle ways and rights of way
- outdoors sports facilities (with natural or artificial surfaces, either publicly or privately owned) – including tennis courts, bowling greens, sport pitches, athletics tracks, playing fields and other outdoor sports areas
- amenity green space – including informal recreation spaces, green space in and around housing, domestic gardens and town or village greens
- provision for children and teenagers – including play areas, adventure playgrounds, skate parks, basketball courts and other informal areas
- allotments, community gardens, city (urban) farms and land used for permaculture
- cemeteries and churchyards
- accessible countryside in urban fringe areas
- civic spaces, including civic and market squares
- landscape around buildings – including street trees

RESEARCH

At an individual patient level, in 1983 R Ulrich [5] found that a view over green space could quicken someone's recovery from surgery in a suburban hospital in Pennsylvania, USA. This study compared similar people who had the same operation, but what differed between the two groups compared was the view from their window - either a brick wall or trees. Those with the green view had statistically significant lower length of stays and lower use of painkillers. This early evidence showed that there may be a restorative effect to simply viewing greenery and natural environments.



Looking at the population level, a study in the Netherlands [6] examined the electronic GP records of over 340,000 patients, and measured their illness by how often they saw their GP for various health problems. This was then compared with the percent of green space in a radius around their postcode based on satellite imaging. The analysis showed that over half the health problems were less common among

the patients who lived in areas with more green space, even when correcting for potential confounding factors such as age and socioeconomic status. The correlation was strongest for anxiety and depression, children under 12 and those aged 46-65. They found that an extra 1% of green space in a person's area was as beneficial to overall health as being a year younger.



How can we measure Green space?

How can we define how 'green' our neighbourhoods are? There are many ways this is measured in scientific study, the two most common being:

- Satellite imaging – by looking at photographs taken from space, scientists can calculate what percent of an area is covered by plants. This is relatively easy to derive, and data is available for much of Europe. However, it does not account for the quality of the green space, e.g. for access or for food production, or how much we can actually access or use that greenery, as any plants on roofs, within private land, or in the middle of a roundabout would be included.
- Mapping – analysing maps can reveal the different land types in an area, from arable to housing. Counting how much of an area is covered by accessible green space can be used to measure the amount of natural environment in a neighbourhood. This method will miss small areas, such as verges and paths, which contribute to green routes but are not large enough to be documented on most maps.

Although effective at developing a measure of how green an area is, neither of these methods account for how easy the space is for people to access, how much that space is used or the quality of it. This aspect of the natural environment can be heavily influenced by the community who use it and live near it, such that we can all have a part to play in making the most of green spaces in our area.



Resources

A variety of resources are available for us to find and use green space in our area.

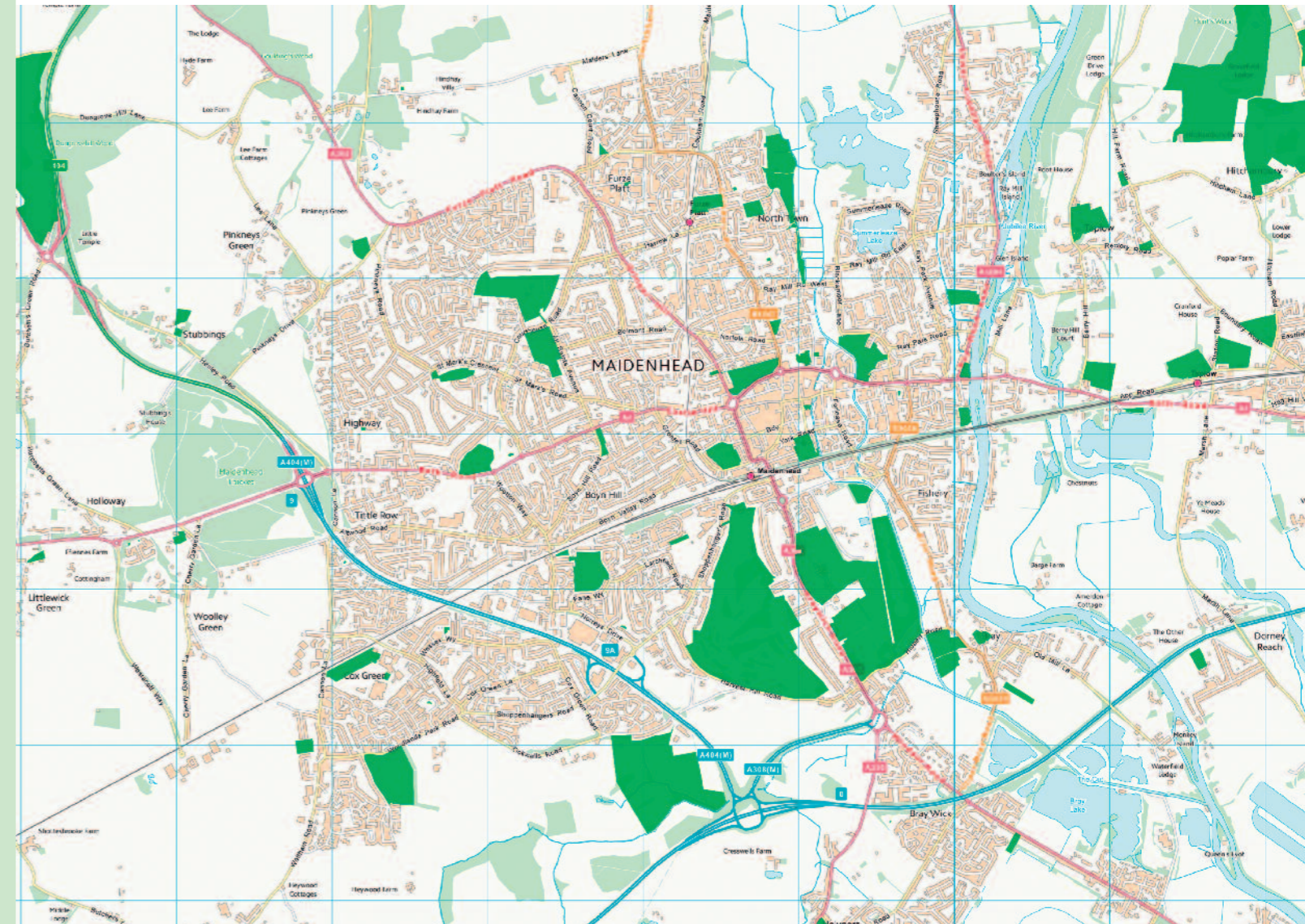
WOODLANDS TRUST WEBSITE

The Woodlands Trust, the UK's largest conservation charity, has an online database of the woods they manage. Using your postcode, you can find more about the woodland in your area.

OS GREENSPACE

The Ordnance Survey has assessed their own data about land use in the United Kingdom to produce an interactive map which can be used to see where green spaces are, what they are used for and how they can be accessed.

The Royal Borough of Windsor and Maidenhead keeps online records of all the green spaces they manage, which includes details about facilities and opening times. You can find this resource at the following address: https://www3.rbwm.gov.uk/info/200200/parks_and_open_spaces



Source: © Ordnance Survey OpenData (2018)

HEALTH OUTCOMES AND BEHAVIOURS –

Profiles

The following section describes some of the key health outcomes and behaviours on which there is a firm evidence base for the effect of green space or the natural environment. The relevance of these to our communities is demonstrated by data about the current health and wellbeing of the local communities in a summary graphic. You will also find original research evidence and a case study from your local area.



