Tailoring Engagement with Urban Nature for University of Sheffield Students' Wellbeing

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Abstract

The prevalence of common mental health issues amongst university students has continued to increase, with the number of students declaring a pre-existing mental illness doubling since 2014/15. This has resulted in an increased and unmet demand for university student support services. Students suffering from mental health issues are more likely to drop out and underperform academically.

This thesis explores what type of nature based interventions could support University of Sheffield students' wellbeing. Using a mixed methods approach, this thesis addressed four research questions: *(1) What nature based interventions are currently available to University of Sheffield students in South Yorkshire? (2) How do a walking intervention and an app intervention in urban nature compare in terms of their effect on student wellbeing? (3) How did participants experience these interventions? (4) How should engagement with the natural environment be encouraged for university students' wellbeing?* The use of expert interviews details the current procedures and availability of nature based interventions. An intervention study was designed to improve university students' wellbeing through encouraging regular engagement with nature. This aimed to facilitate nature connection and attention restoration. The intervention compared a specially designed mobile phone app and walk activity.

This is the first study to detail the lived experience of university students' engagement with nature, to include follow-up measurements and a detailed evaluation. This resulted in findings in relation to noticing the negative and positive aspects of nature, and the viability of introducing novel nature based interventions for this population's wellbeing. Statistical analysis presented a mixed result in nature connection and quality of life outcome between the interventions. Critically, the qualitative results presented opportunities to improve university student's engagement with nature through green space design in coordination with interventions. Thematic analysis revealed the importance of campus green spaces designed to facilitate social and academic activities.

Declaration

I, the author, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not been previously been presented for an award at this, or any other, university.

Francesca Boyd

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List of Published Papers:

The following list contains work from the thesis that has been published:

1. Boyd, F. (in review). University students noticing nature: The unpleasant, the threatening and the unfamiliar. In: T. Smith, H. Pitt and R. Dunkley, ed., *Unfamiliar Landscapes*, 1st ed. Palgrave Macmillan.
2. Boyd, F; Allen, C; Robinson, J (in review) The past, present and future of nature-based interventions for human health.

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Preamble

My best friend is scared of butterflies.

My research interests are founded in understanding how people who are not explicitly fond of nature could still benefit from its health and wellbeing properties. This began with understanding the reasons behind why certain people not regularly visit the natural environment. My master's thesis analysed the differences in responses to the question: *"thinking about the last 12 months, how often, on average, have you spent your leisure time out of doors, away from your home?"* (King *et al.*, 2015 p.11)*,* between subsections of the English population in Natural England's Monitor of Engagement with the Natural Environment (MENE) survey. The findings included that 16-34 year olds had significantly higher odds of responding 'no particular reason' (Boyd *et al.*, 2018). In this research, I take a step further to see if it is possible to overcome that 'lack of reason' to visit the natural environment by creating a reason for university students to engage. My best friend and many others have experienced severe mental health issues whilst undertaking their university degrees. I have seen first-hand the failures of the current system, which amplifies the need for preventative action. I wanted to know whether there were types of urban nature based interventions that could support university students' wellbeing, and for whom the different types of intervention were most effective.

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Where do you eat your lunch? If it's a beautiful sunny day do you go outside?
How could nature filter into the lives of those who do not regularly seek it? Lunch time is a daily activity full of possibilities. It can be a social occasion, an opportunity to break from work or it is can be almost nothing, a time which happens between greater priorities: grabbing a sandwich and eating it in front of the laptop. 'Where do you go to eat your lunch?' was a discussion point during focus groups in this research. We are on a university campus with flower filled borders around the car park, next to a Victorian public park managed by the city council, but where do these students often eat their lunch? In the concrete square next to the student union or the one small square of grass outside the library. Sometimes it is the local park, or beside the churchyard, but most often it is at their desk, alongside their laptop. Because university students are under time and social pressure, how might the traditional scheduled nature-based intervention work for them?

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"…In this extensive habitation, Nature dwells in her loveliest garb.
Here is to be found the antidote to the poison of town life.."
On the opening of Ecclesall Woods to the public, Yorkshire Telegraph and Star, 23rd August 1928

Chapter 1: Introduction

Mental ill health is a leading cause of disability in the developed world with associated high levels of economic cost and personal suffering (WHO, 2014). Worldwide suicide mortality disproportionately affects young people and elderly women in low- and middle- income countries (WHO, 2019). Poor mental health reduces life satisfaction and self-perpetuates, with poor life satisfaction exacerbating mental health issues (Fergusson *et al.*, 2015). The prevalence of common mental health issues (such as depression and anxiety) in the UK have steadily increased since 1993 (Public Health England, 2018). In 2017, suicide was the leading cause of death in men under 50 and women under 35 (Public Health England, 2018). It is estimated that at least one in four people will experience a mental health issue in any one year (Bragg and Atkins, 2016). Mental health is a growing health burden around the world, with a particularly high rise in the UK amongst university students (Lau, Gou and Liu, 2014; Aronin and Smith, 2016). Whilst the underlying factors contributing to the increase within the university context is not comprehensively understood, there is an immediate need to respond to the increased demand for support services.

This thesis explores the opportunities to implement the emerging type of nature-based intervention known as a green prescription. A green prescription is an intervention that harnesses the benefits of engagement with the natural environment through a facilitated activity, as a non-clinical approach to a health or wellbeing condition (Bragg and Leck, 2017). Green prescriptions aim to support better physical and mental health by facilitating an individual's connection with the natural environment. At present green prescriptions are primarily offered to children, the acutely unwell, and the elderly (Bragg and Leck, 2017). There is the prospect of responding to increased university student mental health concerns through adapted preventative measures which harness the salutogenic effects of nature. The trial of two possible interventions for university students allowed this thesis to document the opportunities and challenges in implementing green prescriptions for this population. Furthermore, through the use of emergent focus group analysis, this thesis details university students' experience of campus green space. It furthers knowledge on the influence different elements have on the use and preference of green space specifically for university students.

1.1 Context and Rationale

The rationale for this research is centred on the prevalence of university student mental health difficulties and the developing green prescription sector. It considers the evidence on the benefits of engagement with urban green spaces, and how opportunities for engagement can be encouraged for the university student population through intervention and campus design.

University Students' Mental Health

University students represents a unique subsection of the population as they undergo an intense period of transition in location, social and economic status and context, moving from one stage in the life-course to the next (Ibrahim *et al.*, 2013). Data from the Office of Students' reported that students who suffer from mental health issues are more likely to drop out of university, underperform academically, and less likely to secure higher level employment (Office for Students, 2019). Three quarters of mental health problems emerge by the age of 25 (Public Health England, 2018). In comparison with the general public, undergraduate university students are five times more likely to be diagnosed with a mental health issue (Usher and Curran, 2019). Twenty-seven per cent of university students report a common mental health problem, such as depression or anxiety. The serious implications of this trend are highlighted by a 52% increase in recorded suicide amongst students in higher education since 2001 (Aronin and Smith, 2016; Johnson, 2018). It is worth noting that in age group comparisons the suicide rate is significantly higher in the general population, however between 2013-2017 there was no increase in suicide rate for the general population in contrast to the significant increase in student suicides (ONS, 2018a, 2018b).

In the past five years universities have come under increased media pressure on mental health provision (BBC News, 2018; The Guardian, 2019; Turner, 2019). The former health minister Sir Norman Lamb reported a complex and fragmented picture of mental health care provision across UK universities (Richardson, 2019). His enquiries revealed a large difference in the financial investment into wellbeing services between institutions, ranging between £500,000 over to £1 million (Richardson, 2019). It also found some universities do not monitor the use or requirements of their service provision (Richardson, 2019). Universities UK reported British universities were at risk of 'failing a generation' due to the lack of co-ordination between the National Health Service (NHS) and universities' support services (BBC News, 2018; Universities UK, 2018). Education Secretary Damian Hinds raised concerns over the increase in dropout rates, especially amongst disadvantaged and underrepresented groups (Department for Education, 2019). Mr Hinds said "it is important that all students feel supported to do their best – both academically and in a pastoral sense" (Department for Education, 2019).

The increased prevalence of mental ill health amongst the university student population is not comprehensively addressed within the literature. However, there are three main agreed points; an

increased awareness of mental health issues and therefore more people seeking support for their mental health issues which may have previously been left undiagnosed, increased financial pressures on students due to increased fees and concern over the job market, and finally an increased number of students from vulnerable backgrounds attending university (Ibrahim *et al.*, 2013; Usher and Curran, 2019). Studies from the USA and UK present a mixed understanding of mental health issues at university, however it is evident that mental health support for depression and anxiety is needed amongst the university student population (Blanco *et al.*, 2008; Ibrahim *et al.*, 2013). Mental health related disclosure amongst students at the University of Sheffield has increased five-fold in the last ten years (University of Sheffield, 2017b).

Nature and Health

For centuries, salutogenic properties of natural environment settings have been incorporated into healthcare facilities to provide spaces for healing and restoration (Thwaites, Helleur and Simkins, 2005; HHARP, 2010). Nature has been used as part of the design of the medical built environment from the Romans through to ninetieth century hospital sites (Thwaites, Helleur and Simkins, 2005; Bourke, 2012). Roman military hospitals used courtyards known as 'valetudinariums' to encourage fresh air to travel through the building, as fresh air was believed to be central to the recovery process (Thwaites, Helleur and Simkins, 2005). This principle continued with the Victorian Pavilion hospital design, as seen in the 1868 rebuild of St Thomas' Hospital London, which focused on hygiene, fresh air and cross ventilation through courtyards, outward facing wards and low corridors (Cook, 2002; Thwaites, Helleur and Simkins, 2005). Hospital grounds before and immediately after World War One provided opportunities for a range of activities such as feeding chickens and watering pot plants. These spaces facilitated formal and inform interactions as part of the therapeutic regimen (Bourke, 2012). However, enabling use of the natural environment for health was superseded by medical and technological advances in the 20th century (Dobson, 2017).

Recently the development of a courtyard garden at Great Ormond Street Hospital has seen the return to the previous value attached to time spent in the natural environment (Dobson, 2017). In the nineteen century, this hospital included time in the garden or balcony as a vital part of the inpatients' recovery process (HHARP, 2010). Nationwide there has been renewed attention on the development of specially designed gardens within hospital and hospice settings. Garden designs, such as Horatio's gardens in several spinal outpatient facilities, are specifically designed for surgical outpatients to visit and interact with plants (Dobson, 2017). These have been shown to reduce reported levels of pain, anxiety and fatigue (Buck, 2016). Beyond hospitals, harnessing natural elements within retirement communities and

care homes has also had positive psychological, social and physical effects on residents (Pretty *et al.*, 2005).

At a public health level a diverse repertoire of evidence has shown the beneficial impact of engaging with the natural environment on physical activity, and physiological and mental health (Hartig *et al.*, 2014; Parliamentary Office of Science and Technology, 2016). The Department for Environment, Food and Rural Affairs (DEFRA) estimated that if suitable access to the natural environment was achieved across the English population there would be an associated increase in physical activity resulting in a £2.1bn saving to the health care system per year (Parliamentary Office of Science and Technology, 2016).

Mechanisms behind nature and wellbeing

Health is greatly influenced by social and environmental determinants (Barton and Grant, 2006). Multiple studies have evidenced the effect the natural environment has on the lowering levels of health inequality related to deprivation (Wheeler and Ben-Shlomo, 2005; Hartig *et al.*, 2008; Mitchell and Popham, 2008; CABE Space, 2010). The causal mechanisms behind the wellbeing benefits associated with connecting with nature are not comprehensively understood (Mayer *et al.*, 2009). One mediator is the natural environment's facilitation of mental restoration through creating opportunities for soft fascination (Kaplan and Kaplan, 1989). Other research has considered the innate connection humans have with nature, known as biophilia (Wilson, 1984). This area of research continues to develop, with more recent research considering the role of life satisfaction (Howell, Passmore and Buro, 2013) and engagement with beauty (Lumber, Richardson and Sheffield, 2017) as mediators between connection with nature and wellbeing.

Beyond considering the psychological causal mechanisms in the heath and nature relationship, research has begun to consider the 'dose' response to engagement with the natural environment (Shanahan *et al.*, 2016). The increased attention from health providers to the implementation of nature as a non-clinical intervention has developed this area of research (Barton and Pretty, 2010; Shanahan *et al.*, 2016). Dose of nature frameworks create recommendations on how much, how frequently and what quality people require to harness the associated health outcomes of nature. Understanding these dimensions of engaging with nature supports what types or characteristics of nature need to be incorporated into urban spaces and nature based interventions (Shanahan *et al.*, 2016).

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Nature on prescription

In the past decade the national public health approach to health care has shifted from reactive treatment and care, to proactive presentative measures. The upstream determinants of health are thought to consist of three key factors; social, economic and environmental. To influence these determinants the NHS is moving to a preventative model of care within the community (NHS England, 2014). This includes increased recognition for community-led interventions such as social prescribing. Social prescribing is a non-medical intervention offered by some general practices to support specific medical conditions. The intervention can take the form of a variety of activities, ranging from befriending schemes to community gardening. Social prescription activities that involve nature are known as nature-based or green prescriptions. These interventions use the salutogenic effect of engagement with the natural environment to reduce conditions such as anxiety, depression and stress (Bragg and Atkins, 2016).

Benefits of Urban Green Space

The public health benefits of the urban natural environment are pivotal as the global population urbanises (Hartig *et al.*, 2014). Over the past century, there has been a shift from the implementation of parks to reduce disease, crime and social unrest to the creation of areas focused on leisure and sport (Maller *et al.*, 2009). This resulted in parks losing their importance as a societal asset and becoming viewed as optional amenities within urban infrastructure and design (Maller *et al.*, 2009). As evidence and public awareness of the additional benefits of green spaces has increased, the importance of green spaces in urban infrastructure has begun to return to the original consideration as a space for health and community cohesion. The role of a park as a public and accessible space to engage with nature is associated with many health benefits (Lovell, Depledge and Maxwell, 2018). There is evidence that beyond physical health benefits, parks also reduce levels of crime, enhance productivity and support community cohesion (Maller *et al.*, 2009). As discussed by Maller *et al.* (2009), parks in urban areas provide a space with softer biological time rather than demanding mechanical time in city life. The acknowledgement of the symbiotic relationship between parks and people is visible through the increased associated public value of high quality green spaces (Lindholst *et al.*, 2016; Fongar *et al.*, 2019). In the UK this is illustrated by the increase in friends of parks groups, political activism to protect nature, and new legislation (DEFRA, 2018; BBC, 2019). The World Health Organisation (WHO) and CABE identify urban green spaces as an important contribution to the improvement of health inequality in urban areas, especially in relation to mental health (CABE Space, 2010; World Health Organization, 2017).

Opportunities to connect with urban green space are also vital to the protection of ecosystems worldwide (Dunn *et al.*, 2006; Mackay and Schmitt, 2019). This is known as nature connectedness, the deep and psychological construct which is defined through the way an individual includes nature as part of the their identify (Mayer and Frantz, 2004; Mayer *et al.*, 2009; Howell, Passmore and Buro, 2013). Nature connectedness is affected by exposure to nature and considered to be a mediating factor to wellbeing (Howell, Passmore and Buro, 2013). Connecting with nature, thus increasing nature connectedness, stimulates pro-environmental behaviour and cooperation to solve social dilemmas unaffected by demographic identity (Zelenski, Dopko and Capaldi, 2015; Mackay and Schmitt, 2019). While the average person will not visit the rainforest, their connection with nature within their usual environment may affect their behaviour, voting preference and desire to protect vulnerable ecosystems (Dunn *et al.*, 2006). With the majority of the population in the UK living in cities, the nature they are regularly exposed to and able to more deeply engage with will be city based, referred to as the 'pigeon paradox': the survival of worldwide vulnerable flora and fauna will rely on urban populations' connection with urban habitats and wildlife, such as pigeons (Dunn *et al.*, 2006). The pivotal role of connecting to nature in urban spaces in determining environmental behaviour and social cohesion promotes the requirement for built environment professionals, such as landscape architects and urban planners, to provide accessible and suitably designed green spaces that foster meaningful interactions with nature, beyond pigeons (Dunn *et al.*, 2006; Zelenski, Dopko and Capaldi, 2015; Mackay and Schmitt, 2019).

Campus Green Space

Nature on campus can provide numerous health and wellbeing benefits including reduced stress, improved emotional regulation, and attention restoration (Felsten, 2009). The open spaces which surround university buildings provide places to work, socialise and relax (Liprini, 2014). Previous research found the perceived amount of nature on the university campus was associated with the student's quality of life and restorative effect of the campus environment (Hipp *et al.*, 2016). Students who frequently visited and engaged with the natural environment within their university campus environment reported a better quality of life and wellbeing (McFarland, Waliczek and Zajicek, 2008; Holt *et al.*, 2019). Students' preferences on the landscape design of these spaces has been found to differ between different parts of the university student population (Speake, Edmondson and Nawaz, 2013; Hipp *et al.*, 2016; Holt *et al.*, 2019). As discussed by Hipp *et al.* (2016) and Holt *et al.* (2019), further research is required to understand the difference of experience and preference in campus green space.

Life Stage and Connection to Nature

An individual's connection with the natural environment is believed to change throughout their life course. Initial non-longitudinal research from Bird (2007) found that different ages groups reported varying levels of nature connectedness. A dramatic decrease in connection to nature was observed in teenagers (Bird, 2007). Further substantiating longitudinal research to understand this change has been undertaken by the RSPB (Hughes *et al.*, 2019) and Richardson, Hunt, *et al.*, (2019). Additionally, research has demonstrated that experiences and activities which occur in nature during childhood can have an influence later in life on a person's use of and connection with nature (Milligan and Bingley, 2007; Moss, 2012; Wilson, 2012). An individual's connection to nature is subject to change in relation to their personal and social circumstances; research has found current everyday nature experience will have an effect on an adult's nature connection (not moderated by childhood experience) (Cleary *et al.*, 2018). The influence of life stage alongside current natural environment experience is an important consideration within research for understanding the design of intervention to encourage engagement with the natural environment. Cleary *et al.* (2018) encouraged the development of adult nature based initiatives that are tailored to consider the age, ability, cultural and social context of the target population.

1.2 Aim

Green prescriptions in the UK have previously targeted the acutely ill, school children and elderly populations (Bragg and Atkins, 2016). However, there is a need for better understanding of how nature can benefit others at different life stages and within a healthy population (Bickerdike *et al.*, 2017; Cleary *et al.*, 2018). Supporting the desire for a preventative mental health approach there is an opportunity to create better mental health resilience amongst university students. This thesis aims to understand what type of nature based interventions could support University of Sheffield students' wellbeing.

1.3 Research Questions

This thesis aims to understand what type of nature based interventions could support University of Sheffield students' wellbeing. To achieve this the pre-existing opportunities for nature based intervention within South Yorkshire must considered (see figure 2.3). Following from the context study (chapter four) and the previously defined knowledge gap on the need for evidence to support tailoring engagement through green prescriptions for university students. The subsequent research questions were formed:

1. What nature based interventions are currently available to University of Sheffield students in South Yorkshire?

2. How do a walking intervention and an app intervention in urban nature compare in terms of their effect on student wellbeing?

3. How did participants experience these interventions?

4. How should engagement with the natural environment be encouraged for university students' wellbeing?

Aim: To understand what type of nature based interventions could support university students' wellbeing.

Chapter 4: Context Study

Research Question 1: What nature based interventions are currently available to University of Sheffield students in South Yorkshire?

Intervention Study

Chapter 5: Statistical Analysis

Research Question 2: How do a walking intervention and an app intervention in urban nature compare in terms of their effect on student wellbeing?

+

Chapter 6: Evaluation Analysis

Research Question 3: How did participants experience these interventions?

Research Question 4: How should engagement with the natural environment be encouraged for university students' wellbeing?

Figure 1.1 Research question structure

1.4 Approach

Thesis Structure

This thesis is structured as follows (figure 1.1):

Chapter one provides an overview of the research area, the aims and research questions, and offers an update on the changes which have occurred since beginning this PhD in November 2016.

In **chapter two** the current literature is presented on: the determinants of health, developments in social prescribing within the UK, the relationship between natural environments and health including the role of green prescriptions, and finally the variation in engagement with the natural environment amongst young adults. To understand how university student mental health is influenced by their campus surroundings the literature review includes research into associations between mental health and green space within university campus design and more broadly within the workplace. It finishes by discussing the limitations acknowledged within the field of green prescriptions and the current gaps in knowledge.

The theoretical foundation for the methodology is introduced in **chapter three**. An initial study is undertaken to understand the context of social prescribing within South Yorkshire. This is conducted through the use of expert interviews from two different organisations. As social prescribing is an emerging topic, the completion of a research diary allowed developments to be recorded throughout the three years of this PhD. This thesis used a mixed methods approach to consider the outcomes and evaluate the experience of the intervention study for university students.

Due to a lack of current green prescribing within Sheffield (as detailed in the initial context study), the intervention study required the development of a green prescription style activity. This PhD is part of a larger research project called Improving Wellbeing through Urban Nature (IWUN). As part of IWUN's research an app was created to encourage engagement with the natural environment and study the outcomes across the population of Sheffield. Therefore, this study with university students utilised the IWUN app as an opportunity for a unique development and understanding of mobile phone technology for connecting with nature, and as a comparison against a more traditional style green prescription activity. These two conditions (app and walk) are used across three groups (app only, app and walk, and walk only) to test the opportunities and challenges of green prescriptions amongst the university student populations. Focus groups are used to evaluate the interventions and understand the participants' experience and preference of urban green spaces.

Chapter four presents Sheffield's public health priorities, the university's mental health policy and currently available support services, and the context of the study from the perspective of social prescribing within the city. It includes a preliminary study undertaken to understand the current

procedure for social prescribing within Sheffield and the surrounding area. As becomes apparent in the literature review, there is considerable variation in the processes supporting social prescribing and thereafter in how green prescriptions are currently implemented. As detailed above, the evidence on the available types of social prescription, and therefore green prescriptions, is presented. This chapter portrays the variation in available interventions within the city, the lack of current green prescriptions affects the subsequent study which is undertaken with university students. As an existing intervention is not available, an intervention is designed based on the academic evidence and from reviewing the currently popular interventions from the green prescribing community.

Chapter five presents the results from the quantitative outcome measures and includes a comparable dataset extracted from the IWUN app dataset. It contains the demographic details of the participants. Due to the data's lack distribution normality, statistical analysis is conducted through initial descriptive tests and then non-parametric tests are used to explore the quantitative results. The use of non-parametric tests allowed for three hypotheses to be tested on the effectiveness of the different interventions. These hypotheses are focused on the relationship between nature connection and quality of life post intervention and at 30 day follow up, and the difference in outcome between the intervention groups. The results from the statistical analysis present a mixed message on the association between quality of life and connection to nature.

Chapter six presents the results from the qualitative data and an evaluation of interventions from the focus groups. As an unexpected addition they also provided insight into the participants' priorities for future campus landscape design, alongside insight on the campus and city green spaces they currently use or avoid. Grounded theory prompts the use of inductive analysis. This chapter includes consideration of the coding strategy. The use of quotes and word clouds illustrates the emergent themes.

The emergent themes are discussed in **chapter seven** along with the merits and opportunities within both the interventions. It consists of the four research questions in this thesis and draws together the findings from the two previous chapters (chapter 5 and 6). This includes consideration of the integration of green spaces on campus.

Chapter eight presents the final thoughts on the research undertaken within this thesis. It provides reflection on the methodological approach in capturing the participants' experience and the implementation of nature into university student's lives. This chapter considers the findings from a social prescribing perspective and the implications for policy and practice. It includes the opportunities for further research in this area. Finally, it offers a concluding thought on the antidote to city life through integrating moments to notice nature within university student's lives.
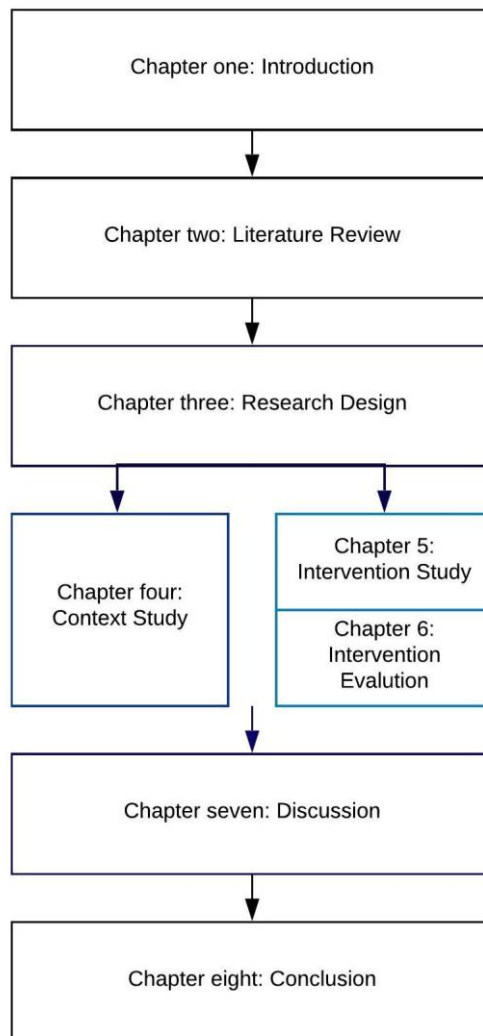
Figure 1.2 Thesis Structure

1.5 Since 2016

This PhD began in November 2016, at which point in time social prescribing in the UK was being championed by a small number of local NHS partnerships (such as Volunteer Action Rotherham) and charities (such as the Wildlife Trust and Sheffield Sage Fingers). Some Clinical Commissioning Groups (CCGs) were funding community development as part of a holistic approach to public health. Over the three years that this research was undertaken there have been several large developments; some of these have been detailed in the research diary (used to write this section and also featuring in chapter four), others have happened whilst this thesis was being written. The development of a social prescribing network and research centre from Westminster University has seen a coordinated approach to evidence, networking and the creation of a platform to demonstrate the available opportunities.

In 2018 the NHS launched the primary care network which intends to create a collaborative network of medical practices including pharmacies and GPs (NHS England, 2018). The networks are designed to support 30-50,000 people each. In June 2018 the government announced a five-year funding settlement for the NHS, providing an additional £20.5 billion a year in real terms by 2023/24. In response, the NHS has published a Long Term Plan with 2019/20 intended to lay the groundwork for the implementation of this new plan (NHS England, 2019b). The NHS's Long Term Plan includes development of the physical, digital and professional services over the next ten years.

Included within the Long Term Plan is a second report on mental health, which detailed the expansion of the personal care budget for those eligible under the Mental Health Act Section 17 (passed 31st October 2019) (Department of Health and Social Care, 2019a) to aftercare provided in the community (NHS England, 2019a). This is expected to support the expansion of social prescribing alongside clinical mental health services. The NHS announced in June 2019 the commitment to building infrastructure to support social prescribing in primary care (NHS England, 2019c). The intention is to have 1,000 new social prescribing link workers in place by 2020/21 with a predicted increase to support the goal of 900,000 referrals by 2023/24. The link workers are an integral part of the primary care networks and will be implemented alongside the General Practice (GP) contract reform (illustrated in figure 4.1 on page 57). Funding for the salary cost of the link worker was introduced in July 2019 (NHS England, 2019c).

Social prescribing is occurring worldwide, with varying quality of evidence and process. For some communities the developments in social prescribing has functioned as a rebrand of pre-existing interventions, there is some debate visible in online forums such as Twitter on the integrity of the new offer. In some areas, social prescription functions as a new investment in community provision. Whilst new to the UK, it is worth noting New Zealand has offered a form of green prescription since the early 2000s, with patients being offered gym membership for particular conditions. This is known in New

Zealand as Green Prescription or GRx. There is limited evidence of shared practice between the two health departments or possible research academics. A challenge within the sector, which the UK has grappled with is the choice in terminology, as discussed later (page 32) this may have hindered the opportunity for collaboration worldwide. The framing of social prescribing development is discussed further in the research diary (appendix C).

In October 2019, the National Academy for Social Prescribing was launched by the Secretary of State for Health and Social Care. The remit of the academy includes raising awareness of social prescribing, exploring new ways of funding it, and promoting cross sector working. The academy aims to "standardise the quality and range of social prescribing available to patients across the country" (Department of Health and Social Care, 2019b). This is closely linked with the government's Loneliness Strategy with all eligible patients connected to a social prescribing scheme by 2023.

Student Mental Health Charter

The Student Mental Health Charter from the charity Student Minds was launched in December 2019. The charter sets out the principles to support mental health at UK universities (Hughes and Spanner, 2019). It forms the basis of the Charter Award Scheme due in 2020. The Charter and Award advocate a whole university, and whole healthcare sector and community approach. This includes engaging with social services, the NHS, third sector organisations and the local communities within which universities are based (Hughes and Spanner, 2019). The whole university approach includes adequately resourced and accessible mental health services and proactive interventions. It comments on the requirements for an environment and culture that promotes good mental health and demonstrates good practice. The Charter includes facilitating staff and students in wellbeing provisions (Hughes and Spanner, 2019).

The Charter is composed of four domains: 'Learn, support, work and live'. There are two specific aspects in relation to this thesis. Within the 'Live' domains is the role of proactive interventions and physical environment (Hughes and Spanner, 2019). The Charter proposes universities support students to engage with their mental health through evidenced interventions, such as promoting physical exercise and healthy diet. Second, the Charter encourages the use of nature to provide wellbeing benefits; this includes indoor nature and urban green infrastructure (for example, green roofs). It encourages the design of nature into university spaces to create dynamic spaces which can be used for meetings and learning outdoors. The design of these spaces need to be appealing, comfortable, and meet basic needs of accessibility and navigability (Hughes and Spanner, 2019).

Chapter 2: Literature Review

2.1 Social, Economic and Environmental Determinants of Health

The accumulation of positive and negative factors of social, economic and environmental conditions determines health and wellbeing inequalities throughout life (Marmot and Bell, 2012; Public Health England, 2017). As illustrated in figure 2.1 an individual's health and wellbeing is constructed by multiple layers from the biological cell through to the global ecosystem (Barton and Grant, 2006). At the smallest scale, health is affected by influences such as bacteria, nutrients, genetics, and physiological factors such as age and gender. The next level of influence comes from lifestyle factors such as work-life balance, physical activity and diet. The role of community and local economy influences factors such as recreational behaviour and job opportunities. Finally, there is the outer layer of the environment within which a person undertakes their activities. This can include opportunities to work, shop and learn. Divided between built and natural, the environment is impacted by factors such as pollution, street navigability, green space and fresh water (Barton and Grant, 2006).
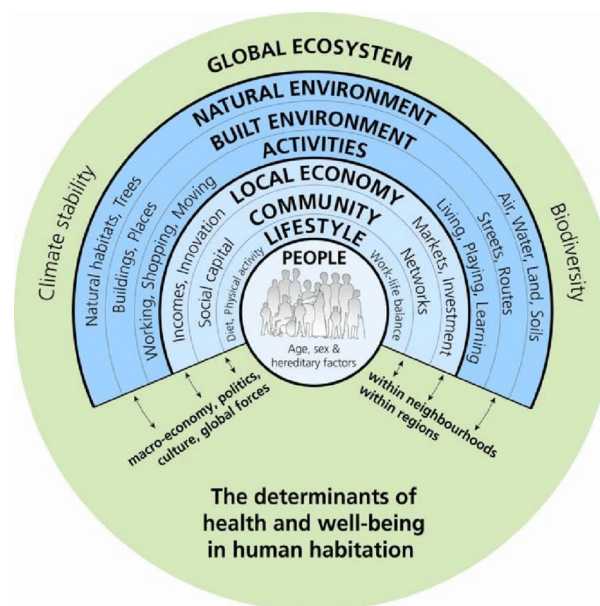
Figure 2.1 Determinants of health and wellbeing in human habitation (Barton and Grant, 2006)

In 2006 the WHO published a report in which it stated 'approximately one-quarter of the global disease burden, [...] is due to modifiable environmental factors' (Pruss-Ustun and Corvalan 2006:6). Over the past decade there has been increased attention dedicated to the effect the environment has on public health. Public Health England has developed the way it responds to health prevention with a more holistic consideration of all the influential factors (Public Health England, 2015). In 2014, the Chief

Executive Officer of the NHS prioritised a change in the current "'factory' model of care and repair" (NHS England 2014 p.9) to focus more holistically on individual and community engagement. Public Health England's recent report discussed the psychosocial pathways and health outcomes which underly health inequalities within England (Public Health England, 2017). This report demonstrates the evidence for action to reduce health inequality through the social determinants of health including the areas of education, employment, income, access to green spaces, and the built environment (Ward Thompson *et al.*, 2012; Public Health England, 2017). On a local scale the Sheffield Public Health Director has repeatedly discussed the importance of societal factors such as the economy in creating a healthy population (Fell, 2018).

As discussed, there has been a national shift towards reviewing a person's health and wellbeing holistically, which has resulted in a change in the issues medical professionals are dealing with. Psychosocial problems, such as debt, housing concerns, social isolation, domestic abuse, family problems, grief, and loss can greatly affect a person's health and wellbeing. Age UK found loneliness to be linked to increased blood pressure, cardiovascular diseases and increased feelings of depression and anxiety (Davidson and Rossall, 2015). The WHO detail stress as one of the key social and psychological symptoms that can be influenced by policy for health and wellbeing in the workplace (Wilkinson and Marmot, 2003). The WHO reports that the body responds to stress through hormonal and nervous system change (World Health Organization, 2013). Therefore, prolonged levels of high stress result in reduced mental health, reduced life expectancy, and are associated with increases in other conditions such as stroke, heart attack and depression (Wilkinson and Marmot, 2003; World Health Organization, 2013). In response to the need to consider all the determinants of health there have been changes to the interventions available through general practice (Davidson and Rossall, 2015). Clinical Commissioning Groups are responding to the population level need to target lifestyle health factors through commissioning non-medical interventions known as social prescriptions.

2.2 Urban Green Space and Health

In a progressively urbanised world there is a particularly important role for nearby nature, as discussed by Kaplan (1993). Momentary, incidental or indirect contact with nature such as a view from a window or noticing a street tree may provide micro-opportunities for restoration (Maller *et al.*, 2009). Whilst the direct mechanisms behind the effects of nature on health and wellbeing still require further exploration, there is consensus within the evidence base that green spaces in urban environments provide multiple health benefits (Frumkin, Frank and Jackson, 2004; de Vries *et al.*, 2013; Hartig *et al.*, 2014; Panno *et al.*, 2017). Urban green spaces contributing to these benefits include large and small public parks, pocket green spaces, trees along a street or parklets which provide a place to relax created through plants and seating which are located in a place usually for cars to park alongside the street. The quantity and quality of available green space has been correlated to lower levels of income deprivation related health inequality (Mitchell and Popham, 2008). Exposure to green space is particularly of benefit to the elderly, youth, and those with only a secondary level of education compared to other groups in large cities (Maas *et al.*, 2006).

Nature in Cities

Historically, theories supporting the salutogenic benefits of natural environments were founded on the health benefits of natural light and fresh air to reduce the spread of diseases, and parks were thought to provide 'green lungs' for the city, reducing population unrest and offering spiritual restoration (Thwaites, Helleur and Simkins, 2005; Maller *et al.*, 2009). In the present day improving urban green space is an important and cost effective way to transform local neighbourhoods and people's quality of life (CABE Space, 2010). The UN's New Urban Agenda (2017) sets out the universal desire to provide sustainable development for the increasingly urban global population. The document discussed the need to ensure the creation of safe and clean environments through design which supports ecosystem services, and the protection of ecosystems to promote urban stability and resilience (United Nations, 2017; McDonald, Beatley and Elmqvist, 2018). Vegetation in urban areas has natural capacity to absorb and remove pollutants, especially from areas with dense traffic flows (European Commission, 2016). The WHO estimates that 40% of the European Union population is exposed to road traffic noise levels exceeding the recommended level which can lead to sleep disturbances, stress, and impaired cognitive development in children (European Commission, 2016).

Whilst the implementation of urban green infrastructure is important, it is not truly effective without complimentary social initiatives. A recent meta-analysis evidenced the social, economic and health outcomes of urban green infrastructure, ranging from green walls through to initiatives promoting green trails (Hunter *et al.*, 2019). This analysis found strong evidence to support intervention implemented alongside promotion of programmes in parks and green trails. By combining the improved urban design alongside social intervention to promote physical activity and community initiatives, there was a more effective response from the population, as evidenced in the increased use of the areas and physical activity (Hunter *et al.*, 2019). This exemplifies the importance of collaborative working by all agencies involved in urban planning and health initiatives of this kind. Green urban infrastructure requires a holistic partnership across multiple agencies to be sustainable and efficacious.

Hypotheses relating to human wellbeing and nature

The mechanisms which facilitate the benefits gained from engagement with the natural environment are not comprehensively understood. The multifaceted experience of humans' interactions directly and indirectly with nature has led to several hypotheses.

There are at least three pathways to present the benefits associated with green space and human health (Markevych *et al.*, 2017). The first is mitigation against sound and air pollutions as a result of urban green spaces not being sites of major pollutants, thus reducing exposure to harmful air pollution and noise (World Health Organization, 2017). Second is the restorative properties of the natural environment in facilitating the restoration of depleted capacities (Kaplan, 1995). The biophilic properties of nature are considered to provide psychological benefits due to human evolutionary survival (Wilson, 1984; Capaldi *et al.*, 2015). Whilst a challenge to test, there is evidence of an innate preference for natural environment over built environment and an attraction to nature across diverse cultures and from a young age (Capaldi *et al.*, 2015). The third is the natural environment's facilitation of other activities, such as encouraging physical activities and providing a space for social contact which may not be available elsewhere (Parliamentary Office of Science and Technology, 2016; World Health Organization, 2017). Physical activity and social cohesion have associated independent wellbeing benefits which may act as confounding factors in examining this pathway (Paluska and Schwenk, 2000; Peters, Elands and Buijs, 2010; Markevych *et al.*, 2017). There is an interrelation between the three pathways, with the influence of different cultural, geographical and contextual factors difficult to distinguish (Markevych *et al.*, 2017).

This thesis is founded in the role of Attention Restoration Theory (ART) in nature improving respite from university life. ART and Psycho-evolutionary Stress Reduction Theory can be considered parallel theories that explain the related human cognitive and affective response to nature (Ulrich, 1984; Kaplan, 1995; Berto, 2014). The biophilia hypothesis offers an overarching principle to humans' relationship with the natural environment (Wilson, 1984).

Biophilia hypothesis: This is the innate tendency to an affiliation with the natural environment. Introduced by Wilson in 1984, this hypothesis is founded on nature and humans being unequivocally connected (Wilson, 1984). In recent years, the idea of biophilia in design and architecture has gained popularity, whereby the built environment is designed in synthesis with nature through the integration of plants, landscape design and use of natural form (McDonald, Beatley and Elmqvist, 2018).

Attention Restoration Theory: Prolonged levels of mental engagement result in directed attention fatigue (Kaplan, 1995). According to Kaplan (1995) nature provides an environment that allows for recuperation because it allows the mind to 'get away' from the usual habits by providing 'soft fascination' through natural phenomena, such as clouds moving. Being in the natural environment can facilitate a neutral space in which a person may experience respite, unlike in built spaces which are more likely to contain predefined standards and societal expectations (Kaplan, 1995). The benefit of attention restoration can also be experienced in micro-form or through the addition of natural elements to indoor settings. The use of indoor plants or views of nature from a window provides opportunity for the mind to recuperate. Application of ART to indoor spaces have seen a positive effect on stress and fatigue (Kaplan, 1993).

Psycho-evolutionary Stress Reduction Theory: Natural environments offer specific attributes inherent to survival that humans have evolved to have a preference for, such as water and open spaces (Ulrich *et al.*, 1991). Originated in Ulrich's research on hospital recovery, it has been found that exposure to the natural environment produces a salient parasympathetic nervous system response which promotes a positive emotional state and physiological activity, which create a sustained attention and perceptual intake (Ulrich, 1984; Ulrich *et al.*, 1991).

2.3 Nature and Place

It is known from research on place-making and place-belonging that the practices which occur as part of the identity discourse differ between location and community (Benson and Jackson, 2013). The identity of a place is created, in part, through the intersection between behaviours and the unspoken narrative which exists within a community (Scannell and Gifford, 2010). In simplistic terms this may be the urban myth of a haunted old house or the more nuanced discourse on how parents play with their children in a park (Refshauge, Stigsdotter and Cosco, 2012). This epistemology is applicable to our perception of green space; for example, visiting the park during lunchtime might have negative influences on a person's professional image, scuff their suit, or affect a colleague's perception of their work ethic (Hitchings, 2013). To better understand how physical intervention could connect university students with the natural environment, nature and place are considered in this section within two different contexts; residential areas and the workplace. Previous research on workplace green space offers similar insights into the experience of university space, as they are both work places that operate under similar built physical infrastructure and social pressures.

Residential Green Space

Worldwide studies have shown the value of providing green infrastructure within the built environment (World Health Organization, 2017). A study in Sweden on self-reported mental health found that it was uncommon for urban residents to replace access to a garden with a visit to a park or natural environment (Grahn and Stigsdotter, 2003). Whilst a positive association was found between mental health and engagement with the natural environment, this disconnect for those living without a garden, for example residents of an apartment block, suggests the need for urban design to be more inclusive and to provide accessible green spaces (Grahn and Stigsdotter, 2003). In Toronto, Canada, a study (considering the following outcomes from the Ontario Health Study: general health perception, cardio-metabolic conditions and mental illnesses) found that having more than 11 trees per block (25 blocks is equivalent to 400-700 inhabitants with boundary lines along roads) had a quantifiable effect on increased perceptions of general health and decreases in cardio-metabolic conditions equivalent to being 1.4 years younger in health (Kardan *et al.*, 2015).

In built up areas, natural environments that are easily accessible and close to residential areas provide opportunities for immediate nature engagement and present multiple health benefits, including 50% less depression and 43% less stress in neighbourhoods with more than 20% forest cover, increasing to 56% less anxiety in neighbourhoods with more than 30% forest cover (Cox *et al.*, 2017). Cartwright *et al.* (2018) further tested the association between subjective wellbeing and nature exposure through analysing the mediating factors of social connectedness, nearby nature, and nature visit frequency. All

factors were positively associated with wellbeing, with nearby or indirect nature exposure providing mitigation against the adverse wellbeing outcomes of low social connectedness (Cartwright *et al.*, 2018). This is supported by Shanahan *et al.*'s (2016) neighbourhood research that found higher connection to nature predicted greater feelings of social cohesion and increased levels of physical activity. These participants also often reported better wellbeing and life satisfaction, with lower levels of anxiety (Shanahan *et al.*, 2016). Triguero-Mas *et al.*'s (2017) study of four European cities examined the influence of neighbourhood green space on mental health. They found that whilst neighbourhood green space related to social cohesion and attachment, for some cities the social environment was not the underlying mechanism to these relationships. The study found only Barcelona residents' mental health was directly related to the neighbourhood greenness (Triguero-Mas *et al.*, 2017). The level of contact with neighbourhood green space was related to mental health. This suggests direct nature exposure is more important for wellbeing influence than indirect nature exposure.

Workplace green space

Workplace based evidence supports the positive relationship between green workplace environments and employees' wellbeing, with levels of stress and self-reported wellbeing being reduced by physical and visual access to nature (Hitchings, 2013; Lottrup, Grahn and Stigsdotter, 2013; Gilchrist, Brown and Montarzino, 2015). Previous studies into the effect of plants within the office environment have mixed results. Raanaas *et al.*'s (2011) study tested university students' attention capacity while working and taking breaks. They found the group with desk plants had an improvement in completing tasks compared to the group with a barren desk space. They concluded that the difference between groups may have been caused by the stress-reducing effect of the indoor plants (Raanaas *et al.*, 2011). Research carried out among workers on which elements are most valued in their work environment, showed that natural light is the most sought-after element within the workplace (Ayuso Sanchez, Ikaga and Vega Sanchez, 2018). Similarly, indoor plants and vivid colours are ranked in the top five. Day light and level of greenery affected the creativity and performance of participants in a controlled workspace experiment, with reduced negative symptoms in the groups containing both daylight and greenery (Ayuso Sanchez, Ikaga and Vega Sanchez, 2018).

Research within the workplace showed stress and wellbeing responses differed between male and female participants. Male participants presented more stress reduction but less change in positive work attitude in relation to visual and physical access to greenery, whereas females participants presented a positive change in workplace attitude but no change in stress levels (Lottrup, Grahn and Stigsdotter, 2013). Hitchings' (2013) research into office workers found a negative social stigma associated with spending allocated break time within the workday outside. There was a perception that lunch breaks

taken outside would be seen as too leisurely, and that aspects of being in the external environment, such as exposure to bad weather or getting sweaty, would have an effect on their professional appearance later in the day (Hitchings, 2013). Hitchings (2013) discussed the need for people to be reminded of the available green spaces and the restorative benefits of visiting them. They include the need for visiting green space to be facilitated within the work routine and integrated within the workspace in a sophisticated manner (Hitchings, 2013). Further to research on the use of green space in the workplace, Gilchrist, Brown and Montarzino's (2015) work found the cumulative amount, rather than frequency of time spent in outdoor green space, had a positive effect on employees' wellbeing. This study also noted a window view containing trees, lawn and bushes/flowering plants had an associated positive affect on wellbeing (Gilchrist, Brown and Montarzino, 2015).

2.4 University Campus

Arriving at university may represent the first time a young adult is living away from home. The backdrop to this change of environment and identity is the landscape of the immediate environment they find themselves in: the university campus. University campus design varies depending on location, history and estate, ranging from historic Capability Brown environments (Bath Spa University, 2016) through to multiple locations in dense urban cities (King's College London, no date). The experience of and opportunities to engage with green space will greatly differ between types of campus. As discussed in the University Mental Health Charter, the physical environment can be pivotal in creating a supportive environment for the promotion of mental health (Hughes and Spanner, 2019).

University campuses accommodate and shape the experience and education of the students (Ibrahim and Fadzil, 2013; Turk, Sen and Ozyavuz, 2015). They contain formal spaces for teaching, experiments, study and group work, and soft spaces for eating, social activities and sports. Different modes of learning and connections to wider societal and global context exist within these spaces (Ibrahim and Fadzil, 2013). Thus campus space is encompassed within cultural, human behavioural and psychological dimensions (Ibrahim and Fadzil, 2013; Turk, Sen and Ozyavuz, 2015). The physical environment can support or inhibit these factors. There are numerous health and psychological benefits associated with experiences of nature on campus, including reduced stress, improved emotional regulation, and attention restoration (Felsten, 2009). The use of murals and views of nature to encourage restoration on the university campus can be an appropriate alternative when bad weather prevents outdoor engagement. Felsten (2009) concluded that campus managers and landscape architects have an opportunity to enhance the restorative features of campus green space through planning and renovating outdoor areas.

Design Features

Multiple studies have endorsed the connections between physical environments and learning activities (Lau, Gou and Liu, 2014; Benfield *et al.*, 2015; Beckers, van der Voordt and Dewulf, 2016). Beckers, van der Voordt and Dewulf (2016) discussed how students believed their learning spaces affected their learning outcomes. They found the perceived effectiveness, rather than the experience, altered the students' preference in the environments' characteristics (Beckers, van der Voordt and Dewulf, 2016). Students primarily favoured studying in quiet or private learning spaces, away from public areas (Beckers, van der Voordt and Dewulf, 2016). This study highlighted the importance of the interplay between the physical and social dimensions for university students' studying preference (Beckers, van der Voordt and Dewulf, 2016). Other research in this area of study has focused on physical dimensions such as air quality, temperature, acoustics, furniture and colour. Further, and relevant to this thesis, are the more limited studies that have investigated the natural elements within learning environments, such as preferences for classrooms with natural views, and productivity in relation to plants in work environments (Benfield *et al.*, 2015; Beckers, van der Voordt and Dewulf, 2016).

Overall, students' intrinsic and extrinsic experience of academia and the university campus environment are associated with academic accomplishment (Liprini, 2014; Hipp *et al.*, 2016; Hughes and Spanner, 2019). The open space which surrounds the university buildings provides alternative spaces to work, socialise and relax (Liprini, 2014). The navigability of the university campus is created through the outside spaces and integrates the experience between place and learning (Lau, Gou and Liu, 2014). Exploring university campus design in Hong Kong and New South Wales, Lau, Gou and Liu's (2014) research considered the key elements to successful campus design. They provide three key elements to creating healthy campus design; healing gardens which provide privacy and recovery, architectural stimulation that provides navigability and focus points, and green building approaches (Lau, Gou and Liu, 2014).

Abdelaal's (2019) review of the design of the university campus finds that there could be further encouragement to go beyond the sustainable curriculum to integrate biophilic design into the learning environment. Abdelaal (2019) comments that producing an environment attuned with nature provides sustainability and creativity for the student experience. Jones (2013) introduced the root model of a biophilic university, the idea being to provide spaces allowing for the restoration of affinity with nature. Thus, campus environments that provide access to nature offer economic, social, and health benefits for those studying and working on campus (Jones, 2013).

University Student's Experience

The way a campus is orientated affects the interactions students and staff have within those spaces. The alignment of outdoor furniture, shade and pathways affects where ideas are exchanged, and socialising and commuting between classrooms occurs (Hanan, 2013). Liprini (2014) undertook questionnaires on the perception of green spaces on campus. The 286 students in the study reported that they enjoyed spending time in green spaces, and reported all green spaces on the South African campus as restorative (Liprini, 2014). Students who used the campus green spaces more frequently perceived their quality of life as higher when compared with students who did not use these spaces as frequently (McFarland, Waliczek and Zajicek, 2008). The availability of and engagement with campus green space is suggested as a contributing factor to student retention (McFarland, Waliczek and Zajicek, 2008).

