

Development of a realist-informed intervention framework for greenspace programmes for people with poor mental health and problem substance use

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Declaration

I declare that this thesis has been composed by myself, and that it embodies the results of my own research. I acknowledge that to the best of my knowledge this thesis contains no material written or published by another person, except where due reference to such is made.

Signature: 

Date: 09/12/2021

Abstract

Background

Greenspace programmes are health projects run outside in nature, typically with the aim of improving mental health. Research suggests that greenspace programmes are also effective in supporting people with problem substance use (PSU). However, there is limited understanding of the key components that make greenspace programmes successful for this client group.

Methods

A three-phased, realist-informed study was conducted to develop a potential intervention framework. Firstly, a realist synthesis enabled initial development of a novel framework demonstrating how greenspace programmes improve mental health; secondly, the proposed framework was tested by surveying greenspace organisations across Scotland to identify if the framework was transferable to programmes that support people with PSU; finally, qualitative interviews with programme staff and stakeholders provided in-depth refinement of framework components.

Results

The synthesis showed that greenspace programmes support mental health due to: feelings of escape; space to reflect; physical activity; self-efficacy; feelings of purpose; relationships with facilitators; and shared experiences. These findings were supported by survey data. Survey data also showed high levels of agreement from organisations that supported people with PSU suggesting that the framework was transferable to programmes that support this client group. Interview data showed that, as well as the original identified factors, programmes must also consider: explicit intervention focus to ensure adequate support for people with poor mental health and PSU; existing challenges with funding and stakeholder buy-in; and the impact of COVID-19.

Conclusions

The findings of this project are theoretically novel, but also have practical relevance for those designing such interventions by providing recommendations on how to optimise, tailor, and implement future programmes. Findings could be particularly relevant for academic researchers, health professionals, mental health teams, and for those working in the third sector, developing and delivering greenspace programmes for people to improve their mental health and to support them with PSU.

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Acronyms

ART = Attention Restoration Theory
CBT = Cognitive Behavioural Therapy
CMOc = context-mechanism-outcome configuration
CMOs = contexts, mechanisms, and outcomes
COVID-19 = Coronavirus disease 2019
CPR = cardiopulmonary resuscitation
CSGN = Central Scotland Green Network
DEFRA = Department for Environment, Food, and Rural Affairs
DRNS = Drugs Research Network Scotland
ECEHH = European Centre for Environment and Human Health
EMCDDA = European Monitoring Centre for Drugs and Drug Addiction
ERFS = Elements of a Recovery Facilitating System
EU = European Union
GDPR = General Data Protection Regulation
GHP = Green Health Partnership
GP = general practitioner
IPBES = Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC = Intergovernmental Panel on Climate Change
IPT = initial programme theory
MENE = English Monitor of Engagement with the Natural Environment survey
MRC = Medical Research Council
MS = Microsoft
n.d. = no date
NGO = non-governmental organisation
NHS = National Health Service
NICE = National Institute for Health and Care Excellence
NIHR = National Institute for Health Research
NK = natural killer
ONHS = Our Natural Health Service
OS = Ordnance Survey
OSS = Open Space Strategy
OWL = Outdoor Woodland Learning
PHE = Public Health England
PIS = participant information sheet

PSU = problem substance use
RSPB = Royal Society for the Protection of Birds
SARN = Scottish Alcohol Research Network
SDGs = sustainable development goals
SHAAP = Scottish Health Action on Alcohol Problems
SROI - Social Return on Investment
SSA = Society for the Study of Addiction
SRT = Stress Reduction Theory
SUAB = Substance Use and Associated Behaviours
TCV = The Conservation Volunteers
UK = United Kingdom
UN = United Nations
UKRIO = UK Research Integrity Office
US = United States
WHO = World Health Organisation

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Chapter 1: Introduction

Introduction to chapter

This project is a development of an intervention framework for greenspace programmes for mental health and problem substance use (PSU) using realist methods (Pawson and Tilley, 1997). This introduction chapter outlines the rationale and aims of the study, provides detail on the target population, and presents the research questions. It also provides the definition of 'greenspace' in the context of the study before explaining how the work fits into the existing policy landscape. The theoretical framework that informs the project is then described, and the potential of greenspace programmes within mental health and substance use services discussed. The chapter ends with a summary of the thesis which covers the methodological approach, the project structure, and an outline of the thesis chapters.

Rationale of study

A growing body of literature now supports the hypothesis that greenspace positively impacts human health. This study explores this relationship and examines how greenspace programmes can be used to support people with their mental health and PSU. Within the context of this study, mental health is defined as the state of a person's psychological wellbeing (Pilgrim, 2019). PSU is defined as recurrent drug or alcohol use which is either directly causing harm to a person, through physical, psychological, and/or social problems, or is significantly increasing risk of these harms (EMCDDA, n.d.). The rationale behind exploring mental health and PSU together is that there is evidence that they are inherently linked, and previous systematic reviews and meta-analyses have reported a strong association between the two (Hunt et al., 2016, Kingston et al., 2017, Lai et al., 2015). In some instances, the use of drugs and/or alcohol may be a way of trying to reduce or cope with existing symptoms of poor mental health or used as coping strategies to manage stressful life events (McVicar et al., 2015). The use of drugs and/or alcohol can also lead to poorer mental health (Green et al., 2017, McKetin et al., 2019).

Given the relationship between mental health and substance use, if greenspace programmes are successful in supporting mental health, they may also be effective in supporting people with PSU. If so, this could reduce the need for separate programmes providing either mental health support or PSU support and could enable a more inclusive programme. The target population for intervention development in this project is

therefore threefold: firstly, people with poor mental health; secondly, people with PSU; and thirdly people with co-occurring poor mental health and PSU. Co-occurring mental health problems and PSU is often referred to as 'dual diagnosis', and it has been estimated that up to 75% of users of drug services and 85% of users of alcohol services experience mental health problems (Public Health England (PHE), 2017). However, it has also been proposed that between 50-66% of this group will not access mental health services (UK Government, 2006). Parallel, separate programmes provided for patients with coexisting conditions have been cited as ineffective (Alsuhaibani et al., 2021), and services are currently fragmented in such a way that results in barriers to access for those who need both mental health and PSU support (Gunner et al., 2019). The Scottish Government's Mental Health Strategy (2017) acknowledges that people with dual diagnosis can "*fall through the gaps*" (p.30) where services are not joined up, and more effort should be given to ensure that services provide mental health and substance use support in a holistic way. The development of intervention frameworks that are suitable for people with co-occurring poor mental health and PSU is therefore a priority in health research.

More widely, the project's rationale for focusing on mental health support is clear given that mental health problems are one of the main causes of the overall disease burden worldwide (Mental Health Foundation, 2021), and it is estimated that one in four people in the UK will experience a mental health problem at some point in their life, with the most common being anxiety and depression (Bebbington and McManus, 2020, Scottish Government, 2020b). The prescription rate of anti-depressants and the demand for talking therapy, such as Cognitive Behavioural Therapy (CBT), is at record levels in the UK (Iacobucci, 2019), and there is a need to establish ways to support the rising demand for mental health support while limiting rising costs. The focus on substance use support is also essential given the current profile of drug-related deaths in the UK and in Scotland specifically which has the highest rate of drug-related deaths in Europe (National Records of Scotland, 2021b). In 2020, there were 4,561 drug-related deaths registered in England and Wales, and 1,339 drug related deaths in Scotland (Office for National Statistics, 2021b, National Records of Scotland, 2021b). There were also 7,565 alcohol specific deaths in the UK in 2019 (Office for National Statistics, 2021a), and, in 2020, there were 1,190 alcohol-specific deaths in Scotland, an increase of 17% since 2019 (National Records of Scotland, 2021a). With the rising drug and alcohol deaths, exploration of interventions which have the potential to provide holistic support for people with PSU is essential, particularly those that meet people where they are at and do not require criteria to be met before support is given. However, a more robust understanding

of existing interventions, such as greenspace programmes, is needed to understand what works, for whom, and in what circumstances. Although greenspace programmes for people experiencing PSU do exist, they are not currently supported by in-depth, theory-based frameworks which can aid implementation. Without this knowledge, programmes are less likely to be implemented successfully, stakeholder and client buy-in is more difficult to ascertain, and continued funding is less likely to be secured.

Study aims

1. To critically explore and synthesise the literature to identify how, for whom, and in what circumstances greenspace programmes can lead to optimal mental health outcomes.
2. To work with a range of existing Scottish greenspace organisations and wider stakeholders to explore how greenspace programmes might also be successful in supporting people with PSU.
3. To uncover the underlying mechanisms which, when triggered under certain contextual conditions, lead to desired outcomes on greenspace programmes that support people with poor mental health and PSU.
4. To propose an overarching, realist-informed intervention framework for greenspace programmes for mental health and PSU. This will allow a more robust understanding of how these types of interventions could be developed and implemented in the future.

Research questions

1. What greenspace programmes have been used to improve mental health in both clinical and nonclinical populations?
2. What outcome measures are associated with current greenspace programmes, what are the potential mechanisms that influence outcomes, and what is the role of context in enabling/constraining these mechanisms?
3. What context-mechanism-outcome configurations (CMOCs) lead to optimal outcomes in greenspace programmes for mental health? Do these configurations also explain the pathways by which greenspace programmes can potentially support people with PSU?
4. How can staff and wider stakeholders inform further identification, refinement, and consolidation of CMOCs, relative to greenspace programmes for mental health and PSU, in order to better understand what works, for whom, and in what circumstances?

Contextual background of the study

Over half of the world's population now lives in urban areas with this predicted to rise to around 70% by 2050 (United Nations (UN) Department of Economic and Social Affairs, 2018). With the rise in global urbanisation, questions about how this change in environment may affect human health have been raised given that existing literature has shown that exposure to green spaces such as parks, gardens, forests, and other green areas is beneficial for multiple measures of health (Gascon et al., 2016, Hartig et al., 2014, Markevych et al., 2017). When looking to define 'greenspace', there are two broad interpretations present across the literature. In some instances, 'greenspace' refers to any type of natural or semi-natural, undeveloped land and is often used synonymously with the word 'nature' (Swanwick et al., 2003). The other use of 'greenspace' is to describe any type of vegetated land within, or on the immediate outskirts of, an urban area (Taylor and Hochuli, 2017). Much of the recent literature considers greenspace to be part of the urban environment rather than rural, however, in a review of 125 greenspace articles, less than half of the included articles gave an explicit definition of greenspace (Taylor and Hochuli, 2017).

The range of Scotland's greenspace is highlighted by the Scottish Government's Planning Advice Note for Planning and Open Space (2008), where ten separate classifications of open space were identified. This typology not only emphasises the range of greenspace in Scotland but also highlights that terms such as public parks and gardens, amenity greenspace, playspace, sports areas, green corridors, undeveloped land, and allotments might be used instead of the term 'greenspace', depending on context. In fact, over half of urban land in Scotland could be classed as a type of greenspace (Greenspace Scotland, 2018). Further, the Greenspace Use and Attitudes Survey (Greenspace Scotland, 2017) collected data from 1,000 people living across Scotland and showed how the interpretation of greenspace differs from person to person which can result in many subjective definitions. Unclear definitions can lead to confusion, and Taylor and Hochuli (2017) proposed that research in this field must clarify what is meant by 'greenspace' in each study, as this is the only way to ensure explicit understanding. With this in mind, this thesis will use the term 'greenspace' as an umbrella term when referring to all types of green areas, whether situated in an urban environment or in a rural environment. When talking about specific types of greenspace, these will be specified and described to ensure clarity. This is the most pragmatic way of addressing the challenge in defining greenspace while still acknowledging that the meaning of greenspace is both objectively and subjectively varied.

Clarity is also necessary when discussing greenspace interventions (Bragg and Atkins, 2016). There are three basic types of greenspace interventions: those that aim to develop greenspace and increase the amount, quality, or improve accessibility; those that aim to increase use of greenspace; and those that use targeted health interventions based in greenspace (Lovell et al., 2018). This project focuses primarily on investigating the third type of greenspace intervention, and the term 'greenspace programme' is used throughout the thesis when referring to this type of targeted health intervention. Although the term 'greenspace programme' is used in this thesis, other terms are used within this research field, such as nature-based programmes, nature-based interventions, or green health programmes, to describe the same types of interventions. Potential challenges with differing terms are discussed in Chapter Two. For targeted greenspace programmes, many settings have been used such as public parks, woodlands, rural settings, hospital and community gardens, farms, private gardens, and allotments, among others (Fullam et al., 2021, Garside et al., 2020, Masterton et al., 2020, Shanahan et al., 2019). From a mental health perspective, they incorporate many factors that allows a person to effectively build capacities in factors such as social cohesion and interaction, self-efficacy, and learning new skills (Fullam et al., 2021, Garside et al., 2020, Hardie et al., 2021).

Greenspace and the wider policy landscape

The role of greenspace in supporting the delivery of health, social, environmental, and economic priorities is becoming more commonplace as the benefits of greenspace are increasingly being understood (Edinburgh & Lothians Health Foundation, 2019, Public Health England (PHE), 2020). The extent to which greenspace provides benefits can be challenging to measure, however natural capital accounting methodology has evolved in recent years to better support local government in understanding the value of greenspace across the UK (PHE, 2020). Recent estimations have suggested that £2.1 billion in health costs could be saved per year if every person in England had good access to greenspace and was able to use these spaces for increased physical activity. Using the large UK city, Birmingham, as an example, the annual net benefit to society of local greenspace is approximately £600 million, including £192 million in health benefits (PHE, 2020). Data from the urban greenspace Natural Capital Accounts for Scotland (Roberts et al., 2021) show that Scotland's urban greenspaces are valuable natural assets, particularly for their contributions to health and recreation, and their role in reducing costs associated with flooding, heat, pollution, and/or noise. For example, the savings on mental health costs were approximated to be £2.5 million overall, and savings on diseases related to poor physical health in the major cities was approximately £301.5

million. Health care savings relating to air quality in the major cities was £364 million, and savings relating to noise pollution was £313k to £2.5 million.

Relative to greenspace interventions specifically, the Centre for Health Promotion Research undertook a Social Return on Investment (SROI) analysis of greenspace volunteering programmes run by The Wildlife Trust and found a SROI value of between £6.88 and £8.50 for every £1 invested in the programmes (Bagnall et al., 2019). The SROI tool enables prediction and allocation of a financial value to a range of outcomes, even if they were not originally measured in financial terms. This tool has been increasingly used in recent years to attribute monetary value to greenspace programmes for mental health and are particularly useful for facilitating strategic direction and identifying where services could be improved (Bagnall et al., 2019). A range of stakeholders across the UK play a role in developing and maintaining greenspace for recreation, health programmes, and active travel as well as maintaining and linking greenspace to enable active travel (Edinburgh & Lothians Health Foundation, 2019, PHE, 2020). To achieve the health benefits that greenspace can provide, multi-agency working between public health, social care, urban planning, transport, greenspace management, and communities, among other groups, is essential. Policies and strategies that incorporate greenspace requirements are necessary to guide decision making at a national and regional level, while also ensuring that wider priorities such as biodiversity and tackling climate change are met.

National policy landscape

In Scotland, the importance of greenspace can be seen across the current policy landscape relating to physical activity, mental health, early years, community development, and conservation. The National Performance Framework (Scottish Government, 2018b) identifies access to greenspace as an important factor for health, and the ability to live in vibrant, healthy, and safe places is Priority 1 of the Public Health Priorities for Scotland (Scottish Government, 2018d). Priority 6 also covers physical activity and eating well and acknowledges the role of the environment in this. Greenspace is central to the Position Statement which discusses preparation for the National Planning Framework 4 (Scottish Government, 2020a), including goals such as supporting a sustainable and green economic recovery from COVID-19, greening and redesigning city and town centres, restoring the natural environment, and improving access to quality greenspace for everyone in order to promote health and reduce inequalities. The Position Statement also discusses the need for enhancing existing natural infrastructure and that this should be informed by the ongoing success of the

Glasgow and Clyde Valley Green Network Partnership and Central Scotland Green Network (CSGN) (Scottish Government, 2020a). Within the National Planning Framework 3 (Scottish Government, 2014b), the CSGN is one of 14 national developments which aimed to deliver on environmental changes including networks of woodlands, greenspace, waterways, and active travel routes. The aim of CSGN is to make central Scotland more attractive, promote and enhance biodiversity, promote active travel, outdoor recreation, and improve ecosystem services (Scottish Government, 2014b). Greenspace is also integral to other national health policies such as: the Active Scotland Delivery Plan (Scottish Government, 2018a); the National Walking Strategy (Scottish Government, 2014a); and Good Mental Health for All (Public Health Scotland, 2016).

The development of green infrastructure in urban areas is increasingly being acknowledged as one way to improve health and quality of life, enhance biodiversity, and combat climate change. Green infrastructure is defined by the EU Commission as:

“a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation, and climate mitigation and adaptation.” (EU Commission, n.d., p.1)

Examples of green infrastructure are green walls and green roofs which are designed to protect cities against some of the effects of climate change, provide aesthetically pleasing environments and ecosystem services through carbon sequestration, regulating temperature, filtering dust, air oxygenation, reducing storm water, mitigating flooding, lowering energy consumption within buildings, lessening wind-speeds, and preserving biodiversity (Benedict and McMahon, 2012, Byrne and Jinjun, 2009). More frequent exposure to green infrastructure appears to have a positive influence on mortality rates, certain types of morbidity, mental health, quality of life, and is associated with reducing health inequalities, although there is not yet a set of specific health and wellbeing metrics that can be tested in relation to green infrastructure (Lovell et al., 2020). In the UK, the commitment to developing green infrastructure is seen in national planning policy. For example, the revised National Planning Policy Framework (Ministry of Housing, 2021), the Scottish Planning Policy (Scottish Government, 2020c), the National Planning Framework 3 (Scottish Government, 2014b), the Position Statement for the National Planning Framework 4 (Scottish Government, 2020a), and Green

Infrastructure: Design and Placemaking (Scottish Government, 2011) all prioritise green infrastructure as an essential approach to delivering multi-functional benefits through urban and rural greenspace. However, although there are good examples of clear and evidence-based green infrastructure planning policy, there remains a lack of certainty amongst practitioners about how to deliver this green infrastructure (Hislop et al., 2019, Sinnott et al., 2015, Markevych et al., 2017). Further, a lack of partnership working between green infrastructure policy makers and other policy sectors currently appears to limit the development of green infrastructure to certain areas (Hislop et al., 2019, Lovell et al., 2020).

As well as policies related to human health, the UK Government has proposed an ambitious 25-year environment plan which sets out the main goals for the UK in terms of improving the environment within one generation (UK Government, 2019). The goals include ensuring greenspace is protected and maintained; that air quality is improved through a reduction of air pollutants; that at least three quarters of the UK's water is made cleaner and more available; reversing the loss of biodiversity both in water and on land; restoring three quarters of protected sites; creating or restoring 500,000 hectares of habitat outside the protected site network; and increasing woodland. The way that nature is used for resources is also considered and plans to sustainably improve soil management, timber supply, and food production are discussed, as well as how to minimise waste. The plan also addresses the risk of harm to people from environmental hazards such as extreme weather, and hazards such as exposure to chemicals during agriculture, and plans to mitigate this harm (UK Government, 2019).

In Scotland specifically, the Scottish Planning Policy (2020) states that all new planned developments must take biodiversity into account, promote habitat restoration, and avoid habitat destruction. The Nature Conservation (Scotland) Act 2004 requires all public bodies to consider their role in promoting biodiversity and to consider the Scottish Government's 25-year strategy Scotland's Biodiversity: It's In Your Hands (2004). This strategy's main aims are to: halt the loss of biodiversity; increase awareness and understanding of biodiversity; increase enjoyment and engagement with nature and biodiversity; better plan and design environments to promote biodiversity; incorporate biodiversity into day-to-day commercial decisions; and keep all relevant people such as policy makers up to date with important, new research in biodiversity. Various non-governmental organisations (NGOs) have also developed policies and strategies with environmental restoration at their core. For example, The John Muir Trust is a Scottish charity which aims to protect and enhance wild places in the UK, and much of their work

is driven by local communities who are passionate about bringing wild nature back to their local parks and greenspaces (John Muir Trust, n.d.). They also highlight the benefits of environmental restoration and the importance of supporting it as a conservation strategy. While human health outcomes may not be the primary outcome of their work, restoration and increased biodiversity can facilitate engagement and connectedness with nature, both of which have been shown to be beneficial for a person's health (Capaldi et al., 2014, Martin et al., 2020).

Regional policy landscape

At a regional level, cities are developing their own strategies as to how best they can develop and utilise their local greenspace. In the 2017 city plan for Dundee, there is a focus on promoting and developing links between environment and health sectors. Dundee has the most greenspace per head of population compared to any other Scottish city (Dundee City Council, 2017), and a Dundee Green Network has been developed to identify areas of green infrastructure in the city and how best to improve and support them. The planned actions include improving access to local greenspaces, empowering local people, improving the quality of neighbourhoods, and improving transport connections. In Edinburgh, the Edinburgh and Lothians Health Foundation and NHS Lothian commissioned Scotland's first health board-led Greenspace and Health Strategic Framework which aims to support and deliver on all relevant policies (Edinburgh & Lothians Health Foundation, 2019). For example, strategies are being implemented to develop underused NHS land into areas for health improvement such as therapeutic gardens, outdoor gyms, and green infrastructure (Edinburgh & Lothians Health Foundation, 2019). These priorities have been reiterated in the NHS Lothian Sustainable Development Framework which highlights the potential of the NHS estate for health and wellbeing, among other goals such as the fight against climate change and reducing inequalities (NHS Lothian, 2020). In Glasgow, the Open Space Strategy (OSS) has been developed to direct future decision on open spaces, identifying where new spaces should be created and where existing ones could be developed for new purpose (Glasgow City Council, 2020). The OSS states that, by 2050, Glasgow's greenspace will be good quality, distributed through the city, and act as multi-functional spaces. In turn, this will increase the health of both the city's human inhabitants and the wildlife and help in combatting climate change.

Further north, Greenspace Scotland has worked in partnership with Aberdeen City Council and community groups to develop Hazlehead Park, one of Aberdeen's largest and most historic sites, to better meet the needs of the local residents (Green Cities

Europe, 2020). As a result of the changes made to the park, residents have reported the notable benefit of having quality greenspace for recreation which is easily accessible on foot or by cycling. Aberdeen City Council has used the learning from Hazlehead Park to further inform greenspace management across the city, including creation of wetlands at other parks, and the introduction of wildflower areas in the city centre. In the Highland council area, the Active Highland Strategy (Highland Community Planning Partnership, 2017) explicitly highlights the role of quality greenspace in enhancing physical and mental health for all age groups and has this as a key area of development within the strategy outcomes. More recently in the Highlands, the Cairngorms National Park has secured £12.5million Heritage Horizons funding for the new project, The Cairngorms 2030: people and nature thriving together (Cairngorm Regional Park Authority, 2021). The project will involve partnership working between NHS Highland, local communities, and existing groups that work in the national park, such as deer management groups, with the aims of tackling the climate emergency, protecting and enhancing biodiversity, and improving people's health and wellbeing through nature. Plans for the project include expanding woodlands, peatland restoration, river catchment management, sustainable transport, outdoor health programmes, and the creation of a nature-based dementia centre (Cairngorm Regional Park Authority, 2021).

As well as greenspace development strategies, greenspace is also increasingly being integrated into health policy across regions of Scotland through green prescribing, a type of social prescribing designed to improve physical and mental health and wellbeing through exposure to, and engagement with, nature (Hardie et al., 2021, McHale et al., 2020, Robinson and Breed, 2019). Almost 15 years ago, a White Paper reviewed the NHS and highlighted the importance of people being able to access community services to help improve their mental wellbeing and address the wider determinants of health (Department of Health and Social Care, 2006). The report identified social prescribing as a suitable way of linking patients in primary care with sources of support within the community, usually provided by the voluntary and community sector, offering GPs a non-medical referral option that can operate alongside existing treatments to improve health and wellbeing. Social prescribing can help ensure that people with long term health conditions are able to access a sufficient range of services and facilities within their own community to support their physical and mental health (Department of Health and Social Care, 2006). Since this White Paper, social prescribing is receiving increasing government support across the UK (Husk et al., 2020), although certain regions appear to have better provisions of certain types of social prescribing, such as programmes relating to greenspace (Garside et al., 2020).

The Scottish Government has committed that, by 2022, at least half of NHS spending will be in community settings and recommends that social prescriptions should be treated equally to medical prescriptions when issued by health and social care professionals (McHale et al., 2020). Central to green prescriptions in Scotland is 'Our Natural Health Service' (ONHS), a programme led by NatureScot, working in partnership with Scottish Forestry, Public Health Scotland, and a range of other national and local organisations across the environment, transport, sport, education, and health sectors (NatureScot, 2020). Four Green Health Partnerships (GHPs) are led locally by health boards, and local authorities and have been established in Lanarkshire, Dundee, North Ayrshire, and Highland to run the ONHS programme. Staff within the four GHPs co-ordinate the following types of activity: improving access to green health information; raising awareness of the value of green health to health professionals and the general public; developing green prescription referral pathways to green health projects; incorporating green health options into existing physical activity, mental health, social prescribing, and lifestyle pathways and programmes; and developing green health projects and opportunities. So far, green prescriptions have been implemented in Dundee through the regional GHP (Dundee GHP, n.d.). In addition, green prescriptions have been implemented by ten GPs in Shetland, in partnership with RSPB Scotland (RSPB, 2018), and in five GPs in Edinburgh, in partnership with Edinburgh and Lothians Health Foundation and RSPB Scotland (Edinburgh & Lothians Health Foundation, n.d.). A development project run by the Edinburgh and Lothians Health Foundation, which aimed to raise the profile of green prescribing and identify barrier and enablers, identified that a system-level approach is necessary to ensure continued successful implementation of green prescribing across the country (Hardie et al., 2021). A review of the types of programmes that could be prescribed with a green prescription is covered in Chapter Two.

International policy landscape

From an international perspective, greenspace is a key component within many of the UN's 17 Sustainability Development Goals (SDGs). The UN promotes these SDGs to tackle poverty, protect the planet, and to improve the global population's health and wellbeing (UN, n.d.). The UN has explicitly stated that without global commitment to the 17 SDGs, the rate of climate change and the number of non-communicable diseases will continue to increase, both of which have been described by the UN as defining challenges of the 21st century (Röbbel, n.d.). Maintaining quality greenspace and related ecosystem services is crucial in reaching many of the targets relating to ending hunger, renewable energy, innovation and infrastructure, reducing inequalities, sustainable cities

and communities, restoring and protecting life on land, improving and maintaining health, and climate action (UN, n.d., World Green Building Council, 2021). Meeting the climate action goal is of particular importance given that the latest report from The Intergovernmental Panel on Climate Change (IPCC) has shown that climate change is happening faster than previously thought (IPCC, 2021). As part of the climate action goal, maintaining and protecting greenspace is integral to climate change agreements worldwide such as the Kyoto Protocol (UN, 2021b), the Paris Agreement (UN, 2021a), and the Parma Declaration on Environment and Health (World Health Organisation (WHO), 2010). Through these agreements, the goal is to limit global warming to 1.5 degrees Celsius, compared to pre-industrial levels (UN, 2021b). Only by achieving these goals can we avoid doing irreversible damage to the planet through extreme weather conditions, species extinction, rising seas and oceans, and other climate-related risks and poverty (IPCC, 2021).

Given the centrality of greenspace maintenance within the SDGs, there has been a call for continued greenspace research to provide further evidence for their maintenance and development. The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) undertook an extensive, global assessment of the planet's biodiversity, ecosystems, and ecosystem services, and outlined the health benefits for humans of interacting with nature (IPBES, 2019). From this document, a summary for policymakers highlighted four key messages. Firstly, nature makes vital contributions to people, and biodiversity is declining faster than at any other time in human history. Secondly, direct drivers of changes such as those in land and sea use, direct exploitation of organisms, climate change, pollution, and invasion of non-native species, have all accelerated in the past 50 years. Indirect drivers of change, underpinned by societal values and behaviours, have also accelerated in this timeframe. Thirdly, conservation and sustainability goals will not be met unless there are large scale changes across economic, social, political, and technological factors. Finally, it is possible to simultaneously conserve and restore nature while meeting other goals, but only through urgent and transformative global change (IPBES, 2019). In Europe, the EU commissioned an evaluation of the social, cultural, and health value of its protected sites network to highlight the importance of continued maintenance to improve population health (ten Brink et al., 2016). The report emphasised the rising healthcare costs due to aspects such as air pollution, heat stress, noise pollution, low physical activity levels, poor mental health, and increased socioeconomic inequalities. However, it also proposed how nature-based solutions may offer affordable and sustainable ways to address some of these challenges through promoting physical activity, supporting social

cohesion, mitigating noise stress, reducing exposure to pollutants and heat, and aiding in stress reduction.

The WHO have also stated that greenspace is essential for healthy, sustainable, liveable conditions through reports such as Urban green spaces and health - a review of evidence (WHO, 2016). Further, they have reported the role of greenspace within health interventions through their review, Urban Greenspace Interventions and Health: A Review of Impacts and Effectiveness (WHO, 2017). The report indicated that greenspace interventions should be considered as long-term investments for population health since they provide wide ranging health, social, and environmental outcomes for all population groups, particularly among people with a lower socioeconomic status and with poor mental health, in a way that few other public health interventions are able to. However, the report also states that to successfully integrate greenspace interventions into existing health policy, there needs to be greater political support for and acknowledgement of their potential across local governments.

Theoretical framework for this project

While greenspace is increasingly being written into policies and strategies at a regional, national, and international level, there is still much debate about the mechanisms by which greenspace affects health. The WHO defines health as:

“...a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.” (WHO, 2020, p. 1)

By acknowledging the multidimensional and interacting determinants of health, the WHO definition supports the involvement of a wide variety of approaches to best enable and support health. The Social Ecological Model, originally developed by Bronfenbrenner (1979), enables an understanding of how different layers of influence interact to shape a person's health. What a social-ecological framework recognises is that, while individual level factors such as demographics and lifestyle can affect health, there are also influential external factors, outside of a person's control. For example, social influences such as relationships; living and working conditions, and other factors within the physical environment; and wider macro-level societal and environmental factors have the potential to impact health positively or negatively (Bronfenbrenner, 1979). The Dahlgren-Whitehead rainbow model, as shown below in Figure 1, is an example of a social-ecological model that was developed to map out the main determinants of health and show four distinct layers of influence on an individual (Dahlgren and Whitehead, 1991).



Figure 1: The Dahlgren-Whitehead rainbow

Dahlgren and Whitehead's (1991) model is not only a visual simplification of health determinants that must be addressed but is specifically organised to inform how interventions are developed and implemented to promote positive health and/or reduce illness. The model has been used widely since its development in many different research areas and continues to be drawn on particularly within health inequality research (Economic Social Research Council, 2021). The Marmot Review, Fair Society, Healthy Lives (Marmot et al., 2010), and the 10-year update (Marmot et al., 2020) hold that action to reduce health inequalities requires addressing all social determinants of health. To achieve this, the need for interdisciplinary and partnership working to best attain outcomes is evident as expertise from different sectors will be needed to understand how different determinants of health interact.

When looking specifically at public health interventions, such as greenspace programmes, the pathways by which these can influence human health is complex. Existing research in this area has drawn on models such as the Dahlgren-Whitehead rainbow (1991) to inform the development of theories and how these might contribute to understanding and development of future programmes. In 2016, an international interdisciplinary workshop brought together various disciplines with the aim of identifying how the underlying biopsychosocial pathways for greenspace and human health could be understood and organised to support future policy and public health research (Markevych et al., 2017). The evidence synthesised during this meeting of experts supported the concept of various pathways encompassing environmental factors, physiological and psychological factors, and behavioural factors. It was proposed that potential pathways that link greenspace to human health fall generally into three domains: reducing harm through ecosystem services (e.g. reducing exposure to air pollution, noise and heat); restoring capacities (e.g. attention restoration and

physiological stress recovery); and building capacities (e.g. encouraging physical activity and facilitating social cohesion). Engagement with greenspace can affect health in a multifaceted way and the benefits gained from interacting with nature will likely involve all pathways simultaneously (Markevych et al., 2017). Although each pathway has different theoretical and practical premises, these appear to complement rather than contradict one another, both as a basis for understanding and for interventions. An in-depth review of these pathways is discussed in Chapter Two.

Greenspace programmes for improving mental health and supporting people with problem substance use (PSU)

Despite the prevalence of greenspace in current policies and strategies, continued research into the pathways for greenspace and health is needed to better inform future intervention implementation. In particular, a greater understanding of exactly how greenspace can improve mental health seems important given the high rates of mental health problems in the UK (Bebbington and McManus, 2020). Indeed, the population prevalence of mental health problems increased from 24.3% in 2019 to 31.9% in June 2020 (Daly et al., 2020), with depression and anxiety rising in many individuals (Salari et al., 2020). This rise in mental health challenges has been attributed, at least partly, to the stress related to the COVID-19 pandemic (Daly et al., 2020, Salari et al., 2020), and the isolation felt by many due to lockdowns and shielding (Chandola et al., 2020, Usher et al., 2020). Further, those experiencing socioeconomic disadvantages are shown to be most at risk for increased mental health challenges relating to the pandemic (Brunoni et al., 2021, Chandola et al., 2020). An additional concern is that the figures for poor mental health may be even greater in reality, with high levels of unreported mental health problems and/or fewer people managing to access treatment, during the pandemic (Mind, 2020, Peng et al., 2020, Wilkinson, 2020). Even as restrictions are lifted, there have been reports that mental health, and anxiety in particular, are rising again (Anxiety UK, 2021). Exposure to greenspace has been associated with reduced antidepressant prescription rates (Helbich et al., 2018), and has recently been proposed as a way to reduce the high global burden of chronic pain and related mental health challenges (Stanhope et al., 2020). There are now a number of greenspace programmes for mental health, with a range of outcomes, across the UK. A literature review of the evidence base for the association between greenspace and mental health and existing greenspace programmes is presented in Chapter Two. Further exploration of why programmes work, for whom, and in what circumstances is explored in Chapter Four.

The use of greenspace programmes for people with PSU is also a focal point of this thesis. Various programme types exist that support this client group, and a number of these are described in Chapter Two. One of the key research aims of the project is to identify whether the pathways through which greenspace programmes are shown to improve mental health, can also explain how greenspace programmes might be successful in supporting people with PSU. As discussed in the project rationale, the link between mental health and PSU is well established (Kingston et al., 2017, McVicar et al., 2015, McKetin et al., 2019), so if greenspace programmes can be successful in supporting mental health, they may also be effective in supporting people with PSU through similar causal mechanisms. This is particularly important given the current rates of drug-related deaths, and further, there is evidence that the stress and distress caused by COVID-19 may be contributing to higher levels of drug and/or alcohol consumption, in some people, as a way of coping (Jacob et al., 2021, Garnett et al., 2021, Wardell et al., 2020). With the rising number of deaths and substance-related harm, there is increasing pressure on related health services, such as treatment and recovery services, to deliver effective support to people with a wide variation in their needs (Scottish Government, 2018c).

Treatment approaches for PSU are wide ranging and can be placed on a continuum ranging from abstinence-based approaches to harm reduction. Services that are abstinence-based include most residential rehabilitation facilities, some higher threshold non-residential services that require abstinence and structured treatment and appointments, and support groups such as Alcoholics Anonymous (n.d.) and Narcotics Anonymous (n.d.). Although recovery services have traditionally been linked to abstinence-based approaches, there has been a move to defining recovery as relating to functioning, rather than solely about substance use (Harrison et al., 2020). Indeed, abstinence can be difficult to comply with because of unrealistic conditions and/or undesirable goals (Carver et al., 2021). Evidence shows that harm reduction strategies are necessary in order to meet the needs of people who, for whatever reason, are not accessing abstinence-based approaches (Carver et al., 2021, Boucher et al., 2017), and there is increasing acknowledgement of the value of taking a combined approach to treatment (Ashford et al., 2018). The goal of harm reduction is to reduce individual and societal harms of substance use through policies and interventions that change risks, risk behaviours, and risk settings (Hedrich and Hartnoll, 2021). Harm reduction does not replace the need for other treatment but increases the ability to respond effectively to a wide range of health and social challenges raised by substance use. In particular, harm reduction strategies aim to reduce the risks associated with long-term use of alcohol and

other drugs and with behaviours such as injecting drug use, which place a person at a higher risk of harm, as well as other health, psychological, or social problems (Bates, 2017). Harm reduction is therefore a pragmatic approach that incorporates a number of evidence-based, targeted interventions tailored to local settings and an individual's needs (Hedrich and Hartnoll, 2021).