Mental Health

Mental health is essential for our overall health and wellbeing, and changes in policies and the NHS is increasingly recognising this. The 2011 report from the Department of Health 'No Health Without Mental Health' identifies some key facts about the national picture:

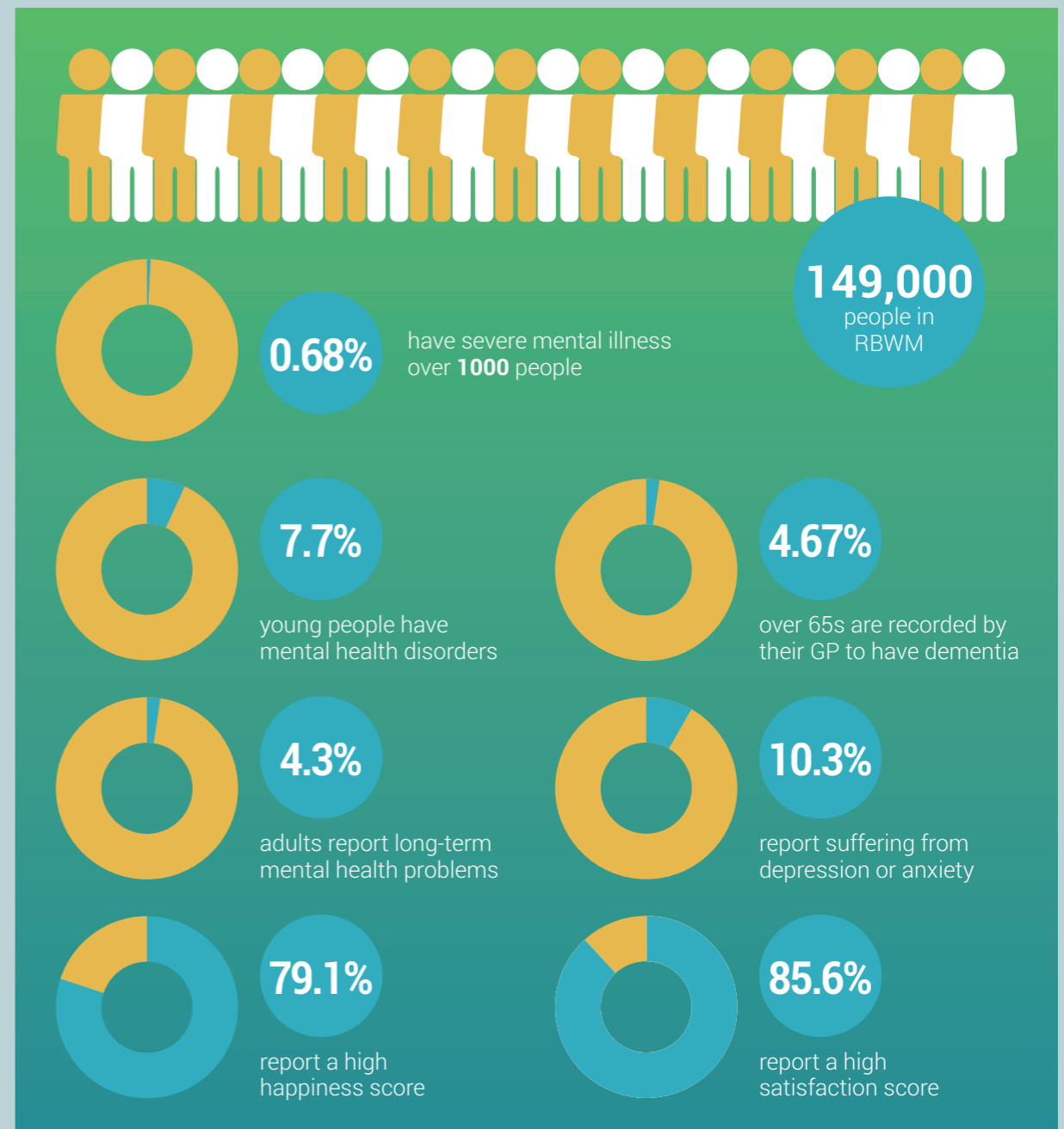
- mental illness is the single largest cause of disability in the UK
- at least one in four people will experience a mental health problem at some point in their life and one in six adults have a mental health problem at any one time
- the costs of mental health problems to the economy in England have recently been estimated at a massive £105 billion, and treatment costs are expected to double in the next 20 years

National policies and initiatives recognise the benefits of spending time in green spaces on mental health. For example, Mind's Ecominds scheme found 7 of 10 people experienced significant increases in mental wellbeing by the end of an ecotherapy project [7]. It helped people find full-time employment, with potential savings of around £5,700 for each person in terms of government spend.

How could natural environments contribute to changing this picture? It is hard to identify exactly the mechanisms for these benefits, but a variety of evidence is available. It has been shown that exposure to natural environments can reduce stress, anxiety, blood pressure and anger. Over longer periods of time, those who live in greener areas are more likely to report good mental health and wellbeing.

IN OUR AREA

There are currently estimated to be around 149,000 people [8] in the Royal Borough of Windsor and Maidenhead: 0.68% have severe mental illness – over 1,000 people. An estimated 7.7% of young people have mental health disorders, and 4.67% of over 65s are recorded by their GP to have dementia. Responding to a GP Survey, 4.3% of adults report long-term mental health problems, and 10.3% report suffering from depression or anxiety. In terms of self-reported well-being, 79.1% report a high happiness score and 85.6% a high satisfaction score. [9] [10]



RESEARCH

Evidence for the effect of green space on mental health looks at both the short-term, temporary effects and long term benefits. Contact with nature can improve emotional state, reduce self-reported anger, fatigue, anxiety, sadness and increase feelings of energy. [11]

Hartig et al [12] tested whether natural environments were more relaxing and restorative than purely urban surroundings, by giving subjects difficult tasks. They measured blood pressure and reported mood throughout, and found that being in nature was associated with quicker returns to normal levels of blood pressure and mood after stress – evidence that being in nature can improve your physical and mental wellbeing in times of stress.

A study by Alcock et al [13] looked at people who moved to greener areas during the years of an annual survey of their mental health. Moving from a less to more green area was associated with improvements in reported mental health.



CASE STUDY: BOYN GROVE COMMUNITY RESOURCE CENTRE GARDENS

By Debbie Dickenson, Public Health Commissioning Officer

Boyn Grove Community Resource Centre was built in 2011. The building is divided into sections and provides day services to people with learning disabilities, profound and multiple learning disabilities (PMLD) and dementia. There are three gardens on site which provide different experiences for clients. They are all paved so that they are completely wheelchair accessible.

There is a small sensory garden with a Redwood tree and Mulberry tree in the centre. A waterfall water feature provides gentle noise. Basil, mint and lavender will be planted this spring. The idea is to stimulate the clients' senses with things to look at, smell and feel.

The garden for the dementia patients is a pretty outdoor space with spring flowers, benches and a large awning to provide shade from the sun. Initially it was thought that dementia clients would help with the gardening, but their problems with concentration has made this difficult. However they do enjoy being outside and have also shown an interest in the allotment garden next door.

The newest of the three gardens was developed in 2016 and was originally just a bit of grass at the side of the building. The centre's manager was approached by the local Foodshare charity and asked if they could have a piece of land as a community allotment to grow fruit and vegetables on. The plan was that local residents' would be able to come and pick and use any produce which was grown.

The council's Bright Ideas fund provided monies to purchase raised planters and vegetable plants to get the project started. The allotment was run by volunteers and while they were dedicated, it was felt that the space could be better utilised. In 2017, the centre's manager took back the management of the space, had the whole area paved and put benches to make the allotment garden more accessible.

Dementia clients have enjoyed helping to pick the vegetables and as a result a pickling and bottling reminiscence project is being planned for later in the year. The idea is that after picking and pickling the produce, clients will be able to take it home to eat. It is also hoped that a local primary school can get involved in the project and make use of one of the allotment beds.

The local Men in Sheds group will be moving their base to Boyn Grove allotment garden in the near future when a shed has been erected for them.

Despite having a relatively small growing space and lots of different groups involved, the allotment garden works so beautifully because it's one aim is to grow food which everybody can enjoy.



Children and Young People

Every child deserves the best start in life to give them the opportunity to thrive in life. Pregnancy and upbringing impacts our physical and mental health during childhood and through to adulthood. Enabling good maternal health can allow a safe delivery and good growth of the foetus, preventing potential poor outcomes from low birth weight or prematurity. The development of a baby's brain and immune system begins in the womb, and continues as they grow.

Green spaces may alter the environmental stimuli we are exposed to, and through this change whether we develop inflammatory diseases such as asthma. They can encourage us to be more active or to connect with our community, which can improve cognitive development. Exposure to the natural environment appears to have an impact on the development of our microbiome – the vast number of microorganisms

that co-inhabit the human body. This microbiome may have an impact on the formation of our immune system, and as such the prevalence of allergies and long-term inflammatory diseases – including asthma. There is also evidence that street trees can improve the air quality in urban areas by absorbing some of the particulate matter from pollution, as well as reducing the 'heat island' effect generated by the concentration of hard surfaces and taller buildings [14].

Together with the improvements in mental health through spending time in nature, green spaces can contribute to a positive development for children, especially for play. The natural environment can improve our environment and change our behaviour to help us grow well. A healthy community which is using the green space available for both formal and informal play to increase a child's chance for the best start in life can set them off on the way to greater health and wellbeing.