In a detailed photovoice (a participatory research method based on documenting and reflecting) study, 12 participants at an American university were asked about their favourite places for positive mental health in the built and natural environment (Windhorst and Williams, 2015). Participants all chose places that were natural and familiar to them, places with a symbolic influence from previous positive experiences there. Most participants discussed the importance of features such as old trees and water. Windhorst and Williams (2015) discussed the importance of natural settings in providing restoration and that the locations allowed a separation from the context of the participants' everyday lives. Specifically, and in a change to the usual narrative on green space, this study found the lack of social interaction in the space was important. The discussed spaces provided an isolated environment as the participants wanted to be by themselves. The natural environments allowed participants to be away from the social expectations and perceived social judgement within university life (Windhorst and Williams, 2015). Windhorst and Williams (2015) found that the preference for restorative natural environments within university students' lives differed according to demographic and childhood experiences. Preference was often associated with places which had familiarity with positive childhood memories or were influenced by social factors (female participants choose spaces away from perceived social judgement) (Windhorst and Williams, 2015).

Two studies of the perceived greenness of university campuses and student wellbeing in the USA and the UK found that greenness was significantly associated with student quality of life and the restorativeness of the campus environment (Speake, Edmondson and Nawaz, 2013; Hipp *et al.*, 2016). In Hipp *et al.*'s (2016) USA study, the pathway between quality of life and greenness was mediated by the perceived restorativeness of the campus. They conclude that green spaces on campus provide restoration during the stressful life transitions which occur whilst at university (Hipp *et al.*, 2016). This finding is furthered by Holt *et al.'s* (2019) research that found those undergraduates who regularly engaged with the natural

environment through regular physical activity reported higher quality of life, positive emotions and lower perceived stress.

Speake *et al.'s* (2013) UK study found that different university green space are appreciated by different students, with an overall preference for green spaces near facilities such as the library and lecture rooms. Undergraduate students were more likely to use the green space for social activities than postgraduate students, and male students reported using the outdoor space for sports more frequently than female students (Speake, Edmondson and Nawaz, 2013). Pockets of green space, such as courtyards, are important to providing learning and social opportunities beyond the formal space of the classroom or lecture theatre (Ibrahim and Fadzil, 2013). Speake, Edmondson and Nawaz's (2013) survey also found a preference for quality (planting schemes, maintenance, litter) over quantity for the green space the participants would regularly visit, with the formal lawns being rated above the more naturalistic woodlands on the peripheries of the campus.

Passmore and Holders' (2017) two-week intervention study with university students in noticing nature through photos and visual engagement found a positive association with improved wellbeing in noticing nature compared to the built environment and the control group. Whilst there was no change in the amount of time spent in nature, the increases in wellbeing are reported to have been achieved through emotional engagement with the everyday nature encounters which could otherwise be missed (Passmore and Holder, 2017). This study reflected that a whole scale lifestyle change or travelling to 'wild' areas may not be necessary to improve wellbeing through nature. Instead, small regular interactions are more practical and have significant outcomes for sense of nature connection and pro social orientation (Passmore and Holder, 2017).

2.5 Differences in engagement with the natural environment

Engagement with the natural environment can occur as indirect or direct exposure. This could be indirectly through a window, mural or directly through walking or gardening. As with direct engagement, the benefits gained by an individual's indirect engagement with nature are reliant on the individual's preference, perceptions of and experiences within natural environments (Hartig *et al.*, 2014). Evidence demonstrates the difference in response towards natural environments experienced by different demographic groups. Cultural and socio-economic background, gender and age affect an individual's response to the natural environment (Dallimer *et al.*, 2014; Boyd *et al.*, 2018; Hughes *et al.*, 2019).

Connection to Nature

An individual's connection to nature can be understood through different measures (Jorgensen and Gobster, 2010; Van den Berg *et al.*, 2010; Capaldi *et al.*, 2015; Barbaro and Pickett, 2016; Pritchard *et al.*, 2019; Jarvis *et al.*, 2020). Within the literature, connection to nature can be associated with various terminology such as 'nature exposure' and 'nature connectedness'. Nature exposure often relates to the proximity, quantity and quality of green space in relation to an individual or neighbourhood (Van den Berg *et al.*, 2010; Jarvis *et al.*, 2020). Nature connectedness is an individual's subjective sense of their relationship with nature (Pritchard *et al.*, 2019). Individuals who are more connected to nature have been shown to report greater eudemonic wellbeing and personal growth (Pritchard *et al.*, 2019). One study identified contact, emotion, meaning, and compassion, with the latter mediated by engagement with natural beauty, to be pathways to improving short-term nature connectedness (Lumber, Richardson and Sheffield, 2017). It also found knowledge based activities were not associated with increase nature connectedness (Lumber, Richardson and Sheffield, 2017). Additional studies support the effect appreciation of the beauty of nature has as a factor in increasing nature connectedness (Zhang, Howell and Iyer, 2014; Richardson and Sheffield, 2017).

An individual's previous experience with the natural environment can influence their future interactions and the benefits they receive from this engagement (Milligan and Bingley, 2007; Wilson, 2012). The study by Southon *et al.* (2018) on perception of biodiversity in urban green space found a relationship between accurate perception of species richness and connection to nature. Participants with greater connection to nature were able to more accurately predict species richness, which in turn affected their reported satisfaction with an urban green intervention. The meadow site provided additional benefits to those who had higher levels of pre-existing connection to nature (Southon *et al.*, 2018). Both childhood nature experience and duration of current nature experience were independently found to predict an individual's present connection to nature (Cleary *et al.*, 2018).

Gender and Age

Gender affects some of the health and wellbeing benefits people gain when visiting the natural environment. A nationwide study in the UK found the effect for associated health benefits of green space on long term health conditions differed between genders (Richardson and Mitchell, 2010). Male cardiovascular disease and respiratory disease mortality rates decreased with increased green space cover, yet no significant associations were found for women (Richardson and Mitchell, 2010). Evidence also shows a gendered difference in participants' self-reported response to nature (Lottrup, Grahn and Stigsdotter, 2013; White *et al.*, 2013).

There are also differences in the effect nature has throughout the life course. Astell-Burt, Mitchell and Hartig (2014) found variations in the age at which green space affected mental health, with men benefitting in early to mid-adulthood compared to women who appeared to be affected later in life. Hughes *et al.* (2019) and Richardson, Hunt, *et al.*, (2019) demonstrate gender and age associated variation in nature connection across the life course, which may be associated with generational experiences.

Infrequent Visitors to the Natural Environment

There is evidence that some parts of the population do not regularly engage with the natural environment and thus do not experience the potential benefits of nature (Dallimer *et al.*, 2014; Kabisch, Qureshi and Haase, 2015; Natural England, 2015; Roe, Aspinall and Ward Thompson, 2016).

The Monitor of Engagement with the Natural Environment Survey (MENE) is a large nationwide study conducted since 2009 which includes questions on self-reported reasons for not engaging with the natural environment in England. The MENE consolidated annual surveys between 2009 to 2015 found that specific demographic groups were more likely to given certain responses to why they had not recently visited (King *et al.*, 2015). The most common factor was time restraints across the working population. Within Natural England's survey, 20% of the 8852 respondents aged 16-34 years reported visiting the natural environment less than monthly in the past 12 months (Boyd *et al.*, 2018). The youngest age group (16-34 year olds) were 10% more likely than any other age group to provide the response 'no particular reason' for their lack of visitation (24.5%) (Boyd *et al.*, 2018). Older adults were significantly more likely to report poor health as a preventative factor. As is mentioned in the preamble to this research, there is further opportunity to understand the constraints that apply to different demographics of the English population which limit their benefit from engaging with the natural environment, through development on the findings from the MENE. Research from Holt *et al.* (2019) into the use of green space amongst university students found the most common response category for infrequent use were 'not enough time' and 'not aware of opportunities'.

Young Adults and the Natural Environment

The nuances of a young person's relationship with the natural environment can be difficult to capture through a single methodological approach. This relationship changes throughout a lifetime, and present positive experience in the natural environment can be associated with high levels of nature connection even for those lacking in childhood nature experiences (Cleary *et al.*, 2018). Whilst nature connection may support positive emotional wellbeing, contradicting evidence exists suggesting that the immediate environment may have limited influence over the wellbeing of a young person. A study of 11-16 year olds in Canada found the environment where a young person lived did not act as a leading determinant of their emotional wellbeing (Huynh *et al.*, 2013). Instead, Huynh *et al.* (2013) found individual context such as demographic characteristics, social-economic status of their family, and perceptions of neighbourhood surroundings were stronger potential determinants for emotional wellbeing. Whilst this research may not be conclusive, it does reflect the challenges in accounting for the multifaceted effects of the surrounding contextual, built and natural environment.

Cross-sectional data from MENE conducted by Natural England and analysed by Richardson, Hunt, *et al.* (2019) demonstrated changes in nature connection across the age groups. Supporting the earlier cited work by Bird (2007), connection to nature dips between age 10 to 15, and does not return to the national mean until the age of 30 (see appendix A Figure 1). This apparent adolescent disconnect is discussed in relation to the transition young people go through during this age, from children into adulthood combined with the experience of a change in environment. Initial transitions from primary school to secondary, and then again into higher education or work, results in a loss of time for visiting natural environments (National Research Council (U.S), 2011; Richardson, Hunt, *et al.*, 2019). During this time there is the additional pressure of changes in socialising, societal expectations in behaviour, and the development of the young person's identity (National Research Council (U.S), 2011). Richardson, Hunt, *et al.* (2019) interpret for some of the changes that occur during the transition from child to adult to be related to the development and formation of identity. During adolescence, the emerging traits and series of stages such as physical growth, group acceptance and careers choice may result in identity crisis, and therefore coping mechanisms that do not prioritise nature. This is to say that engaging with nature may lose its relevance and importance, and hence results in a temporary decrease in nature connection until a stable identify is formed (Richardson, Hunt, *et al.*, 2019).

The bond which occurs between an individual and their meaningful environment is known as place attachment (Scannell and Gifford, 2010). This bond is associated with pro-environmental behaviour in natural environments and positive psychological benefits such as a sense of belonging or relaxation (Halpenny, 2010; Scannell and Gifford, 2017). The individual connection with place is a dynamic and complex relationship, influenced by social interactions, personal identity and the experience of the physical place (Raymond, Brown and Weber, 2010). The place attachment framework by Scannell and Gifford (2010) defines three dimensions to the person dimension of place attachment; person-process-place. It encompasses the influence socially constructed narratives have on behaviour and emotional response to an environment or location (Scannell and Gifford, 2010). The role of process and person can be evidenced in the experience of young adults and natural environments (Bell, Thompson and Travlou, 2003; Milligan and Bingley, 2007). Some young adults reported the influence their parents' warnings had on preventing further exploration of uncharted territories such as woodlands (Milligan and Bingley, 2007). In contrast, the natural environment can be a place to escape to, with teenagers reporting the more unkempt spaces providing a place of peace without judgement (Bell, Thompson and Travlou, 2003). The understanding of a natural environment can be developed through understanding the person–process–place dimensions (Scannell and Gifford, 2010). These elements may present themselves differently for a young adult compared to an employee or visitor to a space. Beyond the physical elements, a space is constructed by individual, social and behavioural dimensions, and these unseen dimensions contribute to the way a space is experienced and used (Raymond, Brown and Weber, 2010; Scannell and Gifford, 2017).

2.6 Dose of Nature

There is limited consensus on the exposure-response relationship between nature and wellbeing benefit (Shanahan *et al.*, 2015; Kondo, Jacoby and South, 2018). Research has considered the quality and quantity of nature as a measure of exposure to the population in various ways. This has ranged from remote sensing data on green coverage within neighbourhoods through to measuring the level of micro-organisms on people's skin after visiting the natural environment (Bixby *et al.*, 2015; Liddicoat *et al.*, 2019). The parameters on frequency and duration recommendations also vary (Shanahan *et al.*, 2015). Using the self-reported MENE survey data, White *et al.* (2019) found that participants who reported 120 minutes per week in a natural environment achieved through either a single visit or cumulatively, reported better health and wellbeing outcomes when compared to those who spent less than 120 minutes visiting the natural environment or not visiting at all. Hunter, Gillespie and Chen (2019) found a reduction in physiological biomarkers of stress after 20 minutes in an urban green space, recommending regular 20-30 minute engagement for health benefit.

A meta-analysis of physical activity intervention studies in green spaces found that for the youngest group (those under 30 years old), the effect of taking part in a green space physical activity intervention had the greatest impact on their self-esteem compared to other outcome measures (Barton and Pretty, 2010). For participants of all ages, self-esteem and mood showed the greatest change for the smallest duration (5 minutes). At the other extremity of activity length, those that lasted over half a day increased positive affect (Barton and Pretty, 2010). While this review lacked long term outcome measurements, it does support the value of incremental moments to engage with nature and take part in physical activity (Barton and Pretty, 2010). Shanahan *et al.'s* (2016) research aimed to identify the dose-response for outdoor green space use. In their study they found visits to outdoor green space of 30 minutes or more per week could reduce population prevalence of depression and high blood pressure by 7% and 9% respectively (Shanahan *et al.*, 2016). In the study by Tyrväinen *et al.* (2014) comparing city centre, urban park and urban woodland in Finland, it was found that a short-term (15-30 minutes) visits to urban nature areas had a positive effect on stress relief. The same study found that urban park and urban woodland had a similar positive outcome within 15 minutes of being in the space. This study concluded that large urban green spaces perform an important role in improving wellbeing of urban residents, especially as a place to visit after work (Tyrväinen *et al.*, 2014).

Creating engagement with nature for health

At an individual (rather than population) level there are two prominent approaches to integrate nature into an individual's life for their wellbeing: through specially designed landscapes such as healing gardens, or through behaviour change intervention (Milligan, Gatrell and Bingley, 2004; Richardson and Sheffield, 2017). Focused on harnessing the benefits of the natural environment, green prescriptions encourage the participants to engage with nature. Although medieval hospitals incorporated nature for restorative benefits, this developed use of nature alongside medical treatment was lost in the 20th century with technological and medical advances (Thwaites, Helleur and Simkins, 2005; Bourke, 2012; Dobson, 2017).

Experiencing a resurgence in popularity with studies such as Ulrich's (1984) research on viewing nature from the hospital window improving recovery rates, there is now a strong evidence base supporting positive health outcomes from nature-based interventions. As implemented by the New Zealand health service, green prescriptions have been shown to have a long-term effect on the participants. Forty-two percent of those who took part in a physical activity based green prescription reported increased physical activity compared to the non-adherence group 2-3 years later (Hamlin *et al.*, 2016). Evidence to support specific psychological benefits of engaging with nature includes reduced stress and anxiety, increased perceived wellbeing and improved concentration (Annerstedt and Wahrborg, 2011). Three main elements have been identified as the means by which green prescriptions improve mental health; directly by restoration through nature, positive social contact, and facilitating meaningful activity (see figure 2.2) (Bragg and Atkins, 2016).
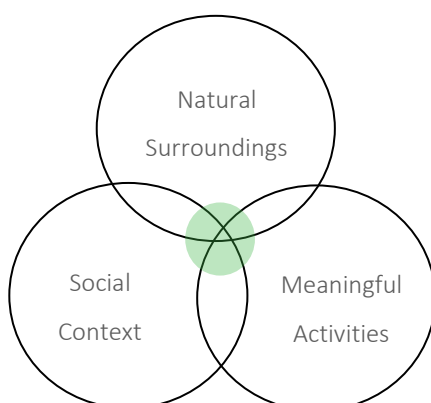
Figure 2.2 Green Prescription Venn
Simplified from Bragg and Atkins, 2016

Green Prescriptions

Within social prescribing is the sub-genre intervention which utilising nature within the intervention design. There are many terms for this including: green prescription, nature-based therapy, ecotherapy, dose of nature and care farming (Bragg and Atkins, 2016). The approach uses plants, animals and landscapes to utilise the available health and wellbeing benefits (Bragg and Atkins, 2016). Most social prescribing services contain one or two nature-based interventions (Natural England, 2017). Within this thesis this type of intervention is referred to as a green prescription.

Types of Green Prescriptions

Often provided by a third sector organisation such as the Wildlife Trust or specialised small businesses there is a range of available approaches to green prescriptions within the UK.

Social and therapeutic horticulture (horticultural therapy): Gardening, growing food or cultivating plants often undertaken in a group over an extended period of time. Participants are encouraged to interact with plants through guided activities such as planting seeds or weaving baskets from willow (Thrive, 2019).

Environmental conservation: Facilitated conservation work such as clearing scrub or maintenance of wildlife reserves. This is often undertaken in groups with a ranger or charity worker as the leader (Wildlife Trust, 2019).

Animal-assisted interventions: Utilising domesticated animals in the rehabilitation or social care of humans. This may be through petting dogs, feeding livestock or collecting eggs. It can be undertaken at a small holding, farm or at the participants location through charities such as Pets As Therapy which visit care homes and universities (*News - Pets As Therapy*, no date).

Green exercise: Engaging in physical activities whilst in the natural environment, for example a green gym or ramblers walking group. Some managed green spaces have installed special trails which include equipment and guidance whilst others are scheduled activities with a set meeting time and place with a pre-planned route (Centre for Sustainable Healthcare, 2019).

Wilderness therapy: The immersion in 'wild' nature to provide an opportunity for personal development and wellbeing. Organisations facilitate a weekend away or it can be experienced through an individual turning off their phone and spending time in a forest. This is similar to the Japanese practice of Shinrin-yoku or forest bathing coined by the Japanese Ministry of Agriculture, Forestry, and Fisheries in 1982 (Park *et al.*, 2010).

Walking on Prescription

In 2011, the Chief Medical Officer for Wales, Scotland and Northern Ireland recommended walking as a suitable entry-level activity to achieve the recommended 150 minutes of physical activity (Walking for Health, 2014). The group walk activity is an opportunity for social interaction, helps reduce isolation and improves mental health (Gladwell *et al.*, 2013; Walking for Health, 2014; Lovell, Depledge and Maxwell, 2018). An intervention evaluation in Scotland found that for every £1 invested in a single health walk intervention generated around £5 of benefit (Greenspace Scotland, 2011).

Social Prescriptions Evidence

A critical review of the current evidence surrounding social prescriptions and therefore green prescriptions in the UK suggests a lack of robust and long-term evidence. Systematic reviews find the evidence relating to GP attendance, A&E attendance and secondary care referrals to be contradictory (Polley *et al.*, 2017). Overall, social prescribing has been found to have a protective effect on service demand. The extent of this impact is a challenge to quantify, due to a lack of long-term studies and participants often having complex needs (Polley *et al.*, 2017). A limitation of social prescribing for health care commissioners and practitioners is the requirement for additional robust evidence on what constitutes best practice (Moffatt *et al.*, 2019). Further research is needed to identify who is most likely to benefit from social prescribing and what type of intervention is most cost effective (Drinkwater, Wildman and Moffatt, 2019).

Target population

In the UK, social prescriptions including green prescriptions, are usually targeted at patients who are frequent healthcare service users with multiple complex needs (Bragg and Leck, 2017; Drinkwater, Wildman and Moffatt, 2019). This has resulted in a study population often over 65 years old or acutely unwell. Within the UK, green prescriptions are not actively promoted compared to other types of social prescriptions and are generally only suggested if the patient expressed an interest in nature (Natural England, 2017). There is no explicit reason why green prescriptions would not be suitable for younger population as studied in this research. In New Zealand, physical activity is targeted through green prescriptions with positive outcomes in evaluations on children and adults (Hamlin *et al.*, 2016; Anderson *et al.*, 2017).

2.7 Evidence limitations

Due to the developing nature of this field of research, the studies undertaken are often with small-scale interventions of 10-30 participants (Lumber, Richardson and Sheffield, 2017). Primarily operating in the third sector, the grassroots development of green prescriptions has resulted in a lack of consistent language, outcome measures and intervention approaches (Bickerdike *et al.*, 2017). Bragg and Atkins' (2016) review of the current state of nature based intervention for mental health in the UK highlighted the magnitude of the differences between measurements and ambiguity within the sector. Two points of particular interest for this research are the variation in participant experience and the choice of outcome measurements.

Research into university campus green space is predominately focused on surveys and detailed interviews into preference of university spaces or visualisation of natural environments (for example through murals or photographs) (Felsten, 2009; Speake, Edmondson and Nawaz, 2013; Liprini, 2014; Windhorst and Williams, 2015; Hipp *et al.*, 2016). Research from Holt *et al.* (2019) identified 'not enough time' and 'not aware of opportunities' as barriers for university students to visiting nearby green space, and concluded with a call for further research into tailoring green intervention for university students.

Knowledge Gap

Green prescriptions are generally focused at the acute and long-term unwell part of the population. Interventions are targeted at those over 65 years old, or with a severe and enduring mental health condition (Natural England, 2017). There has been a request for research which explores the influence of green space on the health of different population groups throughout the life course to understand what works best for whom and when (Buck, 2016). There is little known about 16-24 year olds' interactions with the natural environment or possible lack thereof. Hughes *et al.*'s (2019) research indicated that targeted tailored interventions are required to increase connection with the natural environment in specific groups with differences existing between age and pre-existing levels of nature connection.

The prevalence of mental health conditions amongst university students provides an opportunity to facilitate better mental health through the benefits provide by the natural environment. Research has previously involved questionnaires, simulated environments, or interviews with university students to gain a theoretical understanding of the influence of campus green spaces. Research has identified the importance of university green space for student wellbeing and success. However, there is limited knowledge encapsulating the variety of experience when in the green space, and a lack of measured outcome effects from visiting these spaces (Speake, Edmondson and Nawaz, 2013). The majority of studies have focused on perception and preference for green space characteristics rather than monitoring the effect of visiting these spaces through measurable outcomes.

Chapter 3: Research Design

This chapter introduces the theoretical underpinning to the methodological approach, the specifics of the research methods implemented in both the context study and the intervention study and finally, it presents the study design. Developing on the literature reviewed in chapter two and the expertise in the IWUN project this research incorporates a mixed discipline approach, drawing from environmental psychology, public health and landscape architecture. To achieve the aim of this research required a detailed approach to the capture participants' experience as well as the outcome measures. The use of a two part research design allowed for the context of the intervention to be comprehensively detailed before moving into the intervention study. The first exploratory phase implemented expert interviews and research diary. This approach allowed this thesis to detail the unexpected developments to social prescription over the past three years (see page 13 "since 2016"). The methods for the intervention study were partially dictated by the design of the app, as designed for the IWUN project. This chapter examines the methodological approach, the specific research methods implemented in this thesis and finally, the study design.

3.1 Methodological Approach

Green prescriptions are theorised to be successful due to three elements; by mobilising restoration through nature, positive social contact and facilitating meaningful activity (Bragg and Atkins, 2016). The overall aim of the intervention study was to increase the participant's connection to nature as a pathway to increase wellbeing. According to Kaplan (1995) nature provides an environment that allows for recuperation from mechanical time through providing fascination with natural phenomena, such as watching clouds move. This is known Attention Restoration Theory (ART) (Kaplan, 1995). Application of ART to indoor spaces have seen positive effect on stress and fatigue. Lower levels of stress and fatigue have wide reaching effects on health, work productivity and wellbeing (Kaplan, 1993).

The application of a mixed method approach allowed the research to capture the detail of the experience (Peat *et al.*, 2001). As influenced by environmental psychology, the intervention study is a small scale study with repeated quantitative wellbeing measurements (Lumber, Richardson and Sheffield, 2017). The choice of these outcome measurements allows for the study outcomes to be related and contrasted with other research in this field (Bragg and Leck, 2017; Pritchard *et al.*, 2019). Whilst the size of this study limits the generalisation of the findings and application to the wider population, it does maintain a manageable participant size for recruitment and intervention implementation.

The success of the design and development of a green prescription would rely on the positive and accessible experience for the users. The evaluation part of the study is founded in grounded theory, as related to health-related disciplines, focused on the value of the individual participant's experience (Charmaz, 2006; Sbaraini *et al.*, 2011). Grounded theory allows the results to emerge over the time of the research. In line with these fundamental components the focus group part of the research used an open methodological approach with inductive analysis. This allowed the hypotheses to move from the particular to the general (Sbaraini *et al.*, 2011). The use of emerging thematic analysing of the focus groups allowed the experience to be captured as it is presented rather than from a pre-determined perspective. Different user groups perception and use urban public spaces such as city parks differently, the use of focus groups and a small open survey allowed the exploration of the participants' experience in the intervention study (Peat *et al.*, 2001; Sbaraini *et al.*, 2011). Grounded theory is limited by the time available for the study and requires acknowledgement of the impact the researcher's own subjective role. Note keeping alongside conducting the research and analysis allows for events, changes and experiences to be captured and compared, this occurs in this research through the research diary (Sbaraini *et al.*, 2011). A limitation of the application of this method is it may not be possible to capture the emergent findings in their full detail if enough time is not available within the research.

3.2 Research Methods

This research used a mixed method approach as is common in nature and wellbeing studies (Hitchings, 2013; Windhorst and Williams, 2015; Richardson, Richardson, *et al.*, 2019). The complexities of human-nature relationship lend themselves to the use of quantitative measures to understand the health related outcomes, with the qualitative method to examine the emotional or social outcomes. This approach allowed for the nuanced dimensions of the participants' experience to be explored and measured. The method are presented in the order in which they are used in this thesis.

Qualitative data is primarily offered in this thesis to evaluate and reflect on the intervention. It is designed to provide a deeper understanding of the experience participants took part in and to examine the challenges faced in implementing green prescriptions amongst this population. The use of focus groups also provided an opportunity for discussion on the green spaces and desired landscape design features. The maintenance of a research diary provided a reflection on the developments of social prescribing between 2016-2019, and captured the experience of conducting multiple interventions with university students.

Research Diary

A research diary was kept throughout the study time (June 2017-July 2019). For the context of the study the use of a research diary allows the researcher to reflect and provide a source of supporting evidence for developments which occur over the duration of the study (Bloor and Wood, 2006). During the intervention student notes were made after each walk. In general entries were added at other points of interest over the research timeframe, for example after conferences.

Expert Interviews

To gain an understanding of the way social prescribing operates within Sheffield and the surrounding area interviews were conducted with experts from the social prescribing sector. This information is not available elsewhere, and as a reasonably new initiative is still developing. These interviews were used to build context and understanding of the system currently in place for tailoring green prescriptions. As discussed in chapter four the system in Sheffield for green prescriptions is limited. The interviews were expanded to included Rotherham so to provide a comparative case study of the difference applications and procedures for green prescriptions.

Structured interviews allowed for a specific area of the participants knowledge or experience to be explored (Bryman, 2015). The questions were designed to not be leading and allow the participants to divulge their knowledge freely (available in the appendix B). When interviewing experts, it was important to be respectful of the context and location of the interview (Bogner, Littig and Menz, 2009). As this is the participant's area of employment, the interviewer had to be sensitive to contentious topic such as funding implementation, changes and the political nature of the workplace in question.

Mobile Phone App

There is an opportunity to design and implement mobile phone apps to support the general public's engagement with nature. In 2018, 87% of 16-75 year olds reported owning or having access to a smartphone (Deloitte UK, 2018). This increases to 95% amongst 16-24 year olds (O'Dea, 2019). Smartphone apps are a widely available and constantly advancing technology that offers an innovative way to interface with real world spaces. Mobile phone apps have previously been used to create different ways of enjoying nature, feature publicly accessible environmental knowledge and as a research tool for collecting detailed information on the experience a breadth of the population have with the natural environment (Jepson and Ladle, 2015). Some previous mobile phone apps have aimed to gamify the natural environment with varying success (Sandbrook, Adams and Monteferri, 2015). For example, 'Pokemon Go' created an alternative reality overlaid on the real world. It encouraged users to visit different locations and environments to find different collectable fantasy animals known as

Pokemon (Althoff, White and Horvitz, 2016). Users had to take a certain number of steps to receive rewards and different types of animals were associated with different natural environments e.g. fish Pokemon by lakes. The initial engagement with this app saw an increase in physical activity and time spent outside, although this decrease or seized after the initial interest in the game declined (Althoff, White and Horvitz, 2016). In an eight-week comparison study 'Pokemon Go' players walked 54km and spent 40min/day more than the none-app users. This lead to improved emotional wellbeing, cognitive performance, and social cohesion (Ruiz-Ariza *et al.*, 2018).

Mobile phones apps have been developed as an intersection between virtual reality and the real world. The mobile phone game 'Ingress' was developed and published in 2013 for Android and iOS devices. It behaves as a multiplayer online real-time strategy game which overlays location specific details from the game on to the real world. Buettel and Brook (2016) argue that the additional goal-driven dimension of Ingress could provide a format for an ecology focused mobile phone app. Advances in virtual technology could provide an opportunity for the user to experience a historic landscape or illustration of potential ecosystem restoration, and develop their knowledge of the ecosystem through identification of flora and fauna (Buettel and Brook, 2016).

Walking

Walks are common green prescribing interventions with evidence supporting a wide range of benefits, such as increased physical activity and positive mental health (Nisbet and Zelenski, 2011; Roe and Aspinall, 2011; Marselle *et al.*, 2015; Gladwell *et al.*, 2016; Kondo, Jacoby and South, 2018). Walking through an urban green space is found to be more beneficial to mental restoration and physical health than walking through a built up area (Nisbet and Zelenski, 2011; Song *et al.*, 2015). The group walk intervention is an opportunity for social interaction in a natural environment which has been found to reduce isolation and improve mental health (Lovell, Depledge and Maxwell, 2018). Group walk intervention have been implemented by many different health charities and organisations (Greenspace Scotland, 2011; Walking for Health, 2014; Lovell, Depledge and Maxwell, 2018; Active Fife, 2019).

Previous research on rural and urban walks found that for those whom experience mental health difficulties, walks in both settings were found to be beneficial (Roe and Aspinall, 2011). Rural walks had additional positive effect on emotional and cognitive restoration on all participants (Roe and Aspinall, 2011). Additionally research has found walking in a group can be an integral part of the therapeutic landscape experiences (Doughty, 2013). Doughty (2013) found walking together to be transformative element within countryside walkscape, as the created social interaction and embodied mobilities facilitated the therapeutic dimensions of the landscape. Walking as a research opportunity is discussed by Pink *et al.* (2010), who states that walking should be recognised as something more than movement

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between one place to another, but it is itself a form of engagement with our perception of the environment. Walking also provides an ideal means of learning as an ethnographer (Pink *et al.*, 2010).

Focus Groups

Focus groups allow for certain topics to be explored within a group of participants. This method has strength in the contribution of discussion and idea development which occurs between participants (Bryman, 2015). There may be a limitation to what participants are willing to discuss alongside their peers and may feel unable to contribute in a large group. It is the role of the facilitator to mitigate this weakness and provide a guidance for the discussion (Bryman, 2015). The focus groups used in this research focused on three key areas, the intervention, the spaces within campus and open spaces within Sheffield. Full questions available in the appendix B.

The influence of the facilitator

In placebo experiments the expectations of the participants is shaped through verbal and social learning and have been found to be strongly related to emotional factors (Klinger *et al.*, 2018). As this research is predominately focused on wellbeing outcomes the possible influence as the facilitator should be noted. The intervention contains three groups which have contact with the researcher, an additional group (group four 'Shmapped') was drawn from the wider IWUN app research. The participants selected were in the same age group and gender ratio as the other groups. This was to regulate for the influence I might have as researcher, as shown in placebo experiments the attention of a facilitator can influence the outcome of the intervention. This is also regulated through the use of a research diary to reflect and self-monitor my influence during the walk interventions. Additionally, the IWUN group provided participants who took part during different months compared to this study's research which occurred within one month.

The validity self-reported measures

All of the quantitative data collected within this research is self-reported. Self-reported measures can be influenced by a number of factors including societal pressures and the participants desire to respond to the researcher. In research which investigates wellbeing outcomes, self-reported data is the most common technique. Evidence has shown that individuals are accurate in knowing their own health and the changes within this (Krueger and Schkade, 2008). Self-reported measures can be less robust for interpersonal comparisons, and individual factors such as economic status may have an influence (Krueger and Schkade, 2008). With this in consideration the analysis is primarily focused on comparison across time points on the same individual or means between groups. The groups have been formed to be reflective of the student population and as balanced as possible to reduce the influence of individual

factors (age, ethnicity and gender). Taking multiple measurements across time points increases the reliability of the findings.

3.3 Study Design

This research contains two phases, the initial context study and the intervention study (see figure 3.1). The research initially undertaken was to determine the potential for the use of green prescriptions within the city and to understand the pre-existing processes as it became apparent in the literature review that the system for green prescriptions was not consistent. The second study applied the learning from the literature review and first study to create and trial a theoretical green prescription for university students.

Context Study

Social prescribing is a developing area of healthcare. The lack of written evidence required an alternative approach to review the evidence, procedure and form a foundation for further research. This initial study was designed to contextualise the social prescribing process and opportunities for green prescriptions for university students. It presents the case studies of Rotherham's Volunteer Action Rotherham and Sheffield' People Keeping Well. The University of Sheffield is in the city of Sheffield, South Yorkshire, England. It is one of two universities in the city. Sheffield's population is 575,400 with approximately 29,000 University of Sheffield students (Sheffield City Council, 2016; University of Sheffield, 2018). The city has below national average life expectancy and enduring health inequality across the city. Rotherham is six miles North East of Sheffield and has a population of 265,000. The borough also experiences stark health inequalities (10 years life expectancy difference between most and least deprived) and below average life expectancy (NHS Rotherham, 2018; Brenner, 2019). The social prescribing scheme in Rotherham is highly regarded nationally and has been independently evaluated (Dayson *et al.*, 2016; Voluntary Action Rotherham, 2018).
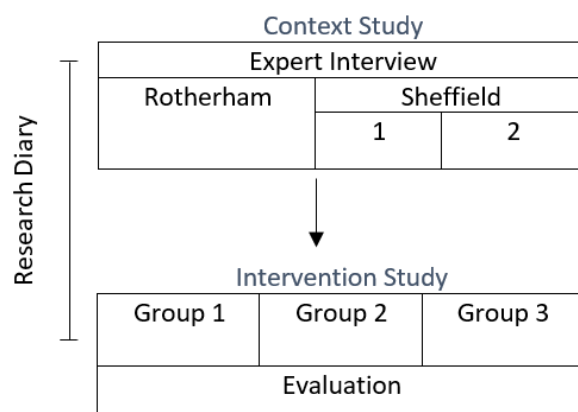
Figure 3.1 Simplified Study Design

Research diary

The research diary is a multifaceted element within this research. Throughout the PhD I have attended social prescribing events at a city, regional and national level. It is worth noting how social prescribing has developed over this time and the input at each key event allowed my perception and role in conducting this research.

Expert interviews

Participants were selected through recommendations by those within the sector, initial contact at conferences and via signposting through generic organisation contact details. The six participants who took part in three interviews were contacted due to their specialist knowledge in the sector. Whilst intend to be an interview with one person, for two of the interviews (Sheffield) the expert being interviewed invited additional participants on the day of the interview. The interview questions were sent to the participants in advance of the meeting. This allowed for the participant to check they were the most relevant person to answer the questions and gave time to prepare, including the production of additional supporting material. During the interview additional small follow up questions were asked for clarification. The interviews were undertaken either in a private room at the participant's place of work or within a nearby café as per the participant's request. The interview is limited to the area of expertise, whilst some of those interviewed did discuss their personal experience and opinion on nature for wellbeing this has been omitted from the transcription as it is not directly related to the implemented procedure. The interviews lasted approximately an hour. Participants often provided additional written material to support the discussed topic and where relevant these have been included in chapter 4 (available in appendix C p.196 & p.199). Participants were invited to review the interview transcript for clarity of information and accurate representation. The interviews were transcribed (extracts available in appendix C p.193) and converted into the procedural details and diagrams of the systems in place as available in chapter 4 section 4.2 Differences in Social Prescribing.

Intervention study

This study contained two interventions: a mobile phone app called Shmapped and a walk intervention which contains one group walk and one individual walk. These were divided into three conditions; (1) mobile phone App group, (2) AppWalk group and (3) Walk group (see figure 3.2). The second wave of recruitment and intervention for the walk condition was needed to mitigate for the high dropout rate which occurred in the initial wave of research. The second wave occurred the following week to reduce change in environmental conditions and not clash with the Easter holidays.

The intervention was run in two waves in Spring 2018. As discussed under challenges it should be noted that during this time there was a strike by university staff which stopped teaching on campus and unprecedented heavy snow. Both are likely to have affected the study but also reflect the varying nature of university life for students.
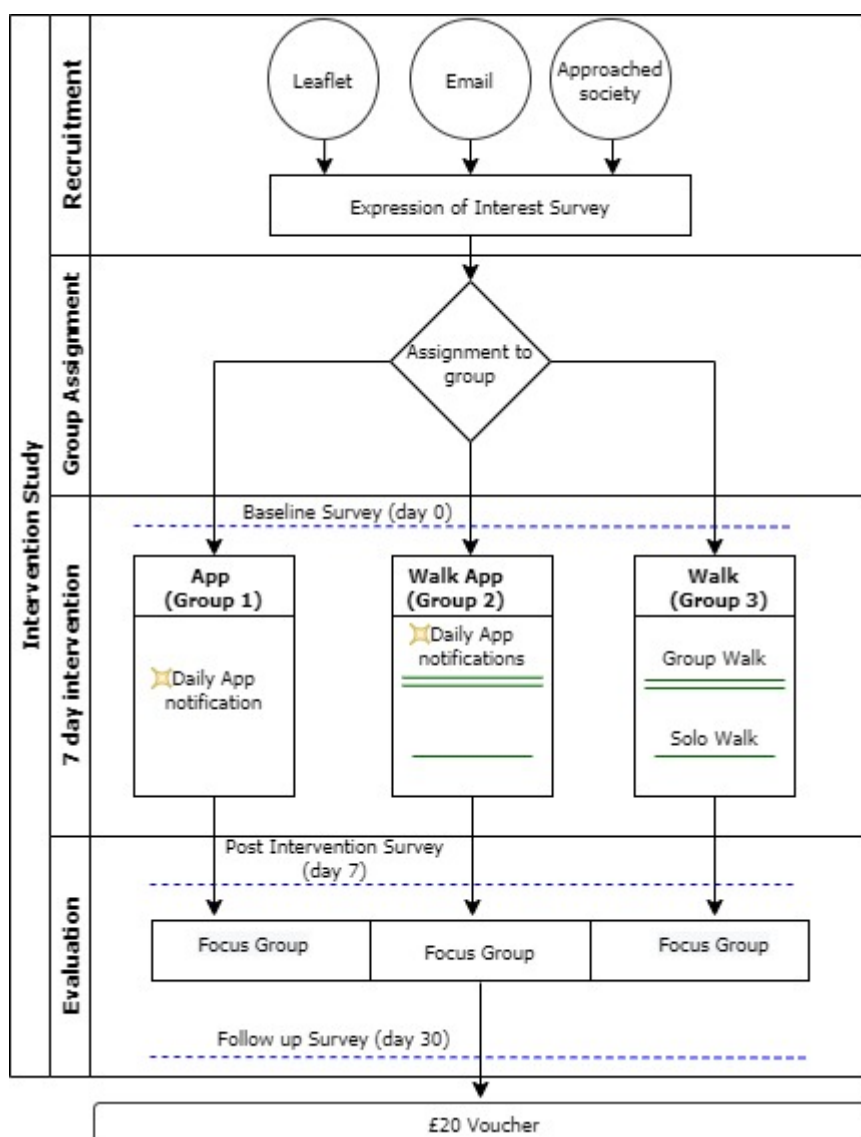
Figure 3.2 Intervention study design

Participants Recruitment

Recruitment for this study aimed to be representative of the student population and avoid the common issues within this area of research where those who are already engaged with nature are interested in participating perpetuating the knowledge gap regarding those with limited nature connection. To reduce the bias of participants having a predetermined interest in the natural environment recruitment was designed to be as limited in 'green' language and imagery as possible. Whilst not misleading the participants details of the intervention were limited with the study being advertised as an urban green research project. Recruitment occurred through the university research participants email list, flyers distributed throughout the campus and through direct contact with University of Sheffield societies without an association to the natural environment (example of recruitment material is available in the appendix B). For example, the climbing club was not contacted but the table top gaming society was. Participants were asked to complete a short form online to collect basic demographic information and exclude those outside of the 18-24 target age group. The exclusion criteria allowed the research to focus on 'generation z' and those most likely to be undergraduates.

There was an initial valid expression of interest from over 200 students. The participants were then allocated to a group (n = 30) based on their demographic information with the aim of creating groups as representative of the student population as possible. Due to a high initial interest the exact group assignment after demographic selection was conducted through random number generation. For example, those female and British were assigned a number and the random generate sequence then allocated them to one of the three groups. This was repeated until the groups reflected the demographic of the university (table 5.3 p.75).

Shmapped: Mobile Phone App

The app used in this research is called 'Shmapped' (Sheffield – Mapped). It was developed by the IWUN team based on previous research conducted by Richardson and Sheffield (2017). Designed to increase nature connectedness through noticing the good things in nature, Richardson and Sheffield (2017) found regularly engagement with nature delivered sustains increase in people's connection with nature. The increase in participants nature connection was associated with psychological health improvement (Richardson and Sheffield, 2017). With a similar approach, participants in the Wildlife Trust study were encouraged to engage with nature every day for 30 days (Richardson *et al.*, 2016). This mass engagement campaign saw participants complete before and after online surveys. Analysis on this data found sustained increase in happiness, health, connection nature and pro-environmental behaviours (Richardson *et al.*, 2016). The improvement in health was predicted by an improvement in happiness which was found to be mediated by the change in connection to nature (Richardson *et al.*, 2016). Building on this idea of noticing the good things in nature and regular engagement with the natural environment improving nature connection and there after wellbeing, Shmapped was designed to provide a comparison study on noticing the built and natural environment on a city wide scale.

The mobile phone app was designed in collaboration with the mobile phone app development company Furthermore and included a user test group as part of this development (McEwan, Richardson, Brindley, *et al.*, 2019). The app randomly assigned users to notice either the built or natural environment (30:70) The mobile phone app used in this study functioned as an intervention and a research tool for data collection. The research tool part ran as a background function to the daily intervention notifications. The front house function of the app displayed as a chatbot fox which asked the participants when they first entered a green space to rate the space on a scale for how it made them feel, amount of nature and their activity in the space (app display illustrated in figure 3.3). They were also able to enter a description of the space and a photo. The app collected the before, after and follow-up questionnaires as well as monitoring the GPS track of the participants once they entered the geofenced areas of Sheffield (parks and urban green spaces). A total of 945 the parks and other green spaces in Sheffield were turned into geofenced areas by the IWUN team. The built environment condition users received a daily alert not connected to a geographical location. When the participants entered data, the location of this input was marked on a map (this is also visible to the app user).

Initially designed as a 30 day intervention, it contained baseline, post 30 day and two month follow up questions. Uptake and adherence to this was poor with only 55 participants completing the full 30 days. The app was therefore redesigned to be 7-day intervention with the measures at baseline, post 7 day and 30 day follow up. The redesigned intervention ran throughout Winter 2017/ Spring 2018.
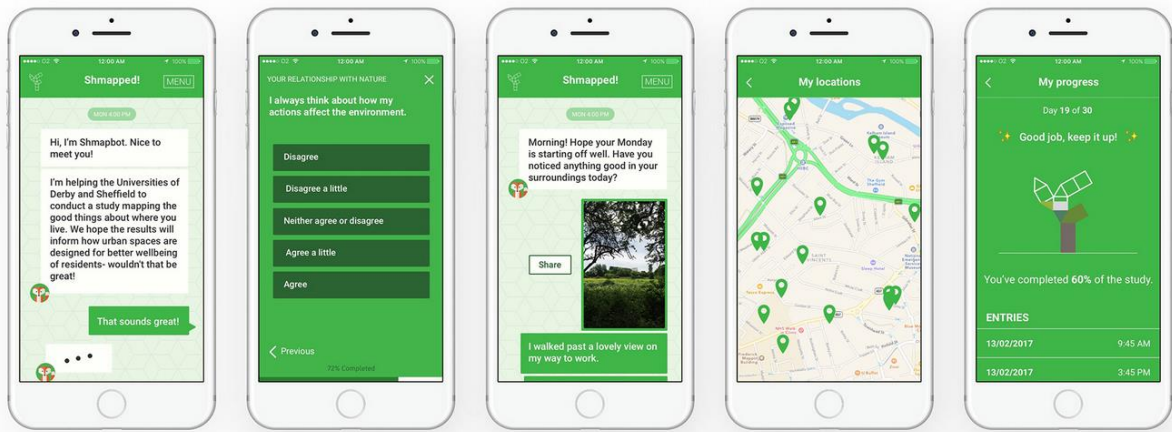
Figure 3.3 Example of Shmapped display

Walk Intervention

Designed to replicate green prescription walk activities and encouraged participants to meet the regular 20-30 minute in nature threshold (Tyrväinen *et al.*, 2014; Shanahan *et al.*, 2016; Active Fife, 2019; Hunter, Gillespie and Chen, 2019). The walk intervention composed of a group walk at the beginning of the week followed by an individual week at the weekend.

Group Walk

The walk aimed to encourage participants to take a break from their work on campus to visit an easily accessible local park with the opportunity to chat as we walked if they wished. Four different time options were offered per group, this resulted in a total of seven walks being undertaken with the first wave of participants. Location

The walk travelled through two local public parks. Weston Park is 5 hectares with the boundaries defined on three sides by roads. A municipal park opened to the public in 1875 it retains much of its original planting scheme. The wide expanse of grass includes tennis courts, monuments and an irregular shaped pond (Historic England Archive, 2004). Crookes Valley Park was created around the existing reservoir in the early 20th century. The central feature is the Old Great Dam built as a water reservoir in 1785 (Friends of Crookesmoor Parks, no date). This is now used for fishing and other water activities. The park also contains a pub, bowling green (early 20th century) and a children's play area (1970s). It is just under 5 hectares and contains an area of naturalistic woodland with occasional rose flowerbeds.

Size

The group walk was designed for a small group up of up to five participants. This was to support social engagement whilst being sensitive to the other users in the park. In practice group size was unpredictable with timetable changes and cancellation effecting the attendance. This resulted in group size ranging between one and seven.

Time

The group walk occurred in the morning, lunch time and afternoon over the first three days of the week. This allowed participants to sign up for a time which fit within their timetable. Due to weather warnings this was delayed by a day. The group walk was timed to be approximately twenty minutes. Based on the literature this should provide an appropriate break in the participant's day and enough time in a green environment for them to receive restorative benefits (Hartig, 2006). Once combined with the additional self-guided walk later in the week the participants would have experienced above the recommended 'dose' of 30 minutes a week to have an effect on their wellbeing (Tyrväinen *et al.*, 2014; Hunter, Gillespie and Chen, 2019).

Route

The walk was designed to travel through varied planting schemes to allow for preference to be discussed later in the focused groups. The group walk (see figure 3.4-3.9) was in through two parks beside the university campus. The walk passed Victorian museum, traditional Victoria style bedding flower beds, a pond with a lot of ducks which is alongside the library, through a small wooded area, alongside a large pond, open grassy area, a children's play park and alongside a slope containing flowering daffodils and emerging tree blossom. The walk started and finished in the same place next to the Firth Court entrance to the park (figure 3.7).

Verbal Prompts

As the facilitator I had scripted lines to be said at certain points of the walk to direct the participants attention to different elements of the walk. Identified in Lumber, Richardson and Sheffield's (2017) work and structured around the nine values of the biophilic hypothesis, the pathways include; contact, emotion, meaning, compassion and engagement with nature beauty. These prompts were designed to encourage connection with the natural environment. Prompts included discussing memories of feeding the ducks as a child, the new tree leaves representing the arrival of spring, the flowers and tree blossom being beautiful, the silence of the far side of the pond offering peace from the city and the detail of the feather on a female duck. Language when discussing nature was kept simple to make sure all participants felt they could participate, including resisting my personal desire to identify the ducks and other waterfowl (transcript available in appendices).

Individual walk

The second walk was under their own initiative and aimed to encourage the participants to walk somewhere on the weekend to support creating a new route or finding a new piece of urban nature. Participants were asked to go on a second walk of their own volition later in the week. All participants received a walk reminder email on the Friday. Participants were encouraged to walk for over 20 minutes and to use it as an opportunity to explore a new place.

Figure 3.4 Photo One: Western Park.

All photographs authors own

Figure 3.5 Photo Two: Crookes Valley Park Pond

Figure 3.6 Photo Three: Flowers in Crookes Valley Park

Figure 3.7 Map of Walk Route

Figure 3.8 Photo Four: Crookes Valley Park

Figure 3.9 Photo Five: Weston Park

3.4 Outcome Measures

Data was collected at day zero pre intervention, day seven post intervention and day 30 as a follow up (see figure 3.1). All questionnaires were conducted either through the app or for the walk only group via an online survey which the participants could complete through their mobile phone or computer. The question format is designated by the Shmapped app design and replicated for the non-app users via an online survey. For all the measurements excluding INS the responses are on Likert scale. Full script of the questionnaire is available in the appendix B.