There are a number of different harm reduction strategies, and approaches typically require a co-ordinated response from a range of stakeholders, including treatment, prevention, public health, the police, community groups, and local authorities (Rhodes, 2002, Hedrich and Hartnoll, 2021). Furthermore, it goes beyond individual interventions and stresses the need for enabling environments which enhance protective factors, reduce harms, and promote public health (Rhodes, 2002). Crucially, harm reduction aims to improve equality in access to services, promotes dignity, and attempts to counteract social exclusion and stigma (Carver et al., 2020). Harm reduction strategies for alcohol include pricing and drinking environment policies, education, alcohol brief interventions, pharmacotherapy, and Managed Alcohol Programmes (Ivsins et al., 2019). Harm reduction strategies for other drugs, some of which are implemented in the UK, include: opioid substitution treatment; needle and syringe programmes; prevention interventions such as naloxone; outreach, peer education and health promotion; testing, vaccination, and treatment of infectious diseases such as blood-borne viruses; interventions for stimulant use; drug checking; and drug consumption rooms (Hedrich and Hartnoll, 2021, Measham and Turnbull, 2021).

Implementing greenspace programmes as an intervention for people with poor mental health and PSU could have various benefits. For example, programmes are often low threshold, meaning that they provide support for people without placing any demands or expectations on them. Although some greenspace programmes are run as part of wider abstinence-based programmes, for example Phoenix Futures' Recovery Through Nature programme (Phoenix Futures, n.d.), many do not require a commitment to reduce substance use. Further, they can run alongside other substance use and/or mental health services. There are a wide range of beneficial health outcomes relative to greenspace programmes, but they are often supportive without falling under a typical banner of 'treatment' which immediately removes potential stigmatisation and medicalisation that can be seen relative to substance use treatment (Corrigan and Nieweglowski, 2018, Zwick et al., 2020). Greenspace programmes address challenges of integrating mental health and substance use support because they do not fall under the banner of either treatment type. This is particularly important since there is evidence

that shows that people with co-occurring PSU and mental health problems can be denied appropriate support and treatment due to having to meet strict conditions such as a period of abstinence before accessing mental health services (Han et al., 2017, Motta-Ochoa et al., 2017, Williams et al., 2020). Conversely, greenspaces programmes have the potential to provide a 'no wrong door approach' (PHE, 2017) for individuals with co-occurring PSU and mental health problems meaning that they could support people regardless of their health needs.

Greenspace and health inequalities

There is existing evidence that time spent in greenspace is actually more beneficial for people with poor mental health compared to those with positive mental health (Roe and Aspinall, 2011, Rogerson et al., 2020). Time spent in greenspace also appears to be more beneficial to health for those from more deprived areas compared to affluent areas (Lachowycz and Jones, 2014, Mitchell et al., 2015, Mitchell and Popham, 2008, PHE, 2020). This may be important relative to substance use since living in a deprived area has been shown to increase a person's risk of substance-related harm (Boyd et al., 2021, Rehm and Probst, 2018). Indeed, in Scotland, alcohol specific deaths are seven times higher in the most deprived areas than the least deprived, and alcohol related hospital stays are eight times higher (Alcohol Focus Scotland, 2018). As noted by Pearce et al. (2015), research frequently focuses solely on which characteristics of environments are harmful, how they are harmful, and who is more likely to be exposed to them. Alternatively, it could be more helpful to explore why people stay well and what contributes to their health. If greenspace is shown to contribute positively to health, particularly for those from lower socioeconomic backgrounds and those with poorer mental health, then increasing opportunities for engagement with greenspace could play a role in reducing health inequalities and mitigating harm, including substance-related harm, for these groups. This idea that features of the social, physical, or service environments could create health equality within the confines of existing material inequality is referred to as 'equigenesis' (Pearce et al., 2015).

Despite the potential role of greenspace in reducing existing health inequalities, current provisions of greenspace are not equal, and those who may benefit the most are often at a disadvantage in terms of access to both quantity and quality of space (Geary et al., 2021, PHE, 2020, Shanahan et al., 2019). For example, the availability of greenspace differs depending on where you live, and affluence can allow people to buy homes in areas that have more quality greenspace and access to nature, less exposure to pollution, and more space for physical activity (Pearce et al., 2015). Even though some

deprived areas contain a larger quantity of greenspace (Jones et al., 2009), overcrowding can be an issue, particularly in cities, and is often seen at a higher rate in deprived areas (UK Government, 2020). This means that the number of people who are using each available greenspace is likely higher compared to in more affluent areas (Shoari et al., 2020). Inequalities are further deepened since, in the UK, people from White ethnic groups are least likely out of all ethnic groups to live in the most deprived 10% of neighbourhoods (UK Government, 2020). Further, quality green infrastructure, which has been linked to reduced inequalities in health, is typically less in more deprived communities, and poorer quality green infrastructure can exacerbate inequalities (Lovell et al., 2020).

Inequalities in access to greenspace became more apparent during the period of the COVID-19 nationwide lockdown. Shoari et al. (2020) highlighted that around 13% of people in England and Wales live more than a ten-minute walk from their local park. Walking in local parks and other greenspace was deemed essential for mental health during the pandemic and lockdown especially, however, those that live further away from such areas are at a clear disadvantage. Additionally, those who lived in overcrowded housing, and areas such as apartment blocks with no gardens, were more likely to share greenspace with many people compared to those who lived in less crowded areas, or who had their own gardens (Geary et al., 2021). Burnett et al. (2020) found that greenspace access reduced during COVID-19 due to various possible reasons. For example, people reported that they were anxious about leaving home, particularly those who were shielding, and those who were frontline workers reportedly had less time to visit greenspace. The study also showed that women and older adults were less likely to visit greenspace during the pandemic which highlights the importance of acknowledging the wider contexts that exist and influence people's engagement with greenspace, over and above the existence of the greenspace itself.

Inequalities in access are also seen relative to specific greenspace programmes. Programmes may be designed to improve health outcomes, but attending programmes can be reliant on practical, but often overlooked aspects. Examples of these include cost, ease, and safety of travel; owning the correct clothing and footwear, particularly since COVID-19 and no longer being able to share or borrow items; caring responsibilities; medication or treatment needs; physical capabilities and general differing personal circumstances can present inequalities in programme suitability (Masterton et al., 2020). For example, mobility issues may limit a person's ability to take part in physically demanding programmes; wilderness projects may not be suitable for people who have

been involved in offending and are limited where they can go; and overnight programmes, or those that start early in the morning, may not be suitable for those on daily pick-up prescriptions (Livingston et al., 2011, Masterton et al., 2020). Systemic issues such as lack of consistent funding and resources also present barriers to access, with some locations receiving less funding for programme implementation than others (Garside et al., 2020). A lack of focus on context means that the impact of existing inequalities is not considered which may hinder programme implementation. Further, there is little research exploring which mechanisms may lead to beneficial outcomes for different groups of people. Programmes can be adapted to fit the needs of clients, but to do this, those implementing the programme must address and be aware of contextual circumstances and their influence in the first place. An improved understanding of the relationship between potential CMOs could assist interpretation of research findings and help future programme development and implementation. This study has been designed to address these issues and will utilise realist methodology as a way of explaining what greenspace programmes work, for whom, and in what circumstances.

Thesis summary

Methodological approach summary

Realist methodology (Pawson and Tilley, 1997) was considered the most appropriate design for the study (see Chapter Three for a detailed description of the methodology and methods). Briefly, realist approaches are pragmatic practices based on critical realism and aim to identify causal relationships through a theory driven, generative model (Pawson et al., 2005). Public health interventions are highly affected by context, difficult to predict, and there are often many challenges when implementing an intervention such as engaging target groups and meeting the multiple competing needs of people using the service (Pawson et al., 2005). The premise of realist-informed research is that outcomes in complex, public health interventions are achieved through underlying generative mechanisms which are present in the right contexts. This changes the question of 'what works' to a more in-depth inquiry of 'what works, for whom, and in what context or circumstance'. Since greenspace programmes are an example of complex, public health interventions, realist methodology enables the exploration of how greenspace programmes might be successful in improving mental health and supporting people with PSU, and allows development of a potential framework for future programme implementation.

Structure of the study phases

There are three main phases involved in this study: initial development of the potential programme theories that explain how greenspace programmes work, for whom, and in what circumstances; testing and refinement of these programme theories; and consolidation of the programme theories (Pawson and Tilley, 1997). However, realist methodology is iterative in nature so these phases are not progressed through in a linear way and can move between phases within each part of the study (Pawson and Tilley, 1997). A detailed description of the methods used in each phase is covered in Chapter Three.

Study Phase One: Initial programme theory (IPT) development and initial refinement (Chapter Four)

The data for this phase were obtained through a detailed realist synthesis of the international literature on greenspace programmes for mental health. Testing and refinement of the IPTs was also undertaken in the realist synthesis to provide an initial framework for greenspace programmes for mental health in clinical and non-clinical populations.

Study Phase Two: Testing and refinement of programme theories (Chapter Five)

In the second study phase, the realist framework from the synthesis was tested with primary data. An exploratory survey based on the components of the realist synthesis framework was designed and distributed among greenspace organisations in Scotland. This allowed initial exploration of the transferability of the framework to practice and allowed testing of the framework for programmes that support people with PSU.

Study Phase Three: Testing, refinement, and consolidation of programme theories (Chapters Six, Seven, and Eight)

The framework and programme theories from Phases One and Two became the IPTs for Phase Three. In Phase Three, the IPTs were tested through qualitative interviews with greenspace organisation staff and wider stakeholders. This phase was split into two stages which allowed for the programme theories to be refined after stage one and the interview schedule to be amended in response to the emerging interview data. The second stage of Phase Three then progressed to testing the refined programme theories with the aim of programme theory and framework consolidation.

Thesis structure

This thesis is divided into nine chapters. This introductory chapter has provided an overview of the rationale/aims/objectives of the study and the research questions. It has summarised the contextual background and theoretical framework of the study, introduced the idea of greenspace programmes for mental health and PSU, and explored how these could be a feasible addition to holistic care for these populations. Chapter Two provides a review of the literature and is split into two sections. The first section explores the pathways by which greenspace affects human health, and the second provides a review of existing greenspace programmes for mental health and PSU. This chapter will end by presenting the gaps that exist in this research area which highlight the importance of this project. Chapter Three introduces and explains how the study is informed by realist methodology and details project methods. Ethical considerations are discussed, including the impact of COVID-19 and challenges integral to the methodology. The chapter ends with a positionality statement and reflexive considerations. Chapter Four provides a realist synthesis, the first stage of the realist framework development, which allows identification of the IPTs which are then tested and refined through the findings chapters. The findings of the study are presented in Chapters Five to Eight. The quantitative findings are presented in Chapter Five, and the qualitative findings are presented in Chapters Six to Eight. Chapter Six includes findings from the staff participants and Chapter Seven includes findings from stakeholder participants. Chapter Eight contains the final refinement of all programme theories and presents a novel realist framework for potential use in future greenspace programme implementation for people with poor mental health and PSU. Finally, Chapter Nine presents how the findings fit into the existing empirical literature base, implications for practice and future research, the strengths and limitations of the study and, finally, the conclusions which can be drawn.

Chapter 2: Literature review of greenspace programmes for mental health and problem substance use

Introduction to chapter

The aim of this chapter is twofold, firstly to provide a synthesis of the literature on greenspace for physical and mental health through three proposed domains that provide an interdisciplinary framework. Secondly, to provide a detailed review of existing greenspace programmes for mental health and problem substance use (PSU), both internationally and in Scotland. The chapter will finish with key principles seen within greenspace interventions, as well as recommendations for future research drawn from the evidence.

Health is defined as *“a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity”* (WHO, 2020, p. 1), and the Social Ecological Model (Bronfenbrenner, 1979) and the Dahlgren-Whitehead rainbow (Dahlgren and Whitehead, 1991) enable an understanding of how different layers of influence interact to shape a person’s health. These models show that, while individual level factors can affect health, health is heavily influenced by external factors, outside of a person’s control. The idea of the environment, and specially greenspace, being beneficial to health is not a new concept, and it is generally accepted that there are numerous biopsychosocial pathways by which this can happen (Hartig et al., 2014, Kuo, 2015, Markevych et al., 2017, Shanahan et al., 2019, Zhang et al., 2021). Much of the existing empirical evidence has focused on four main pathways: air quality, physical activity, stress, and social cohesion (Hartig et al., 2014, Markevych et al., 2017, Zhang et al., 2021). Several other possible mechanisms have also been suggested, although these can generally be grouped under the similar pathways of environmental conditions, physiological and psychological states, and behaviours and conditions (Kuo, 2015, Markevych et al., 2017). In 2013, Keniger and colleagues reported that there was limited research from biological sciences relating to the exploration of the nature and human health relationship, and this may have affected understanding of potential key pathways and/or mechanisms (Keniger et al., 2013). Although many studies exploring different pathways have been published since this then, it is still essential to acknowledge the need for interdisciplinary input in order to adequately understand the complex relationship between greenspace and health (Krabbendam et al., 2021).

In 2016, an international, interdisciplinary workshop was held in Germany to explore potential pathways linking greenspace to health drawing on expertise from various disciplines such as environmental and social epidemiology, exposure science, environmental psychology, forestry, geography, and city planning (Markevych et al., 2017). The purpose of this meeting was to review existing evidence linking greenspace and health from an interdisciplinary standpoint, with a particular focus on how the underlying biopsychosocial pathways might be understood and organised to support future policy and public health research. The evidence synthesised from the meeting supported the concept of a number of pathways encompassing environmental, physiological, psychological, and behavioural factors. It was proposed that the pathways linking greenspace to human health fall into three domains: reducing harm through ecosystem services such as reducing exposure to air pollution, noise and heat; restoring capacities through attention restoration and physiological stress recovery; and building capacities through aspects such as encouraging physical activity and facilitating social cohesion (Markevych et al., 2017). These pathways are supported by recent narrative reviews, systematic reviews, and meta-analyses (Jimenez et al., 2021, Krabbendam et al., 2021, Zhang et al., 2021). Although each pathway has different theoretical and practical premises, these appear to complement rather than contradict one another, both as a basis for understanding pathways and for targeted health interventions. Indeed, the benefits gained from interacting with nature will likely involve all pathways simultaneously (Markevych et al., 2017).

While there is strong evidence for the beneficial effect of nature on health, it should be acknowledged that, in some instances, it is difficult to ascertain the direction of effect. For example, it is possible that associations between health and greenspace is at least partially explained by healthier people wanting to spend more time in greenspace (White et al., 2019). It is also important to briefly consider that some evidence has shown adverse effects of greenspace in certain circumstances. For example, higher quantities of greenspace could lead to higher levels of allergenic pollen (Aerts et al., 2020, Cariñanos and Casares-Porcel, 2011), or a higher number of infections or disease, with increased tick-borne diseases being one example (Heylen et al., 2019). Expanses of greenspace can also be linked with crime, or the fear of increased crime, due to greenery cover and limited surveillance (Kimpton et al., 2017). Increasing and renovating greenspaces can also lead to gentrification and increase the cost of living in the surrounding areas which could have detrimental effects, particularly for those with lower socioeconomic status (Jelks et al., 2021, Lovell et al., 2020). It is important to acknowledge these issues, however, despite this, much of the body of existing evidence

still strongly supports that engagement with greenspace has multiple benefits on many levels.

Part One: Domains and pathways

Reducing harm through ecosystem services

Ecosystem services are the benefits that humans gain from biodiversity in the natural environment. There are many ecosystem services including, but not limited to: food provision; pollination services; pest and disease regulation; air oxygenation; water retention and purification; carbon sequestration; climate moderation; medicine provision; and spiritual and cultural values (Romanelli et al., 2015). However, urbanisation is expanding, and over half of the world's population now live in urban areas, such as towns and cities, with this number expected to rise to 60% by 2030 and almost 70% by 2050 (Romanelli et al., 2015, UN Department of Economic and Social Affairs, 2018). With this increase in urbanisation and potential loss of green spaces, there will likely be a negative effect on biodiversity and subsequent ecosystem services (La Roux et al., 2014). Levels of biodiversity have been shown to be directly impacted by rising urbanisation, with a reduction in overall greenspace linked to a reduction in species (La Roux et al., 2014). While some species are able to adapt well to urban settings, urbanisation typically involves the reduction or destruction of natural or semi-natural habitats (La Roux et al., 2014), an increase in wildlife mortality due to increased incidents such as vehicle or building collisions (Loss et al., 2014), and an increase in competition for food (Parsons et al., 2019), among other factors.

Humans appear to respond favourably to biodiverse environments, for example by preferring a higher number of plant species in urban greenspace (Fischer et al., 2018), a higher number of fish and crustacean species in aquaria (Cracknell et al., 2017), and a diverse range of species when hearing birdsong (Hedblom et al., 2014). Positive relationships have also been evident between people interacting with species abundance and mental wellbeing (Bell et al., 2018, Marselle et al., 2019). Wellbeing benefits gained from biodiverse environments are also seemingly achievable through indirect contact (Keniger et al., 2013, Wolf et al., 2017), for example through viewing nature through a window, photographs, paintings, or videos of nature. Wolf et al. (2017) asked participants to rate their mental wellbeing after watching videos of either high or low bird and tree species richness. Participants who watched videos with greater species richness rated their mental wellbeing as significantly higher than participants who watched videos with lower species richness. However, conclusions relating to the

relationship between biodiversity and human health must be interpreted with caution since existing reviews of biodiversity and mental health have shown mixed results (Lai et al., 2019, Lovell et al., 2014, Marselle et al., 2019).

While the exact relationship of biodiversity and mental health is unclear, there is concern that reductions in biodiversity may contribute to what has been described as 'nature deficit disorder' (Louv, 2008). Without access to, and engagement with, different forms of nature and biodiversity, children may grow up without appreciation, enjoyment, or understanding of the natural world, and could be more likely to lead sedentary lifestyles, resulting in future health complications. Increasing time spent on electronic devices such as televisions and smart phones has been linked to children spending less time outside in nature, and with lower knowledge of plants and animals (Louv, 2008, Verboom et al., 2004). When children are outside, play can be confined to small urban areas such as private gardens, residential streets, or play parks with limited biodiversity raising concerns about how possible it might be to develop a connection to nature (Hand et al., 2018). A connection to nature refers to the degree to which a person feels an affinity to nature, and that nature is part of their identity (Dutcher et al., 2007), and it is proposed to occur through learning about nature and through meaningful physical experiences in nature (Zylstra., 2014). People with high nature connectedness report spending more time outdoors (Chawla, 1999), show more pro-environmental behaviours (Alcock et al., 2020, Martin, 2020), report a higher level of support towards conservation (Alcock et al., 2020, Dutcher et al., 2007), and report higher levels of wellbeing related to meaning and purpose in life (Martin, 2020). Indeed, a meta-analysis of 30 samples ($n=8,523$) found that people who are more connected to nature experience more positive affect, vitality, and life satisfaction, compared to those who report less connection to nature (Capaldi et al., 2014).

Development of nature-based solutions such as green infrastructure could be key in tackling the detrimental effects of urbanisation and climate change on biodiversity and ecosystem services. In a recent review of the health and wellbeing evidence for the Framework of Green Infrastructure Standards, which are part of the UK Government's 25-year environment plan, Lovell and colleagues (2020) reported that green infrastructure can have a positive influence on population and individual level health and could aid in reducing health inequalities. More frequent exposure to green infrastructure appears to have a positive influence on mortality rates, certain types of morbidity, mental health, quality of life, and is associated with less stark inequalities in health (Lovell et al., 2020). However, there remains a gap in knowledge about how different people benefit

from green infrastructure. As Lovell et al. (2020) argue, all social groups will likely benefit from green infrastructure, but the evidence is currently inconsistent on who benefits, in what ways, and to what degree. This makes it challenging to identify what quantity and quality of green infrastructure is needed for health and wellbeing outcomes in different contexts. Moreover, the perception of quality is likely to be highly variable between socio-cultural groups which presents challenges in both definition and measurement (Lovell et al., 2020).

Conversely, a lack of quality green infrastructure can exacerbate inequalities. Research from the United States (US) has shown that tree canopies within urban areas appear to be unequally distributed, and Black and lower income communities have less areas of tree canopy compared to more affluent communities (Berland and Hopton, 2014). Namin and colleagues (2020) concluded that tree canopy was approximately 17% lower in the most deprived areas of the US, compared to least deprived, and exposure to airborne carcinogens was three times higher. This pattern of inequalities in exposure to greenspace has also been reported by other researchers outside of the US (Geary et al., 2021; Shanahan et al., 2019). However, tackling health inequalities through nature-based solutions can be complex since there is also evidence that simply increasing or renovating green infrastructure can increase inequalities in health through processes such as gentrification, thus negatively affecting people who already live there (Lovell et al., 2020). This highlights that addressing inequalities through greenspace development is not only about increasing greenspace but requires partnership working and community engagement and involvement throughout the process (Geary et al., 2021).

Restoring capacities through attention restoration and physiological stress recovery

The biophilia hypothesis (Wilson, 1984) holds that humans have an innate desire to interact with nature. This attraction towards living organisms is proposed to be part of our biological evolution as it benefits our physical, cognitive, and intellectual health (Kellert and Wilson, 1993, Keniger et al., 2013), well as providing aesthetic satisfaction and spiritual meaning, both of which have been linked to positive mental health (Svendsen et al., 2016). From a functional-evolutionary perspective, landscapes that are integral to survival and provide resources for drinking, eating, hiding, and shelter should theoretically be preferred across human cultures (Ulrich, 1986). Research has criticised that the biophilia hypothesis is too broad in itself to be a theory with testable hypotheses, and that it is perhaps more accurate to regard it as a general concept (Joye and de Block, 2011).

More specific than the biophilia hypothesis, the two leading theories of how nature can benefit human health through restorative environments are Attention Restoration Theory (ART) (Kaplan and Kaplan, 1989) and Stress Reduction Theory (SRT) (Ulrich, 1983). Attention Restoration Theory posits that we have a finite capacity for attention and that there are two types of attention: direct and indirect. Direct attention occurs when a task is being attended to and, regardless of whether the task is deemed stressful or not, and prolonged periods of direct attention will eventually lead to attentional fatigue and a decrease in mental performance (Kaplan and Kaplan, 1989). Attentional fatigue has been linked to increased irritability, frustration, errors in work, impulsivity, as well as decreases in social skills (Kaplan and Kaplan, 2003, Kuo and Sullivan, 2001). Mental fatigue will continue until the opportunity for restoration arises which might be achieved by using indirect attention, a mode of attention which requires no cognitive effort and therefore allows psychological restoration (Kaplan and Kaplan, 1989, Marselle, 2019). The premise of ART is that when a person is immersed in nature this immersion facilitates indirect attention which initiates feelings of calm, attention restoration, and a decrease in mental fatigue (Kaplan and Kaplan, 1989). Kaplan (1995) proposed that attention restoration in nature is a result of four components: fascination; being away; extent; and compatibility. 'Fascination' describes the way in which nature is interesting and draws attention without direct effort. 'Being away' refers to a conceptual change of feeling removed from everyday life. 'Extent' describes the scope of the environment and whether the environment is extensive enough to "*take up a substantial portion of the available room in one's head*" (Kaplan, 1995; p.173). Finally, 'compatibility' refers to how compatible the environment is with a person's purpose, so that engagement and activities can occur with ease.

In support of ART, Berman et al. (2008) measured cognitive performance with a backwards digit-span task, where participants repeat numbers in reverse order after listening to a sequence, and the Attention Network Task (Fan et al., 2002), which can be used to test three attentional functions: alerting; orienting; and executive attention. Results of both tests showed that walking in a botanical garden compared to walking in a city street facilitated greater cognitive performance in participants. Similarly, Hartig and colleagues (1991) tested proofreading scores in participants backpacking in the wilderness, compared to participants in a non-wilderness holiday setting and a non-holiday setting. In the follow-up study, proof reading scores remained significantly higher in the wilderness group, compared to declines in participant scores in the two non-wilderness groups. Although baseline ability should be acknowledged, the authors suggested that cognitive abilities improve after immersion in nature and that they remain

elevated for an extended period of time. However, despite being a key theory in the field it is not without criticism. Ohly et al. (2016) conducted a systematic review of the attention restoration potential of exposure to natural environments and found mixed results and that there appears to be uncertainty around what aspects of attention are affected by exposure to natural environments. The review also raised concern about the diversity of populations, study design, and outcomes across studies that look to test ART, making overall comparisons and conclusions difficult. Further criticism has been made about the lack of clarity regarding the components of ART. For example, there are questions about what 'fascination' means objectively, and how it can be measured (Joye and Dewitte, 2018).

In comparison to cognitive processes, SRT (Ulrich, 1983) holds that engagement with nature allows changes in psycho-physiological processes leading to reductions in psychological stress, and physiological arousal. This theory builds on assumptions about biologically prepared patterns of responses to environmental stimuli. Visual perception of the environment is proposed to evoke an immediate affective reaction and an automatic behavioural response of either approaching or avoiding the stimulus. Cognitive appraisal may then modify the initial response leading to emotional appraisal and a change in physiological arousal and behaviour (Ulrich, 1983). Therefore, SRT proposes that viewing aspects of nature can enhance positive emotions that effectively block negative thoughts and feelings which then reduces the stress response (Markevych et al., 2017). According to SRT, there are specific properties of natural environments that best lead to this type of restoration: moderate to high complexity (e.g. the number of independently perceived elements in a setting); a focal point in the setting to attract or direct attention; moderate to high level of depth (or openness); a lack of threat; presence of a deflected vista (e.g. a path bending away), and water (Ulrich, 1983).

There is a large body of evidence in support of SRT. Early research showed that participants who were exposed to videos of vegetation showed quicker recovery from a stressor, compared to participants who were exposed to videos of built environments (Ulrich et al., 1991). This was true for physiological indicators as well as for self-ratings of affect. A number of systematic reviews support SRT (Antonelli et al., 2019, Haluza et al., 2014, Ideno et al., 2017), and a recent review of the literature described reductions in stress hormones such as adrenaline and noradrenaline, as well as a reduction in blood pressure and heart rate, when immersed forests (Li, 2019). However, there has been criticism in other reviews that considerable heterogeneity in research design, and in measures such as cortisol metrics, highlights the need for further rigorous research to

better understand the relationship between greenspace and stress (Jones et al., 2021). Nevertheless, integrating nature into the treatment of stress and burnout is becoming more commonplace, with an increasing awareness of the additional benefits of undertaking talking therapies outside in greenspace (Cooley et al., 2020, van den Berg and Beute, 2021). There is also some evidence that a reduction in stress may be experienced without being physically present in nature, for example by looking through a window at scenery (Shin, 2007). An emerging area of research is exploring whether nature viewed using virtual reality can facilitate reductions in stress, with some evidence already showing promise in this field (Anderson et al., 2017, Yeo et al., 2020b, White et al., 2018). While virtual reality may not offer some of the benefits gained from physical contact with nature, it does remove the barrier of accessibility (White et al., 2018). For example, people with less available greenspace around them, people with various health conditions, people in hospital, people with limited time, older adults, and those who do not feel safe in their local greenspace, could benefit from accessing nature through virtual reality.

Building capacities

Physical health

Availability of greenspace has been reported as an important resource for promoting active engagement, for example through physical activity and active travel (Hartig et al., 2014, Vert et al., 2019). However, current evidence is mixed; although some studies have supported an association between greenspace and physical activity (Broekhuizen and Vries, 2013, Gianfredi et al., 2021, Jimenez et al., 2021), others have found no effect of proximity to greenspace on physical activity levels (Maas et al., 2008, Mytton et al., 2012). In relation to active travel, attractive routes through greenspaces may lead people to choose to walk or cycle rather than taking the car or bus to their destination. However, empirical evidence is again mixed (Fraser and Lock, 2011, Lachowycz and Jones, 2011), and the association may be mediated by factors such as the journey distance, availability of suitable cycle or walking routes, lighting, perceived safety, and practical considerations such as cost and availability of parking (Appleyard and Ferrell, 2017, Heinen et al., 2010, Uttley and Fotios, 2017). It is also possible that some green areas are more rural with residents being more likely to require a car to get around (Heinen et al., 2010). While quantity of greenspace is typically included in studies, relatively little attention has been given to greenspace quality and what specific characteristics of greenspaces are associated with physical activity. Of the studies that have explored this, results are again mixed (Akpınar and Cankurt, 2017, Hillsdon et al., 2006, Lachowycz

and Jones, 2013). Given the variation in existing evidence, it is difficult to draw conclusions about this pathway in relation to physical activity. It is possible that increases in physical activity are more likely to occur if there are structured programmes in place, as well as accessible quality greenspace (Gianfredi et al., 2021, Hunter et al., 2019). Furthermore, much of the existing evidence is cross sectional in design and focused on different populations which, again, makes conclusions difficult to ascertain (Jimenez et al., 2021). Continued research is necessary to allow mechanisms within this pathway to be uncovered and better understood. Within the Scottish context, this is particularly important since one of the key target outcomes set in the Scottish Government's Active Scotland Delivery Plan is to continue to promote/enable physical activity through improving active infrastructure such as local greenspace (Scottish Government, 2018a).

Mental health and wellbeing

As well as building physical capacities, greenspace can be utilised to improve mental health outcomes. It is important to highlight that mental health is not an isolated pathway and there is notable interlink between all of the pathways already described (Markevych et al., 2017, Zhang et al., 2021). The evidence base for greenspace and mental health is rapidly growing. Previous research undertaken in 2015 found a lack of evidence of mental health benefits in relation to greenspace proximity (Gascon et al., 2015). However, one of the key limitations of the review was the quantity of research studies in the field at the time. In a review published in 2020 by Callaghan and colleagues, 23 out of the 25 studies showed positive associations between mental health and greenspace, and over half of the included studies were published after 2015. The evidence base is growing faster yet with the emergence of COVID-19 bringing the importance of nature for our health to the forefront. From the increased focus on nature and health since the pandemic began, it could be argued that, only when we are forced to stay inside and remain 'locked down', do we truly acknowledge how essential getting outside into nature is for our resilience, mental health, and wellbeing, and the detrimental effects of when that is taken away (Aerts et al., 2021, Hubbard et al., 2021, McCunn, 2020, Pouso et al., 2021, Soga et al., 2020).

As it stands, work in the area of greenspace and mental health is substantial and interlinks with previous pathways, for example improved mental wellbeing due to stress reduction (van den Berg and Beute, 2021, Mygind et al., 2019), or improved mental health with increased physical activity (Powell et al., 2019). Research has explored the relationship between greenspace and mental health in a myriad of domains such as: subjective wellbeing, depression, anxiety, psychological stress, happiness, general

mood, rumination, self-esteem, psychological distress, bipolar disorder, and schizophrenia (Callaghan et al., 2020, Chang et al., 2020, Collins et al., 2020, Henson et al., 2020, Reece et al., 2021, White et al., 2021). A study of over 19,000 people in England found that people who spent at least two hours in nature per week were consistently more likely to report higher levels of health and wellbeing, compared to people who spent less time in nature (White et al., 2019). Importantly, this pattern of a two-hour threshold was present for all included groups, including those with and without a long-term illness or disability. This suggests the results are not because people who visit nature are already a self-selected sample of healthier people since even those with long-term illnesses were more likely to report better health and wellbeing if they spent two hours a week in nature (White et al., 2019).

In Scotland, the Green Health project was designed to explore the relationship between greenspace and mental health using an interdisciplinary, multi-method approach (The James Hutton Institute, 2014). Evidence was found that urban greenspace was associated with lower levels of self-reported stress and higher mental wellbeing. One key finding of the study was that people living in urban areas who used greenspace such as woods and forests for physical activity had a lower risk of poor mental health than people who did not use these spaces. Furthermore, use of outside areas such as woods and forests appeared to be more effective in improving mental health than use of the gym. Much work has also been undertaken on the relationship between social cohesion and greenspace and the effect on mental health and wellbeing. Social cohesion refers to shared norms and values, having positive relationships with others, and feelings of acceptance (Hartig et al., 2014). Overall, studies suggest a positive relationship between social cohesion and natural environments (Jennings and Bamkole, 2019, Leavell et al., 2019, Markevych et al., 2017, Masterton et al., 2020), and that this pathway can account for much of the relationship between greenspace and mental health overall (Dadvand and Nieuwenhuijsen, 2018, Hartig et al., 2014, Markevych et al., 2017).

Greenspace programmes are also increasingly being used to support people with PSU (Berry et al., 2021, Elings and Hassink, 2008a, Harper et al., 2019, Lehmann et al., 2018, Panagiotounis et al., 2021), but evidence for their efficacy is currently limited. As discussed in Chapter One, given the link between mental health and substance use, it is possible that the pathways by which greenspace is associated with mental health could also explain associations between engagement with greenspace and PSU outcomes.

Part Two: Greenspace intervention programmes

Previous research has suggested that to achieve desired mental health outcomes there must be a change in the physical greenspace environment and a planned intervention that will encourage people to use the space (Hunter et al., 2019, Wheeler, 2020). With this line of thinking, greenspace can provide a location for 'green care' (Haubehofer et al., 2010, Peacock et al., 2007). Green care is typically an umbrella term that is used to describe a spectrum of health interventions that incorporate nature into their design (Hine et al., 2008), although Bragg and Atkins (2016) highlight concerns with this terminology. According to their report, the UK Green Care Coalition propose that interventions can only be defined as 'green care' if they are developed for people with a specific mental health diagnosis. Other researchers such as van den Berg (2017) suggest that this is too restrictive and becomes confusing in many circumstances, for example when greenspace interventions such as walking groups or gardening interventions are designed for the health of the general population but could also be deemed as 'green care'. What may be more pragmatic would be to have subsections under the umbrella term 'green care' and acknowledge the variety of programme types with different aims and outcomes. Green care interventions are not solely about immersion in nature but are programmes specifically designed with the aim of maintaining or promoting human health, most often from a social, educational, physical, and/or mental standpoint (Haubehofer et al., 2010). Indeed, green care interventions do not necessarily have to take place in an outdoor space and can be implemented in indoor environments such as prisons, care homes, and hospitals, where access to the outdoors may be limited (Yeo et al., 2020a).

Greenspace programmes are a type of green care but are programmes that are typically undertaken outdoors in a green area. As outlined in Chapter One, greenspace programmes are targeted health interventions undertaken in a variety of settings such as public parks, woodlands, rural settings, hospital and community gardens, farms, private gardens, and allotments (Fullam et al., 2021, Garside et al., 2020, Lovell et al., 2018, Masterton et al., 2020, Shahanan et al., 2019). While some greenspace programmes fall into specific types, others will incorporate a variety of activities, including: gardening or horticultural programmes; organised walks for wellbeing; forest walks and forest bathing; wilderness programmes; outdoor woodland learning; adventure programmes; nature-based mindfulness; conservation activities; and care farming, among others (Barton et al., 2016, Fullam et al., 2021, Garside et al., 2020). As well as specific physical and mental health outcomes, intended outcomes of greenspace

programmes can include supporting biodiversity (Goddard et al., 2010), increasing connectedness to nature (Liefländer et al., 2013), learning new skills (Adevi and Lieberg, 2012), and increasing social cohesion (Jennings and Bamkole, 2019). There is no definitive picture of the scale of greenspace programmes in the UK overall (Bragg and Atkins, 2016) although there have been recent attempts to synthesise existing intervention types (Garside et al., 2020, Robinson et al., 2020). Despite these attempts, and up-to-date databases such as Trellis's network for therapeutic horticultural programmes (Trellis, 2020), many existing organisations are not in the public domain so the true scale of existing greenspace programmes across the UK remains relatively unknown. Further, many informal recreational activities are organised in greenspace, from team sports to individual boot camps, with aims of improving physical and mental health, particularly based within communities. For example, in the UK, football programmes for improving mental health have increased in popularity (Friedrich and Mason, 2017). However, the explicit role of the outdoors and nature is not typically explored in these types of programmes, and they are generally not referred to as greenspace programmes.

In this second part of this review, the empirical evidence for the most common types of greenspace programmes for mental health is presented, alongside describing what greenspace programmes exist for people with PSU. Evidence is drawn from international literature with an additional focus on what exists in Scotland. Evidence of relevant organisations in Scotland will be informed primarily by mapping work undertaken during the quantitative survey study conducted in Phase Two of this PhD (see Chapter Five). While this was not a complete mapping of greenspace programmes for mental health and/or PSU across Scotland, there was a wide geographical spread of included programmes, with respondents from ten different regions. Further, intervention activities and greenspace type used varied greatly across programmes, with approximately 23% of respondents using rural greenspace in their interventions, 16% using urban woodland or forests, 35% using parks, gardens, or allotments, and 23% indicating that they use various types of greenspaces. Just under half of the programmes (46.9%) were in an urban area. This sample provided a 'snapshot' of what exists nationwide.