RESEARCH

Dadvand et al [15] studied a group of 2,593 primary school children in 36 schools in Barcelona, Spain. Using repeat measures of memory and inattentiveness as an indicator of cognitive development, they compared this with exposure to green space. They measured the 'greenness' around the children's homes, their route to school and the school itself from satellite data that measures the percent of an area covered by plants. They found greater progress in the children in greener schools and home environments, partly explained by a reduced exposure to air pollution.

An American study [16] examined the association between birth outcomes and residential greenness. Looking at 64,705 births in Vancouver, Canada (1999-2002), they examined the density of vegetation within 100m of participants' homes, their birth outcomes and other aspects of their environment. They found that, independent of air pollution, noise, neighbourhood walkability and proximity to a park, increasing residential greenness was associated with beneficial birth outcomes including higher term birth weight and reduction of likelihood of prematurity.



IN OUR AREA

Looking at the most recent data for the health of children in the Royal Borough of Windsor and Maidenhead, we see 6.3% of infants born at a low weight. There were 9,667 attendances to Accident and Emergency by those under 18 years old, and 33 hospital stays last year to treat asthma. At 4-5 years of age 6.6% of children are obese, which increases to 16.2% at age 10-11.

In terms of being ready for school, 83.8% of children meet the expected level at the phonics screening check and 73.4% had achieved a good level of development at the end of reception year. Looking ahead, 59.1% of pupils at Key Stage 2 met the expected standard in reading, writing and maths; just under 70% of teenagers achieved five A*-C grades at GCSE. [17] [18] [19]



6.3%

of infants born at a low weight



6.6%

at 4-5 years of age

of children are obese which increases to **16.2%** at age 10-11



9,667

attendances to Accident and Emergency by those under 18 years old

33

hospital stays last year to treat Asthma



83.8%

of children meet the expected level at the phonics screening check

73.4%

had achieved a good level of development at the end of reception year

Looking ahead

59%

of pupils at Key Stage 2 met the expected standard in reading, writing and maths

just under

70%

of teenagers achieved five A*-C grades at GCSE



CASE STUDY: THE DAILY MILE

By Mark Jordan, Public Health Commissioning Officer



The aim of 'The Daily Mile' is to improve the physical, social, emotional and mental health and wellbeing of children – regardless of their age, ability or personal circumstances. Children are encouraged to walk, jog or run a mile every day. It takes 15 minutes from desk to desk and children of all abilities can take part.

Cookham Rise Primary School introduced 'The Daily Mile' in September 2016. This was a response to their national weight stats which (in line with the national average) showed that 25% of their year 6 pupils were classified as overweight or obese.

In addition, the school had introduced the 'Quad Kids' format to their sports day the previous year and it had become apparent that the children were unable to comfortably tackle the longer distances of three and four hundred metres. It was hoped 'The Daily Mile' would address these problems.

During the autumn term the PE leader, Dawn Bennett found that it was difficult to fit 'The Daily Mile' into the teaching day. Therefore, in January 2017 she timetabled it between literacy and maths.

She reports that running breaks up a long morning for the children. It provides them with a breath of fresh air and allows them to socialise. The idea of 'personal best' is promoted; the children compete with themselves rather than comparing themselves to others and they are encouraged to help and inspire each other.

The Daily Mile gives the children a chance to refocus and they come back into class re-energised.

The Head Teacher, Helen Daniels felt that one of the barriers to running was that the school field got very muddy in bad weather - with seven classes running seven laps of the field there was the potential for it to turn into a mud bath. She bid for funds from a local charity (Spoore, Merry and Rixman Foundation) and put it with her Sport Premium to purchase an all-weather track which was put down in January 2018.

Year 6 pupils run 'The Daily Mile' every day while the younger pupils run it on the three days when they do not have a PE lesson. The Head Teacher is now looking at technology which would allow the children to time their runs and monitor their progress.

The Royal Borough has used the work at Cookham Rise Primary School to promote 'The Daily Mile' within the area. It was used as a case study at a Building Resilience in Primary School Children conference (January 2018) aimed at teachers and other professionals. It also featured in the spring edition of the Around the Royal Borough Magazine that goes out to every household (63,000 properties). The two local Schools Sports Partnerships are offering training to teachers with the aim of making schools more confident and removing perceived barriers to running 'The Daily Mile'. It is hoped that many more schools will sign up over the next year.

For more information please visit: www.thedailymile.co.uk

Physical Activity

Being active can have wide reaching benefits to our health. It has been shown to reduce the risk of coronary heart disease, stroke, type 2 diabetes. It can help maintain a healthy weight, improve self-esteem and reduce depression and anxiety. Physical inactivity contributes to 1 in 6 deaths [20], estimates suggest that an inactive person is likely to spend 37% more time in the hospital and visit the doctor 5.5% more often than an active person [21]. The Department for Environment, Food and Rural Affairs estimates that the health system could save £2.1 billion per year if everyone had sufficient access to green space and its benefits. [22]

We also know our environment can shape our behaviour, so there is the opportunity to design our neighbourhoods and towns with activity in mind. The links between access to green space and levels of physical activity are well-established in research, which shows higher levels of physical activity in areas with

more green space [23]. Careful planning of towns can enable active travel – i.e. walking or cycling as a mode of transport – through making distances achievable and creating safe and aesthetically pleasing routes to travel on. Those who walk or cycle to their place of work are more likely to meet their physical activity needs. If more of us were active, we could significantly improve the health and wellbeing of our communities. The potential benefits are not limited to health – reducing journeys made by car will decrease carbon emissions, air pollution and traffic, and encouraging walking for shopping can boost our local economy.

Accessible, quality green spaces also allow sports and play to increase leisure time activity. Supporting local sports clubs with facilities, giving spaces for community groups and the provision of playgrounds can all enable people at all ages to be more active. We can harness the natural environment to increase physical activity in our community, and be healthier as a result.

What are the health benefits of physical activity?



[24] Public Health England Health Matters Blog, 2016

POLICY

Chief Medical Officer Recommendations [25]:

1. Adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of ten minutes or more – one way to approach this is to do 30 minutes on at least five days a week.
2. Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous intensity activity.
3. Adults should also undertake physical activity to improve muscle strength on at least two days a week.
4. All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

RESEARCH

Analysis of the Danish National Health Survey [26] was able to assess self-reported distances to green spaces, BMI and exercise habits. It revealed that those who reported living over 1km, compared with less than 300m, to green space were more likely to be obese and less likely to exercise. Although based on self-reporting which may be biased, this study highlights the potential benefit of encouraging physical exercise through proximity to green space.