Recovering Quality of Life (ReQoL)

Recovering Quality of Life (ReQoL-10) is 10-item self-reported recovery focused quality of life measure (Keetharuth *et al.*, 2018). It contains 10 questions on mental health and one on physical health. This self-reported outcome measure is designed to comprehend the quality of life of someone with a mental health condition. It is a development on the Short Warwick-Edinburgh Mental Wellbeing Scale and EQ-5D with a simple and accessible question format. It is designed to be consistent with themes of recovery (hope, activity, belonging, relationships etc.) and is suitable for a range of mental health conditions including common mental health disorders such as depression and anxiety. ReQoL have been developed and validated against other psychometric measures (Keetharuth *et al.*, 2018). An increase of 5 points or more denotes a reliable improvement. The general population score 25 or above and those under 24 are considered within the clinical range for a mental health condition (Keetharuth *et al.*, 2018).

It is also possible to generate quality adjusted life years (QALYs) through ReQoL measurements (Brazier *et al.*, 2016). Whilst not directly relevant to this PhD research, this is important for the app as the IWUN project intended to investigate the QALY and economic valuation of different interventions (Keetharuth *et al.*, 2018). ReQoL is a relatively new scale with limited published studies (Keetharuth, no date; McEwan, Richardson, Sheffield, *et al.*, 2019).

Nature Relatedness (NR-6)

Shmapped included the short form version of the Nature Relatedness scale that assess the affective, cognitive, and experiential aspects of individual's connection to nature. It has been validated with respect to an assortment of environmental and personality measures (Nisbet, Zelenski and Murphy, 2009). Nature relatedness is a useful measure for understanding a person's relationship with nature and the processes underlying environmental concern and behaviours (Nisbet, Zelenski and Murphy, 2009). Previous studies have found a strong nature relatedness score is associated with greater happiness and pro-environmental behaviour (Nisbet and Zelenski, 2013). For efficiency in time and space within the app, this research used the shorter version of nature relatedness known as NR-6. The NR-6 is composed

of six items from the dimensions of 'self' and 'experience'. It has been tested among students, community members and business people, and has shown good internal consistency (Nisbet and Zelenski, 2013).

A meta-analyses of environmental behaviour and nature found a small but significant different in the size of the relationship between university students and non-university populations results (Mackay and Schmitt, 2019). Mackey and Schmitt (2019) hypothesise this could be due to undergraduate students being more familiar with answering survey questions used in these forms of questionnaires and thus answer with more precision. Additionally, Mackey and Schmitt (2019) found university students may be more motivated and able to act in ways consistent with their environmental attitude. Whilst this does not directly affect this study, it is worth considering if the findings from this survey were to be extrapolated to the general population. This may also affect the distribution and therefore analyses available.

Inclusion of Nature in Self (INS)

The Inclusion of Nature in Self scale is based on the theoretical foundation that the characteristics of the natural environment can be used for self-benefit and therefore self-nature connection can be defined as 'the extent to which an individual includes nature within [their] cognitive representation of self ' (Wesley Schultz, 2001, Schultz, 2002 p.67). It is concise and composed of seven images that depict a venn diagram of 'self' and 'nature'; these circle, become closer together to the point of being one. Criticised due to its single-item nature the application to psychometric properties result in a limited scope (Wesley Schultz, 2001; Martin and Czellar, 2016). The use of two nature connection scales should mitigate this limitation and allow for a comprehensive and comparable evaluation of the participant's measurement. This measure was achieved in Shmapped by the user sliding a bar to move the amount the circle overlapped (see appendix B).

Inclusion of nature in self has been found to have a stronger relationship with happiness compared to NR-6 (Capaldi, Dopko and Zelenski, 2014). A possible explanation for this difference is INS may also assess general connectedness more than NR-6, which might provide a more precise reflect on an individual's subjective connection to nature (Capaldi, Dopko and Zelenski, 2014). Additional studies have found the scales identify different aspects of an individual's connection to nature (Tam, 2013; Balundė, Jovarauskaitė and Poškus, 2019; Colley and Craig, 2019). The use of both NR-6 and INS creates a comprehensive account of the change in nature connection which may occur during an intervention (Richardson and Sheffield, 2017).

3.5 Evaluation Approach

Focus Groups

A total of 26 student took part in the hour-long focus groups. Participants' background varied in ethnicities, ages, course studied, year of study and gender. Recruitment to the study initially allowed for the groups to be representative of the undergraduate student population at the University of Sheffield. However, due to drop out this was not maintained. The set questions were based on the app user's experience and separately on the walk experience (questions in appendix B p.189).

App User Questions

Group one and two included questions on the usability, design, visual appeal and different features of the app. To gauge the apps application outside of the research study with university students, participants were asked if they would use to the app if they had not been involved in the study or if they would recommend it to a friend. This section of questions included opportunities to discuss improvements and limitations with the premise that as the researcher I had not designed the app so they could talk without concern of causing offence.

Walk related questions

For groups two and three, the use of drawing the group walk and park aimed to get participants to recall the walk and create discussion between the group. Once they had created their group drawn map of the walk, participants were asked to mark any area they particularly liked or disliked, sensory elements they may have remembered and if the areas were familiar. Available in appendix E Participants were asked to describe the individual walk they went on including, if it was part of their usual routine or a new activity for them. From this topic participants discussed different areas within Sheffield that they enjoyed or avoided walking through.

Green Space Questions

The questions were designed to be flexible and allow the group to openly discuss their experience of nature on campus. As is important with focus groups whilst the facilitator offered the topic, the conversation was allowed to develop between participants. Due to some recent building on campus and discussion of converting a large carpark into a green space, there was an opportunity here to discuss what participants preferences. The Arts Tower car park (figure 3.10) is a large flat space pinched between two main roads. It is located between the student union, a library, the Art Tower and two other departmental buildings. The Arts Tower contains offices, lecture theatres and studio space. The recent urban infrastructure added to campus (figure 3.11) are outside the Diamond building (opened 2015) which is central point for study space, laboratories, seminar rooms, computer suite and lectures. The focus group questions concluded on the participant's favourite outside space at home or in the city. This was to gauge the participant's usual level or enthusiasm for engagement with the natural environment.

Figure 3.11 New Green Infrastructure by Jessop West

Figure 3.10 Arts Tower Car Park

Survey

Due to the second wave of data collection falling close to the Easter holidays, some participants were unable to partake in focus groups. Those unable to attend the focus group expressed a desire to still contribute to the evaluation of the intervention so were provided with an optional a short survey (available in the appendix B p.191). Treated in a similar way to the focus group transcriptions, this data was collated and analysed for themes and general feedback. A total of 24 participants completed the survey.

Transcription Protocol

The focus groups were digitally recorded, transcribed and anonymised. Focus group transcriptions are coded through NVivo (version 12) to identify key priorities for participants from a nature based intervention and developing opportunities to engage with nature on campus. These codes are kept as close to the original context as possible to allow the themes to organically emerge before being related to one another and pre-existing theories (Charmaz, 2006; Sbaraini et al., 2011). Grounded theory emphasises the relationship between coding and emergent themes. Charmaz (2006) summarises this as 'coding is the pivotal link between collecting data and developing an emergent theory to explain these data. Through coding, you define what is happening in the data and begin to grapple with what it means' (p.45). Ten percent of the transcriptions have been checked by a second (blind) researcher to monitor for bias in attribute codes to themes. Additionally, the two-stage approach to the coding process supported a comprehensive understanding of the content within the focus groups.

3.6 Ethical considerations

Mental Health

This study collected as limited personal data as possible. Names were not used for any registers or transcriptions. Wellbeing scores were collected that would make it possible to identify participants with score considered clinically low (suggesting depression), action was not taken in direct relation to individuals but instead the final email to the participants included links to student support services. The discussion and publication of the rationale behind this study included conversion on student mental health issues including suicide. Therefore, when applicable presentations included a trigger warning and details of support services such as the Samaritans.

Participant's data

The project has been ethically reviewed by the Department of Landscape in accordance with procedure laid down by the University of Sheffield's Research Ethics Committee, which monitors the application and delivery of the University's Ethics Review Procedure across the University, reference number: 016529 and 014504.

As this study is about university students it felt essential that the participants remained integral to the production of the research. It was important to maintain the perspective and engagement of the participants whilst upholding research ethics and confidentiality. This was approached through two key measures. Firstly, once participant's data had been collected across all three time points it was combined and coded. The participants were anonymised through assignment of a randomly generated letters sequence. To allow participants to maintain engagement with the research they then received a final thank you email and option to follow the IWUN project. At this point all identifying details were deleted. Secondly, for qualitative data the names of participants were not collected and instead each person's voice is identified in the transcription through the ice breaker activities in which they named their favourite chocolate bar and this became a set of initials. To maintain the voice of the participant within the study the gender and year of study for quotes in publications are an approximation, for example some participants explicitly comment that because they are in their first year of university study and therefore have not explored further in Sheffield or the university campus. Therefore, if the written quote does not include related information that is visible in the transcript, then additional information would be attached to the quote, for example 'first year student'. This is to contextualise the participant's experiences for the reader. All data is stored in line with General Data Protection Regulation and the University of Sheffield's ethics guidelines.

Chapter 4: Context

As previously established in chapter two, health and wellbeing are influenced by economic and social factors. Additionally, there is variety in the social prescribing offer, to create applicable evidence it was important to understand the context this research is situation in. This phrase of research aimed to understand the current procedure and availability of green prescriptions in South Yorkshire. This chapter provides a detailed account of the study context in relation to the area, university and relevant healthcare sector. The objectives of this chapter are summarised after the case studies. To finish this chapter details the current information on the University of Sheffield mental health approach.

This chapter addresses the research question one, 'what nature based interventions are currently available to University of Sheffield students in South Yorkshire?' through two objectives:

Objectives:

1. What green prescriptions are currently available in Sheffield?

2. What are the procedural differences for social prescribing in the Sheffield and South Yorkshire region?

4.1 Joint Strategic Needs Assessment: Sheffield

The Joint Strategic Needs Assessment (JSNA) is an over-arching report on the current and future health and wellbeing needs of the Sheffield population (Sheffield City Council, 2019). Sheffield has varied levels of regional deprivation, with the polarised difference between least and most increasing by 10% between 2010 and 2015 (Sheffield City Council, 2019). In 2015, the national comparisons presented the levels of deprivation in Sheffield as improved, with Sheffield ranked 60th out of 315 most deprived local authority, compared to 56th in 2010 (Sheffield City Council, 2019).

The mental health and wellbeing priorities in the JSNA are loneliness amongst older people, suicide and undetermined injury (Sheffield City Council, 2019). For infants, child and young people's health is focused on child obesity, infant mortality and teen pregnancy. The 2018 Director of Public Health's report is focused on the role of the economy in supporting good health (Fell, 2018). With the economic determinants such as meaningful employment and supporting positive mental health to reduce sick days being a priority (Fell, 2018). A focus on the wider determinate of health is supported by the Thriving Place Index which found unemployment as the lowest scoring domain in Sheffield and therefore a recommended focus (Thriving Places Index, 2019). As reflected in the aforementioned public health report and JSNA, due to the severe health and economic inequalities within Sheffield, common mental health issues which green prescriptions are targeted towards are not the present priority (Fell, 2018; Sheffield City Council, 2019).

4.2 Social prescription

A social prescription is a non-clinical intervention for a health or wellbeing condition. Social prescribing is listed as one of the ten high impact actions in the NHS's General Practice Forward View (NHS England, 2014). This report contains a review of how General Practice (GP) operate and how they are supported through the NHS. Within the UK, social prescribing is primarily used for loneliness, mental health and dementia (Polley *et al.*, 2017). It can also be used as a mechanism to support individuals in resolving social welfare issues such as housing, benefits, debt and employment (NHS England, 2019d). Referrals to a social prescription are often via a healthcare professional, such as a GP to a link worker. The link worker acts as a broker between patient, healthcare professional and service provider (Natural England, 2017; Drinkwater, Wildman and Moffatt, 2019) (figure 4.1). Service providers offer a range of interventions such as arts and creative activities, physical activity, volunteering and educational opportunities, and support with practical issues (Kinsella, 2016). In the UK, services providers include small business, national charities, community groups and pre-existing grass root activities.
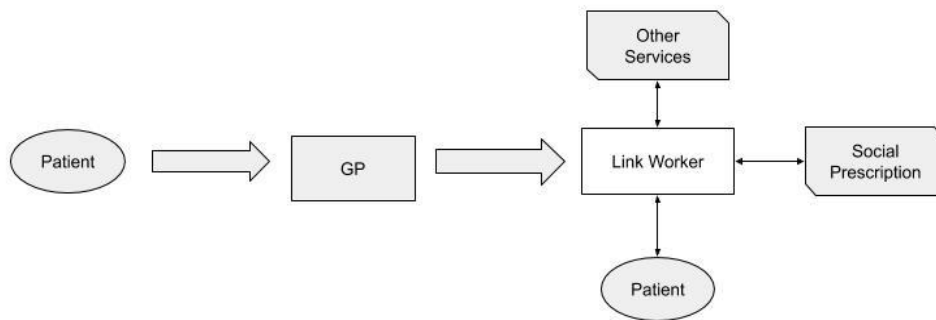
Figure 4.1 Example of Social Prescribing Procedure

Considered a secondary or community healthcare service this type of intervention is commissioned by CCGs. The introduction of 200 CCGs in 2015 meant a change in the responsible for managing a large proportion of the NHS budget, in 2016/17 CCGs accounted for £76.5 billion out of total of the £107 billion NHS budget (Harker, 2018). CCGs operation varies between areas. Yorkshire and the Humber contains 15 CCGs and each aims to provide a tailored approach to the public health needs within its area (NHS England, no date). The way care is commissioned within the different services has resulted in a varied programme of available interventions depending on geographical location. There are currently no guidelines on the availability, type or procedure for social prescribing within the NHS. There is a great deal of regional variation that is illustrated within this chapter through the case study of Sheffield and the nearby town of Rotherham.

Differences in social prescribing

There are currently many different models of social prescribing in England. They each operate different referral mechanisms, funding arrangements and procedures. Most schemes target a range of beneficiary groups (Burt and Preston, 2017; Natural England, 2017). To understand the context of Sheffield's green prescriptions required a preliminary study into the social prescribing model. Sheffield's social prescribing occurs through the scheme 'People Keeping Well' which is defined as an 'integrated commissioning programme' (CCG Sheffield and Sheffield City Council, 2016). The social prescribing system in Rotherham (a town less than 10 miles away) is offered for contrast and comparison. The Rotherham approach to social prescribing is highly regarded with the CEO being awarded an MBE (VAR, 2017).

The findings are as follows:

Rotherham –Volunteer Action Rotherham

Voluntary Action Rotherham (VAR) is a charity founded in 2012 to support, develop and promote the voluntary and community sector in Rotherham. It provides a portal for wellbeing services by acting as a mediator between patient and GP. In 2018, the organisation supported 344 groups and distributed over £500,000 in grants through varied work streams including the social prescribing service and community hubs (Voluntary Action Rotherham, 2018). Of specific interest to this thesis is the social prescribing service.

Interview one: The project manager provided expertise on the process and success of the service. The interview was conducted on 12th July 2017.

Funding

The CCG funds a small team of advisors, administration and management staff. The CCG outline the patient group of interest and VAR have autonomy over the interventions they commission through service level agreements with local organisations and groups. There is also funding for VAR to invest in the voluntary sector more broadly in response to demand from the patients. This includes the creation of community hubs and employment of staff. At the time of interview VAR had over 30 service level agreements with local charities and organisations.

Referral Process
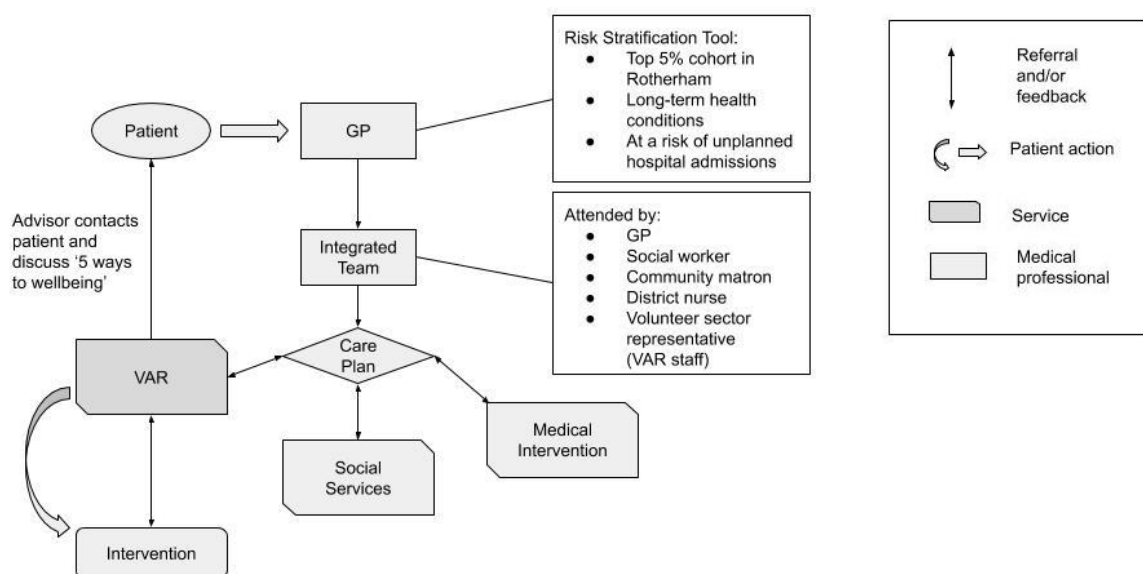
Figure 4.2 VAR referral process

Upon meeting with their GP the patient is referred to VAR via the integrated team which meet with the GP and others to construct a care plan (figure 4.2). This care plan is intended to holistically consider the patient's needs including social services, district nursing and social prescribing. If the patient would benefit from a social prescription they are referred to VAR. At this point a VAR advisor contacts the patient to arrange a conversation to discuss the '5 days to wellbeing' at the patient's home or at VAR's centre. This helps the adviser to form a wellbeing plan to support the patient's needs. There is a 28 day target from GP referral to the VAR patient assessment. From this point VAR aim to have the patient engaged with the relevant service within two weeks, this includes arranging adequate transport and any additional support. Depending on level of demand and capacity within the commissioned services these time frames can vary, however the patient is kept up to date with possible delays in their referral to an intervention. The service receives an average of 110-115 referral monthly.

Population of interest

At the time of interview the CCG had commissioned VAR to support top 5% of acute patients in Rotherham registered with a GP practice in Rotherham. These are considered elderly patients with a long-term health condition and at risk of unplanned hospital admission. In 2015, VAR and CCG embarked on a new scheme to support the area's mental health services in using a recovery based model to support the discharge of long-term users of mental health services. This process is similar to the previous model but includes working and meeting alongside the patient's practitioner. In the pilot first year the service supported 160 people aged between 30-60 years old with long-term mental health conditions.

Interventions

As the service has developed VAR have been able to predict the typical needs of those they support and commission intervention based on the previous year's performance. VAR is also able to tailor the provision to a specific need through 'spot purchases' of short-term small-scale interventions. For example, a patient who had previously regularly enjoyed fishing but was now experiencing social isolation and physical limitations. VAR were able to fund transport and membership for a short period of time to support this patient's engagement with a local fishing group. VAR aim to be a pathway to community based activities, they will fund engagement for up to 12 weeks. Services commissioned by VAR must be able to show sustainability within their intervention including how the patient is transitioned into long-term community engagement.

Green Prescriptions

At the time of interview VAR did not explicitly offer any nature-based prescriptions. The service had contracts with Rotherham United Community Sports Trust to undertake community based sport activities which may be outside and includes a local fishing group which meet at the local pond (weather permitting). Rotherham have a Wildlife Trust group that offer 'Wild at Heart' in a particular area of the town, however this is funded through a different route not linked to VAR. At the time of interview VAR were developing community based hubs that included 'men in sheds'[1] and outdoor activities such as gardening and archery. Due to the main social prescription cohort being elderly patient there was limited demand when the service began to provide outdoor and physical demanding interventions. This may change with the increase in the younger, mental health conditions cohort.

Outcome measures

VAR have a three point outcome measure which they receive from the service provider:

- 'S+' successful referral with a positive outcome – the patient has completed the allocated time and joined something else, or they are still engaged with the group or in the community.
- 'S-' successfully referred but they did not complete or no record of a successful outcome.
- 'U' after the referral they didn't engage, this is deemed an unsuccessful referral.

Approximately 15% of GP referrals do not engage with the initial contact from VAR. Prescription uptake is effect by a variety of reason, the most common was the patient not being sufficiently ready to engage. This could be due to a lack of understanding of the service or a change in health after the GP visit and VAR's contact. For example, an advisor may find the patient has been admitted to hospital or in more extreme circumstance, died.

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[1] Men in Sheds is a space for men to pursue practical interests in a social environment to reduce loneliness and social isolation (UK Mens Sheds Association, no date).

Sheffield – People Keeping Well

Due to the availability of staff and the variety in Sheffield's social prescribing system information was collected over the course of two separate interviews. It is worth noting the second Sheffield interview (interview three with the commissioning manager and senior programme manager) was conducted a year after the initial People Keeping Well interview, this is discussed further within the research diary reflect and in appendix C.

Interview two: Commissioning and management team

To understand the referral process and available interventions within the city of Sheffield this interview was conducted with three members of the People Keeping Well team:

- Community services manager, which includes library and community services, peer support and capacity building in the community.
- Health and wellbeing programme manager, which includes the community support element that engages the population with social prescriptions.
- Commissioning officer for People Keeping Well.

The interview was conducted 27th July 2017.

Interview three: Sheffield CCG and Sheffield City Council

This interview was conducted to understand the system behind People Keeping Well and develop my understanding on how interventions are commissioned within the Council and CCG in Sheffield. This interview was conducted with two people from the CCG and Sheffield City Council:

- Commissioning Manager at Sheffield City Council, lead on commission for people keeping well, careers and dementia.
- Senior Programme Manager for active support and recovery within the CCG. This role aims to: (1) develop neighbourhoods and (2) develop out of hospital care.

It was conducted 23rd August 2018.

Overview

People Keeping Well is an integrated commissioning programme for the city of Sheffield. Through a variety of pathways it aims to create a holistic overview to health and wellbeing within the city. The programme streamlines the previous funding process to produce two district strands; People Keeping Well and Strong Resilient Communities programme. This is designed to be a multifaceted approach to health and wellbeing with input from Sheffield City Council and Sheffield CCG. In 2015, this commissioning programme covered 75 GP practices (out of 85 GP practice in the CCG city area) and supported over 500 referrals per month. It is considered one of the social prescribing options in the city.

The programme aims to be community lead through smaller facilitating organisations (see figure 4.4 on page 64).

Funding

Central government funding known as the 'Better Care Fund' supported the implementation of community support workers, while other funding has been reallocated from disparate low level prevention activity contracts. At the time of the first interview the reallocated and central government funding was purposed to develop infrastructure around community relationships, social prescribing and community support workers. The funding is allocated to organisations which are based within the neighbourhood usually covering 20-30,000 people. Multiple small organisations can join together to form a partnership framework.

Referral Process
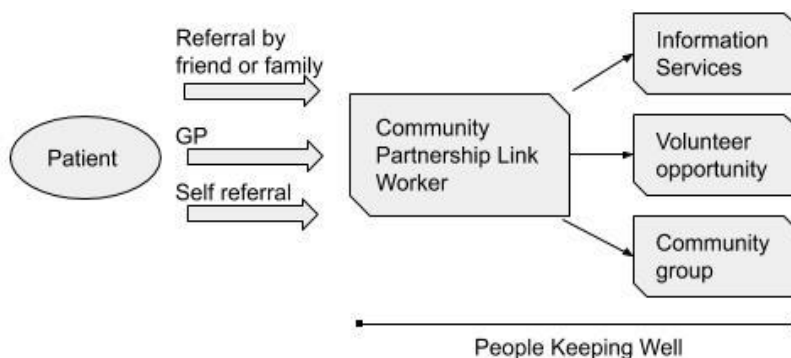
Figure 4.3 Sheffield Referral Process

The majority of patients are referred into the system via the GP or district nurse, approximately 10% of people self-refer. In the past year (2016) there has been increased attention in training the GP staff to be care navigators. The GP receptionist are trained in triaging the patients to three specified areas; community support working, pharmacy services and eye clinic services. Upon the referral being received by the community partnership link worker, the patient can expect to be contacted within 24-48 hours. Within 21 days after this initial conversation the team aim to have the intervention allocated to the patient. The patient's social prescription varies depending on the community partnership organisations in their neighbourhood. The use of co-production aims to create intervention based on the localised population need. While it is possible to be referred out of area, it is unlike as the programme aims to keep the patient local. Across the city, the link workers will see between 500-600 people a month.

Population of interest

The service is open to anyone who may benefit as it is not cohort specific. At the time of interview People Keeping Well had specific funds for supporting those with dementia and carers for respite breaks. People Keeping Wellbeing has generally been accessed by those over the age of 65 year old, however recently (2018) this had begun to change with engagement from a younger age groups (40-65 year old in deprived areas). Separate to People Keeping well is the Better Care Fund that is designed to reduce the number of inappropriate admissions to hospital and support more efficient access for families to engage with community and social care. It is targeted at people with multiple long-term health conditions. In tangent People Keeping Well aims to implement preventative measures within the community context, to reduce the prevalence of the acutely unwell population targeted by the Better Care Fund.

Interventions and service provision

Pre-People Keeping Well was reported to already contain the required interventions and services to support the populations' needs, the introduction of People Keeping Well was the employment of link workers to consolidate and improve access to the available services. The inclusion of the council employing the link worker as a professional statutory service supported the uptake and engagement from other organisations. The alignment between CCG and council allowed for reduced duplication and improved strength in community development.

At the time of interview, there were 19 community partnerships. The community partnerships are collaborative work between voluntary community organisations and other organisations which are deemed important in the area. This is reflected in the CCG's work to support community development centred on public health issues considered through a holistic lenses on the social determinate on health. This has resulted in public health funds invested in community assets such as Age UK. Interventions provided by the partnership framework includes supporting individuals with applying for benefits, befriending services, reading on prescription and local lunch clubs. Full details of the available interventions are in the appendix C. The map below displays the distribution of partnership organisation within the area of Sheffield (figure 4.4). It should be noted not all of Sheffield is covered.

Green Prescriptions

The interventions offered depend on what is available from the community partner. In some areas it may be possible to access a community allotment or nature walk. The link worker would refer the patient to an intervention based on their likes and dislikes.
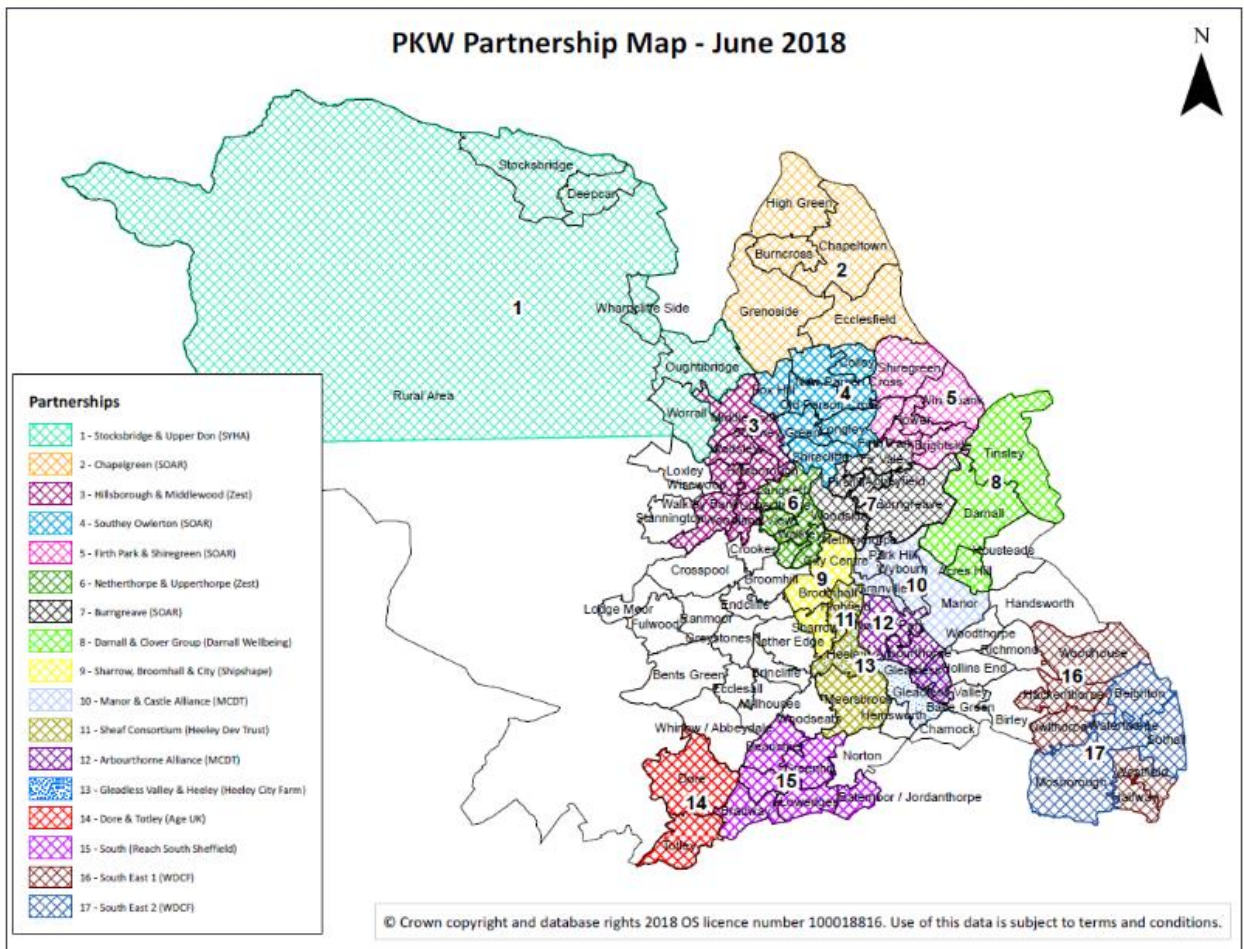
Figure 4.4 People Keeping Well Partnership Map

Table 4.1 Replication of figure 4.4 legend for clarity

1	Stocksbridge, Upper Don & Grenoside	6	Netherthorpe & Upperthorpe	11	Sharrow, Broomhall & City	15	Arbourthorne Alliance
2	Chapelgreen	7	Burngeave (Creative Pathways)	12	Manor & Castle Alliance	16	Dore & Totley
3	Hillsborough & Middlewood	8	Burngreave (SOAR)	13	Shef Consortium	17	South
4	Southey Owlerton	9	Darnall & Clover Group	14a	Heeley City Farm	18	South East
5	Firth Park & Shiregreen	10	*not featured*	14b	Gleadless Valley & Heeley	19	Sothall, Beighton & Mosborough

Outcome measures

Due to the breadth of services and variety of intervention offered there is not a centralised monitoring system for social prescribing. The programme was undergoing a three year review through a partnership with the University of Sheffield at the time of interview (University of Sheffield, 2015b). People Keeping Well monitors the number of prescriptions offered citywide. During the interview the participants expressed a desire for a more comprehensive understanding of the impact achieved. Evidence used to develop the services available comes from a variety of sources. Public health information on health condition and lifestyle factors such as smoking or social isolation is used to spotlight areas of need. Additional evidence is gathered from front line workers, public and community engagement with reliance on forums and 'tried and tested' approaches. These are collected and adaptable to the needs of the community as influenced by the evidence and availability of interventions and opportunities. The evaluation is primarily supported through anecdotal evidence and contract management.

Update

Since the time of interview the most recent plan navigation from Sheffield CCG outlines the next steps for the Better Care Plan to include:

- "Implement a social prescribing model in all areas of the City.
- Develop a central referral hub.
- Clear and consistent approach to management information and measuring impact."

(CCG Sheffield, 2017 p:23)

Harris *et al.* (2017) published their evaluation of People Keeping Well in September 2017. It found that the referral process effectively engaged with the target population, the use of community support workers offered a holistic approach for a non-medical conditions and could provide an effective short-term intervention when linked to a long-term community based peer-support (Harris *et al.*, 2017). However, it was deemed there was a lack of evidence for the long-term impact of the service and the delay in being assigned to an intervention resulted in poor adherence. They highlighted that the future effectiveness of the service will depend on the capacity and responsiveness of the referral services (Harris *et al.*, 2017).

4.3 Research Diary

The maintenance of this research diary has helped to reflect on my own understanding of the social prescribing sector and how green prescribing fits within the procedure. While I maintained autonomy in writing up the interviews it seemed to me that VAR were more responsive to their patients' need with a desire to develop the community secondly. The small team which had been developed specifically for the role of social prescribing appeared functional and with a clear mission. In contrast the social prescribing in Sheffield seemed at times disconnected, with several different areas having responsibility for the aims to improve preventative health, community and social concerns.

Input from research diary:

*"**Interview VAR***

The service is very tailored through guided conversation on the 5 areas of wellbeing.

Predominately aimed at doing what the patient wants at the centre.

Community hubs designed to support preventative action and to create self-sustaining groups.

*****Interview with People Keeping Well***

Aimed at being community focused which appears to leave gaps in provision.

Still new and developing targeted at different areas, facilitated and outcomes.

Involved someone from the library as a point in the community

Uses currently funding by rearranging it.

*****August 2018***

Interview
Sheffield does things differently because it's historically had a community based approach at the heart of interventions involving social equalities.

"

Due to the current pressure on health and social care there is no focus towards university students. This appear to be due to their relatively good health compared to other sections of the population. There is also no direction towards using or tailoring green prescriptions to harness the additional benefits of connecting with nature in social prescription.

4.4 Interview Summary

The interviews allowed a breadth of information to be gathered which is otherwise not available. Understanding the strengths and weakness of pre-existing procedures for social prescribing in Sheffield supports the adaption and implementation of green prescription for university students in future. It was also important to make sure this research did not ignore any opportunities which may already exist for the student population. The objectives of this chapter are recapped below followed by consideration of the research question. To finish this chapter the current information on the University of Sheffield mental health approach is covered.

Objectives:

1. What green prescriptions are currently available in Sheffield?

There is limited availability of green prescriptions. As both system use a similar approach to tailoring the intervention through the five ways to wellbeing, there is currently limited interest to implement navigating those not already interested in nature towards a green prescription. This may change as the target population change (as suggested for Rotherham) and evidence and implementation practices develop under the incoming NHS guidance.

2. What are the procedural differences for social prescribing in the Sheffield and South Yorkshire region?

Both systems aim to put the patient's needs at the centre of their prescriptions. VAR approached this from a top down manner with contract management and financially supporting the required interventions. People Keeping Well in contrast supported the intervention development from the community level up. The evaluation and evidence policy also differ between the two systems. VAR's system required an annual report and review of the service, and intervention availability that is regularly reviewed by the organising management and link workers. The reactivity and engaged framework allowed the service to be responsive to the needs of the population. People Keeping Well's system relies on a narrative between the community, services providers and management team. This system may allow for a more personal antidotes to be communicated back to the funders, however it lacks a structure to easily accrue evidence. People Keeping well is responsible for a larger population which may account for the area based variation. As this service develops it may provide a better backbone for the community services to develop from. Both services are still relatively new and creating partnerships with the community, CCG and other healthcare providers.

Research Question one: What nature based interventions are currently available to University of Sheffield students in South Yorkshire?

University of Sheffield students would be able to access a social prescription depending on the location of the GP and home address. At present 18-24 year olds are not a target population as the health, social and economic priorities of the JNSA and People Keeping Well demonstrate. Due to the focus on the more urgent and acutely unwell population, student mental health is consequently devolved to a university support services responsibility. To further answer this question the University of Sheffield mental health policy is explored below.

4.5 Mental Health and University of Sheffield

Sheffield Student Health and Wellbeing Board oversees the partnership working for supporting health and wellbeing within the city, it is formed of the University of Sheffield, Sheffield Hallam University, Sheffield City Council, the NHS and other city-based partners. The University of Sheffield has 29,666 students (2018/19) and over 8,000 staff (University of Sheffield, 2018). Staff mental health is overseen by the 'Juice' programme and student mental health is covered by Student Access to Mental Health Support (SAMHS). The University Health Service is a GP practice located on the edge of campus near the main library.

The university has a Mental Health Strategy focused on a single point of access triage team, it is this holistic and in house approach which is reviewed by the Times Higher Education as a reason for the university's high score on their category for mental health provision (Bhardwa, 2018). It is also within the broad policy level initiative that support for mental health could be provided through the design of the campus estate (University of Sheffield, 2017b). Whilst succeeding in comparative league tables nationally, within the university there is still a high unmet demand on the mental health support services (University of Sheffield, 2017b).

Student Mental Health Strategy

The University of Sheffield's Student Mental Health Strategy 2017-2020 outlines the priorities of the university to support the increased demand from across the student population for mental health support services (University of Sheffield, 2017b). The principles behind the strategy are; to create an informed and open community, build on partnership working between the student union, NHS, CCG, local and national charities, and embed mental health across university business through several policy areas including the estates strategy.

At the University of Sheffield there are three main services for support student's wellbeing (University of Sheffield, no date b). The first is the SAMHS, which is the first point of contact for a broad range of possible psychological support needs via a single triage appointment. This service refers students on to support such as counselling, groups therapy session and the Big White Wall (also available for self-referral). The Big White Wall is an online peer and professional support portal which provides access to counsellors as well as ways to self-manage mental health difficulties. Sheffield IAPT (Improving Access to Psychological Therapies) provides support through the NHS that includes online wellbeing courses, self-referral to professional one to one support and employment advice via specific GP practices. SAMHS may also refer students to the Student Advice Centre which is a service from Sheffield Students' Union that provides confidential and impartial advice, support and representation on a wide range of topic from visas through to academic procedures.

As stated in the University's Mental Health Strategy the introduction of SAMHS provided a user-friendly experience with better accessibility to the available resources, however it did not lessen demand (University of Sheffield, 2017b). The strategy continues:

"In order to address student need, it is necessary to progress a whole system approach, giving new, increased emphasis to preventative activity and support, to enable earlier resolution of issues and the creation of a healthy University community with the ability to discuss and promote positive mental health." (University of Sheffield, 2017, p.1)

Emerging from the wider healthcare sector is the application of social prescription for mental health. This alternative approach to health and wellbeing has gained popularity in the past decade and could facilitate the university's aim to implement preventative measures. The Student Mental Health Charter intends to offer an award for universities to work towards which includes the use of pro-active interventions.

Chapter 5: Intervention Study

From understanding the current procedures in South Yorkshire it was evident a separate intervention study would be required. Due to the lack of nature based intervention this study used the IWUN mobile phone and as a comparison an intervention developed from the literature. This chapter presents the quantitative results from the intervention study. The qualitative results and evaluation of the experience are in chapter 6. This study was undertaken with university students in the spring of 2018. This chapter offers details on the participant numbers and the quantitative analysis.

To understand **research question two**: How the app and walk intervention compare in terms of the outcome measures on student wellbeing as effected by a connection to nature, the following hypothesis are tested:

1. There is a positive relationship between connection to nature (NR-6) and quality of life (ReQoL).

2. The participants will experience a change between (a) baseline to 7 day and (b) across the intervention in connection to nature and quality of life scores. It is predicted that group 2 will demonstrate the highest increase over the intervention.

3. There will be a significant difference between the intervention in connection to nature and quality of life scores.

5.1 Participants

Over 200 expression of interest forms were completed by students. Once accounting for eligibility and duplication the study had 240 potential participants. Using stratified sampling, 50 participants per group were contacted resulting in 25 participants per group willing to take part. A second wave of recruitment was run to bring this to 30 per group, (total of 90 contacted). On the day of the group walk a further ~20% dropped out. This resulted in a third wave of recruitment for group three. Sixty-nine participants completed the baseline-questions and 52 completed all three time point measurements. The addition of 60 Shmapped users as previously discussed were added to the dataset, these users did not require recruitment and would support the robustness in the tests conducted (see table 5.1).

Participants were divided into three groups (see figure 5.1):

Table 5.1 Participant distribution

Name	Intervention Design	Participants
Group one	Mobile Phone App	26
Group two	App and Walk	26
Group three	Walk	28
Group four	Shmapped data	60
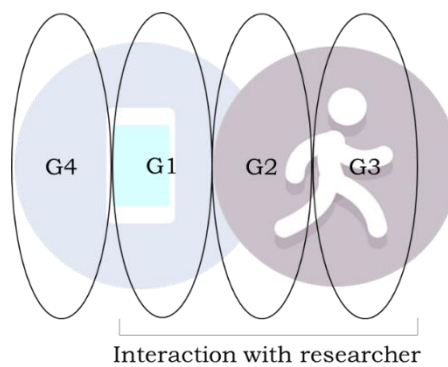
Figure 5.1 Group Conditions

Representative proportion

In an attempt to provide an accurate representation of the University of Sheffield student population ethnicity distribution, the percent per ethnicity as designated by the university survey data was adapted into the research group assignment (table 5.2) (University of Sheffield, 2017a). The University of Sheffield student population for the aged 18-24 year old and thereafter research group proportion, are as follows:

Table 5.2 University of Sheffield Student Population Aged 18-24

Ethnicity	Number	Percent
White	14471	69
Chinese	2976	14
Asian or Asian British - Indian	703	3
Other Asian background	591	3
Asian or Asian British - Pakistani	420	*2*
Black or Black British - African	391	*2*
Mixed - White and Asian	329	*2*
Other Ethnic background	241	*1*
Other Mixed background	214	*1*
Arab	206	*1*
Mixed - White and Black Caribbean	138	*1*
Asian or Asian British - Bangladeshi	95	*1*
Mixed - White and Black African	84	*1*
Black or Black British - Caribbean	73	*0*
Other Black background	38	*0*
Gypsy or Traveller	1	*0*
Gender		
Female	9634	49
Male	10027	51

Intervention Group Demographic

The university's survey ethnicity categories were amalgamated to maintain participant anonymity and add a greater element of robustness. This amalgamation was in line with the Higher Education Statistics Agency categories for ethnicity (see appendix A) (HESA, 2018). The demographic details of the groups are shown in table 5.3.

Table 5.3 Intervention Group Demographics

	Group 1: App		Group 2: App Walk		Group 3: Walk		Group 4: Shmapped	
Gender	n	%	n	%	n	%	n	%
Female	17	65.4	11	42.3	18	64.3	37	61.7
Male	9	34.6	15	57.7	9	32.1	23	38.3
Other					1	3.6		
Age								
18	3	11.5	2	7.7	1	3.6	6	10
19	4	15.4	4	15.4	5	17.9	10	16.7
20	5	19.2	7	26.9	8	28.6	7	11.7
21	7	26.9	4	15.4	6	21.4	13	21.7
22	4	15.4	3	11.5	3	10.7	9	15
23	2	7.7	2	7.7	2	7.1	9	15
24	1	3.8	4	15.4	3	10.7	6	10
Ethnicity								
White	22	84.6	19	73.1	20	71.4	47	78.3
Asian/British Asian	1	3.8	3	11.5	5	17.9	9	15
Black or Black British	1	3.8	2	7.7	2	7.1	2	3.3
Other	2	7.7	2	7.7	1	3.6	2	3.3
Total	26		26		28		60	

Dropout rate

The study experienced a high dropout rate with participants offering various explanations. Initially participants were unable to take part in the study due to having already used the app and due to a lack of compatible device (Shmapped was not available on the Microsoft Windows operating system, n = 2). Once assigned to a group and requested to complete the sign-up for a walk, participants found a clash of timetable, vacation period or disinterest in the study (n ~10). This stage experienced the highest drop out with a second wave of assignment required to increase and rebalance the group numbers. Due to bad weather forecast on the Monday of the intervention week the walks were rearranged for Wednesday. This may have effect some participants' ability to participant. On the day of the intervention activity students dropped out due to illness, change in scheduled academic event, forgetfulness and change in team activity (n ~ 5). Additional responses included family emergency or returning home due to the strikes cancelling their intended university activities (see 'challenges' below) (n~5). Some participants were able to attend an intervention later in the day however this was logistically difficult to manage (n~3).

Error in data collection

In wave one of the condition Walk (group 3), an error was made in collecting the follow-up survey data, which meant the participant's identifying details were not collected. It is therefore not possible to match the pre and post, data with the follow-up data. Whilst it is still possible to undertake analysis which relies on means which rely on comparisons of group averages between the different groups, it is not possible to analyses this data with pair matched tests across the three time points.

Due to errors within the app, there were some technical issues in uploading the data from the mobile phone to the server. Connection issues meant that data were at times lost within the server, this resulted in not all the data from the participants being received at the end of the 30 days. It would be expected that the error associated this this would be random (e.g. not effecting one particular group to a greater extent than others) but there is no way of verifying this assertion and bias may have been introduced. By this point it was too late in the academic year to repeat the tests. The weather, vegetation and academic environment had changed and recruitment of the additional participants would not have matched the original recruitment plan or research conditions.

Challenges

There were two large and unpredictable challenges that may have effected the participants use of campus and the impacted the logistics of the walk.

Weather

It should be noted that the week before the walks took place Sheffield experienced unusually heavy snow in March. Whilst most of the snow had melted by the week the walks occurred there was still some unpredictable weather including light snow, rain and intense sunshine. The mean temperature for March in Sheffield is 2 - 8 °C, the week before the intervention was -5 - 6 °C with the intervention week experiencing 1 - 8 °C (First week of March weather chart available in Appendix B).

University Staff Strikes

During the spring of 2018, University staff associated with the University and College Union began industrial action against 64 universities over a proposed change to the pension scheme. This was the longest strike in UK higher education history. It should be acknowledged that the right to fair pay and working condition are important and rightly defended through strikes. Unfortunately, the strikes coincided with this research intervention. The campus was noticeable quieter with many students verbalising their decision to go home rather than wait for potentially cancelled academic timetable.

5.2 Quantitative Analysis

All statistical analyses were conducted using SPSS version 25.

Required Statistical Power

A statistical power calculation dictated the requirement for a minimum of 16 participants per group for the study based on the NR-6 mean and standard deviation of previous research (α = 0.5, β = 0.2) (Lumber, Richardson and Sheffield, 2017). In line with previous studies there was a target of 30 participants per groups (Tyrväinen *et al.*, 2014; Lumber, Richardson and Sheffield, 2017). The required statistical power for some analysis was not met due to dropout, error in data collection and loss of data through the app. Due to the low number in participants the majority of tests were run with both app conditions (green and built) so to not reduce the sample sizes any further. Whilst this is acknowledged as a limitation of the approach, in analysis from the IWUN project found participants noticed nature in both app conditions (McEwan, Richardson, Sheffield, *et al.*, 2019). This examined the change in the data includes the Shmapped group. Including this group allows for consideration towards the influence of factors beyond the seven day intervention study (for example weather, due to Shmapped being conducted winter-spring).

Normality

Normality of the variables of interest is important for determining the most appropriate statistical analysis and was tested using the Shapiro-Wilk test of normality (table 5.4). This test is appropriate for small samples sizes of less than 50. If the significance value of the Shapiro-Wilk Test is greater than 0.05, the data is normally distributed. If it is below 0.05, the data significantly deviate from a normal distribution.

Table 5.4 Outcome of normality test

	Group 1 (App)			Group 2 (AppWalk)			Group 3 (Walk)			Group 4 (Shmapped)		
	Pre	Day 7	Day 30	Pre	Day 7	Day 30	Pre	Day 7	Day 30	Pre	Day 7	Day 30
N	*26*	*20*	*22*	*26*	*23*	*18*	*28*	*25*	*22*	*59*	*57*	*58*
ReQol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.463	0.176	0.450	0.304	0.066	0.051	0.090	0.964	0.901	0.207	0.144	0.224
NR-6	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗
	0.000	0.010	0.073	0.002	0.033	0.103	0.002	0.009	0.004	0.022	0.009	0.037
INS	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
	0.177	0.841	0.220	0.985	0.370	0.091	0.035	0.652	0.201	0.059	0.769	0.180

Descriptive Statistics

Given the large amount of data found to be not normally distributed and the desire to use the same statistic approaches across the data, non-parametric (opposed to parametric) tests were employed.