Wilderness and adventure therapy

It is not uncommon to see the terms 'wilderness therapy' and 'adventure therapy' used interchangeably, however there are some distinct differences between them. While wilderness therapy promotes and teaches endurance, resilience, and adaptability, often through the use of survival skills in wilderness environments (Russell, 2001), adventure

therapy typically involves the use of emotionally and physically challenging outdoor activities which incorporate a degree of risk (Barton and Pretty, 2010). Though time spent in the wilderness can play a role in adventure therapy, there are several other activities and treatment strategies which are often incorporated. For example, adventure therapy can include problem solving activities, trust building activities, and high intensity, adventure-based exercises such as outdoor running, mountain biking, kayaking, rock climbing, and rope courses (Barton and Pretty, 2010). Both interventions are usually residential programmes and are often, but not always, developed for young people as a way of promoting recovery through removal from highly stressful, often chaotic environments (Haubenhofner et al, 2010).

Much of the existing literature for wilderness and adventure therapy is from the US (Harper, 2017), and many programmes exist that have not yet been empirically evaluated. Bowen and Neill (2014) conducted a meta-analysis of 197 studies of adventure therapy participant outcomes and reported that the short-term positive effect size for adventure therapy was medium, and larger than for alternative medical treatment and no treatment comparison groups. There is limited other research that synthesises the adventure therapy evidence base meaning that conclusions are often based on individual studies. There is a slightly larger focus on wilderness therapy, although most reviews focus on adolescents described as 'at-risk' (variably defined; van Hoven, 2014). Benefits of wilderness therapy have included positive client change, improved communication and relationships, better family and client functioning, improved connection to nature, positive changes to self-efficacy, and sustained decreases in problematic behaviour (Kraft and Cornelius-White, 2019, van Hoven, 2014). Bettman et al. (2016) conducted a meta-analysis of 36 studies and found medium effect sizes for: self-esteem; locus of control; observed behaviour; personal effectiveness; clinical measures; and interpersonal measures. However, not all evidence is as clear. For example, although Gillis and colleagues' (2016) meta-analysis of psychological treatment outcomes demonstrated a difference between wilderness and non-wilderness interventions, effect sizes were larger for wilderness interventions in parent/guardian observations. In adolescent self-report data, effect sizes were larger for non-wilderness interventions suggesting that the adolescents themselves did not view wilderness therapy as successful.

The use of adventure and/or wilderness therapy for PSU is growing in popularity, although evidence remains mixed. A pilot study by Panagiotounis et al. (2020) explored the effects of a five-day adventure therapy intervention on self-esteem and self-efficacy

in people with PSU. Results showed a statistically significant increase in self-esteem and self-efficacy, and researchers concluded that adventure therapy interventions could be used as an alternative to, or alongside, more traditional treatment options. Conversely, and relative to wilderness therapy, Russell (2008) reported that while clients on these types of programmes reported a belief that wilderness therapy is beneficial for them in reducing substance use, many intervention effects do not appear to be long lasting. Russell (2005) poses that, in order to be effective long-term, more research is needed into the underlying mechanisms by which outcomes are achieved. By understanding what mechanisms have specifically facilitated a reduction in substance use, the intervention can be supported and maintained once the programme has ended.

Interchanging terms like adventure therapy and wilderness therapy again highlights issues with inconsistent language and definitions across programmes. This is not a new concern, with Russell (2001) noting that terms such as 'rehabilitative, outdoor-based approaches', 'challenge courses', 'adventure-based therapy' or 'wilderness experience programmes' are also used interchangeably. This can hinder future implementation design and future research efforts, and a lack of definition may also deter accreditation agencies, insurance companies, and mental health professionals (Russell, 2001). This criticism extends beyond specific wilderness and adventure therapy programmes. For example, there are a number of organisations in the UK that run wilderness-based programmes with elements of adventure. However, it is important to note that these interventions are often not specifically 'therapy' and therefore should not be labelled as such. This is important as there is a risk that all types of practices could claim all types of benefits for all types of clients. Without clarity of what these approaches may or may not consist of it becomes hard to distinguish types of practice that are ethical and effective from those that over claim their benefit and put potential clients at risk of potential harm.

The Outdoor Mental Health Interventions Model developed by Richards et al. (2019) offers a way of addressing this concern of accurate labelling and explains the importance of the combination of competence, professional responsibility, and leadership within interventions. A key feature of this model is that practitioners must remain within their own professional competence and accurately represent themselves and their practice using terms that can be justified and evidenced by professional training and qualifications where appropriate. Typically, a multidisciplinary team approach should be adopted, and professionals should work collaboratively in the delivery of an integrated approach. It is important to acknowledge that there may come a point where the type of work is such

that it should be a combined professional membership and qualifications approach and way of working. For example, an intervention should only be described as wilderness or adventure ‘therapy’ if a trained therapist is on the programme as well as a trained outdoor professional (Richards et al., 2019).

In Scotland specifically, there are a handful of programmes that have successfully incorporated the wilderness and adventure-based practices into their programmes in supporting people with poorer mental health and PSU. For example, the Venture Trust (2021) is an Edinburgh based charity that supports people who are experiencing challenging life circumstances. Their mission is to support people to make positive changes to their lives by giving them the confidence, motivation, and life skills to do so. Venture Trust does this by both community outreach work and by delivering a number of outdoors-based programmes. Improvements made on the programme in regard to social, emotional, and physical aspects enable service users to build positive attitudes while equipping them with the confidence and tools to continue with their own personal journey once the programme has ended. Venture Mor (2020), owned by Venture Trust, is a social enterprise with the specific aim of supporting young people aged 14-18 years. Intensive wilderness therapy programmes are run throughout the year and last for two to three weeks. Reflective activities and therapeutic tasks based on themes such as resilience, attachment and overcoming challenges are undertaken in between a number of expeditions. Venture Scotland (2020), an unrelated organisation to both previous examples, offers a year’s outdoor-based, personal development programme known as “The Journey” to young people aged 16 to 30 years who are experiencing difficulties in their day to day lives. The course comprises of four progressive stages with a focus on improving physical, mental, and emotional wellbeing.

Horticultural therapy and therapeutic horticulture

Horticultural therapy, also referred to as garden therapy, is an intervention type most commonly undertaken in specialised gardens within residential care, hospitals, rehabilitation facilities, or in the community. Horticultural therapy involves using plant-based activities alongside trained therapists to achieve specific clinical goals. Conversely, therapeutic horticulture is typically less regimented and describes the process of increasing wellbeing through participation of activities in a plant-based environment, for example within community gardening and volunteering (O’Brien et al., 2010). The evidence base supporting the use of horticultural therapy and therapeutic horticulture for mental health is longstanding, which is unsurprising given the long history of using gardens and plants to improve patient wellbeing within hospitals and psychiatric

institutions (Gerlach-Spriggs et al., 1998, Sempik and Aldridge, 2006). However, given the variety of programmes within this field, one of the challenges, as seen similarly with other programme types, is the lack of common language used when describing programmes. Programmes of similar types may be described as different things, for example as garden therapy programmes, healing gardens, horticultural programmes, zen gardens, or gardens of hope, among others (Bragg and Atkins, 2016). Much of the research in this area has explored the benefits of horticultural therapy and therapeutic horticulture for people with dementia, and for older adults (Lu et al., 2020, Nicholas et al., 2019, Zhao et al., 2020). Lovell et al. (2014) have expressed the need for further in-depth reviews of the literature for the general population, although systematic reviews and meta-analyses of horticultural therapy and therapeutic horticulture for mental health in the general population have shown positive effects overall (Cipriani et al., 2017, Soga et al., 2017). Analysis of the English Monitor of Engagement with the Natural Environment (MENE) survey, a national survey commissioned by Natural England, supported these findings and showed that gardening was associated with wellbeing, physical activity, and increased engagement with nature (de Bell et al., 2020).

Within the UK, horticultural therapy has been shown to be successful for PSU support, although the international evidence base is less extensive and typically consists of single case studies rather than reviews. Berger and Berger (2017) found that plant cultivation was an effective tool as part of rehabilitation for people with problem alcohol use. Participants reported a range of positive emotions, desires, and memories, facilitated by their sensory perception of plants. The authors suggested that focusing on improving connection to nature could be a goal in future research with this group, given the positive study outcome as a result of engagement with plants. Internationally, Lehmann et al. (2018) explored the effect of gardening on stress reduction in veterans attending a PSU treatment programme. Veterans reported feeling calm, serene, and refreshed during time spent in the garden and after leaving the garden. Furthermore, participants used their own initiative and resources to continue the horticulture therapy programme for two years after the pilot ended. Recently, Reynolds et al. (2020) used virtual scenes of nature to test for differences in self-rated affect scores and heart rate in people with PSU. There were statistically significant reductions in mean negative affect scores and heart rate in participants in the virtual nature group compared to those in the control group. Moreover, the self-reported mood of participants in the virtual nature group improved significantly and in a similar way to those in a comparative, non-nature, mindfulness-based activities group. Researchers concluded that the results from this study provide initial evidence that viewing nature has similar benefits to mindfulness in the treatment of stress and

negative mood and could therefore be beneficially integrated into typical treatment plans for substance use support.

In Scotland specifically there are a number of community gardens, particularly around hospitals such as Ninewells Hospital in Dundee (Ninewells Community Garden, 2020), Midlothian Community Hospital and Royal Edinburgh Hospital (Cyrenians, 2020a), and Gartnavel Hospital in Glasgow (TCV, n.d.), among others. Horticultural programmes are run within gardens, typically for hospital patients, but also for the community, to promote physical activity/healthy living through community gardening, in environments where horticulture supports wellbeing, therapy and rehabilitation. The NHS Edinburgh and Lothians Greenspace and Health Strategic Framework includes guidance on how best to develop the NHS outdoor estate to improve health of patients, visitors, staff, local community, and the environment (Edinburgh & Lothians Health Foundation, 2019). Outside of hospital settings, there are examples of Scottish horticultural programmes that specifically support people with PSU. Some of these interventions have been developed by city councils and others are run by the third sector, for example Viewfield Garden Collective (n.d.) and We Are With You Dundee (2020).

Conservation activities

With more people understanding the benefit of nature, there is an increasing number of programmes that focus on community development and how to facilitate connection between people and local greenspace. Although many of these programmes could be labelled as a type of therapeutic horticulture, the focus on conservation and community involvement and development distinguishes these activities and programmes from those listed above. For example, The Wildlife Trusts run a number of health projects in a variety of natural environments intended to improve the health/wellbeing of clients (Bragg and Atkins, 2016). There are 47 Wildlife Trusts in the UK whose primary concern is the conservation of nature within its own geographical area. The Trusts often work in partnership with other organisations such as local NHS trusts, health charities, and National Lottery funders (Bragg and Atkins, 2016). Every year, Wildlife Trusts run more than 14,400 health promotion activities for the general public and 2,965 sessions for people classed as 'vulnerable', such as those experiencing social disadvantage, with poor mental health, and who are unemployed. The majority of these programmes are practical conservation activities (Bragg and Atkins, 2016).

The Conservation Volunteers (TCV) are another UK-based charitable organisation with strategic goals to engage with communities and promote working together to improve

greenspaces and the local environment. Their premise is that this in turn can lead to improve physical and mental health/wellbeing both through the effects of spending time outdoors and learning new skills and connecting with others (TCV, 2020). In 1998, TCV (then called the British Trust for Conservation Volunteers), set up the first Green Gym. This Green Gym was described as an outdoor, guided practical activity session, with tasks such as planting trees, based on the novel idea of social prescribing green exercise for health and fitness. Since then, Green Gym has grown in popularity with 57 programmes now running across the UK, 11 of which are in Scotland (TCV, 2021). Furthermore, TCV have developed a specific strategy for connecting people and greenspaces within their community, supporting over 1000 local community groups to develop their local greenspaces. They have implemented a variety of projects in areas such as parks and community gardens, local nature reserves, sites of scientific interest, schools, hospital grounds, waterways, wetlands, and woodlands (TCV, 2020). Many of the projects that TCV have developed are in partnership with other organisations such as Mind and Dementia Adventure, with the aim of best meeting the needs of people who may benefit from programmes (TCV, 2020). Through collaborative work, TCV programmes have been successful in supporting people with poor mental health and PSU by incorporating the Five Ways to Wellbeing (Aked et al., 2008) into their programmes. These are: connecting to others, physical activity, taking notice of nature, learning new things, and supporting and encouraging others, and have been cited in empirical research as key components within greenspace interventions (Hubbard et al., 2020).

Another example of how conservation groups in Scotland support people with PSU is the Recovery Through Nature programme, run by Phoenix Futures, specifically for people who are abstinent, or working towards abstinence (Phoenix Futures, n.d.). Phoenix Futures work with organisations such as National Trust, RSPB Scotland, and The Woodland Trust to identify and implement nature-based projects for clients to work on. Examples of projects include habitat building, repairing walls and fences, clearing overgrown areas, and food growing initiatives. Additionally, through this programme, environmental conservation qualifications can be achieved which celebrates commitment and can support motivation and attendance on the programme. Phoenix Futures reports that those who engage in Phoenix Future's creative programmes, such as Recovery Through Nature, often engage better with wider support and recovery services. For example, people who use opioids are reportedly 75% more likely to complete their treatment plan when they have taken part in Recovery Through Nature alongside their other treatment (Phoenix Futures, n.d.). Recovery Through Nature

appears to be successful for a variety of reasons, and people on the programme report connection to nature, improved physical and mental health, increased confidence, increased self-esteem, improved social relationships, and an increase in feelings of hope for their future (Phoenix Futures, n.d.).

Forest bathing/Shinrin-Yoku

The concept of Forest Bathing, or Shinrin-Yoku as is the Japanese term, was developed in 1982 by Tomohide Akiyama, the Japanese Minister of Agriculture, Forestry, and Fisheries, and describes the phenomenon of spending time in forests with the aim of improving mental (and physical) health (Hansen, 2018, Ochiai et al., 2015). The effects of forest bathing on human health have been widely documented, particularly in Japanese and Korean studies. Forest bathing has been shown to increase the number and activity of human natural killer (NK) cells, as well as the number of intracellular anti-cancer proteins, which may suggest a preventative effect on cancer (Li et al., 2008, Li, 2019). Further, forest bathing appears to reduce stress hormones such as adrenaline and noradrenaline as well as reducing blood pressure and heart rate (Li et al., 2019). In turn, this may suggest a preventative effect on hypertension. Aside from physiological measures, a number of studies have indicated that forest bathing reduces anxiety, depression, anger, and fatigue, and appears to increase vigour (Li et al, 2019). Further, these interventions appear to be effective very quickly with many programmes only lasting a few days (Chen et al., 2018, Ochiai et al., 2015).

The concept of forest bathing is now gaining popularity worldwide, but there is still a lack of understanding of what the most effective intervention strategies and practices might be, as well as what might be the best outcome measures. For example, interventions developed for people in Asian countries, where forests are ingrained in their culture, will work differently to interventions developed for people in the UK where forest bathing is less common. This is just one example of a contextual factor which could hinder the successful implementation of an intervention if not acknowledged during intervention development. In Scotland, forest bathing is still a new concept. However, Forest Therapy Scotland (2020) run forest bathing sessions across the Central Belt. These sessions last between one and four hours and are guided by trained professionals with the aim of aiding feelings of calm and reductions in stress. Activities include guided nature meditation in the outdoors, various sensory activities, and traditional foraged herbal tea ceremonies. Similar programmes also exist, for example programmes relating to foraging and wild medicine. Online versions of programmes also ran during the COVID-19 pandemic.

Walking groups

Walking has been described as one of the most accessible yet effective ways of maintaining and improving physical and mental health (Cooley et al., 2021, Kelly et al., 2017). Walking is free, incorporates physical activity with an opportunity for social contact and support, is typically low risk, and is within the physical capabilities of the majority of the population (Paths for All, 2021). In 2014, the Scottish Government published a National Walking Strategy and action plan with the aim of creating a countrywide culture of walking, developing better walking environments, and supporting mobility for everyone (Scottish Government, 2014a). A large range of walking for health groups now exist across Scotland, some are privately organised, but many are run by TCV and Paths for All. Paths for All in particular currently deliver, or provide grants for other organisations to deliver, 670 walks every week across Scotland. These include walks specifically for people with dementia, walks to help build strength and balance, buggy friendly walks, walks for people with cancer, walks alongside health professionals, and walks for people with long term health conditions among others (Paths for All, 2021).

There is ongoing multidisciplinary research in Scotland working to increase accessibility of nature walks for specific populations. Inexperienced walkers have been shown to be less inclined to take part in walking activities (Elliott et al., 2020), and those with pre-existing conditions may also be excluded. For example, those with severe mental illness may face additional barriers, including stigma, and existing walks may not meet their needs (Cooley et al., 2021, Hubbard et al., 2020). Hubbard and colleagues developed a nature walks programme specifically for this population which incorporated the Five Ways to Wellbeing mentioned previously (Aked et al., 2008). The programme focused on aspects such as personal relevance, relapse prevention, and self-efficacy, and was designed to be run by members of the hospital team and community volunteers. Another growing area of research is implementing walking in the workplace interventions. The premise of these interventions, which typically include walking outside in nature during the working day, is based on research showing the benefits of reduced sedentary behaviour in terms of employee productivity, physical, and mental health (De Bloom et al., 2017, Tirman et al., 2021). Positive effects on mental health and cognitive ability have consistently been demonstrated, as described in a recent systematic review of nature-based interventions in the workplace although, given the diversity between studies, further research in areas such as key mechanisms is necessary for future implementation (Gritzka et al., 2020).

Care farming

Care farming, also referred to as social farming, is the use of regular farming activities to promote mental and physical health, typically based on a commercial farm or any other agricultural landscape (Hine et al., 2008). While types of care farm vary, they are commonly run as a parallel process to the commercial running of the main farm making this intervention type particularly economically beneficial (Hine et al., 2008). While exact numbers are difficult to determine, it is estimated that there over 240 care farms in the UK, with over 8000 people using them for some type of support (Gorman and Cacciatore, 2017). Care farms use a collaborative approach between farm staff, care providers, and clients, and provide a range of support on a continuum from passive provision of therapeutic environments to more structured interventions, often with a focus on education, routine, and learning new skills (Gorman and Cacciatore, 2017; Hine et al., 2008). However, research so far shows unequal distribution of services between England and the rest of the UK (Rotheram et al., 2017), and there does not appear to be any empirical evaluation of specific farm programmes in Scotland which makes identification of existing services difficult. Two examples of care farms in the Central Belt include Edinburgh's Gorgie Farm (2020), and Cyrenians Farm Enterprise (2020). Both organisations support people from various backgrounds and with different support needs, with many clients having experienced previous trauma and challenging life circumstances, including lived experience of PSU.

There is also promising evidence from outside the UK that supports the use of care farms as an intervention to support people with PSU (Murray et al., 2019). A key suggestion in this research field is that care farms could be successful in supporting this client group through mechanisms such as feelings of value and purposeful. Being responsible for animals, crops, and plants has been proposed as a way to create an identity shift which gives autonomy back to the clients and, in turn, empowers them and facilitates feelings of control in their lives (Bragg and Atkins, 2016). For example, a Dutch study looking at the experience on care farms of those with lived experience of PSU found that the majority of clients were highly appreciative of their time spent on the farm, particularly the responsibilities, the social opportunities and sense of community, and the physical space that the farm gave (Elings and Hassink, 2008). In a Norwegian study, clients with PSU reported a sense of community and belonging, increased self-esteem, increased social skills, and the feeling of doing something meaningful (Granerud and Eriksson, 2014). The researchers concluded that there appears to be a strong connection between concepts mentioned by clients on care farms and those that are often mentioned as important by people in PSU treatment; for example, feelings of control within their own

lives, social inclusion, shared experiences, and identify changes from being 'ill' or a 'patient' to a larger focus on health and wellbeing. Researchers suggested that these outcomes support the integration of greenspace programmes like care farms into typical treatment models to ensure a multifaceted, holistic range of services.

Outdoor learning

Outdoor Woodland Learning (OWL) Scotland is supported by Forestry Commission Scotland and evolved out of the Forest Education Initiative which has run successfully for over 20 years (OWL Scotland, 2021). OWL Scotland is dedicated to increasing the use of Scotland's outdoor environments for learning and actively engages young people and connects their broader learning with the natural world. Forest School is a developmental programme for young people that is typically attended one a week, for at least six weeks. Delivery of Forest School is mainly in primary schools, however Forest Kindergarten has been implemented as an alternative option for Early Years, and Forest School for adults is also in development (OWL Scotland, 2020). Aside from Forest School, OWL Scotland also helps fund independent, locally managed OWL groups across the country. The objectives of OWL Scotland are to learn new skills in the outdoors, to learn about the natural world and how it links to social and economic factors, to facilitate depth and progression in learning using outdoor environments, and to improve physical and mental health and wellbeing of clients.

Other outdoor nurseries and outdoor educational programmes for young people also exist across the country, some are private, and others are run by the third sector. For example, Inspiring Scotland supports Thrive Outdoors to implement their 'Active Play' programme (Inspiring Scotland, 2020). 'Active Play' is currently implemented in 139 primary schools across Glasgow in conjunction with Glasgow City Council; in eight primary schools in Dundee, in partnership with Scottish Government and Dundee City Council; and with a plan to implement the programme in primary schools in the Highland council area in the near future (Inspiring Scotland, 2021). These types of educational programmes are typically for younger clients. However, when thinking about greenspace programmes from a life course perspective, programmes like Forest School and Active Play could be important for allowing children to spend time in greenspace and connect to nature, as well as allowing early development of skills such as problem-solving, self-efficacy, and social skills, all of which are associated with improved mental health in later life (Crandall et al., 2019, Pearce et al., 2018).

Green prescriptions

As briefly introduced in Chapter One, there is growing interest in the UK for prescribing greenspace interventions typically for health concerns such as poor mental health (Fullam et al., 2021, Garside et al., 2020, Robinson and Breed, 2019). In Scotland, green prescriptions have so far been implemented in Dundee, Edinburgh, and Shetland (Dundee GHP, n.d., RSPB, 2018, Hardie et al., 2021). Green prescriptions can include any of the activity types discussed in this chapter, plus other recreational activities conducted outside such as cycling, climbing, and creative activities such as green woodworking (Dundee GHP, n.d., Fullam et al., 2021, Garside et al., 2020). Increased provision of green prescriptions has the potential to reduce the need for more costly traditional healthcare which could subsequently increase NHS sustainability (Hardie et al., 2021). However, to establish effective and sustainable green prescribing schemes, co-operative relationships between primary care professionals and organisations that run greenspace interventions are typically required which has been reported as challenging in some parts of the UK (Garside et al., 2020, Hardie et al., 2021, Husk et al., 2020, Robinson et al., 2020). Other challenges relating to implementing green prescriptions include limited funding, length of programmes, and lack of available, consistent services (Hardie et al., 2021, Robinson et al., 2020). Further, Husk et al. (2020) undertook a detailed exploration of what approaches work in social prescribing, for whom, and in what circumstances. Existing research suggests that people are more likely to enrol in social prescriptions if they believe that they will be of benefit and that any concerns have been addressed adequately by their GP. Patients are also more likely to engage if the activity is both accessible and they are supported to attend the first session, for example by planned transport.

Despite developing research within the social prescribing field, the evidence base for mechanisms within programmes, such as green prescriptions, is still relatively limited. This makes it difficult to evaluate particular models or approaches (Husk et al., 2020). Further research is required to better understand the causal processes within programmes and in what contexts they are most successful, given that increased understanding may increase acceptability and buy-in both from GPs prescribing as well as the people being prescribed (Robinson et al., 2020). Recent reports such as the What Works briefing on natural environment-based health interventions (Lovell et al., 2019), the report for the Department for Environment, Food, and Rural Affairs (DEFRA) on nature-based social prescribing for diagnosed mental health conditions in the UK (Garside et al., 2020), and the 'Handbook for Nature on Prescription to Promote Mental Health' (Fullam et al., 2021), have all sought to unpick the mechanisms within

greenspace programmes that lead to desired mental health outcomes, as well as the various contexts that allow this to happen. These reports acknowledge that these components will change across client groups, and while useful in developing initial theories about why greenspace programmes work, it is still not clear why they also appear to work for supporting people with PSU.

Principles of greenspace interventions and recommendations

From the evidence provided, it is clear that there are many different types of greenspace intervention programmes, and direct comparisons between them are often difficult due to heterogeneity. Despite this, there appears to be some similarities across intervention types in regard to what makes a programme successful or not. Researchers at the European Centre for Environment and Human Health (ECEHH) have proposed four key principles for successful greenspace interventions, synthesised from reports, evidence summaries, and published data, which could be helpful for those wishing to implement programmes in the future (Wheeler et al., 2020). Firstly, for greenspace programmes to be effective, physical improvements often need to be made to a space alongside promotion of social activity. For example, if a gardening programme to combat loneliness and improve mental health in older adults was being developed, then promotion of the social support aspect would be essential. However, physical changes should also be reviewed, for example, whether the ground and walking areas are level enough to minimise falling risk, if there is seating/toilet facilities available, and adequate lighting, among others. Secondly, programmes must be easy to access. For example, the programme should be close enough to people's homes with a safe route to get there. Thirdly, the quality of the greenspace is important, covering biodiversity as well as the overall condition of the space. For example, areas with litter, that are not well maintained, and are not perceived as safe, for example due to inadequate lighting, are less likely to be favoured and this may negatively affect engagement. Finally, development of programmes should be undertaken alongside the target participants. Community engagement is essential in developing a greenspace programme that will meet support needs so involving potential participants in the design and implementation process is key at all stages. This is particularly important to reach marginalised groups, address inequalities, and to understand the barriers to engagement for different communities (Wheeler et al., 2020).

Along with these suggested principles and recommendations, other recommendations have been identified through the literature reviewed in this chapter which could influence future success of programmes. There is a need for sustained investment and secure

funding to provide consistent and longer-term support (Garside et al., 2020, Hardie et al., 2021, Robinson et al., 2020), and there is a need for more effective partnership working between different sectors, for example between third sector and primary care (Robinson et al., 2020). There also must be more advocacy, peer support, and training accessibility across all sectors (Garside et al., 2020; Lovell et al., 2019). Additionally, to achieve more effective partnership working, there is likely a need for a common language; this is not currently the case. In Bragg and Atkins' (2016) review of greenspace interventions for mental health care, the lack of a collective name for greenspace intervention programmes, referred to as 'nature-based interventions' in the report, was highlighted as a challenge in the promotion of the green care sector overall. For example, providers of greenspace programmes for people with poorer mental health referred to their programmes as 'green care', 'ecotherapy', or 'nature-based interventions'; providers of greenspace-based activities for the general population preferred the terms 'nature-based interventions' and 'green care'; and health practitioners and other support staff preferred the term 'nature-based interventions'.

Differing terms for specific programmes such as wilderness therapy, adventure therapy, and horticultural therapy, have also been discussed in this review. Perhaps rather than aiming for global consensus on terms used, a more pragmatic solution might be to ensure explicit explanation and full-team agreement on terms at the start of any intervention implementation. This will help to ensure continuity within the team, as well as when promoting the programme, recruiting participants, and with stakeholder engagement. There must also be clear guidance for programme development and clarity on what titles should be used to describe programmes. This is essential to protect and safeguard participants, and to ensure programmes do not promise what they cannot achieve. Finally, while these principles and recommendations could be applied generally across programmes, this review has also highlighted that contexts vary, and general recommendations may not be sufficient to replicate existing projects in a new setting. To improve understanding and aid future implementation, particularly for specific client groups, further exploration of why programmes are successful, for whom, and in what circumstances, should be undertaken (Garside et al., 2020, Lovell et al., 2019). This is what I aim to do in this thesis.

Chapter conclusion

This chapter has firstly provided an in-depth synthesis of the literature on greenspace for human health through three proposed domains which provide an interdisciplinary framework. While the existing evidence affirms the beneficial effect of greenspace on

health, there is still much to understand about the specific pathways and functional form of such relationships, and how these may vary by context. Secondly, the review provided an exploration of existing greenspace programmes for mental health and PSU, both internationally and in Scotland, and proposed principles and suggested recommendations for future intervention implementation. While it appears likely that greenspace has a positive effect on mental health, it is still not clear how greenspace programmes work, and what mechanisms of change lead to the desired outcomes. Although recent research has expanded this research area, there is also a lack of understanding about how these programmes may work for different client groups, such as people with PSU. Without a convincing explanatory framework showing the necessary components and processes needed for the intervention to work for different client groups, it is impossible to understand why the programmes work and how best to design or replicate them. Additionally, detailed explanatory framework is necessary within this field to facilitate partnership working, better raise awareness, increase confidence of greenspace intervention services, and communicate outcomes to service users, their families, commissioners, and other bodies of mental health and substance use professionals.

This project addresses existing research gaps through a three-phased realist approach. Firstly, a realist synthesis of the international literature on greenspace programmes for mental health is conducted, and a realist framework is developed which shows what works, for whom, and in what circumstances (Chapter Four). Secondly, the accuracy of the framework is tested with data from greenspace organisations in Scotland, and its applicability for use on programmes that support people with PSU is explored (Chapter Five). Finally, the framework is again tested, refined, and consolidated for use on programmes that support people with poor mental health and PSU through qualitative interviews with programme staff and wider stakeholders (Chapters Six to Eight). The next chapter (Chapter Three) describes the methodological approach and the research methods used in the project.

Chapter 3: Realist methodology and project methods

Introduction to chapter

This chapter provides an in-depth description of the methodological approach chosen for this study. The chapter covers the philosophical foundations of critical realism, before describing empirical realism and its associated methodological underpinnings. The rationale of using this methodology is discussed and the process of using realist methodology in a research project is described in detail. The methods used in each phase of this study are provided to guide the reader through the realist research cycle relative to this study. The chapter ends by discussing ethical considerations, including the limitations experienced as a result of COVID-19, challenges integral to realist research, and the importance of reflexivity in research.

Research paradigms and methodology

Critical realism

Critical realism is a philosophy of science that distinguishes between the 'real' world and the 'observable' world (Bhaskar, 1978). Typically, positivists argue that only one reality exists, and scientific evidence can provide measurable accounts of this reality. At the other end of the continuum, constructivists believe there is no single truth and reality is socially constructed (Bergin et al., 2008). Critical realism positions itself as a "*model of scientific explanation which avoids the traditional epistemological poles of positivism and relativism*" (Pawson and Tilley, 1997, p.55) and is regarded as a post-positivist perspective, meaning that researchers believe theories, hypotheses, background knowledge, and values influence what is considered to be reality (Groff, 2004). Critical realism is heavily influenced by the work of Bhaskar (1978) and is based on the realist perspective that we should challenge the belief that what we know about the world is real (Collier, 1994, Archer et al., 2013). Realism holds that while there are objective realities and universal laws, at least to some extent, positivists miss underpinning assumptions about why things exist, and the world is more than we can empirically observe. Critical realists assume that the social world is both constructed and material and is made up of causal mechanisms independent of our perceptions, the events caused by these mechanisms, and the observably experienced (Bhaskar, 1978). Further, multiple causal mechanisms will exist for each situation, dependent on the context, which will in itself have an influence, and they will constantly interact with, counteract, or reinforce each

other (Westthorp, 2014). Critical realism therefore rejects the idea of linear causality and instead holds that reality is a complex and multi-layered web of interacting forces. These multiple layers of reality are described as tentative and potentially fallible, the assumption being that neither observation nor measurement will enable a complete interpretation of social systems, therefore theory is essential to best explain the world around us (Pawson, 2013).

Empirical realism

Critical realism is a model of logic, rather than a research technique. As discussed, realists assume that reality is not uniform and universal, but also not completely subjective, so there will be some patterns across realities. These patterns are referred to as 'demi-regularities', defined as semi-predictable outcomes, and allow researchers to discern broad lessons about for whom, and in what circumstances, interventions are most likely to work, while acknowledging it is not possible to be certain (Pawson and Tilley, 1997). Empirical realism involves pragmatic practices, based on critical realism, which aim to identify causal relationships through a theory driven, generative model. Empirical realism holds that when undertaking social research, the question of 'what works' is answered through establishing causal pathways and relationships.

Theory-based approaches are valuable because they explain 'why' interventions work, rather than focusing on 'if' they work. By asking how and why interventions work or do not work, for whom, and in what circumstances or context, research can provide robust insights and transferable lessons about why programmes succeed or fail. In comparison to typically positivist experimental approaches, realist approaches can add value when informing policies, programme decisions, and implementation practice (Westthorp, 2014). For example, policymakers and practitioners need to have an understanding about programmes so that they can make decisions about how best to refine or scale up existing programmes, how to best develop and implement new programmes, how to adapt to different contexts, and how to evaluate programmes that have shown mixed results (Pawson and Tilly, 1997). Theory of Change-based approaches, contribution analysis, and process tracing are also theory-based approaches to understanding interventions (Stern et al., 2012). However, realist approaches provide a greater level of detail and attempt to hypothesise what processes are represented by the arrows within the logic models that link inputs and outputs, and then evidence this with empirical data. This provides clarity and conviction to the presented causal linkages within theory-based frameworks.

Realist approaches also have distinctive assumptions which are grounded in realist philosophy. These assumptions ensure the approach's rigour, explanatory power, and practical value (Westhorp, 2014; Punton et al., 2020). Firstly, researchers undertaking realist work see programmes as “*theories in action*” (Punton et al., 2020, p.2). This means that there could be many different proposed theories about why a programme is working, or not, and the purpose of the research is to test these proposed programme theories. It should be acknowledged that programmes are often complex interventions that are introduced into complex social systems (Pawson, 2013) and therefore proposed frameworks must be tested iteratively to explore how interventions work for different sets of people, in different environments and contexts (Wong et al., 2016). Secondly, realist methodology seeks to infer causation. The changes that occur because of the programme are referred to as outcomes, and these can be intended or unintended. The outcomes are proposed to be directly caused by the mechanisms which have been activated in the right contexts, for example individual, interpersonal, organisational, or institutional factors within the programme setting (Pawson and Tilley, 1997). Realist work therefore looks to establish causality between a programme and an observed outcome by focusing on these context-mechanism-outcome configurations (CMOCs), and theories are developed and tested to explore them (Pawson and Manzano-Santaella, 2012, Wong et al., 2013). This concept is discussed in more detail later in this chapter. A final assumption of realist approaches is the realist understanding of what constitutes knowledge and evidence. As mentioned, the complexity of the social world means that the programme theories proposed can only ever be an estimate of reality (Pawson et al., 2005). Theory is therefore developed and tested in an iterative way, with the aim of reaching a refined theory that provides an adequate explanation of how and why outcomes have and have not occurred. However, it is recognised that no theory can ever be irrefutably confirmed as correct given we live in a constantly shifting social world (Pawson et al., 2005, Pawson, 2013).

Rationale for choosing this methodology

One of the key reasons to choose realist methodology in public health research is that it enhances the clarity and applicability of the study findings. Realist methodology encourages researchers to develop clear and nuanced theories about how and why a programme works which means it is arguably more practical and helpful in practice. The focus on causation and on different contexts and their influence allows learning to be taken from one programme and applied to another. This means that the programme theories and developed framework in this project could inform other similar projects. Further, the iterative nature of realist approaches allows the programme theory to

constantly be developed and built on in line with any new evidence. Building on existing evidence and theory helps to develop richer insights that are grounded in what is already known, rather than a cycle of beginning and ending new research projects (Punton et al., 2020). Given that greenspace programmes are growing in number and developing new aims and objectives, this iterative process is necessary to ensure that existing knowledge of the complexity of programmes is built into future evaluations.

Secondly, realist methodology addresses complexity in a pragmatic way and is becoming an increasingly popular way to develop and/or evaluate public health interventions (Pawson et al., 2005). Public health interventions are described as complicated and multicomponent, with many feedback loops, rather than simple, easily replicated entities (Rogers, 2008, Wight et al., 2016). These types of interventions are complex due to several characteristics such as: the number of, and interactions between, phases within the interventions; number and difficulty of behaviours; expertise and skills (including technical and non-technical); number of groups or organisational levels targeted by the intervention; number and variability of outcomes; and degree of flexibility in tailoring the intervention (Skivington et al., 2021, Wight et al., 2016). Greenspace programmes are an example of complex, public health interventions: the setting is in an uncontrolled environment, they are ideally run by multidisciplinary teams, and there are often many intervention components. Realist methodology provides tools and frameworks to help deal with these challenges through investigating the specific features of context that make a difference to interventions, and iteratively revising, testing, and refining theories to provide the best possible evidence (Punton et al., 2020). Therefore, relative to greenspace programmes, realist methodology is the most plausible methodological approach for this project as it can uncover the underlying mechanisms and processes through which greenspace programmes can support people with poor mental health and problem substance use (PSU). In turn this will better allow development of an intervention framework which represents a theoretical proposal of the intervention process.