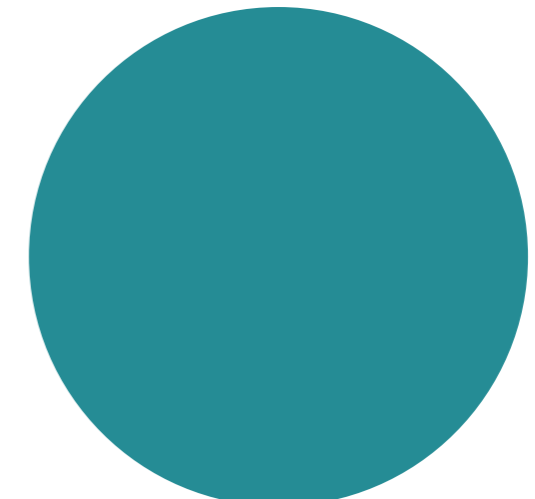
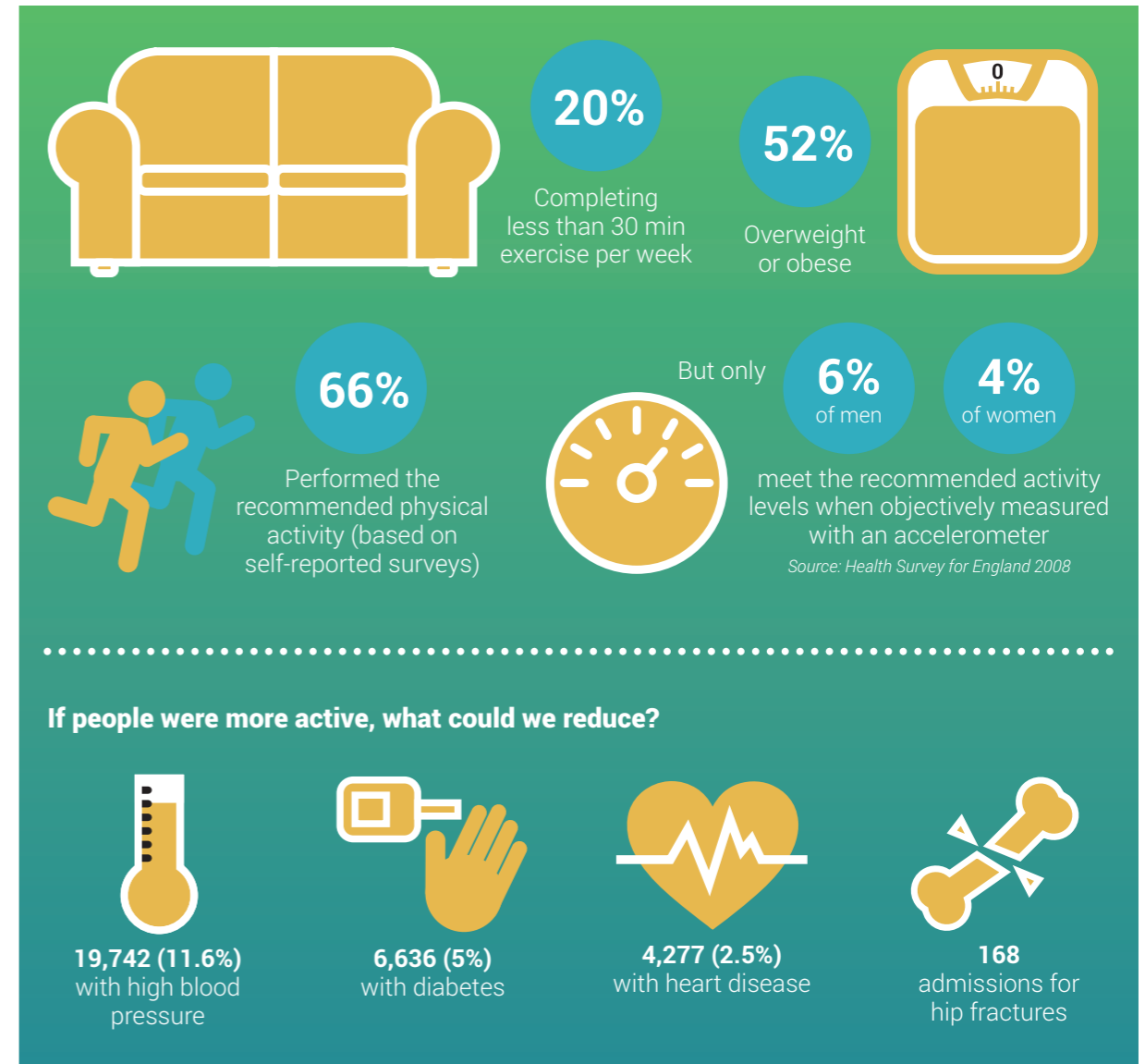
A study [27] in Bristol, UK, used data from the 2005 Bristol Quality of Life in your Neighbourhood survey of 6,821 adults and matched it with a mapping database of neighbourhood and green space information. After statistical analysis, they found that the amount of use reduced with increased distance from the green space, and those living near a formal park were most likely to achieve the recommended amounts of physical activity and were less likely to be overweight.



IN OUR AREA

In the Royal Borough of Windsor and Maidenhead, current data shows 66.3% of adults (18-65) report meeting the physical activity guidelines set out by the Chief Medical Officer, yet 20.3% of adults complete less than 30 minutes exercise per week [28]. Less than half (46.1%) of adults do any walking at least 5 times per week. 58.7% of 15 year olds are sedentary for over seven hours per day on average. A study by NHS Digital using an accelerometer found however that only 6% of men and 4% of women met the required levels of activity [29].

Over half of the Royal Borough of Windsor and Maidenhead's adults are overweight or obese (52.2%), and this starts in childhood – 30.5% of Year 6 children are overweight or obese. 6,636/5% have diabetes, 19,742/11.6% people are living with high blood pressure and 4,277/2.5% suffer from heart disease. 168 people were admitted to hospital last year having broken their hip. [30] [31]



CASE STUDY: PARKRUN MAIDENHEAD

By Helen Preedy, Sports Development Manager



The concept of parkrun is a simple one. It is a 5k run that is open to everyone. It's free and it takes place every Saturday at 9am. Runners sign up in advance and are given a bar code which they scan at the end of the course so that their run time is logged. The first parkrun started in Bushy Park in 2004 and there are now 213 taking place across the UK.

Parkrun Maidenhead is held at Braywick Park. It celebrated its third Birthday on 17th March 2018 with many of the runners running the course backwards! Local residents who had taken part in nearby Parkrun's in Woodley and Reading were instrumental in setting it up. They gained the £3,000 that was needed (to match fund start-up costs provided by the parkrun organisation) through submitting an application to the council's 'Bright Ideas' fund.

Club runners attend the weekly run, but it is a family orientated affair and is aimed at beginners. People run with their children, with pushchairs and with their dogs (1 per runner). There are themed runs where people can dress up and pacer events where runners try to beat their personal best times.

On average 233 people run at Maidenhead parkrun per week, but the biggest event has involved 409 runners. In total 5,811 people (up until 17.03.18) have run Maidenhead parkrun with an average of six runs per person.

Up to twenty-two volunteers help out each week in the 11 different roles from marshal to token sorter. Around a dozen Duke of Edinburgh award young people have helped out and have tried out all the roles including that of the run director.

Parkrun Maidenhead has its own webpage and after every event a report and photos are posted by that week's volunteer report writer and photographer. See: www.parkrun.org.uk/maidenhead/. There is also an active Twitter account (@maidenparkrun) and Facebook page (@maidenhead parkrun) which help to keep runners in touch and also fosters a spirit of camaraderie.

The Toby Carvery at the nearby Stafferton Lodge is the venue for post-run refreshments, but other local businesses have benefited from parkrun 'tourists' coming into the town.

A junior (2km) parkrun is currently being planned at Ockwells Park, Maidenhead. This initiative is due to start up in June and is also being pushed forward by local residents.

Communities and Health Inequalities

The wider determinants of health, as described in the introduction, have an important role in shaping our health and wellbeing. They were a key focus of the Marmot Review [32], which examined the health of our nation and identified a number of inequalities across our society – those of a lower socio-economic class have a lower life expectancy, a higher frequency of many diseases and poorer mental health. The mechanisms between a lower socio-economic class and poorer health are complex, but can include low quality housing, less healthy diets and lower educational achievement.

Green spaces have been shown to reduce these health inequalities, as the benefits of the natural environment may have a stronger effect for those in lower socio-economic groups. This may be in part due to smaller personal gardens and less aesthetic features in neighbourhoods, but there are often more barriers to the use of green spaces as well – such as crime, traffic and social isolation, which itself has been shown to be associated with increased mortality [33].

An important task of public health is to ensure improvements to health occur throughout society, and inequalities in our area are reduced. Improving green spaces in particular areas of deprivation or using initiatives that reduce isolation and loneliness might be one of the means for us to eliminate health inequalities in our area and improve our communities.



POLICY

The Marmot Review [32] of 2010 is a key piece of work that identifies many of the health inequalities in our society and gives recommendations for change. Policy Objective E, 'Create and develop healthy and sustainable places and communities' has a number of aims for the improvement and development of green spaces across the social gradient.

PRIORITY OBJECTIVES:

- Develop common policies to reduce the scale and impact of climate change and health inequalities
- Improve community capital and reduce social isolation across the social gradient

RECOMMENDATIONS:

- E1: Prioritise policies and interventions that both reduce health inequalities and mitigate climate change, by:
 - Improving active travel across the social gradient
 - Improving good quality open and green spaces available across the social gradient
- E2: Fully integrate the planning, transport, housing, environmental and health systems to address the social determinants of health in each locality.
- E3: Support locally developed and evidence-based community regeneration programmes that:
 - Remove barriers to community participation and action
 - Reduce social isolation.

