'WellGreen': Improving Urban Greenspace for Mental Wellbeing
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Introduction

Half of the world's population now lives in cities, potentially disconnecting residents from the natural environments in which humans evolved and are best adapted to flourish. Our research uses large population surveys and greenspace maps, as well as local interventions, to investigate how access to urban greenspace improves mental wellbeing. We aim to demonstrate *the value of urban greenspace for mental wellbeing* and *how to incorporate greenery to benefit mental wellbeing*.

Context

In the UK, population growth and urban migration patterns have led to approximately 80% of people living in towns and cities. This increases pressure to accommodate growing numbers of residents in a healthy and positive environment, where space is already limited; perhaps for this reason, mental health and wellbeing are often poorer in cities, exacerbating the global challenges of urbanisation. However, exposure to nature can reduce stress and promote positive feelings (Hartig et al, 2015), a process acknowledged by the United Nations' *Sustainable Development Goals*, which aim to provide universal access to greenspace (Goal 7) and ensure good health and wellbeing (Goal 3) by 2030 (United Nations, 2015). While much research has focused on physical health and mental illness, mental wellbeing is also a vital component of health which affects everyone. As a measure of positive mental health, it is more than an absence of illness and has two main aspects: how we feel (happiness and satisfaction, known as *hedonic* wellbeing) and how we function (our sense of purpose and fulfilment, known as *eudaimonic* wellbeing)(Ryan and Deci, 2001).

In the UK, the 2015 Annual Population Survey, of over 100,000 residents, highlighted a growing wellbeing inequality (Evans et al., 2015), which may have widespread implications: mental illness is estimated to cost the British economy £94bn, over 4% of GDP per year (OECD, 2018). Globally, poor mental health is consistently rated among the top 10 contributors to the Global Burden of Disease, contributing 30% of years lived with disability (Vigo et al., 2016). However, individuals with good mental wellbeing are more likely to be satisfied, sociable and emotionally resilient, while at a population level, improved wellbeing can increase life expectancy, productivity and societal prosperity (Fredrickson and Losada, 2005). As an issue of growing political importance, mental wellbeing is now measured alongside traditional, economic progress indicators in the *Beyond GDP* initiative.

Exposure to nature is associated with better health; improving urban greenspace therefore has the potential to promote mental wellbeing of local communities. However, greenspace only exists in cities if it is specifically reserved or designed into the environment, and present understanding of how to do this is limited (Houlden et al., 2018). Current guidance on greenspace provision is also lacking, with different organisations making contrasting recommendations: these range from providing a greenspace 'close to homes', within an 800m straight-line distance (Fields in Trust, 2018), to 300-400m on foot (GLA, 2017). The broadest, (archived) *Accessible Natural Greenspace Standard*, recommends 2ha 'natural' greenspace within a 300m walk of all homes (Natural England 2010), but it is not known if this is optimal to improve mental wellbeing. The responsibility for greenspace care is also commonly decentralised and outsourced to local parks groups, such as Newcastle's Urban Green Trust, who called for further research into the health and wellbeing benefits of local greenspaces via the City Council's 2018 Open Spaces Assessment (Ethos Environmental Planning, 2018).

Our research

In this briefing, we draw on two completed and one ongoing research projects, focusing on urban greenspace and mental wellbeing, within Newcastle and across the UK.

What do we know so far about the relationship between urban greenspace and mental wellbeing?

To understand existing research, we undertook a systematic literature review of 927 studies of greenspace and wellbeing. We screened and assessed the quality of these studies, aggregating the

evidence provided by the 52 most relevant and high-quality papers. We grouped the findings by the ways in which greenspace was measured, identifying which features of greenspace are known to be important for mental wellbeing, while identifying knowledge gaps to address in our future research.