Thirdly, realist methodology encourages moving outside the academic silo to work with stakeholders (Punton et al., 2020). This increases the likelihood of the research being applicable in practice. With complex interventions, such as greenspace programmes, it is unlikely that the researcher alone would be able to uncover enough depth to build programme theories, and it would be difficult to consider the nuances across programmes that those working directly on programmes might see. Realist work does not necessarily require deep stakeholder engagement. However, involving the right

people at the right times is integral to making realist findings useful. Furthermore, working with wider stakeholders throughout allows working relationships that are essential when looking to disseminate the project outputs (Punton et al., 2020). Finally, realist methodology allows iterative refinement which allows new contexts to be addressed. Given the emergence of COVID-19, and the impact that COVID-19 had on the implementation of greenspace programmes, it was essential that this contextual factor was addressed and written into the programme theories.

Before moving on to the stages of realist work and the methods used within this study, it is important to note at this point that there are no methods that are specifically integral to realism, unlike with positivism and constructivism which have more conventional methods of data collection (Marchal et al., 2012). This allowed flexibility in research design which was beneficial given the interdisciplinary focus of my PhD and the aim of integrating different disciplinary perspectives and methods within a single research project. However, this ambiguity can make it challenging to establish best practice. While it may seem logical to suggest that qualitative research could allow a deeper exploration of mechanisms, realist methods can include the use of experimental trial designs as long as they are combined with methods that seek to go beyond questions of effectiveness and look at the underlying process to better understand the dynamic interplay between CMOcs (Greenhalgh et al., 2009, Moore et al., 2015).

Steps of realist methodology in the context of this study and project methods

There are specificities unique to a realist approach. Importantly, realist intervention framework design is an iterative process, rather than linear. This means that the researcher will go back and forth between project stages until the best possible design has been achieved (Westhorp, 2014, Wong et al., 2016). The main steps of a realist-informed research project are: establish relationships; establish purpose; set research questions; develop initial programme theories (IPTs); test programme theories through primary data collection and analysis; refine programme theories; and dissemination (Westhorp, 2014, Wong et al., 2016). In the following section, each step of the realist research process in the context of this study will be explained. Detailed description of the research methods used within each step will also be described.

Step 1: Establish working relationships

Realist methodology is intended to inform future research, policy, and/or practice, and collaboration with stakeholders is likely to improve how useful the work is. Working

relationships with greenspace organisation staff, researchers in the same field, and wider stakeholders, such as practitioners and policymakers, were initiated at an early stage in my PhD through networking at conferences, informal meetings, Twitter, and email. These relationships were maintained throughout my PhD study which was important for: increasing visibility of my own work across other research centres and organisations; increasing my awareness of ongoing research being undertaken in the field; facilitating initial access to relevant organisations and their work; and for aiding in development of the IPT for the study (see Step 4). Established working relationships also made recruitment easier for Phase Three, an important benefit due to potential challenges with recruiting participants and undertaking research during COVID-19.

Step 2: Establish purpose

Clarifying the aim of the project and the purposes for which the work will be used provides the focus for the study. This is important to guide the research and also to ensure that wider stakeholders involved in the project understand the aim. The aims of this project were:

1. To critically explore and synthesise the literature to identify how, for whom, and in what circumstances greenspace programmes can lead to optimal mental health outcomes.
2. To work with a range of existing Scottish greenspace organisations and wider stakeholders to explore how greenspace programmes might also be successful in supporting people with PSU.
3. To uncover the underlying mechanisms which, when triggered under certain contextual conditions, lead to desired outcomes on greenspace programmes that support people with poor mental health and PSU.
4. To propose an overarching realist intervention framework for greenspace programmes for mental health and PSU. This will allow a more robust understanding of how these types of interventions could be developed and implemented in the future.

Step 3: Set research questions

It is essential to add here that no evaluation will be able to answer every question that could be asked, and there must be boundaries within the scope of the study. The research questions developed and prioritised for this study were:

1. What greenspace programmes have been used to improve mental health in both clinical and non-clinical populations? (Study Phase One)
2. What outcome measures are associated with current greenspace programmes, what are the potential mechanisms that influence outcomes, and what is the role of context in enabling/constraining these mechanisms? (Study Phase One)
3. What CMOcs lead to optimal outcomes in greenspace programmes for mental health? Do these configurations also explain the pathways by which greenspace programmes can support people with PSU? (Study Phases One and Two)
4. How can staff and wider stakeholders inform further identification, refinement, and consolidation of CMOcs, relative to greenspace programmes for mental health and PSU, in order to better understand what works, for whom, and in what circumstances? (Study Phase Three)

Step 4: Develop IPTs

Guidance on conducting realist work suggests that the starting point in developing a realist intervention framework is to create IPTs (Westhorp, 2014, Wong et al., 2013, Wong et al., 2016). There are two distinct tasks in developing IPTs. The first is to hypothesise on a basic level how the programme works. Sometimes interventions may be well defined and already have programme theories attached to them. However, there are often no explicit programme theories, so the researcher is required to build them (Pawson, 2013). This includes theorising about for whom does the intervention work and not work, and why; in what contexts will this programme theory work and not work, and why; what are the main mechanisms by which outcomes are achieved; and what are the potential outcomes. The RAMESES guidance provides standards that depict best practice when undertaking realist research, and these state that IPTs may be elicited from a number of sources (Wong et al., 2013, Wong et al., 2016, Westhorp, et al., 2014). For example, data can be gathered through reviewing existing documentation for the intervention including: empirical literature, grey literature, and any other written source; through discussions with people involved with the programme or experts in the field; and/or through adapting existing theories that appear to partially explain the intervention process. These existing theories will likely need refined slightly to fit the current intervention, given the required specificity of the IPT to the intervention in question. Existing formal theories drawn solely from the literature are often too abstract or distant from the intervention to be a perfect fit (Wong et al., 2013, Wong et al., 2016, Westhorp, et al., 2014). Regardless of how the IPTs are developed, it is crucial that the theories reflect causation. After the IPTs are developed, the second task is to test these

hypotheses by collecting data. The IPTs act as the initial structure and framework of the intervention which will be refined by synthesising diverse evidence from a multitude of sources (Pawson, 2013, Pawson et al., 2005, Rycroft-Malone et al., 2012).

Context-Mechanism-Outcome configurations (CMOCs)

The concept of how CMOCs are used to infer causation was introduced previously in this chapter. CMOCs are the building blocks of programme theories, and it is through their identification within interventions that IPTs can be built (Pawson, 2013). For clarity, the results of the IPT generation can be represented in a table, such as the IPT table in Chapter Four (Table 1), listing proposed CMOCs as ‘if (context), then (outcome), because (mechanism)’ statements to explicitly show causality between components (Westhorp, 2014). It is important to note that it is not possible to identify every CMOC within an intervention given the scale of how many there could be. The researcher therefore must be pragmatic and maintain a focus on CMOCs that could help answer the research questions (Westhorp, 2014). As mentioned earlier, Pawson and Tilley (1997) describe mechanisms as the invisible processes within interventions that lead to change. However, to further expand on this definition, Dalkin et al. (2015) describe changes in reasoning occurring as a result of introduced programme resources and together these constitute the programme mechanism. Mechanisms are often hidden, for example, at the level of human reasoning, and therefore cannot usually be directly observed or tested (Sayer, 2000). Conversely, contexts are not typically processes and are more commonly defined as the changing aspects of circumstances, situations, or groups, for example: cultural norms; individual characteristics; economic conditions; environmental elements; previous experiences; or public policy among others. It can be challenging to distinguish between contexts and mechanisms, but mechanisms directly cause outcomes, whereas contexts do not. If the researcher establishes the context and the outcome, a middle step must be added for it to make sense as a causal process. Conversely, if the researcher identifies the mechanism and the outcome, it directly explains the causal process, but does not tell the researcher what circumstances it will operate in.

Pawson (2013) states that it is preferable to develop CMOCs and IPTs as an initial stage in a realist project because this enables data to be collected with a specific aim to test them. To develop the first IPTs for this project, a realist synthesis was undertaken to synthesise the international evidence for greenspace programmes for mental health. A realist synthesis is defined as:

“...a method for studying complex interventions in response to the perceived limitations of conventional systematic review methodology. It involves identification of contexts, mechanisms and outcomes for individual programmes in order to explain differences, intended or unintended, between them” (Booth et al., 2016, p. 267).

The aim of this realist synthesis was to explore which greenspace programmes work to improve mental health, how they work, why they work, for whom they work, how context influences mechanisms, and how mechanisms lead to outcomes. The objective of the synthesis was to develop IPTs and then test and refine the theories using both quantitative and qualitative evidence. This would provide the first programme theories and initial framework for the project before primary data collection in the next two phases. The rationale for developing IPTs for greenspace programmes for mental health rather than PSU was that initial exploratory searching during the synthesis showed that there were too few existing studies to synthesise in relation to substance use. Therefore, testing the applicability of the IPTs for use on programmes that support people with PSU would be implemented in Phase Two and Phase Three.

Study Phase One: Realist synthesis to establish IPTs

Pawson et al. (2005) propose five steps which help guide the realist synthesis process. These are: clarify scope; search for evidence; appraise primary studies and extract data; synthesise evidence and draw conclusions; and disseminate, implement, or evaluate. These steps are iterative rather than sequential and each stage can influence another. For example, research questions might be refined after IPT formulation, or the programme theory might be refined at any point when new evidence emerges. The first step of the realist synthesis was an initial exploration of literature and theory formulation about how greenspace programmes for mental health might be effective. This involved comparing and synthesising relevant theories and hypothesising how a greenspace programme is thought to work to achieve desired outcomes. Conversations were also had with staff working on greenspace programmes to inform this process and to establish what worked, for whom, and in what circumstance, and also what was not successful. This theory mapping provided the IPTs for the synthesis about what works, for whom and in what circumstances. These theories were then tested and refined throughout the realist synthesis process as evidence emerged, and this resulted in tested and evidenced programme theories for greenspace programmes for mental health for both people with diagnosed mental health problems, and those with self-reported mental health problems. In line with the iterative nature of realist work, these programme

theories became the IPTs for Phase Two and Three of the project. Since this first phase is now published, and to avoid duplication of words across chapters, detailed description of the methods used in the realist synthesis are reported fully in Chapter Four, as they appear in the published paper (Masterton et al., 2020). The published paper is also included in Appendix 1.

Step 5: Test programme theories through primary data collection and analysis

Study Phase Two: Quantitative survey study

In this second phase of the project, a quantitative, exploratory survey study was designed to test the proposed framework in Phase One using primary data. The purpose of Phase Two was to establish whether the programme theories that informed the framework in Phase One took into account the nuances across existing greenspace programmes, including whether the framework was applicable to all settings, from urban-based to rural-based programmes. Further, Phase Two explored how greenspace programmes could also support people with PSU by testing the proposed framework using data from greenspace programmes that support for this client group. Like Phase One, since Phase Two is now published, and to avoid duplication of words across chapters, detailed description of the methods used in this phase are reported fully in Chapter Five, as they appear in the published paper (Masterton et al., 2021). The published paper is also included in Appendix 2.

Study Phase Three, stage one: Semi structured interviews with greenspace staff and wider stakeholders

With the results of Phase Two indicating that the framework appeared to be transferable to programmes that support people with poor mental health and PSU, the aim of Phase Three was to conduct semi-structured, qualitative interviews with greenspace programme staff and wider stakeholders to further test, refine, and consolidate the framework for this varied client group. Using a realist approach, participants were interviewed about the CMOs relative to greenspace programmes for mental health and PSU therefore allowing a deeper exploration of why programmes work, for whom, and in what circumstances. Semi-structured interviews were deemed the most suitable method by allowing participants to provide a deeper exploration of why greenspace programmes work, for whom, and in what circumstances, relative to people with PSU. Semi-structured interviews can test existing theories, but they are also flexible enough to allow identification of new CMOs for programme theory refinement. As a result of the COVID-19 pandemic, interviews were conducted virtually via telephone, MS Teams, or

Zoom. Methods were chosen in discussion with my supervisory team and agreed to be the best fit in the circumstances and placed the least stress or pressure on participants during the already challenging time. Research has also shown that, even prior to the pandemic, virtual methods can generate comparable data to face-to-face methods (Sullivan, 2012).

Phase Three was split into two stages which supported the iterative nature of realist methods. There were 17 interviews across the two stages. Two thirds ($n=12$) of the interviews were completed in stage one, and the programme theories were refined in light of the emerging stage one interview data. This allowed refinement of the interview schedule in preparation for the second stage of the interview data collection where five participants were interviewed (see Appendix 7 for interview schedules for stage one and stage two). Concurrent analysis of the data showed that by the fifth interview in stage two, no new themes were being identified relating to programme theories, so the pragmatic decision was made to cease interviews at this point. There is no specific guidance in conducting realist interviews but this method of different stages of realist interviews is supported by Pawson (1996), and in a more recent paper by Manzano (2016).

A key objective of a realist interview, compared to other qualitative interviews, is that it is not designed to gather participant narrative. Instead, the realist interview is conducted to test specific programme theories through participants' stories that illuminate the CMOcs (Manzano, 2016). The purpose of the realist interview is to test hypotheses (the programme theories), and then refine them in response to the emerging data (Manzano, 2016; Pawson, 1996). Interviews typically start as exploratory interviews, before moving onto refinement and consolidation (Manzano, 2016, Pawson, 1996). As with other realist methods, this process can be iterative rather than linear, and the researcher can return to test and refine theories a number of times before consolidation, if it is deemed necessary. This process can be timely if IPTs are required to be established before testing and refinement, but since Phase One of the wider project had provided the IPTs for this phase, this reduced the need for numerous exploratory interviews, and allowed testing and refinement of programme theories to happen alongside more exploratory questions.

Stage one recruitment and participants

This first stage of interviews was conducted between September and December 2020. All participants were identified through existing networks, and purposive sampling was

used to select individuals based on gender, role, and organisation to ensure the sample reflected a wide range of views and experiences. To provide the necessary depth of information, two categories of participants were interviewed. The first category were staff that worked directly on greenspace programmes with people who have poor mental health and/or use drugs and/or alcohol ($n=6$). Two staff worked on wilderness-based programmes, three staff worked on garden-based programmes, and one staff member worked on both rural and urban conservation settings. By interviewing staff from programmes that used different greenspace settings, this ensured the framework was tested and refined using data from a range of programmes, thus ensuring framework transferability across programme types. The second category of participants interviewed were wider stakeholders whose work was directly linked to greenspace programmes for mental health and substance use but did not work on the programmes themselves ($n=6$). Five stakeholders were academic researchers whose previous work on projects relating to greenspace programmes allowed valuable insight into the proposed CMOcs, as well as identifying refinements and additions to the programme theories. One stakeholder was an NHS practitioner who had previously been involved in supporting clients onto greenspace programmes, and who still had an interest in advocating for the health benefits of time spent in nature. Recruitment was not limited to participants in Scotland: five were from other UK nations; and two were from international organisations. This was important because it created opportunities to test the generalisability of the emerging framework to programmes outside of Scotland/the UK. No clients were included in the sample as, due to COVID-19, the majority of greenspace programmes were not open/operational during the period of data collection or had very limited capacity. This is covered in more detail in the ethical considerations section at the end of the chapter.

An initial recruitment email was sent to potential participants letting them know about the study and aims. Interested individuals were asked to respond to the email, upon which, a participant information sheet (PIS) and a copy of the conceptual framework proposed in the realist synthesis was sent to them (see Appendices 4-6). Sharing the framework was viewed as an important step as it gave context to the study. A follow up email was sent two weeks later if there was no initial reply. Only one follow up email was sent as a reminder. If the participant agreed to take part after reading the PIS, a consent form was emailed to them (Appendix 8), and they were asked to sign it by e-signature or by typing their name, then return it electronically before the interview. The consent forms were stored on a secure MS Teams channel which was only accessible by me. All potential participants were assured that participation was voluntary, and they could withdraw at any time without giving a reason.

Stage one interview process

Written consent was acquired from all participants before the start of the interview. Twelve interviews were conducted by either telephone, MS Teams, or Zoom at the participant's preference. All interviews were audio recorded. Interview schedules explored the CMOs relative to greenspace programmes for mental health and PSU, uncovering why programmes work, for whom, and in what circumstances. All the interview questions were directly related to CMOs that were identified and tested in the first two phases of the project, and which constituted the IPTs. However, the interview schedule was still broad enough to be exploratory where necessary and allowed identification of new contexts, mechanisms, or outcomes (see Appendix 7 for interview schedules for stage one and stage two).

Stage one data analysis

Data were transcribed in full and analysed and coded thematically in NVivo 12. There is sparse evidence of how best to use NVivo within realist methodology, so to try to ensure transparency and best practice, guidance was taken from two key papers: one by Dalkin and colleagues (2021); the other by Gilmore and colleagues (2019). Both papers discuss how coding in NVivo is beneficial as it allows inductive approaches (codes emerging from the data) (Boyatzis, 1998) and deductive approaches (codes developed from the research question) to be used (Crabtree and Miller, 1992). This facilitates testing the data against the proposed programme theories, but also allowed identification of new CMOs therefore lending itself to realist research. Transcripts were split into two separate datasets, one for staff and one for wider stakeholders, read in full, and then coded line by line. The staff interviews were analysed and coded first which allowed the first iteration of refinement from the IPTs. The stakeholder interviews were analysed and coded second which enabled further refinement to the programme theories before the stage two consolidation interviews. Finally, each transcript was re-read for completeness to ensure that the final framework was inclusive of all major themes. NVivo allows tracking of programme theories from the initial testing to consolidation, through memo boxes for example (Dalkin et al., 2021, Gilmore et al., 2019). Memo boxes were used throughout data analysis as a way of reflecting on the data and identifying refinements needed for the interview schedule between stages one and two. They were also used to track colour-coded changes and refinements of the programme theories from the initial interviews to consolidation interviews. This increased transparency and aided understanding when coding was checked by my supervisory team. My supervisory team reviewed the coding at multiple points. This provided opportunities for discussion on

anything that was unclear or could have different interpretations, and therefore enhanced rigour (Barry et al., 1999).

Step 6: Theory refinement and consolidation (after further testing)

Study Phase Three stage two: Semi-structured interviews

As discussed above, this second stage of interviews was undertaken to test the refined theories that were a result of stage one. This iterative process is crucial in realist evaluation and allows final refinement and consolidation of the programme theories.

Stage two recruitment and participants

All participants were different people than in stage one, but the recruitment process was the same. As in stage one, all participants were identified through existing networks, and purposive sampling was used to select individuals whose expertise would provide insight into the proposed programme theories. As before, two categories of participants were interviewed. Relating to the staff that worked directly on greenspace programmes with people who have poor mental health and/or use drugs and/or alcohol ($n=2$), one staff member worked on both rural and urban conservation settings, and one staff member worked on a garden-based programme. The second category was again wider stakeholders whose work was directly linked to greenspace programmes for mental health and/or substance use but did not work on the programmes themselves ($n=3$). In stage one, five academic researchers were interviewed, but only one practitioner; so, the decision was made to prioritise recruitment of practitioners in stage two, rather than academic researchers. Two stakeholders were NHS practitioners who had experienced with green prescribing, and one stakeholder worked in the third sector and had experience with green prescribing and greenspace programme development. Three participants were from Scotland, one was from another UK nation, and one was from an international organisation.

Stage two data analysis

Data analysis occurred through the same process as in stage one, informed by Dalkin et al. (2021) and Gilmore et al. (2019). However, in this stage, the findings refine and consolidate the programme theory (Manzano, 2016, Pawson, 1996). This final stage of refinement is important as it can facilitate better understanding of proposed mechanisms, or identification of new mechanisms; better understanding of key contextual factors; or a more refined understanding of the patterns of outcomes resulting from the interaction of context and mechanism. Again, NVivo memo boxes were used to keep track of the

refinements and subsequent consolidation of the programme theories in this stage, and final CMOcs were written down and discussed with the supervisory team before findings were written up.

Step 7: Dissemination

Although this work relates to development of an intervention framework, rather than evaluation of a specific greenspace programme, all realist-based research should be disseminated in line with the RAMESES guidance for realist syntheses and evaluation in order to ensure appropriate communication of findings (Wong et al., 2013, Wong et al., 2016). This includes: reporting the research questions in realist format; describing the IPTs and the initial CMOc hypotheses for the programme; explaining what data was used to test which aspects of the programme theory; presenting and discussing outcomes for different groups identified in the programme theory; explicitly aligning evidence against the programme theory to provide a transparent basis for judgements; and presenting the refined programme theory and intervention framework and its implications for policy and programmes. This thesis has been written in line with these criteria. Additionally, the realist synthesis (Chapter Four), and the survey study (Chapter Five), have been published open access in *Health & Place*, an international, interdisciplinary journal (see Appendices 1 and 2). Funding has been confirmed for open access publication(s) developed from the qualitative findings (Chapters Six to Eight). These will be shared with interested participants of the interview phase as well as wider stakeholders. I have also developed my findings from the realist synthesis into a briefing paper through collaborative work with TCV and the Dundee GHP, and which can be found on the 'Become a Partner' page on the Greenhealth.scot website (<https://www.greenhealth.scot/partner>). This briefing provides a guide for greenspace programmes for mental health and has been designed to aid programme developers with implementation. It has been well received and shared widely across many networks, including the social prescribing network at the European Centre for Environment and Human Health (ECEHH) and the Edinburgh and Lothians Green Health Prescribing team. Further, I have disseminated my findings across a range of public events run by organisations such as Highland GHP, Drugs Research Network Scotland (DRNS), Scottish Health Action on Alcohol Problems (SHAAP), Scottish Alcohol Research Network (SARN), Society for the Study of Addiction (SSA), and the Substance Use and Associated Behaviours (SUAB) Research Group. Again, this has enabled my work to be shared across a variety of networks, both in relation to greenspace research and within the fields of mental health and substance use.

Ethical considerations

For this study, ethical approval was sought and granted by the General University Ethics Panel (GUEP) at the University of Stirling for the Phase Two survey (GUEP 799) and the Phase Three qualitative interview study (GUEP (19 20) 959). The approval letters from GUEP are provided in Appendix 3. All components of this study were in line with the Concordat to Support Research Integrity (UK Research Integrity Office (UKRIO), 2020). There were no methods in this project that raised significant ethical concerns. The following sections cover the main ethical considerations that were raised through the study.

COVID-19 context and recruitment

Given the context of COVID-19 throughout the data collection phases, any service or person recruited could be experiencing more stress compared to usual. Care was taken to identify methods that placed the least pressure on participants. Participation in all parts of the study were optional and participants were given the option of using telephone, Zoom, or MS Teams, for qualitative interviews. I was flexible with days and times of interviews and communicated this when inviting people to take part.

One of the main ethical considerations was the decision to not interview clients. I acknowledge that this likely had an impact on the development of the framework and testing of programme theories, given that missing out the client voice would hinder the ability to uncover potential CMOcs. However, the closure of many greenspace programmes due to COVID-19 meant that I did not have the ability to meet directly with clients. Although there may have been potential to ask staff on these programmes to identify clients who may be interested in taking part in a telephone interview, this would place further demand on staff and clients when there were many other priorities, such as keeping clients and staff safe during a period of crisis. Further, programmes that were operational were typically running at capped numbers, and it was felt there were ethical implications of me taking a space on a programme that could have been used by a client. Therefore, the decision was made to only gather data from staff and wider stakeholders within the field to protect the feasibility of the study. This was undertaken using advice from the PhD funders (Scottish Graduate School of Social Sciences), from the University of Stirling and Faculty of Social Sciences, and project supervisors.

Informed consent

All participants were provided with a PIS for the survey and for the interviews. The rationale behind both studies were provided, and for the qualitative interviews, a summary document of the proposed framework was provided to give context to the study. There were no hidden objectives at any point in the project. The design of the study was clear and there were no leading questions. Participants could withdraw at any time without providing a reason for their withdrawal and participants completed an online consent form for the survey and a written consent form for the interview study.

Research sensitive topics and risk of participant distress

While the study asked questions about greenspace programmes for mental health and PSU, the questions in the survey and in the interviews were not invasive. There were no personal questions relating to the participants, and participants were aware that they did not have to answer any question they did not want to, without having to give a reason. This was reiterated at the start of each interview. Although this did not happen, participants had the right to withdraw at any point during the survey or interview without providing a reason for this. This was clearly explained to participants in the PIS for both studies.

Confidentiality, anonymity, and data protection

All information shared within the survey and interview context was kept confidential. All data was pseudo-anonymised. Data was collected, stored, and accessed in accordance with the General Data Protection Regulation (GDPR). Pseudo-anonymised interview transcripts, with all identifiable data such as names, organisations, and locations removed, and electronic copies of consent forms from interviews were stored on the secure MS Teams channel for the study. Audio recordings were deleted once the transcripts were uploaded. Data being transferred between the transcriber and me was through the secure OneDrive system, and files were encrypted and password protected before being shared. Data transferred within my supervisory team was through the secure Onedrive system.

Challenges of this methodological approach

While the strengths of realist methodology have been covered in detail in this chapter, as well as the rationale for choosing the approach, limitations must also be recognised. One of the key challenges of realist methodology is that it is based on guiding principles rather than standardised rules (Pawson et al., 2005). This means that terms can be

understood and implemented by different researchers in different ways. Although an attempt was made to maintain transparency at all points of the project, for example by submitting the realist synthesis protocol to PROSPERO, adhering to robust quality standards (Wong et al., 2013, Wong et al., 2016), and through thorough documentation and in-depth discussion of key decisions, the realist research process is inherently interpretive and subjective, especially in regard to relevance and rigour assessment. Another challenge, as reported in a review of realist studies (Marchal et al., 2012), is that there is a notable diversity in terminology. For example, the definition of 'mechanism' and 'context' differed across studies which led to different theoretical models, and there were evident challenges in separating the context from the mechanism (Marchal et al., 2012). To attempt to address this concern, this chapter has been explicit in informing the reader what constitutes a mechanism and a context and the differences between the two.

An important consideration relative to this project was the possibility of confirmation bias in the primary data. Suggestions to address this have been explored in Vogel and Punton's extensive realist evaluation (2018) and were drawn on for this study. In the survey study, statements were created to be as neutral and non-leading as possible, and all statements were discussed and agreed by the full research team. In the interviews, the first questions asked were purposefully broad and probed indirectly for CMOs. Only once CMOs were developed, were more specific questions asked in relation to what had already been confirmed. A further limitation was that, although realist methodology allowed the impact of COVID-19 to be addressed, the pandemic also gave rise to limitations that were unavoidable and affected the project in a detrimental way. As mentioned previously, it was not possible to interview clients on the programmes which could limit development and refinements of programme theories and limit conclusions drawn from the project as a whole. Further, building a realist intervention framework requires exploration of which outcome data might best represent programme efficacy, and my original plan was to collect quantitative outcome data from clients on the greenspace programmes. This was not possible due to COVID-19, but to try and mitigate this limitation, specific questions were asked in the qualitative interviews relative to outcomes. This limitation with methods for triangulation was unavoidable, but it must be acknowledged. As mentioned, realist methods are iterative and seek to build on existing programme theory, so there is potential for the work conducted in this project to be the basis for future framework development work that can better incorporate quantitative outcome measures.

Positioning myself within the project

Jacobson and Mustafa (2019) suggested that the way that researchers view and interpret the world is directly related to our own experiences. This means that the way that we undertake research is also impacted by our own experiences and every part of the research journey is shaped by our own biases, from how we design our studies, to the way we interact with participants, and the way we interpret the data. Reflexivity, and positionality in particular, is therefore essential for acknowledging and better understanding how our backgrounds impact our work and our motivations for research (Jacobson and Mustafa, 2019). Indeed, being explicit about who you are and your background relative to the research field allows transparency around how the data are produced (Finlay, 2002). Further, through being aware of how our own thoughts affect the way we see the data, this encourages critical analysis of the data and of our work.

With this in mind, and given that a large section of this project is qualitative, it is necessary to draw on my own experiences growing up using various outdoor centres, both on day programmes and over longer residential periods. It was through these experiences that I developed an interest in outdoor sport and other physical activities, and where I learnt how beneficial they were for my own mental health, particularly when navigating other external challenges outside the programme. However, due to the positive nature of my experiences, this means my views about programme effectiveness are likely biased. I acknowledge that I have not experienced many of the wider systemic challenges that are present for those with poor mental health and PSU, and which affect people's lives far beyond the greenspace programme. My own experiences therefore bear little resemblance to the experiences discussed throughout my research about what works for people with poor mental health and PSU. It has been crucial during this project for me to take a step back from my own experiences and approach both data collection and analysis fully accepting that what works for one person, may not work for another, and for a number of reasons. Further, realist approaches are not about reporting the stories of participants but creating theory about why a programme works. Through detailed notes and maintaining memo boxes, I have been able to use my own knowledge and experience to my benefit in aiding in the development of programme theories, but I have also been able to see when my existing knowledge or thoughts were challenged by new data and keep a note of this. This has provided me with the space to be reflexive and create programme theories which have been guided by the data, rather than allowing my own experiences to excessively influence the research.

My understanding of my research field has also been driven by work outside of academia. I have extensive experience working with young people, many of whom have experience of living in environments where poor mental health and PSU is prevalent. Most of the people I work with have experienced failings of services that are designed to protect them and have experienced stigma, blame, and lack of understanding throughout their lives. When working with young people, I have previously incorporated the outside environment, and in particular being physically active outside, into much of the work I have done. Many young people have explained to me that the four walls of indoor support settings, or education settings, are oppressive and add to anxiety. On the other hand, I have seen the benefits of spending time in nature with the people that I worked with, and I feel strongly about advocating for this. However, this has been challenged at times by those in power within organisational settings, and I have felt frustrated at the lack of understanding and willingness to challenge the status quo that support work should be undertaken in a standard care setting. This drive has been central to the development of my project, but it has remained important for me to be aware that this is a growing area of focus and not everyone shares the same views and passion that I do. I have needed to be open to criticism and other views, and I have needed to be explicit about the role that greenspace programmes might have in future support and treatment for poor mental health and for people with PSU. I am not claiming that these types of interventions are a silver bullet, but I do genuinely believe that they provide aspects to care which other treatment programmes do not. This is the reason why I believe the work that I am doing is important, because only through developing theoretical understanding of the processes by which greenspace programmes can positively impact people's health, can we convincingly promote the role of nature and greenspace within public health.

Chapter conclusion

This chapter has provided a detailed account of the philosophical foundations of critical realism and the methodological underpinnings of empirical realism. The realist research process was described along with the rationale for using this methodological approach in the project. The methods used in each phase of the study were clearly presented to guide the reader through the realist research cycle, and ethical considerations, challenges integral to realist methodology, and the importance of reflexivity in research were discussed. The next chapter contains Phase One of the project, a realist synthesis of greenspace programmes for mental health.

Chapter 4: Phase One - Building initial programme theories through a realist synthesis of greenspace programmes for mental health

Introduction to chapter

Chapter Four is a detailed account of the realist synthesis that was conducted to explore greenspace programmes for mental health. As discussed in Chapter One, this review focused on greenspace programmes for mental health rather than for supporting people with problem substance use (PSU). This was because there was sparse empirical evidence of greenspace programmes for people with PSU which meant a realist synthesis with this focus was not possible. This review was Phase One of my PhD and was published in the journal *Health & Place* in June 2020 (Masterton et al., 2020). Due to word count limits, this chapter is a slightly shortened version of the full paper, but the published paper as it is found in *Health & Place* can be seen in Appendix 1. An important caveat for this chapter is that, since the realist synthesis was Phase One of my PhD and written and published in 2019-2020, there will likely be some recently published studies that are missing. However, through my reading of recent publications in the field, many of which are mentioned in Chapter Two, I am not aware of any research that significantly expands what is already presented in this chapter. I therefore do not believe that adding further literature to an already extensive review is pragmatic. Further, given that the programme theories presented in this chapter are tested and refined again through the Phase Two quantitative survey study (Chapter 5), and the Phase Three qualitative interview study (Chapters 6 to 8), this enables testing of the programme theories with up-to-date primary data. This iterative testing and re-testing of programme theories is central to realist work, and each phase allows deeper insight into the identified programme theories and allows an understanding of what works, for whom, and in what circumstances.

This chapter will provide the contextual background for the realist synthesis, before providing in-depth description of the methods used to undertake the review. The findings are presented which includes detailed reporting of the refined programme theories, as well as what does not work. Finally, a discussion of the review is presented which includes depiction of a novel conceptual framework based on the findings, as well as strengths and limitations. The chapter ends with a description of how the findings of this synthesis contribute to the thesis as a whole, and how the refined programme theories

from this chapter will be used as initial programme theories in the successive project phases.

Contextual background for the review

The term 'mental health' describes the state of a person's psychological wellbeing, running on a continuum from positive mental health to poorer mental health (Pilgrim, 2019). For this review, I was interested in how greenspace programmes might be effective in improving mental health in those who have a poor mental health diagnosis, sometimes referred to as a mental health problem or mental illness, or in those who have expressed concern about their own mental health. While 'mental health' is neither positive nor negative by definition (Pilgrim, 2019), the population inclusion criteria for our study means that the term, in this review, is more likely to represent a continuum of states from mild to moderate low mood to severe mental ill health. One of the benefits of using nature to aid mental health recovery is that it can be used alongside a more typical medicalised treatment plan, such as talking therapy, and interventions could potentially be implemented anywhere, including within people's own communities (van den Berg and van den Berg, 2015).

Previous systematic reviews of greenspace programmes for mental health improvements have provided some evidence of their effectiveness (Bowen et al., 2016, Cipriani et al., 2017, Genter et al., 2015, Gorman and Cacciatore, 2017, Zhang et al., 2021). However, without identifying the necessary components, processes and influences needed for an intervention to work, it is difficult to understand why the programmes work, and how best to replicate them. Other recent reviews and reports have produced more detailed accounts of the mechanisms by which engagement with nature impacts physical and mental health (Fullam et al., 2021, Garside et al., 2020, Hardie et al., 2021), but continued exploration of how different contexts are likely to facilitate different mechanisms and outcomes is important, as what 'works' in one setting might not 'work' in a different one. As outlined in Chapter Three, realist methodology is increasingly being used in public health research to address this gap and better understand the processes within complex interventions (Pawson et al., 2005). A realist synthesis is a form of systematic literature review (Pawson, 2005), but is distinguished from other forms of systematic review by the focus of the study being on the programme theory. The process of theory testing is undertaken by synthesising existing research into context, mechanism, outcome (CMO) elements. In this study, adopting a realist lens allowed the underlying mechanisms through which greenspace programmes result in optimal mental health outcomes to be identified, and in what contexts these mechanisms

occur. A realist synthesis allows development of initial programme theories (IPTs) which can then be tested with primary data in latter phases, as is the case in this project. The aim of this realist synthesis was to explore what greenspace programmes work to improve mental health, how they work, why they work, for whom do they work, how does context influence mechanisms of change, and how do mechanisms of change lead to outcomes. The objective was to develop IPTs, and then test and refine these programme theories using quantitative and qualitative empirical evidence, grey literature, and conversations with greenspace programme staff. The research questions were as follows:

1. What types of greenspace programmes have been used to improve mental health?
2. What outcome measures (O) are associated with current greenspace programmes (e.g. quality of life, increased confidence, increased mood)?
3. What are the potential mechanisms (M) that influence outcomes?
4. What is the role of context (C) in enabling/constraining the above mechanisms?
5. What are the optimal context-mechanism-outcome configurations (CMOCs) that will lead to optimal outcomes in greenspace programmes to improve mental health?

Methods

Formation of IPTs to be tested and refined within the realist synthesis

As discussed in Chapter Three, Pawson et al. (2005) propose five iterative steps which help guide the realist synthesis process. The first step of this review was initial exploration of literature and theory formulation about how greenspace programmes for mental health might be effective. This stage is prior to systematic searching of the literature and involved wide reading of the evidence base and comparing and synthesising potentially relevant theories and hypothesising how a greenspace programme is thought to work to achieve desired outcomes. This initial theory mapping provided the very first initial theories which were to be tested and refined using secondary data identified through systematic searching in the review. As previously discussed,

these refined programme theories would then act as the new IPTs taken forward to Phase Two and Phase Three to be tested with primary data.

The first iteration of IPTs for this review were developed initially through reading existing literature on greenspace programmes for mental health, informal conversations with existing programme staff, and by reading relevant policy documents and reports which discussed conceptual frameworks in relation to practice. These IPTs were discussed and checked by my supervisory team, who were co-authors on the published paper (Appendix 1), and this ensured that all authors were involved, and in agreement with, the development of the theories. By using this approach, relevant CMOs were identified for several different programmes and potential CMOs developed. Table 1 shows the eight IPTs proposed under three identified programme theory themes of Nature, Individual Self, and Social Self. To further clarify the configurations, and to show how CMOs fit together in a causal relationship, 'if-then-because' statements are included under each IPT.