RESEARCH

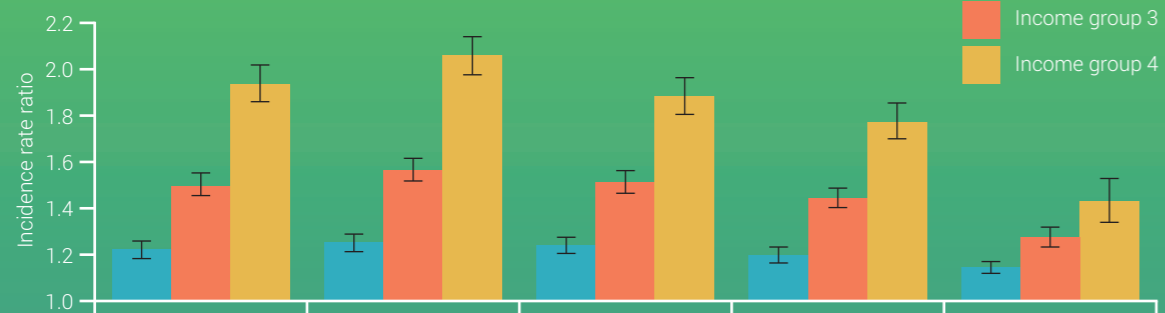
Mitchell and Popham [34] compared different socio-economic groups and the influence of green spaces on their health. Looking at people of working age in groups of increasing income and comparing them with the same groups in areas of increasing green space, they found that the difference in different health outcomes was reduced in areas with more green space. This can be seen in the graph below by the reducing size of the bars as you move left, which is areas of higher green space.

National data from the Monitor of Engagement with the Natural Environment survey, undertaken by Natural England from 2013 to 2015 [35] found that 12% of children had not visited the natural environment in the previous year, and these children were more likely to be of Black and Ethnic Minority origin or of a lower socio-economic class.

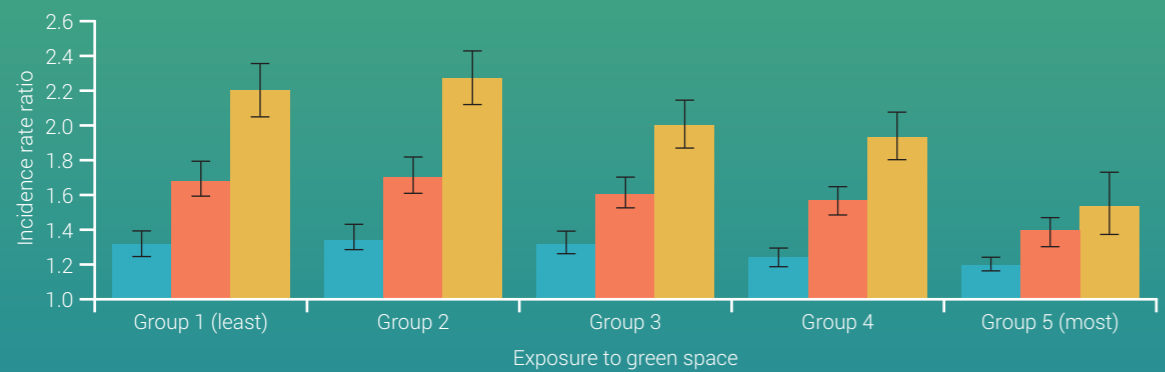
A study [36] in Chicago, USA, looked at the surrounding greenness of 98 publically owned apartment blocks. Residents were randomly assigned to any of the blocks. An examination of police data showed that there were fewer crime reports from apartment blocks with greener surrounding areas when compared to those with less green surroundings.



A All-cause mortality



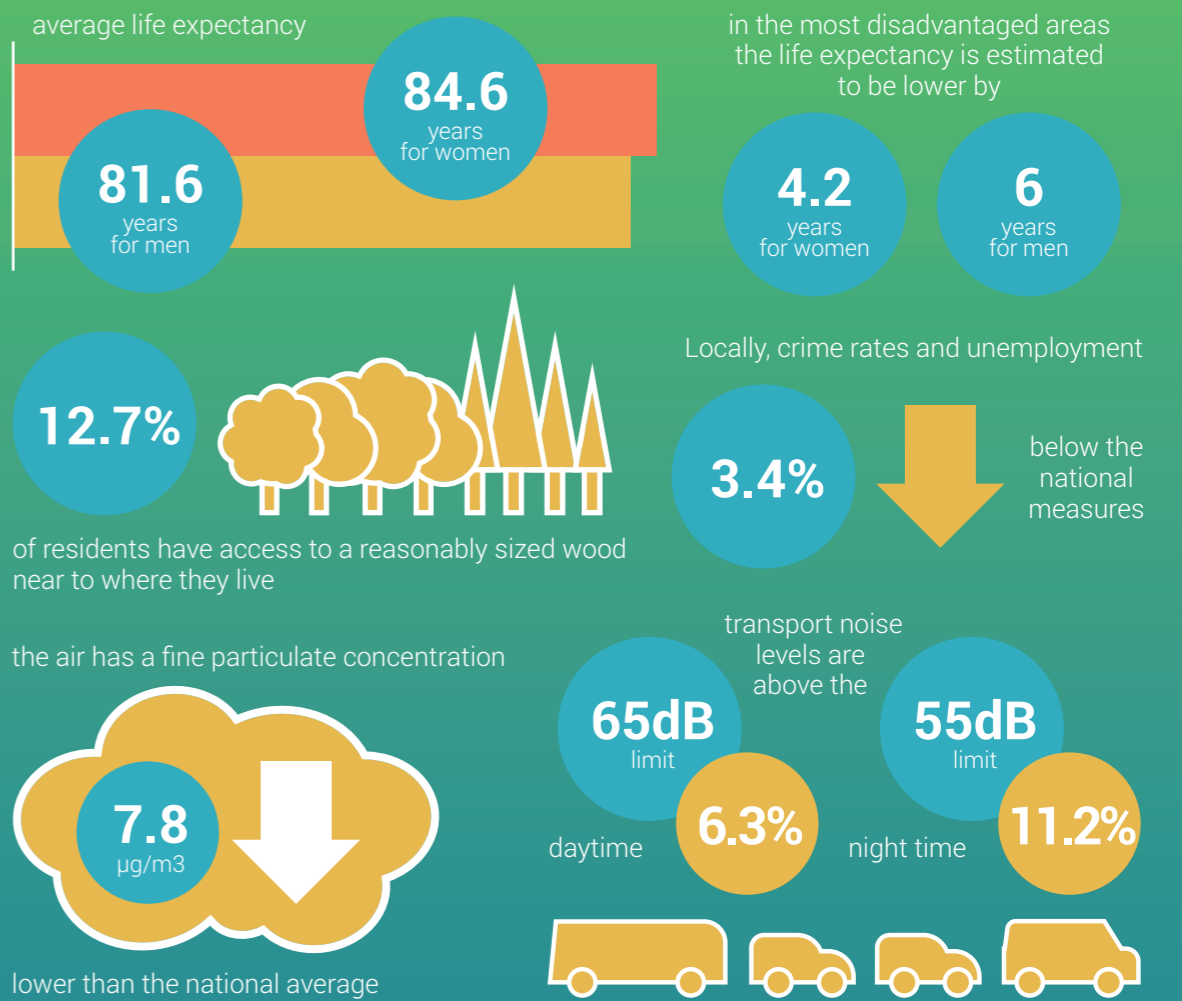
B Deaths from circulatory disease



[34] Mitchell and Popham, 2008

IN OUR AREA

The latest data for the Royal Borough of Windsor and Maidenhead shows the average life expectancy is 84.6 years for women and 81.6 for men. However, in the most disadvantaged areas the life expectancy is estimated to be lower by 4.2 years for women and 6 for men, compared to the least disadvantaged areas. There are lots of ways to measure the potential causes – they are often the wider determinants of health discussed earlier in the report. Locally, crime rates and unemployment (3.4%) are below the national measures. In terms of pollution, the air has a fine particulate concentration of 7.8µg/m3 (lower than the national average), but transport noise levels are above the 65dB limit in daytime for 6.3% of residents, rising to 11.2% for the night time 55dB limit. In terms of personal isolation, only 48.7% of adult social care users have as much social contact as they would like. Only 12.7% of residents have access to a reasonably sized wood near to where they live. [37]



CASE STUDY: STAND OUT FOR AUTISM

By Debbie Dickenson, Public Health Commissioning Officer



Stand Out for Autism (SOFA) was set up in 2015 by Holly Clarke, a mother with an autistic son who has experience of working in marketing, events and the media. Holly's vision was not only to raise awareness and acceptance, but to build a community that could support, provide information and create activities for families like hers.