How can greenspace be made accessible, to benefit mental wellbeing?
Building on the findings of our opening project, we undertook the first large-scale analysis of greenspace and mental wellbeing in the UK, combining survey and map data, to spatially connect residents with their local greenspaces. We focused on greenspace types and accessibility, to understand how existing greenspace provision relates to the recommended amounts, and whether people with more local greenspace have better mental wellbeing. We first examined greenspace as the proportion per area, across all of England, and comparing this to mental wellbeing measured in the *Understanding Society* survey, of over 30,000 residents. Focussing on locations of greenspace relative to individuals, we then trialled our methods in London, where (at the time of the study) greenspace maps were most comprehensive. We calculated the amount of greenspace within varying distances of homes, to identify which showed the strongest association with mental wellbeing. We then examined different types of available greenspace. We are currently undertaking the national expansion of this project (using Ordnance Survey Greenspace Mastermap), to examine associations across the whole of England, and identify whether different types or combinations of greenspace are more valuable in different areas.

Which forms of urban greenery are most beneficial to mental wellbeing?
Our final project focusses on understanding the importance of greenspace in Newcastle itself, in order to directly support the mental wellbeing of local communities. This ongoing research is part-funded by Research England and will allow us to work within community spaces, using sensors to build up biodiversity and tranquillity soundscapes, as well conducting interviews with local park users to identify features that are most important to residents, alongside barriers and benefits of using these spaces.

Why did we do this research?
These projects are designed to work together to produce a holistic understanding of the relationship between urban greenspace and mental wellbeing. Some of the shared reasons behind each of these complimentary projects are:
- To develop and disseminate a better understanding of the benefits of urban greenspace for mental wellbeing
- To identify how urban greenspace should be designed and incorporated to maximise benefits to the local community
- To generate informed recommendations for urban greenspace planning, addressing the current gap in guidance

What did we find?
The key findings from our projects have been grouped into themes which emerged throughout our research: that the importance of greenspace, and relationships with greenspace, can be conceptualised in a number of ways; that consideration should be given to the individuals, communities and local contexts; and that different types of greenspace may have different uses and benefits. We discuss each of these in turn.

The importance of, and relationships with, greenspace can be conceptualised in a number of ways:
Through our large, systematic literature review, we were able to holistically aggregate all the existing evidence for a relationship between greenspace and mental wellbeing, identifying the key important features of greenspace. We highlighted six main aspects of greenspace which should be considered:
- The **amount of greenspace**, either within an administrative boundary, or within a certain distance of residents' homes or workplaces. Neighbourhood greenspace quantity is associated with improved life satisfaction and reduced symptoms of psychiatric distress.
- Available **access to greenspace**, both physically and socially. Physical access can be defined as either direct proximity or walking distance and may vary according to where people spend their

time (e.g. homes and workplaces). Facilities within the space, such as toilets, benches, and the types of path, may also affect accessibility for elderly or family groups, and those with reduced mobility. Opening times for public parks also influence when spaces are accessible. Perceptions of and social barriers to access will also vary by context.

- **Type of greenspace**. Although there is currently no standardised greenspace typology used in research, the former *Planning Policy Guidance 17 (PPG17) for Open Space, Sport and Recreation*, considers 10 broad categories of public open spaces[1]. A combination of different types provides options for residents and compatibility for different activities. The results of our studies, among others, have suggested that natural areas (for example nature reserves and woodlands) have stronger associations with mental wellbeing than other types. The amount of trees and other streetscape greenery (living walls, verges), may also be important.
- **Views of greenspace** from homes and workplaces are likely to be more satisfactory if they include trees and other natural features; street trees, living walls, grass verges and planting may all contribute to green views.
- **Visiting greenspace** can provide a mentally restorative environment and allowing individuals to connect with nature, while also facilitating activities known to be beneficial to wellbeing, such as socialising and being physically active. As well as potentially receiving benefits after exposure to greenspace, individuals who visit greenspace more frequently in general often have better wellbeing, particularly sense purpose and fulfilment.
- Feeling a stronger **connection with nature** may also be important for mental wellbeing. This may be achieved through living in a greener environment, having more opportunities to interact with nature, or consciously taking more notice of nature.