The table 5.5 below shows descriptive statistics for the measures and demonstrates the large variability within the data. The mean scores per condition and time point are displayed in the line graphs below (figures 5.2-5.4)

Table 5.5 Variables' Means and Deviation

Measure	Condition	Pre	Day 7	Day 30
Mean (SD)				
ReQoL	*Group 1: App*	28.96 (5.73)	32.45 (3.88)	30.41 (4.70)
	Group 2: Walk/App	29.00 (5.10)	32.09 (4.97)	32.61 (6.57)
	Group 3: Walk	31.11 (3.90)	31.16 (4.94)	31.41 (5.32)
	Group 4: Shmapped	28.07 (6.83)	30.04 (5.98)	28.98 (6.43)
Nature Relatedness (NR6)	*Group 1: App*	24.88 (6.20)	22.05 (6.32)	21.18 (6.98)
	Group 2: Walk/App	25.73 (4.34)	22.09 (5.79)	22.56 (5.29)
	Group 3: Walk	24.32 (5.24)	24.20 (5.28)	24.64 (5.12)
	Group 4: Shmapped	20.35 (5.61)	21.57 (5.65)	21.48 (5.57)
Inclusion of Nature in Self (INS)	*Group 1: App*	43.35 (21.96)	48.30 (21.17)	50.36 (22.67)
	Group 2: Walk/App	49.62 (20.74)	54.17 (24.81)	55.44 (24.10)
	Group 3: Walk	40.39 (17.50)	50.24 (20.84)	46.14 (20.06)
	Group 4: Shmapped	42.55 (22.94)	46.38 (22.30)	51.16 (22.04)

Mean Scores Line graphs

The following line graphs contain error bars on the AppWalk condition
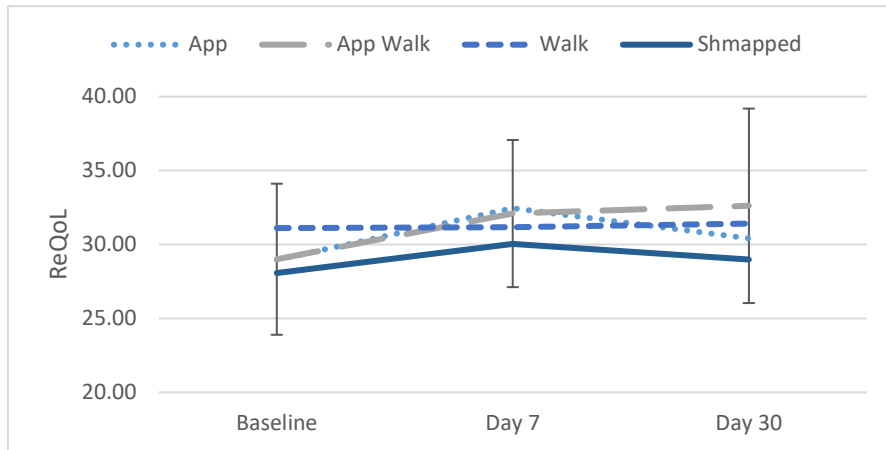
Figure 5.2 Mean ReQoL by Group
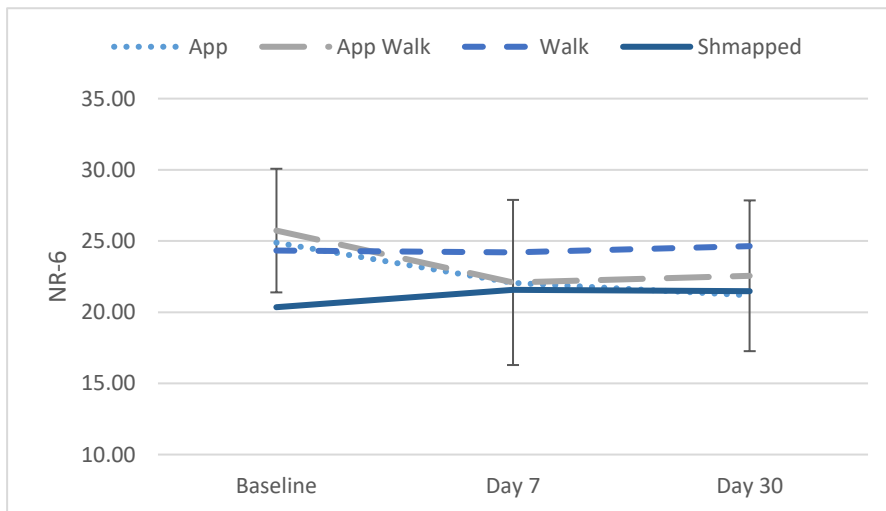
Figure 5.3 Mean NR-6 Score by Group
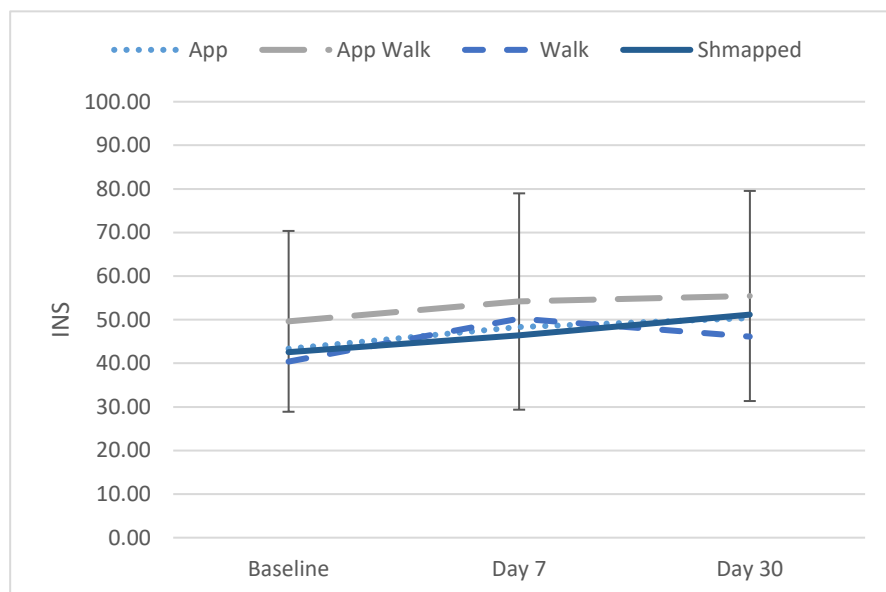
Figure 5.4 Mean INS Scores by Group

Boxplot

The boxplot illustrates the changes in the groups across the three time points (figure 5.5, 5.6, 5.7). The median is shown with a line and the 'x' marks the mean point. The median represents the middle number across the data set and therefore illustrates the change across the three categorises (time point: baseline, day 7 and day 30). The graphs present the systematic trends in recovering quality of life (ReQoL) (figure 5.5) and connection to nature (NR-6 and INS) (figure 5.6 and figure 5.7). From previous research into connection to nature and quality of life the following trends would be expected; INS and NR-6 will increase over the 7 day intervention and level off to day 30. As quality of life is positively associated with connection to nature, the ReQoL would be expected to increase across the 30 days in association with NR-6 increase. If a change in behaviour has occurred it would be evident in an increase at 30 days as the pariticpants continues to engage with nature.

As is visible in the ReQoL there is some variations in the experience between groups. However as previously discussed the deviation in the data limits the conclusions available to draw.
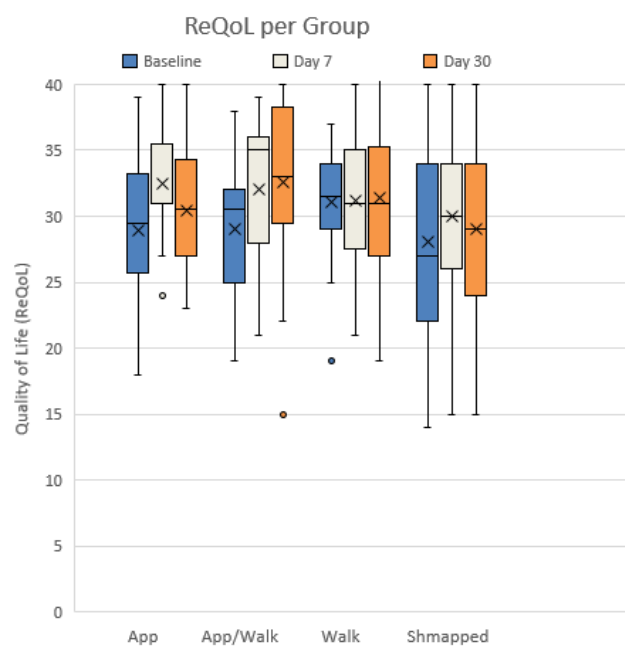
Figure 5.3 Boxplot for ReQoL score

NR-6 measure for the app users display increase in variations in response over the time points. This graph also displays the potential for the walk intervention to have some influence over the nature connection score of the participants which could be explored further in future.

The INS score is presented here as a comparison to the NR-6 score, there is a correction between the two scores (see figure 0.4 and 0.5 in appendix D), yet within the research presents large variations. This measure is a single sliding scale so senesitive to individual input and immediate response (screenshot from app available in appendix D).
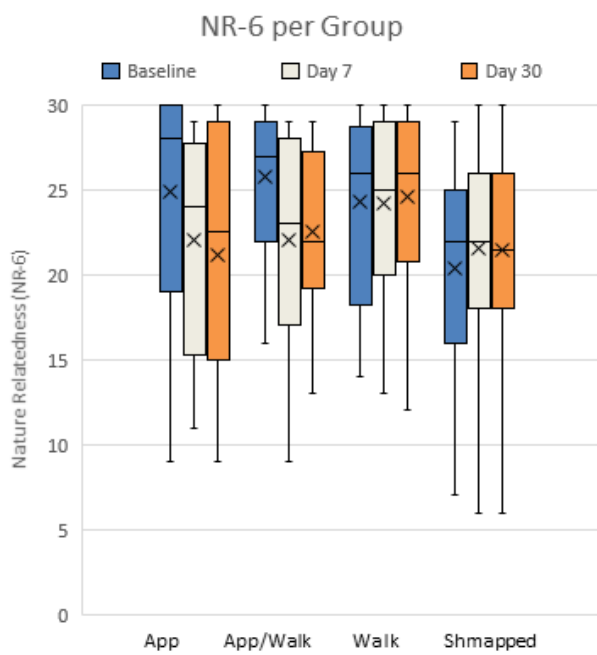
Figure 5.6 Boxplot for NR-6
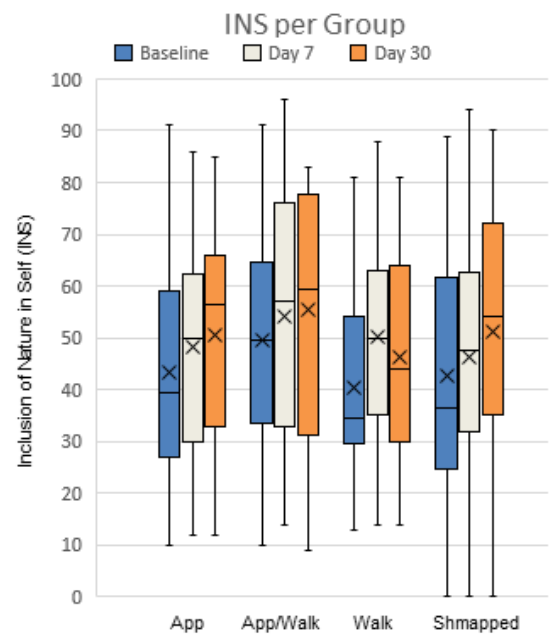
Figure 5.7 Boxplot for INS

5.3 Hypothesis one: There is a positive relationship between connection to nature (NR-6) and quality of life (ReQoL).

Correlation Coefficient

To test for correlations between the different time points and two variables a (non-parametric) Spearman's rank correlation coefficient was performed on all the data (group $1 - 4$, see table 5.6). This produced correlations to a weak but significant level for the relationship association between baseline measure of 0.214 (*p= 0.05*) and at the 30 days measure of 0.223 (*p=0.05*). For the post intervention measure at day 7 the finding was very weak and not statistically significant at 0.087.

Table 5.6 Spearman's rank correlation coefficient

Spearman's rho		ReQoL at start	ReQoL after 7 days	ReQoL after 30 days
NR-6	Correlation Coefficient	.214*	0.144	0.161
	Sig. (2-tailed)	0.011	0.109	0.103
	N	139	125	104
NR-6 after 7 days	Correlation Coefficient	.567**	0.087	0.12
	Sig. (2-tailed)	0	0.341	0.246
	N	124	123	95
NR-6 after 30 days	Correlation Coefficient	0.132	0.137	.223*
	Sig. (2-tailed)	0.182	0.187	0.015
	N	103	94	119
*. Correlation is significant at the 0.05 level (2-tailed).				
**. Correlation is significant at the 0.01 level (2-tailed).				

Sensitivity analysis was undertaken using parametric tests due to many of the data variables being normally distributed (Table 5.4). This intended to further investigate the significant correlation found in the test above (Table 5.6). Results broadly presented a weak correlation between Recovering Quality of Life (ReQoL) and Nature Relatedness (NR-6) at the baseline measurement ($F(1,137) =5.143$, p = 0.25), and a weak relationship post intervention at day 30 ($F(1,117)=5.022$, p= 0.027. Full results can be found in Appendix D. To summarise there was not a significant positive relationship between NR-6 and ReQoL.

5.4 Hypothesis two: The participants will experience a change between (a) baseline to 7 day and (b) across the intervention in connection to nature and quality of life scores. It is expected that group 2 demonstrate the highest increase over the intervention.

This hypothesis is focused on:

a. *the change between baseline and 7 day*
b. *the change across the entire intervention baseline, 7 and 30 day.*

Connection to nature is explored as NR-6 and INS.

2.a The participants will experience a change between baseline to 7 day in connection to nature and quality of life scores. It is predicted that group 2 will demonstrate the highest increase over the intervention.

Change scores

The initial investigation into the group mean change in recovering quality of life and connection to nature suggested the app had a positive influence on recovering quality of life and a negative influence in nature relatedness, but a steady increase in INS (figure 5.8, 5.9 and 5.10). The difference in ReQoL and NR-6 becomes partially poignant with the visual comparison with the walk. The walk group appears to experience minimum change over the invention time and follow up at day 30 and in this analysis acts as a control group for the impact of the weather, season and academic variables. However, the amount of variation between participants is evident (as shown in the standard deviation in the line graph below and boxplots above 5.5-5.7) and it would be misleading to continue to compare data using such an approach. The following line graphs contain the standard deviation on the AppWalk condition (also available in table 5.5). Further analysis was run to test the trend which appear visible in the line graphs (figure 5.8-5.10)
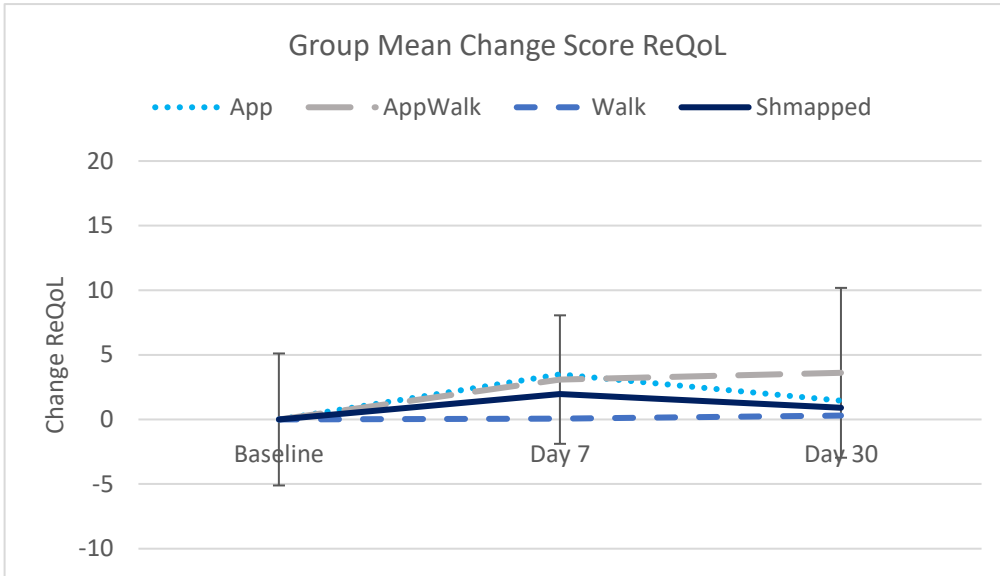
Figure 5.8 Group Mean Change Score ReQoL
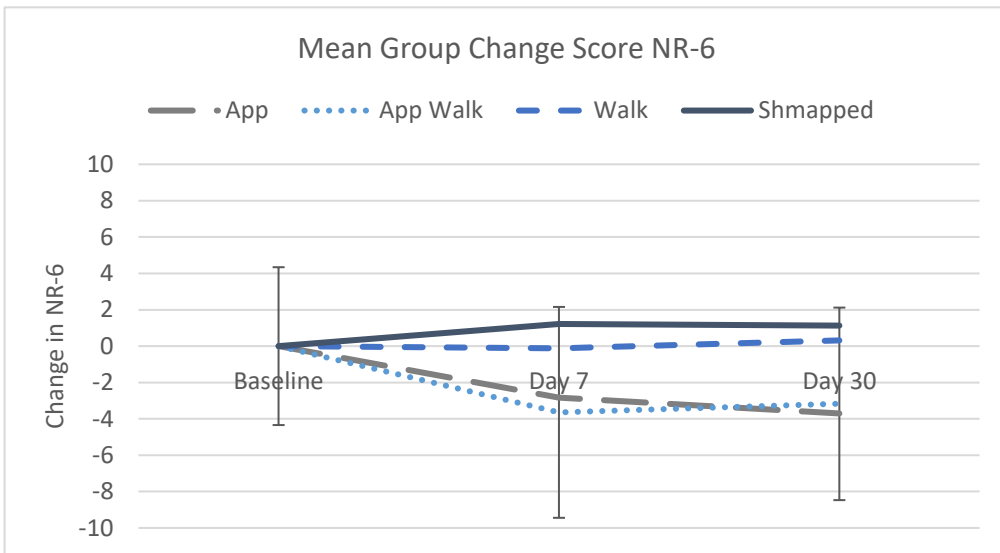
Figure 5.9 Group Mean Change Score NR-6
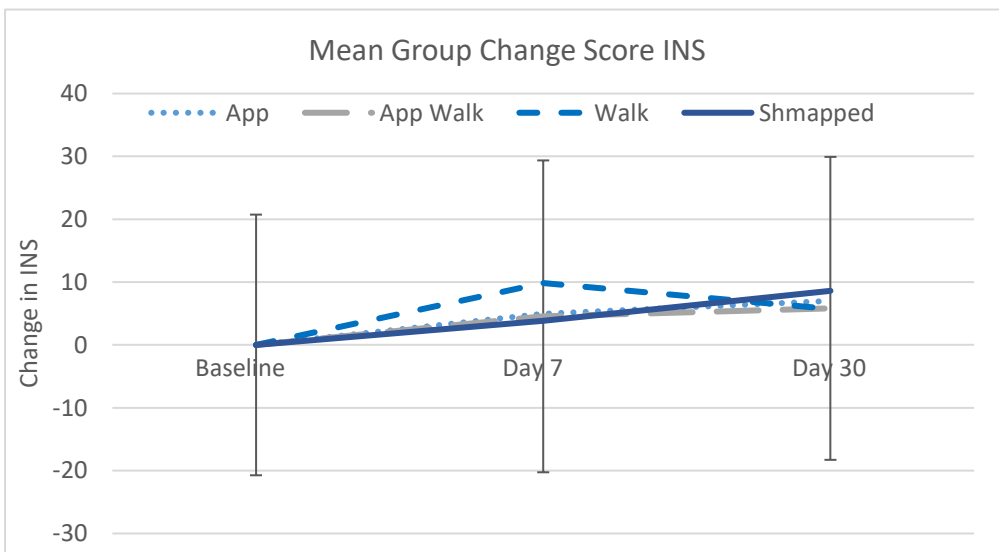
Figure 5.10 Group Mean Change Score INS

Non-Parametric Test

To test if the intervention had a statistically significant effect on the participants' wellbeing or connection to nature a non-parametric test was run on related samples. SPSS creates a model that portrays the relationship change across the time points. Related-Samples Wilcoxon Signed Rank Test (table 5.7) for baseline and post intervention (7 day) measurements was run for both NR-6, INS and ReQoL. The null hypothesis is that the distribution between the two time points are the same. Therefore, if the model rejects the null hypothesis, there is a significance difference through time. A negative test result shows that the measure or condition (NR-6, INS or ReQoL) declined over time, whilst a positive result indicates an increase.

Table 5.7 Hypothesis Two: Wilcoxon Signed Rank Test

Condition	NR-6 (N, p)	ReQoL	INS
Group 1 App	*Reject (20, 0.006)* *Negative Δ*	*Reject (20, 0.003)* *Positive Δ*	Retain (20, 0.161) -
Group 2 AppWalk	*Reject (23, 0.001)* *Negative Δ*	*Reject (23, 0.002)* *Positive Δ*	Retain (23, 0.294) Positive
Group 3 Walk	Retain (25, 0.961) Negative	Retain (25, 0.871) Negative	*Reject (25, 0.049)* *Positive Δ*
Group 4 Shmapped	Retain (58, 0.131) Positive	*Reject (56, 0.001)* *Positive Δ*	Retain (60, 0.081) Positive

Δ represents significant change

This supports the predicted effect that the app and app walk group experience a change between baseline and day 7 while there is no significant change in the walk group. It was hypothesised that all groups would experience a positive increase in nature connection and quality of life, with group two AppWalk would experience the highest increase. This would be due to the multiple opportunities for engagement with the natural environment and the regular reminders on the app condition. This hypothesis is rejected as group two displayed an overall decrease in nature connection was shown by the decrease in NR-6 and no change in INS.

Whilst the Walk group (group 3) for INS is the only condition that showed a significant change between baselined to 7 day. A particular note should be taken of the figure 5.7 which displayed an apparent strong positive trend across all the groups. The most likely explanation for non-significant results here, is this trends is present on a relatively small sample size. The trend suggests potential for further research.

2b: The app and walk intervention will experience a change between baseline to 7 and 30 day measurements in both connection to nature and therefore quality of life.

To further investigate the difference between the groups and time point the following analysis was undertaken. This hypothesis is run to further investigate the above findings, however the results are less preferable due to the walk group containing a diminished number of matched pairs.

Non-Parametric Test

As mentioned above to test if the intervention had an effect on the participants' wellbeing or connection to nature a non-parametric test was run on related samples (table 5.8). The null hypothesis is that the distribution between the three time points are the same. This test was run on ReQoL, INS and NR-6 for the four groups.

The Friedman's ANOVA allowed for the same population to be tested across time points. **The null hypothesis states that the distribution across the time point 0, 7 days and 30 days are the same**:

Table 5.8 Hypothesis Two b: Friedman's ANOVA

Condition	NR-6 (N, d.f, p**)	ReQoL	INS
Group 1 App	*Reject (17, 2, 0.000)* Δ	Retain (17, 2, 0.000)	Reject (17, 2, 0.032) Δ
Group 2 AppWalk	*Reject (16, 2, 0.000)* Δ	*Reject (16, 2, 0.000)* Δ	Retain (16,2, 0.773)
Group 3 Walk*	Retain (6, 2, 0.827)	Retain (6, 2, 0.827)	Retain (6, 2, 0.834)
Group 4 Shmapped	Retain (56, 2, 0.497)	*Reject (56, 2, 0.497)* Δ	Reject (55, 2, 0.007) Δ

Δ represents a significant change; *due to an error in data collection N=6; **Significance threshold = p 0.05*

This shows a change in the NR-6 mean scores for the population within the App and AppWalk condition. In comparison with the previous test (hypothesis two-a) this is expected as the result for NR-6 showed changed (negatively) between baseline and 7 day. Additionally, the App condition experienced a change in INS across the intervention but not between 0-7 day (see previous hypothesis), this suggests a change in distribution between 7 and 30 day. The AppWalk group variation in the data between 7 and 30 day is visible in figure 5.6 and may account for the lack of change in INS score. The change in INS for the Walk condition between 0, 7 and 30 day remains the same. The previously demonstrated difference between 0 and 7 day is not replicated here, this could be due to the reduced sample size available for the Friedman's ANOVA (N=6). This would be an area for potential future work.

For ReQoL score the change across the time points occurred within the Shmapped dataset and the AppWalk group. In comparison with the previous test this is the same output as the AppWalk group,

however it is a different result for the App group. This suggests there is a difference between the 7 and 30 day output.

The participants did not all experience a significant increase in NR-6 and differences were found between output for NR-6 and ReQoL score. Therefore, the hypothesis that all participants will experience an increase in both scores over the three time points of the intervention is rejected. It was expected that conditions involving the app would have similar outcomes. This analysis showed that the experience and outcomes varied between group.

Wilcoxon test

Whilst the above test demonstrates if there was a significant change in participant's scores through time, the test fails to identify the direction of any change (i.e. do scores increase or decrease over time). An additional test was performed to support the previous findings and to explore the direction of output (table 5.9). In accordance with the previous test the outcome is supported by the Wilcoxon test. This signed rank test compares the paired means within the group. An additional calculation of effect size was run due to the small sample size. The full SPSS output is available in appendix D (figure 0.20 - 0.23 p.209).

Table 5.9 Wilcoxon test of variables of interest across all participants

	Change	N *(pairs)*	Z (*p*)	Effect size – Cohen's classification	
ReQoL					
Baseline to Day 7	Positive	124 *(117)*	4.623 (>*0.000*)	0.427	Moderate effect
Day 7 to Day 30	Negative	94 *(81)*	-1.844 (*0.065*)	0.205	Small effect
NR-6					
Baseline to Day 7	Negative	126 *(116)*	-2.079 (*0.038*)	0.193	Small effect
Day 7 to Day 30	Negative	95 *(76)*	-0.438 (*0.661*)	0.050	Small to no effect
INS					
Baseline to Day 7	Positive	128 (125)	3.132 (0.002)	0.280	Small effect
Day 7 to Day 30	Positive	94 (85)	2.038 (0.042)	0.221	Small effect

ReQoL

Between baseline and post intervention the change to ReQoL is more likely to be positive than negative according to the Wilcoxon test. A Wilcoxon signed rank test showed that there was a significant difference (Z = 4.623, p < 0.001) between the ReQoL scores given at the baseline measurement compare to the measurements post intervention (day 7). The median on day 7 was 31 compared to 30 at the baseline. Therefore, there was a positive moderate increase at day 7 in the study. Forty-four percent were above the average of the baseline measurement by day 7. Between the scores given at the post intervention measurement and follow up point (day 30) there was a non-significant negative change (Z = -1.844, p =0.065), this had a small effect size.

NR-6

Between the baseline and 7 day measurement for NR-6 there is a negative not significant change. A Wilcoxon signed rank test showed that there was a non-significant different (Z = -2.079, p= 0.038) between the NR-6 score given at the baseline measurement and post intervention (day 7). The median remained unchanged at 24. This had a small negative effect. Fifty-four percent of the baseline measurements would be below the average of the day 7 measurement. Between the scores given at the post intervention measurement and the follow up point (day 30) there was a non-significant positive change (Z = -0.438, p = 0.661), this had small to no effect.

INS

Between baseline and 7 day measurement for INS there is a positive significant change. A Wilcoxon signed rank test showed that there was a significant difference (Z = 3.132, p=0.002) between the INS scores at baseline compared to measurement post intervention at day 7. The median increased from 39.50 at baseline to 49 at day 7. Between 7 and 30 day there was a positive but not significant small effect. A Wilcoxon signed rank test showed that there was a non-significant difference (Z=2.038, p=0.042). The median increased to 54 on day 30.

Summary of Wilcoxon

To summarise the Wilcoxon, this indicates when considering all the participants there was an overall moderate positive change in quality of life between baseline and post intervention at day 7. For the same time frame there was a small negative effect on nature connection as measured by NR-6 but a positive increase when measured by INS. The NR-6 and INS measure slightly different elements of a individuals connection to nature with NR-6 being more trait based measurement. Between the post intervention and follow up at day 30 there was a negative change in the participants' quality of life. For connection to nature there was a change in the participants outcome, however in opposing directions depending on the measurement considered (NR-6 = negative, INS = positive).

5.5 Hypothesis three: There will be a significant difference between the intervention in connection to nature and quality of life scores.

A Mann-Whitney is conducted to test the difference between the groups (table 5.10). The independent variable was the change in scores (either ReQoL, NR-6 or INS) between the two times periods (baseline-day 7 and day 7 to day 30). The null hypothesis is that the two sample sets of data have been taken from a common population so any apparent difference between them is due to chance. To reject the null hypothesis would be to state that the difference between the sample sets of data are different due to an intervention (i.e. not chance and significant difference).

Table 5.10 Mann-Whitney of Variables of Interest against Groups

Condition	ReQoL		NR-6		INS	
U (p*)	Baseline - Day 7	Day 7 - 30	Baseline - Day 7	Day 7 - 30	Baseline - Day 7	Day 7 - 30
App v AppWalk	No diff.	Sig. diff.	No diff.	No diff.	No diff.	No diff.
	218 (0.769)	80 (0.045)	195 (0.391)	111 (0.353)	217 (0.742)	113 (0.406)
App v Walk	Sig. diff.	No diff.	Sig. diff.	No diff.	No diff.	No diff.
	148 (0.020)	36 (0.319)	150 (0.021)	40 (0.414)	232 (0.681)	33 (0.206)
App v Shmapped	No diff.	No diff.	Sig. diff.	No diff.	No diff.	No diff.
	416 (0.088)	399 (0.358)	250 (0.000)	378 (0.196)	565 (0.697)	446 (0.775)
AppWalk v Walk	Sig. diff.	No diff.	Sig. diff.	No diff.	No diff.	No diff.
	170 (0.015)	39 (0.541)	142 (0.002)	48 (0.971)	238 (0.302)	41 (0.605)
AppWalk v Shmapped	No diff.	No diff.	Sig. diff.	No diff.	No diff.	No diff.
	481 (0.077)	308 (0.068)	198 (0.000)	438 (0.891)	679 (0.907)	345 (0.188)
Walk v Shmapped	No diff.	No diff.	No diff.	No diff.	No diff.	No diff.
	150 (0.734)	150 (0.735)	644 (0.415)	158 (0.810)	623 (0.219)	99 (0.107)

Significance threshold = p 0.05

As previously demonstrated there is a positive increase in quality of life for the App and AppWalk group, this is found to be difference in baseline to day 7 when compared against the Walk for both conditions. As shown above there is a difference between the App and AppWalk for ReQoL between day 7 and 30, this is also evidenced in the change found in hypothesis 2b Friedman ANOVA, and the mean change scores (figure 5.8-5.11) suggest this is negative change.

As shown in table 5.9 the negative change in NR-6 between baseline and day 7 for App and AppWalk is a different outcome compared with the Walk condition. The compared difference between the App/AppWalk and Shmapped may be related to the lack of change displayed by Shmapped in NR-6.

The Mann-Whitney found no differences between the groups in relation to the day 7 to 30 NR-6 measurements. Nor was any difference found between the groups in the INS scores, across all time

points. It was expected that there would be a consistent difference between the Walk and App condition. However, the variety of similarities and differences between groups displayed in this data suggests the need for further research and that the difference in nature connection and quality of life is a more complicated mechanism than previously explored. **There may be additional variables affecting participants that have not been accounted for within the study.** Statistically significant differences between groups may not have been identified within this study due to the relatively small participant numbers. Additional research would be required to test this further.

5.6 Limitations and Opportunities

As accounted in the literature there is a known influence to gender in the effect of connecting with nature in the workplace, if more data had been available it would have been desirable to run analysis that controlled for the influence of gender on the data. The exploratory analysis of gender offered some insight to the influence this factor may have (appendix D figure 0.16 - 0.19 p.206). This would be a suitable factor for future research within this area. Due to feedback from participants, the GPS feature on input and rating of the area by the app users was not analysed. Participants reported often-inputting data once home and this was confirmed by an initial overview of the clustered data input points.

Issues

As is expected with new and developing technologies the app experienced several issues brought to our attention through personal use of the app, emails from the IWUN study participants and emergence over time. The more detailed and individual issues from participants in the intervention study are presented in chapter 6 as discussed in the focus group.

The location for the data input (rating nature, experience, adding photos) were not reliable as participants often delayed responding to the prompt and instead reply once at home. This led to a cluster of input data in the same location related to a different location or experience. The notification to notice something could be distracting from engaging with the environment and for participants they reported being out cycling or driving past a green space when the alert occurred. The app was not available across all platforms, including Window operating system phones. Some participants who expressed interest in the study did not have smart phone so were unable to participant if allocated to the mobile phone group.

Additional Variables

The app collected additional measurements which have not been explored within this research. An initial review of the results did not produce any significant outcomes of interest. The table of means and standard deviations for these variables are available in the appendix D (table 0.4 p.208).

5.7 Summary

The following hypothesis were tested to examine the outcome possibilities of different intervention to engage university students with the natural environment. The findings are as follows:

1. There is a positive relationship between connection to nature (NR-6) and quality of life (ReQoL).

This hypothesis is accepted. There was a weak positive relationship between NR-6 and ReQoL at the baseline and 30 day follow up time point. There was no relationship between these variables at the 7 day measurement.

2. The participants will experience a change between (a) baseline to 7 day and (b) across the intervention in connection to nature and quality of life scores. It is expected that group 2 demonstrate the highest increase over the intervention.

This (a) hypothesis is accepted, was the participants did experience a change. However, this was not cohesively as positive change, therefore the final part of the hypothesis should be rejected: Group two displayed a significant negative difference in NR-6 (no change in INS) between baseline and post intervention and a positive significant change in ReQoL during the same time points. Group one displayed the same change of group two and group three outcomes remained unchanged except for INS which changed positively.

Hypothesis (b) is rejected. The data presented an overall moderate positive change in quality of life but a small negative change in NR-6 between baseline and post intervention at day 7. Followed by a negative change in ReQoL and NR-6 at follow up on day 30. Inclusion of Self in Nature scores demonstrate a positive change across the intervention with small effect.

3. There will be a significant difference between the intervention in connection to nature and quality of life scores.

This hypothesis is accepted. Between baseline and post intervention there is a significant difference in NR-6 and ReQoL scores for the App and Walk interventions. In relation of NR-6 score there is significant different between the most of the groups between baseline and day 7 (App v Walk and Shmapped; AppWalk v Walk and Shmapped). However, this hypothesis would be rejected if considered in relation to the INS only as shown by the Mann-Whitney test (table 5.10). There was no

significant difference between the groups in relation to the connection to nature when measured as INS. The difference in nature connection outcome could be partial explained by the difference in measurement; NR-6 measures trait based aspects considering elements of 'self' and 'experience', whereas INS is a single measure for the extent which an individual includes nature as part of their identity.

Chapter 6: Intervention Evaluation

This chapter presents the qualitative evaluative results from the intervention study. This includes the focus group discussion on current university and city urban green. This data from the focus group and surveys is thematic analysed. Grounded theory prompts the use of inductive analysis to allow themes to emerge without preconceived expectations (Charmaz, 2006). The use of grounded theory dictates a strong consideration to the procedure in undertaking the research, including mapping themes as the data is received and meeting theoretical saturation. As this is part of the analysis of the data it is considered here under methodological considerations.

This chapter answers the following research questions:

3. How did participants experience these interventions?
    a. In relation to using the app
    b. In relation to the walk intervention

4. How should engagement with the natural environment be encouraged for university students' wellbeing?

6.1 Methodological considerations

Theoretical saturation

It is not always possible within research to reach theoretical saturation. As the focus groups were undertaken over a fortnight there was some opportunity to develop the questions as the data was received. This was done by the researcher developing on points of interest introduced by the participants. For example, participants started discussing where they were allowed and preferred to eat their lunch when they take a break and this led to additional questions in the next focus group on where participants eat their lunch. Some questions were asked at a different point in the conversation as the discussion natural lead towards certain topics, for example participants would ask about the building work occurring by the student union, and what the university intended to do with that green space. This easily led to discussing what features they would like a green space to contain.

This responsive and adaptive approach to the focus group discussion was designed to create the optimum conversation between participants and allowed a broad range of topics to be covered. Whilst it is possible that saturation was not met, a repetition in answers and a strong thread of common themes developed within the three main areas of discussion. Theoretical saturation from a grounded theory approach is discussed further within the methodological reflection in chapter eight.

Participants

Taking part in the evaluation of the intervention was an optional activity for participants and did not affect the eligibility for the £20 voucher. A total of 50 participants took part in a form of evaluation (survey: 24, focus group: 26).

Focus Groups

Nine focus groups were conducted with between one and eight participants (see table 6.1). Originally designed to be a minimum of three participants per group there was logistical difficulties which meant this was not always achieved. The one participant focus group formed more of a personal narrative on the experience as discussion opportunities were limited between participants and researcher.

Table 6.1 Focus Group Participants

		n	**Female:Male**
App	Group 1.1	3	1:1:1*
	Group 1.2	4	3:1
AppWalk	Group 2.1	2	0:2
	Group 2.2	2	1:1
	Group 2.3	3	1:2
Walk	Group 3.1	5	3:2
	Group 3.2	4	2:2
	Group 3.3	2	2:0
	Group 3.4	1	1:0

non-specific gender or trans

Survey responses

As participants expressed a desire to provide take part in the evaluation, a short open answer survey was offered (table 6.2). The responses were analysed in the same process as the focus group transcriptions.

Table 6.2 Survey Response

Group allocations	Number of responses
Group 1	8
Group 2	7
Group 3	9

Coding process

Transcriptions were coded into broad categories and then within each large category additional shared themes were created as dictated by the data as it accumulated (see figure 6.1). As with best practice in grounded theory the coding went through two stages; an initial stage in which themes emerge inductively and a second stage of focused coding which pursues a central set of codes (Sbaraini *et al.*, 2011). This is achieved in this research by an initial coding of all themes within the dataset before being refined into final categories which are central to the entire study and relate to one another (see figure 6.1). A full list of codes is available in the appendix E (table 0.5 p.240). Verification of the coding was undertaken by a second blinded researcher with the coded transcriptions available in appendix E for comparison. The use of a second researcher who has not been involved in the study allows for bias in coding to be identified. The final set of coding is divided into the three research questions discussed within this chapter.
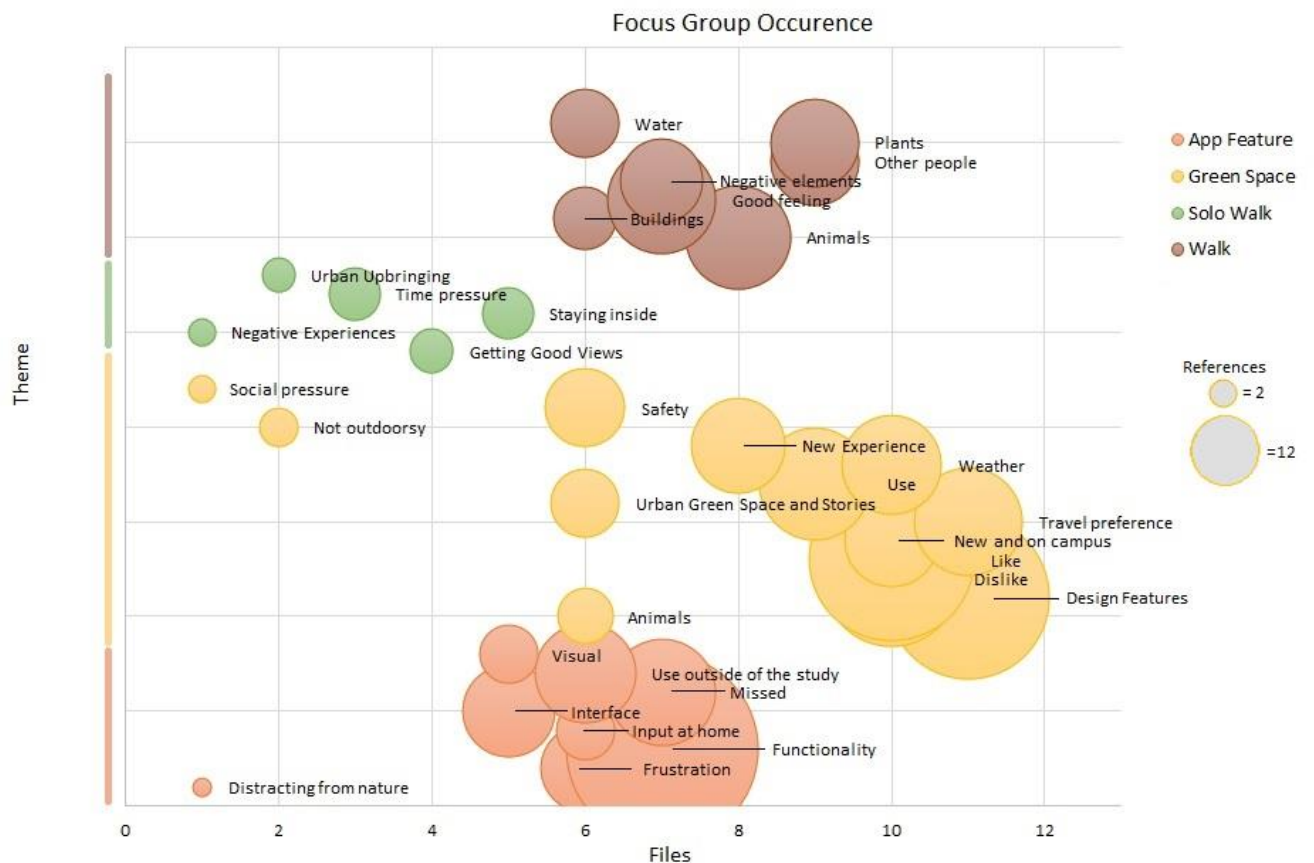
Figure 6.1 Focus Group Theme Codes

	Phase 1		Phase 2	
	Files	References	Files	References
App Feature	1	1	1	1
Distracting from nature	1	1	1	1
Frustration	4	16	6	20
Functionality	5	71	7	93
Input at home	4	7	6	9
Interface	4	16	5	22
Missed	5	24	7	29
Use outside of the study	5	21	6	26
Visual	5	9	5	9
Green Space	1	1	1	1
Animals	4	5	6	8
Design Features	9	61	11	67
Dislike	9	43	10	47
Like	8	54	10	68
New and on campus	8	19	10	22
Travel preference	9	28	11	30
Urban Green Space and Stories	6	12	6	12
Use	7	25	9	32
Weather	7	18	10	25
New Experience	5	10	8	23
Not outdoorsy	2	4	2	4
Safety	6	16	6	16
Social pressure	1	2	1	2
Solo Walk	6	13	8	16
Getting Good Views	1	2	4	5
Negative Experiences	4	5	1	2
Staying inside	4	6	5	7
Time pressure	3	7	3	7
Urban Upbringing	1	2	2	3
(Group) Walk	4	5	4	5
Animals	6	16	8	28
Buildings	1	3	6	10
Good feeling	5	15	7	30
Negative elements	6	15	7	18
Other people	7	15	9	20
Plants	7	14	9	20
Water	4	8	6	12

In quotes the author is referred to as 'F' and all other initials are those assigned to participants to reflect the discussion. These initials are assigned letters and not related to their names.

6.2 The user experience of the App intervention

4a. What was the participants' experience of using the app?

Participants were asked specific questions relating to functionality, visual appeal, overall use of the mobile phone app and use of the app outside of the study. From these questions the following themes emerged of functionality, frustration and opportunities for future design.

Functionality

The majority of participants felt the app was functional as a research tool and to a certain extent enjoyable to use. There were some frustrations with the app design as discussed further below. Participants found the visual appearance of the app appropriate and appealing. Participants generally reported noticing more of their surroundings due to the app daily notifications.

"I think like when, because you got a notification when it sensed you were in somewhere in nature. So like walking through Weston park you would get a notification and it just made me more aware of my surrounds to try and like pick up on things instead of just having like head down going."

-

"I wouldn't say it like drastically but I would say I sort of pay attention more to sort of what's around you as I live in an area with very little nature at the bottom of west street. So it teaches you to notice the small things."

-

"I don't know if it was interesting, but it wasn't like not interesting."

Participants describing their interactions with the app different features and its usability defined this code.

Frustrations

Due to a complication with the GPS and app sleep mode on Android operating systems there was one frustration that would prevent participants from wanting to continue with the study. During the phones sleep mode the GPS would be turned off, this meant when a geofenced space was entered, the app would wake the phone up simultaneously opening the app. This caused the app to take over the phone's display and at times crash the phone. This could occur when using navigation tools (for example, google maps) whilst driving past a green space. There was unfortunately not an alternative way to fix this.

"Oohh so I actually downloaded in the past but I never did the survey because I just deleted it because it popped up so many times I couldn't' do anything with my phone."

Additional frustration developed from feeling unable to answer the apps questions as the participant's attention turned to unpleasant elements within green spaces or being unable to accurately answer using the five-point scale. For example, one participant did not feel they could identify the level of 'nature' in a space as asked by the app:

"How do I say how much nature there is, I don't know."

Some participants felt that noticing their surroundings more lead to them noticing more unpleasant elements of the natural environment, such as litter or their perceived idea of Sheffield being nature rich being challenged:

"I don't know, I sort of realised that there wasn't as much green space as I initially thought, I was ah it's going to be quite easy"

-

"My usual thing is like down west street and into the city centre and I was like this whole route is literally just trashy and I was like there's literally nothing, the dual carriageway, even around uni I don't think it's that great"

This code related to participants commenting negatively on aspects of the app functionality. These aspects limit the app's appeal and adherence.

Missed features

Participants repeatedly reported thinking that they were using all the available features only to discover later several features they had not used or realised existed. The most commonly missed features were the map to show the participants' data input location and the progress trees showing how much of the study the participants had completed. Some participants were also not aware of the ability to add photos, although this is included in the app introduction sequence.

Input at home

Participants regularly reported inputting their data once at home. This practice occurred across six groups of participants, with half of the participants reporting inputting their data whilst no longer in the space they were reporting about or once at home at the end of the day.

Distraction from Nature

One focus group felt that the app was fundamentally flawed in that it distracted the user from engaging with the natural environment by setting off the notification alert on their mobile phone.

S: but I also found that it kinda ruined the effect of being in a green space like cos I went on my phone to check it out.

T: yeah I agree with that.

S: so I saw a notification so I went on it and then I am on my phone rather than enjoying the green space, yeah it kinda detracted from it, I dunno how else you could do it.

T: I did this like mindfulness thing and I think it contradicts you, by go on our phones to look forward.

This is discussed further in chapter 7, as whilst this theme was only discussed in one focus group, it is an important factor to the likely popularity of the app and its opportunity to influence daily routine.

Opportunities for development of the app

Only two participants said they would have recommended the app to a friend. Whilst participants appreciated being part of the study, they were sceptical about the app's potential popularity with their age group outside of a research context. Some participants went further with this to say they would not have used the app if it had not been for the monetary incentive (£20 voucher). Participants provided several key concepts to improve the app. These fell broadly into the following categories as shown in table 6.3:

Table 6.3 App development ideas

Concept	Description	Benefits
Photo sharing	The ability to share locations and elements of nature seen within Sheffield.	This would provide opportunity and inspiration to explore new and seasonal areas for people who are new to the area or want to expand the places they visit.
Metric of Wellbeing Benefit	Similar in design to step counting or drink water reminder app.	This would allow the user to track their mood alongside the amount of time they had spent in green space. The app would provide a target of time in the natural environment for mental health benefit.
Nature Journal	A place to record your encounters with the natural environment which provides recommendation based on your previous visit and seasonal reminders.	This would act as a prompt to remind the user to revisit places they have previously enjoyed and allow them to record the locations they have enjoyed on a map with photos. This could also allow the user to share with a friend network.

6.3 The user experience of the Walk intervention

4b. How did the participants experience the walk intervention?

The walk intervention was designed to encourage participants to achieve the recommended level of engagement with the natural environment. As a group walk it was also designed to meet the expectations of Bragg and Atkins' (2016) tripartite model for green prescriptions in participating in a meaningful activity, social interaction and utilising the benefits of engaging with the natural environment.

During the focus group participants were asked to draw a map of the walk they had attended two weeks earlier (examples of group drawn maps in appendix E). Drawing the map created discussion on the elements the participants had positively or negatively noticed and could now recall. With the addition of the discussion on the experience of the walk, participants particularly noticed and recalled five key elements on the walk; animals, other people, trees, water and buildings (see figure 6.2). The frequency of these and similar words, and in how many different groups these occurred in is presented in table 6.4

Figure 6.2 Word cloud of the different elements participants noticed on the walk

Table 6.4 Fifteen most frequent words from the code 'walk'

Word	Count	Occurrence in group*	Similar Words
nice	33	8	nice, nicely
ducks	23	7	duck, ducks
trees	21	9 (all)	tree, trees
felt	20	6	felt
people	20	7	people
birds	17	7	bird, birds
feel	15	7	feel, feeling, feels
lake	15	3	lake
time	15	7	time, times
pond	14	7	pond, ponds
noticed	13	5	notice, noticed
nature	11	4	natural, nature
pigeons	11	3	pigeon, pigeons
relaxed	10	6	relaxation, relaxed, relaxes, relaxing
day	9	4	day, days

*questions about the walk groups 1 and 2 = 7 focus groups and 2 surveys

Feeling Good

"I felt very relaxed during the walk, probably again because of the company, although the escape from there busyness of the city certainly helped. It was a time when I didn't need to focus on anything else."

Many participants reported positive feelings at the end of the walk or during the focus groups. Themes inductively emerged and once mapped out it became apparent that they fit within the social prescription elements.

Social Interaction

Except for two participants who happened to know each other, everyone else was walking with strangers. They were instructed to talk as little or as much as they would like. The majority of groups chose to talk a little.

"we had a couple of nice little comments, someone was really funny so it made us all laugh, so it was just really nice. I felt like I bonded and had a nice chat but I didn't, I felt no commitment afterwards, it was lovely."

-

"Yeah it was quite relaxed because we all just got chatting to each other and found out about what everyone else was doing."

Participant's positive emotional language in relation to the other participants on the walk defined the code.

Natural Environment

The walks went through two different style parks as previously discussed (chapter 3). The setting to the walks provided a backdrop to conversation and elements of interaction. The route aimed to provide a variety of terrain and this is apparent in the maps the participants drew. They often defined the parks separately and expressed different feelings within them (see drawings in appendix E).