At the end of 2016 the charity was awarded £46,060 after receiving 3,300 votes in the 'People's Projects' (ITV and Big Lottery campaign) competition. This funding allowed the charity to expand its activities and start new projects in Maidenhead.

One of these new initiatives was Sunday morning football sessions for children with autism at Maidenhead United FC's ground. Three sessions are run for different age groups (4-7yrs, 8-11yrs and 12-16yrs) each week during term time in conjunction with the team's 'Magpies in the Community' programme.

The sessions are delivered in small groups by FA Level 2 qualified coaches who have completed the National Autistic Society's autism and sports training. Sessions are open to all children on the autistic spectrum and their siblings and friends can also attend.

Parents report that their children feel safe and confident in the sessions and the children can just be themselves as the coaches understand their behaviour. A number state that this has opened up a sport to their children which was previously not accessible to them. The fact that siblings can attend means the training can be a family affair.

Stand Out for Autism also run multi sports sessions for adults at Maidenhead United FC's covered Astro Turf pitch. These are delivered by qualified multi-sports coaches on Monday's between 6.30pm and 8pm. A range of sports such as football, table tennis, archery and badminton are on offer. There are currently seven participants, six of which travel from outside Maidenhead to attend.

For more information see: www.standoutforautism.com



OPPORTUNITIES AND CHALLENGES

New Developments and Regeneration

The planning of our local area can influence our health behaviours. Quality, easily accessible green space can enable us to exercise, accessibility to services allows walking and there can be opportunities for social engagement.

With local pressures on housing and the demand for new homes to be built in our area, there are both opportunities and challenges to the amount of quality green space. As urbanised areas already become increasingly built up, there is the need to use green areas on the peripheries of towns to provide enough quality accommodation for our population, often against the wishes of some residents. Although green views can be lost, the majority of these developments take place on private land which is not generally accessible by the public. With careful planning, new developments on previously private land could actually result in more publically accessible green space.

A variety of national policies and frameworks exist to assist local authorities concerning the provision of green spaces. These take the form of general advice through to specific quantifications of how much should be provided and for what purpose. These policies are often used by planning authorities to develop local policies that are relevant to the local situation.

To deliver safe, quality homes and neighbourhoods for all groups in our community it is important to find ways to balance the loss of green areas, the need for more housing and the opportunity to develop new green spaces and use investments to benefit the wider community. By engaging with the planning process and ensuring health and wellbeing of residents is considered in planning, we have the opportunity to develop new assets to improve our neighbourhoods.

POLICY

The Six Acres Standard [38] is a commonly used set of measures to guide local planners as to the amount of recreational space that should be in a community. It was developed by the National Playing Fields Association (NPFA, operating name Fields in Trust), and has existed in various forms since the 1930s with a specific recent update in 2008. It aims to inform policy that will result in the protection, improvement and green spaces focused on sport and play. Many Local Authorities include the standard in their open spaces policies.



Fields in Trust recommended benchmark guidelines - formal outdoor space [38]

Open space typology	Quantity guideline (hectares per 1000 population)	Walking guideline (walking distance: metres from dwellings)	Quality guideline
Playing pitches	1.2	1200m	<ul style="list-style-type: none"> Quality appropriate to the intended level of performance, designed to appropriate technical standards Located where they are of most value to the community to be served Sufficiently diverse recreational use for the whole community Appropriately landscaped Maintained safely and to the highest possible condition with available finance Positively managed taking account of the need for repair and replacement over time as necessary Provision of appropriate ancillary facilities and equipment Provision of footpaths Designed so as to be free of the fear of harm or crime Local authorities can set their own quality benchmark standards for playing pitches, taking into the account the level of play, topography, necessary safety margins and optimal orientation Local authorities can set their own quality benchmark standards for play areas using the Childrens' Play Council Quality assessment tool
All outdoor sports	1.6	1200m	
Equipped/ designated play areas	0.25	LAPs - 100m LEAPs - 400m NEAPs - 1000m	
Other outdoor provision (MUGAs and skateboard parks)	0.3	700m	

The National Planning Policy Framework [39] features a number of policies relating to green and open spaces. They include:

- Promoting healthy communities, through access to high quality open spaces and opportunities for sport and recreation
- Protection for existing facilities and the 'Local Green Space' designation, which can be used to

afford special protection for green areas of particular local importance due to their use or features

- Protection of green belt land and the need to positively enhance beneficial use of the land through increasing access, biodiversity of improvement of damaged land

CASE STUDY: THE MAIDENHEAD WATERWAY PROJECT

By Steph James, Maidenhead Town Manager



The Maidenhead Waterway project aims to restore and enlarge the neglected town centre channels into an accessible waterway that everyone can enjoy, whether for boating, walking, cycling, fishing or simply interacting with nature. Better yet, this will all be in the heart of Maidenhead.

Today's overgrown, dried up and neglected channels were once substantial lakes and rivers. As the waterway fell into disuse, Maidenhead town centre lost its riverside setting, yet the old channels are still there. Running south from the Thames near Cliveden, the channel divides into York Stream - passing under the historic Chapel Arches - and Moor Cut which crosses Town Moor. The channels re-join at Green Lane and broaden out before returning to the Thames by Bray Marina. The channels were enlarged in the 1960s for flood defence, a purpose now served by the Jubilee River to the east of the main river Thames. Bray Cut remains up to 14m wide, but is largely hidden and inaccessible. It needs some minor work but, as canoeists have proved, is already navigable today.

The Royal Borough has been our partner as the plans have evolved and the restoration of Maidenhead's waterways has become one of five key initiatives to improve the appearance, amenity and vitality of our town centre. Consultations on the waterway plans were met with enthusiastic public support and, as a result, it was included in the council's adopted Area Action Plan. Maidenhead Waterways expects to tackle the project in stages, as funding allows, but the priority is to restore York Stream and Moor Cut to create a 'ring' for small boats to operate around the town centre. To the south, we will also open up the Bray Cut channel to allow small and then eventually larger craft to enter from the Thames. Longer term, we aim to restore and enlarge the channel from the Thames in the north, completing a larger circuit.

The work involves cutting back or removing the overgrown trees and bushes that obstruct the waterway, selective widening of the narrower sections of the channel and dredging/lowering the bed to increase water depths. The construction of a weir at Green Lane will raise and stabilise water levels within the 'ring' and a lock is to be added at a later stage to allow larger boats to pass into the town centre. We are excited about the opportunities this regeneration will bring for people to be outside, enjoy their town and interact with nature.

INCREASING ACCESS

Another way we can maximise the benefits of green space in our area is to make best use of existing spaces. This can be through improving the quality of already available spaces, opening previously private areas and finding new ways to encourage their use.

Access to green spaces can be increased by removing the barriers to their use. These can vary for different groups, and are not restricted to their quantity or closeness to home. Personal concerns for safety, the quality of the spaces, the weather or poor transport infrastructure can prevent people using green spaces.

Local authorities can work to remove these barriers, alongside the wide range of other organisations who aim to improve the natural environment, encourage people to use it and increase healthy behaviours. Finding new ways to collaborate and strengthening existing links can allow us to make the most of the potential benefits for the green spaces already in our area.



RESEARCH

Volunteering with the Wildlife Trusts [40] improved peoples' mental wellbeing in 6-12 weeks in a study looking at 139 people, some of which were referred by healthcare providers, who volunteered with the Wildlife Trusts as they took part in nature conservation volunteering activities. 95% of participants with low self-reported wellbeing at the start of the project reported an improvement in 6 weeks, this level increased further over the following 6 weeks. Participants reported significantly enhanced feelings of positivity, increased general health and pro-environmental behaviour, higher levels of physical activity and more contact with green space at 12 weeks.

An Australian study [41] combined an audit about public open spaces in Perth with over 1,800 personal interviews. After statistical analysis, they found that those with very good access to large, attractive open spaces were 50% more likely to report high levels of walking, when compared with those do not have access to quality public spaces. This is evidence that the proximity and quality of spaces increases their use.



POLICY

A briefing [42] from the UCL Institute of Health Equity and Public Health England suggests some ways to increase access to green spaces:

1. Create new areas of green space and improve the quality of existing green spaces.
2. Increase accessibility of green spaces and improve engagement with local people.
3. Increasing the use of good quality green space for all social groups.