Table 1: Initial programme theories identified to be tested and refined

Theme	Initial Programme Theory (IPT) number	Context (C)	Mechanism (M)	Outcome (O)
Nature	1	Nature-based location Ease of access	Feeling calm Feelings of escape Feeling removed from everyday life	Decrease anxiety Decrease stress
<p>IPT 1: If there is easy access to a nature-based location, then participants may experience decreased anxiety and/or stress. This is because they can feel removed from everyday life, experience feelings of escape in nature, and feel calm. If the nature-based location is not easy to access, it is much less likely that people will go there.</p>				
Nature	2	Nature-based location Ease of access	Indirect attention used	Attention restoration Decreased mental fatigue
<p>IPT 2: If there is easy access to a nature-based location, then participants may experience a decrease in their mental fatigue, as well as feel that their attention has been restored. This is because indirect, or effortless, attention, as described in Kaplan and Kaplan's Attention Restoration Theory (1989), is being used when immersed in nature rather than direct attention. If the nature-based location is not easy to access, it is much less likely that people will go there.</p>				
Nature	3	Nature-based location Ease of access	Time alone to reflect	Increase in readiness to change lifestyle and/or coping strategies Increase in desire to change

				Increase in awareness of the need for change
<p>IPT 3: If there is easy access to a nature-based location, then participants may experience an increase in readiness to change, an increase in desire to change, and/or an increase in awareness of the need for change. This is because the nature-based location gives participants time along to reflect on their lives and what they want to change. If the nature-based location is not easy to access, it is much less likely that people will go there.</p>				
Individual	4	Availability and resources for trained facilitators Access to resources	Planned structured activities Enjoyment of activities	Increased physical activity Increased physical health Improvement in mood
<p>IPT 4: If there is the availability and the resources to provide trained facilitators, and these trainers have access to a variety of resources (such as equipment), then there will be an increase in physical activity, and a subsequent increase in physical health and improvement in mood. This is because there will be the availability of a number of different planned, structured activities from the trained facilitators, and participants can pick what they would like to do best, and therefore enjoy the activity.</p>				
Individual	5	Availability and resources for trained facilitators	Learning new skills Feelings of self-efficacy	Confidence Confidence in ability to change and cope with challenges in life
<p>IPT 5: If there is the availability and the resources to provide trained facilitators, then this will enable an increase in participant confidence, as well as in their confidence to change and cope with challenges in life. This is because participants are able to learn new skills from the facilitators, which lead to feelings of self-efficacy.</p>				

Individual	6	Time on programme Availability and resources for trained facilitators	Learning new skills Feeling responsible for something	Increased self-esteem Increased vigour for life
<p>IPT 6: If there is the availability and the resources to provide trained facilitators, and if there is adequate time spent on the programme, then participants will show an increase in self-esteem and an increase in vigour for life. This is because participants are able to learn new skills from the facilitators, as well as feelings of responsibility. The longer that the participant is able to feel responsible for something, the bigger the increase in self-esteem and vigour for life.</p>				
Social	7	Previous experience of patient-therapist relationship Existing facilitator attitudes and/or perceived attitudes of facilitator	Feelings of rapport and trust Good relationships with facilitators	Continued engagement with, and after, the programme.
<p>IPT 7: If facilitators have positive attitudes, then participants are more likely to engage with, and after, the programme. This is because, when participants perceive a positive attitude towards them, feelings of rapport and trust are more likely to develop, and a good relationship with the facilitator can be established. Previous experience of a patient-therapist relationship can also influence continued engagement with, and after, the programme. If there is a positive previous experience, then this can lead to engagement. This is because feelings of rapport and trust can be built quicker, and participants can more easily develop a good relationship with the facilitator.</p>				

Social	8	Perception of how others are engaging on the programme Time on programme	Team building/teamwork exercises Feeling safe and unjudged by others with similar backgrounds Feelings of rapport Opportunities to share Opportunities to learn from others	Increased social abilities Improvements in interpersonal relationships
<p>IPT 8: If participants perceive others to be engaging well on the programme, then this can lead to increased social abilities and improvements in interpersonal relationships. This is because, when participants perceive others to be engaging, this increases feelings of rapport between participants. This can lead participants to feel safe and unjudged by others during team building/teamwork exercises where there are opportunities to share and learn from others. Even if others are perceived to be engaging well, time spent on the programme is also important in order to achieve outcomes. This is because social improvements do not occur quickly, and interpersonal relationships take time to build.</p>				

Search strategy

To test and refine programme theories a selection of relevant electronic databases were searched between May and July 2019. These were: MEDLINE; PsycINFO; GreenFile; SocINDEX; CINAHL; Health Source; SPORTDiscus; Scopus; Web of Science; Natural Science Collection; and Wiley Online Library. Searches were limited to studies published after 2000 to ensure that included evidence was current. Qualitative, quantitative, and mixed-methods papers were included. The search string was developed by exploring what existing reviews in the research field had used, and by discussing any additional terms with my supervisors. The faculty librarian was also consulted to provide any additional input. Through these discussions, we identified that several terms are used interchangeably for 'greenspace' and 'mental health', so I included these in the search string (see Table 2).

Table 2: Search terms in published literature

Databases Searched	Search Terms	
MEDLINE	greenspace OR "green space" OR "green care" OR greencare OR "nature therap*" OR "wilderness therap*" OR "outdoors behavi*ral healthcare" OR "outdoors behavi*ral therap*" OR "forest bathing" OR "shinrin yoku" OR "shinrin-yoku" OR "horticultur* therap*" OR "therapeutic horticulture" OR "green exercise" OR ecotherap* OR "conservation therap*" OR "care farm*"	
PsycINFO		
GreenFile		
SocINDEX		
CINAHL		AND
Health Source		
SPORTDiscus		"mental health" OR "mental ill health" OR "mental illness" OR "mental disorder" OR "mental fatigue" OR psychiatric OR "psychiatric illness" OR stress OR depression OR anxiety OR recovery OR "low mood" OR wellbeing
Scopus		
Social Care Online		
Web of Science		
Natural Science Collection		
Wiley Online Library		

Citation lists were also searched for any additional papers not captured in the original literature search, and grey literature was identified through search engines (Google, Google Scholar), grey literature databases (OpenGrey, Social Care Online), relevant organisational websites and reports (see Table 3), social media platforms such as Twitter, and through word of mouth.

Table 3: Organisations included in search for grey literature

UK	Europe	International
Venture Trust	Asociacion Experientia (Spain)	Enviros (Canada)
Phoenix Futures		Shepherd's Hill Academy (US)
The Wilderness Foundation		Rites of Passage (US)
Forest Therapy Scotland		Redcliff Ascent (US)
Cyrenians		
Venture Scotland		
The Green Team		
Youth Vision		
Venture Mor		

Inclusion/exclusion criteria

Inclusion criteria aligned to both the research questions and IPT development, as suggested by Wong et al. (2013), were refined in response to emerging data, and discussed as a team to reach agreement. All programmes had to be greenspace-based however this could include gardens, woodland, plots, parks, and other types of greenspace. All age groups were included. In terms of mental health, both non-clinical and clinical studies were included in the search strategy. Participants could have a mental health diagnosis or be self-diagnosed; as many greenspace programmes are applied in a similar manner to specific and general populations. Programmes were included if improved mental wellbeing was an explicit intended outcome. The exclusion criteria were developed and refined in response to emerging data and again were discussed as a team to ensure consensus. A decision was made to exclude studies focused on dementia because, upon initial analysis, the CMOs appeared very different to those for mental health. It was unclear whether those with dementia had the capacity to reflect meaningfully on their experiences and if these studies could effectively answer the review questions. Furthermore, many of these studies were implemented inside and could not be described as 'greenspace' programmes.

Relevance and rigour

Following the guidance set in the quality standards for realist reviews (Wong et al., 2013), each study was appraised for relevance and rigour. Relevance was assessed in relation to three criteria: population, intervention, or study design; explanation of CMOs as individual aspects as well as in combinations; and explanation of theory. In realist syntheses, studies can be included even if only a small part is relevant. This can mean that a certain amount of subjective judgement is necessary to ensure the number of included studies is not unmanageable. Similarly, in realist syntheses, studies are assessed for rigour in a different way from systematic reviews; standard quality assessment tools are not used due to the risk of 'nuggets of wisdom' (Pawson, 2006a) being missed due to discarding papers deemed methodologically weak. As advised in the quality standards (Wong et al., 2013), we identified whether the methods in each study were rigorous enough to be able to rely on the small percentage of findings that we needed to draw on and use in our review. However, as discussed in Pawson (2006a), even studies typically deemed methodologically weak can be included, with careful analysis and appraisal, since they may explicitly, or implicitly, allow insight into why an intervention did not work. To ensure that the risk of bias was reduced, a second reviewer, independent of the supervisory team, checked a selection of included/excluded papers

to ensure validity and consistency. Where there was inconsistency, a thorough discussion was held to decide whether to include or exclude the study.

Findings

Search results and data extraction

In the first stage of searching, after removing duplicates, 2,119 titles and abstracts were screened against the inclusion and exclusion criteria: 2,095 studies identified through database searching; 19 grey literature sources; and five studies through citation searching. In a realist synthesis, the search process is iterative, and during a final search for evidence, another eight empirical studies and one grey literature evaluation were identified. In total, 113 potentially eligible studies were identified in this process so full texts were obtained. As a result of further close reading of full texts, 49 articles were identified and included. Literature searching and screening results are reported in Figure 2 using PRISMA (Moher et al., 2009). Although I acknowledge that a newer version of PRISMA has been published since the synthesis was undertaken (Page et al., 2021), the updated guideline is designed primarily for systematic reviews and requires additional information about inclusion/exclusion relating to standard quality appraisal. As discussed above, this is not in line with realist methodology which advises against this type of quality assessment (Pawson, 2006a). Detailed characteristics of the programme, for example number and gender of participants, country, programme type, and programme focus, were recorded and can be found in the published paper (Appendix 1 pp. 258-263).

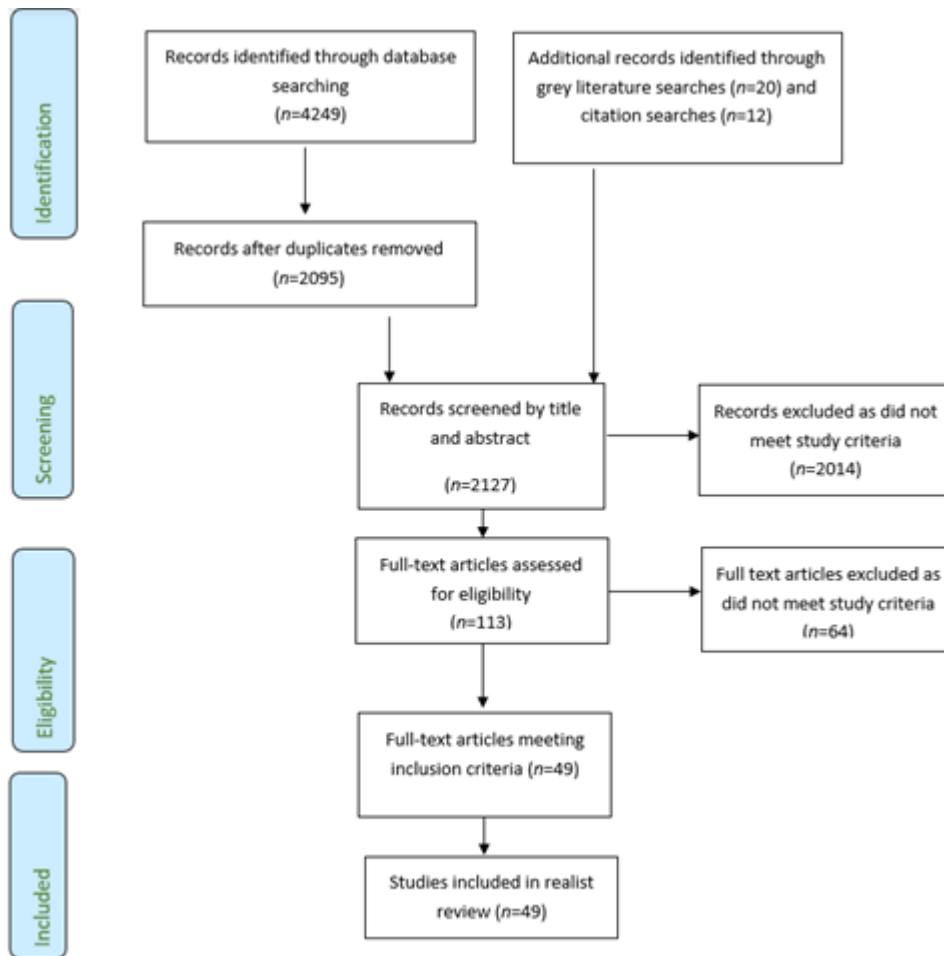


Figure 2: PRISMA diagram (Moher et al., 2009)

Detail on CMOs of each included study were recorded in an Excel spreadsheet. Data extraction and synthesis were undertaken, and the results were regularly discussed with the wider supervisory team to ensure consistency and to reduce bias when refining programme theories. Ongoing conversations with greenspace organisation staff were held throughout the search and appraisal process to further ensure that programme theories accurately described the underlying mechanisms and causal pathways of the interventions. It became clear during data synthesis that IPTs did not adequately integrate the ‘for whom’ and ‘in what circumstance’ aspects of the realist method. Therefore, while the programme theory themes stayed similar, there was refinement and greater emphasis placed on these contextual factors given that they are essential for implementation and targeting. Figure 3 shows a brief outline of how the identified programme theories fit in to three overarching themes. The seven programme theories are represented by headings which we believe best describe their core concept.

<p>Nature</p> <ol style="list-style-type: none"> 1. Escape and Getting Away 2. Space to Reflect <p>Individual Self</p> <ol style="list-style-type: none"> 3. Physical Activity 4. Self-Efficacy 5. Having a Purpose <p>Social Self</p> <ol style="list-style-type: none"> 6. Relationships with Facilitators 7. Shared Experiences
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Figure 3: Three programme themes and subsequent representative headings for the seven programme theories identified through data synthesis

Testing and refinement of programme theories

Programme Theory One: Escape and Getting Away

Perhaps unsurprisingly, given the integral part nature plays in the programmes, most of the included studies mentioned the importance of immersion in greenspace for mental health benefits. IPT 1 and IPT 2, as shown in Table 1, were condensed into the single encapsulating programme theory of 'Escape and Getting Away'. A reduction in stress and mental fatigue were identified as the main outcomes in this programme theory and were causally linked to the mechanisms of indirect attention being used, as described in ART (Kaplan and Kaplan, 1989), and through the participant feeling removed, relaxed, and 'getting away' from their stressors. Fernee and colleagues (2019) discussed how the role of the wilderness created a calming effect on participants, in contrast to their usually chaotic lives, and how the calming environment facilitated cognitive processes such as reflection. Some participants described immersion in nature as feeling like "a cloud disappearing" (Kogstad et al., 2014, p.6063), while participants in the study by McIver et al. (2018) reported that immersion in nature helped reduce rumination and stressful, negative thoughts. One participant in O'Brien et al. (2010) reported that he felt sitting on the hillside for ten minutes was as effective as his antidepressant medication. In the Nacadia Therapy Garden, participants described the garden as "a magical world of its own" (Sidenius et al., 2017, p. 5), whereas other participants described being out

in nature as *“like another world”* and *“like part of the world but a pocket, a haven pocket”* (Stevens, 2018, p.7 & p.9 respectively). The greenspace setting was identified across all studies as the main contextual factor as it provided the right supportive environment for these mechanisms to occur, but there was some evidence that ease of access to the programme sites was also a contextual factor. One study highlighted that not owning a car to get to sites could be a barrier (O'Brien, 2018), and Husk et al. (2020) stated that support to get to the location of the programme was necessary for success. Additionally, during a discussion with greenspace programme staff, one manager emphasised that access to minibuses could influence the ease by which the programme was attended and therefore travel arrangements should be taken into consideration.

When exploring for whom programmes are most effective, programmes that utilise greenspace and allow participants to feel as if they are escaping from their day-to-day lives were shown to be particularly effective for participants with experience of trauma, anxiety, depression, suppressed anger, and other emotions, conflicts in relationships, as well as for people who explicitly state that they need help (Bettmann et al., 2011, Russell and Phillips-Miller, 2002). A further individual-level contextual factor may be gender, with the WHO report, *Urban Green Space: A Review of the Evidence* (WHO, 2016) highlighting the importance of taking account of gender differences in response to exposure to greenspace, and a previous longitudinal study by van den Bosch et al. (2015) reporting positive associations between exposure to greenspace and mental health in women, but not men. Further, Combs et al. (2016) reports that female participants showed a faster decrease in stress than male participants, suggesting that a shorter stay on a programme may work for female groups. Such findings suggest that men and women may respond differently to the greenspace environment on programmes so could be important to consider during programme development. It is also worth noting that cultural differences may also influence how well a participant engages with a greenspace programme in the first instance. For example, during conversations with greenspace programme staff, uptake of greenspace programmes such as forest therapy is reportedly much higher in Japanese and Korean culture where time in forests to aid stress reduction and improve wellbeing is an integral part of people's lifestyle. The normalisation of forest therapy in these cultures could influence uptake and engagement of programmes compared to countries where there is stigma attached to such ideas.

Programme Theory Two: Space to Reflect

The contextual role of the greenspace setting is discussed in the above Escape and Getting Away programme theory and is also integral to this programme theory. In this

programme theory, the greenspace environment was described as a catalyst for change, with Mclver et al. (2018), and participants on the Living Wild programme (Venture Trust, 2021), describing nature as being a mediator in preparing a person for a therapeutic experience. Sidenius et al. (2017) supports this, describing nature as providing a 'backdrop' where therapeutic conversations seem easier. An integral mechanism of this programme theory is that time alone in greenspace can allow participants to reflect on their lives. This is particularly important for those with coping strategies which may be harmful to them, such as using drugs, alcohol, or self-harm (Bettmann et al., 2011). Participants on a wilderness therapy programme (Ferneer et al., 2019) spoke about the physical space allowing them to reflect in a prolonged and undisturbed way, both when sitting and walking. This, in turn, was said to increase their awareness of the need for change in their lives (Hassink et al., 2010, Mclver et al., 2018, Russell and Phillips-Miller, 2002), and how to *"live a better life"* (Fieldhouse, 2003, p.90). Additionally, the outcome of a desire to change could be facilitated by metaphors encountered within the programme and participants applying these to their own lives. An example of this was a description of how trying to control a canoe and fight against its natural course proved more difficult than letting nature take its course around obstacles; this was a metaphor for trying to control life and avoid obstacles (Mclver et al., 2018).

The context of adequate time spent on the programme was an additional context in this programme theory since change and reflection did not happen quickly (Kogstad et al., 2014, Pálsdóttir et al., 2014, Schreuder et al., 2014, Sidenius et al., 2017). Participants in Gabrielsen et al. (2018) believed change happened due to the number of unique experiences participants have during programmes but stated that change could take months to become apparent. Pre-existing diagnoses were also identified as a crucial contextual refinement for this programme theory and could be particularly important when designing programmes for specific populations. For example, extensive time alone for reflection is not appropriate for participants with existing diagnoses such as severe depression or psychosis (Ferneer et al., 2017).

Programme Theory Three: Physical Activity

Enjoyment of physical activity was identified as the mechanism that best allows increased engagement and improved physical and mental health (Barley et al., 2012, Bloomfield, 2017, Cole and Christie, 2016, Harris, 2017, O'Brien, 2018, Schreuder et al., 2014). Two participants in Ferneer et al.'s study (2019) described how, even though they felt tired during physically challenging hikes, they still felt happier when taking part and therefore found it easier to push themselves. However, caution must be taken before

generalising this finding; Caulkins and colleagues (2006) highlighted how young women in their study appeared to benefit less from wilderness hikes, compared to other participants, due to higher reported levels of aversion to the outdoors. In particular, the context of weather influenced enjoyment of activity as participants who did not like spending time outside found it difficult to enjoy any aspect of the programme due to discomfort during poor weather (Harper et al., 2019). Gabrielsen et al. (2018) suggest that informing and preparing participants for any challenges prior to the programme commencing is advisable, and ensuring participants have the right equipment, such as waterproof clothing and shoes, is also important.

Further, Evans (2013) suggests that greenspace programmes must provide clients with a variety of activities in order to meet varying needs. Conversations with service managers identified that availability of resources is an important contextual factor for successful engagement with physical activities as programmes must be fully equipped and functional. However, SurrIDGE et al. (2004) discuss how resources can also be in the form of support and advice from stakeholders in areas such as risk assessment and group safety. Six studies stressed the importance of having confident, adequately trained facilitators to enable and lead activities (Bloomfield, 2017, Evans, 2013, Granerud and Eriksson, 2014, Kogstad et al., 2014, O'Brien et al., 2010, SurrIDGE et al., 2004). With increases in physical activity, improvements in mood are also seen (Bryson et al., 2013, Eriksson et al., 2011, Fernee et al., 2019, Fieldhouse, 2003, Leck et al., 2015, Wilson et al., 2010). This supports existing systematic reviews and meta-analyses supporting the role of physical activity on mental health (Bize et al., 2007, Penedo and Dahn, 2005, Rosenbaum et al., 2014).

Programme Theory Four: Self-Efficacy

Twenty-eight studies reported that service users who learned and mastered new skills had increased self-esteem, pride, and confidence. Indeed, existing evidence supports continued learning as a mechanism for mental health improvement (Feinstein and Hammond, 2004, Hammond, 2004). Increases in self-esteem, pride, and confidence was said to be enabled through the mechanism of increased empowerment when learning new skills (Cole and Christie, 2016, Combs et al., 2016, Howes et al., 2018, Fernee et al., 2019, Lehmann et al., 2018, O'Brien, 2018, Woodford et al., 2017). Learned skills can be practical tasks, for example, learning how to look after plants was very effective for those with stress-related illness (Adevi and Lieberg, 2012, Eriksson et al., 2011), and for those without a clinical diagnosis wanting to improve wellbeing in general (O'Brien et al., 2010). Learning practical skills on wilderness therapy programmes was shown to be

a particularly positive experience for young people (Fernee et al., 2019, Warber et al., 2015), and for those who were in the wilderness alone for the first time (Russell and Phillips-Miller, 2002). However, learned skills can also be skills such as self-regulation of emotion (Adevi and Mårtensson, 2013), and coping strategies (Barley et al., 2012). Whilst learning how to cope with challenges was present across programme type, the type of challenges varied. For example, in wilderness therapy, adventure therapy, and care farming programmes, coping strategies focused on overcoming physical challenges (Fernee et al., 2019), while on horticultural therapy programmes, coping strategies might focus on dealing with how to manage plants or vegetables that were failing to grow or dying (Palsdottir et al., 2014). These psychological skills were described as being particularly important in facilitating self-efficacy post-programme, enabling service users to integrate new skills into their lives (Bryson et al., 2013, Howarth et al., 2018, Phoenix Futures, n.d.). As with the programme theory for Physical Activity, the availability of adequately trained facilitators was said to be necessary to enable the mechanism of learning new skills (Bloomfield, 2017, Evans, 2013, Granerud and Eriksson, 2014, Kogstad et al., 2014, O'Brien et al., 2010, SurrIDGE et al., 2004).

Programme Theory Five: Having a Purpose

The mechanisms of feeling responsible and purposeful were seen across all programme types, however, these mechanisms were facilitated by different environments. For example, in care farm programmes, participants felt responsible for animals and farm activities (Elings and Hassink, 2008, Schreuder et al., 2014), and in horticultural therapy programmes, participants felt responsible for plants and other produce (Hassink et al., 2010). Managers of wilderness therapy and adventure therapy programmes, as well as facilitators in SurrIDGE et al.'s study (2004), also discussed how service users felt responsible for carrying resources, even when this was challenging. This feeling of purpose appeared to be particularly applicable to participants who had psychiatric or addiction histories, where the work and community-like environment of greenspace programmes enabled them to fill their day and have a routine (Elings and Hassink 2008, Hassink et al., 2010). Similarly, service users in Iancu et al.'s study (2014) reported feeling that structure and routine was something they were lacking before the programme and was helpful for their mental health. Although there is some evidence that people on greenspace programmes for leisure purposes can benefit from passive immersion in nature (Lovell et al., 2015), this might not be enough to achieve changes in mental wellbeing in those with high levels of stress/mental ill health. In a previous review by Hunter et al. (2015), greenspace interventions were shown to be most effective

when there were structured programmes in place that provided routine, rather than simply changing the physical environment.

The availability of trained facilitators was shown to be an important context for both leading and enabling participants to learn new skills (Bloomfield, 2017, Evans, 2013, Granerud and Eriksson, 2014, Kogstad et al., 2014, O'Brien et al., 2010, SurrIDGE et al., 2004). Both this programme theory, and the Self-Efficacy programme theory above, provide some explanation of why greenspace programmes may fail; when there is an absence of confident, trained facilitators, or an absence of programme components which allow participants to learn new skills, interventions will not be effective. The context of time spent on a programme was shown to be correlated with a sense of purpose and subsequent changes in self-esteem since change was said to occur slowly; the longer service users were responsible for something, the higher their self-esteem (Gabrielsen et al., 2018, Harris, 2017, Kogstad et al., 2014, Pálsdóttir et al., 2014, Schreuder et al., 2014, Sidenius et al., 2017). Many studies mentioned how this increased self-esteem and time on the programme led to participants thinking more about their future and feeling more positive about this (Cole and Christie, 2016, Combs et al., 2016, Gabrielsen et al., 2018, Harris, 2017, Howarth et al., 2018, Lehmann et al., 2018, O'Brien, 2018, Pálsdóttir et al., 2014, Schreuder et al., 2014, Sidenius et al., 2017, Woodford et al., 2017).

Programme Theory Six: Relationships with Facilitators

Five studies highlighted the influence of previous relationships with healthcare professionals as a contextual factor in how well participants initially engaged with programmes (Cole and Christie, 2016, Fernee et al., 2019, Granerud and Eriksson, 2014, Stevens, 2018, Woodford et al., 2017). Existing attitudes of programme facilitators were also a crucial context, and facilitators who appeared non-judgemental, open, and genuine, enabled relationships to be built quickly with participants. Further, participants in one study discussed the importance of being treated without prejudice and as a person, rather than a diagnosis (Hassink et al. 2010). If a participant had previous negative experiences, there was some evidence that this might be mitigated by ensuring that adequate information about the programme is provided prior to the start, and that each participant is met by a confident and friendly facilitator at the start to help engage participants (O'Brien et al. 2010). Another contextual factor was effective programmes having a culture of 'doing with' not 'doing for' people. Involvement of the facilitators in the same tasks as the service users led to the mechanisms of decreased perceived power inequality and increased empowerment. For example, some study participants described

how facilitators would ask them what they wanted to do, eat, and which way to go, which allowed participants to feel empowered, decreased power imbalances, and promoted inclusion (McIver et al., 2018). Other identified mechanisms in this programme theory, related to the same contexts, were rapport, trust, and confidence in facilitators. These mechanisms were described as vital within this programme theory because programme participants had often experienced difficult interpersonal relationships and problems developing trust (Evans, 2013, Fieldhouse, 2003, Iancu et al., 2014, McIver et al., 2018). Overall, the stronger the relationship between client and facilitator, and the more that the participant felt empowered and included, the more likely participants were to fully engage with programmes and engage with available aftercare support (Cole and Christie, 2016, Combs et al., 2016, Redcliff Ascent, 2019, Schreuder et al., 2014, Stevens, 2018).

Programme Theory Seven: Shared Experiences

The mechanisms identified in this programme theory that led to the outcomes of improved social skills, improved interpersonal relationships, and increased self-esteem were: feeling safe within the group (Kogstad et al., 2014, Sidenius et al., 2017); lack of stigma and judgement by others (Combs et al., 2016, McIver et al., 2018, Stevens, 2018); increased rapport (Evans 2013, Fernee et al., 2019, Warber et al., 2015); and increased trust between people on the programme, with participants feeling more comfortable to express themselves (Adevi and Mårtensson, 2013). Almost all the included studies discussed that greenspace programmes are typically undertaken in environmental contexts that promote shared experiences and subsequent social cohesion. Many studies reported that the 'real life' environment of the greenspace programme, in comparison to traditional clinical environments, was an important context which enabled the above mechanisms, and one of the most valued aspect mentioned by the majority of participants (Adevi and Mårtensson, 2013, Barley et al., 2012, Bryson et al., 2013, Cole and Christie, 2016, Combs et al., 2016, Cook, 2008, Dolgin, 2014, Fieldhouse, 2003, Harris, 2017, Hassink et al., 2010, Howes et al., 2018, Iancu et al., 2014, Leck et al., 2015, O'Brien, 2018, Rappe et al., 2008, SurrIDGE et al., 2004, Wilson et al., 2010, Woodford et al., 2017).

The engagement of others on the programme was identified as a contextual factor to be aware of, with the success and development of social interactions being a two-way process (Fernee et al., 2019). If a participant does not believe that other participants are engaging, it was shown that they are less likely to do as they may feel less safe and/or comfortable during team exercises. However, age was identified as a potentially related contextual factor. For example, adolescents may be more susceptible to peer influence

compared to adults, and while perceived social support can have a buffering effect on stress in adolescents, low satisfaction with social support in adolescents can increase anxiety (Dolgin, 2014). Therefore, perceived engagement and social support in programmes may be more important contextual factors in adolescent programmes, compared to those supporting adults. Time spent on the programme was also an important contextual factor for social cohesion to occur since social changes, in particular, can take longer to occur compared to psychological, physical, physiological, or cognitive changes (Ferneer et al., 2019).

Refined if-then-because statements (specific to this review)

As was shown for the IPTs previously in Table 1, to further clarify how CMOs fit together in a causal relationship, ‘if-then-because’ statements are shown for each refined programme theory in Table 4 below.

Table 4: Refined programme theories and corresponding CMOs shown as ‘if-then-because statements’

Theme	Programme Theory Name	if-then-because statement
Nature	Escape and Getting Away	If there is easy access to a quality greenspace environment, then there will be a reduction in stress and mental fatigue, because indirect attention has been used, and the participant feels relaxed and away from their day-to-day stressors.
Nature	Space to Reflect	If the client accesses greenspace which provides physical space and a backdrop for therapeutic conversations, then as long as there is adequate time spent on the programme, this results in increased desire to change, because of increased opportunity for reflection.
Individual Self	Physical Activity	If there are a variety of activities available, and if participants are prepared for challenges, for example with the weather, and programmes have the right resources such as staff

		and equipment, then this will lead to increased engagement and increased physical and mental health, because clients will enjoy the activities they do.
Individual Self	Self-Efficacy	If there are available, trained facilitators to lead programmes, then clients will learn new skills and be more confident in applying skills such as new coping strategies to their lives outside of the programme, because of increased feelings of empowerment and self-efficacy relating to their abilities.
Individual Self	Having a Purpose	If a programme provides structure and/or routine, and if there are available, trained facilitators to lead programmes for an adequate length of time, then clients' self-esteem increased and they were more positive about the future, because of increased responsibility and a sense of purpose.
Social Self	Relationships with Facilitators	If facilitators appear non-judgemental and genuine and meet the clients who have previous negative experiences of healthcare professionals at the start of programmes, and if the programmes have a 'doing with' and not 'doing for' culture, then clients are more like to buy into programmes and engage with aftercare support, because they feel empowered, included, and there is increased rapport, trust, and confidence in facilitators.
Social Self	Shared Experiences	If the greenspace programme provides a real-life environment in comparison to typical treatment environments for an adequate amount of time, and if

		<p>participants saw others engaging in the programme, then participants saw improvements in social skills, improved interpersonal relationships, and increased self-esteem, because they felt safe within the group, a lack of stigma and judgement by others, and increased rapport and trust between peers.</p>
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What does not work

There are numerous contextual factors which will likely influence the success of greenspace programmes, and it is not feasible to attempt to identify the many individual factors which might make a programme work, or not. However, there are certain factors which seem particularly influential in programme success. For example, with the increase in awareness of the benefits of being outside for mental health, more greenspace programmes are embedding mental health outcomes into their aims. This increases the risk that some programmes could be claiming all types of benefits, with little evidence to support claims. Without clarity of what approaches may or may not consist of, it is difficult to distinguish practice that is ethical and effective, from programmes that over-claim benefit and put users at risk of potential harm. This potentially makes it difficult to know which programmes to enrol on, or which programmes care providers should recommend. Richards and colleagues (2019) suggested an Outdoor Mental Health Intervention Model outlining the importance of the combination of competence, professional responsibility, and leadership in each intervention. The model maintains that, for best practice, a multidisciplinary team approach should be adopted, and professionals should work collaboratively in the delivery of an integrated approach. The authors state that programme providers should represent themselves, and their practice, using terms that can be justified and evidenced by professional training and qualifications, rather than using terms such as ‘therapy’ too loosely, for example in terms such as ‘wilderness therapy’ or ‘horticultural therapy’. Only then can programmes enhance opportunities for improved mental health and wellbeing and offer a best-fit intervention for individual clients.

Age has also been identified as a contextual factor, but it remains unclear if age affects efficacy of programme types. For example, programmes based in the wilderness are

often undertaken by adolescents or young adults. What seems less clear, is whether wilderness-based programmes are successful for older adults. During a conversation with a greenspace project staff member, the fear of injury or fear of falling was highlighted as the top barrier to engagement. Further, although there are programmes designed specifically for older adults, such as horticultural programmes, other specific contextual barriers can limit their effectiveness. For example, the Greenspace and Health Strategic Framework for Edinburgh and Lothians (Edinburgh & Lothians Health Foundation, 2019) discussed how staffing numbers on hospital wards means that patients cannot leave the hospital to access greenspaces with the necessary support. Without staff available to support people who need assistance to and from greenspace programmes, programmes cannot be successful, even if they are designed specifically for a client group. While this report is specific to one geographical area, it is feasible to see how systemic understaffing will affect any greenspace programme reliant on support staff.

The synthesis also identified that some situations, such as time spent alone in a wilderness environment, might not be appropriate for people with pre-existing diagnoses like psychosis, although this may be mitigated by having trained staff to support participants (Bryson et al., 2013). However, there are other circumstances where certain greenspace programmes might not meet the needs of clients due to personal circumstances. For example, residential greenspace programmes may be unsuitable for those on daily pick-up prescriptions, and Livingston et al. (2011) discussed how people on methadone prescriptions might be excluded from certain programmes because early start times mean they cannot pick up their medication beforehand. Another example raised during a meeting with a member of staff was limitations relating to electronic tagging. Greenspace programmes have been successful in supporting people who have been involved in offending (Venture Trust, 2021), but if a person has an electronic tag then they may be limited to where they can go, so a programme must account for this.

Individual level contextual factors, such as a person's belief about the programme, has also been identified as a driving contextual factor in initial enrolment. While some people with previous treatment experience may welcome a new approach, particularly if they feel that current treatment has not worked, others may be cynical about its reliability. For example, Husk et al. (2020) reported barriers such as concerns about adequate facilities, and adequate staff experience/training. They also reported concern about the greenspace environment and whether it was an appropriate environment for people with complex needs. Davis-Berman and Berman (2012) stated that participants on greenspace programmes must want to be part of the programme and have some level

of self-motivation. Conversely, if a person does not want to enrol on a greenspace programme because they do not believe that it will be beneficial for them, it is unclear how this can be changed, and even if it should. For example, this review has identified that one of the key mechanisms by which greenspace programmes are effective is through an increase in feelings of empowerment. In contrast, coercion and involuntary treatment has shown to threaten effectiveness of treatment (de Valk et al., 2019). Harper et al. (2019) raise concerns about how involuntary treatment may impact the effectiveness of youth wilderness programmes, where parents have enrolled their children, or in hospitals where primary care staff may have enrolled patients on their behalf.

Relatedly, Husk et al. (2020) highlight how the power dynamic between care provider and patients can also be influential, with some patients viewing social prescriptions, of which greenspace programmes are a type, as an order rather than a choice. If empowerment and agency are mechanisms that lead to successful outcomes, then taking these away means that these programmes may not be effective. However, as identified in Husk et al. (2020), this does not equate to leaving all responsibility for enrolment to the person potentially accessing the programme. Instead, it highlights the importance of dialogue between care provider and participant, as well as the necessity of the provider knowing what is available for recommendation. One of the concerns in this regard, however, is that short term funding makes it difficult for providers to recommend greenspace programmes, due to lack of continuity of services (Edinburgh & Lothians Health Foundation, 2019).