"It felt great to be out in nature and it was one of the first days that felt like spring so it gave me a refreshing feeling and lifted my mood as I noticed all the new flower buds waiting to bloom and all of the people enjoying nature"

-

"It felt so good to be able to get out in nature on what was a really nice and sunny day."

This code highlighted positive feelings towards the natural environment often referring to the weather or seasons.

Meaningful Activity

A meaningful activity can offer a sense of achievement or provide an additional beneficial element to someone's day. At the end of the walk two participants separately said they felt positive about returning to the library having taken a break outside from their work. Within the focus groups participants reflected on the change the walk offered to their usual routine.

F: Did it change how you felt for the rest of the day?

W: yeah

G: yeah it put me in a better mood actually

W: I felt like I had accomplished something. like something out of my daily routine.

DD: for me it was a nice break out of my day.

This code represented an activity with meaning as expressed through the participant's enjoyment of the change of task or the relatively more long-term positive impact.

Negative Aspects

Negative aspects arose in key areas, especially within the Crookes Valley part of the walk and within the return journey of their solo walk. For some participants the group walk in the park contained negative aspects such as litter, traffic noise and dirty looking water. The participants primarily reported enjoyable solo walks, however for two participants the neighbourhood they walked through was threatening on the journey back (they had walked to a destination such as a friend's house or supermarket). This included muddy paths, unsafe neighbourhoods and almost standing on a toad.

L: I remember the Crookes Valley lake, water thing was quite dirty

CE: Yeah and there was like some reeds wasn't there and then a lot of trash

-

"The noise of the road is quite disturbing"

Negative aspects emerged through participants identifying elements on the park or walk they did not like or remember finding an unpleasant feature. This included muddy leaves, litter in the pond and noise pollution.

Noticing on the Walk

Participants reported noticing five common themes on the walks; animals, plants (trees), other people, buildings and water.

Animals

Within the group walk animals were mentioned 28 times. Some of these references are due to the participants struggling to draw said animal on their map. Some of these references are in relation to the moorhen which stood on the side for almost all of the walks and two different dog walkers appearing at different times. Participants also discussed the sound of birds and seeing people feed the ducks.

FN: I love how ducks dive and sort of do this

M: Yeah when they flick their tails up

FN: That's fun yeah, so funny

-

"I noticed a lot of wildlife (ducks and squirrels)"

Animals were primarily noticed as a positive element, this code included the placement of animals on the map drawings and the experience with walking past other people's pets.

Plants

Blossom, flowers, hedges and trees were discussed as positive and memorable parts of the walk. As it was early spring there were limited plants in full bloom but the emerging new leaves and flowers were noticed by participants. There was also an appreciation for the shade or sense of cover the trees provided in certain areas of the park.

"this entire area kinda under the trees it's very very scenic and I always if and when I ever walk through which depending on the time of the day I might or I might not. depending also on where I am at university, I find this bit quite soothing"

-

"Lots of cherry blossom trees but they weren't out yet, just starting to."

This code included trees which are mentioned again by participants in the discussion of green space features. Within this theme it is considered as provision of shelter and beauty.

People

The other people in the park were an unpredictable factor within the group walks. In one walk a couple had a massive argument next to the path route. Some participants thought this might have been set up and was in fact the focus of the research. Other park uses included kayaking, swimming, dog walking, playing tennis and feeding the ducks. Other people in the park during the walk were not associated with any common feelings or comments, participants generally commented on their location and activity rather than having any specific influence over their experience.

N: I'm going [to draw] those kayakers which were over in this corner

C: there were some wild swimmers as well, weren't there.

-

"there were people here who were like taking a break from their cycling, so I'll draw in the people"

-

"I noticed other walkers/park attendees more than nature, like when we walked past some people with a puppy by the second lake/pond."

This theme represented positive and negative elements of the role of other people in the park. Other people had an influence on the atmosphere and expected behaviours in a space.

Buildings

Both parks are surrounded by buildings. This includes a museum, university labs, library, hospital, pub and residential buildings. These buildings range in ages and design from Victorian grandness to modern functionality and greyness.

CO: like the bandstand is here

M: The bandstand in the middle which you can get married in

-

"would be nice if all buildings in Sheff were like Western [Park]"

-

"[there's some] old building but the university buildings [near the park] look crap."

This code within noticed features had minimal further influence, it was defined through physical built structures and was present primary in the group walk drawing discussion.

Water

The parks contained one pond each; these both often had duck on or around them. The Crookes Valley Park pond is large and square, whereas the pond in Western park is small with bridges and water fountains.

"I think it was also like one of the most enjoyable parts of the walk like just the lake, for me it was my personal opinion, when I see water it just relaxes me."

-

"it's a nice balance between land and water, which I like, because I grew up by the beach so I like seeing water"

-

"The rain falling in the pond/lake was very calming and therapeutic"

This code was defined by the discussion on water, ponds and rain. It reoccurred in the design feature theme and was mentioned often in relation to the resident ducks or pigeons.

6.4 Urban Green Spaces

5. How should engagement with the natural environment be encouraged for university students' wellbeing?

The importance of certain green space features became apparent through the discussion of participants' favourite spaces to visit and when asked their preference in relation to campus green spaces. These features included trees, water, tranquillity and places to sit. The importance of socialising within green spaces is prominent within the discussion. In this section the features most commonly mentioned from the visits to green spaces, the elements requested for green spaces on campus and the negative dimensions are discussed further.

The most commonly discussed urban green spaces in Sheffield were the Botanical Gardens, Endcliffe Park and the Winter Gardens / Peace Gardens. These spaces are close to dense urban areas with the Winter Gardens being a large covered space in the centre of the city. The role of other people in these spaces was also important. Whilst people watching was discussed by several people as a positive, this was counter balanced by people displaying unusual or antisocial behaviour. Once dark other people in a space became a threat to be avoided.

Participants loved the birds

"I felt warm while watching the ducks, pigeons, pets, colourful flowers."

"so many cute pigeons around the lake"

"[…] you just sit like next to the roots of the trees its like a, its really nice. Because I went in there a while ago and like just made friends with a duck. And like it came and literally sat right next to me and I was just revising or something and it sat there for like an hour it was great"

There were 28 reference across 8 of the files to pigeons, ducks or dogs. There was predominately a positive association, with enthusiasm for feeding the ducks and pigeons from childhood through to the present day (see figure 6.3). There was one negative mention of a pigeon 'like birds would be like pigeons, rather than like nice pretty birds'. However as noted in the pigeon paradox (Dunn *et al.*, 2006), whilst pigeons are seen as a pest at times, connection to common city wildlife is a vital part of connecting with the global environment.
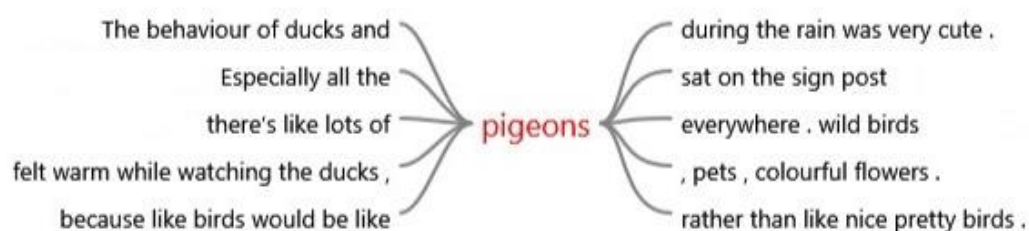
Figure 6.3 Text search for 'pigeons' within the code 'green space' and 'walk'

What are university students design preferences for campus green spaces?

M: Lots of trees

FN: Water, water

M: Oh yeah, preferably wildlife as well as water. Lots of benches because I think, I like sitting on the ground but for when it's a bit damp

The table below (table 6.5) presents the word count for the spaces students liked and the design features they desired from campus green spaces. Participants discussed green spaces on campus which contained trees, were large spaces and had places to socialise and sit (figure 6.4). These ideas are explored further within this section.

Table 6.5 Word frequency for design features and likes within green space

Word	Count	Occurrence in group*	Similar Words
nice	65	10	nice
sit	52	9	sit, sitting
park	51	10	park, parks
green	47	9	green
trees	40	7	tree, trees
feel	32	9	feel, feeling, feels
gardens	30	6	garden, gardens
benches	29	8	bench, benches
place	29	8	place, places
around	27	7	around
*questions about green spaces were asked to all groups = 9 focus groups and 2 surveys			

Figure 6.4 Word cloud of participants discussing features for campus green space

Students wanted trees

Trees formed an integral part of most green space design discussion. They were deemed to serve two purposes; one to be large trees in their own right and second as a shield from the city life, be that from traffic, ugly city buildings or noise. There were 37 references to trees, two comments were negative in relation to trees without leaves looking depressing, but the vast majority participants wanted more trees on campus. This affection for trees was across all ages, genders and nationalities.

"I think I also appreciate, trees, just trees a lot of, a bunch of trees like in this place."

"I welcome trees"

"full of wildlife, tree with picnic benches"

"green space with like huge trees and stuff"

"I like trees, I'd have trees"

"definitely like trees, trees bushes, shrubbery"

"And you feel sort of, you can escape into there […] As long as its also like, you know surrounded by something. Maybe trees or you know like in Firth Court."

-

FN: So just like covered space from

F: Because this one [Crookes Valley Park] you sort of sink down into don't you?

FN: Yeah which is nice you know […] You feel sheltered.

-

"I think we could use trees for a shield for the city. So you see as little building as possible if that makes sense? Because if you have, if you walk along and you're like oh I can see the trees and oh I can see the arts tower at the same time. that's why I like Graves Park because its so big and there are so many layers to it you get to the middle you can't hear, you can't see anything [urban]."

Coded by the word trees, this was a passionate subject for participants. There is an additional context surrounding Sheffield and recent conflicted relationship with street trees which may have prompted the participants into noticing them more.

Sociable spaces

There was a strong desire for sociable spaces. A place to eat lunch, meet friends and relax away from work. This was often expressed through the desire for seating, particularly benches which were not in a straight line. As expressed by these participants:

KB: I think like benches but erm bench where you don't sit in a row. as they are very unsociable

F: facing each other?

KB: yeah that why I think I like picnics benches are attractive and yeah like nice flower plants.

-

"sometimes you want to be able to sit on a bench instead, maybe even like picnic tables or something because sometimes benches can be a little bit anti-social if there's quite a few of you because you're having to like sit on different benches, or like an equivalent of a picnic bench kind of thing so you can all kind of like huddle and chat."

For the space to be suitable for socialising they need to be versatile, with all year round weather proofing opportunities:

F: would you want to be able to sit in them?

DD: yeah yeah some shelter if it's a sunny day or rain if you want to sit there in the rain.

DD2: yeah sort of somewhere that is sort of just a green space where you can sit and relax as I say eat your lunch or something. We don't really have that, this would be the nearest place to where I am so yeah probably something just sort of a social place that is chill that you can use during the day.

KB: Yeah, I think there not many green spaces where you can like just sit in summer.

-

"Mhmm well I guess make it more of a meeting space for people. Which would also need to incorporate some greenery and spaces and structures that can be used for a variety of things, as part of the built landscape but you can use built structures or whatever to sit or stand or lean on or anything like that and also areas where you can meet, like under this tree or this post."

The desire to use the space with friends or classmates or the limitations which prevents people being able to socialise in the space were coded into this theme. It was discussed by many different participants.

As with the noticed elements within the parks, participants were attached to the use of water, with both ponds and water fountains being mentioned. The appeal of water was expressed as a strong positive feeling.

CE: I'd probably stick a body, like a body of water in there because they're always like, always good.

GC: Yeah, I always like a water feature like a fountain

-

"some rocks and then like there's a little pond fountain thing, just a little one, doesn't have to be a lake, just one to the side, like a tear fountain"

Water was featured within a limited number of focus groups. This code accounted for references to water, fountains, and ponds.

Large and Wild Space

Participants expected their green space to be popular and felt the size of the space was important. It should also be located centrally. In relation to the current green spaces on campus, some areas are considered hidden or inaccessible to those not within the department. It was unanimously desired that the area currently used as a car park by the Arts Tower would be a suitable size and position for a university park. Without being asked the majority of participants expressed a dislike for the manicured management of Weston Park. It was described as artificial and too geometric. In this desire for unmanicured was also the expression of peace and quiet coming from a green space which would not have people walking past you. One of the perceived failures of other urban green infrastructure on campus was the positioning of it as a thoroughfare, one participant saying they would never sit there as they would bump into too many people. Whilst using the new green infrastructure by the Diamond for socialising is a possibility (figure 3.11), it should be balanced alongside privacy and peacefulness.

"so if there were benches and stuff it would actually be more useful; I think as well the scale of green space would have to be quite significant cause say like the size of the diamond the size of the arts tower just having a few plants outside doesn't really do a lot."

-

"I quite liked this bit around here [points to Crookes Valley Park], where we kind of, where there's all this kind of rough greenery that we walked past, it's like being in somewhere that's not too, you know when you see somewhere and it's a bit too managed? You know like these over here that are like rows of flowers where as its all kind of a bit tangled and stuff, it's quite cool"

-

"What do you guys think about the path, the bench and stuff on the other side? With the trees near it because I don't know how like, I wouldn't really want to sit there because everyone is always like running past you like"

-

B: an ideal thing where I don't have to think about the upkeep, flowers, but like flower not just flowers, but the bush that has flowers, like a hedge the has flowers

F: something a bit denser than just squares [referring to Weston Park planting scheme]

B: because flowers on there, it feels unnatural, like someone's planted them and yeah it's pretty but it doesn't feel natural.

\-

"it's really like everything is cut clearly and this stuff is really clean for nature. It's really artificial"

\-

C: Everywhere, everywhere in the uni I just dislike

F: does it feel too forced? Is that part of it?

C: Yeah like I'd like when there erm, I've always liked Crookes Valley but Western bank [park] it feels like some guy sat down and probably drew a better map than that but its not like oh put the pond here or we'll plant a tree here and 10 metres further on we'll put another one and then we'll put another one.

CE: I agree a bit with that, I kind of dislike how there are such set paths through it. I kind of think that for like: A speed and B like going a different way, but then I feel strange just like walking on the grass erm and I'm like can I walk on the grass? Like I know you can but I don't like how its like designated paths and they're very like set.

C: It feels like somebody designed western bank [park] with like a geometry set

\-

B: yeah winding paths are nice, I'd like a little

C: some rocks, I'd like a rockery

\-

This theme is coded through ideas about space, planting preference and responses to green space management. This coded included vehement responses, especially in relation to Weston Park 'geometry set' and the perspective of artificial nature.

Dislike and safety concerns

"It depends on the time of day for me, yeah, I'm quite kinda wary of walking through green spaces when it's late. You know I think you're asking for trouble if you're walking through a public green space if it's dark and late at night."

Participants raised concerns about green spaces at night. The words most commonly associated with safety fears and space they disliked in the city are listed in the table below (table 6.6). To avoid urban green spaces which were deemed dangerous by both genders, participants would walk alongside the road or take the bus. This becomes a challenge for opportunities to engage with the natural environment when the daylight hours are limited or the weather is poor.

Table 6.6 Word Frequency for text coded 'dislike – green space' and 'safety'

Word	Count	Occurrence in group*	Similar Words
walk	42	7	walk, walking
dark	33	4	dark, darkness
park	26	5	park, parked, parks
road	20	8	road, roads
green	19	7	green, greenness, greens
avoid	18	6	avoid
night	17	4	night, nights
seeing	15	4	see, seeing
around	13	4	around
many	12	3	many

*questions about green spaces were asked to all groups = 9 focus groups and 2 surveys

The main nightlife street in Sheffield was the other most commonly mentioned space to avoid.

KB: I tend to avoid West Street and Devonshire Street because it's just so urban and crazy and hectic

B: I would avoid Devonshire Street just because yeah it's pretty weird even compared to West street after eight [o'clock].

Participants preferred to use a parallel street through the university as an alternative. As described in Scannell and Gifford (2010) people-people-process approach the socially constructed narrative can create an identity to a place. The safety of a place was also influenced by the social narrative attached to the area.

"I like would not walk down there either, like heard that […] mushroom lane is quite a dodgy at night"

-

Y: But still like can't just leave when, wherever you want,
so its safer to just walk around the park basically
GC: Yeah

CE: and even like Western Park which is like right on the main road you see police cars there and stuff all the time so its like I don't really want to go in there.

This coded accounted for feelings of security and insecurity, the lack of visibility (darkness or hidden areas) and the influence of other people in a space. Participants discussed built and green spaces they disliked in and the perception and fear of crime rather than crime itself. For example, police cars may stop outside Weston Park as a central location to park and might not reflect the level of crime. This theme explored urban public spaces beyond green spaces to included urban spaces that participants actively avoid. It provides an insight into the social narratives that construct the positive and negative opportunities to engage with a space.

Current Campus Green Spaces

Green space available on campus was considered limited by all participants (see map figure 6.12). Some participants knew green spaces that were local to their department or felt that they might be missing out on green space as they were not aware of all the possible hidden locations. This theme was often related to a specific location and therefore, quotes have been presented alongside the locations (figures 6.5 to 6.11).

N: round the SU itself and that's all just tarmac underpass if you know what I mean

C: yeah exactly

F: yeah that's true

N: I can't really think of any, but I haven't been round the whole of uni so…

-

M: I don't know if I've been to any that actually I'd call green places

FN: Nor me actually.

Participants discussed the following spaces as place they might eat their lunch if the weather was good.

The space next to the Student Union/Octagon. Photo authors own.

"I quite like out by the octagon where there is those step that you can sit on."

"I think the SU with the big steps, its nice to sit on the big steps if it's warm and things erm and when it's quite busy its quite cool to just see everyone passing by and stuff. Even though its not a very green area and stuff it's just pretty cool"

Figure 6.5 Outside the Octagon

The patch of grass next to the IC (library) between a car park and road.

"people seem to just like that space a lot they come out of the IC they go to that tiny patch of grass and sit down there."

Figure 6.6 Beside the IC

The steps outside the Diamond.

"it's been cold so people don't really use that space but you know just outside diamond, that's not really a green space but there's steps and stuff I do see people hanging out there, sit on the steps and read a book or something, that does happen. I wouldn't call these areas green spaces. I don't really, like, I wouldn't be able to tell what green spaces there are on campus."

"I feel like the diamond does need more spaces like that because they don't have any places for us to sit and eat our own lunch."

Figure 6.7 Outside the Diamond

St George's

F: would you sit in the St Georges grass square…

B: it's a cemetery [laughter]

F: it is a cemetery

B: if it wasn't, I would

-

"for me it's weird seeing people who just walk on the grass around graves and stuff because we have like erm, a how to say, we have respect so we have to avoid stepping on the ground near graves"
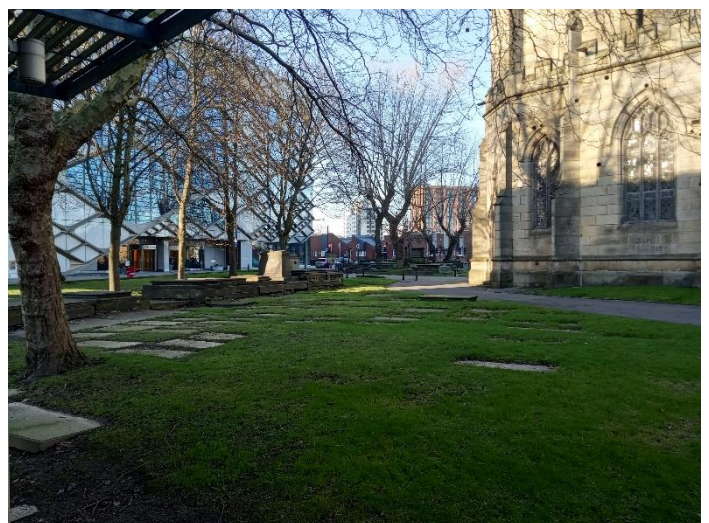

Figure 6.8 Outside St George's

Spaces with belonging

Discussed by a few students were spaces in which they felt were not generally accessible spaces, in the sense that they belonged to someone else. Some departments have courtyards that are perceived to be 'owned' by that department. One student commented on how you have to be 'fortunate enough' to get into the courtyard in Firth Court, whilst for a different building another student discussed an area no one else in the group had heard or seen. Coded by the referral of spaces that are either a possessed space or deemed a privilege to visit.

"I really like Firth court it is kind of my building but it's just nice as you go through it's got a massive staircase, nice entrance then in the middle there is a courtyard it's just pretty, calm."

-

M: Inside Firth court? […] If you're ever fortunate enough to get in there

FN: Ahh yes

M: That's really nice

Figure 6.9 Regent Court

Figure 6.10 Regent Court 'hidden' courtyard

Figure 6.11 Firth Court Courtyard.

Title: University of Sheffield Campus

Key:

1. Octagon

2. IC Grass Patch

3. Steps Outside the Diamond

4. St. George

5. Regent Court

6. Firth Court

Figure 6.12 Annotated Map of University Campus

6.5 Additional Themes

Two additional themes emerged which stand-alone. 'Staying inside' and 'not being outdoorsy' represent two key aspects of the participants' lifestyle, are also two key challenges to university students' engagement with the natural environment.

Staying inside

An unexpected occurrence was the number of students who do not leave their house in a day. This was in some parts due to the strikes, the weather but also the high level of university work.

"To be honest I haven't left my house much with the strikes."

-

B: I hated going in the snow so I just didn't visit

F: anyone else have any bad experiences?

S: when I had to do a lot of work, so you don't have to leave the house

This code was primarily focused on app users as they did not have to undertake any outdoor activity as part of the intervention. This code is defined by references to 'staying inside' often in relation to the weather or university work load.

Not being 'outdoorsy'

One participant declared themselves as 'not outdoorsy'. This research aimed to engage with those who do not consider themselves as engaging regularly with the natural environment. Whilst this can be deduced from the nature connection scores at baseline (appendix D) it was also openly declared by two participants. Their experience of engaging with green urban spaces differed from the rest of the group. These two participants (B and P) felt that their lack of desire to do outdoor activities stemmed from their upbringing. Whilst it is not possible to explore this in full it is worth noting for further research.

B: [talking about the peak district] I've not actually been there yet, you'll see I'm not very outdoorsy

-

T- have you found it quite nice living in Sheffield then? Like with the Crookes Valley Park, and Western Park or do you not really care, because you grew up that way?

B: I don't really, like I've walked past Crookes Valley Park but I've never been in it

T: oh it's really nice

B: and like I've walked through western park but like never sat in it, and then like not been to the peaks yet and I'm in second year

T: do you think you're not really bothered because you grew up in that sort of environment

B: probably yeah, like I'm just not, I don't appreciate the greenery, if you said me to, look how pretty the flowers are, yeah I see that but it doesn't change my day. It doesn't matter to me that I've seen like colourful flowers and green plants

-

P: See I would say I'm not very in tune with nature I'm a much more urban person, so erm, I mean there were obviously definitely trees around and stuff but there wasn't anything that stuck out to me there wasn't like a big tree or anything

-

P: no and especially like people who are from here, they do like walking dates

F: do they?

P: apparently so, but honestly I don't know what the aim of this is, I'm having to constantly think of things to say and it's like why are we walking! I need a destination basically; I can't just be walkin'.

As coined by one of the participants, the code for not being 'outdoorsy' was defined by the participant's self-definition of not being involved in outdoor activity or seeing oneself as different to those who like to regularly visit natural environments, such as the peak district. Whilst this discussion only occurred in two focus groups, it is a vital consideration in understanding how those who do not regularly engage with the natural environment may experience nature based interventions differently.

6.6 Research Diary reflection

At the end of the first week of group walks the research diary contains the following:

"The ache in my feet reminds me of the 32,000 steps I've done in 48hrs. The warmth of my face brings the memories of the sun, wind and snow. Walking as a method has been full of worry but the smile on my face is from the stories my participants have shared. The laughter, the moments of peace and the insights into someone else's world as we took each step, felt the sun and walked as strangers."

The research diary account of the experience as a researcher illustrates the shared experience within the walk as a methodological approach.

6.7 Summary

This chapter explored the following research questions through focus group and survey data. It used emergent coding to allow the themes to develop through the analysis. As focus group discussion developed the research questions evolved to cover more specific topic than first outlined at the beginning of this chapter. In particular, question four gained the addition of campus green space design preference as the natural environment university student predominately interactive with was those on campus.

3a. How did the participants perceive the app?

Overall, the app was well received as a research tool. Participants experienced some frustration with its functionality and did not engage with all the available features. There was a range of suggestions for creating an alternative style app for engaging with nature. Ultimately, the app did increase the amount of nature the participants noticed, however this included some negative elements such as litter.

3.b What was the experience of the participants during the walk?

The participants enjoyed the opportunity to take a break from the academic schedule and walk around the parks. For some participants walking through the park was a new experience. Adherence to attending the walk was a challenge, in the case of the participants who did not attend it is not known if the walk was the reason they excused themselves. Participants noticed and recalled trees, animals, water, other people and buildings in discussion on the walk. There was also the identification of areas that provided feelings of peace or tranquillity and other elements that promote joy or beauty appreciation.

4. How should engagement with the natural environment be encouraged for university students' wellbeing?
   a.   What are university students design preferences for campus green spaces?

University students within this research predominately experienced nature during their commute to and from university or whilst walking between campus buildings. There was the desire to explore the natural environment further afield, such as visiting the peak district however this was limited by resources (lack of transport) and time. Therefore, the preference for a space on campus were explored in more detail than originally anticipated. Due to the building work on campus at the time of the research there was some consideration to the physical changes on the campus, especially as the grass lawn had been recently dug up.

The key design preference for campus green spaces is one that facilitates socialising whilst providing shelter from the weather and city environment. Unlike some spaces on campus these should be accessible and not viewed as 'owned' by a particular department. The desire for water features, less

managed spaces and large trees, suitable reflected the desire for a mix of landscape features and sensory experiences. Significantly, all evaluation contained a mention of trees especially as place to provide shelter. Campus green space engagement is affected by time of day, a green space should provide a place for students to eat their lunch whilst mitigating for the factors of fear associated with green spaces once dark.

The inductive analysis allowed the additional themes of safety, not being outdoorsy and staying inside to emerge over the coding process. These additional themes may be limited in discussion yet represent integral barriers to university student's engagement with the natural environment.

Chapter 7: Discussion

Following exploration and analysis of the outcome measures and evaluation data, it is possible to respond to the research questions concerning the use of nature based intervention for university students' wellbeing. As such, the discussion in this chapter considered the findings from Chapters four, five and six. It presents a response to the research questions and addresses the ways in which the findings align with the current literature discussed in Chapter two. Through reflection on the evidence that emerged in the statistical analysis and qualitative evaluation data, this chapter focuses on the different findings between the interventions and details the opportunities and attitudes towards engagement with green spaces for university students.

7.1 Research question one: What nature based interventions are currently available to University of Sheffield students in South Yorkshire?

The JSNA demonstrates the diverse needs of the Sheffield population. The university student population is not a priority group. This may be due to the limited funding, social care demand and relative good health of young adults. In general nature based intervention are not widely accessible within South Yorkshire. In Rotherham this has started to change as VAR have developed community based hubs which have engaged more with local outdoor activities (for example, archery) and will continue to develop to suit the community's needs. Within Sheffield's People Keeping Well scheme the intervention available would depend on the service provider in the individual's location. There are some service providers who offers intervention such as allotment gardening.

The availability of nature base interventions for University of Sheffield students would depend on their residential area, GP location and personal preference. There is currently no service provision in the main student residential areas (Endcliffe, Crooks and Broomhill), although in theory it would be possible to self-refer into People Keeping Well. Student mental health is a shared responsibility between NHS, local services and the university (Hughes and Spanner, 2019). As advocated in the University Mental Health Charter, universities should facilitate opportunities and environments that encourage positive mental health such as engaging with nature (Hughes and Spanner, 2019). If the University of Sheffield aims to achieve the Charter Award Scheme (expected 2020) there may be an opportunity to innovate approach within the currently available services (GP, SAMHS, Student Union). These services could collaborate and create a VAR style scheme which enabled the healthcare providers to triage and refer students to the volunteering and outdoor activities provided in the Student Union.

7.2 Research question two: How do a walk intervention and an app intervention in urban nature compare in terms of their effect on student wellbeing?

The sample size and variation in the data effected the significances of the findings. Whilst trends were visible within the descriptive data (change scores and boxplots), the robustness required for statistical significance in the further analysis was often not met. However, there was a difference between the interventions as displayed through hypothesis two and three. When compared to each other the intervention displayed differences in quality of life and connection to nature (NR-6) but no difference between groups in relation to connection to nature when measured as INS.

As evidenced in hypothesis two, the participants who used the app experienced a negative change in their connection to nature (when measured NR-6) over the seven day intervention. The participants in the walk intervention experienced no change in their wellbeing score. In relation to connection to nature, the walk only group displayed no change in their NR-6 score but had a positive increase in INS score that suggests an increase in how they embed nature within their own identify post intervention. After 30 days all participants using the app experienced a negative change to their connection to nature score (NR-6). For wellbeing, the app only group (group 1) experience no change over the 30 days; over the same time period the appwalk group (group 2) experienced a negative change (both statistically significant). The walk group (group 3) experience no change in wellbeing score or connection to nature score after 30 days (not statistically significant). The participants drawn from the Shmapped dataset experienced no change in nature connection across the 30 days. The wellbeing score for the Shmapped participants increased at day seven (post intervention) and then decreased at the follow up on day 30.

The trend overall for all participants as shown in the Wilcoxon test was an increase in wellbeing after seven days, decreasing at day 30. For connection to nature this was a negative score at day seven and day 30. When connection to nature is measured through Inclusion of Self in Nature there is a positive change in the overall data set with small effect. This suggests further research is required to identify the nuanced differences which have occurred for the participants. It would appear for some participants their trait-based relationship with nature has decreased but their inclusion of nature within their identify has increase over the intervention.

To summarise in terms of statistical outcomes, using the app had a positive effect on the participant's quality of life, however it had a negative or no effect on their connection to nature. Taking part in a walk only intervention had a positive or limited effect on the participant's connection to nature but no effect on their quality of life.

7.3 Research question three: How did the participants experience these interventions?

From the focus group discussion, it was evident that the interventions were experienced differently. The social elements of the group walk became an integral part of the experience for those participants. It also introduced a new urban green space to some participants. The positive experience of the walk intervention was reflected through the common use of words such as 'nice, good, quiet, ' and the reflection on the sensory aspects of the experience as seen in the high word count of 'felt, feel, see, noticed'. The app was generally well received. However, there was some criticism, as some functional aspects of its operation caused frustration, and some participants were unsure of the purpose of the app and therefore found the questions difficult to answer. The similarities between the experience came through in the urban green spaces the participants regularly engage with or notice, with discussion from all participants on animals and plants. Noticing nature emerged as a key theme for all participants. This included noticing the good, the bad and the ugly in their surroundings. The specifics within each experience and how this is situated within the current literature are discussed further below.

Engaging with nature through a mobile phone app

The advancement and integration of technology into daily life has been held partly accountable for the increased nature deficit amongst young adults and children (Moss, 2012; Fletcher, 2017). Harnessing this technology may provide an opportunity to counter this deficit in the digitally native generation (Buettel and Brook, 2016). Mobile phones offer an instant form of information sharing, with various approaches utilising the potential, from city parks texting officer worker about interesting nearby green spaces to encourage visits through to citizen science projects using apps to capture the relationship between city experience and wellbeing (Hitchings, 2013; Bakolis *et al.*, 2018).

Mobile phone apps, use and nature connection

The use of mobile phone apps as a facilitator to engagement with the natural environment is appealing as apps are a widely available and accessible form of technology within the UK (Andrachuk *et al.*, 2019; O'Dea, 2019). The relationship between the individual and their mobile phone has been found to influence their wellbeing and connection to nature (Richardson, Hussain and Griffiths, 2018). Previous research has identified the negative impact increased mobile phone use has on levels of anxiety and connection to nature (Richardson, Hussain and Griffiths, 2018). As discussed in this thesis the focus groups revealed that there is the potential for an adverse effect caused by the distraction of a mobile phone app thus actually preventing users from notice nature whilst in nature. Richardson, Hussain and Griffiths', (2018) work identified the need for more research into the influence of individual traits in effective behavioural use of mobile phones and the effect on connection to nature. For example, there

was a difference between taking selfies as opposed to pictures of nature, with the latter being a significant predictor of increased nature connection (Richardson, Hussain and Griffiths, 2018).

Research tool and user design preferences

An app based research tool allows for real time experience based sampling and is theoretically accessible to a wide range of users: Shmapped was designed to be accessible to diverse user groups (McEwan, Richardson, Sheffield, *et al.*, 2019). It was reported by participants in the focus groups as easy to use, and no requests for assistance were received by the researcher in this study. A limitation in the participants' engagement with the app was the missed features or lack of interest in using the app beyond taking part in the study as reflected in incorrect placement of location, lack of uploaded photos and feedback from the focus group. The balance between research tool, behavioural change intervention and enthusing the public is a challenge for all research based nature apps (Jepson and Ladle, 2015). As discussed in other literature mobile phone apps within this category are generally either gamified or knowledge based (Buettel and Brook, 2016). Gamification of nature conservation may risk increasing the void between environmental values and behavioural change in failing to bridge the gap between commitment to environmental causes and effective action (Fletcher, 2017): Participants may feel they are already engaged in positive environmental action through a virtual nature experience rather than direct environmental conservation action. Apps designed as predominately knowledge based approaches to nature connection are also limited in effectiveness as increasing knowledge, e.g. about a species, may not be integral to increasing nature connection (Lumber, Richardson and Sheffield, 2017). As the Shmapped app is a dual data collection tool and wellbeing intervention, it encouraged a positive appreciation for nature with the intended result being an increased connection with nature (McEwan, Richardson, Brindley, *et al.*, 2019). It was not a knowledge based or gamified nature based app and this is where participants felt it lacked long-term potential from a user perspective. Maintaining app adherence was an issue in the intervention study presented in this research and was also a challenge in the Shmapped study within the overarching IWUN research project. Within the IWUN research, of the 582 participants who were eligible to participate and completed the baseline questionnaire, only 27.5% went on to complete the final follow-up measures (McEwan, Richardson, Sheffield, *et al.*, 2019).

Shmapped and Nature Connection

As previously discussed in chapter 5, the app users in this study experienced an increase in recovering quality of life, yet they did not experience a significant increase in nature connection. The illustrative descriptive data exploration in chapter five does show some variation in the changes between conditions which may have been statistically significant if there had been more participants. The change in nature connection score was noticeably different between the app users and those who went on the walk only, however the limited statistical power behind these numbers minimise the opportunity for generalisation of the results. The IWUN project conducted the app intervention across a larger population and geography, with recruitment from across the city of Sheffield. The findings from this research presented a positive outcome in recovering quality of life and connection to nature (McEwan, Richardson, Sheffield, *et al.*, 2019). In contrast to the Shmapped research from IWUN and the evaluation of 30 Days Wild (Richardson *et al.*, 2016; McEwan, Richardson, Sheffield, *et al.*, 2019) this thesis research did not find a significant positive association between increase nature connection and wellbeing. This could be due to the number and type of participants involved (difference in sample size and focused on a student population aged 18-24 years old).

The use of mobile phones and urban green space research

This research experienced some of the challenges associated with a mobile phone app as a research tool and this was evident in lost data (see chapter five: Error in data collection). The focus group participants' criticism of its potential outside the study and the poor adherence within the IWUN project. The use of modern technology has been used by several research projects to understand how the public engages with urban green spaces (Raento, Oulasvirta and Eagle, 2009; Richardson *et al.*, 2016; Bakolis *et al.*, 2018; Brindley *et al.*, 2019). Innovation in technology has created opportunities for sampling methods that utilise smartphones, online participation, GPS and social media (Raento, Oulasvirta and Eagle, 2009; McEwan, Richardson, Sheffield, *et al.*, 2019). These sources of data allow new insights into everyday social behaviours such as green space users' locations, activities and patterns of movement (Raento, Oulasvirta and Eagle, 2009).

Frequently the innovative role of technology has been proclaimed as a pioneer to solve many issues, whilst in reality it often appears to create a different set of problem. In the Tranquil London study the expected correlations between noise levels and pollution were not explicitly matched with the areas '#tranquilcitylondon' (Waters, 2018). In contrast the use of workshops and guided walks allowed the researchers to develop the initial idea and to identify the tranquil areas they aimed to find (Waters, 2018). However, this study will have been limited by the levels of public engagement and may be biased by the populations that engage with outreach activities like this. One risk of conducting research through

popular social media platforms is the limitation of the platform's accessibility and appeal. Brindley *et al.*'s (2019) study into the relationship between social media data and field survey green space quality further supports the lack of correlation between the two, finding social media to be a poor proxy measure for green space quality and health outcomes. The use of field surveys provided evidence of levels of cleanliness associated with better general health that could not be gained from social media data (Brindley *et al.*, 2019). In this thesis the location of the reported experience was frequently inaccurate as the participants tended to input the data once at home and therefore no longer in the space they were referring to. A systemic scoping review of smartphone technology identified several other challenges to the expansion and effective use within research and community based environmental action (Andrachuk *et al.*, 2019). These challenges, applicable to the broader use of mobile phones for nature based research, included the lack of shared knowledge on costs and actual impacts, the accounting and discussion of factors that lead to success and failures and the influence digital data has on conservation outcomes (Andrachuk *et al.*, 2019).

Engaging with nature through walks

The group walks provided the three elements of a social prescription as defined by Bragg and Atkins (2016)(natural environment, social interaction and meaningful activity. This is additionally true for the group which used the app as well, as it also provided a daily meaningful activity. Understanding the effects of walking in urban green space is important as they will influence the success of green prescriptions and how urban green infrastructure is planned, designed and managed. Natural England's 2019 MENE report stated that 56% of those surveyed chose to walk through a local green space or park on their way to other places (Natural England, 2019). A comparative study into rural and urban walks found the rural walk provided emotional and cognitive restorative benefits for those with good and poor mental health (Roe and Aspinall, 2011). Additionally, urban walks were more beneficial to those with poor mental health compared to those with good mental health (Roe and Aspinall, 2011). Walking through an urban green space rather than a city area has been found to significantly lower heart rate and reduce levels of anxiety (Song *et al.*, 2015). The focus group and survey data revealed the motivations and barriers to regularly walking through an urban green space.

Motivations and Barriers

An individual's use and access to urban green space as places to walk through is influenced by subjective and objective factors (Seaman, Jones and Ellaway, 2010). There is the requirement therefore, to understand the subjective factors such as an individual's motivations, values and experiences to ensure green spaces are visited and re-visited (Seaman, Jones and Ellaway, 2010). Developing on this area of research this thesis evidenced the individual's factors that influenced university students' preference and experience of urban green spaces. Participants in this study discussed the value of being able to revisit a green space they had previously enjoyed. In the focus group and during the walks participants said the group walk introduced them to a new area they intended to revisit, or refocused their attention on walking as a hobby, however there was limited evidence of these positive outcomes in their nature connection or recovering quality of life scores. The research also provided an opportunity to discuss what physical factors would influence participants motivation to visit a campus spaces regularly, thus integrating it into everyday life.

Subjective barriers to engaging with an urban green space include those which create feelings of exclusion such as anti-social behaviour or evidence of such behaviour (for example graffiti) (Seaman, Jones and Ellaway, 2010). This was similarly reflected in this study in participants' memories of the argument in the park and acute awareness of other people's activities. In this study the focus group revealed the subjective barrier of park visiting behaviour: breaking group study time to visit the park was deemed a socially strange activity to suggest, unlike a visit to the shop for snacks, which felt purposeful. As discussed by Nisbet and Zelenski (2011) people fail to regularly engage with nearby nature and in doing so miss opportunities to increase their wellbeing and connection to nature. The focus groups discussion presented several missed opportunities where nearby nature was not regularly engaged with or purposefully avoided as being unpleasant. In consensus with the thesis, findings Holt *et al.* (2019) reported university students limited by time and a lack of awareness of the opportunities to engage with the natural environment.

7.4 Noticing something new: the good, the bad and ugly.

Participants throughout the intervention conditions (app and walk) reported noticing something new. For those in the mobile phone app group they reported in the focus groups that they continued to notice these things after the study had finished. For those in the walk condition some participants said during the walk and afterwards that they had visited the park for the first time ever or in a while and intended to return. This opportunity to engage with a 'new' part of the natural environment begins to answer the question surrounding previous research that found this age group were significantly more likely to have 'no particular reason' for not regularly engaging with the natural environment (Boyd *et al.*, 2018). The intervention study operated within a limited time frame to alter the participants' engagement with the natural environment. It is likely that sustained wellbeing benefit would result from a long-term behavioural change resulting in increased time spent in the natural environment and it is therefore important that future research continues to explore mechanisms for achieving this. Successful interventions encourage participants to not only spend time in nature, but also to reflect on the ways in which they feel like a part of and interdependent with nature (Mackay and Schmitt, 2019).

The good

The opportunity to be in awe and experience soft fascination with the natural environment is an integral part of ART and supports the development of connection to nature (Kaplan and Kaplan, 1989; Mayer *et al.*, 2009). In this intervention study noticing positive elements of the natural environment provided opportunities for this awe and fascination. In the focus groups and survey feedback the positive elements of nature were often referred to as a feeling about a space, such as an area of the park being tranquil, or fascination with an animal or plant. During the focus groups participants in the app group said they noticed new local nature on the days when they had not left the house due to the prompt by the app (for example, a view out of their window). Participants said this local positive nature experience continued for them after the seven days. However, this was not reflected in the connection to nature outcome measures which presented no change or a negative change between post intervention at day 7 and follow up at day 30. For those who visited the park (as part of the group walk) there was a common response in relation to the joy at seeing the ducks or pigeons. The importance of connecting with animals aligns with other's research (Dunn *et al.*, 2006; Frey *et al.*, 2018). The interactions with city animals such as pigeons form an integral part of connecting people with global eco-systems (Dunn *et al.*, 2006). Some interventions have taken this a step further with creating opportunities to monitor wild animals through a tracking app (Frey *et al.*, 2018).

From the focus group discussion, it was evident that good elements of the natural environment in Sheffield can be found in the city centre through to the Peak District. The nature connection scores did not provide any evidence that these positive moments converted into a measurable change. However, this could be because the positive elements were counteracted by the negative elements as discussed below.

The bad and ugly

For some participants noticing more resulted in noticing the unpleasant. Whilst these findings are unusual Bixler and Floyd's 1997 paper on 8th graders reaction to unmanicured natural environments classified responses within the emotions of fear, disgust and discomfort. They found students who preferred modern comforts were more likely to favour indoor activities and be less interested in careers working outdoors (Bixler and Floyd 1997). Participants in the focus groups discussed how being encouraged to notice nature every day via the app or during the group walk had a negative side effect of noticing the unpleasant. For the app users, litter they had previously not noticed became more evident, and as they actively began to seek out nature in the city centre, they felt discontent, contradicting their previous perception of the city's environment (as greenest in England). Similarly, Speake, Edmondson and Nawaz's (2013) survey of university students also found an attention to quality (planting schemes, maintenance, litter) over quantity for the green space the participants would regularly visit. Furthermore, Brindley *et al.* (2019) found that green spaces with poor cleanliness standards were associated with higher prevalence of self-reported poor health.

Some university green spaces were considered not physically accessible to the participants or not suitable to enjoy. Firstly, the courtyard in Firth court, which participants felt was associated with a certain department and therefore they would not be welcome in this space. Firth court courtyard has a physical barrier of being behind two large imposing doors. Secondly, the green space surrounding St George's, is a graveyard. As urban area continue to expand urban green spaces such as graveyards become contested as the historic, cultural and memorial spaces which may be redesigned to facilitate different types of engagement (Allam, 2019). In the focus groups participants were divided in the behaviour expected in St George's. One participant would never walk near the graves, yet another would eat their lunch in the space cleared of headstones. This is a morally and ethically challenging space for the participants, and their experience reflects the requirement to comprehend the pre-defined behaviours associated with some urban green spaces which may limit engagement (Scannell and Gifford, 2010; Allam, 2019). The ambiguity of a deconsecrated church and the surrounded green space meant this space provided limited engagement with the natural environment for university students.

Entwined with the unpleasant aspects of noticing nature was the commentary on the safety risks in visiting natural environments (Fisher and May, 2009; Mak and Jim, 2018). For some participants in the focus groups the dangers of urban green spaces in the dark resulted in a change of transport or route when walking home in the dark. In agreement with other research, this finding reflects the impact socially constructed narrative and the physical threat of the unknown has on avoidance of urban green spaces at night or early morning (Fisher and May, 2009; Jorgensen, Ellis and Ruddell, 2013).

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7.5 Research question four: How should engagement with the natural environment be encourages for university students' wellbeing?

The interventions offered two approaches to increase engagement with the natural environment. However, given the limited significance of the outcome measures and the participants' focus group discussion on their preferred green space, it became apparent there may be a different approach worth considering. The process of conducting the walks made the time demands of students' day to day experience apparent, it also emphasised the unpredictability of their timetables and the university environment. Previous research has highlighted the importance of regular small engagements with the natural environment to support wellbeing (Passmore and Holder, 2017). Given the challenge of adherence and the role of noticing the negative in the intervention, green prescription may not be the most effective way to influence the wellbeing of university students. This concept was further developed in the focus group questions about green spaces on campus.

University Green Spaces

As previously introduced, within Scannell and Gifford's (2010) model, the complexities of space are explored through the model of the place attachment framework. The perception of a natural environment or space can be affected by the personal, place and process based dimensions (Scannell and Gifford, 2010). Understanding connection to the natural environment required the multifaceted approach taken in this research, investigating how green space campus experience is influenced by dimensions beyond those immediately visible. Through the discussion in the focus groups of local green space and the places participants regularly visit, it became apparent that the opportunities for university students to engage regularly with the natural environment come primarily from the environments within their commute and the university campus. As reflected in Hitchings' (2013) study on workplace employees' use of green spaces, this research also recommends focusing on infrequent as well as frequent green space visitors, with the implementation of evidence-based landscape design as a means of promoting effective green space engagement for all. They suggest the importance of appreciating different lifestyles to inform strategies to influence engagements with urban green space to access its benefits in promoting health (Hitchings, 2013). The University Mental Health Charter principles of good practice include embedding wellbeing and accessibility to the redevelopment and maintenance of university estates. It advocates for facilitates and activities which encourage staff and students to engage with nature (Hughes and Spanner, 2019). The evaluation of interventions facilitated further discussion on the availability and accessibility of green spaces in the University of Sheffield campus.

Experience and design of university spaces

In the case of university open spaces, focus group participants reported that the perception of those spaces had an greater influence on the way those spaces were used/not used and the benefits derived from them than the reality of the space themselves (Beckers, van der Voordt and Dewulf, 2016; Hipp *et al.*, 2016). This aligns with research on study space design for university students, which highlighted that the perceived value of a space was more important than its experienced value (Beckers, van der Voordt and Dewulf, 2016). Students viewed spaces which they perceived as quiet as more conducive to learning regardless of their previous experience (Beckers, van der Voordt and Dewulf, 2016). Equally, the perception of campus green space corresponded with reported quality of life, and acted as a partial mediator of perceived restoration from stress related to campus space (Hipp *et al.*, 2016). This means that students who perceived the campus to have more green space reported better wellbeing and found the campus space more restorative (Hipp *et al.*, 2016).

Previous research has suggested that the campus environment should be designed to have open spaces which create an integrated blend of sheltered spaces for study and open spaces for collaboration (Beckers, van der Voordt and Dewulf, 2016). These spaces should be clearly defined to denote expected behaviour within the space and so reduce the stress that can occur when a space is not coherent (Lau, Gou and Liu, 2014). The desire for collaborative and sheltered spaces was qualified through this study's focus group findings. In alignment with this and others' research campus design is emerging as a potential wellbeing component of the university experience (Hipp *et al.*, 2016). Previous research has considered the biophilic campus, campus design to integrate sustainability and promote learning and collaboration (Ibrahim and Fadzil, 2013; Matloob *et al.*, 2014; Abdelaal, 2019). Future research into campus design could take these ideas further by working in collaboration with the users' perceptions and lived experience of campus green space. Through the focus group discussion this research found three keys dimensions of importance:

Socially constructed elements of green space

There are attributes in the design of urban green spaces which impact the participants ability to engage with a space (Seaman, Jones and Ellaway, 2010; Bell *et al.*, 2014). The complexities which surround a green space on campus are enwrapped in the socially constructed narratives and personal preference. As discussed by Bell *et al.* (2014) these personal preferences are susceptible to change as influenced by circumstantial priorities and place practice.

In focus groups and through the survey feedback, the social narrative surrounding the risk of entering urban green space in the dark was reflected across nationalities, age, and gender. These university students had heard stories related to incidents on campus, or had personal experience of them. Urban green spaces being considered dangerous at night heightens the argument for providing accessible green spaces that are appealing during the day, as well as reducing students' fears to use campus space outside daylight hours. Most of the university term occurs in the less climate favourable time of year between September and April. Daylight hours and weather conditions can reduce the opportunities to engage with the natural environment outside of university time. A prime time opportunity is lunchtime, which participants discussed as having limited current potential for visits to urban green space as the spaces on campus where they currently eat their lunch consist of various 'grey' concrete steps.