The Accessible Natural Greenspace Standard (ANGSt) was developed by Natural England to aim to quantify the need for local, useable space near communities. The standards state:

'All people should have accessible natural green space:

- of at least two hectares in size, no more than 300m (five minutes' walk) from home
- at least one accessible 20 hectare site within 2km of home
- one accessible 100 hectare site within 5km of home
- one accessible 500 hectare site within 10km of home'

These criteria account for the need for immediately local smaller spaces, as well as larger areas for sports and walking and are a means by which we can measure the depth and breadth of green spaces around us. Applying the standards to our area might enable us to find particular spaces that could be opened for residents for the widest benefit.



CASE STUDY: DEDWORTH ALL-WEATHER FOOTBALL PITCH

By Catherine Williams, Public Health Communications Officer, and Helen Preedy, Sports Development Manager



In October 2016 an all-weather football pitch was opened at Dedworth Middle School in Windsor. The aim of this dual use facility was to provide a high quality pitch for pupils at the school while improving the sports offer to the local community.

The pitch has increased the use of managed sports facilities and also supports the local playing pitch strategy in identifying more schools to develop their community use offers and support additional facilities to play sport.

It has brought new opportunities for local residents to get active. For example, over the summer parents were invited to take part in beginner netball sessions at the courts next to the all-weather pitch, while their children took part in a football training session.

Dedworth is an area of higher deprivation in the Royal Borough and the Broom Farm (Army) estate is nearby.

The school uses the pitch for PE lessons, but from 6pm (5pm on Mondays and Fridays) and all day at the weekends, it is open to community groups. Floodlighting means that the pitch can be used until 9pm all year round.

The idea was developed to replicate other school based leisure centres although the three facilities with a similar set up are run by the Royal Borough's leisure partner Legacy Leisure. The Dedworth pitch is currently run by a management group comprising of staff from the sports development team, local councillors, the head teacher, the facilities manager and representatives from local football clubs. The group meet three times per year and make decisions on maintenance, promotion of the pitch and the rates charged among other areas.

Currently over 500 young people use the pitch each week (23 junior groups and 2 adult 5-a-side groups). It is fully booked Monday to Friday in season, but has some availability at the weekends and will have empty slots out of season, which can be promoted to the wider community.

Due to the great success of this venture, there are now plans to improve and floodlight the tennis and netball courts that are next to the football pitch. In addition there are plans to utilise the new three court sports hall that is currently being built at the school. This will build on the wider community offer and address some activity gaps including the opportunity to set up a netball league in Windsor.

CONCLUSIONS

Green spaces can fundamentally define the spaces in which people live and work. The natural environment can have wide ranging health benefits for individuals and our communities and therefore have an important role to play in helping to reduce health inequalities.

Green spaces are free at the point of use and are an accessible asset for all communities, including those who may not be willing or able to pay to use other public or private facilities. It should be noted that green spaces are assets of value in their own right and are often valued for their relatively undeveloped and unspoilt nature. The quality of such spaces and their benefit to communities depends upon appropriate design and management of them.

We have examined how there is clear evidence for a range of improvements to health and wellbeing, including but not limited to:

- Mental health
- Pregnancy
- Childhood development
- Reduction in cardiovascular disease
- Increasing physical activity
- Reducing health inequalities
- Improving cohesion in communities

We have been able to showcase the wide range of success stories from the local authority and other organisations that are increasing our health and wellbeing by using the natural environment.

We also considered the current health of our population, particularly in the areas that could be improved by green spaces.

There are opportunities and challenges to using green spaces, and we have also considered some of the limitations to achieving these benefits and a few of the ways we might make more use of the assets in our area.



RECOMMENDATIONS

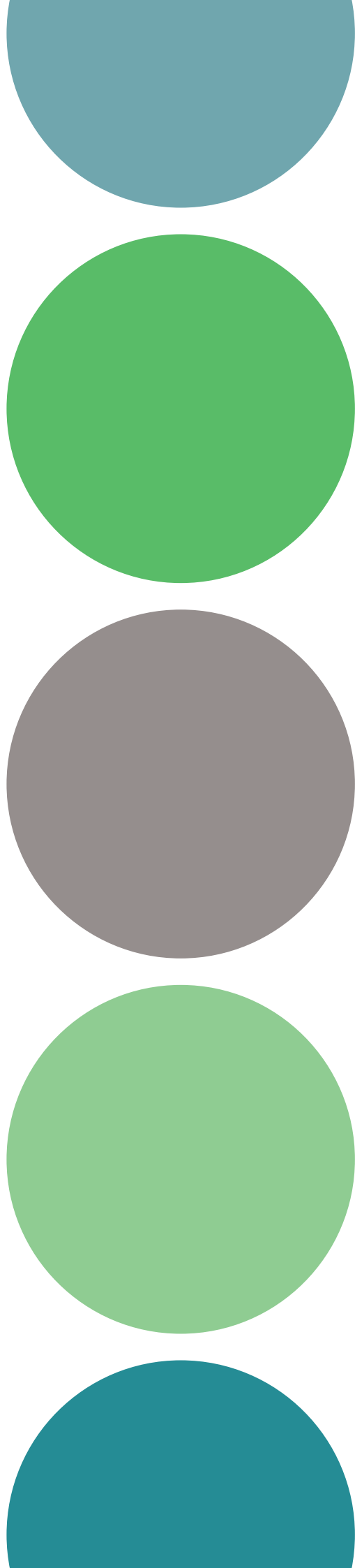
1. Local authorities and other agencies should continue to encourage community initiatives that make the most of natural space available, with the aim of improving mental health, increasing physical activity and strengthening communities.
2. Existing green space should be improved and any new developments should include high quality green spaces. The use of professional design and arrangements to ensure the ongoing management of natural environments should be considered if spaces are to be sustainable.
3. Opportunities to increase active transport should be considered when designing new green spaces and in the improvement of existing space.
4. Planning guidance for new developments should specifically consider the use of green and blue space to improve the health and wellbeing of residents and others using the space.
5. Local Authorities and their public health teams should foster new relationships with organisations aiming to improve the natural environment and its use.



BIBLIOGRAPHY

- [1] Health Canada, "Determinants of Health," Health Canada, Population and Public Health Branch, 2002.
- [2] H. Barton and M. Grant, "A health map for the local human habitat," *Journal for the Royal Society for the Promotion of Health*, vol. 126, no. 6, pp. 252-253, 2006.
- [3] WHO Regional Office for Europe, "Urban green spaces and health," Copenhagen, 2016.
- [4] Department for Communities and Local Government, "Planning for a Natural and Healthy Environment: Consultation," Communities and Local Government, 2010.
- [5] R. Ulrich, "View through a window may influence recovery from surgery," *Science*, vol. 224, no. 4647, pp. 420-421, 27 April 1984.
- [6] J. Maas, R. Verheij and S. de Vries, "Morbidity is related to green living environment," *Journal of Epidemiology & Community Health*, no. 63, pp. 967-973, 2009.
- [7] R. Bragg, C. Wood and J. Barton, "Ecominds effects on mental wellbeing: An evaluation for Mind," Essex Sustainability Institute and School of Biological Sciences - University of Essex, 2013.
- [8] Office for National Statistics, "Population Estimates for UK," ONS, Mid 2016.
- [9] Public Health Profiles, "Mental Health JSNA," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile-group/mental-health/profile/mh-jsna>. [Accessed March 2018].
- [10] Public Health Profiles, "Dementia," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile-group/mental-health/profile/dementia>. [Accessed March 2018].
- [11] D. E. Bowler, L. M. Buyung-Ali, M. T. Knight and A. S. Pullin, "A systematic review of evidence for the added benefits to health of exposure to natural environments," *BMC Public Health*, vol. 10, p. 456, 2010.
- [12] T. Hartig, G. W. Evans, L. D. Jamner, D. S. Davis and T. Garling, "Tracking restoration in natural and urban field settings," *Journal of Environmental Psychology*, vol. 23, no. 2, pp. 109-123, 2003.
- [13] I. Alcock, M. P. White, W. B. Wheeler, E. L. Fleming and M. Depledge, "Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas," *Environmental Science*, vol. 48, no. 2, pp. 1247-1255, 2014.
- [14] R. McDonald, T. Kroeger, T. Boucher, W. Longzhu and R. Salem, "Planting Healthy Air," The Nature Conservancy, 2016.
- [15] P. Dadvand, M. J. Nieuwenhuijsen, M. Esnaola, J. Forn, X. Basagana, M. Alvarez-Pedrerol, I. Rivas, M. Lopez-Vicente, M. De Castro Pascual, J. Su, M. Jerrett, X. Querol and J. Sunyer, "Green spaces and cognitive development in primary schoolchildren," *PNAS*, vol. 112, no. 26, pp. 7937-7942, 2015.
- [16] P. Hystad, H. W. Davies, L. Frank, J. Van Loon, U. Gehring, L. Tamburic and M. Brauer, "Residential greenness and birth outcomes: evaluating the influence of spatially correlated built-environment factors," *Environmental Health Perspectives*, vol. 122, no. 10, pp. 1095-1102, 2014.