Aside from issues which impact initial engagement with greenspace programmes, it is also important to recognise that not everyone will benefit from or enjoy programmes when on them. This review has discussed the necessity of a variety of activities to initially engage participants (Wilson et al., 2010), but O'Brien et al. (2010) also proposed that activities that are repetitive can cause participants to lose interest and quit. Even participants who enjoy programmes, but see no change in their condition, can become demotivated and quit (Husk et al. 2020). In Husk et al.'s study (2020), participants explicitly said that the main reason for drop-out was lack of change in health status which led them to question if the interventions were effective and worthwhile. Similarly, those with higher, or unrealistic, expectations of the intervention were said to be more likely to drop out (Husk et al., 2020). This again shows the importance of trained facilitators guiding participants and their expectations, as well as providing participants with enough time on the programme for benefits to be gained.

Discussion

This realist synthesis contributes to international empirical research as it is a novel approach to both understanding and evaluating how greenspace programmes can be used to improve mental health. Through an iterative process, data were collected and analysed which allowed continuous development of programme theories as new data emerged. The synthesis of empirical findings has allowed a greater theoretical understanding of the intervention process itself, rather than reporting whether an intervention was effective or not. The theoretical findings are therefore transferable across a range of interventions and are more useful for the logical, evidence-based development of other effective interventions. To identify the CMOc for each programme theory, the IPTs were first tested against the literature and then refined to explain how, for whom, and in what circumstances, do greenspace programmes for mental health work, or do not work.

Russell and Farnum (2004) have previously suggested a programme theory for wilderness therapy that incorporated three interrelated factors of Wilderness, Physical Self, and Social Self. This programme theory was noted but did not prematurely influence this review since it was a synthesis of greenspace programmes in general, and not of a specific type. In-depth reviews by Lovell et al. (2015) and Husk et al. (2016) have also produced detailed conceptual models of how engagement with nature can impact physical and mental health. These models were helpful for building a deeper understanding of mechanisms and outcomes, as well as touching on some of the contextual factors which may influence programme development. This review expands on some of the work in these models through further focus on context, additional mechanisms, and the focus on 'for whom' and 'in what circumstance'.

Overall, Nature, Individual Self, and Social Self aptly described the three overarching themes under which the refined programme theories fell. The headings of the seven programme theories, identified through a thorough engagement with 49 included studies and discussions with greenspace service providers, are shown in Figure 3 under the three identified themes of Nature, Individual Self, and Social Self. The in-depth synthesis of each of the programme theories, as covered in the results section above, allowed an understanding of the causal relationships which make up each programme theory. While it is indeed possible for programme theories to exist independently from each other, it is feasible to deduce that greenspace programmes work best in the circumstances where CMOcs are activated under each programme theory simultaneously. As Pawson (2006b) states, transformation may be achieved by the fact that CMOcs happen together in a

process over time. However, through data synthesis, we found that 27 of the included studies explicitly reported that the interaction of nature, individual changes, and social changes, was related to best outcomes. Therefore, the results suggest that programmes should include adequate opportunities for development in both individual and social skills, in order to mitigate any negative effects of trade-offs.

Based on the seven programme theories, Figure 4 visually depicts the CMOc framework developed through the synthesis. The full conceptual model can be seen in Appendix 4. The key differences between this conceptual framework and previously mentioned models are that this framework could be transferable to all types of greenspace programmes, and not just one type of programme. Secondly, CMOcs have been synthesised within the seven programme theories to provide a better causal understanding of the pathways to mental health improvement.

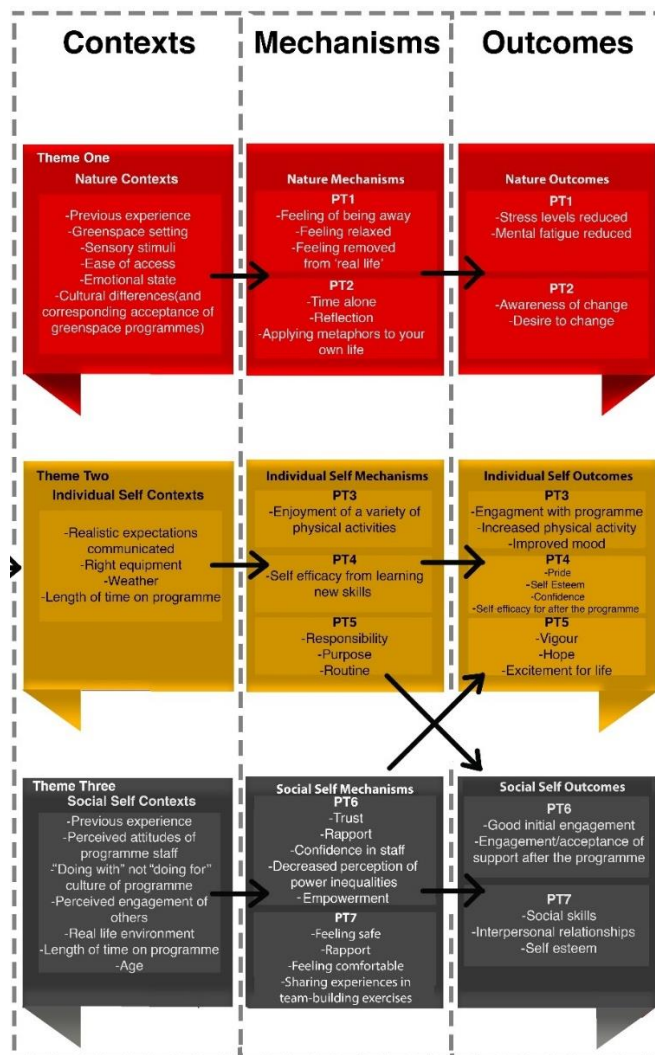


Figure 4: A novel conceptual model developed from synthesis findings to show an overarching CMOc framework for greenspace programmes for mental health

Strengths and limitations of this phase

To my knowledge, this is the first review to use realist methodology to examine greenspace programmes for mental health where studies were not excluded based on intervention type. This allowed different types of greenspace programmes to be analysed with a realist lens and similar CMOcs to be identified across programmes. The findings highlight that greenspace programmes appear to be successful as a result of three interacting themes: Nature; Individual Self; and Social Self; regardless of programme type. Another strength is that studies covered nine countries, potentially allowing the findings of this review to be internationally relevant. However, it must be acknowledged that included studies were from high-income countries only. If the framework is indeed transferable internationally, further work needs to be undertaken to be explicit about whether this does in fact include all countries, or only high-income countries.

Other limitations should also be recognised when using realist methodology, particularly relating to reviews being based on guiding principles rather than standardised rules (Pawson et al., 2005). Although transparency was prioritised at all points of the review, for example by submitting a protocol to PROSPERO, adhering to robust quality standards (Wong et al., 2013), and through thorough documentation and in-depth discussion of key decisions, the realist review process is inherently interpretive and subjective, especially in regard to relevance and rigour assessment. Secondly, realist approaches can synthesise data from quantitative and qualitative methods (Wong et al., 2016, Pawson and Tilley, 1997), and analysis is guided by data that are best suited to answer research questions. In the papers examined, the qualitative studies were regarded as higher relevance for informing programme theories compared to quantitative data, due to CMO information in qualitative studies being more accessible. Future research should examine how best to integrate more quantitative data into programme theories, for example with physiological mechanisms and outcomes such as salivary cortisol changes, body mass, and heart rate. Finally, individual level contextual factors such as age, gender, ethnicity, and individual circumstances and opinions were identified as important in some studies, but evidence was varied meaning it was unclear how these contexts fitted into CMOcs. Future research should explore the roles of these contexts, and their impact, further.

Chapter conclusion

This realist synthesis has examined the contexts and mechanisms in greenspace programmes which can lead to outcomes in mental health to show what works, for whom,

and in what circumstances. These configurations have been developed into an original overriding theory involving seven programme theories under three themes of Nature, Individual Self, and Social Self. The interaction of these three factors represents a new conceptual framework for greenspace programmes for mental health. The findings of this review are not only theoretically novel, but have practical relevance for those designing such interventions, providing recommendations on how to optimise, tailor, and implement, existing interventions. These could be particularly relevant for academic researchers, health professionals, and mental health multi-disciplinary teams, and for those working in the third sector, developing and delivering such interventions. As realist methodology is inherently iterative, this framework and programmes theories will now act as the IPTs for Phase Two and Three of this project. The programme theory components will firstly be tested using a quantitative, exploratory survey study (Chapter Five). This will allow initial testing of the framework using primary data to identify if the framework is transferable to practice, and whether it is transferable to programmes that support people with PSU. Upon confirmation that the framework is indeed transferable, the programme theories will then be fully explored and tested using qualitative interviews (Chapters Six to Eight). This will allow refinement with primary data from people whose work is directly linked to programmes that support people with PSU and will lead to final consolidation of the programmes theories for greenspace programmes that support this client group.

Chapter 5: Phase Two - A quantitative, exploratory survey study of greenspace programmes for mental health and problem substance use

Introduction to chapter

This chapter presents the second phase of the project, a quantitative, exploratory survey study which tested the proposed realist framework in Phase One using primary data. Developing a framework using realist methodology is an iterative process and programme theories are changeable depending on the intervention. The purpose of Phase Two was to establish whether the developed programme theories that informed the framework took into account the nuances across existing greenspace programmes, including whether the framework was applicable to all settings, from urban-based to rural-based programmes. Further, this phase explored how greenspace programmes could support people with problem substance use (PSU), as well as poor mental health. This chapter firstly outlines how this phase fits into the wider project before presenting the methods, findings, and discussion relative to the survey. The chapter will end with strengths and limitations of this phase, a number of which are necessary to consider in order to understand the importance of further testing and refinement of programme theories using qualitative methods in Phase Three. The main body of this chapter was published in *Health & Place* in October 2021 (Masterton et al., 2021). As with the previous chapter, due to word count limits, this chapter is a slightly shortened version of the full paper, but the published paper as it is found in *Health & Place* can be seen in Appendix 2.

Situating Phase Two within the wider project

Uncovering the mechanisms through which engagement with nature impacts physical and mental health has recently received considerable attention (Fullam et al., 2021, Garside et al., 2020, Hardie et al., 2021), but continued exploration of how different contexts are likely to facilitate different mechanisms and outcomes is important, as what 'works' in one setting might not 'work' in a different one. The purpose of Phase Two was to test the Phase One framework (reported in Chapter Four) for the first time with primary data to establish whether the developed programme theories were indeed transferable across a range of programme settings. Further, this phase explored how greenspace programmes may potentially support people with PSU, as well as poor mental health. As

discussed in Chapter One, both mental health and PSU were examined together, given that previous systematic reviews and meta-analyses have reported a strong association between the two (Hunt et al., 2016, Kingston et al., 2017, Lai et al., 2015). Therefore, if greenspace programmes are successful in improving mental health, then this improvement could also affect substance use. Previous research within the field of substance use has shown that mechanisms such as increasing feelings of empowerment and improving relationships are core components of successful substance use interventions (Mincin, 2018, Pettersen et al., 2019). If these mechanisms are also evident within greenspace programmes, this suggests that these types of programmes could be effective in supporting people with PSU. However, there is currently very little existing evidence to inform how greenspace programmes that support people with PSU might be developed. By testing the proposed framework using data from greenspace programmes that support for this client group, the extent to which the framework could work for PSU support can be explored. If the framework is indeed applicable to programmes that support people with PSU, as well as people with poor mental health, building on existing knowledge and assessing the potential for transferable programme theories may be more timely and pragmatic than attempting to develop an entirely new framework. In particular, testing the framework for use with various client groups will provide valuable detail about ‘for whom’ a programme works and why, key questions in realist research.

To test the framework, I chose to focus on existing greenspace programmes in Scotland. The original framework was informed by data from nine countries to make it internationally relevant but testing of the programme theories in a specific geographical context allowed exploration of this. If the framework is internationally relevant, it should be applicable to greenspace programmes in any chosen country. The range of Scotland’s greenspace is highlighted by the Scottish Government’s Planning Advice Note for Planning and Open Space (2008), and further, with the role of greenspace growing in health improvement discourse, the number of greenspace programmes for mental wellbeing is also increasing (Edinburgh & Lothians Health Foundation, 2019). Due to the variety of greenspace settings and growing number of programmes, gathering data from Scotland allowed testing of the framework using a range of programmes such as urban garden programmes, horticultural programmes, conservation programmes, and wilderness programmes, among others. This was particularly important to test the claim that the framework is applicable to greenspace programmes regardless of activity and setting.

Aim of Phase Two

The first aim of this exploratory study phase was to test the accuracy of the proposed framework by collecting primary data from staff on greenspace programmes in Scotland. A claim in the realist synthesis was that the framework should be transferable to all greenspace programmes. If the framework is indeed transferable to all programme types and settings, there should be overall agreement for all programme theories from all staff, regardless of programme setting. The second aim was to test the potential applicability of the framework to greenspace programmes for people with PSU.

Research questions for Phase Two

1. What greenspace programmes exist in Scotland, what client groups do the programmes support, and where?
2. Does the existing framework, developed in the realist synthesis, adequately represent the underlying context-mechanism-outcome configurations (CMOCs) of greenspace programmes for mental health, when tested with data from existing greenspace programmes?
3. Is there overall agreement with the framework from staff on across different settings of greenspace programmes, from urban greenspace programmes to rural-based programmes?
4. Does the framework have the potential to be applicable to greenspace programmes for people with PSU, as well as for poor mental health?

Methods

Survey rationale and design

Realist approaches use multiple methods to gain insight into programme theory, therefore a survey approach was considered to be an appropriate method for an exploratory study. The rationale of using a survey was that it enabled the collection of data relatively quickly from a mix of people based in different geographical areas which was important in order to test the applicability of the framework across diverse contexts in Scotland. Using a survey also allowed statistical testing and comparison between different groups to explore the relevance of the framework for use on greenspace programmes that support people with PSU. The survey was designed using the JISC online survey tool (<https://www.onlinesurveys.ac.uk/>) and ran between 28th January 2020 and 27th May 2020. As the COVID-19 pandemic began during the data collection phase, the use of a survey allowed continuation of data collection from a mix of people despite travel restrictions. The survey had 67 items in total which were split into three main

sections: organisation information, greenspace programme information, and programme components. Additional information about survey development can be seen in the published paper in Appendix 2 (pp.274-276), and the full survey document can be seen in Appendix 9.

Section A: Organisation information

In this section, respondents were asked the name of organisation, whether the organisation was public, private, or third sector, and which town or city the organisation was based in.

Section B1: Greenspace programme information

To gather data about programme characteristics six questions were asked: the name of the programme, whether the programme supported mental wellbeing, whether the programme supported people with PSU (both drugs and/or alcohol), what age groups could access the programme, and were there exclusion criteria for clients attending programmes.

Section B2: Greenspace programme information

To understand what 'greenspace' meant in relation to each programme, and how the greenspace used by each programme differed, four questions were asked. These were: the greenspace setting (e.g. wilderness, forest, public park, etc.), ownership (e.g. public or private), distance from nearest town or city in kilometres, and size of the greenspace each programme used in acres.

Section C: Programme components

The main body of the survey included 54 statements based on the seven programme theories developed in the realist review (Phase One). The survey was designed so that each statement tested an individual context, mechanism, or outcome discussed in the review. Seven statements representing CMOs were given relative to each programme theory, and five additional statements were included at the end which represented unconfigured contextual factors identified in the realist review as important, but not yet linked to mechanisms and outcomes. Inclusion of these unconfigured contextual factors in the survey was deemed important, since any identification of diverse opinion across respondents would indicate that these factors should be explored further in future research to identify their impact on programmes. To further aid understanding of survey design, a table was created to explicitly show the CMOs within each identified programme theory and map how each of these components, as well as the five

unconfigured contexts, were tested with the corresponding survey statement (see Appendix 2, pp. 274-276). It is important to note at this point that, although CMOs typically appear as a “context + mechanism = outcome” configuration heuristic in realist research (Pawson and Tilley, 1997), and appeared as such in the realist review, they were separated into individual components in this study as this allowed testing of each of them individually and identification of where exactly agreement or disagreement lay. If the configuration was kept as a whole, insight would only be gained into the full configuration, rather than explore each part.

Respondents indicated on a 5-point Likert Scale (where 1 = strongly disagree and 5 = strongly agree) the extent to which they agreed or disagreed with each statement. No negatively worded items were used since previous research has shown little evidence of advantages of alternating positive and negative statements (Sauro and Lewis, 2011). Indeed, alternating positive and negative items can also be misinterpreted, confusing, and lead to a higher number of mistakes (Sonderen et al., 2013). To address this, statements were created to be as neutral and non-leading as possible, and all statements were discussed and agreed by the full supervisory team.

To test the survey before distribution, a pilot survey was sent to five lay people outside the supervisory team to check for any errors, and to ensure that survey items were clear and easy to understand. Minor adjustments such as wording and punctuation were made in response to suggested edits. No questions or statements were added or removed.

Participant inclusion/exclusion criteria

Survey participants were required to work on programmes which utilised outdoor greenspace as a core part of their programme. Participants working on outdoor programmes not using greenspace did not meet the inclusion criteria. Given the aim of comparing responses from those working on programmes that also support people with PSU and those that did not, participants were not required to work on programmes that supported this client group. However, all participants had to work on programmes which had an aim of improving client mental wellbeing. Additionally, all participants had to be working on a programme based in Scotland, were service managers, programme facilitators, or in another staff or volunteer role, and were over 18 years of age. Participants were required to complete an online consent form and confirm that they met the inclusion criteria prior to beginning the survey.

Recruitment and setting

A total of 133 survey participants were recruited online. Initially the survey was distributed via email to relevant existing contacts. Extensive mapping was then undertaken to identify as many greenspace organisations as possible across Scotland. This work involved searching existing databases such as the Trellis map of projects (Trellis, 2020), the Paths for All map of health walks (Paths for All, 2021), and the mapping undertaken by the four GHPs (NatureScot, 2020). Trellis also provided me with contact details for organisations not in the public domain. Organisations were also identified via websites, social media (Twitter, Facebook, LinkedIn), and through word of mouth. This mapping allowed collation of a range of greenspace organisations, including those that explicitly supported groups of people with PSU, as well as people with poor mental health. To ensure that as many relevant organisations were contacted as possible, including any not identified in our own mapping, email recipients were asked to forward the survey to other relevant organisations. The survey link was also shared via Twitter, inviting greenspace programme staff to take part if they met the inclusion criteria. It was not possible to identify how many people subsequently received the survey for this reason, and it is therefore not possible to calculate the exact survey response rate. However, the respondents represented a very high proportion of the organisations identified through mapping. Further, given that the search for relevant organisation was extensive, this suggests that the number of respondents from programmes identified outside of the initial mapping work who were sent the survey, but did not complete it, is likely to be low.

Data analysis

Descriptive statistics were reported to summarise the diversity of greenspace organisations, and stacked bar charts showed overall patterns of responses. This allowed identification of which statements had the largest variability in answers overall. I then explored whether variability in responses could be explained by programme setting. Programme setting was identified as urban, rural, or both using reported greenspace setting in the survey (urban/rural/both), distance from town in kilometres, and examining the OS MasterMap Greenspace Layer (Ordnance Survey, 2021). Urban areas were designated as those where urban cover was shown to be the dominant land type within a 1-km grid square (Boughey et al., 2011). To test for differences in responses between programme setting, Kruskal-Wallis ANOVAs were used (Siegel, 1956). These tests were appropriate since ordinal data are not suitable for parametric tests, and Likert data are ordinal, bounded, and discrete. The dependent variable in each test was the response to survey statements and the categorical variable was the greenspace programme

setting (rural/urban/both). When the Kruskal-Wallis test showed significant differences between programme settings (rural/urban/both), Mann-Whitney tests were run as post-hoc tests to determine which groups differed from each other. To control for the inflation of Type 1 error rate, a Bonferroni adjustment was used. The adjusted p-value was calculated by dividing the alpha value (0.05) by the number of comparisons made.

To examine whether there were differences in responses between programmes explicitly supporting those with PSU and those that did not, each respondent's median response scores were calculated across the seven statements within each programme theory. When creating an overall response score for each programme theory, it is good practice to check that all combined items are measuring the same underlying construct and that the score is therefore reliable (Laerd Statistics, 2018). Cronbach's Alpha tests allowed examination of the internal consistency of each programme theory. Kruskal-Wallis ANOVAs were then used to test for differences in survey responses between respondents from organisations that support people with PSU and those from organisations that do not. The dependent variable was median score for each programme theory, and the categorical variable was intended beneficiary group (problem alcohol use only, both drugs and alcohol, neither, not sure). 'Drugs only' was not included as a categorical variable as no organisations fell into this group. Again, Mann-Whitney tests were run as post-hoc tests to determine which groups were significantly different from each other and a Bonferroni adjustment was used to control for Type 1 errors.

Results

Characteristics of programmes: What exists, where, for whom, and with what focus?

The survey was completed by 64 people representing 55 separate organisations. Programme characteristics including programme location, whether the programme was in the public sector, private sector, or third sector, programme aims, and age range of clients, are reported in Table 5. Greenspace characteristics of programmes are also reported in Table 5 to highlight the diversity of greenspace used across programmes.

Table 5: Characteristics of programmes

Programme characteristics	Overall	
	%	N
Location (Region of Scotland)		
<i>Aberdeen & Aberdeenshire</i>	6.3	4
<i>Argyll & Inner Hebrides</i>	4.7	3
<i>Ayrshire & Arran</i>	12.5	8
<i>Dundee & Angus</i>	9.4	6
<i>Edinburgh & The Lothians</i>	18.8	12
<i>Greater Glasgow & Clyde Valley</i>	18.8	12
<i>Stirling, The Trossachs, & Forth Valley</i>	6.3	4
<i>Perthshire</i>	1.6	1
<i>The Highlands</i>	6.3	4
<i>Scottish Borders</i>	1.6	1
<i>Programme runs in different regions</i>	14.1	9
Public/Private/Third Sector		
<i>Public Sector</i>	15.6	10
<i>Private Sector</i>	3.1	2
<i>Third Sector</i>	75	48
<i>Not sure</i>	6.3	4
Programme age range		
<i>Children and young people (< 16)</i>	14.1	9
<i>Over 16</i>	59.4	38
<i>All age ranges</i>	25	16
<i>No answer</i>	1.6	1
Does the programme aim to improve mental wellbeing?		
<i>Yes</i>	98.4	63
<i>No</i>	0	0
<i>No answer</i>	1.6	1
Does the programme support people with PSU?		
<i>Yes - people with problem drug and alcohol use</i>	35.9	23
<i>Yes - people with problem alcohol use only</i>	7.8	5
<i>Yes - people with problem drug use only</i>	0	0
<i>No</i>	39.1	25
<i>Not sure</i>	17.2	11
Greenspace characteristics of programmes		
	Overall	
	%	N
Setting of greenspace programme		
<i>Rural forest/wood/open space</i>	23.4	15
<i>Urban woodland/hill/forest</i>	15.6	10
<i>Park/garden/allotment</i>	34.4	22
<i>Other</i>	3.1	2
<i>Different types of greenspace used</i>	23.4	15
Greenspace size		
<i><0.5 acres</i>	7.8	5
<i>1-1.5 acres</i>	14.1	9
<i>2-4 acres</i>	12.5	8
<i>5+ acres</i>	46.9	30
<i>All different sizes used</i>	3.1	2
<i>Not sure</i>	14.1	9
<i>No answer</i>	1.6	1
Distance (in km) from nearest urban area (town or city)		
<i>In an urban area</i>	46.88	30
<i>1-5km</i>	25.0	16
<i>6-10km</i>	6.25	4
	3.13	2

11-20km	6.25	4
21+ km	3.13	2
Different distances depending on which area used	7.81	5
Not sure	1.56	1
No answer		

Overall trends for the proposed framework

Figures 5–12 show responses from strongly agree to strongly disagree for each statement ($n=7$) within each programme theory. Survey statements, as seen on the Y-axis of each graph, are shown as descriptors and represent a context (C), mechanism (M), or outcome (O) from each programme theory. The percentage of respondents choosing each response from strongly agree to strongly disagree is shown on the X-axis of each graph.

Respondents showed a high level of agreement with the programme theory ‘Escape and Getting Away’ with 93.8% to 100% of respondents agreeing or strongly agreeing with the statements aside from the statement ‘less enclosed’ where 64% of respondents agreed or strongly agreed (Figure 5).

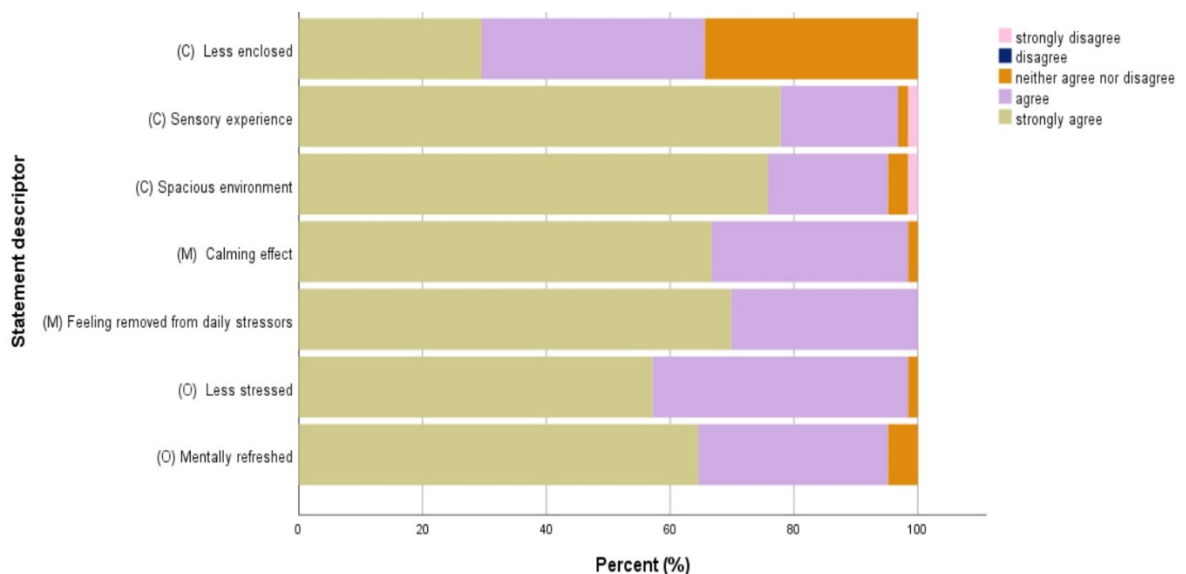


Figure 5: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory ‘Escape and Getting Away’

Respondents showed a high level of agreement with the programme theory ‘Space to Reflect’ with 75% to 87.5% of respondents agreeing or strongly agreeing with the statements aside from the statement ‘changing environment represents client changes’

where 65.6% agreed or strongly agreed, and the statement 'change in behaviour does not happen quickly' where only 15.6% agreed or strongly agreed (Figure 6).

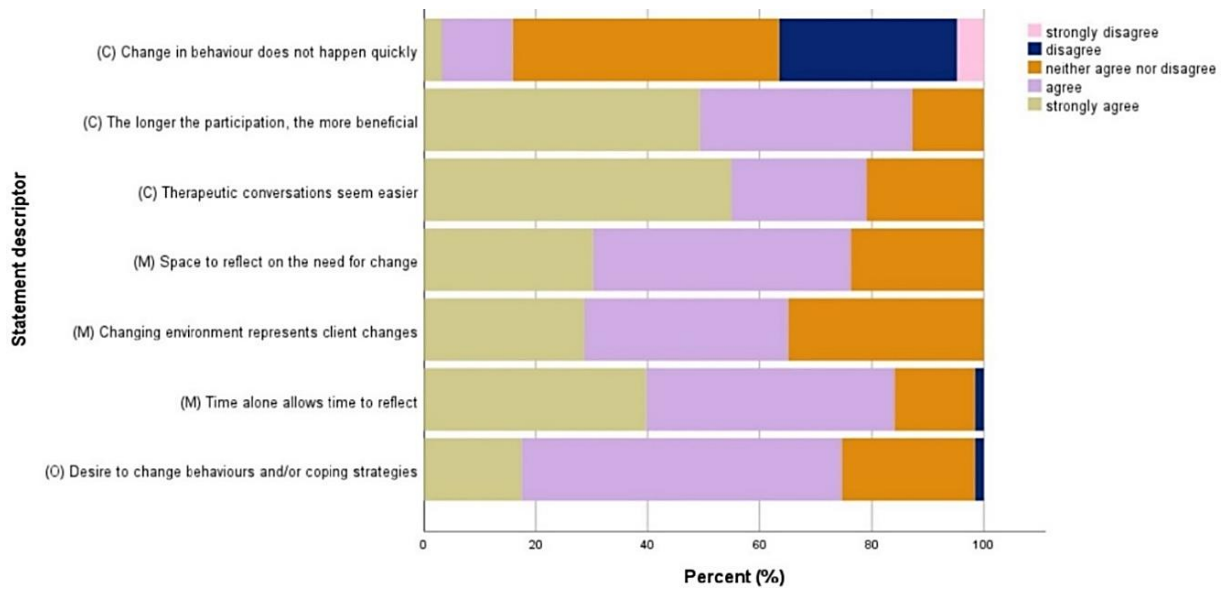


Figure 6: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Space to Reflect'

Respondents showed a very high level of agreement with the programme theory 'Physical Activity' with 79.7% to 93.8% of respondents agreeing or strongly agreeing with the statements. There was also a very high level of agreement for the programme theory 'Self-Efficacy' with 84.4% to 100% of respondents agreeing or strongly agreeing with the statements (Figures 7 and 8, respectively).

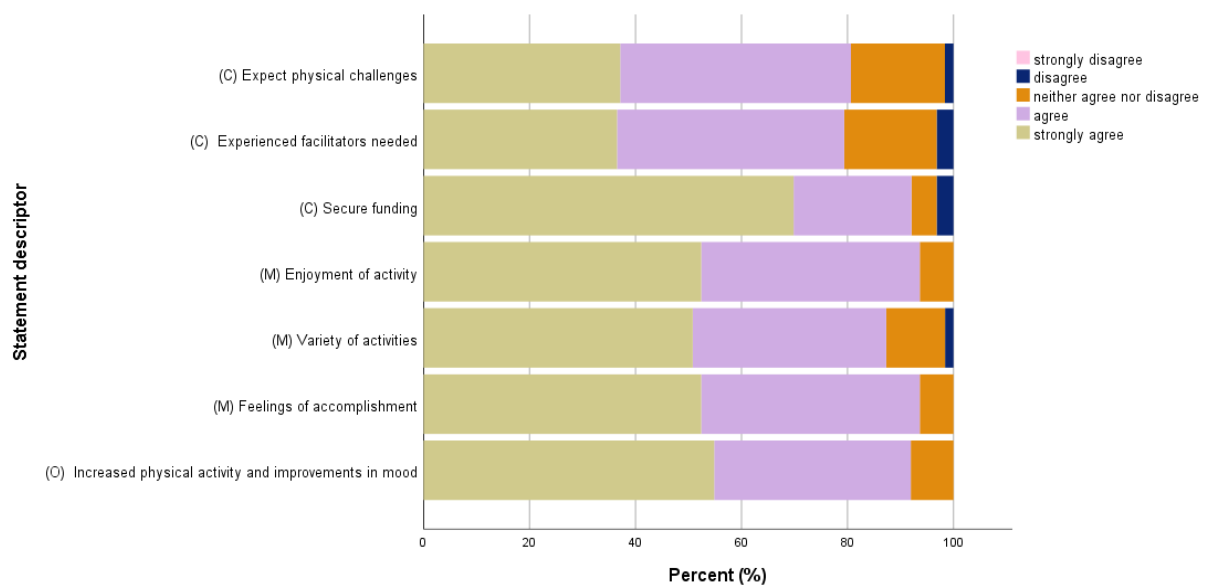


Figure 7: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Physical Activity'

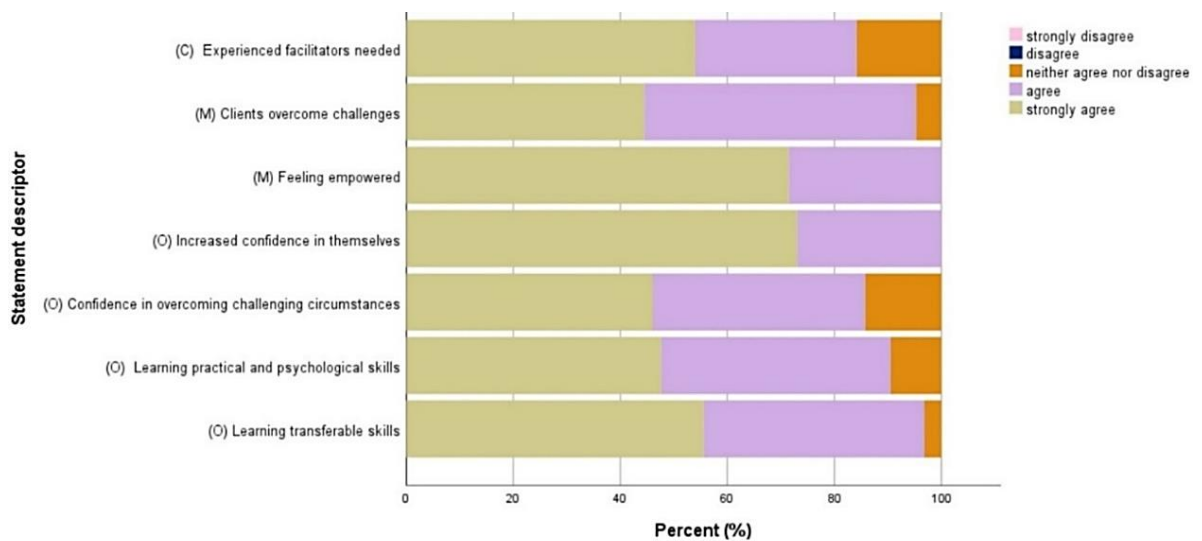


Figure 8: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Self-Efficacy'

Respondents showed a high level of agreement with the programme theory 'Having a Purpose' with 76.6% to 95.4% of respondents agreeing or strongly agreeing with the statements aside from the statement 'structured programmes are most effective' where 62.5% agreed or strongly agreed (Figure 9).

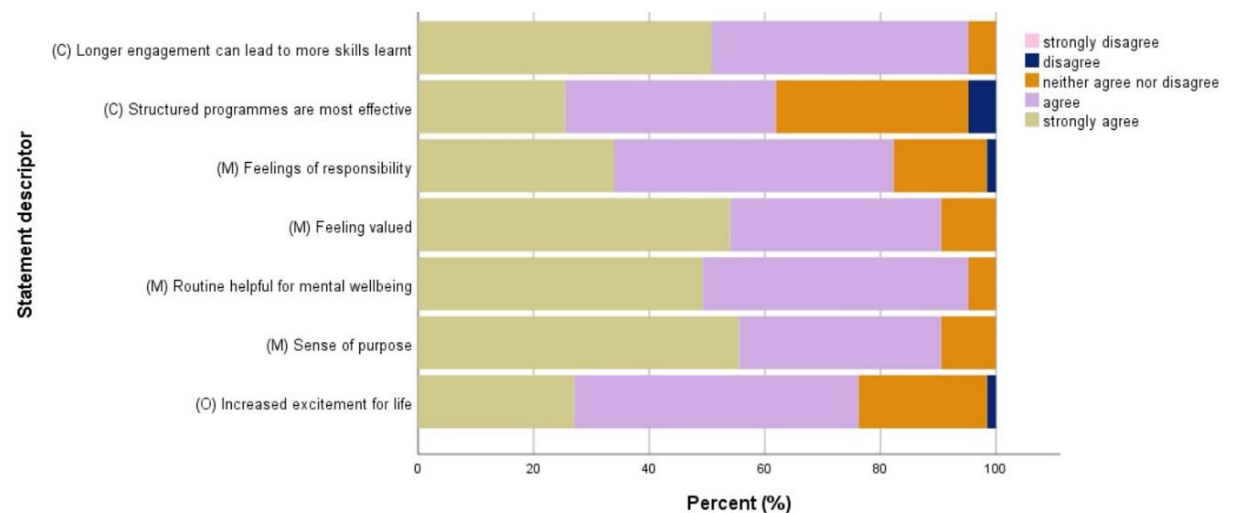


Figure 9: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Having a Purpose'

Respondents showed a high level of agreement for the programme theory 'Relationships with Facilitators' with 84.4% to 98.5% of respondents agreeing or strongly agreeing with statements aside from the statement 'previous experience with health professionals'

where 67.2% agreed or strongly agreed, and the statement 'difficulty in building relationships' where 54.7% agreed or strongly agreed (Figure 10).