Shelter from the city

Urban green spaces can offer respite from the city soundscape and busyness of campus (Windhorst and Williams, 2015). As found in other research, participants valued the opportunity to feel protected from the sounds and sights of the city (Birch, Risbeth. and Payne, 2020). Previous research has found participants reported feeling calm and relaxed by the presents of water and mature trees (White *et al.*, 2014; Windhorst and Williams, 2015). These restorative aspects of green space visits were acknowledged in the focus groups by several students who had attended the group walk. This was highlighted particularly in the desire for design features that provided sensory reoccupation such as water fountains and large trees. These participants were also likely to choose a seat by the window in the library to look at the park. In contrast the mobile phone app only users did not comment on how restored they felt after the intervention. If walking through campus provided a restorative experience similar to walking through the park, it could support better mental health. McDonald, Beatley and Elmqvist, (2018) argue for integrating green prescriptions and city designs which harness nature into urban development. Therefore, this research suggest that university campus green space design should be in coordination with interventions, such as introducing green trails alongside cycling schemes.

Wildlife and wild

Unexpectedly, participants during focus groups for both interventions talked about animals and wildlife found in the urban green spaces with affection. Some participants wanted to see wildlife beyond just pigeons and this could represent a desire for more biodiversity within the spaces they visit. In agreement with this finding, evidence does suggest the role of perceived nature to have a strong influence in the restorative effect of the space, with those with higher nature connection more perceptive of flora and fauna diversity (Hipp *et al.*, 2016; Southon *et al.*, 2018). As previously suggested in the literature, the connection created with city wildlife provides a vital relationship (contributing to pro-environmental behaviour) which can affect the global ecosystem (Dunn *et al.*, 2006).

There was also an attention to the management of landscape features in the urban green space. Some participants in the focus groups were strongly opposed to the level of strict design. This was particularly in reference to the Victorian planting style scheme found in Weston park. Crookes Valley Park's area of naturalistic woodland was commented on for offering tranquillity and cover from the city. Wild can be in relation to the perception that nature is dominate compared to manage where a place looks controlled and maintained (Colley and Craig, 2019). Colley and Craig (2019) studied perception of wildness for those living in local rural communities. The influence perceived levels of design and management have on individual's attachment to a place as 'wild' can be replicated in this finding to include difference of preference in a place in relation to its perceived level of design, management and wildness (Colley and Craig, 2019). As discussed in Colley and Craig (2019) work the different forms and how they are perceived may offer an opportunity to develop established ideas of aesthetic preference, for university student's in this thesis there was a strong preference for less managed environments.

Attitudes to the Natural Environment

Young people are often attributed with generational decrease in their connection or knowledge of the natural environment; nature deficit is deemed the result of decreased engagement with the natural environment (Louv, 2008; Moss, 2012). Coinciding with the drop (during adolescence) in nature connection young adults are expected to attribute less importance to the natural environment (Bird, 2007; Hughes *et al.*, 2019; Richardson, Hunt, *et al.*, 2019). Whilst the participants in this study discussed in the focus groups prioritised their studying and socialising (and gave these priorities as reasons for dropping out), there was passion and value for the natural environment. This was most apparent when talking about trees.

As with understanding people's attitudes towards a physical space, it would appear specific elements of the natural environment are also exposed to socially constructed narratives. Sheffield and its trees are an unusual case, as during this thesis there was a conflict between the local community and the council about street tree management (BBC, 2019). During the focus groups participants in this study spoke passionately about the desire for more, and especially large, trees. Previous research into individually valued restorative space on campus found a positive association with mature trees (Windhorst and Williams, 2015). Specific preferences for different types of plants have not been comprehensively considered within literature on campus green spaces, whereas participants in this thesis discussed their preference for mature trees, flowering plants and natural planting schemes. Further to this, this finding challenges the notion that young people do not value the natural environment, but highlights that they express this in a different way with alternative unaccounted ways to connect with nature (such as house plants) (Birch, Risbeth. and Payne, 2020). Natural England's 2019 MENE report identified generational differences in attitudes towards intention to make lifestyle changes to protect the environment. On average 16% of those asked intended to make changes, with young people (16-24 year old) 10% more likely than older people (over 65 years old) (Natural England, 2019). This study's findings qualify research from Birch, Risbeth. and Payne, (2020) in young people's experience of urban green spaces and the tangible connection to plants such as trees. There is further opportunity for this relationship to be explored within campus and urban green space design.

Chapter 8: Conclusions

This final chapter presents the summary of the research undertaken within this thesis. This research aimed to understand what type of nature based interventions could support University of Sheffield students' wellbeing. It approached this through four research questions: (1) What nature based interventions are currently available to University of Sheffield students in South Yorkshire? (2) How do a walking intervention and an app intervention in urban nature compare in terms of their effect on student wellbeing? (3) How did participants experience these interventions? (4) How should engagement with the natural environment be encouraged for university students' wellbeing? This chapter presents the strengths and limitations of the methodological approach, the implications for policy and practice within social prescribing and the university environment, and future research opportunities. It outlines the main contribution made by this doctoral work, whilst the last sections feature some final key remarks.

8.1 Summary

This research specifically targeted the university student population due to the prevalence of mental health concerns in this group, in comparison to the general public (Universities UK, 2018). Poor university student mental health has a detrimental impact on retention rates, grade achievement and life satisfaction (Universities UK, 2015). Universities have begun to implement a more holistic approach to student wellbeing, adopting similar approaches to those found in social care and the NHS (Mental Health Taskforce, 2016; University of Sheffield, 2017b). However, as the demand on student support services continues to rise it is suggested that more preventative action is required (Hughes and Spanner, 2019). This thesis therefore looked at the viability of implementing a preventative measure through the use of nature based intervention for the healthy population. In a similar approach to green prescriptions, these interventions harnessed the restorative benefits of the natural environment (Burt and Preston, 2017). There is evidence that connection to nature increases pro-environmental behaviour, psychological wellbeing and promotes social cohesion (Dunn *et al.*, 2006; Mackay and Schmitt, 2019).

The use of a mobile phone app as an intervention for noticing nature is in itself novel. To develop on the IWUN research, this doctorate used the mobile phone app intervention in a comparison study amongst a specific subsection of the population. The focus on university students is unique to this research tool, and the use of an intervention study which includes a detailed evaluation of the intervention and broader experience of engaging with urban nature is novel. At present, social prescribing interventions are not targeted at university students, and therefore there is limited knowledge on the effectiveness and practicalities of this approach.

A strength of this research is how it captured the experience of university students during the intervention and more generally in their use of urban green spaces. In this aspect, this thesis contributes to the changing narrative on how young adults' experience of nature is understood. Specifically, it is worth noting the nine focus groups and evaluation surveys, which all independently contained conversation on the value of trees. The unknown dimension of young adults' connection to nature is exemplified in the difference in nature connection outcome measurements, with INS showing a different change to NR-6. These scores assess slightly different aspects of nature connection and the difference in findings suggests there is still more to be known.

The method of asking participants to recall the elements of nature they noticed during the 7-day intervention provided an insight into the previously undocumented experience of urban green space. The process of having university students engage with a natural environment (through the walk or app) and then reflect on the experience allowed for unexpected discussion elements to arise. In relation to university students and space, research has previously considered the built environment, campus study spaces, or study spaces which feature simulated nature (McFarland, Waliczek and Zajicek, 2008; Felsten, 2009; Raanaas et al., 2011; Hunter et al., 2019). This research on the other hand evidenced the participants' lived experience and preference for green spaces on their campus. The use of an intervention followed by focus groups with a grounded theory approach allowed the themes to inductively emerge. Key elements of nature with previously limited evidenced value for university students was the joy at seeing pigeons and the desire to be protected from the city sound.

This methodological approach also gave rise to the importance of the negative aspects of nature. As found in MENE, this group are significantly more likely to have 'no particular reason' for being infrequent visitors to the natural environment (Boyd *et al.*, 2018). Focus on the negative elements of nature may provide an alternative perspective through which to consider opportunities to overcome 'no particular reason'. Reasons such as fear associated with darkness and crime, social priorities and peer pressure, and poor weather, provide motivation to better integrate green space into the university's built environment, especially to facilitate daytime engagement opportunity, such as lunchtime.

There is limited acknowledgement of the importance of campus green spaces in relation to proactive wellbeing. Whilst it is included in the University Mental Health Charter, there is still progress required for these to become a priority in new infrastructure design. The findings of this thesis contributes a novel perspective on the pivotal role person-process-place has in defining students' perception and therefore their desire to use nearby green space (Scannell and Gifford, 2010; Lau, Gou and Liu, 2014). An example of this was the ambiguity at the deconsecrated graveyard and the presents of police cars. There was also the consideration of how these perspectives are effected by other people at a university campus. This

element has been previously considered in Windhorst and Williams (2015), whose work found natural environments were important places because they were free of socially constructed pressures. Subsequently, it may be that understanding the social context that influences a space and the behaviours within it, results in the creation of spaces that facilitate or change these processes.

8.2 Methodology reflection: strength and limitations

The methods implemented aimed to capture the full extent of the social prescribing system in Sheffield and the feasibility of implementing green prescriptions for university students. The initial context study use in this research provided a strong knowledge base in the pre-existing procedures and opportunities in Sheffield. This allowed the intervention stage of the research to be adapted to the location and university context. The original intention was adapted to include a green prescription from the nationwide rather than local initiatives and the intervention used nearby university green space.

Capturing the experience

To answer the research questions; (2) *How do a walking intervention and an app intervention in urban nature compare in terms of their effect on student wellbeing?* and (3) *How did participants experience these interventions?* It was important that this mixed method approach captured the entire experience; both through the outcome measures and from the participants' perspectives. As found in the literature review there is a great deal of variety within the social prescribing sector, from the funding systems through to the interventions themselves. Capturing the detail of this variation in Sheffield was achieved in this research through the detailed expert interviews and the comparison with Rotherham's system. To understand the opportunity for social prescriptions amongst the university student population, value and attention was given to the participants' evaluation of the experience alongside the outcome measures.

A priority within this research was understanding the experience of the green prescription style intervention from the perspective of university students. The range of participants (reflected through course, age and ethnicity) involved in the research, and the extensive use of focus groups, allowed for the variety of experiences to be captured. The dedication to the focus group data and the grounded theory approach to identifying emergent themes allowed findings to emerge iteratively over the course of the research. Grounded theory uses a reflect and adapt approach to allow the emerging themes to be comprehensively covered (Sbaraini *et al.*, 2011). A limitation of implementing the theory within this thesis is the restriction on time and resource may have meant that saturation was not met. Capturing the participants' experience was also achieved through being adaptive in allowing participants to complete the survey if they were unable to attend a focus group.

A strength of this research is that it allowed for comparison between the outcome measures and the participant's experience of the intervention. It is this comparison that revealed some of the more interesting dimensions of this research. As discussed further in chapter seven, the variation between the statistical outcome measures (chapter five) and the qualitative data from the focus groups (chapter six) changed the narrative of this thesis. An opportunity to further explore this research development would be provided by a closer examination of an individual's accumulated data across the study from understanding the pathway the participants took to signing up (leaflet, society approach or email advert) through to their change over the course of the intervention and finally their reflection on the experience. This was not a consideration during the design of this research and therefore the process of maintaining anonymity of the participants (limited personal details collected at expression of interest, registers of walk and focus groups were destroyed after use) resulted in this being unachievable.

To further test the effect of green prescriptions on individuals with a low nature connection it would be beneficial to repeat the study with additional participants (to increase opportunities to reach statistical significance) and to collect nature connection scores at the point of sign up. This would allow the researcher to predispose the composition of the study group more reliably towards those who are less likely to participate in this research area, which is important as this represents a current knowledge gap within the literature.

Overall, this research captured a detailed account of the opportunity for green prescriptions amongst university students. In providing this level of detail it also allowed additional themes to develop. An unpredicted highlight of the findings from the data was the opportunity to give attention to design details of green spaces on campus.

Context study

The context study was required as the information sought was not readily available through literature review. The conduct of expert interviews provided a detailed account of the principles and systems behind the social prescribing offer in Sheffield and Rotherham. The interview with VAR portrayed a different system and illustrated the challenges faced by the incoming social prescribing academy in standardising the offer nationwide. It was important to understand the current system in Sheffield in order that the implementation of green prescriptions for university students could be considered within this. Current provision of mental health services to university students includes the opportunity to refer on to NHS primary care. It was the original intention to use a green prescription similar to those found in Sheffield as the comparative intervention to the app. As none were found, an alternative was implemented, based on principles derived from the literature.

Intervention study

The second part of this research aimed to test the effectiveness of two styles of intervention for university students. The mobile phone app and a walk based intervention provided opportunities to engage with and notice nature. Group two (App Walk) was expected to be the most effective group as it included an opportunity to engage with nature, have social interaction and take part in the app as a meaningful activity to engage the participants with nature every day. The addition of the Shmapped (group four) based data provided a comparison which removed the time restriction, thus reducing the influence of the university timetable and the weather. This group also had reduced level of researcher influence. The walk group also provided a good group comparison, but for the opposite reason, in that they undertook the study at exactly the same time and experienced different outcomes as discussed. The findings of the previous literature on nature connectedness (NR-6) being positively associated with wellbeing (ReQoL) were not supported in the statistical analysis in this thesis, suggesting further research is required to increase sample sizes for robustness and account for the confounding factors affecting university students' wellbeing.

Mobile phone app

The mobile phone app functioned as a research tool that was accessed easily by most of the participants. A small number of people were unable to participate due to the lack of a suitable smartphone (Windows operating system was not compatible). Some participants experienced a flaw in the design which it was not possible to rectify (screenshot available in appendix E). The clustering of data around a single point often represented the home location for the participants as it was common across the study for participants to enter their answers once at home. This is worth considering from the point of views of its design as a research tool. To engage with the natural environment required the participants not to be distracted by their phone, and as mentioned in one focus group the notification alert distracted them, therefore they were likely to silence the app. This reduced the ability of researchers to pinpoint the actual locations the participants were noticing and therefore, deduce participants' responses to different urban green spaces. The use, perception and effects of green space are factors that can be studied using a mobile phone app, however there was some reservations from the participants about being tracked regularly and the battery draining effect of having the GPS on so often.

A dimension of the research methods were reliant on the app design. The negotiation between function for participants and function as a research tool is a challenge in this method. Participants doubted the appeal of the app beyond being a research tool. As discussed by Andrachuk *et al.* (2019), as a research method the use of an app is limited by budget and at the mercy of operating system updates. The system is also vulnerable to data loss through phone signal and the storage cloud. It is not possible to know

where the data was lost in the case of this study. To conclude, mobile phone apps as a research method have exciting possibilities to engage with large cohorts, but there can be unexpected technical challenges with this method.

Walking

As previous studies have found, as a research method walking allowed the researcher in this intervention study to be alongside the participants, which reduced the researcher-participant hierarchy and created a shared experience, as reflected on in chapter 6 (Pink *et al.*, 2010). Walking provides a common experience of exploring the landscape being travelled through (Medford, 2018). The public parks that formed the settings for the group walk were dynamic and changing environments. There were unpredictable conditions and events stemming from the weather and other park users. For example, one morning it snowed, and during another walk two people in the park had a loud argument next to the path the group walked along.

Seven days is a limited time frame to have a long-term effect on a participant's daily habits. This may have limited this intervention's ability to create a behaviour change, which would be evident in the day 30 results. The opportunity may instead lie in timetabled opportunities to visit the natural environment, or maps detailing urban green space walks students could undertake near the campus and student residential areas. Participants commented on their time constraints and these time priorities became apparent as from discussed in the cancellation of walk attendance. A walk intervention would have to be able to mitigate for the time pressures university students experience.

8.3 Policy and Practice Implications

This research focused on generation Z (born 1995-2010), and as with other research into workplace design, the ability to implement behavioural change or create spaces which will be used by the target group relies on the ability of practitioners and decision makers to understand the realities of generational similarities and differences (Deal, Altman and Rogelberg, 2010). To engage with university students in their requirements from the green spaces on campus requires consideration beyond the expected stereotypes. Therefore, translating this research's findings into a real world application should be done with the collaboration of the intended user community.

The policy and practice implication from this research relates primarily to the use and design of nature based interventions for university students within the university environment. Second but no less crucial are the broader implications for wellbeing interventions and urban green space development within the UK context.

University policy

While universities compete to be at the top of leader boards for academic attainment, world class research and cutting-edge facilities, it may be time to contemplate the role of the natural environment in supporting wellbeing in the university student experience. Considering the impact of mental health on grade attainment, retention and social cohesion, university campus landscapes could become the next league table. The introduction of a Charter Award Scheme in association with the University Mental Health Charter, means that this aspect of the university sector will soon be under closer scrutiny, with an expected assessment and therefore possible comparison as part of the award (Hughes and Spanner, 2019). In agreement with other research and as part of the 'live' dimension of the Charter, this study has found that university green spaces can be developed as a wellbeing resource for students and staff (Hipp *et al.*, 2016; Hughes and Spanner, 2019).

There is a need for green spaces which accommodate university students; spaces that are not seen as limited to members of the department associated with the nearest building. This facilitation should also be achieved through the spatial design. Students are focused on their university studies and socialising. It became apparent that lunch is the time university students take a break and are likely to seek an alternative environment. A successful green space would provide opportunities for both if it provided shelter from the weather and practical seating, which allows for both studying and social lunches.

University of Sheffield

Social prescriptions within Sheffield do not currently consider university students as a target population. However, the ability to tailor an intervention to be responsive to a person's lifestyle would be appropriate for this population and its transient nature. Social prescribing can have a waiting list, which may be a risk for a university student who goes home at the end of the term. However, this should not prevent further exploration of the opportunities here. At present the university staff wellbeing service 'juice' provides a leaflet on walking for wellbeing and offers a monthly lunchtime club (University of Sheffield, no date a). This style of activity could be better advertised, and an alternative could be provided for students. The University Health and Wellbeing service should consider the opportunities working in partnership with the Student Union to offer volunteering and outdoor activities in a social prescribing style scheme. The University of Sheffield Mental Health Strategy includes the estates management plan, however the estates management plan does not include health and wellbeing, possibly because it is instead featured in the campus master plan as greening for the benefit of staff and students to "promote learning, well being and healthy lifestyle" (University of Sheffield, 2015a p.45) (University of Sheffield, 2017b). It is recommended that these spaces include physical features that facilitate socialising and studying as a priority. At the University of Sheffield specifically, there is a need to provide shelter from the noise and sight of the city, and accommodate for the poor weather during term time.

UK Policy

Within the context of UK policy, DEFRA's 25 year environmental plan included the natural environment as a resource for population level health (DEFRA, 2018). Whilst there is no single government department or body tasked with ensuring the potential benefits between the natural environment and improved population health are realised, many third sectors organisations have begun to acknowledge this within their practice and policy, for example Mind and the Wildlife Trust (Lovell, Depledge and Maxwell, 2018). The evidence in this thesis further supports the vital role urban green spaces play in facilitating positive mental health, especially when accessible and of high quality.

Social Prescribing

The developing nature of social prescribing and its increasing popularity provides a pivotal opportunity to consider the system behind the social prescribing process. There are opportunities to develop the ways in which social prescribing engages with green prescriptions. At the moment the focus for tailoring interventions is on the 'five ways to wellbeing'. Given the evidence on the additional benefits of engaging with the natural environment, it may be imperative to expand the current referral criteria to include

activities which would introduce more nature into a person's life. The participants within this study who defined themselves as 'not outdoorsy' did not report any negative experience in going on a walk.

Urban Green Space Development

Natural England reported the most frequently visited green spaces are in towns and cities (Natural England, 2019). The Communities and Local Government Select Committee (2016) report on Public Parks concluded that parks were under serious threat as decline in funding and local planning pressure reduced the quality and quantity of green spaces. The report identified the diverse eco-system services urban green spaces provide, such as community cohesion, physical and mental health and wellbeing, biodiversity, climate change mitigation, and support for the local economy (Communities and Local Government Committee, 2017).

The requirement for urban planning to prioritise urban green spaces goes beyond the availability of the space but must also include its accessibility and safety. A recent narrative from Australia highlighted the continuing need for green space safety through design guidelines (Department of Sustainability and Environment, 2005; Kalms, 2018). Through this thesis it emerged that the perceived insecurity of green spaces contributes to a lack of engagement with the natural environment amongst university students. It also identified the impact of the process of formation of the social narrative surrounding a place on campus. To overcome this requires the integration of programming alongside urban green space creation (Hunter *et al.*, 2019).

8.4 Future Research Opportunities

This research is positioned between multiple disciplines and therefore allows collaboration and combination of different disciplinary perspectives into research approaches, resulting in opportunities for a more holistic understanding of the potential for nature to be used to support students' wellbeing. Such opportunities include understanding campus design from a wellbeing perspective.

Health, Wellbeing and Nature

This research has demonstrated that the relationship between different aspects of an individual's relationship with nature (as accounted for with the two different measures of nature connection) is complex and dynamic. The influence connection to nature has on quality of life is also not necessarily a direct mechanism (Markevych et al., 2017). The difference in outcome measures and direction of change suggested there may be additional variables affecting participants that have not been accounted for within the study. Further research into university students and young adults' relationship with the natural environment should consider additional lifestyle and work related influences.

Campus design from a wellbeing perspective

Human health and wellbeing in the natural environment continues to develop as a field of research. Progress has been made in the spaces which are considered within this area, for example the MENE survey now includes questions on personal gardens, and the King's Fund recently published a policy brief on gardens and health (Buck, 2016). The King's Fund policy brief highlights the importance of further integration of gardens into mainstream health practice (Buck, 2016). This approach should be taken in the evaluation of university campus design. Mental health issues reduce students' attention and attainment; integrating spaces designed for students to use as study and social spaces could support a preventative approach to wellbeing on campus. The design of these spaces needs to consider the desired use of the space beyond the physical appearance, and as previously discussed campus space operate under social constraints similar to the workplace. Future research could trial the elements proposed in this thesis and investigate ways to create outdoor social and study spaces on campuses. Beyond the design is the requirement for these spaces to be well maintained, as when not maintained, or when poorly lit, green spaces can become threatening or unpleasant.

8.5 Concluding thoughts

On 23rd August 1928, Ecclesall Woods was opened to the public as an opportunity for city dwellers to escape the poison of town life (see preamble). Whilst 90 years later the industry in Sheffield is no longer heavy steel factories, there is still the necessity for spaces and opportunities that offer the antidote to city life. With university student numbers continuing to increase, the campus expansion must include integrated green spaces beyond planted flower boxes and benches in straight lines. This thesis found green prescription style interventions offer one way to encourage engagement with nature, but that they must be considered in association with high quality urban green spaces. Campus green spaces may be the only green space university students regularly access. These spaces must facilitate the needs of university students to socialise and study, thus providing effective opportunities to engage with the natural environment for their wellbeing.

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Appendices

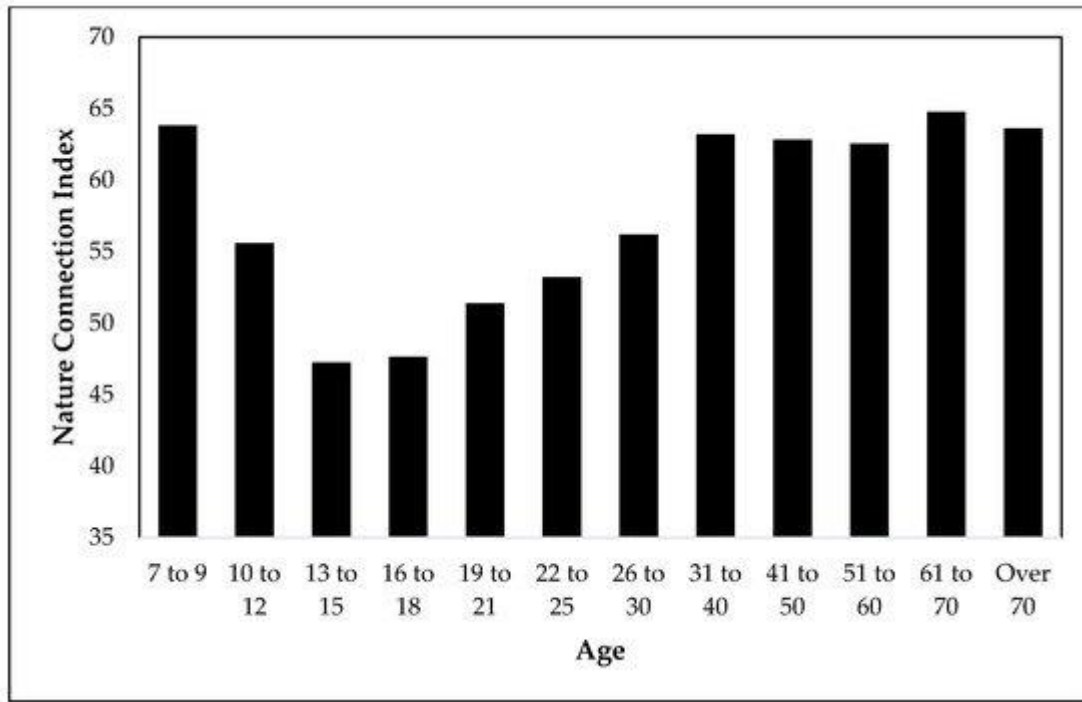## Appendix A

Nature Connection across different ages

Figure 0.1 Means score across the life span from Richardson, Hunt *et al.* 2019 Figure 2 p.11

Student ethnicity

Ethnicity	2015/16	2016/17
White	1,417,300	1,425,665
Black	122,150	130,020
Asian	183,510	192,780
Other (including mixed)	90,030	96,305
Not known	29,320	30,360
Total UK domicile	1,842,315	1,875,125

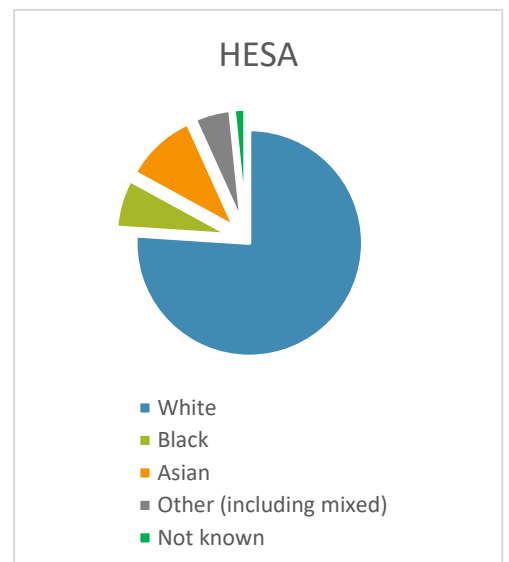Table 0.1 UK Student ethnicity 2017-2018 (HESA, 2018)

Figure 0.2 Pie chart representing student ethnicity in the UK

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Appendix B

Recruitment material

Do you live in Sheffield?
Aged 18-25?
£20 voucher for study participation

This research is about wellbeing and the urban environment. By taking part you will contribute to improving our understanding of how we can use urban green spaces to boost wellbeing.

You'll be asked to participate in a 7-day intervention which will take up no more than 1 hour of your time in total and attend a short follow-up focus group.

To take part or for further information, please contact:
Francesca Boyd - fboyd1@sheffield.ac.uk
PhD Student – Department of Landscape
Supervised by Anna Jorgensen and Miles Richardson

The research has been approved by the University of Sheffield Department of Landscape's Research Ethics Committee.

Figure 0.3 flyer front

Urban Wellbeing

Do you live in Sheffield?
Aged 18-25?
£20 voucher for study participation

Urban Wellbeing

Do you live in Sheffield?
Aged 18-25?
£20 voucher for study participation

Figure 0.4 flyer back

Recruitment email to volunteer list

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Original Message
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Urban wellbeing study - £20 voucher for participation

Do you live in Sheffield? Aged 18-24?

This PhD research is about wellbeing and the urban environment. By taking
part you will contribute to improving our understanding of how we can use
urban green spaces to boost wellbeing.

You'll be asked to participate in a 7-day intervention which will take up no
more than 1 hour of your time in total, and attend a short follow-up focus
group. The intervention will require either taking part in a set activity or
downloading an app, it does not require daily attendance.

Subject to completion of the study, each volunteer will be compensated with a
GBP20 Voucher for their time and effort. You will need to complete
questionnaires (pre, post and 30-day follow up) and attend the follow up
focus group.

To express your interest in taking part please click here:
https://goo.gl/forms/1Ges5jRkbHuUEz7e2. Further details will be emailed to
those interested in taking part.

For further information, please contact: PhD student Francesca Boyd -
fboyd1@sheffield.ac.uk
Supervised by Professor Anna Jorgensen - a.jorgensen@sheffield.ac.uk