Findings also highlight how greenspace can mean different things to different people, and individual preferences for different types of interactions should be considered. Health benefits of greenspace may differ by demographic factors such as gender, ethnicity and socio-economic status, class, living context, greenspace type and climate (Lachowycz and Jones, 2013; World Health Organisation, 2016). This also means that unequal provision, or social and physical barriers to access, may exacerbate inequalities, despite the potential of greenspace to greatly benefit marginalised communities.

Researchers, as well, often define greenspace in different ways, so account should be taken as to whether, for example, results apply only to greenspaces above a certain size, if they include 'useable' designated greenspace or also include streetscape greenery like trees, or whether they include both public and private greenspace, such as gardens. Our primary research considers all *public greenspaces*.

There are multiple proposed mechanisms driving the mental wellbeing benefits of greenspace, which may influence the characteristics of the greenspaces or interactions which are most beneficial:

- *Biophilia*: popularised by the natural historian Edward Wilson in the 1980s, the theory of biophilia suggests that, as humans involved in natural landscapes, modern people still have an innate desire to connect with other forms of life. Nature and urban greenspace hence provide environments where individuals feel most at home and are best able to flourish (Wilson, 1984).
- *Attention Restoration* and *Stress Reduction* **Theories**: two different but complementary theories suggest that nature is innately fascinating, allowing us to rest and restore our fatigued attention (Kaplan, 1995), and secondly that exposure to nature has to capacity to reduce mental stress (Ulrich et al., 1991).
- **Use of greenspace**: for wellbeing-boosting activities, including relaxing, caring for the environment (e.g. gardening, litter picking), viewing beautiful surroundings, social interactions, physical activities and active travel.

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[1] The former *Planning Policy Guidance 17 (PPG17) for Open Space, Sport and Recreation*, considers 10 broad categories of public open spaces, which include: natural greenspace, parks and gardens, green corridors, outdoor sports facilities, amenities, provision for children/teenagers, allotments/city farms, cemeteries/church yards, countryside in the urban fringe, and civic spaces.

Consider the individuals, communities and contexts:
Our research compared the proportion of greenspace available within administrative, data collection boundaries (Lower Layer Super Output Areas, *LSOAs*, of approx. 1200 residents) to that available within a set distance of individual post codes. We found that greenspace within these *LSOA* boundaries was not associated with mental wellbeing, whereas previous, similar studies *have* found an association with life satisfaction and reduced symptoms of psychiatric distress. This reinforces the notion of mental wellbeing as a measure of positive mental health, reflecting much more than an absence of illness. However, evidence clearly suggests that having more greenspace in a neighbourhood is, in general, associated with better mental health.

The amount of greenspace at an **individual level** (that is, within a radius of the resident's postcode) was strongly associated with mental wellbeing. Comparisons across varying distances revealed that greenspace is most significant within 300m of homes, decreasing beyond this buffer. We believe that these differences in results between *LSOA*-based and individual-based boundaries highlight how traditional data collection boundaries do not capture real-world neighbourhoods or represent the lived experience of individual **communities**. We suggest that both research and practice would benefit from monitoring greenspace relative to individual homes, rather than a top-down approach. Although these results are based on our study in London, we included over 25,000 participants, and expect these associations to be largely replicated as we expand our research across England, using newly available data.

We also noted that the strength of the association between greenspace and wellbeing varied across space; that is, greenspace seems to be more important in some areas than others. This may be due, in part, to the types of greenspace available in different areas, as well as the types of people and wider **contexts**. For example, older people, those who do not work or who have young families are likely to spend more time at home, and may therefore have more exposure to their local greenspaces than people who commute to their workplace, particularly during the working week. Furthermore, residents in more deprived areas often report poorer accessibility, despite having comparable greenspace provision to more affluent areas. Individual perceptions of a space may therefore be influential, which could be addressed through advertising or sympathetic campaigns.