- [17] Public Health Profiles, "Pregnancy and Birth," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile-group/child-health/profile/child-health-pregnancy>. [Accessed March 2018].
- [18] Public Health Profiles, "Overview of Child Health," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile-group/child-health/profile/child-health-overview>. [Accessed March 2018].
- [19] Public Health Profiles, "School Age Children," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile-group/child-health/profile/child-health-school-age>. [Accessed March 2018].
- [20] Public Health England, "Everybody active, every day: An evidence-based approach to physical activity," London, 2014.
- [21] N. Sari, "Physical inactivity and its impact on healthcare utilization," *Health Economics*, vol. 18, pp. 885-901, 2009.
- [22] Department for Environment, Food and Rural Affairs, "Defra's climate change plan," London, 2010.
- [23] A. Ellaway, S. MacIntyre and X. Bonnefoy, "Graffiti, greenery, and obesity in adults: secondary analysis of European cross sectional survey," *British Medical Journal*, vol. 331, no. 7514, pp. 611-2, 2005.
- [24] Public Health England, "Health Matters Blog," 19 July 2016. [Online]. Available: <https://www.gov.uk/government/publications/health-matters-getting-every-adult-active-every-day/health-matters-getting-every-adult-active-every-day>. [Accessed March 2018].
- [25] Chief Medical Officer, "Physical activity guidelines for Adults (19-64 years)," Crown Copyright, London, 2011.
- [26] M. Toftager, O. Ekholm, J. Schipperijn, U. Stigsdotter, P. Bentsen, M. Grønbaek, T. Randrup and F. Kamper-Jørgensen, "Distance to green space and physical activity: a Danish National Representative Survey," *Journal of Physical and Active Health*, vol. 8, no. 6, pp. 741-9, 2011.
- [27] E. Coombes, A. P. Jones and M. Hillsdon, "The relationship of physical activity and overweight to objectively measured green space accessibility and use," *Social Science & Medicine*, vol. 70, no. 6, pp. 816-822, 2010.
- [28] Sport England, "Active Lives Survey," 2016-17.
- [29] R. Craig, J. Mindell and V. Hirani, "Health Survey for England: Physical Activity and Fitness Summary of Key Findings," Joint Health Surveys Unit, London, 2008.
- [30] Public Health Profiles, "Physical Health," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile/physical-activity>. [Accessed March 2018].
- [31] Public Health Profiles, "Older People's Health," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile/older-people-health>. [Accessed March 2018].
- [32] M. Marmot, J. Allen, P. Goldblatt, T. Boyce, D. McNeish, M. Grady and I. Geddes, "Fair Society, Healthy Lives," The Marmot Review, London, 2010.
- [33] A. Steptoe, A. Shankar, P. Demakakos and J. Wardle, "Social isolation, loneliness, and all-cause mortality in older men and women," *PNAS*, vol. 110, no. 15, pp. 5797-5801, 2013.
- [34] R. Mitchell and F. Popham, "Effect of exposure to natural environment on health inequalities: an observational population study," *The Lancet*, vol. 372, no. 9650, pp. 1655-1660, 2008.
- [35] A. Hunt, D. Stewart, J. Burt and J. Dillon, "Monitor of Engagement with the Natural Environment: a pilot to develop an indicator of visits to the natural environment by children - Results from years 1 and 2 (March 2013 to February 2015)," Natural England Commissioned Reports, London, 2015.
- [36] F. E. Kuo and C. W. Sullivan, "Environment and Crime in the Inner City: does vegetation reduce crime?," *Environment and Behavior*, vol. 33, no. 3, pp. 343-367, 2001.
- [37] Public Health Profiles, "Wider Determinants of Health," Public Health England, [Online]. Available: <https://fingertips.phe.org.uk/profile/wider-determinants>. [Accessed March 2018].
- [38] F. I. Trust, "Beyond the Six Acre Standard," 2008. [Online]. Available: <http://www.fieldsintrust.org/Upload/file/guidance/Guidance-for-Outdoor-Sport-and-Play-England.pdf>. [Accessed 8 12 2017].
- [39] Department for Communities and Local Government, "National Planning Policy Framework," Crown Copyright, London, 2012.
- [40] The Wildlife Trusts and University of Essex, "Volunteering: A Natural Health Service," The Wildlife Trusts, Newark, 2017.
- [41] B. Giles-Corti, M. Broomhall, M. Knuiman, C. Collins, K. Douglas, K. Ng, A. Lange and R. Donovan, "Increasing walking: how important is distance to, attractiveness, and size of public open space?," *American Journal of Preventative Medicine*, vol. 28, no. 2, pp. 169-76, 2005.
- [42] UCL Institute of Health Equity, "Local action on health inequalities: Improving access to green spaces," Public Health England, London, 2014.
- [43] P. Dadvand, J. Sunyer, X. Basagna, F. Ballester, A. Lertxundi, A. Fernandez-Somoano, M. Estarlich, R. Garcia-Esteban, M. Mendez and M. Nieuwenhuijsen, "Surrounding greenness and pregnancy outcomes in four Spanish birth cohorts," *Environmental Health Perspectives*, vol. 120, no. 10, pp. 1481-1487, 2012.
- [44] H. Bixby, S. Hodgson, L. Fortunato, A. Hansell and D. Fecht, "Associations between Green Space and Health in English Cities: An Ecological, Cross-Sectional Study," *PLoS ONE*, vol. 10, no. 3, p. e0119495, 2015.
- [45] R. Mitchell and F. Popham, "Greenspace, urbanity and health: relationships in England," *Journal of Epidemiology & Community Health*, vol. 61, pp. 681-683, 2007.
- [46] I. Markevych, J. Shoierer, T. Hartig, A. Chudnovsky, P. Hystad, A. Dzhambov, S. de Vries, M. Triguero-Mas, M. Brauer, M. Nieuwenhuijsen, G. Lupp, E. Richardson, T. Astell-Burt, D. Dimitrova, X. Feng, M. Sadeh, M. Standl, J. Heinrich and E. Fuentes, "Exploring pathways linking greenspace to health: Theoretical and methodological guidance," *Environmental Research*, vol. 158, pp. 301-317, 2017.
- [47] R. Mitchell, T. Astell-Burt and E. Richardson, "A comparison of green space indicators for epidemiological research," *Journal of Epidemiology & Community Health*, vol. 65, pp. 853-858, 2011.

- 
- [48] SE AONBs Woodlands Programme, Forestry Commission and Natural England, "An analysis of accessible natural greenspace provision in the South East," 2007. [Online]. Available: <http://www.forestry.gov.uk/southeasternengland>. [Accessed 8 12 2017].
- [49] M. van den Bosch, P. Mudu, V. Uscila, M. Barrdahl, A. Kulinkina, B. Staatsen, W. Swart, H. Kruize, I. Zurllyte and A. Egorov, "Development of an urban green space indicator and the public health rationale," *Scandinavian Journal of Public Health*, vol. 44, no. 2, pp. 159-167, 2016.
- [50] I. Alcock, M. White, R. Lovell, S. Higgins, N. Osborne, K. Husk and B. Wheeler, "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*, vol. 142, pp. 38-46, 2015.
- [51] M. Gascon, M. Triguero-Mas, D. Martinez, P. Dadvand, D. Rojas-Rueda, A. Plasencia and M. Nieuwenhuijsen, "Residential green spaces and mortality: A systematic review," *Environment International*, vol. 86, pp. 60-67, 016.
- [52] E. Richardson and R. Mitchell, "Gender differences in relationships between urban green space and health in the United Kingdom," *Social Science and Medicine*, vol. 71, no. 3, pp. 568-75, 2010.
- [53] A. Lee and R. Maheswaran, "The health benefits of urban green spaces: a review of the evidence," *Journal of Public Health*, vol. 33, no. 2, pp. 212-22, 2010.