The research has been approved by the Department of Landscape's Research
Ethics Committee.
```

Thank you for taking the time to answer these questions. I am currently undertaking a PhD at the University of Sheffield, exploring the role of the natural environment in green (nature based) care. I am interested in the commissioning and referral process, and as part of my research I have already interviewed staff from the People Keeping Well team. They recommended talking to someone from the CCG. For more information please refer to the information sheet attached to the email.

1. What formal or informal procedures/processes does the CCG have in relation to commissioning Social Prescribing* in Sheffield?
2. Is this procedure likely to change in the near future and if so how?
3. If relevant, what type of evidence is used to justify and evaluate the commissioned interventions?
4. How does the CCG prioritise the commissioning of interventions (including but not limited to social prescribing) for certain individuals or communities?
5. Does the CCG have any interest in offering green prescriptions**
6. Would the CCG be interested in exploring the opportunity for the development of green prescribing in Sheffield?

Thank you,

Francesca Boyd

This PhD is funded as part of the Improving Wellbeing through Urban Nature project, for more information on IWUN please visit our website or sign up for the newsletter – www.iwun.uk

*Social Prescribing is understood here to mean non-clinical interventions such as those offered through community-based activities, for example: group learning, gardening, befriending.

**Green prescriptions are nature-based interventions which are specifically designed and facilitated for individuals with a defined need. Sometimes known as horticultural therapy, ecotherapy and care farms. A popular example would be social gardening groups.

Interview Information Sheet
Research Title: The role of natural environments in green care prescriptions.
Researcher: Francesca Boyd

Overview

This PhD study is part of the Improving Wellbeing through Urban Nature project, which aims to find out more about how Sheffield's natural environment can improve the health and wellbeing of the city's residents. Find out more: www.iwun.uk.

Specifically, this research aims to explore the role of natural environments in nature based interventions known as 'green care'. These interventions are one form of social prescription, already used within the NHS and social care sector in Sheffield and nationwide. This study aims to understand more about the role of the natural environment, and about which individuals are most likely to benefit from what type of green care intervention.

These interviews are designed to inform the next stage of research. Green care is an evolving sector with localised variations in practice. This phase is focused on answering research question no.1: how does the current referral process works and how are interventions currently tailored to the individual's defined need?

What will I be asked to do?

You have been invited to take part in a semi-structured interview. During this interview you will be asked approximately 5 questions relating to your field of expertise with some follow up questions depending on your answers. The interview will be recorded and transcribed for easy reference to its content in future.

Why have I been asked to take part?

You have been asked to participate in this research as you are an expert involved in the area of green care or social prescriptions interventions in the health and social care sector.

Do I have to take part?

You do not have to take part in the interview and are able to withdraw at any point, without giving a reason. If you wish to take part you will be asked to read this information sheet and sign a consent form. You are welcome to keep a copy of this information sheet. Your time and effort is much appreciated.

How long will it take and what is expected?

The semi-structured interview is specifically focused on issues relating to social prescriptions and green care within your area, and how patient's health and social needs are defined and met. It will take no longer then one hour and you are welcome to pass on any questions.

What will happen to the results of this research?

The interviews will be transcribed, thematically analysed and used to contextualise and develop later phases of this research project. Participants will have an opportunity to review transcriptions of the interviews if they wish. All recordings will be destroyed after transcription. The findings including short

written extracts from the interviews will be presented at conferences and in subsequent publications on the process of green prescriptions. The transcriptions may also be archived for use in later research.

Will it be anonymous?

Your contribution will remain confidential and anonymous if you wish (please write yes to question 4 on the consent form). If so you will not be referred to by name in publications of any kind and your anonymity will be ensured by removing any personal or other information that might identify you such as your job title or work location.

The project has been ethically reviewed by the Department of Landscape in accordance with procedure laid down by the University of Sheffield's Research Ethics Committee, which monitors the application and delivery of the University's Ethics Review Procedure across the University.

If you have any further questions or concerns please contact:

PhD student - Francesca Boyd, Department of Landscape, Arts Tower, University of Sheffield. fboyd1@sheffield.ac.uk

Supervisor - Dr Anna Jorgensen, Department of Landscape, Arts Tower, University of Sheffield a.jorgensen@sheffield.ac.uk

Transcription Protocol

An original transcription is typed up detailing what the interviewee said. Details of particular members of staff or very specific locations will be left out if not relevant to the content.

A second transcription will be created giving clear responses to the questions ask, this will be accessible to a lay person and omit irrelevant information.

Colloquial phrases can be altered if it supporting the message of the response and reduces confusion. Put the brakes on, pay out of their own pocket – pay for it themselves

Replace a word if it could be confusing to read – we're out, replaced with we visit

Deleting repeats if not influential on meaning.

These interviews are not designed to review the contextual meaning from the interviewee they are to gather information on a service being provided. The expert holds a position of authority through their job function and the knowledge desired if not readily available elsewhere (Bogner, Littig and Menz, 2009).

Notes on the overall interview will be kept in the researcher's diary to continue the development of learning. The expert may not appreciate seeing their answers written up in an informal style with grammatical errors (concern was raised by one participant that there were errors within their transcript).
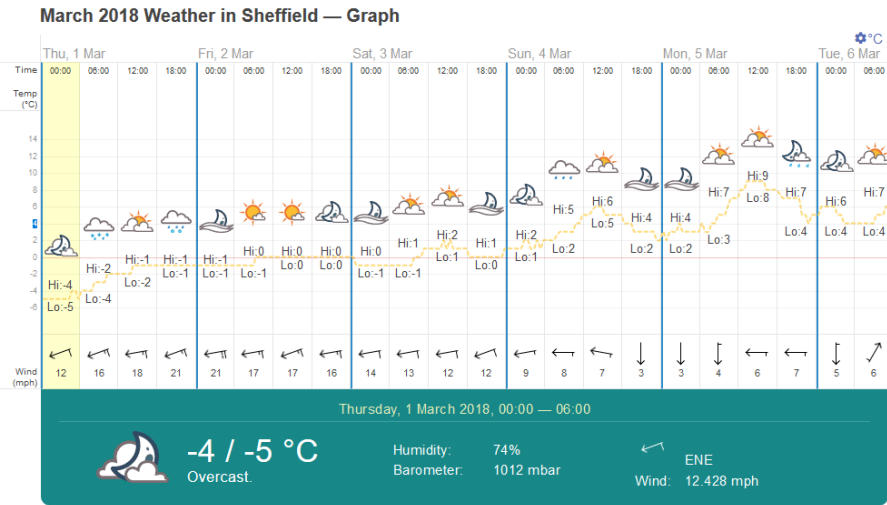
Weather for the week preceding the intervention

Figure 0.5 weather report

From Timeanddate.com (2019)

https://www.timeanddate.com/weather/uk/sheffield/historic?month=3&year=2018
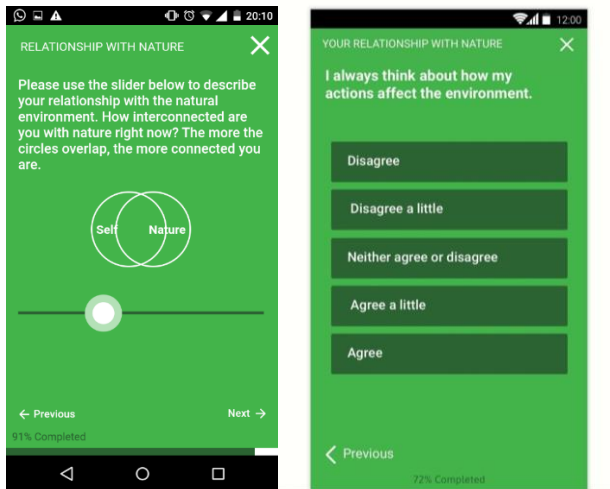
Sample of questions from app script

Figure 0.6 Shmapped question interface

General Health questionnaire

On the following screens, please tap the statement that best describes your health TODAY

○ Your Mobility TODAY

○ I have no problems in walking about

○ I have slight problems in walking about

○ I have moderate problems in walking about

○ I have severe problems in walking about

I am unable to walk about

Quality of life

Recovering Quality of Life scale

For each of the following statements, please tick one box that best describes your thoughts, feelings and activities over the **last week.**

1. Over the last week: I found it difficult to get started with everyday tasks

None of the time	Only occasionally	Sometimes	Often	Most or all of the time
○	○	○	○	○

Positive emotions
We are interested in the degree to which you commonly experience these feelings:

Calm

Not characteristic of me		Fairly characteristic of me		Very characteristic of me
○	○	○	○	○

Your relationship with nature

Please rate the extent to which you agree with each statement.

1. My ideal vacation spot would be a remote, wilderness area.

◯Disagree ◯Disagree a little ◯Neither agree or disagree ◯Agree a little ◯Agree strongly

1.I notice beauty in one or more aspects of nature.

◯Very unlike me ◯Unlike me ◯A little unlike me ◯Neutral ◯A little like me ◯Like me

◯Very much like me

Post (1month) questions about experiences of sites

What was your best experience of a green space/built space, and where was this?

What was your worst experience of a green space/built space, and where was this?

Questionnaire– outcome measures

Recovering Quality of Life scale (ReQoL)

For each of the following statements, please tick one box that best describes your thoughts, feelings and activities over the last week.

None of the time   Only occasionally   Sometimes   Often   Most or all of the time

1. Over the last week: I found it difficult to get started with everyday tasks

2. Over the last week: I felt able to trust others

3. Over the last week: I felt unable to cope

4. Over the last week: I could do the things I wanted to do

5. Over the last week: I felt happy

6. Over the last week: I thought my life was not worth living

7. Over the last week: I enjoyed what I did

8. Over the last week: I felt hopeful about my future

9. Over the last week: I felt lonely

10. Over the last week: I felt confident in myself

Short Form Version of the Nature Relatedness Scale (NR-6)

Instructions: For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5 as shown below. Please respond as you really feel, rather than how you think "most people" feel.

1. My ideal vacation spot would be a remote, wilderness area.
2. I always think about how my actions affect the environment.
3. My connection to nature and the environment is a part of my spirituality.
4. I take notice of wildlife wherever I am.
5. My relationship to nature is an important part of who I am.
6. I feel very connected to all living things and the earth.

INS

Please use the slider below to describe your relationship with the natural environment. How interconnected are your with nature right now? The more the circles overlap, the more connected you are.
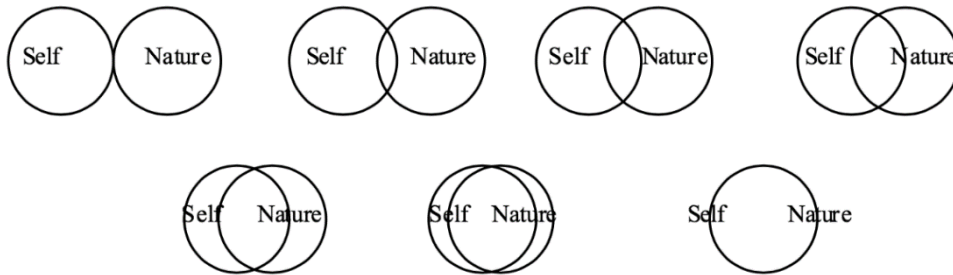
Group Walk Script Design and Diary entry

Small groups for social interactions.

Some groups are expected to be smaller than others.

In reality participation is variable and unreliable. Changes had to be made due to weather forecast and picket line.

When walking around I will talk as much as they talk and match their walking pace.

I will wear trainers to look fit in better with the group and not look like a keen nature person in hiking boots.

Including a range of landscapes: covered areas, trees, open grassland, duck pond, alongside a Victorian building, open water, alongside flower beds, closed and open spaces.

Discussion points on walk:

— Feeding the ducks as a child (compassion) – *when next to the duck pond*
— New flowers and spring (beauty) – *on approach to the mushroom lane crossing*
— Hearing bird song (contact) – *in the quiet corner of the boating lake*
— Memories of joy and enjoyment (emotion) – *in Weston Park*
— New tree leaves representing new life (meaning) – *along the edge with cherry trees*

Contact, beauty, meaning, emotion, compassion (Lumber, Richardson and Sheffield, 2017).

- -

Post Walk

The ache in my feet reminds me of the 32,000 steps I've done in 48hrs. The warmth of my face brings the memories of sun, wind and snow.

Walking as a method has been full of worry but the smile on my face is from the stories is from the stories my participants have shared. The laughter, the moments of peace and the insights into someone else's world as we took each step, felt the sun and walked as strangers.

I didn't talk to every participant as some groups kept to themselves. Groups range from 1- 8 people most were 4. One large group was very quiet, the other was very chatty.

Walks had trees, water, open/close space, built and less maintained hills, steps and flat.

One person was scared of dogs and pigeons.

Not everyone enjoyed the snow.

Focus Group Questions

1. Introduction myself and the aim of the discussion
    a. Fire alarm, water, snacks, toilets, audio recordings and anonymity
    b. Ice Breaker – favourite chocolate bar

2. The Walk
    a. Draw the walk, aerial photo for guidance if requested
    b. Add trees, flowers, animals
    c. Sounds, smells and feelings
    d. Favourite part
    e. Worse part
    f. Familiarity

3. Solo Walk
    a. Where did you go, who with and why
    b. Was this somewhere new
    c. Did it fit within your usual routine
    d. Are there any urban/green spaces you purposely avoid or aim for

4. App
    a. How easy was it to initially engage with
    b. Was it interesting
    c. Functions did you use all the features/did they work?   Map
    d. Aesthetics
    e. Would you have used this app if it wasn't for this research?
        i. Would you recommend a friend?
    f. What doesn't work
    g. What would you design differently

5. Extra Time
    a. Did you find yourself focusing on anything more than usual
    b. Do you eat your lunch outside when on campus
    c. Favourite green space on campus
    d. If you could design your own green space, let's say the Art Tower carpark what would you want
    e. Favourite outside space at home or in the city

Focus Group Questions Development

In line with grounded theory approach the focus groups gained questions as areas previously not considered appeared through discussion and reflection.
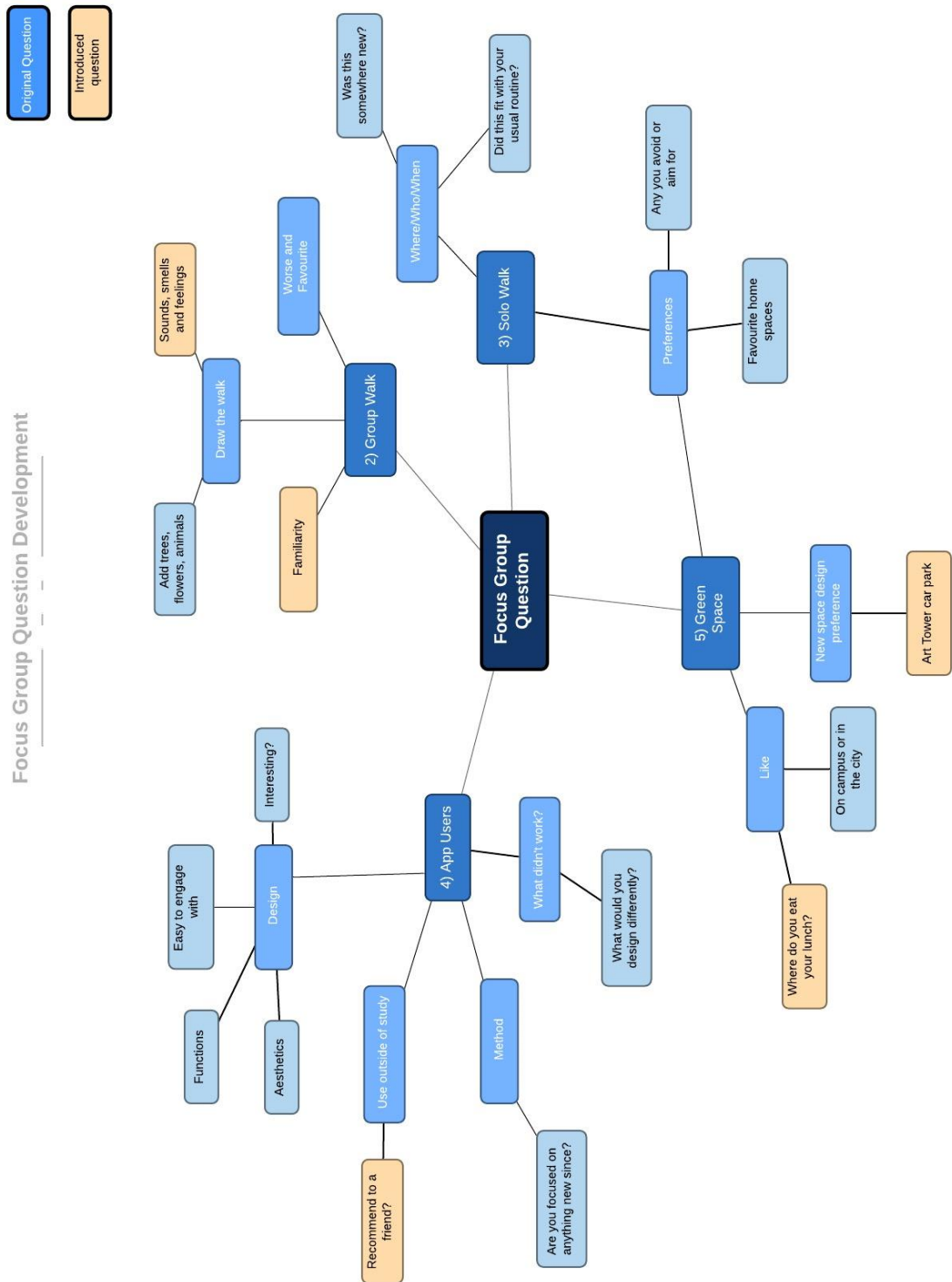

Figure 0.7 Focus group question map

Participants feedback survey questions

This was a open questions survey for those who wanted to give feedback but were unable to attend a focus group. This was partly due to the second and third wave of intervention running close to the Easter holidays. Some students left early in the term for fieldtrips and holidays.

Group 1 survey questions

1. How easy was it to use and engage with Shmapped? What worked well?
2. Which features did you use? (such as the map, progress tree and ability to add photo)
3. Would you use this app outside of the research study? What could be improved?
4. Any other comments?

Group 2 survey questions

1. Thinking back to the walk in Weston Park and Crookes Valley Park describe the things you noticed as we walked around: Did anything stand out, how did you feel, was it familiar?
2. Where did you go for your solo walk? Who were you with and why?
3. Do you have a favourite outside space on or around campus? What is it that you like about this place? *if you have no favourite place - is there a place you avoid?
4. What did you think of the App - Shmapped? Good and bad features
5. Any other comments?

Group 3 survey questions

1. Thinking back to the walk in Weston Park and Crookes Valley Park describe the things you noticed as we walked around: Did anything stand out, how did you feel, was it familiar?
2. Where did you go for your solo walk? Who with and why?
3. Do you have a favourite outside space on or around campus? What is it that you like about this place? *if you have no favourite place - do you have a place you avoid?
4. Any other comments?

Appendix C

Extract from Voluntary Action Rotherham Interview One:

F: How do you work out who has those contracts? How do you work out what the demand is?

NL: So first of all we work out what the demand is through the patients coming in, we record their needs, we look at the services that can support those needs and we've evolved as times gone on. During the early part of the project we had to offer out the funding in grant form to organisations that could potential meet the particular outcomes we set out in the grant application. Now that was based on very early information coming in as to what the typical needs of the majority of patients would need. Because of course we needed to get the money out into the sector during the pilot period.

Quite a lot of that was around typically people who were isolated, lonely or had practical needs with support for welfare benefits, advocacy support around social care. And we commissioned or gave grants out to those provides in that first pilot period. We have an independent panel that sits to approve funding that we recommend at the end of each financial year.

And what we do now, is we monitor contracts for performance, so that will be things; how many referrals are we making, what kind of outcomes are we getting, how is the contract working, is the organisation submitting reports in a timely fashion, are they managing the contact well and are we getting all the information we need and do we have a good working relationship with them. Based on that performance, it is then fed into our analysis each year. We will then make recommendations on to whether some contract should continue with those providers.

Above and beyond contract we can also use certain funding for what we call spot purchases. So if a particular patient comes through with a specific need for a service that's not common, not as many people would need that service, to justify contract [...], we would do it on a spot purchase. If there's an organisation in the voluntary and community sector that could meet that need we would do a pay as you go model rather than a contract model. [...as we have] more patients come through and we get more intelligence on that we can be fairly confident where we can commission large scale contracts because we know, in giving the money to an organising up front, [technically] in parts throughout the year, we know that we are going to send the referrals to them because [of] the typical patient's need. We can make a good judgement on that. And if things don't work out in that way or if there's problems, we have it built into contracts that we can terminate them.

Extract from People Keeping Well Interview Two:

F: *What interventions are offered in Sheffield and how do you decide who gets what?*
E: From a social prescribing point of view?
F: *yeah so not necessarily the nature bit but the general social prescribing as a whole.*

A: so from the practical operational arm of that the GP have a prescriptions pad, which is an electronic pad where they will determine on what the paints information on what they're giving them on whether or not a medical intervention is required or whether a social interaction would benefits which is where the CSW - community support worker - role comes in to play, because the vast majority of things which they can socially prescribe will come through to us and for us then to either work with the person directly or work with our partners within the people keeping well framework to direct them to other place, in regards to the interventions around health based nature based aspects that would be through conversation with the patient on what their likes and dislikes are and whether or not they would deem appropriate for walks. So for example we had a chap yesterday from move more and they're more health walks and nature walks so one of things would be, if someone said I could do with getting out and about and I'm feeling isolated and a bit sluggish. We would then say these this, they've got the contact details and this is what you can go and do, they can then go and do the walks wherever they are across the city and they're currently in X and Z. and then there's all the other stuff around the RIOB and what they're doing, doing walks around the city and going into nature reserve, photography, walking and mindfulness and health walking. So it's through the conversation that we have, and we have a healthy conversation with that person to actual decide if that's deem appropriate.

E: Because a lot of the provider organisations have been around years before people keeping well and probably before social prescribing things like healthy walks or allotment work, things which involve nature and getting outdoors and being and the social interactions. They were set up as a result of people wanting that sort of things and they've been around it's just the mechanisms for the referral into that, which is just developing now through things like social prescribing so the health walks happen all over.

A: They've been going for years haven't they, in different guises.

E: and I think Sheffield got more trees than any other city in the country, and there's lots of open space and obviously the peak district surrounds it.so in terms of having access…

A: of opportunities,
AC: we're quite lucky
AW: isn't the thing now about Sheffield being the running capital of Britain*, because of the accessibility to different terrains whether that be urban or nature, that they can go out and go anywhere in the city.

AC: outdoor city things yeah

E: there's other things, like reading on prescription and there's other things, that again that idea of non-medical interventions to support people around their health and wellbeing this is just part of it, this is the green part of it, because it depends on the person, so it might be that sitting and reading a book on mental health is more appropriate. But you know.

* http://theoutdoorcity.co.uk/

Extract from People Keeping Well Interview Three:

F: You mentioned that public health priorities – what other types of evidence is used to support those groups?

AE: Local feedback from front-line workers, and from residents, the population themselves – we have patient and public engagement, we do quite a lot of other feedback, we have different forums for engagement. We listen to those, we listen to the front-line staff saying: "this is what we need, this is what we need to develop".

RF: it's absolutely tried and tested approaches and I think the important thing is that a program or approach should never stand still so based on the best evidence that we have to date it looks like this but in a year's time if the soundings from staff and providers and people started to say something different we need to be open to start looking at those kinds of things really. So it's triangulating that isn't it – what the national evidence says, what people want and need and what staff feel is useful, appropriate, works.

F: And then in terms of whether or not it works, what's the evaluation process?

RF: I think that this is incredibly emotive, and I could talk about this for hours. I think what has to be really clear is that social prescribing is a well-recognised approach based on community development work that we know works, so let's stop trying to justify this wider approach, the non-medical approach, it works. We absolutely know it works. We now have the royal college of GPs saying "let's do it" so if that's the case let's stop trying to justify it to financial directors that that's the thing. I think it's really important that we recognise "is it achieving outcomes for patients and individuals?" and I think depending on the intervention that people receive, we have to be proportionate around how we measure that. So if someone's seen a community support worker twice and the tootle off into the sunset and they're absolutely fine, realistically beyond maybe a phone call in three months' time that says "did it work for you?" yes, tick, that's absolutely fine. I think where people are getting longer term interventions we're using a range of tools so we've got some patient reported outcome measures that include WEMWEBS, the ONS, wellbeing approach etc – some people want to use *outcome star* etc. and it's important that in a contract situation that I know that the provider (because I hold the contract) then I can assure colleagues like Lorraine that says for the money that we're spending absolutely the provider is recognising the distance travelled of that individual. I think what is the holy grail, and what Lorraine and I would go dancing through the streets with, is how we can show the impact on the system. Yes. And I think this is where when we were talking about cohorts, if you've picked a cohort that's significantly closer and a much more active user of H&SC now, you can show impact on the system relatively quickly so Rotherham have done some really good work and the Hallam evaluation is excellent, because they're working with frail elderly people with multiple long-term conditions so you would expect to see some impact on the H&SC system right now. In Sheffield because we're talking about a cohort that's further away from active use of H&SC, the impact on the system is not a straight line and is not as obvious so we do have anecdotal evidence, we've got partnerships and evidence that says "person x had 6 appointments in the last 3 months, they went to see their link worker at their local community organisation, they're now doing x and y and then be back to the doctor in 6 months". We've got some anecdotal, patient stories and I think that's the thing. What we haven't got is empirical evidence of all of these interventions as a straight line and that is really difficult on occasions to sell to

the finance directors that hold. But I think if we recognise that this is a way of working and that we can show through management and through patient stories that this is really having an impact and the other thing is, I recently went and sat in a room of GPs, we'd been doing a review on keeping well and I was a little bit nervous which is rare for me, I wondered what sort of a reception I would get, I thought I would get a little bit of a going over, and I came out of the room – they essentially said "don't stop this, this is the best thing ever". I tentatively said "if we get over capacity, we might have to restrict this to a certain patient group and I thought I was going to have a mutiny in the room! So I think that's the level of evidence that we've got to recognise that this is working for the system.

AE: it's important to capture the positives I think so if you talk to GPs, when you actually measure we've got care navigators that work in GP practises and they can identify the number of people that they've navigated away from GP appointments into social prescribing and the impact that's had. And that's a very positive impact. What the system tends to try and do is try and measure the negatives, so they measure a decrease in the failures. So they want to measure what's the impact on non-elective admissions, what's the impact on A&E? Really, you're measuring it where it's gone wrong. that's not what we should do – we should measure the positives, and I think that if we do that, there's sufficient evidence to demonstrate that it really works in Sheffield. Added to that all the qualitative data about the difference that it's made to people's lives, and I think the impact will be felt in years ahead because it is a preventative measure, it's not made to be an emergency reactive care-type thing which again I think sometimes people misunderstand what it's meant to be, because there's been discussions about "can they pick up all the discharges from hospital?" well no, that's not really what it's there to do.

RF: And I think the important thing in that conversation is those individuals would benefit from a social prescribing approach, and that's not the wrong thing to do but that wouldn't be people keeping well and if we realigned our resource to do that we wouldn't be doing early help so it's always a challenge in the system because when people say "people keeping well aren't doing that" it's not because they can[t' and shouldn't, it's always that issue of sucking prevention closer to people who need right now rather than being true prevention.

Additional material from People Keeping Well

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People Keeping Well (PKW) Framework Partnerships

PKW Partnership Map - July 2017

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Area 1: Stocksbridge, Upper Don, Rural, Bradfield, Oughtibridge, Wharncliffe Side, Worrall – **(South Yorkshire Housing Association)**
- Oughtibridge Surgery
- Valley Medical Centre
- Deepcar Medical Centre
- Stocksbridge Health Forum
- Stocksbridge Community Care Group
- STEP Development Trust
- 4SLC
- Stocksbridge Community Forum
- Woodthorpe Development Trust
- Dransfield Properties Limited

Main Contact: Liz Caterer - l.caterer@syha.co.uk - 0114 2702551 or Zoe Oldfield – z.oldfield@syha.co.uk - 0114 290 0200 - South Yorkshire Housing Association, 43-47 Wellington Street, Sheffield, S1 4HF

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Area 2: Chapel Green, Ecclesfield, Burncross, Chapeltown, Grenoside – **(SOAR)**
- Age UK
- PACES
- Sheffield Citizen's Advice
- High Green Development Trust
- Chapelgreen Practice
- St Saviour's Church
- Sheffield Carers' Centre
- Ecclesfield Parish Council
- Sheffield 50+
- Alzheimer's Society
- Mortomley TARA

Main Contact: Ian Drayton - ian.drayton@soarcommunity.org.uk - 0114 213 4066 – or Guy Weston - guy.weston@soarcommunity.org.uk - 0114 213 4065 - SOAR Works, 14 Knutton Road, Sheffield, S5 9NU

Area 3: Middlewood, Wadsley, Hillsborough, Walkley Bank, Wisewood, Woodland – **(ZEST)**
- Age UK Sheffield
- Burton Street Foundation
- Dykes Hall Medical Centre
- Places for People Leisure
- St John's Church Owlerton

Main Contact: Megan Ohri – Megan.ohri@zestcommunity.co.uk - 0114 270 2041 - Zest, 18 Upperthorpe, Sheffield, S6 3NA

Area 4: Southey, Fox Hill, New Parson Cross, Old Parson Cross, Southey Green, Longley, Shirecliffe, Colley – **(SOAR)**
- The Healthcare Surgery
- Foxhill Forum
- LEAF
- Parson Cross Initiative (PXI)
- Parson Cross Forum
- Shirecliffe Forum
- Southey Development Forum
- Friends of Ecclesfield Library
- Sheffield Live at Home
- Longley 4G

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Main Contact: Ian Drayton - ian.drayton@soarcommunity.org.uk - 0114 213 4066 – or Guy Weston - guy.weston@soarcommunity.org.uk - 0114 213 4065 - SOAR Works, 14 Knutton Road, Sheffield, S5 9NU

Area 5: Firth Park, Shiregreen, Wincobank, Brightside, Flower, Stubbin, Brushes – **(SOAR)**
- Shiregreen Medical Centre
- Concord Sports Centre (SIV)
- Firth Park Active (Centre for Life)
- Flower Estate Family Action
- Flower Estate TARA
- St Mary's Timebuilders
- Friends of Wincobank Hill / Connect Wincobank
- PACA
- Sanctuary Housing
- Brushes TARA

Main Contact: Ian Drayton - ian.drayton@soarcommunity.org.uk - 0114 213 4066 – or Guy Weston - guy.weston@soarcommunity.org.uk - 0114 213 4065 - SOAR Works, 14 Knutton Road, Sheffield, S5 9NU

Area 6: Upperthorpe, Netherthorpe, Walkley, Langsett, Crookesmoor – **(ZEST)**
- Upperthorpe Medical Centre
- Age UK
- The Vine

Main Contact: Megan Ohri - Megan.ohri@zestcommunity.co.uk - 0114 270 2041 - Zest, 18 Upperthorpe, Sheffield, S6 3NA

Area 7: Burngreave, Abbeyfield, Firvale, Firshill, Spital Hill, Woodside and Darnall – **(Creative Pathways)**
- The Firvale Hub (PACA)

Main Contact: Freda Cotterell - creativepathways@outlook.com - 0114 2701066 - Creative Pathways, Offices 1 – 5, Spartan House, 20 Carlisle Street, Sheffield, S4 7LJ

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Area 8: Burngreave, Firvale, Abbeyfield, Firshill, Woodside – **(SOAR)**
- Page Hall Medical Practice
- PACA
- MAAN
- Aspiring Communities Together (ACT)
- Arches Housing
- Burngreave TARA
- SAGE Greenfingers
- SACHMA

Main Contact: Ian Drayton - ian.drayton@soarcommunity.org.uk - 0114 213 4066 – or Guy Weston - guy.weston@soarcommunity.org.uk - 0114 213 4065 - SOAR Works, 14 Knutton Road, Sheffield, S5 9NU

Area 9: Darnall, Tinsley, Acres Hill (some partnership work with other Clover Group Practices - Jordanthorpe, Mulberry etc.) – **(Darnall Wellbeing)**
- The Family Development Project
- Darnall Forum
- Tinsley Forum
- Darnall Dementia Group
- Heeley City Farm – South Yorkshire Energy Centre
- Sheffield Carers' Centre
- The Clover Group Practice (Darnall and Tinsley)
- York Road Surgery

Main Contact: Lucy Melleney - lucy@darnallwellbeing.org.uk or Natalie Shaw - natalie@darnallwellbeing.org.uk - 0114 249 6315 - Darnall Wellbeing, Darnall Primary Care Centre, 290 Main Road, Darnall, Sheffield, S9 4QH

Area 10: Broomhill, Crosspool, Crookes – **(currently no lead partner)**
- Manchester Road Surgery
- Crookes Practice
- Crosspool Forum
- Crookes Forum
- Recovery Enterprise
- Wesley Hall Lunch Club
- St Timothy's Lunch Club
- Crosspool Lunch Club

- Crookes TARA
- Westminster TARA
- St Columba's Church
- The Beacon St Stephen Hill Methodist Church
- Tapton Hill Congregational Church
- St Francis Roman Catholic Church
- Care in Crosspool

Main Contact: pkw@sheffield.gcsx.gov.uk

Area 11: City Centre, Broomhall, Sharrow – **(ShipShape)**
- Ignite Imaginations
- Broomhall Centre
- Cathedral Archer Project
- Devonshire Green Medical Centre
- Porterbrook Medical Centre
- SIV
- Ben's Centre
- U-Night
- MAAN

Main Contact: Tanya Basharat - t.basharat@shipshape.org.uk - 0114 2500222 - Shipshape Health and Wellbeing Centre, Sharrow Lane, Sheffield, S11 8AE

Area 12: Manor, Castle, Wybourn, Park Hill, Granville – **(Manor & Castle Development Trust One)**
- Dovercourt Surgery
- Whitehouse GP Practice
- Manor Park Medical Centre
- S2 Foodbank
- Green Estate
- Manor Park Post Office
- Manor Assembly
- Victoria Centre (Victoria Community Enterprises)
- MASKK

Main Contact: Lucy Andrews - lucyandrews@manorandcastle.org.uk - 07957 465523 - Manor & Castle Development Trust, The Quadrant, 99 Parkway Avenue, Sheffield, S9 4WG

Area 13: Highfield, Heeley, Woodseats, Gleadless Valley (parts of Meersbrook) – **(Heeley Development Trust)**
- Sloan Medical Practice
- Shipshape
- Roshni
- FURD
- Heeley Asian Women's Group

Main Contact: Andy Jackson - andy.j@heeleydevtrust.com - 0114 2500613 - or Maxine Bowler - maxine.b@heeleydevtrust.com - 0114 2500 613 - Heeley Development Trust, Ash Tree Yard, 62-68 Thirlwell Road, Sheffield, S8 9TF

Area 14a: Older people 65+ in Hemsworth, Meersbrook, Arbourthorne, Highfield – **(Heeley City Farm)**

- Reach South Sheffield
- Heeley Green Surgery
- St Wilfrid's Centre
- Church of Nazarene
- Sheffield Mind
- Shelter
- Freedom Therapies
- Gleadless Medical Centre
- Waggon and Horses Community Pub

Main Contact: Shelly McDonald - shelly.syec@heeleyfarm.org.uk - 0114 3039981 ext 2 - Heeley City Farm, Richards Road, Sheffield, S2 3DT

Area 15: Arbourthorne, Norfolk Park, Gleadless – **(Manor & Castle Development Trust)**
- East Bank Medical Centre
- The Arbourthorne Centre
- Norfolk Park Medical Centre
- Arbourthorne TARA
- Nolfolk Park TARA
- Tiddlywinks
- Arbourthorne Antics and Arbourthorne Strength & Stamina
- The Spires Centre
- S2 Food Bank

Main Contact: Lucy Andrews - lucyandrews@manorandcastle.org.uk - 07957 465523 - Manor & Castle Development Trust, The Quadrant, 99 Parkway Avenue, Sheffield, S9 4WG

Area 14b: Gleadless Valley, Gleadless, Heeley – **(Heeley City Farm)**

- Reach South Sheffield
- Heeley Green Surgery
- St Wilfrid's Centre
- Church of Nazarene
- Sheffield Mind
- Heeley Rise TARA
- Shelter
- Freedom Therapies
- Gleadless Medical Centre
- Waggon and Horses Community Pub

Main Contact: Shelly McDonald - shelly.syec@heeleyfarm.org.uk - 0114 3039981 ext 2 - Heeley City Farm, Richards Road, Sheffield, S2 3DT

Area 16: Dore and Totley – **(Age UK)**
- Royal Voluntary Service
- Sheffield Citizen's Advice
- Totley Community Resource & Information Centre
- Totley Pharmacy
- Sheffield 50+
- Sheffield Carers' Centre
- Voluntary Action Sheffield
- Alzheimer's Society
- Sheffield Health & Social Care
- Carterknowle and Dore Medical Practice

Main Contact: Andy Callard - andy.callard@ageuksheffield.org.uk - 0114 250 2850 – Age UK Sheffield, South Yorkshire Fire & Rescue, 1st Floor, 197 Eyre Street, Sheffield S1 3FG

Area 17: Batemoor, Jordanthorpe, Lowedges, Bradway, Greenhill, Beauchief – **(Reach South Sheffield)**
- The Terminus
- Shelter
- VAS
- CAB
- Jordanthorpe Library
- Heeley City Farm

Main Contact: Steve Rundell - steve.rundell@gvcf.org.uk - 07939 411221 - Reach South Sheffield, 187 Blackstock Road, Sheffield, S14 1FX

Area 18: Woodhouse, Beighton, Hackenthorpe, Westfield, Owlthorpe, Halfway – **(Woodhouse and District Community Forum)**
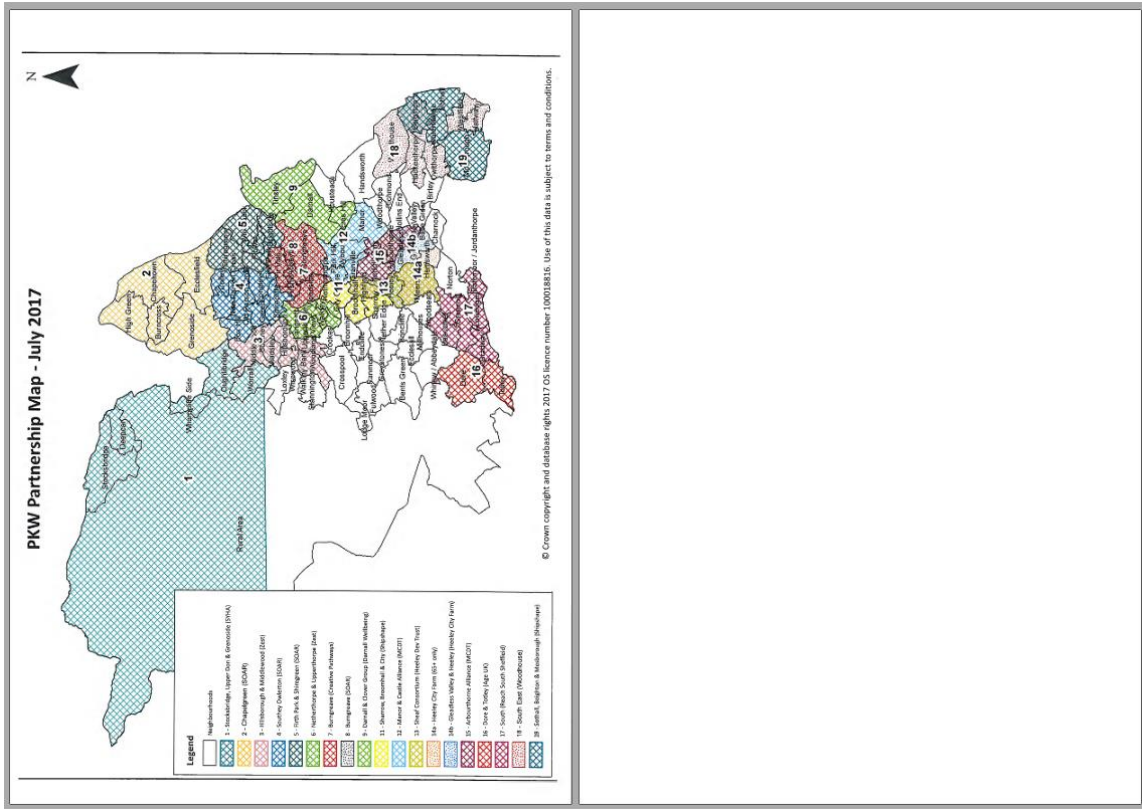- Westfield Big Local
- St Anne's Community Services
- Sheffield City Council Housing and Neighbourhoods
- Woodhouse Health Centre
- Sheffield DACT (Drugs and Alcohol / Domestic Abuse Co-ordination Team)
- South Yorkshire Police
- Woodhouse West Primary School
- The Salvation Army Westfield
- East MAST (Multi-Agency Support Team)
- Hackenthorpe Medical Centre
- Owlthorpe Surgery
- Crystal Peaks Medical Centre
- Alzheimer's Society
- Workers' Education Association

Main Contact: Kathryn Taylor - kathryn_taylor@hotmail.co.uk – 0114 2690222 – Woodhouse & District Community Forum, 2 Goathland Place, Woodhouse, Sheffield, S13 7TE

Area 19: Beighton, Waterthorpe, Sothall, Mosborough – **(ShipShape)**
- Mosborough Health Centre
- Sothall & Beighton Medical Practice
- Woodhouse and District Community Forum
- Heeley Development Trust

Main Contact: Tanya Basharat - t.basharat@shipshape.org.uk - 0114 2500222 - Shipshape Health and Wellbeing Centre, Sharrow Lane, Sheffield, S11 8AE

PKW Partnership Map - July 2017

Legend

Neighbourhoods
1 - Stocksbridge, Upper Don & Genocide (SYHA)
2 - Chapelgreen (SGAP)
3 - Hillsborough & Middlewood (Zest)
4 - Southey Owlerton (SOAR)
5 - Firth Park & Shiregreen (SOAR)
6 - Netherthorpe & Upperthorpe (Zest)
7 - Burngreave (Creative Pathways)
8 - Burngreave (SOAR)
9 - Darnall & Clover Group (Darnall Wellbeing)
11 - Sharrow, Broomhall & City (Shipshape)
12 - Manor & Castle Alliance (MCDT)
13 - Sheaf Consortium (Heeley Dev Trust)
14a - Heeley City Farm (65+ only)
14b - Gleadless Valley & Heeley (Heeley City Farm)
15 - Arbourthorne Alliance (MCDT)
16 - Dore & Totley (Age UK)
17 - South Reach South Sheffield)
18 - South East (Woodhouse)
19 - Sethall, Beighton & Mosborough (Rhythmae)

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Rotherham Social Prescribing

Linking patients to voluntary and community services

Information for patients

Rotherham Clinical Commissioning Group

What is Rotherham Social Prescribing Service?

The Rotherham Social Prescribing Service (RSPS) helps patients with long term health conditions to access activities and services provided by voluntary organisations and community groups in Rotherham. The service is managed by Voluntary Action Rotherham.

How do I access RSPS?

To access the Rotherham Social Prescribing Service, you must be over 18, registered with a Rotherham GP Practice and have a long term health condition. Only GPs can refer patients to the Rotherham Social Prescribing Service.

With your consent, your GP will refer you to the Social Prescribing Service if your physical and mental health could be improved by accessing voluntary and community services.

A Voluntary and Community Services (VCS) Advisor will then visit you, often at home, to discuss any services that could help improve your health and wellbeing.

How can my VCS Advisor help me?

If you would like to get out more, your VCS Advisor can arrange for you to attend support groups or social activities within Rotherham. As many people find this daunting, your Advisor can organise for someone to go with you for a time to any new group or activity.

VCS Advisors can also help with practical things like transport, benefits, budgeting or debt.

Your VCS Advisor can help you to:

- Improve your health and wellbeing, independence and ability to manage your health condition
- Access condition specific support groups
- Attend local community social groups
- Access benefits advice/debt advice/welfare rights
- Address isolation issues
- Access local volunteering opportunities
- Access services for your carer/s
- Create a plan of action

VCS Advisors

Julie Moxon
Office: 01709 726898
Mobile: 07525 767467

Sophia Zubair
Office: 01709 834447
Mobile: 07738 065597

Helen Briscoe
Office: 01709 834448
Mobile: 07738 065603

Marion Martin
Office: 01709 834469
Mobile: 07714560101

Catherine Oxtoby
Office: 01709 834443
Mobile: 07714560102

Manager: Barry Knowles
01709 723098
Voluntary Action Rotherham
Coke Hill, Rotherham, S60 2HX

What can your VCS Advisor help you with?

Tick any boxes to indicate which interest or concern you

- **Lifestyle** (diet, sleeping, exercise, stop smoking, alcohol)
- **Money** (benefits, budgeting, debt)
- **Looking after myself** (shopping, going out, household chores, adaptations/equipment, transport, personal care)
- **Where I live** (accessing local facilities, living conditions eg damp, stairs, heating, fire safety)
- **Managing my symptoms** (information, medication, resting & energy levels, pain management, support groups)
- **Family & friends** (talking, understanding, adjusting, new roles, isolation)
- **Working, volunteering & other activities** (work conditions, retraining, social groups, volunteering, learning/study)
- **Feeling positive** (learning to cope, hope, feeling calm)

Research Diary – Conference and network evolution

During this time, I attended two conferences from the social prescribing network, these are regional events the first was in York 2017, the second in Sheffield 2018. In 2019, the final year of this research I attended the national level social prescribing conference in London. The network has been set up by Westminster University " [The] Social Prescribing Network consists of health professionals, researchers, academics, social prescribing practitioners, representatives from the community and voluntary sector, commissioners and funders, patients and citizens." (University of Westminster, 2019). This network was new in 2017, and there was a tangible excitement in the room as people met from the same passion of work but without previously knowing the other exist. GPs, conservationists and artist gave presentation on the antidote evidence to support their intervention or procedure. The CEO of VAR had received an MBE for her work in the community sector (VAR, 2017). As a new researcher to this area it was apparent that there was a lack robust evidence I would expect from health research. While there was passion in the network, I often found myself gravitating towards those who were sceptical and to quote one CEO from a young people charity in the North East of England 'not yet ready to drink the koolaid' (conference participant - 2018).

At the Sheffield 2018 conference there was a presentation from People Keeping Well, this presentation illustrated that I had not fully understood the system implemented by the local authorities. It was at this point that I was able to talk to the service manager and arrange the second interview. At the final nationwide conference there was a strong narrative of the strength of social prescribing with limited space for discussion on failures or weakness in the evidence or interventions. It is a concern that this will limit the opportunity for learning as the sector continues to develop. This conference also contained an announcement from Public Health England on their intention to support link workers nationwide to develop social prescribing (NHS England, 2019c).
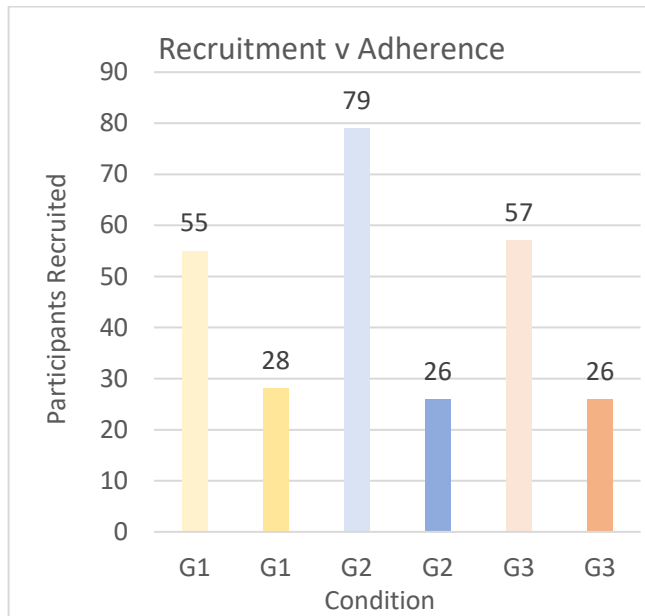
Appendix D

Recruitment and Adherence

Figure 0.8 Recruitment and Adherence

Group 1 = App, Group 2 = AppWalk, Group 3 = Walk

Wave 1 – 240 respondents

Wave 2 – 35 respondents

Wave 3 – 11 respondents (group 3)

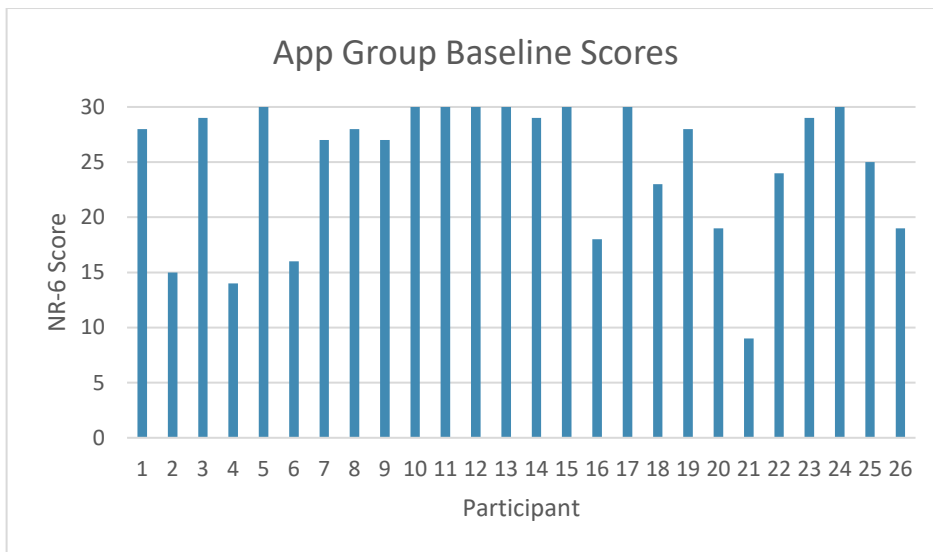*Nature Relatedness Baseline Measurements*

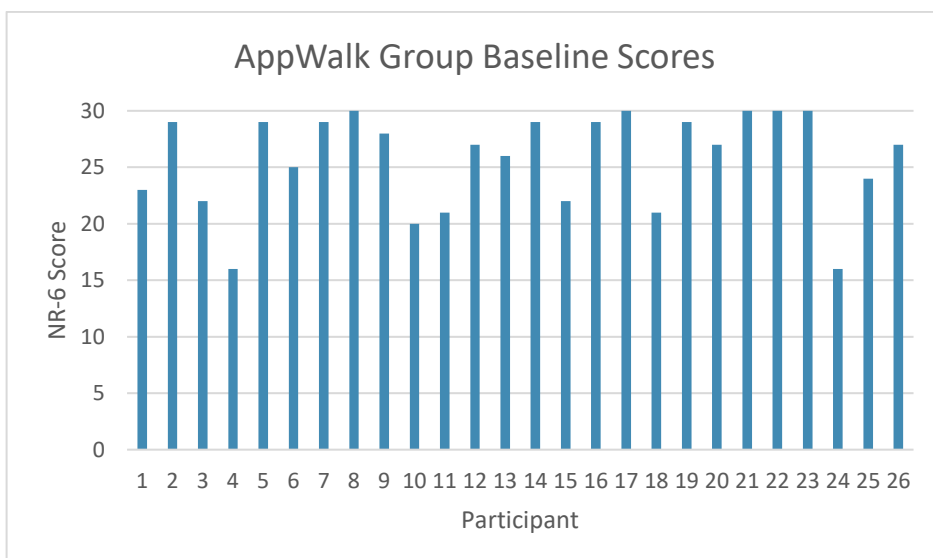

Figure 0.9 Baseline NR-6 in App Group

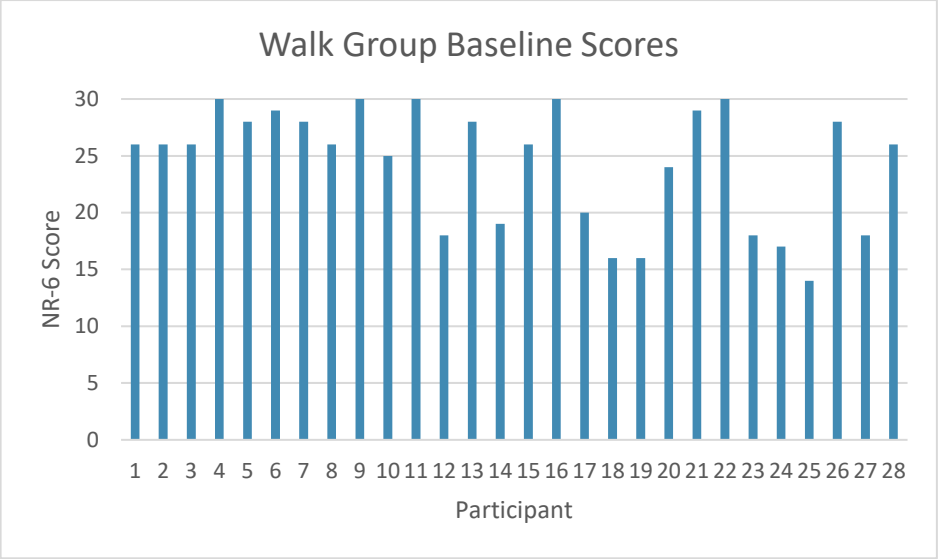Figure 0.10 Baseline NR-6 in AppWalk Group

Figure 0.11 Baseline NR-6 in Walk Group

Linear Regression of ReQoL and NR-6

Scatter graphs display a weak correlation between Recovering Quality of Life (ReQoL) and Nature Relatedness (NR-6) as suggested by the literature review, to test this a linear regression was run to predict the value of one variable based on another (figure 0.12 and 0.13). It found a weak relationship with a regression equation ($F_{(1,137)}$ =5.143, p = 0.25), with only 3.6% of the variation in NIR-6 being explained by ReQoL. Predictive value of 24.663 + 0.190 for Recovering Quality of Life against Nature Relatedness (n=139).
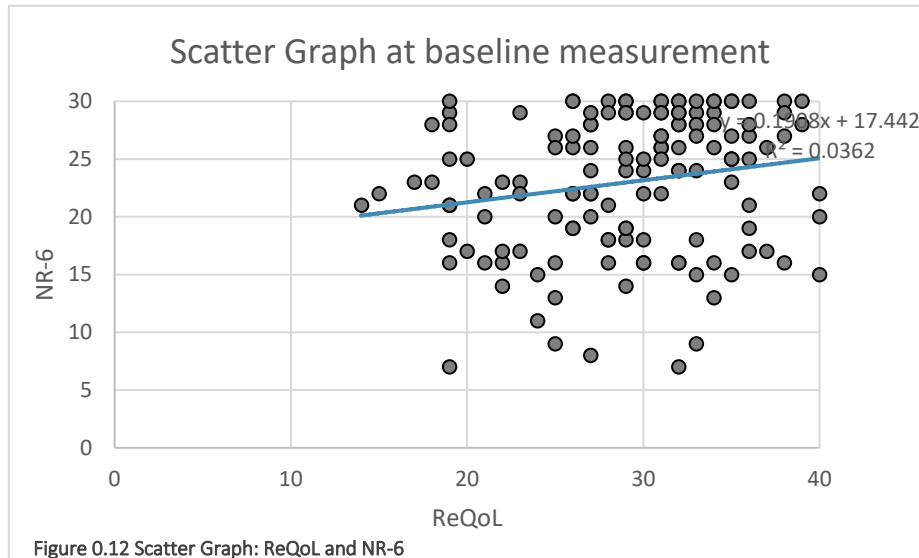

Figure 0.12 Scatter Graph: ReQoL and NR-6

As suggested by the correlation there may be a significant relationship between ReQoL and NR-6 at 30 days measurement. A linear regression was calculated to predict ReQoL at 30 days based on NR-6 at 30 days. A weak relationship with a regression equation found ($F_{(1,117)}$=5.022, p= 0.027), with only 4.1% of the variation in NIR-6 being explained by ReQoL. Predictive value of 25.590+0.212 for Recovering Quality of Life when measured against Nature Relatedness at 30 days (N=119).
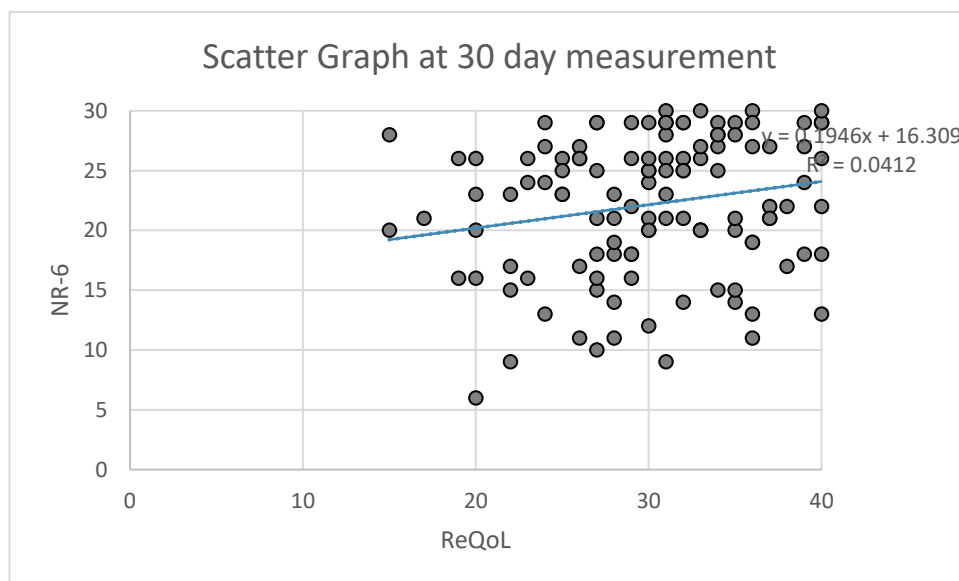

Figure 0.13 Scatter Graph: ReQoL and NR-6 at 30 day

Built v Green App Condition

Some variation between those assigned to the built condition compared to those assigned to the green condition was expected at the design stage of the app. This conditional difference was defined through the chatbot within the app asking the participants to notice things 'in nature' or in the 'built environment'. The wider findings from the App detailed that participant's comments on nature devoid of the condition they were assigned to. From focus groups it became apparent that participants within this study often remarked on nature even when in the built condition. Therefore, little difference is expected between the two groups. By combining all the app users from the population sample used in the intervention study (group 1 and 2) rather than the wider project the following analysis was available.

The pairwise MANOVA displayed a significant change between point 1 (baseline) and point 2 (post intervention day 7). The mean difference between time 1 and 2 is -2.881 (p= 0.05 sd=.822, n=37) for the built environment the same test had a mean difference of -0.529 (p=1. sd=0.692, n=17). The line graphs illustrate the change and the large deviation (figure 0.14 and 0.15).
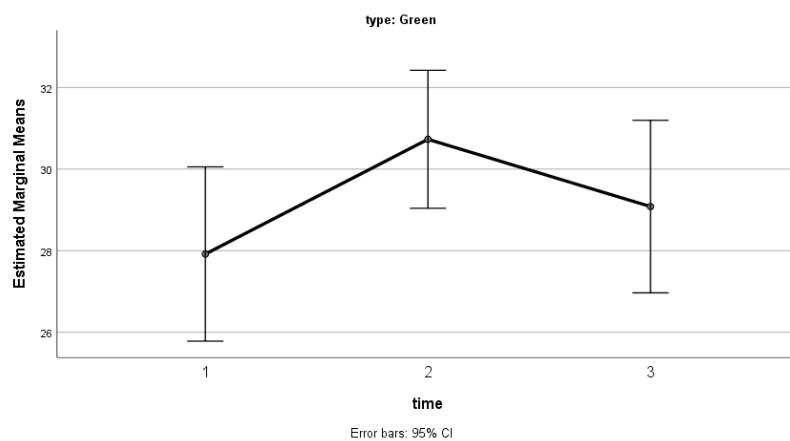
Figure 0.14 Line graph of green condition means
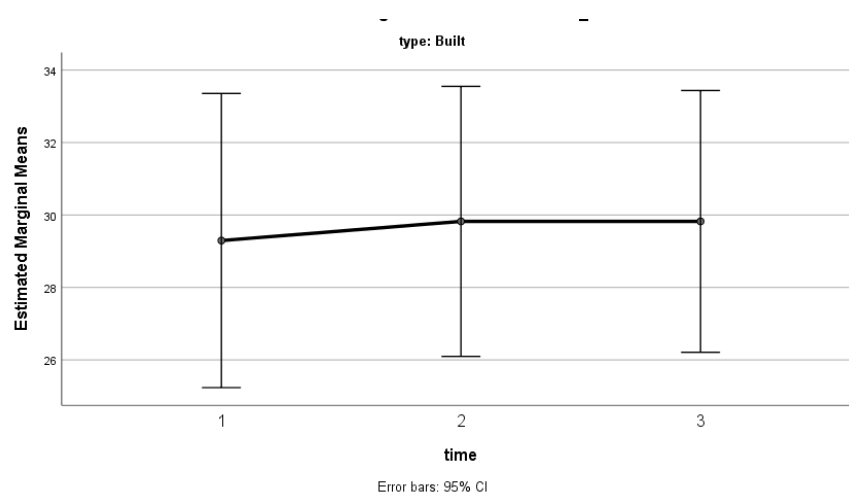
Figure 0.15 line graph of built condition means
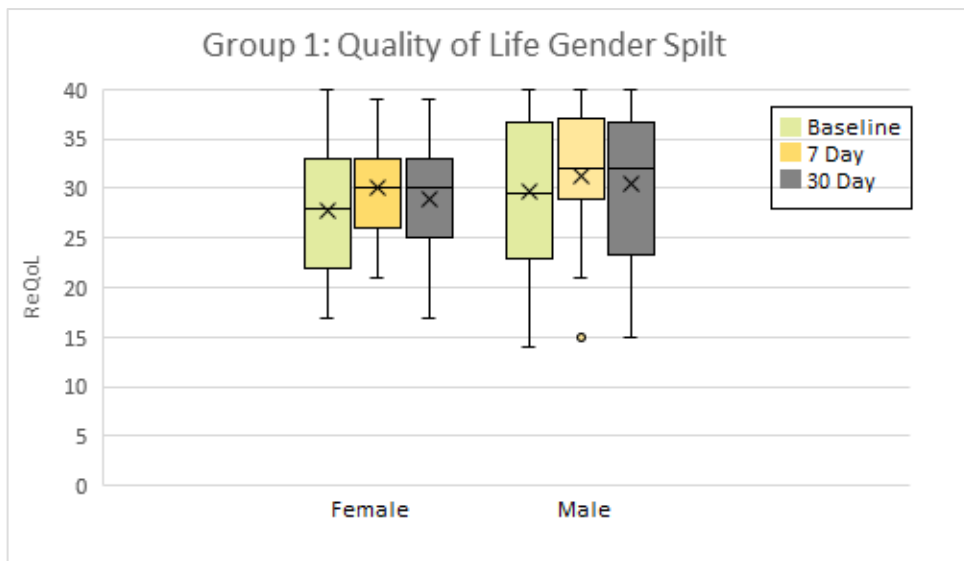
Figure 0.16 Group 1(App) ReQoL by Gender
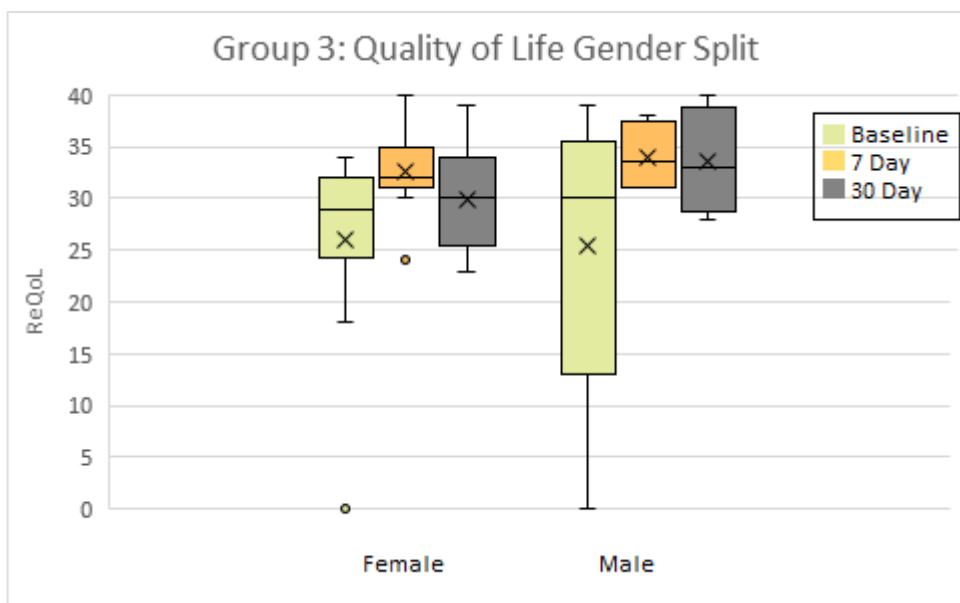
Figure 0.17 Group 3 (Walk) ReQoL by Gender

Table 0.2 Participants in Group 1 and 3 by gender

ReQoL n	Group 1: App	Group 3: Walk
Males	24	4
Female	35	13

Figure 0.18 Group 1 (App) NR-6 by Gender
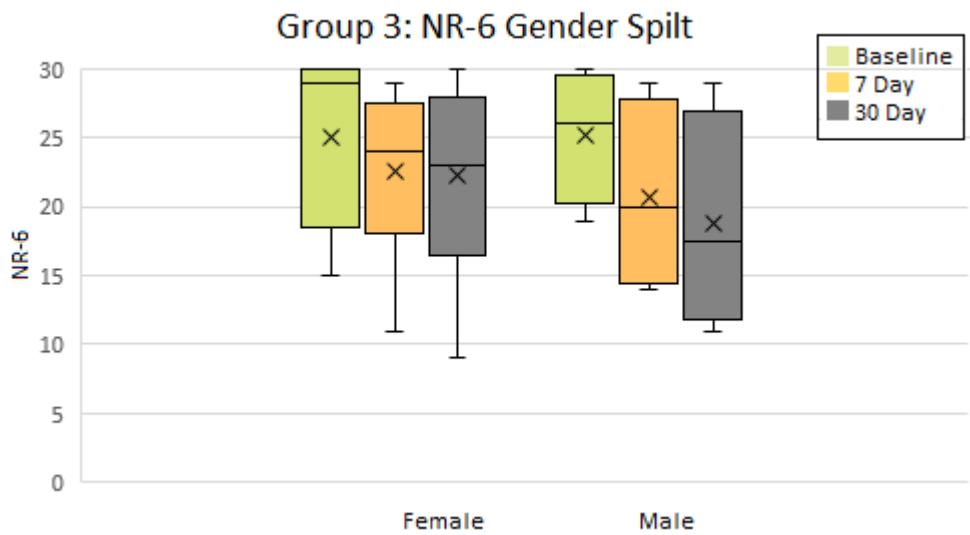
Figure 0.19 Group 3 (walk) NR-6 by Gender

Table 0.3 Participants in Group 1 and 3 by gender

NR-6 n	Group 1: App	Group 2: Walk
Male	25	4
Female	36	13

Additional Variables Means Table

Table 0.4 Additional Variables Means

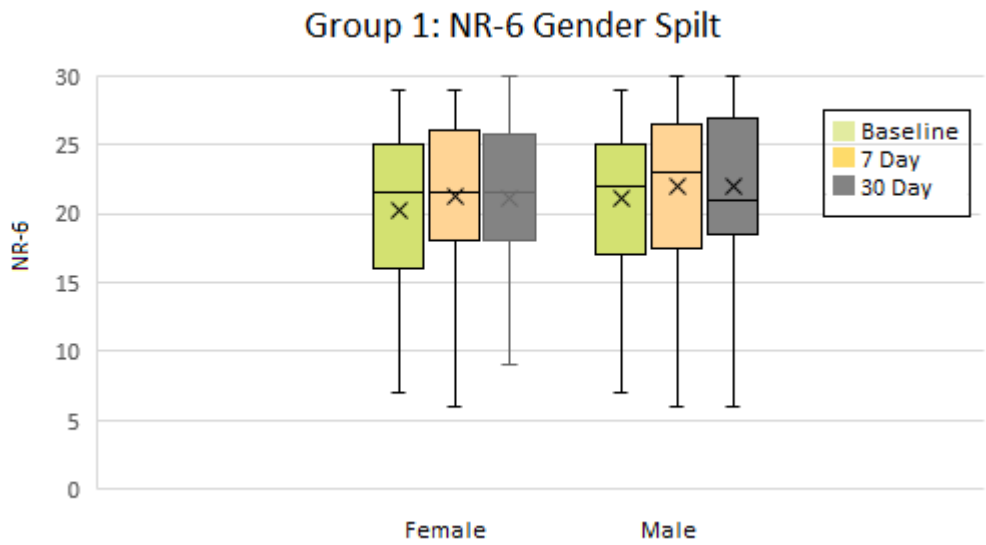| Measure	Condition	Baseline	Post	Follow-up
Mean (SD)				
Safe	*App*	11.92 (3.23)	11.80 (2.71)	11.68 (2.63)
	Walk/App	10.73 (3.07)	11.57 (2.97)	11.72 (2.76)
	Walk	13.82 (2.91)	14.04 (2.33)	14.18 (2.72)
	Shmapped	10.35 (2.96)	11.14 (2.92)	10.78 (2.45)
Relax	*App*	16.00 (4.12)	15.65 (4.50)	16.05 (3.85)
	Walk/App	13.69 (3.83)	14.87 (3.29)	15.39 (5.34)
	Walk	19.04 (3.55)	18.52 (3.42)	19.09 (3.52)
	Shmapped	13.77 (3.72)	15.44 (3.54)	14.89 (3.74)
Active	*App*	21.92 (5.0)	21.45 (5.56)	21.41 (5.15)
	Walk/App	19.62 (3.76)	20.00 (4.35)	21.56 (6.38)
	Walk	26.64 (3.78)	26.52 (4.50)	27.23 (5.50)
	Shmapped	19.42 (3.85)	20.98 (4.89)	20.29 (4.64)
Engagement with Natural Beauty	*App*	18.92 (5.95)	19.55 (6.79)	18.95 (7.02)
	Walk/App	18.85 (4.99)	19.17 (5.69)	19.06 (5.64)
	Walk	18.14 (5.58)	21.92 (5.19)	21.77 (5.40)
	Shmapped	18.57 (5.48)	18.83 (5.35)	19.40 (5.71)

*Wi*lcoxon Signed Rank Test Summary ReQoL
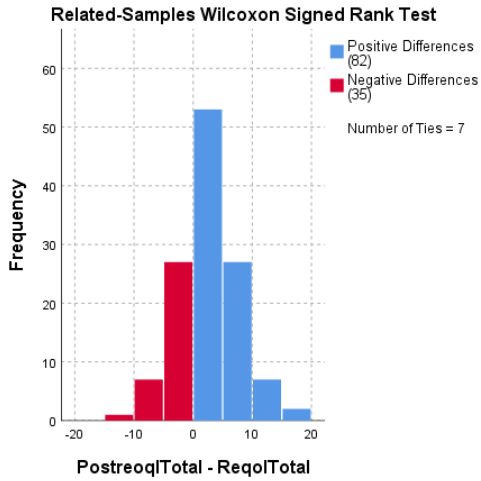
Related-Samples Wilcoxon Signed Rank Test Summary

Total N	124
Test Statistic	5148.000
Standard Error	366.934
Standardized Test Statistic	4.623
Asymptotic Sig.(2-sided test)	.000

Figure 0.20 Baseline - Post ReQoL
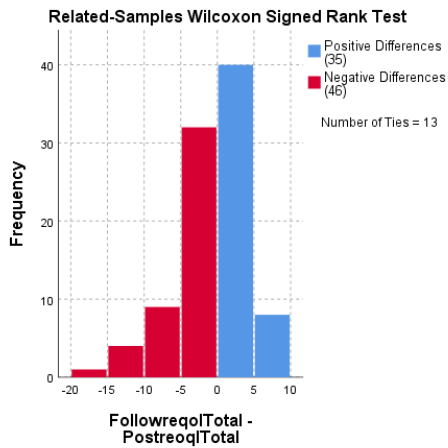
Related-Samples Wilcoxon Signed Rank Test Summary

Total N	94
Test Statistic	1270.000
Standard Error	211.729
Standardized Test Statistic	-1.844
Asymptotic Sig.(2-sided test)	.065

Figure 0.21 Follow up - Post ReQoL

Wilcoxon Signed Rank Test Summary NR-6
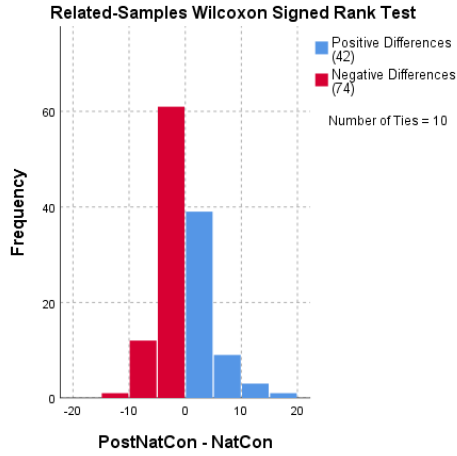
Related-Samples Wilcoxon Signed Rank Test Summary	
Total N	126
Test Statistic	2642.000
Standard Error	361.314
Standardized Test Statistic	-2.079
Asymptotic Sig.(2-sided test)	.038

Figure 0.22 Baseline-Post NR-6
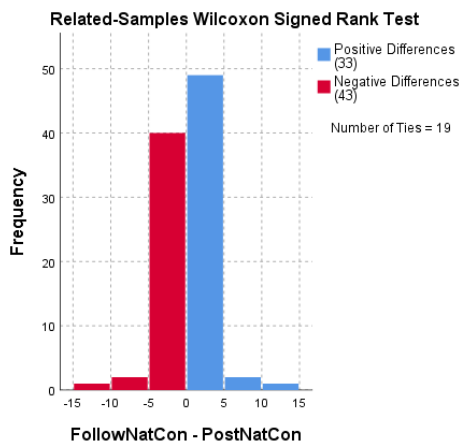
Related-Samples Wilcoxon Signed Rank Test Summary	
Total N	95
Test Statistic	1379.000
Standard Error	191.640
Standardized Test Statistic	-.438
Asymptotic Sig.(2-sided test)	.661

Figure 0.23 Follow up - Post NR-6

Appendix E

Focus Group transcription example

Frustration
Negative elements
Weather
Animals
Plants
New and on campus
Other people
Animals
Travel preference
Staying inside
Dislike
Input at home
Good feeling
Use
Safety
Visual
Missed
Design Features
Use outside of the study
Functionality
Coding Density

Group 2