Different types of greenspace have different uses and values to mental wellbeing:
One area which we have found to often be overlooked in research and practice is the potential different values of various types of greenspace. Many studies are founded on the premise that nature is beneficial to health, although greenspace is commonly considered as a single entity, such as a broad definition of an 'urban park'. What is clear is that being exposed to a green/natural environment is generally more relaxing and beneficial to mental wellbeing than a comparable built-up environment.

We compared associations for the most common types of useable urban greenspace: natural and semi-natural (e.g. nature reserves, woodlands, commons, country parks), (public) formal parks and gardens, and outdoor sports facilities (e.g. playing fields, recreation grounds, golf courses and sports pitches). **Natural greenspace** is most strongly associated with mental wellbeing, most notably feelings of happiness and life satisfaction, while **formal parks** and **sports facilities** showed a weaker association. Further, different types of greenspace offer various opportunities; for example, physical activity benefits may be easiest to obtain in sports facilities while connecting with nature can be achieved through more natural space. Providing a range of local greenspace options may therefore be ideal for wellbeing. Again, although this study was conducted on a large sample of residents across Greater London, we expect similar results from our extension across the rest of England.

Facilities in each space may also influence these benefits, such as the Tower Café in Leazes Park potentially attracting visitors, or Pets' Corner in Jesmond Dene appealing to families; children's play equipment or grassed areas for picnics or ball games could be similarly attractive. More practically, access via steps, the type and incline of footways and presence of toilets all influence how easily visitors can utilise the space. Opening times and lighting also affect when the greenspace is accessible; a

beautiful park during the day may become inaccessible or potentially threatening if it is not lit or supervised after dark, for instance. As another indication of 'nature' in a space, the level of biodiversity may be important; biodiversity can provide habitats and ecosystem services, and so high quality, biodiverse environments could provide opportunities for restoration and offer indirect health benefits through enhanced ecosystem functions, disease regulation, and exposure to microbial diversity (Wood et al., 2019). A recent study also reported that spending at least 2 hours per week in nature was optimal for better satisfaction; it did not matter whether this was one interaction (for example, a long weekend walk, or visit to a park) or spread out in smaller doses throughout the week (White et al., 2019).

Our ongoing, in-situ study of Newcastle's greenspaces, in collaboration with the Urban Green Trust, combines audio and visual detection sensors with large-scale health data to explore implications of biodiversity for both human and ecological health.

Lessons Learnt

Some lessons we would like to emphasise from our research are:

- **Greenspace should be within 300m of residents**. Although many approaches to urban planning are designated *per Local Authority* or *per capita*, due consideration should be given to the real-life neighbourhoods of individuals. Greenspace within 300m of homes is most strongly associated with mental wellbeing, becoming slightly less important beyond this distance.
- **Greenspace doesn't always have to be 'useable'**. Street trees, living walls, balconies, verges etc all contribute to a green, liveable city, and in particular improve views of greenery.
- **Greenspace is not just parks**. Greenspace comes in many forms, and more natural greenspaces, or greenspaces with more biodiversity, may be most beneficial to mental wellbeing.
- **Different greenspaces may have different but complementary value**. Although nature is likely to be most important, having choice is also valuable to residents, and provides a range of opportunities for different demographics and activities.
- **People interact with greenspaces in a variety of ways**. Greenspace may benefit wellbeing through *biophilia*, restoration, improving community cohesion, facilitating physical activity/active travel, and improving connections with nature.
- **People often live and work in different places**. Where people spend their time can influence which greenspaces they are able to access, and therefore benefit from.
- **Greenspace can address or exacerbate other social and environmental inequalities**. Although more deprived communities often report poorer access to greenspace, these spaces have the potential to mitigate the effects of stress and socio-economic inequalities.

Further Reading

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