P1 - Cadbury Nut bar
P2 - Crunchy

Draw Walk Route

C - We started at the gate, near Firth house is it called
F - Firth Court
N - Shall we start with that or something
C- Yeah sure, start with a big red block
N- Red, right, it's like kinda this side init, cos the weston't like here
C- yeah shall we do a little compass thingy as a reference point
N- I'm not really sure which way is north
C - well we're put a point just for us
N- so where's firth in relation to that

F- I've got an image, I can't work out which way up it is

C - okay
F- so north is this way
C - I see that way, that's handy, okay so firth park is, if that's our reference point, sorry firth court would be about here.
N - ah okay
C_ shall we split it in half,
N - yeah go for it
C- it's try is
n - you take weston and i'll take crooks
c - oh we walked around crooks didn't we
n yeah we went round the little lake thing
c yeah i remember
n okay so, this won't be the best likeness
f- no it's not, don't worry, there's no marks here

pencils drawing +20 sec

n - the divider between the two parks is somewhere like here
c - mmm
n - yeah
c - so kinda like weston park would be like a big
n - mushroom lane or something
c - a big green blob

pencil drawing

c- get the feeling this will be a bit impressionist
n- oh yeah definitely
f- that's good we like that
n- I've put a little path round the edge
c- oh yeah i see that
n- put some trees and stuff I guess
c - yeah make some green blobs
n- do you want this green one
c - how many greens are there? just one?
n - ah no there's two, you can choose
c - alright
n - I'll get going on the lake thing over here

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Frustration
Negative elements
Weather

Plants
New and on campus

Animals
Travel preference
Staying inside
Dislike
Input at home
Good feeling
Use
Safety
Visual
Missed
Design Features
Use outside of the study
Functionality
Coding Density

Animals

Other people

Animals

c - okay. Great stuff

pencil sounds

n - are we drawing the things we saw as well.
f - drawing the things you saw yeah, it's more about the walk then it is about making an accurate map
n - yeah
c - ah yeah okay, fair enough.
n - cool
c - where's the cenotaph, I really that quite clearly, that's the gate, ah that'll be there, i'll draw a picture of that
pencils sounds
c - that's green as well, I thought it was black
n - ah that's it
pencil passing

c - I'm going to draw a little sad face to symbolise the cenotaph
c - i'm going for those kayakers which were over in this corner
c - there were some wild swimmers as well, weren't there.
n- were there
c - yeah there was brave harder souls out there in wetsuits
f - there weren't there
n - I don't think we saw them
f- no you had kayakers, the other walk had two people swimming and a dog
I feel like.
n - oh okay.

c- I'll do a crude approximation of someone swimming
f - laughing

f- were they playing water polo or something?
n - I dunno
c - I've drawn a little swimming person that symbolises that, he is having a great time

pencil sounds

pencil 30secs

c- that's a tennis racket
n- laugh, that's pretty good that
c- haha thanks, almost photographic in its depiction
laughter

pencil sounds
c - I've just remembered something, there was a funny birds that we saw,
n- ducks
c - yeah ducks but on my walk we saw strange birds that we commented on
n- I don't think we saw them
c - oh

f- were those the ones with the bright coloured feet?
c - yes
n- mm
f - can you remember where they were?
c - I can't remember the name, but I kinda
f- where abouts were they on the walk?

Frustration

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Functionality
Coding Density

Negative elements

c - I'd say we noticed them I think when we were kinda walk wondering around the lake.
f - mmm
c - probably fair to do a crude sketch of one
f - yeah

pencil sounds

n- i've put the duck in
f - yeah it's lovely bigger than the kayaks I like it
laughter
n - big duck

f - can you remember the route we took
c- yes kinda around firth court,
n - do we draw it in or like
f - yeah draw it in
n - mmm okay, what colour do you want to go for?
c- i'm something that'll stand out maybe, something that we haven't used. yellow
n - yeah
c - i dunno we've used yellow, we can use yellow, you can use yellow anywhere I guess
n - yeah, so we started like here, so we went like, here round and here. wanna go for that?
c - i...
n- all the walks were the same?
f - yes you all did exactly the same route
c- okay alright I'll take your word for it then
f - so we came down past firth court
n - yeah we started by the little gate thing which was like here, the little gate
c - did we kinda go more that way
kinda round there through the tennis courts, through there then kinda we went round the lake
n - yeah we went round the lake didn't we, I thought we went more up if you know what I mean
c - then, yeah we kinda went 'vooup' I think correct me if i'm wrong
n - yeah
c - then finished off back past the cenotaph, over the various terms and conditions round it.
n - oooh.. yeah I think that's right, yeah we went that way. alright cool, draw it on
c - okay
pencil
n - we came out here
c - yeah I think so
pencil
c- I think I also remember commenting about the erm damn house, and how they once served me an off pint
n - did they?
c - they did
n - geez
c - they served me an off pint and the guy tried to write it off as him saying I don't really know that much about beer i'm more of a larger drinker, I think that's no decent excuse.. I'll add a sinky line to symbolise my disgust.
f - yeah the memories

Frustration
Negative elements
Weather
Animals

New and on campus

Animals
Travel preference
Staying inside
Dislike
Input at home

Plants

Other people

Good feeling

Use

Safety
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Missed
Design Features
Use outside of the study
Functionality
Coding Density

c – memories that'll never be washed away

n– there we go
c – yeah
n – all sorted

f– so are there any sounds or feelings you remember? other than your pint

n – there's kinda an open feeling here cos the thing slopes away from you down on the way back up that's quite a nice space i think by those benches yeah
f– so there's benches there,
n – ah yeah i'll put some benches in
c – there's just infront of the gallery there's some bench
n – yeah those the ones

f – lovely
n – that's alright
f – yeah

c – quite alot erm, this entire area kinda under the trees it's very very scenic and I always if and when i ever walk through which depending on the time of the day i might or i might not. depending also on where I am at university, I find to bit quite soothing,
f– it's quiet covered isn't it, have you been to crooks before?
n – i've been weston, erm think like on a uni open day I might have walked around it once but I couldn't remember it at all.
f – it wasn't familiar?
n – nah nah.
c– it's kinda part, it forms part of my walking route sometimes when i'm walking to erm, to the buildings that the school of nursing and midwifey uses it tends to be where I walk through
f – so pretty familiar to you,
c – mm

f – did you have a worse part of the walk?
n c – mmm
n – probably when the sun went away and it was more shady, I don't know I can't really pick out any awful about it.
c – yeah there's nothing awful, there nothing
f – that's reassuring
c – nothing even remotely discomforting really, it was just a nice little walk, that's all. break from the usual passing of ones day

f – what was it like going on a walk with strangers
n – interest yeah
c – it was
n – good to talk to them
c – yeah

f – did it change, you said a break from your day, did it kinda change how you went back?
n – i reckon like maybe not so much effecting it after but during it because you didn't know the person you spent more time talking then you would focusing on the walk if you know what I mean
c – mm

f– did you both go on your solo walks?

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Frustration
Negative elements
Weather
Animals
Plants
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Missed

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Coding Density

asking for trouble if you're walking through a public green space if it's dark and late at night.
f - yeah what are you counting as late? half 10? half 11?
c - erm after 9, after 8 after 9, just depends
f - like in winter, it's dark really early
c - yeah exactly, so i'll kinda admire the green space on the outskirts but I won't walk through it.
f - right yeah
c- it's different in summer obviously, but during the, when it's dark, it's wintery, you can't quite see, just like, why take the risk
f - but during the day then and if you've got a route and your preference is for green space over going along a quicker road
n - I'd pick it on the way back cos i've got like endless time, if you know what I mean, but if i'm on the way to something I'll just go the quickest.
f - get to lectures
n - i'm waking up late like
f - yeah i know what you mean, just thinking back to dark spaces, going to avoid green space at night, are there any open spaces they don't have to be green in Sheffield that you avoid, are there any space that you think, ah I don't really want to walk down there?
n - i'm quite happy to go through anything at night
c - I haven't encounter anything as yet.
f- other than the parks on dark nights
c - yeah dark mornings

f - so we're going to talk about the app, how easy was it to engage with? so like that initial set up, getting use to using it how did you find it
n - it was pretty unique I quiet like the messaging type lay out
f - that sort of chat bot
n - yeah something different for me
c- it was kinda friendly the chat bot, ah take this guy he's interested in me
laughing
c - he wants to hear about my

f- what did you think the icon of the chat bot was?
n - oh the folded, unfolded shape, that's what I thought it was, an unfolded shape
c- I didn't think of it that way I just thought it was a cool symbol
n - ohh
c - I get it now
n - I thought it was like one of them net things like a cube but a weird one
f- you're the third person to say that, interesting. It's meant to be a fox.
c- is it?
n - really?
f - yeah have a look see if you can see it
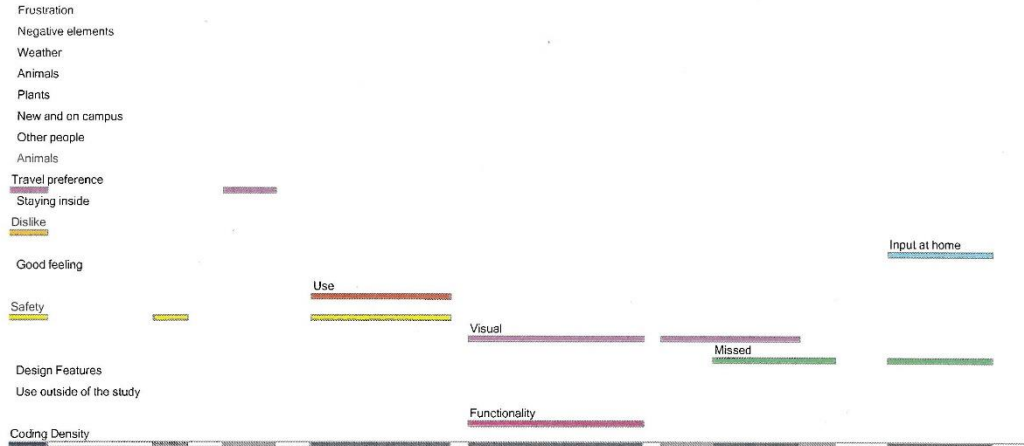n- oh one thing I did find a bit, you couldn't like put the location of a photo when you weren't there, so you come back home and when you uploaded it, it just registers as it is, in your house. you know what I mean. I'd get back and say I went there
f- so you want to be able to mark it
n- yeah afterwards
f - so you added photos to yours, did you add photos to yours?
c - I did yeah

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Frustration
Negative elements
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Functionality
Coding Density

Animals

Design Features

n - yeah well I went for a bike ride
c - I went walking out into the dales, my girlfriend knows it quite well so went out to erm Longshaw (National Trust Estate) which is nice, I guess erm it was good speaking of breaking my day, i've come off quite a busy period which lasted from uh well when I started placement in October, until when i finished in February when I was doing very long monday to friday, probably I'd be getting up at 5, getting a train to Doncaster, and coming home probably about 6 if I was lucky. From, so coming off such an intense period to suddenly being able to have the luxury of a bit of time off kinda of being able to have the time to devote to this type of things, you know it was very suppose the time i've been in a very relaxed frame of mind for the last few weeks. so yeah a nice walk was just the thing really.
f- did you find, so you went for a bike ride, did that fit into your normal routine?
n - yeah no, normally if i've got some spare time and it's like reasonable weather, i'll be straight out. enjoying myself, which is quiet nice
f - yeah where did you go
n - peaks kinda towards Ringalow road and just kept going out that way
f - oh yeah
f - did you go on your own?
n - yup, on my own yeah.

f - is is there anywhere that's like your normal green space that you go to more like your urban space in Sheffield. Like if you wanted to go outside, if you felt like the office was getting abit stuffy and you wanted a bit of a stroll is there anywhere you'd aim for
n - yeah, like it's the Endcliffe park near us and the path that goes to the peak theres that path that follows the stream, all the way up so I just keep going up there erm do you know lady cannons plantation? it's like a foresty thing
f - oh no I don't
n - I always go there, when i'm on my bike like, I like that a lot
f - what sort of vegetation is it?
n - it's all sort of like, tall like christmasy type trees
f- oh okay
n - it's been deforested slightly, but that's quite nice
f - hmm
n - it's got two trails for the bikes so that's nice
c - well there's an area near me called erm just a small green space called ruskin park but again that's somewhere if i'm walking to Sheffield town centre, its I always walk through it. and that really just kinda smaller less almost slightly less attractive version of weston park really
f - oh lovely
c - its go a children play area, erm goal post, big open green spaces, quite a few tall trees and yet, there is wildlife there I noticed when i first moved to that area that there were two foxes that live in that area and because of my early mornings I could count on seeing them at least a couple of times each week, so i knew kinda of there's a decent amount of wildlife there.
f -uh cool and would you, you say you take that route, is that the quickest route or is that the nicest route? like would you choose a route through a green place even if it added one or two minutes to your journey.
c - depends on the time of day for me, yeah, i'm quite kinda weary of walking through green spaces when it's late, you know I think you're

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Frustration

Input at home

share every minuet detail of my life, not to say that people who do that do, but I just kinda find, it's not me.
N - as in sharing with the app or telling your friends you were doing it
c - no
f- there's a share button on the app so you could link it to other things if you wanted to:
n - no
c - no, wouldn't do that.

f- do you think that if it wasn't a research tool, do you think there's a space for it?
N -I don't know what it would do
c - yeah I agree, it's tough to see its application outside of a research basis, although suppose maybe in terms of mental wellbeing it could be a application for mental rehabilitation, mental and physical, who knows really
f- great, would you recommend it to a friend?
n- like as a casual thing?
f - lets so it was a mental wellbeing sort of a tool
n - oh right
c - I think so, if I knew someone who had a really appreciation of kinda out doors stuff, erm and also kinda quiet active on social media I'd say oh this might be, have you tried this might be the app for you.
f- so maybe a sort of niche, if that's the way it went, if that's what it became. Interesting. what doesn't work about it?
n- I think it's just that location things, not being able to change it later
c- off the top of my head i can't really think of anything
f -did it set off a little alarm when you went into green spaces both yeah
fire alarm

f- did you find yourselves noticing anything extra since, cos I presume your not using the app now?
both - no
f - have you noticed more things since, where you've been like oh I would have shmapped that?
N -mmm I dunno
c - difficult to say really
f - you can just be like no I don't care haha
c - no I don't think so
n - I kinda take photos say if I see something nice anyway, I wasn't really thinking about the app thought if I see something nice
c - I have to be kinda prompted by the app and be like
n- oh yeah thats right yeah
f - did you fill it in when you were in location?
N - when I got home yeah, other than the once maybe
c - most of the time while I was in location, if I was ever walking through crooks parks, walking through it along the path just there, heard my phone go and i was like uh while i'm here may as well
f - erm do you have a favourite place outside either at home or in Sheffield
n- yeah yeah i mean i live on the side of Malvern hills so i like going up the side of hills that's really nice anywhere along there's like sound.
c - where i'm from in Harrogate, there's a massive green space called the stray, and that's basically kind of 200 arches worth of just, in the middle of town just a big massive stretch of grass and it's all public

Frustration
Negative elements
Weather
Animals
Plants
New and on campus
Other people
Animals
Travel preference
Staying inside
Dislike
Input at home
Good feeling
Use
Safety

Visual

Missed

Design Features

Use outside of the study

Functionality

Coding Density

f- did you do text as well
n - I'd say if I took a photo of some rocks, I like these rocks
f- I like rocks, the like scales you had to put in, did you reasonably
easy and yeah?
N -oh yeah very just picked a face to go with it
c - self-explanatory really
f- brilliant, and they were accurate enough for how you were feeling
n - yeaah
c - yeah

f- visual appeal? It terms of the colours...
n- yeah
c- yeah it fit with the theme of kinda measuring green spaces, if that
makes sense
f- did you see a tree of progression?
n - not that I noticed,
c - no
f- I think it's under, you know where you can see the map and stuff, I
think there's a bit that says my progress
n - uuuh
f- I think it's under menu
c - oh yeah my progress
n - oh I don't think I ever clicked that
f -ta dah
c - okay
n - mmm
c - whats your percentage
I got a 100 yeah
c- I'm only on 71%
f- I was only on like 65% when I did, i was like waaaht
thats' weird, I wonder why i got 100 then,
f - did you do it every day?
N - no not every day, I skipped like two days
f - eemm
c - I did 5 days
f- yeah, that's good

f- would you have used the app if not part of the research
both - no

f- would you have used the app if you didn't get £20?
c- probably not
n- I dunno, maybe, I quiet like the green space thing you know, so if
it was volunteering for it. I probably wouldn't have minded, its not
like too much of a pain to have either.
f- okay that's good
c- I don't mind admitting I was a bit more mercenary about it
f - no no no that's understandable, what would the app need to do for
you to want to use it
n - I thought it was just a research tool I didn't see any other purpose
for it
c- yeah I agree
f- would you share what you've been doing? did you share it?
n- yeah I was telling all the others what I was up to, where I was going
and stuff... walk to the park
c - less so. online and such I tend not to be so much of an oversharer,
it was different with the bot, but erm I tend not to, I don't like to

Frustration

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c – difficult to say without a massive appreciation of the campus itself and where everything is.
N – I don't really know where you'd have room to stick it
f – lets say we took over the arts tower car park
n – oohh right so the big bit in front
f – what would you put in there?
N –oh like grass, with some trees
f– something to sit on kinda this?
N – oh yeah benches and stuff
c – I can see that, because the arts tower car parks never full is it?
N – I didn't know it was used I thought i was just empty now
c it's just there, uselessly taking up space, might as well have something nice there

f– true, so grass to sit on, benches
n – yeah a few
f – trees
n –yeah i like some trees
c – mm yeah
f– do you want it to look more like weston park or more like crookes?
N –mmm
c– i'd say weston park
n– mhhmm i dunno crooks was a bit more enclosed and damp if you know what i mean where as weston is a bit more open and fresh which i think is a bit nicer
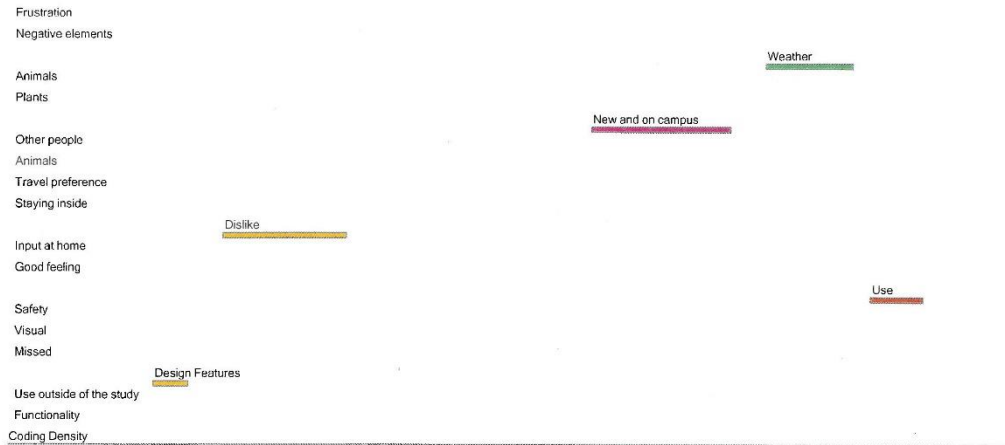c – yeah i agree

f- super that's all my questions

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Dislike

Use

Design Features

land and people are forbidden from building on it. so its kinda, it
dates back to the 19th century so it's quite unique in that regard, so
it always makes me think of home when i think of the stray.
f – ah lovely, so when you think of green spaces on campus, are there
any that you particularly like?
N – within the uni campus?
f – yeah, can you think of any
n – there's the lake in the middle of endcliffe (hall) which was alright
c– that's a pretty sound lake.
n– we sledged down by it, in the snow.
f– more around the campus buildings.
N – ah okay uhh are there many green spaces around the buildings?
c – on the campus itself, i must admit, i'm not really sure
n – round the SU it's self and that's all just tarmac underpass if you
know what I mean
c – yeah exactly
F– yeah that's true
N –I can't really think of any, I haven't been round the whole of uni so

c – yeah
f– yeah maybe there's a hidden one
both – yeah
f – have you seen the trees outside the diamond, the new one in the
square
n –it this by the church?
f– yeah
n –yeah I've seen the church there's a bit of green there
f– so you know where the diamond is, you know where the Henderson
factory is
c – yes yes
n –ooh yeah yeah yeah
n– next to Jessop west
f – yeah along there, what do you think of those
n – very nice, no I welcome trees
c – hmm yeah
f – do you think that's going to be a space, do you use that? as like a
green space
c – I wouldn't say I used it much, just there
n – I don't sit in it, I just walk past it to get to places but it's
nicer to walk through if there's green stuff.
f– yeah that's very true. in the summer, do you go to like weston park
or sit out and eat your lunch, like if you were on campus
n – I haven't really been here for summer yet
c – same actually
f – when the sunshine arrives
n – yeah i imagine we'd be doing more things like barbeques I dunno
something outside hopefully
f – yeah
c– yeah I can see it grabbing a few tins and just sitting in weston park
or something
n – yeah if it's after a lectures, if it's just next door why not

f– what would you put if you were going to make s green space on campus,
because Weston Park obviously isn't the universities... what would you
put and where would you put it?
N – mmmm I dunno

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Seconded coded transcription

Unfamiliarity with (local) nature spaces

Noticing different kinds of nature

Focal/reference point

Associating feelings with places

Green exercise/people using nature

Discussing nature during the walk

Positive impressions/feelings/restoration

Sense of open space

Avoiding nature/safety issues

Novelty, change in normal routine

Social

Noticing animals

Trees specifically

Impact of weather/season

Incidental nature exposure

Favourite/familiar/meaningful nature places/attachment

App positives/potential applications

App shortcomings/areas for improvement

App usability

Unused features

Lack of engagement with the app

Personality factors in use of tech

Group 2

P1 - Cadbury Nut bar
P2 - Crunchy

Draw Walk Route

C - We <mark>started at the gate,</mark> near Firth house is it called
F - Firth Court
N - Shall we start with that or something
C- Yeah sure, start with a big red block
N- Red, right, it's like kinda this side init, cos the weston't like here
C- yeah shall we do a little <mark>compass thingy as a reference point</mark>
N- I'm not really sure which way is north
C_ well we're put a point just for us
N- so where's firth in relation to that

F- I've got an image, I can't work out which way up it is

C - okay
F- so north is this way
C - I see that way, that's handy, okay so firth park is, if that's our reference point, sorry <mark>firth court would be about here</mark>.
N - ah okay
C_ shall we spilt it in half,
N - yeah go for it
C- it's try is
n- you take weston and i'll take crooks
c - oh we walked around crooks didn't we
n yeah we went round the <mark>little lake thing</mark>
c yeah i remember
n okay so, this won't be the best likeness
f- no it's not, don't worry. there's no marks here

pencils drawing +20 sec

n - the divider between the two parks is somewhere like here
c - mmm
n - yeah

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c - so kinda like weston park would be like a big

n - mushroom lane or something

c - a big green blob

pencil drawing

c- get the feeling this will be a bit impressionist

n- oh yeah definitely

f- that's good we like that

n- I've put a little path round the edge

c- oh yeah i see that

n- *put some trees and stuff I guess*

c - yeah make some green blobs

n- do you want this green one

c - how many greens are there? just one?

n - ah no there's two, you can choose

c- alright

n - I'll get going on the lake thing over here

c - okay. Great stuff

pencil sounds

n - are we drawing the things we saw as well.

f - drawing the things you saw yeah, it's more about the walk then it is about making an accurate map

n - yeah

c - ah yeah okay, fair enough.

n - cool

c- where's the cenotaph, I really that quite clearly, that's the gate, ah that'll be there, i'll draw a picture of that

 pencils sounds

c - that's green as well, I thought it was black

n - ah that's it

pencil passing

c - I'm going to draw a little sad face to symbolise the cenotaph

n - i'm going for those kayakers which were over in this corner

c - there were some wild swimmers as well, weren't there.

n- were there

c - yeah there were was brave harder souls out there in wetsuits

f - there were weren't there

n - I don't think we saw them

f- no you had kayakers, the other walk had two people swimming and a dog
I feel like.
n - oh okay.

c- I'll do a crude approximation of someone swimming

f - laughing

f- were they playing water polo or something?

n - I dunno

c - I've drawn a little swimming person that symbolises that, he is
having a great time

pencil sounds

pencil 30secs

c- that's a tennis racket

n- laugh, that's pretty good that

c- haha thanks, almost photographic in its depiction

laughter

pencil sounds

c - I've just remembered something, there was a funny birds that we saw,

n- ducks

c - yeah ducks but on my walk we saw strange birds that we commented on

n- I don't think we saw them

c - oh

f- were those the ones with the bright coloured feet?

c - yes

n- mm

f - can you remember where they were?

c - I can't remember the name, but I kinda

f- where abouts were they on the walk?

c - I'd say we noticed them I think when we were kinda walk wondering
around the lake.

f - mmm

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c - probably fair to do a crude sketch of one

f - yeah

pencil sounds

n- i've put the duck in

f - yeah it's lovely bigger than the kayaks I like it

laughter

n - big duck

f - can you remember the route we took

c- yes kinda around firth court,

n - do we draw it in or like

f - yeah draw it in

n - mmm okay, what colour do you want to go for?

c- i'm something that'll stand out maybe, something that we haven't used. yellow

n - yeah

c - i dunno we've used yellow, we can use yellow, you can use yellow anywhere I guess

n - yeah, so we started like here, so we went like, here round and here. wanna go for that?

c - I...

n- all the walks were the same?

f - yes you all did exactly the same route

c- okay alright I'll take your word for it then

f - so we came down past firth court

n - yeah we started by the <mark>little gate thing</mark> which was like here, the little gate

c - did we kinda go more that way

kinda round there through the tennis courts, through there then kinda we went <mark>round the lake</mark>

n - yeah we went round the lake didn't we, I thought we went more up if you know what I mean

c - then, yeah we kinda went 'vooup' I think correct me if i'm wrong

n - yeah

c - then finished off back past the <mark>cenotaph</mark>, over the various terms and conditions round it.

n – oooh… yeah I think that's right, yeah we went that way. alright cool, draw it on

c - okay

pencil

n - we came out here

c - yeah I think so

pencil

c- I think I also remember commenting about the erm damn house, and how they once served me an off pint

n - did they?

c - they did

n - geez

c - they served me an off pint and the guy tried to write it off as him saying I don't really know that much about beer i'm more of a larger drinker, I think that's no decent excuse.. I'll add a sinky line to symbolise my disgust.

f - yeah the memories

c - memories that'll never be washed away

n- there we go

c - yeah

n - all sorted

f- so are there any sounds or feelings you remember? other than your pint

n - there's kinda an open feeling here cos the thing slopes away from you down on the way back up that's quite a nice space i think by those benches yeah

f- so there's benches there,

n - ah yeah i'll put some benches in

c - there's just infront of the gallery there's some bench

n - yeah those the ones

f - lovely

n - that's alright

f - yeah

c - quite alot erm, this entire area *kinda under the trees* it's very very scenic and I always if and when i ever walk through which depending on the time of the day i might or i might not. depending also on where I am at university, I find to bit quite soothing,

f- it's quiet covered isn't it, have you been to crooks before?

n - i've been weston, erm think like on a uni open day I might have walked around it once but I couldn't remember it at all.

f - it wasn't familiar?

n - nah nah

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c- it's kinda part, it forms part of my walking route sometimes when i'm walking to erm, to the buildings that the school of nursing and midwifey uses it tends to be where I walk through

f - so pretty familiar to you,

c - mm

f - did you have a worse part of the walk?

n c - mmm

n - probably when the sun went away and it was more shady, I don't know I can't really pick out any awful about it.

c - yeah there's nothing awful, there nothing

f - that's reassuring

c - nothing even remotely discomforting really, it was just a nice little walk, that's all. break from the usual passing of ones day

f - what was it like going on a walk with strangers

n - interest yeah

c - it was

n - good to talk to them

c - yeah

f - did it change, you said a break from your day, did it kinda change how you went back?

n - i reckon like maybe not so much effecting it after but during it because you didn't know the person you spent more time talking then you would focusing on the walk if you know what I mean

c - mm

f- did you both go on your solo walks?

n - yeah well I went for a bike ride

c - I went walking out into the dales, my girlfriend knows it quite well so went out to erm Longshaw (National Trust Estate) which is nice, I guess erm it was good speaking of breaking my day, i've come off quite a busy period which lasted from uuh well when I started placement in October, until when i finished in February when I was doing very long monday to friday, probably I'd be getting up at 5, getting a train to Doncaster, and coming home probably about 6 if I was lucky. From, so coming off such an intense period to suddenly being able to have the luxury of a bit of time off kinda of being able to have the time to devote to this type of things, you know it was very suppose the time i've been in a very relaxed frame of mind for the last few weeks. so yeah a nice walk was just the thing really.

f- did you find, so you went for a bike ride, did that fit into your normal routine?

n - yeah no, normally if i've got some spare time and it's like reasonable weather, i'll be straight out. enjoying myself, which is quiet nice

f - yeah where did you go

n - peaks kinda towards Ringalow road and just kept going out that way

f - oh yeah

f - did you go on your own?

n - yup, on my own yeah.

f - is there anywhere that's like your normal green space that you go to more like your urban space in Sheffield. Like if you wanted to go outside, if you felt like the office was getting a bit stuffy and you wanted a bit of a stroll is there anywhere you'd aim for

n - yeah, like it's the Endcliffe park near us and the path that goes to the peak theres that path that follows the stream, all the way up so I just keep going up there erm do you know lady cannons plantations? it's like a foresty thing

f - oh no I don't

n - I always go there, when i'm on my bike like, I like that a lot

f - what sort of vegetation is it?

n - it's all sort of like, *tall like christmasy type trees*

f- oh okay

n - it's been deforested slightly, but that's quite nice

f - hmm

n - it's got two trails for the bikes so that's nice

c - well there's an area near me called erm just a small green space called ruskin park but again that's somewhere if i'm walking to Sheffield town centre, its I always walk through it. and that really just kinda smaller less almost slightly less attractive version of weston park really

f - oh lovely

c - its go a children play area, erm goal post, big open green spaces, *quite a few tall trees* and yet, there is wildlife there I noticed when i first moved to that area that there were two foxes that live in that area and because of my early mornings I could count on seeing them at least a couple of times each week, so i knew kinda of there's a decent amount of wildlife there.

f -uh cool and would you, you say you take that route, is that the quickest route or is that the nicest route? like would you choose a route through a green place even if it added one or two minutes to your journey.

c - depends on the time of day for me, yeah, i'm quite kinda weary of walking through green spaces when it's late. you know I think you're asking for trouble if you're walking through a public green space if it's dark and late at night.

f - yeah what are you counting as late? half 10? half 11?

c - erm after 9, after 8 after 9, just depends

f - like in winter, it's dark really early

c - yeah exactly, so i'll kinda admire the green space on the outskirts but I won't walk through it.

f - right yeah

c- it's different in summer obviously, but during the, when it's dark, it's wintery, you can't quite see, just like, why take the risk

f - but during the day then and if you've got a route and your preference is for green space over going along a quicker road

n - I'd pick it on the way back cos i've got like endless time, if you know what I mean, but if i'm on the way to something I'll just go the quickest.

f - get to lectures

n - i'm waking up late like

f - yeah i know what you mean, just thinking back to dark spaces, going to avoid green space at night, are there any open spaces they don't have to be green in Sheffield that you avoid, are there any space that you think, ah I don't really want to walk down there?

n - i'm quite happy to go through anything at night

c - I haven 't encounter anything as yet.

f- other than the parks on dark nights

c - yeah dark mornings

f - so we're going to talk about the app, how easy was it to engage with? so like that initial set up, getting use to using it how did you find it

n - it was pretty unique I quiet like the messaging type lay out

f - that sort of chat bot

n - yeah something different for me

c- it was kinda friendly the chat bot, ah take this guy he's interested in me

  laughing

c - he wants to hear about my

f- what did you think the icon of the chat bot was?

n - oh the folded, unfolded shape, that's what I thought it was, an unfolded shape

c- I didn't think of it that way I just thought it was a cool symbol

n - ohh

c - I get it now

n - I thought it was like one of them net things like a cube but a weird one

f- you're the third person to say that, interesting. It's meant to be a fox.

c- is it?

n - really?

f - yeah have a look see if you can see it

n- oh one thing I did find a bit, you couldn't like put the location of a photo when you weren't there, so you come back home and when you uploaded it, it just registers as it is, in your house. you know what I mean. I'd get back and say I went there

f- so you want to be able to mark it

n- yeah afterwards

f - so you added photos to yours, did you add photos to yours?

c - I did yeah

f- did you do text as well

n - I'd say if I took a photo of some rocks, I like these rocks

f- I like rocks, the like scales you had to put in, did you reasonably easy and yeah?

N -oh yeah very just picked a face to go with it

c - self-explanatory really

f- brilliant, and they were accurate enough for how you were feeling

n - yeaah

c - yeah

f - visual appeal? It terms of the colours…

n- yeah

c- yeah it fit with the theme of kinda measuring green spaces, if that makes sense

f- did you see a tree of progression?

n - not that I noticed,

c - no

f- I think it's under, you know where you can see the map and stuff, I think there's a bit that says my progress

n - uuuh

f- I think it's under menu
c - oh yeah my progress

n - oh I don't think I ever clicked that

f -ta dah

c - okay

n - mmm

c - whats your percentage

I got a 100 yeah

c- I'm only on 71%

f- I was only on like 65% when I did, I was like waaaht

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thats' weird, I wonder why i got 100 then,

f - did you do it every day?

N - no not every day, I skipped like two days

f - eemm

c - I did 5 days

f- yeah, that's good

f- would you have used the app if not part of the research

both - no

f- would you have used the app if you didn't get £20?

c- probably not

n - I dunno, maybe, I quiet like the green space thing you know, so if it was volunteering for it. I probably wouldn't have minded, its not like too much of a pain to have either.

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c- I don't mind admitting I was a bit more mercenary about it

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c- yeah I agree

f- would you share what you've been doing? did you share it?

n- yeah I was telling all the others what I was up to, where I was going and stuff... walk to the park

c - less so, online and such I tend not to be so much of an oversharer, it was different with the bot, but erm I tend not to, I don't like to share every minuet detail of my life, not to say that people who do that do, but I just kinda find, it's not me.

N - as in sharing with the app or telling your friends you were doing it

c - no

f- there's a share button on the app so you could link it to other things if you wanted to:

n - no

c- no, wouldn't do that.

f- do you think that if it wasn't a research tool, do you think there's a space for it?

N -I don't know what it would do

c - yeah I agree, it's tough to see its application outside of a research basis, although suppose maybe in terms of mental wellbeing it could be a application for mental rehabilitation, mental and physical, who knows really

f- great, would you recommend it to a friend?

n- like as a casual thing?

f - lets so it was a mental wellbeing sort of a tool

n - oh right

c - I think so, if I knew someone who had a really appreciation of kinda out doors stuff, erm and also kinda quiet active on social media I'd say oh this might be, have you tried this might be the app for you.

f- so maybe a sort of niche, if that's the way it went, if that's what it became. Interesting. what doesn't work about it?

n- I think it's just that location things, not being able to change it later

c- off the top of my head I can't really think of anything

f - did it set off a little alarm when you went into green spaces

both yeah

fire alarm

f- did you find yourselves noticing anything extra since, cos I presume your not using the app now?

both - no

f - have you noticed more things since, where you've been like oh I would have shmapped that?

N -mmm I dunno

c - difficult to say really

f - you can just be like no I don't care haha

c - no I don't think so

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N - when I got home yeah, other than the once maybe

c - most of the time while I was in location, if I was ever walking through crooks parks, walking through it along the path just there, heard my phone go and i was like uh while i'm here may as well

f - erm do you have a favourite place outside either at home or in Sheffield

n- yeah yeah i mean i live on the side of Malvern hills so i like going up the side of hills that's really nice anywhere along there's like sound.

c - where i'm from in Harrogate, there's a massive green space called the stray, and that's basically kind of 200 arches worth of just, in the middle of town just a big massive stretch of grass and it's all public land and people are forbidden from building on it. so its kinda, it dates

back to the 19th century so it's quite unique in that regard, so it always makes me think of home when i think of the stray.

f - ah lovely, so when you think of green spaces on campus, are there any that you particularly like?

N - within the uni campus?

f - yeah, can you think of any

n - there's the lake in the middle of endcliffe (hall) which was alright

c- that's a pretty sound lake.

n- we sledged down by it, in the snow.

f- more around the campus buildings.

N - ah okay uhh are there many green spaces around the buildings?

c - on the campus itself, I must admit, i'm not really sure

n - round the SU it's self and that's all just tarmac underpass if you know what I mean

c - yeah exactly

F- yeah that's true

N -I can't really think of any, I haven't been round the whole of uni so

c - yeah

f- yeah maybe there's a hidden one

both - yeah

f - have you seen the trees outside the diamond, the new one in the square

n -it this by the church?

f- yeah

n -yeah I've seen the church there's a bit of green there

f - so you know where the diamond is, you know where the Henderson factory is

n -ooh yeah yeah yeah

c - yes yes

n- next to Jessop west

f - yeah along there, what do you think of those

n - *very nice, no I welcome trees*

c - hmm yeah

f - do you think that's going to be a space, do you use that? as like a green space

c - I wouldn't say I used it much, just there

n - I don't sit in it, I just walk past it to get to places but it's nicer to walk through if there's green stuff.

f- yeah that's very true. in the summer, do you go to like weston park or sit out and eat your lunch, like if you were on campus

n - I haven't really been here for summer yet

c - same actually

f - when the sunshine arrives

n - yeah i imagine we'd be doing more things like barbeques I dunno something outside hopefully

f - yeah

c- yeah I can see it grabbing a few tins and just sitting in weston park or something

n - yeah if it's after a lectures, if it's just next door why not

f- what would you put if you were going to make s green space on campus, because Weston Park obviously isn't the universities... what would you put and where would you put it?

N - mmmm I dunno

c - <mark>difficult to say without a massive appreciation of the campus itself and where everything is.</mark>

N - I don't really know where you'd have room to stick it

f - lets say we took over the arts tower car park

n - oohh right so the big bit in front

f - what would you put in there?

N -oh like grass, *with some trees*

f- something to sit on kinda this?

N - oh yeah benches and stuff

c - I can see that, because the arts tower car parks never full is it?

N - I didn't know it was used I thought i was just empty now

c it's just there, uselessly taking up space, might as well have something nice there

f- true, so grass to sit on, benches

n - yeah a few

f - trees

n -yeah i like some trees

c - mm yeah

f- do you want it to look more like weston park or more like crookes?

N -mmm

c- i'd say weston park

n- mhhmm i dunno crooks was a bit more <mark>enclosed and damp</mark> if you know what i mean where as weston is a bit more <mark>open and fresh which i think is a bit nicer</mark>

c - yeah i agree

f- super that's all my questions

Comments on group walk groups

These are the reflections from the research diary on the different behaviour and group atmosphere during the group walks.

Group 1

We talked about nature economics, economics in general and the subjects we are studying. We discussed how lovely and quiet crookes valley is and the way we walk through these parks regularly. There was a general good awareness of nature being healthy. They both had lived in Sheffield for a while. Weston park museum

Group 2

Talked about where we're from, which course we're studying and what year we are in. We talked about surfing, sailing and diving. How often we visit or don't visit these parks and where we are originally from. We talked about how different and green Sheffield is compared to our home areas and where we walk on a regular basis. We talked about local political elections and I mentioned the green party leaflet as being very well designed. We talked about plans for next year and how stressful exams are. At the end, they said 'that was a good walk'. Weston park museum

Group 3

Talked about home towns, local seaside, visiting Cornwall. Being new to Sheffield, busy city life. Exams and first year.

No group 4

Group 5 one person in the pouring rain, we talked about the rain, the birds looking cute and fluffy. We discussed the lovely pretty blossom and had a laugh about a wet robin. We talked about exams and she said she wasn't sure she should come today as she's got a lot of revision but is very glad that she did.

Group 6

Medic first year students who happened to know each other, were not interested in talking about the birds or the flowers. Spoke about their course, exams and what is involved in a PhD.

Group 7

Talked about the study, what they did in their course/research and a little bit about how quiet the park is. We talked about home towns and previous research they had taken part in. There was a little bit of chat about steps per day and which buildings we work in.

Group 8

Talked about home towns, the ducks, the flowers and blossom. Conversation was easy and there was lots of laughter.

Strangely groups have been gender spilt, this is completely by accident due to cancellation and changing times. These walks have again been enjoyable, the weather has been pleasant and although the participants are visibly stressed about their exams and deadlines, most finish the walk more at easy and cheerful than they started. It's not a very long walk but there's a noticeable change.

Example of group walk drawings

Figure 0.24 Focus Group Walk Drawing 1

Figure 0.25 Focus Group Walk Drawing 2

Figure 0.26 Group walk drawing 3

Figure 0.27 Group walk drawing 4

Shmapped Error Example
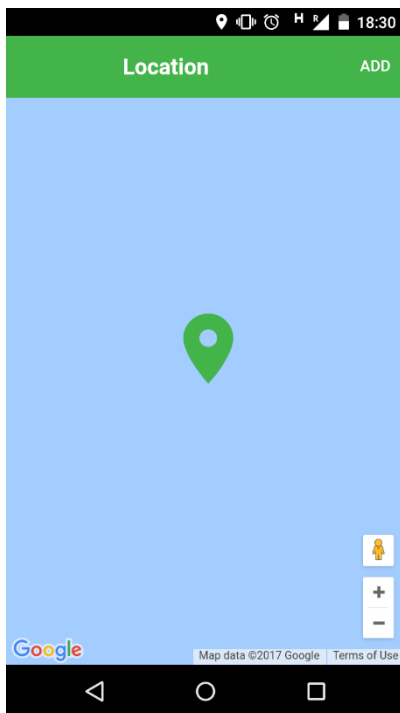
Figure 0.28 Example of map error from Shmapped

Focus group codes

Table 0.5 focus group codes

	Phase 1		Phase 2	
	Files	References	**Files**	**References**
App Feature	1	1	1	**1**
Distracting from nature	1	1	1	**1**
Frustration	4	16	6	**20**
Functionality	5	71	7	**93**
Input at home	4	7	6	**9**
Interface	4	16	5	**22**
Missed	5	24	7	**29**
Use outside of the study	5	21	6	**26**
Visual	5	9	5	**9**
Green Space	1	1	1	**1**
Animals	4	5	6	**8**
Design Features	9	61	11	**67**
Dislike	9	43	10	**47**
Like	8	54	10	**68**
New and on campus	8	19	10	**22**
Travel preference	9	28	11	**30**
Urban Green Space and Stories	6	12	6	**12**
Use	7	25	9	**32**
Weather	7	18	10	**25**
New Experience	5	10	8	**23**
Not outdoorsy	2	4	2	**4**
Safety	6	16	6	**16**
Social pressure	1	2	1	**2**

Solo Walk	6	13	8	**16**
Getting Good Views	1	2	4	**5**
Negative Experiences	4	5	1	**2**
Staying inside	4	6	5	**7**
Time pressure	3	7	3	**7**
Urban Upbringing	1	2	2	**3**
Walk	4	5	4	**5**
Animals	6	16	8	**28**
Buildings	1	3	6	**10**
Good feeling	5	15	7	**30**
Negative elements	6	15	7	**18**
Other people	7	15	9	**20**
Plants	7	14	9	**20**
Water	4	8	6	**12**

Glossary

To aid transparency this work uses definitions as set out below in Table 9.1.

Table 9.1 Definitions

Green Prescription	A type of social prescription which includes the use or inspiration of nature and the natural environment, often lead by a charity or community group (examples listed on page 33) (Bragg and Leck, 2017).
Natural Environment	All green, blue and open spaces in and around towns and cities as well as the wider countryside and coastline. This includes gardens, parks and canals which may include a charge to access as such a national trust garden (King *et al.*, 2015).
Social Prescribing	A non-clinical intervention to support health, wellbeing and social issues as 'prescribed' and sometimes funded by a healthcare practitioner. Targeted conditions include depression, loneliness, heart disease and diabetes. The process underpinning social prescribing is a means of enabling GPs and other frontline healthcare professionals to refer patients to a link worker. The link worker in discussion with the patient refers them to a relevant intervention such as a befriending service or common interest group (Polley *et al.*, 2017).
Wellbeing	Mental health is defined as a state of well-being in which every individual realises their own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to their community (WHO, 2014).

Abbreviations

Table 9.2 Common Abbreviations

CCG	Clinical Commissioning Group
DEFRA	Department of Environment, Food and Rural Affairs
GP	General Practice
IWUN	Improving Wellbeing through Urban Nature
JSNA	Joint Strategic Needs Assessment
MENE	Monitor Engagement with the Natural Environment
NHS	National Health Service
SAMHS	Student Access to Mental Health Support
WHO	World Health Organisation

IWUN
Improving wellbeing through urban nature