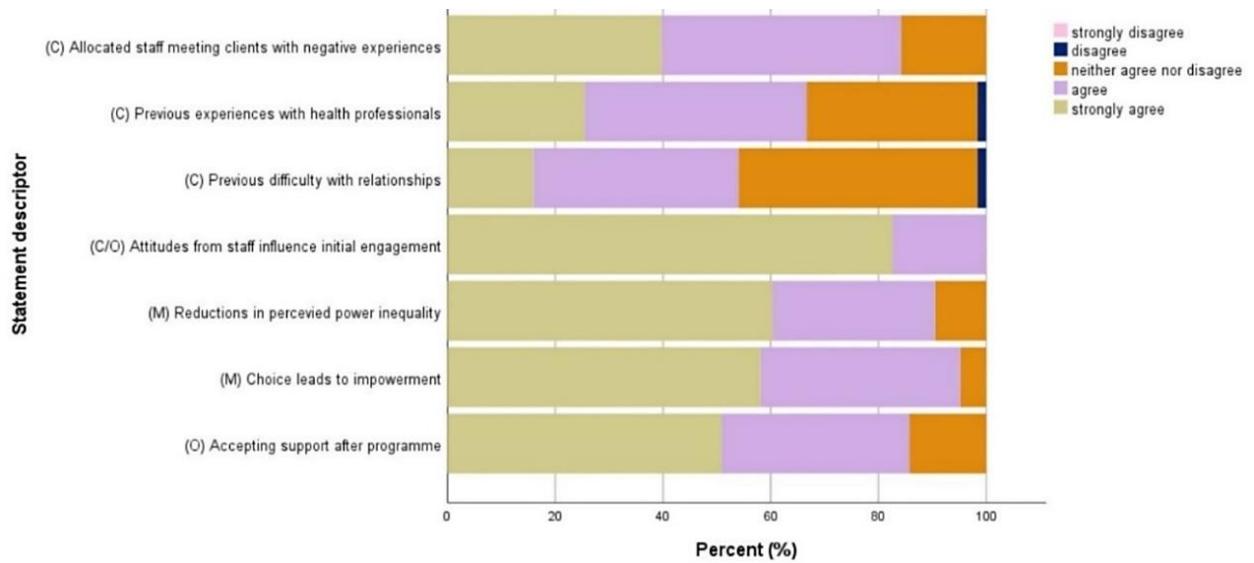


Figure 10: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Relationships with Facilitators'

Respondents showed a high level of agreement for the programme theory 'Shared Experiences' with 84.4% to 98.5% of respondents agreeing or strongly agreeing with statements aside from the statement 'less judgement with peers' where 64.1% agreed or strongly agreed, and the statement 'long time to build relationships' where only 41% agreed or strongly agreed (Figure 11).

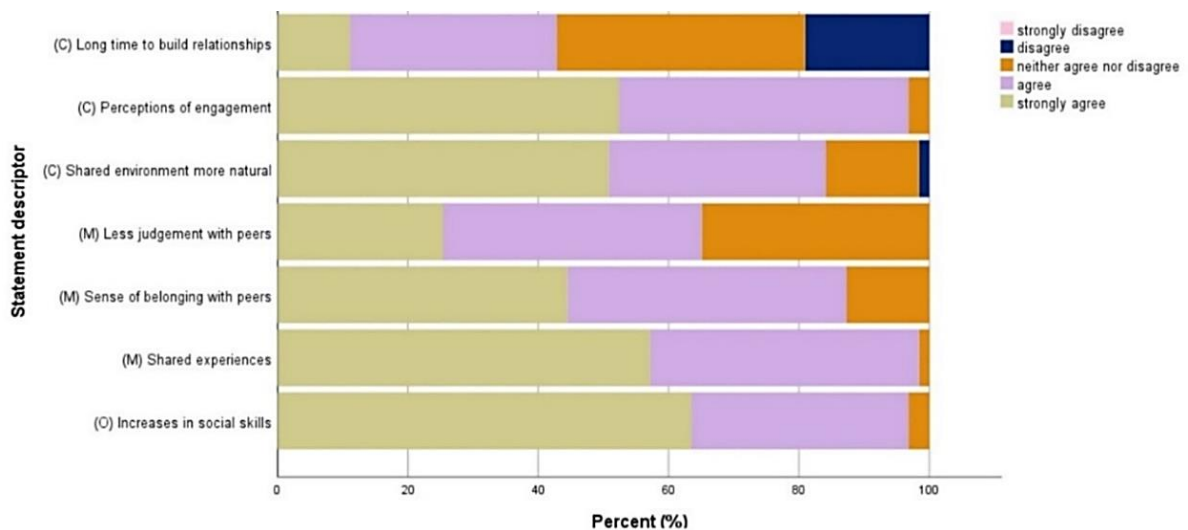


Figure 11: Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Shared Experiences'

Finally, respondents showed a lower level of agreement with statements provided for the extra unconfigured contextual statements included in the survey. Only the statements ‘small groups are preferred’ and ‘programmes are still seen as ‘alternative’ showed over 50% of respondents agreeing. Less than 26.6% of respondents agreed or strongly agreed with the other three statements. All statements showed a greater variability in responses compared to the seven programme theories (Figure 12).

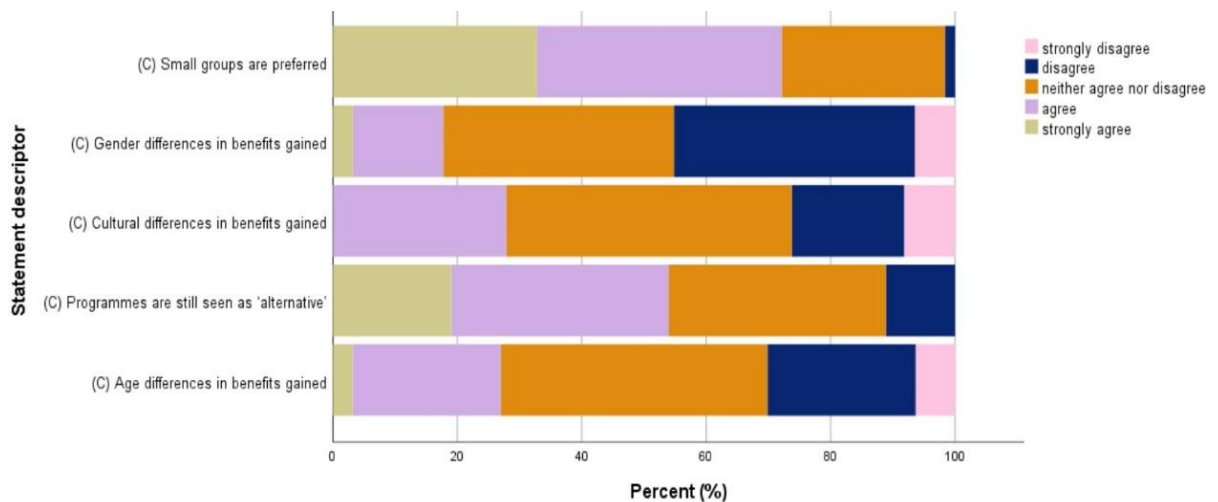


Figure 12: Percentage of responses from strongly agree to strongly disagree for each unconfigured contextual statement

Additional descriptive statistics showing the number of respondents who selected each response score for the survey statements (on a 5-point Likert scale where 1 = strongly disagree and 5 = strongly agree), the corresponding percentage for each statement, and the median score for each statement can be found in the supplementary data files of the published paper (Masterton et al., 2021).

Testing the transferability of the framework for different greenspace settings

A wider range of response scores for a statement demonstrated a higher variability in agreement. Despite the claim that the framework in the realist review is applicable for greenspace programmes using all types of greenspace, differences in responses could be due to the type of greenspace used on the greenspace programme. If over 30% of responses fell outside of ‘agree’ or ‘strongly agree’, responses were examined to see if they differed according to whether the programme was rural-based, urban-based, or if it was based in both rural and urban locations. Of the 54 statements, 11 met the criteria and were tested. The dependent variable in each test was the survey statement and the categorical variable was the greenspace type (rural/urban/use both).

The only statistically significant difference in responses between respondents from rural programmes, urban programmes, and programmes that use both settings was for the statement 'greenspace programmes are most effective in improving mental wellbeing when they are structured' ($\chi^2(2) = 7.29, p = 0.03$). Respondents from rural programmes agreed more with greenspace programmes being most effective when they are structured (Mean Rank = 33.95) compared to those from urban programmes (Mean Rank = 23.06) ($U = 210.0, p < 0.01$). This remained significant with a Bonferroni adjustment ($p = 0.017$). There were no differences in agreement about the effectiveness of structured programmes between respondents from urban programmes (Mean Rank = 21.39) and from programmes that use both urban and rural greenspace (Mean Rank = 21.85) ($U = 156.5, p = 0.91$), or between respondents from rural programmes (Mean Rank = 18.25) and from programmes that use both urban and rural greenspace (Mean Rank = 12.65) ($U = 71.5, p = 0.09$).

There were no other statistically significant differences in statement responses between respondents from urban programmes and from programmes that use both urban and rural greenspace. Table 6 shows the Kruskal-Wallis H test results for all tested statements.

Table 6: Kruskal-Wallis H test results showing differences in statement responses between respondent from urban programmes, rural programmes, and programmes that use both urban and rural greenspace

Statement Descriptor	χ^2	df	p-value
Less enclosed	0.43	2	0.81
Change in behaviour does not happen quickly	0.36	2	0.83
Changing environment represents client changes	2.51	2	0.28
Structured programmes are most effective	7.29	2	0.03*
Previous experiences with health professionals	1.44	2	0.49
Previous difficulty with relationships	0.003	2	0.998
Long time to build relationships	2.86	2	0.24
Less judgement with peers	2.30	2	0.32
Programmes are still seen as 'alternative'	0.44	2	0.80
Gender differences in benefits gained	3.25	2	0.20
Age differences in benefits gained	4.10	2	0.13
Cultural differences in benefits gained	0.42	2	0.81

χ^2 = Chi-square value; df = degrees of freedom;

p = p-value

* indicates significant p-value at <0.05

Testing the transferability of the framework for problem substance use (PSU)

For each respondent, a total score was calculated by taking the median of the seven statements that made up each programme theory. Cronbach's Alpha confirmed internal consistency indicating that the overall scores were reliable (Table 7). The internal consistency was good for six of the programme theories and acceptable for one. The internal consistency for the extra contextual items was judged as acceptable but borderline, as typically a Cronbach's Alpha value of 0.6 and higher is acceptable.

Table 7: Cronbach's Alpha test for internal consistency of survey statements in each programme theory and for extra contextual statements

Programme theory name	Cronbach's Alpha	Rating
1 - Escape and Getting Away	0.82	Good
2 - Space to Reflect	0.68	Acceptable
3 - Physical Activity	0.71	Good
4 - Learning New Skills	0.83	Good
5 - Having a Purpose	0.85	Good
6 - Relationships with Facilitators	0.78	Good
7 - Social Relationships	0.75	Good
Extra contextual statements	0.58	Borderline

The total programme theory score for 'Relationships with Facilitators' differed between respondents from programmes that supported people with problem alcohol use only, both drugs and alcohol, neither, and/or those who were not sure ($\chi^2(2) = 9.45, p = 0.02$). Relationships with facilitators was rated as more important (a higher overall score) in programmes that supported people with problem alcohol use (Mean Rank = 22.0), compared to programmes that did not support this client group (Mean Rank = 14.20). However, with the adjusted alpha rate ($p=0.008$) there was no significant difference ($U = 30.0, p = 0.04$). Respondents from organisations that supported people with problem alcohol use also rated relationships with facilitators as more important (Mean Rank = 12.50) compared to respondents who were not sure if their organisation supported people with PSU (Mean Rank = 6.68). However, with the adjusted alpha rate (0.008), again there was no significant difference ($U = 7.50, p = 0.01$). There were no significant differences between respondents from programmes that supported people with problem alcohol use only (Mean Rank = 19.0) and those that supported people with problem drug and alcohol use (Mean Rank = 13.52) ($U = 35.0, p = 0.10$); neither (Mean Rank = 19.84) and not sure (Mean Rank = 15.45) ($U = 104, p = 0.20$); or neither (Mean Rank = 22.44) and problem drug and alcohol use (Mean Rank = 26.74) ($U = 236.0, p = 0.23$).

There were no other significant differences in overall programme theory scores between respondents from programmes that supported people with PSU, from programmes that did not, and respondents who were not sure. Table 8 shows the Kruskal-Wallis H test results for differences in overall programme theory scores between groups.

Table 8: Kruskal-Wallis H test results showing differences in overall programme theory scores between respondents from programmes that support alcohol only, drugs and alcohol, neither, and those who were not sure

Programme Theory Name	χ^2	df	p-value
Escape and Getting Away	1.67	2	0.64
Space to Reflect	3.85	2	0.28
Physical Activity	2.28	2	0.52
Self-efficacy	1.17	2	0.76
Having a Purpose	2.88	2	0.41
Relationships with Facilitators	9.45	2	0.02*
Shared Experiences	2.41	2	0.49
Extra contextual factors	2.38	2	0.50

χ^2 = Chi-square value; df = degrees of freedom;

p = p-value

* indicates significant p-value at <0.05

Discussion

The positive influence of greenspace on mental health is now widely acknowledged and, although not without its limitations, much empirical research supports the causal link (Callaghan et al., 2020, Hartig et al., 2014, Hartig and Kahn, 2016, White et al., 2019). Globally, there are now many types of greenspace programmes for mental health (Fullam et al., 2021, Masterton et al., 2020, Robinson et al., 2020). However, while greenspace may have a positive effect on mental health, it is still unclear by what pathways this occurs. This gap was explored in Phase One of this project, and a realist framework was proposed consisting of seven programme theories. In this phase, Phase Two, the transferability of the proposed framework was tested by collecting primary data from staff on greenspace programmes in Scotland. The applicability of the framework to greenspace programmes for people with PSU was also tested.

Characteristics of programmes: what exists, where, for whom, and with what focus?

The results demonstrated the heterogeneity of greenspace programmes for mental health and showed that the classification of greenspace appears to be relative to each programme, with no clear definition across programmes. The variability of classification highlights the importance of clarity in terminology, a point highlighted in Chapters One and Two. In a previous review of 125 greenspace articles, less than half of the included articles included a definition of greenspace (Taylor and Hochuli, 2017). If there is a lack of clarity in terminology, not only will this likely lead to confusion (McIntyre et al., 2008), but could also limit research findings. For example, when exploring what aspects of greenspace are most important for health, researchers need to be explicit about what type of greenspace is being explored. Research on engagement with nature and greenspace for health may be challenging if there is little objective clarity about what nature or greenspace means within the context of that study. To address this, the meaning of greenspace specific to each study should be explicitly communicated to better enable understanding. It is important to highlight that, from a practical viewpoint, a greater variety of greenspace programmes could be beneficial for including as many people in programmes as possible. However, a lack of consistent terminology is likely to provide challenges for service providers too, particularly when developing initiatives such as green prescriptions (van den Berg, 2017).

It is important to note that, while this study does not claim to provide in-depth mapping of programmes across Scotland, the pre-work in identifying existing programmes to

recruit was extensive. Further, the general trends of availability of different programmes are supported by existing databases such as the Trellis map of projects (Trellis, 2020), the Paths for All map of health walks (Paths for All, 2021), mapping undertaken by the four GHPs (NatureScot, 2020), the MasterMap Greenspace Layer (Ordnance Survey, 2021), and previous empirical research on the geographical spread of green prescribing (Jepson et al., 2010, Robinson et al., 2020.)

Generalisability of the framework to greenspace programmes for mental health in Scotland

Since programme theory development is an iterative process, the proposed programme theories from the realist synthesis were tested in response to the new primary data. This testing was important to identify whether mechanisms and outcomes within the programme theories, such as the feeling of escape and having space to reflect, would be as applicable to urban programme settings compared to rural programme settings. Findings showed there were high levels of agreement with the survey statements overall, indicating that the results of this study strongly support the seven proposed programme theories for greenspace programmes that were proposed in the review. This suggests that the proposed framework effectively represents the key CMOs seen in greenspace programmes for mental health, allowing a better understanding of *why* programmes work, rather than solely *if* programmes work. This finding is important as it extends the scope of the framework from representing empirical evidence only, to being a potentially usable framework in practice.

Further testing of the framework was also necessary to provide evidence for the claim that the framework was generalisable to greenspace programmes internationally. If the framework is internationally relevant, then it should be successfully applicable to greenspace programmes in any chosen country. Results showed that the framework can be taken and tested successfully in a Scottish setting with very high levels of agreement from greenspace practitioners. The findings from Scotland could be generalisable to other countries, due to the breadth of greenspace typologies as well as the variety of greenspace programmes included in the data. Many of the Scottish programmes identified for inclusion in this survey mirror programmes that were present in the realist synthesis from different countries. Therefore, if the programme theories translate well to Scottish programmes, then the programme theories might also successfully translate to other international settings.

Despite a high level of agreement with the framework overall, the results also allowed identification of individual statements where there was a greater variability in responses. This variability highlighted the areas of the programme theories that potentially need explored further in the following phase. One aim of the study was to identify if respondents from programmes that used different greenspace settings responded to these survey statements in different ways. Previous research has reported different aspects of greenspace as being valuable for health. For example, greenspace with less air pollution, noise, and heat has been reported to be more beneficial for human health (Markevych et al., 2017). It is possible, therefore, that staff from programmes using rural spaces might see benefits faster, due to higher quality greenspace, in comparison to staff using urban spaces. Staff on urban programmes may therefore be more likely to agree with the statement 'change in service users' behaviour does not happen quickly on greenspace programmes'. Equally, staff from urban horticultural programmes might agree that with the statement 'service users find that changes in plants, trees, or the environment, can represent changes in their own lives', more than staff from rural programmes where clients work less directly with changing vegetation.

With this in mind, this phase explored whether there were significant differences in responses between respondents according to where their programmes are based (i.e. rural, urban, both). Results showed that there was a significant difference in responses between urban programmes and rural programmes for the statement 'greenspace programmes are most effective in improving mental wellbeing when they were structured', with staff from rural programmes agreeing more with this statement than staff from urban programmes. This might be explained by rural programmes, such as wilderness or adventure programmes, needing to have more structure and planning due to higher potential risks and being longer in duration (Gabrielsen et al., 2018). There were no other significant differences in responses between groups meaning that staff from urban and rural programmes both agreed overall with the framework for how greenspace programmes work. This is an important finding since it supports the previous claim that the framework is applicable to all greenspace programme settings and is transferable across urban- and rural-based projects. This is in comparison to other models that only focus on one programme setting, such as Russell and Farnum's Wilderness Therapy Model (2004) and the Care Farm model (Hambidge, 2017). It is clear that there are statements that need to be explored further, for example, the additional contextual statements showed a wider range of responses in comparison to statements in the programme theories themselves. A level of caution is therefore advised when interpreting these initial results because, while greenspace setting did not appear

to be linked to differences in responses, due to the heterogeneity of programmes, it was not possible to categorise programmes more specifically. In future research, exploring other characteristics of programmes may allow better identification of the nuances between programmes that do explain differences and help to further refine the framework.

Transferability of the framework for problem substance use

Previous systematic reviews and meta-analyses have reported a strong association between mental health and substance use (Hunt et al., 2016, Kingston et al., 2017, Lai et al., 2015). Given this link, the framework's transferability was explored to see whether the programme theories that explained why greenspace programmes were effective in improving mental health also explained why programmes appear to be effective for supporting people with PSU. Results showed that responses from organisations that support people with PSU use were not significantly different to responses from organisations that did not support this client group. This suggests that the framework may be applicable to both greenspace programmes specifically for mental health and greenspace programmes that also support people with PSU. This is important since there is a small body of empirical research that shows beneficial outcomes on greenspace programmes for people with PSU (Combs et al., 2016, Harper et al., 2019, Lehmann et al., 2018, Panagiotounis et al., 2021), but there is no existing framework that shows the components necessary for greenspace programmes to be successful with this client group thus making future development and implementation of programmes difficult.

Strengths and limitations of this phase

This exploratory study was a novel approach in testing and operationalising the proposed realist framework in Phase One. A claim from the synthesis was that the framework was transferable to all greenspace programmes, in all settings. The range of different greenspace programmes included in this study phase means that this contextual claim is now more convincing, as the range of programmes allowed analysis of different greenspace programmes with a realist lens and similarities to be identified. A key strength of this phase is that it allowed a focus on 'for whom' and 'why' greenspace programmes might be successful. The results not only showed a general consensus of the framework but enabled comparison between different groups to show that the framework could be appropriate for use on greenspace programmes that support people with PSU, as well as poor mental health. These findings are therefore helpful in the development of the IPT taken forward into Phase Three testing.

Some limitations and the need for future work must also be acknowledged. Firstly, because the survey was distributed both by the research team and within respondents' networks, it was not possible to identify how many people subsequently received the survey. It is not therefore possible to calculate the exact survey response rate. However, as mentioned, the extensive search for organisations to recruit allowed an overview of the number of existing greenspace organisations in Scotland, therefore the response rate appeared to be fairly high, since the included organisations represented a very high proportion of the organisations identified through mapping. As with all surveys, there was a reliance on respondents accurately reporting their answers and there was no guarantee that respondents would interpret the statements in the way that was expected. One potential issue was that the survey did not explicitly ask how many people with PSU there were on the programmes. Therefore, although it was clear which organisations would be open to supporting this client group, there was no certainty that respondents were answering with active knowledge about what works/does not work for people with PSU. However, the mapping exercise allowed a level of confidence that the programmes that reportedly support people with PSU, do actively support this group.

Further research is needed to better explain apparent differences in responses between some of the survey statements. The survey tested what has already been proposed, and so was unable to identify any new contexts, mechanisms, or outcomes that may be relevant to the overall framework. Additionally, testing CMOs separately has implications. While we did this to explore individual aspects of the configuration, it could be argued that contexts are only relevant when linked to a specific mechanism and, when they are split, this could result in loss of understanding about why a context is important. The premise of realist research is establishing causality between CMOs, so future work is needed to test the components as full configurations in order to see how they work as programme theories. Indeed, future qualitative work would enable a deeper exploration of the causality within programme theories, identification of CMOs, and allow unanswered questions to be addressed. It is also important to note that respondent agreement does not confirm that the contexts, mechanisms, or outcomes are ontologically 'real', only that they are agreed upon by this specific group of respondents. This limitation is inherent to all realist research: while programme theories allow predictions about why programmes work, they are potentially fallible (Pawson and Tilley, 1997). This is another reason why future work is imperative, so that the CMOs continue to be tested and refined in order to provide further evidence for the proposed programme theories.

Another important point is that respondents may be basing their answers on generic greenspace programmes delivered by their organisation as a whole, rather than specific programmes. This could mean that nuances between programmes are not picked up. Again, this is something which should be explored in future work. For example, follow up work may explore differences between specific activity types, rather than across rural and urban programmes more generally. This was not possible in this project due to the heterogeneity of programmes limiting the ability to categorise programmes other than urban, rural, or both. Due to heterogeneity, testing between activity type would likely require a large sample size. Finally, the survey only represents one country and, while it has been suggested that results could translate to international contexts, further testing of this claim should take place. In particular, contexts within lower-income and middle-income countries will differ from high-income countries: the health care infrastructure and differing cultural values and uses of greenspace may influence implementation and use across different countries. As discussed in Chapter Four, if the framework is indeed transferable internationally, further work needs to be undertaken to be explicit about whether this does in fact include all countries, or only high-income countries.

Chapter conclusion

A novel framework for greenspace programmes for mental health was recently developed through a realist synthesis (Masterton et al., 2020), as described in Chapter Four. In the synthesis, key programme theories comprising of CMOs that showed what works, for whom, and in what circumstances were proposed. Phase Two, reported in this chapter, tested the framework using primary data from 64 staff of greenspace organisations in Scotland, and results supported the proposed realist framework. Given the link between mental health and substance use, the framework's transferability was explored for use on programmes for people with PSU. The results showed that responses from organisations that supported people with PSU were similar to organisations that did not support this client group, but which did support people with poor mental health. This shows that the framework has the potential to be applicable to greenspace programmes for mental health, greenspace programmes for PSU support, and greenspace programmes supporting people with dual diagnosis. This is a novel finding as there is currently no framework that explains the CMOs necessary for greenspace programmes to be successful for people with PSU, or people with dual diagnosis. Although this phase has allowed initial exploration of the framework using primary data, it is important to acknowledge that the limitations indicate the need for additional research and a further phase. For example, since the survey could only test

what was already proposed in Chapter Four, it was not possible to identify any new CMOs that may be relevant to the overall framework. Further the survey phase allowed limited exploration of differences in responses between some of the survey statements and was unable to determine causality. Through the next phase of qualitative interviews, presented in Chapters Six to Eight, these limitations are addressed, with a deeper exploration of the programme theories allowing another iteration of testing, refinement, and finally, consolidation.

Chapter 6: Phase Three - Qualitative findings from staff interviews

Introduction to chapter

The aim of Phase Three was to conduct semi-structured qualitative interviews with greenspace programme staff and wider stakeholders to further test and refine the proposed framework for greenspace programmes that support people with their mental health and problem substance use (PSU). This chapter starts with a brief recap of the realist research process, and how Phase Three fits into the wider study. The staff findings will then be presented and identified context-mechanism-outcome configurations (CMOCs) within each programme theory reported. Stakeholder findings are reported in Chapter 7, and consolidation findings are reported in Chapter 8.

Recap of the realist research process and how Phase Three fits into the wider project

Using a realist approach in intervention framework development has unique specificities. Importantly, using realist methods is an iterative, rather than linear, process, which means that the researcher may go back and forth between research stages until the best possible design has been achieved (Westhorp, 2014, Wong et al., 2016). Given the limitations of Phase Two (discussed in Chapter Five), a third phase consisting of semi-structured, qualitative interviews was identified as a suitable way to enable deeper exploration of the causality within the proposed programme theories. Additionally, this method allowed the flexibility needed to identify new CMOCs to further test the transferability of the framework to programmes that support people with both mental health and PSU. Guidance on using realist methodology reports that the starting point in realist work is to develop initial programme theories (IPTs) (Westhorp, 2014, Wong et al., 2013, Wong et al., 2016). IPTs can be developed using a multitude of sources, and the proposed programme theories developed through Phase One and Phase Two of this project became the IPTs for Phase Three. The IPTs act as the initial structure and framework of the intervention, which is then tested, refined, and consolidated to provide a final realist framework for how greenspace programmes work for people with poor mental health and PSU.

Staff interview findings

The staff findings are presented under the programme theory headings originally identified and tested in Phases One and Two, as well as newly identified programme theories in this phase. Tables consisting of the CMOs identified within each programme theory, and which were refined from the IPTs, are presented at the beginning of each section for clarity. Participant details and their IDs, which are used to attribute direct quotes, are shown below in Table 9.

Table 9: Participant details and pseudonyms

Participant role	Setting of programme	Location	Pseudonym
Manager	Wilderness	Scotland	Rob
Support Worker	Wilderness	Scotland	Malcolm
Manager	Garden	Scotland	Gerry
Manager	Conservation	UK	Michael
Volunteer	Garden	Scotland	Alan
Manager	Garden	Scotland	Jess

Programme Theory One: Escape and Getting Away

Contexts	ease of access; quality greenspace; previous experience
Mechanisms	feeling of 'being away'; feelings of being present/reduced rumination; spiritual feelings of awe
Outcomes	connection to nature; improved mental wellbeing/reduced stress

Contexts

There were certain contextual factors identified through the data which appear to influence whether mechanisms within this programme theory occur. Firstly, from the interviews, ease of access appeared to be a more prevalent context than initially identified in the framework. When greenspace is *“literally on your doorstep”* (Gerry), it is reportedly much easier to access. One volunteer spoke about how it was helpful having their programme nearby pharmacies, where people who use drugs were visiting during the day:

We are quite lucky in where we are situated down there. I mean we are five minutes from where our hub is. That's in the catchment of like another three or four pharmacies [...] so, in general that it is located quite well.
(Alan)

This was compared to another location situated further from the city centre where they have had “*nowhere near the success*” (Alan), compared to the city centre location, “*because of the locality*” (Alan). Another member of staff described the obstacle of:

...so, is it on a bus route, how will people get there? Do they have enough money to get there? All the access-based stuff to actually access the service which is often excluded from the service. (Jess)

For programmes running in rural areas, for example wilderness or adventure programmes, then provision of travel, for example via minibus, was considered essential. As well as being easily accessible, some interviewees described the greenspace used as needing to be of ‘quality’. It was apparent through the interviews that quantity of greenspace is typically not enough to promote the feeling of getting away, with one staff member explaining about conservation work and how clients appeared to gain more benefits from some sites than others:

...we did tree planting, and it was right alongside a motorway village for example. I mean, people get that that is a useful task, and they can still get something out of it, but there is no doubt that they don't comment on it, “Oh I loved being by that motorway”, they talk about the time when they went to this beautiful site. (Michael)

Staff members also spoke about how, in their opinion, greenspace needs various sensory stimuli within it to feel like it was of quality and further facilitate the feeling of getting away:

Whether it's, you know, working on a rainy day, or having water catchments systems, or is there a pond, or some kind of little water feature that is making a sound? Then you can play around with the element of water for therapeutic purposes, like a pond is very contemplative, whereas a waterfall is a bit more active and busy. (Jess)

To ensure greenspace quality, interviewees also spoke about how acknowledging the need for maintenance of the greenspace itself was likely necessary:

Over and above the needs of participants, there is also the needs of the garden. The needs of the garden can create the rhythm and the tempo of the programme, they can also supersede the needs of the participant. So additional resources need to be there, in order to manage the garden safely, over and above what participants are doing in terms of activities.
(Jess)

In terms of individual-level contextual factors, previous experience of nature was said to influence programme success. Indeed, *“a lot of people are extremely agoraphobic, and have extreme anxiety, so that’s a reality as well that we need to be mindful of”* (Gerry). One staff member described how no previous experience of being out in nature could be a contextual challenge:

Clients not being used to the outdoors, you know, you can see them in the first couple of meetings [...] they are looking at you as if “listen mate there is no way in this world you are getting me out there camping for ten days, are you mad” [...] most of the clients, it’s their first experience of anything like that [...] they have already come to us because a lot of them have got little control over their own lives at that stage, and then we take them into a situation where once again you know they haven’t a clue.
(Malcolm)

Mechanisms

Programme outcomes are said to be achieved through generative mechanisms. The key mechanism in this programme theory was identified as a feeling of escape and getting away, with one staff member describing this feeling as *“getting away from their front door”* (Gerry). This mechanism appeared to be particularly key for people who use drugs:

It gets them away from the sort of rat race that they are stuck in. A lot of the guys that we work with, they are in the house, and then they are out the house, they are down to the chemist, getting their prescription, and then they are either going and scoring, or just going straight back home.
(Alan)

In residential environments like therapeutic communities, the feeling of getting away was also described as important, with one staff member saying that, *“for residents that are used to the dynamic of having support workers and routines and pecking orders within the residential setting, the garden space is like a little window out of that”* (Jess).

Although the feeling of being away was identified as key, other mechanisms were also identified relative to this programme theory. For example, immersion in greenspace was said to facilitate feelings of calm, feelings of being present, and reduced rumination. One interviewee discussed how an unpredictable pace of life can have negative consequences with many clients *“incredibly anxious, they think, and think, and think, and they overthink”* (Rob), but conversely, *“being in nature, and being in greenspace, allows you to just stop your brain processing quite so much information that we are bombarded with every minute of every day”* (Rob). Another agreed:

The therapeutic value of being outdoors can't be underestimated. A lot of people feel more relaxed, calm, more at ease, more just themselves [...] it just seems to relax people, and we've seen that time and time again.
(Gerry)

Certain seasonal activities that acknowledge the passing of time were also described to facilitate these feelings of being present:

Planting schemes are grounding people in the process of time passing, because often with mental health challenges you can get a bit lost in your head, so bringing people back into the present moment, into the here and now, via planting schemes, can be really effective. (Jess)

Programme staff also described participants as saying they experienced spiritual feelings, or felt *“overawed”* (Malcolm), and *“blown away”* (Rob):

It's just so hard to describe what it is, but it's something that is there and that is tangible, but to try and kind of like pin it down and say what it is... I'm not sure that you can get that from me today [...] you find that most clients, when they are out there, it kind of takes their breath away.
(Malcolm)

One participant gave an example of this mechanism from a wilderness excursion:

I will wander out the bothy, usually it happens in the morning or really late at night, and there will be a young person standing outside all on their own looking at [beauty spot]. And you go “alright?” And they will go “yep”, and you’ll go “what’s happening?” And they are just going “I’ve never seen anything that looks like this.” (Rob)

Outcomes

A connection to nature was identified as one of the main outcomes in this programme theory. This was described as something that appeared to happen naturally, with participants “*connecting with the outdoors, the space, with nature, with the sounds and the smells*” (Gerry). It is important to note that a connection to nature was said to happen in all types of greenspace programmes:

...at the core of it all is just connecting people to greenspace in lots and lots of different ways [...] people are basically the same, they might have different life experiences, all sorts of differences, but when you are talking about connections to nature, they are pretty fundamental things that I think everybody experiences. (Michael)

An example of this connection to nature was given by one staff member who described trips into the wilderness:

When you are out and you are doing an activity, you have to adjust to what is happening around you, and you become really in sync with that. You know what it’s like when somebody goes, “it feels like it’s going to rain”, and everyone goes “yeah it’s definitely going to rain”. How do we know that? It’s like a feeling you get, and it’s us connecting. I think the power of that experience is very, very powerful. (Rob)

One staff member also shared that when clients are “*looking at the mountains, looking at the trees, hearing the rivers, connecting with nature, connecting with being outside. They are sort of separating from their own agenda and their own issues*” (Gerry). Another staff member believed that this connection to nature is beneficial because:

There is just something inherent in human beings that hasn’t evolved beyond living outside and adjusting to nature, and the weather, and the

seasons, and times of the day [...] there is something about our species that actually needs to be outside. (Rob)

Other outcomes in this programme theory were identified as improved general mental wellbeing and reduced stress, and interviewees highlighted that outcomes were wide ranging depending on the individual:

The benefits and the outcomes are vast. From sleep, to reduced depression, to mental health, to wellbeing [...] people were coming in really low, really depressed, their confidence and self-esteem were really in their boots and, slowly through a kind of nurtured outdoor gardening experience, really finding a wee bit of a sort of niche. (Gerry)

Programme Theory Two: Space to Reflect

Contexts	physical space provided by greenspace environment; time on programme; age
Mechanisms	removal of being boxed in; having 'space to reflect'; use of metaphors
Outcomes	increased 'opening up' and increased discussion from client

Contexts

The physical space provided by the greenspace programme was identified in the interviews to be an imperative environmental context. This context is part of what sets this programme theory apart from the first programme theory, as the physical space can allow physical removal, in comparison to predominantly psychological feelings of removal as seen in the 'Escape and Getting Away' programme theory. One staff member discussed how, when a person is struggling with issues such as PSU, the client can reportedly "*feel trapped and very enclosed*" (Gerry), and the greenspace programme can provide physical space to mitigate this:

You are not as confined, and that sense of freedom, you have space to move about, to breathe, to reassess, to refocus. (Gerry)

Another member of staff explained how the physical environment may allow “*space for people that often feel like their voice isn’t heard a lot in their day to day*” (Jess). Wilderness programmes apparently provide this contextual environment best, which is perhaps unsurprising given the rural space:

...you can see the effect of natural spaces, and I mean proper wilderness spaces, because from the bothy there is only one house that you can see.
(Rob)

However, more limited environments could also provide optimal space:

If I think about a garden design in terms of garden rooms, then I can think about what the need of the group is, and what the needs of individuals in the group are [...] it can be a nice way of bringing people together around a veg plot where there is lots of intensive energy needed that will create opportunities for socialising, and learning, and chatting together. (Jess)

It did appear that the outcomes within this programme theory are reportedly best achieved when clients are able to attend a programme for longer periods of time, with one staff member explaining, “*it’s a time thing*” (Rob), and another stated:

You lay that groundwork for them to open up, the same way a psychologist would see somebody two or three times, before actually going into the sort of nitty gritty. (Alan)

Age was an individual level context that appeared to influence this programme theory, with one staff member describing a “*tipping point*” (Rob) when clients reach their early twenties and may be more inclined to seek support:

They suddenly go, “okay I can’t actually do another 40 years of getting drunk, and partying, and doing drugs, and getting into trouble, and larking around with my mates, because some of them are dead now, because they have overdosed, or they have done something really stupid or committed suicide”. Life starts to get a bit more serious at that point for them [...] the younger people [programmes] don’t work quite so well, it is better if they have lived a bit of life, and it’s a real desire to change. (Rob)

Mechanisms

The key mechanism in this programme theory, facilitated by the physical space, was identified as the feeling of no longer being confined within four walls, as with more typical indoor treatment sessions. Staff members discussed how this could make the setting less formal, so the clients are more comfortable with “*less agendas or less pressure*” (Gerry). One staff member explained:

We've got guys that, for one reason or another, pulled back from engaging with certain things like appointments, it's just not a setting where they felt comfortable. But, if you have got that structure of that one-to-one meeting removed, then it's almost like a casual encounter where they are in control of the conversation. (Alan)

The physical space provided by the programme was also said to give clients space to reflect on their lives:

If you are embroiled in the world of substance use [...] being able to get some distance and some perspective on your life is really, really good. [...] Looking at the mountains, looking at the trees, hearing the rivers, connecting with nature, with being outside. You are sort of separating from your own agenda and your own issues. It helps to put some perspective on your life. (Gerry)

Another staff member discussed how they have seen clients use metaphors to reflect on change and what that might mean relative to their own life:

...it's like a camping journey and it is like a life journey, they start at one point, and they will travel and finish at another destination. (Malcolm)

Outcomes

Although the initial framework identified a desire to change as being the main outcome for this programme theory, in fact, the data highlighted that a more accurate outcome was increased sharing and ‘opening up’ by clients about their lives, challenges, and problems:

People tend to open up a bit more if they are not so focused on it actually being a conversation in treatment about opening up. [...] The mind is not

so concentrated on “right I need to talk, I need to open up”, it’s more of a flowing conversation. [...] They feel more at ease, whether it be doing a bit of work, sitting down and having a cup of tea with somebody, or just chatting in general. That opens the door, it lays the groundwork for them to talk a wee bit more freely about stuff that they feel that they need to talk about, or indeed starting to open up and talk about something that they have been carrying for an awful long time that they are ready to start to process or let go of. (Alan)

Programme Theory Three: Physical Activity

Contexts	availability of resources including equipment and trained staff; weather
Mechanisms	enjoyment of activity; endorphins
Outcomes	increased engagement with physical activity; increased positive mental health; improved physical health

Contexts

The availability of existing resources, or availability of funding for resources such as kit and equipment, was identified as being a necessary contextual factor to facilitate activities on a greenspace programme, particularly if clients “*don’t have access to resources or money*” (Gerry) themselves. With greenspace programmes, having the appropriate clothes and footwear to stay warm and dry was described as crucial, as was having the right tools to safely undertake activities. Interviewees discussed the importance of ensuring clients have access to these items prior to programme commencement. COVID-19 has made this more difficult since people are no longer allowed to share items, limiting borrowing:

We are having to purchase way more tools, we’ve got individual sets of tools for people that we colour code, and they have got their own bucket of tools and sanitiser. (Jess)

Availability of a trained facilitator was also considered to be imperative for programme success:

Before you get to the level of relationship with the staff, just the existence of staff in the first place. [...] It sounds obvious, but we work on quite a lot of projects where there can be a bit of a “build it and they will come” kind of attitude. (Michael)

One staff member described the role of the leader as being essential because it was necessary to have “sufficient staff out on these journeys to give as much support to the clients that they need” (Malcolm). As well as support, skilled leaders were also said to be necessary to ensure the health and safety of clients, an important consideration when on programmes incorporating a level of risk and/or physical activity. Risk was described in different ways: practical skills-based risk; general risk factors; and substance use-related risk:

The field team guys have to be proficient in the outdoor skills and working outdoors with the different activities they do in terms of the climbs, the canoeing and stuff like that. (Malcolm)

If you have a group of people that own that leadership role, and they are skilled in understanding and assessing risk, those are key factors because risk is fluid. When you are away and doing an activity, or you are outdoors, all of a sudden, things can change [...] they are trained, you know, all my staff are trained in naloxone, overdose prevention, CPR, first aid. (Gerry)

Even with the right equipment and trained facilitators, weather was described as a further context to consider. While interviewees acknowledged that there is no way to control for the weather, some discussed the necessity of planning:

Have a sheltered space in the garden, which in COVID times can be a bit more challenging with keeping people safe, but have a wet weather breakaway space. (Jess)

Mechanisms

Interviewees spoke about the need for a range of different activities in order to give clients a “menu of opportunities” (Rob) and ensure there are different activities available:

People need to be able to walk into “what are you into, what do you want to do?”. It doesn't need to be white-water kayaking, that is high-risk and high cost. It can be local you know, really inexpensive activity. (Rob)

A variety of activities was said to facilitate the enjoyment of the activity, and this was a key mechanism leading to physical activity increase. Staff members described the importance for clients to be having fun, particularly for this client group:

There is more laughing, there is a wee bit of mucking about, it's almost playtime. I think, as adults, we don't play perhaps as much as we should. Going out into greenspace and having fun, you can't underestimate the importance of smiling, of laughing, of being happy, and sharing that happiness. [...] It's showing by example, you are having an experience that is really positive, and it doesn't involve anything to do with drugs or alcohol. (Gerry)

This staff member expanded on this thought by discussing how endorphins released through physical activity may be another physiological mechanism responsible for improved wellbeing:

There is a lot of research around the benefits of exercise, and all your chemical releases through exercise, and I think within the world of recovery [...] they've probably been used to a lot of chemical release, through drug and alcohol use, and what we are trying to support people into is finding other ways of feeling really good, and positive, and happy, through exercise and being outside. (Gerry)

Outcomes

Outcomes in this programme theory can reportedly be split into short-and long-term outcomes. In the short-term, interviewees described clients as appearing to engage more with the physical activities, with one staff member saying that clients often begin to pick their own routes and/or design their own activities on the programmes. The increased physical activity was subsequently said to lead to potential longer-term improvements in mental and physical health:

...some are very specifically mental health benefits, and some are obviously physical benefits, and the two completely crossover anyway.
(Michael)

Programme Theory Four: Self-Efficacy

Contexts	availability of trained, competent facilitators
Mechanisms	empowerment and confidence from learning new skills and re-learning old skills
Outcomes	increased self-esteem; application of new skills to life outside the programme

Contexts

As with the programme theory ‘Physical Activity’, availability of a trained, experienced facilitator was considered to be a crucial context for programme success, particularly as the needs of people with PSU could be complex, and facilitators were able to support this. One interviewee discussed how having skilled facilitators makes a “*huge difference*” and “*there is no doubt that people get better benefits*” (Michael) compared to when there are fewer, or less experienced, facilitators. One member of staff explained that experienced facilitators may promote client self-efficacy by being available for support, but ensuring the right ratio of staff was important:

The one-to-one worker will constantly check-in with the participant that they are looking after, just to make sure that they are getting the most out of it. We try and involve them in any of the problem solving and get them to identify what skills they used, and what they brought to the table.
(Malcolm)

Mechanisms

When there is the availability of facilitators to guide and support clients, clients are reportedly more likely to enhance their skillset. This can be practical skills of different types such as gardening, conservation work, mountaineering, fire setting, foraging, bushcraft, or survival skills, among others:

It doesn't matter what your mental, emotional or physical capabilities are, there is always something that you can become an expert in. (Jess)

One staff member spoke about how the mechanism of learning new skills could be about “*reconnecting with old skills*” (Gerry) that had not been used in a long time. They spoke about how people with PSU often had “*full lives and lots of rich experiences*”, but this could be “*lost for years and years*” because of substance use and related challenges. However, experiences and existing skills were said to be revisited through greenspace programmes. An example was given of a client on a programme who was given the opportunity to use skills he had learnt when he was younger:

He was the one who pretty well led the group because he had all the skill and knowledge from when he was a wee lad. This guy is almost in his fifties, but he was lost for 25, 30 years, in the world of drug use. (Gerry)

Learning skills could also be related to new psychological skills. As one staff member said, “*it is not all to do with producing stuff*” (Michael). For example, greenspace programmes are often “*designed to throw up challenges*” (Malcolm), and skills such as increased emotional regulation and problem-solving are viewed as essential mechanisms in achieving related outcomes.

Outcomes

The mechanism of learning skills was described as leading to increased self-esteem, with clients starting to “*recognise their own achievements*” (Rob). This was said to be related to wider outcomes, particularly when greenspace programmes are run alongside other services:

People really starting to find themselves and build their confidence, and they start to make changes that are better for their health and wellbeing. [...] That coupled with some really good counselling or support work. Before you know it, people are making massive positive changes in their whole life. (Gerry)

A number of programme staff discussed how the new skills learnt on greenspace programmes can be transferable to clients' lives outside the programme. One explained that this was an important outcome because staff are not usually part of the client's life outside of the programme: they need to be supported to identify the skills they have

learnt that will allow them to navigate challenges themselves. One example was given about a young person on a wilderness-based programme:

He almost stopped coming to the course, and it was because he couldn't see the point, because when he went home, you know, nothing had changed. He said he literally had a moment of revelation when he went "Oh hold on a second, all that stuff that I do at [greenspace organisation], I need to bring that all home to my mum, and dad, and my brother. I need to do the work back home, not just at [greenspace organisation]." And he said it was a total revelation, he immediately started changing his relationships at home where he set some boundaries and went "no I'm not willing to accept that. (Rob)

The same member of staff spoke about how learning new skills on greenspace programmes can allow clients to “*de-escalate themselves back down*” (Rob) and cope better with challenges encountered in day to day lives. Another staff member spoke about how an important part of the programme was to discuss: “*how do we cope without relying on alcohol and chemicals to deal with life, because life can be really, really tough*” (Gerry). In a similar sense, a different staff member spoke about the importance of discussing with clients how best to support them with their journey once they had left the programme, and how to “*keep the momentum going*” (Malcolm) relative to their recovery, if that was their aim, or simply continuing to build more positive structure in their lives.

Programme Theory Five: Having a Purpose

Contexts	structure and routine of programme; person-centred focus
Mechanisms	feelings of purpose and achievement
Outcomes	improved self-esteem

Contexts

How programmes are designed and structured is a central contextual factor to this programme theory. Some interviewees described this as the routine of the programme. It is important to note that this did not appear to mean that the programme should be inflexible and rigid, but more that the programme provided something certain within a client's day-to-day life. One staff member described the routine and structure as

providing “reassurance” (Gerry). Another explained that the routine in a gardening programme was potentially beneficial for clients because “a very repetitive structure might be the only grounded part of that woman’s day” (Jess).

The other context identified through the data was that the programme should be person-centred. Although greenspace programmes appear to activate similar mechanisms across a range of people, regardless of programme activity, interviewees discussed how the activities themselves should still be individualised:

You will see broad themes that are similar in the goals that people are trying to achieve, but we try and be as individual as we can with that [...] it’s just kind of designing support networks that suit individuals. (Malcolm)

Another staff member discussed that an interests/needs audit can be helpful during the induction process to allow identification of what the client might enjoy doing, as well as the support they might need including potential barriers:

Something that has come up over and over again is around literacy, which you wouldn’t necessarily think of with a gardening project, but if people feel embarrassed if they have got literacy issues, and maybe the first experience that they have coming to the garden is “can you go to that box and pick out the sunflower seeds and have a read and see”, you know? [...] If they are confronted by something that is personal to themselves that they are embarrassed or ashamed of, that has not been properly assessed at a skills/needs/interests induction, then you can lose someone. (Jess)

This audit process was described by the same staff member as “an iterative process we revisit as needs be, and add information to, if people disclose information” (Jess). This was said to allow the structure of the programme to be individualised and flexible, as a client progresses.

Mechanisms

If a programme is structured, and provides person-centred support, this was said to facilitate feelings of purpose and achievement, the central mechanisms in this programme theory. One staff member explained that, even if clients were not trying to reduce their substance use at that moment, the structure of the programme could provide a way to get out the house which can lead to feelings of purpose:

We noticed these great improvements as they were getting involved with the gardening. They were getting a wee bit more organised, they had got a wee bit more structure, they were starting to look at things different [...] It's getting them up, it's getting them more positive, it's getting them active, they are feeling included, they feel like they belong to something, they feel like they matter all over again. They are coming from negative mindsets sometimes, and this is just the positive they need, the boost that they need to get them going. (Alan)

Another reported that some of the clients on their programme come specifically because “they want to do something useful” (Michael):

...that's often how we describe the green gym, it's a purposeful activity. It's not just like going to the gym to get fit, or even just, you know, going into nature for a walk around. You are doing something, and you can see your effect on the local community. (Michael)

These feelings of purpose appeared particularly important for people with PSU:

I think purpose is one of the big things, it's to give them some kind of “something” they see themselves as getting into, and it's fulfilling a need that they didn't have before. (Malcolm)

Another interviewee explained that the sense of purpose that greenspace programmes provided was often linked to clients reporting a greater sense of control over their lives:

...the idea of feeling like they have control over something, and they can impact on something, is a big part of it. Rather than just feeling “Oh I've just got to sit home, and other people will do things, and other things will happen, and I haven't got a job, and I haven't got control over a lot of things in life. (Michael)

Outcomes

The feelings of purpose and achievement were described as resulting in the outcomes of improved self-reported self-esteem and confidence, with one staff member saying, “one of the big mental health benefits for people is that self-esteem element in that they

have achieved something” (Michael). This improvement in self-esteem was described as subsequently impacting other areas of life:

It is a huge, huge confidence booster which also then has the knock-on effect to their lives when they are not at the programme. (Alan)

Programme Theory Six: Relationships with Facilitators

Contexts	programmes having a ‘doing with’ rather than ‘doing for’ culture; staff working in a trauma-informed way; enough time on the programme
Mechanisms	decreased power imbalance; increased trust; feeling safe
Outcomes	increased engagement and buy-in to programmes

Contexts

For clients to engage with, and buy into, the greenspace programme, one of the key contexts in this programme theory was described as needing to have a ‘doing with’, rather than ‘doing for’, culture. This idea might be described as involving clients in all parts of the programme, ensuring “*ownership about the stuff they do and how they go about doing it*” (Malcolm), in comparison to simply being told what to do by programme facilitators:

One of the main goals for the field team is to try and support as much as they can without kind of nursing clients [...] it’s about supporting them but allowing them to sense their own way through it. (Malcolm)

Another staff member described how they felt that clients appreciate when staff “*get your hands dirty with them*” (Alan) as this can lead to rapport:

If we stand on the side-lines and don’t get involved, then there is not so much room for communication as you’ve still got that sort of official role that you are playing. But when you get your sleeves up and start getting involved with them, you start chatting about this, that, and the next thing, and then they suddenly feel a bit more comfortable. (Alan)

Interviewees also discussed the importance of facilitators working in a trauma-informed way. This was described as “*recognising that [clients] will come with quite specific challenges, particularly around trauma [...] groups can be extremely threatening, and scary, and meeting new people can be extremely challenging*” (Gerry). This staff member added that the words ‘trauma-informed’ get “*banded about*” but, in the case of greenspace programmes for people with PSU, working in such a way was perceived as essential:

They are not just people in recovery, but generally people who may have experienced significant mental health issues, and recovery, and all the kind of issues around poverty, and stigma, and so on. You need to have a good grasp on some of those challenges. It is about vulnerabilities, it's about relapse, it's about overdose, it's about financial exploitation, sexual exploitation, [...] it's really important that you've got a really good understanding of the potentials that are there. (Rob)

Another member of staff discussed how clients may have been “*let down*” by the various systems before and may “*bounce between prostitution, addiction, prison, homeless shelters, back on the streets, in a very depressing cycle*” (Jess). This lived experience of inequalities may make it harder to build trust and for clients to want to take part in programmes because they have been let down many times before. However, this staff member also noted, “*we have to be aware of not being a rescuer and not jumping into someone's trauma and trying to take that away from them, because then that is another form of disempowerment*” (Jess). Instead, they explained that facilitators must ensure that they have enough knowledge to work in a trauma-informed way to adequately support the person.

Mechanisms

From the interview data, a ‘doing with’ rather than ‘doing for’ culture of care was shown to lead to a perceived reduction in existing power imbalances between facilitator and clients. Two staff members described this mechanism as the “*level playing field*” (Rob). Another described this type of culture as being able to “*break down the barriers*” (Alan) between client and facilitator. When this has happened, and when facilitators work in a trauma-informed way, interviewees reported that there is more room for trust to be built, and for clients to feel safe. The mechanism of trust was deemed crucial in building relationships, with one staff member describing it as “*the main thing*” (Malcolm) in the success of greenspace programmes. This was echoed by another:

It comes back to relationships. I believe everything we do is relationship-based. You don't learn anything until you've made a relationship with the person that is trying to teach you something. (Rob)

Another reason why feelings of trust was reportedly an important mechanism was related to safety and the novelty of the greenspace environment for clients:

They haven't a clue what kayaking is, or what abseiling is, you know? So, it's a whole new world, and it's just trying to ease them into that. (Malcolm)

Outcomes

According to the data, once trust is built between facilitators and clients, and power imbalances have been reduced, client engagement and buy-in will likely be higher:

It's about increasing people's positive engagement. It's about increasing young people's trust in relationships and increasing young people's awareness of the possibility of change. (Rob)

One member of staff said that clients often come back and speak about the programme facilitators by name and how they made them feel welcome and safe, and that is why they joined in. Another staff member explained that engagement is likely important since *“people who have completed a course are much more likely to engage with you once they come back than early leavers”* (Malcolm). Interestingly, another said that once trust is built with one facilitator, this can appear to have an impact on client relationships and engagement with future programmes with one staff member explaining that *“it can be projected onto other people, as long as they are within that environment of that safe space”* (Rob).

Programme Theory Seven (revised): Increased Communication through Shared Experiences

The programme theory of 'Shared Experiences' was split into two separate programme theories as the interview data indicated that the original theory was too broad. The title of the first revised programme theory is 'Increased Communication through Shared Experiences. The following table shows the CMOs for this theory.

Contexts	enabling environment; trained facilitators available to support client interactions; engagement of peers
Mechanisms	shared experiences and activities; increased communication
Outcomes	improvements in peer and other relationships

Contexts

According to the data, one of the key contexts linked to increased communication was that the greenspace programmes provide an enabling environment, in comparison to medicalised, clinical environments. For example, while greenspace programmes can provide ‘physical space’, as spoken about in the second programme theory, the environment can also be deliberately designed to be a “*pressure cooker*” (Rob) to facilitate communication. One staff member spoke about how the bothy used in wilderness treks was confined which meant clients had to spend time with and speak to each other. This staff member commented that this “*quite often blows up, but that is normal, because the learning comes from those difficulties of not being able to communicate*” (Rob). With peer relationships being integral to greenspace programmes, various staff members spoke about the need to have trained facilitators present to allow clients from different, and often complex, backgrounds to navigate their interactions with other clients:

People can be quite complex, so it’s nice to have somebody that has got some training, and has got some competencies around just supporting people, and being safe, and fair, and honest with people who may have different challenges going on in their lives, and particularly when you mix people together. (Gerry)

The engagement of other clients was also deemed an important contextual factor, with one member of staff explaining that when clients saw others engaging with the programme activities then they often “*followed suit and did the same thing*” (Rob). Conversely, if another person on the programme was not engaging, then this could prove challenging. The same member of staff discussed their experience of when this had happened, and this again also highlights the importance of having trained facilitators to support clients when challenging circumstances occur:

You will get the person who goes “I know it’s an activity day tomorrow, but let’s go and get pissed tonight” or “let’s just not bother with tomorrow actually”, and it’s because they have mentally found it too hard, and so they have stepped off the course mentally, but maybe not physically, and they will drag a group down with them because if they are not going to get to change then “I’m going to take everybody else with me. (Rob)

Mechanisms

The shared experiences that clients have on greenspace programmes were said to be key in improving peer relationships and social skills, and shared experiences could simply be about being together the same space:

There doesn’t need physical contact for it, it just needs two people to be in the same space and having a similar experience. Whether that’s in pouring rain, or walking through mud, or whatever, there is a connection. [...] There is no physical contact there, but just this connection of we are experiencing this. [...] Your experience is different from mine, but we are physically here for each other. Just being in the same space is literally changing us, and the laugh when someone says something funny, and somebody bursts out laughing. Humans need that. We are social animals, and we need that connection, but it doesn’t need to be a physical connection, it can just be being in the same space. (Rob)

Through these shared experiences, clients reportedly developed their communication skills which enabled a “*common bond*” to be built between clients, whereas previously, “*the negotiation skills that they need, the ability to read body language, they just don’t have those skills*” (Rob).

Outcomes

Through shared experiences and increased communication, clients were said to show improvements with peer and other relationships. One staff member said that a successful programme would be one that had a desired outcome of “*increasing people’s ability to maintain positive relationships*” (Rob). Another agreed:

I’d say without fail, anyone that completes one of our journeys will have increased their social skills. [...] They [clients] are standoffish at the start

but, by the end of the journey, they are supporting each other up a climb.
 (Malcolm)

For people with PSU, one staff member spoke about how, in their opinion, outcomes relative to this programme theory were not just in regard to others on the programmes, but to the wider community, and with themselves:

We work with addiction where addiction is viewed as a disconnection to self, to others, and to community. So, through creating opportunities for connection to self, others, and the community through garden-based stuff, then we can maybe make some headway with recovery programmes.
 (Jess)

Programme Theory Eight (revised): Reduced Isolation

This is the second revised theory from ‘Shared Experiences’ and is titled ‘Reduced Isolation’. The following table shows the CMOs for this refined programme theory.

Contexts	enabling environment, trained facilitators available to support client interactions
Mechanisms	increased understanding of others; reduced stigma by self, community, and peers
Outcomes	reintegration into community; reduced isolation

Contexts

The contexts related to this programme theory were shown through the data to be the same as the contexts in the programme theory above. Again, the environment provided by the programme appeared to enable participants to feel included, both within the group, and in the wider community. Additionally, a member of staff spoke about how, in their opinion, facilitators should be trained in supporting clients with peer interactions, but also in how to engage and involve clients. This was said to be important so that clients feel welcome. In particular, being mindful about language relating to substance use was said to be essential in challenging existing stigmatising views from others on the programme, and also in mitigating “*self-isolation and self-stigmatisation*” (Gerry).

Mechanisms

The central mechanisms in this programme theory were described as increased understanding of others and reduced stigma. One staff member spoke about how “*understanding each other’s emotions is a huge part of how we understand each other*” (Rob). Another expanded on this:

We’ve got guys that go down there who have got a lot of substance issues, and they will be working beside somebody from the community that has maybe got a bit of a stigmatised view towards that. As soon as they are getting their hands dirty and they are working away, that all falls away. So, it opens up the ground for discussions there, and for people to actually start looking at the positives, rather than the differences. You’ve got a lot of people down there getting educated on things that they are not aware of. (Alan)

Outcomes

The increased understanding and reduced stigma were shown to be the driving mechanisms in clients reportedly feeling more accepted in their communities. One staff member explained that, through greenspace programmes, clients have said they are once again “*being part of the world, being seen, being heard, feeling like a person*” (Jess). Others reported similar:

It has been fantastic to see, because a lot of our clients, unfortunately, probably due to stigma and other challenges, have really been quite excluded from the community. But, through the allotment, they are really reintroducing themselves and becoming a valued member of their local community. [...] To come from such a stigmatised and isolated, lonely place of serious addiction, to actually feeling part of the community that you live in, through the gardens, is absolutely amazing to see. (Gerry)

Programme Theory Nine (new): COVID-19 Impact

A new programme theory that was developed inductively from the staff data was related to the impact of COVID-19. The following table shows the CMOs that were identified. It is worth mentioning that COVID-19 will likely have many effects, and a number of alternative CMOs could be proposed.

Contexts	COVID-19
Mechanisms	reduced trust; reduced hope
Outcomes	reduced mental wellbeing, poorer mental health, and reduced engagement

Contexts

The relevance of this programme theory will change as pandemic-related restrictions ease. However, given that COVID-19 is a macro-level contextual factor that has affected all greenspace programmes over the course of this project, it is important to include this in the current landscape. All staff who were interviewed talked about how COVID-19 forced changes and many services had to either shut or adjust. One staff member explained that *“the whole ethos of the organisation has been challenged”* (Malcolm). Others explained that spaces were much more limited, and many more rules were in place. One interviewee also spoke about how third sector organisations often had more freedom to re-start their groups, whereas NHS programmes were not typically allowed to, meaning people on those groups were particularly affected. Interviewees talked about their frustration with this, given outdoor programmes were likely *“safer in terms of transmission [...] and social distancing is easier to adhere to”* (Gerry), compared to typical indoor treatment programmes.

Mechanisms

In the context of COVID-19, many programmes were reportedly unable to run or provide the same level of support to clients as *“you just can’t build relationships over Zoom, they become artificial”* (Rob). Interviewees said that this likely negatively affected client trust in services with one explaining that they would try to encourage clients back to programmes to then have to inform them that programmes were cancelled again. Another staff member gave an example of this:

A guy this morning, he was quite nervous about going away, but he got around to it, and I think he’s quite looking forward to it, and then this morning I’m getting his fares and all that sorted, just giving him reassurance, going over certain guidelines and stuff and then having to phone him up and telling him that it’s cancelled. (Malcolm)

Some interviewees also discussed how the pandemic had apparently created feelings of hopelessness among clients as some were losing their support system:

Really, what is the hope for them? And hope is a huge part of what we deliver to people [...] We deliver the belief that life could be better, and when life is getting worse for young people, because of what is happening with COVID, what hope? (Rob)

Outcomes

The mechanisms of reduced trust and reduced hope were said to lead to decreased mental wellbeing and poorer mental health, with one staff member saying, *“I genuinely dread to think what the drug deaths and suicide deaths are going to be over these twelve months”* (Rob). Interviewees also spoke about reduced engagement:

95% of young people who are classed as vulnerable have disappeared and, by that, I mean they have stopped engaging with services. So, either the service has stopped, or whatever services that kept going, they have lost those people, they have just no contact with them. (Rob)

Another staff member did say that COVID-19 may actually increase footfall, particularly post-lockdown, due to the challenges people were facing with coping with the pandemic and seeking out support. However, services needed to *“be there and be dependable, especially in a crisis”* (Alan), for this to happen.

Programme Theory Ten (new): Intervention Approach

This new programme theory was also developed inductively from the staff data and relates to the way the intervention is implemented. This programme theory is therefore more programme-focused rather than client or facilitator-focused. The following table shows the CMOs that were identified.

Contexts	explicit focus of programme; a multidisciplinary team
Mechanisms	feeling supported
Outcomes	satisfaction with and commitment to individualised outcome goals

Contexts

The specific focus of the programme was shown through the data to be an important context with one staff member explaining that there are “*all sorts of different entry routes and all sorts of different programmes*” (Michael). Greenspace programmes can be developed as part of a recovery programme, as a prevention programme, or as a programme not specific to substance use, but with the aim of providing holistic support to a range of clients. This context relative to programme focus should reportedly be established in order to identify for whom the programme is for, and what outcomes are deemed desirable, feasible, and attainable for clients. One staff member described the likely need to support clients in a wide range of areas in their lives, as the greenspace programme is “*just a tiny part of a much bigger storyline*” (Jess), and desired outcomes could differ across clients. Another discussed how supporting different expectations usually requires a multidisciplinary team:

We've got a lot of different services involved in the community garden. We've got people from mental health, people from the [name] clinics, which are run by the [clinic] nurses, the district nurses. So, they bring people in, and it is almost like you've got a signposting effect going on as well. People are coming from one agency and whatever their other needs that they are needing to have met, they can always tap into the people that are around. (Alan)

Mechanisms

If the focus of the programme is explicit, and there is a multidisciplinary team, this was said to facilitate a person-centred approach which can allow clients to feel supported. One staff member spoke about how a person-centred approach was essential, in their opinion, as some clients were able to be involved in more intense therapeutic discussions, whereas with others, “*if you go straight to the talking therapies, it can be harder for people who have experienced trauma to find the benefit*” (Jess) because they may feel overwhelmed and pressured, rather than adequately supported. Another staff member spoke about their concerns regarding appropriate personalised support if programme focus is not explicit, because clients' needs may not be properly met:

Has it been a green prescription from their GP? What quality of information did the GP, or the community psychiatric nurse, have, that signposted them to the garden project in the first place? [...] Is it safe? Is the person that is employed in the service, are they able to work with that

person? Are they being given enough information to make a decision based on that? (Jess)

Outcomes

If a programme has an explicit focus which allows a person-centred approach and adequate support, this reportedly ensures satisfaction and commitment to individualised outcome goals. This was described as essential because *“in the world of substance use and recovery people tend to come with a range of wants and needs”* (Gerry). As mentioned, some clients may have a desire to reduce their substance use or maintain abstinence, and one participant talked about the programme being a supportive recovery group. Conversely, for other clients, a reduction in substance use might not be the primary focus. One member related that none of the clients on their programme sought to reduce substance use:

The project we’re in just now is addiction-based recovery work, but it’s unmanaged addictions. At the moment, none of the residents are in any kind of recovery programmes, and the idea is to pilot using therapeutic gardening as a vehicle to reduce harm, that approach to trauma. (Jess)

Programme Theory Eleven (new): Stakeholder Buy-in

This final programme theory was also developed inductively from the staff data and relates to the influence of stakeholder buy-in, for example funders or prescribers, in the success of programmes. This was deemed important to ensure continued funding of programmes and also signposting potential clients onto programmes that may be beneficial. The following table shows the CMOs within the programme theory that were identified.

Contexts	existing funding available; existing clear objectives and outcome measures of the programme
Mechanisms	stakeholder belief that the programme is ‘worthwhile’
Outcomes	increased stakeholder buy-in, such as increased referrals or funding

Contexts

In order to encourage stakeholder buy-in, a macro-level contextual factor was identified to be existing funding availability. Various staff members spoke about how, in their opinion, this was one of the driving contextual factors for greenspace programmes overall and was particularly challenging to navigate given the current landscape of limited funding within all public health interventions. One staff member described how, from their experience, funding for mental health interventions such as greenspace programmes was limited because “*mental health is often the poor relative within the NHS system*” (Jess), although another believed that, because their programme was recovery-focused, this was beneficial in attracting funding. Another voiced frustration with how this contextual factor can negatively impact buy-in:

It's such a cliché thing to say, and it's the obvious thing to say every time, but it is a huge barrier, not just the lack of quality funding, but it's just very short term [...] People are reluctant to buy into things when they are like “well this might only be here for six weeks”, or if it's just a four week taster, or it's just a trial session. Particularly the individuals, but also all the referral organisations, if you go to them and say we are running this programme for the next six weeks, they are not really that interested, because by the time they've actually spoken to people, and started to refer people into it, it's going to be gone again. (Michael)

Given that availability of funding is not typically controllable by those working on the programmes, it was clear through the staff interviews how the very existence of greenspace programmes can be limited and challenged by this one macro-level contextual factor:

Even if you did manage to get it [the programme] to be entirely robust, it probably wouldn't necessarily change anything, it's not like they have got the money there to just go right well as long as you can evidence this, we will suddenly put all this money into green mental health programmes. (Michael)

However, even with available funding, another contextual factor that was said to influence buy-in was if the greenspace programme had clear objectives and outcome measures. This is similar to the programme theory ‘Intervention Approach’ in that programme implementers should reportedly be explicit about who their programme is

open to, and how it will support them. This was cited as important for two reasons: firstly, not every greenspace programme will have a specific outcome focus like reducing substance use, and implementers and/or facilitators were described as not always being clear about programme objectives which can make it more difficult when hoping to “*make a case to the funder*” (Michael) about the efficacy of the programme. Conversely, when objectives were clear, “*it kind of focuses minds on what we are actually trying to do*” (Rob). Secondly, clear objectives were described as a necessary context because greenspace programmes are still sometimes viewed as less established than traditional treatment interventions which can deter potential stakeholders:

...fear of change, you know, “we’ve never done it that way”, you know, “we’ve always done it this way”, stuff like that. Fear of being innovative or fear of challenging the norm, fear of taking risk [...] Those are big challenges for systems, you know, the NHS, trying to get their head around really good greenspace programmes. That is a culture shift.
(Gerry)

On the other hand, when objectives of the programmes were clearer, stakeholders were described as more likely to buy-in to what was being offered.

Mechanisms

If existing funding is available, and if the programme has clear objectives and outcome measures, then stakeholders are supposedly more likely to feel like the programme is worthwhile. This was described as the key mechanism in ensuring positive outcomes relative to this programme theory. One staff member explained that when stakeholders believe the programmes will save the NHS money then it can be a “*win-win*” (Gerry) and is potentially more likely prioritised.

Outcomes

Despite challenges relative to funding, when stakeholders felt like the programmes were worthwhile, this was described as resulting in increased stakeholder buy-in. Two specific outcomes were reported to be increased onward referrals onto programmes or increased availability of programmes due to continued funding, where possible. One staff member said that when there was stakeholder buy-in, it was possible to see “*more people really, really engaged in good quality, structured, activity-based programmes*” (Gerry). Another spoke about how increased buy-in to programmes from wider stakeholders, such as GPs, could increase the likelihood of more secure funding, including for “*upstream*

prevention agendas” (Gerry), meaning that greenspace programmes could play a protective role in preventing, not just substance use, but “obesity, heart disease, you know, the list goes on and on and on the benefits are there, the evidence is there” (Gerry).

Chapter conclusion

This chapter reported the findings from the Phase Three staff interviews which have allowed refinement from the IPT framework, as well as identification of new programme theories. CMOs have been described in detail under programme theory headings. However, as discussed, refinement is an iterative process, and stakeholder interviews in stage one allowed further refinement of staff findings from those with different expertise. These stakeholder findings will now be discussed in Chapter Seven.

Chapter 7: Phase Three - Qualitative findings from stakeholder interviews

Introduction to chapter

The realist interview consists of different stages, with the first designed to test and refine initial programme theories (IPTs), and the second used to consolidate programme theories. This chapter presents findings from the stakeholder interviews which were used to refine the programme theories identified through staff interview data (Chapter Six). The stakeholders held a variety of roles (see Table 10), which was an asset, because it provided a breadth of expertise and enabled context-mechanism-outcome configurations (CMOCs) to be considered which had not yet been identified.

Stakeholder interview findings

The findings are presented under the programme theory headings identified through Phases One and Two, and which were refined using staff interview data in Chapter Six. Participant details and pseudonyms, which are used to attribute direct quotes, are shown below in Table 10.

Table 10: Participant details and pseudonyms

Participant role	Location	Pseudonym
Director of Research Institute	International	Gillian
Research Fellow	International	Sarah
Research Fellow	UK	Hayley
Research Fellow	UK	Jack
Research Fellow	UK	Laura
NHS Practitioner	Scotland	Ross

Programme Theory One: Escape and Getting Away

Contexts

In line with identified contexts through the staff interviews, stakeholders reported that ease of access was an important context to consider, particularly as some clients may have no prior experience of nature, and even local greenspace could be like “*another country*” (Ross):

We think “why would you not want to come to my group or programme? We have designed this wonderful programme, why would you not want to come?” And it’s not that the person doesn’t want to come, they simply can’t get there. (Sarah)

Another stakeholder expanded on this context proposing that it meant more than proximity, and included *“issues of uneven surfaces, slippery surfaces, [...] lighting is particularly important, that feeling of safety”* (Laura). Stakeholders agreed that the quality of greenspace is likely to be as important, if not more important, than the quantity of greenspace, with one stakeholder explaining:

I don’t think the quantity is enough. You can have a piece of greenspace anywhere, but if you don’t feel safe in it, if it’s not attractive, if there is nothing to do in it [...] then they are not going to go to it. (Sarah)

Further, one of the key refinements from stakeholder data was that, in some instances, existence of a greenspace, even if of high quality, does not appear to be enough to engage clients and, in these circumstances, a guided programme is likely necessary. This was described as particularly true for those with little previous experience of nature who may find being out in nature *“anxiety inducing”* (Hayley), or *“may not feel that particular parks were a place meant for them”* (Laura):

If you change the built environment, you only get so far. You need to do this dual approach. You need to change the built environment and animate the space, or promote the space, or give people a reason to use and experience the space, in order to get the desired outcomes. (Laura)

As with the staff interviews, sensory stimuli were mentioned as important contexts, and said to be part of what made ‘quality’ greenspace, with one interviewee explaining that *“it’s a very stimulating experience to touch, to sense, to smell everything”* (Gillian).

Mechanisms

Stakeholder interview data supported the mechanism of the feeling of escape and removal from everyday life, with two interviewees describing this as a feeling of *“being away”*. Feelings of calm, reduced rumination, and feeling present were also supported by the data as mechanisms, as were feelings of awe and spirituality. One stakeholder described clients on rural programmes as feeling *“blown away by it [greenspace], they*

couldn't believe that this was in Britain and the scale of it" (Ross). Another stakeholder echoed this idea:

People just really talked about this ethereal sense of wellbeing whilst being in nature. It's really difficult to pin people down because, when you start separating it out, people talk about the other things, being away from stresses, going into nature, linking, social stuff, but they do also talk about this spirituality, so we include it as a mechanism. (Jack)

An important refinement was that stakeholder data appeared to identify connection to nature as a mechanism rather than an outcome. One stakeholder explained:

The first response I got from all of these people, different people with different mental health issues, was "I feel connected", that is what they say you know, usually, "now I feel connected". That is the first thing that comes out of their mouth. (Gillian)

It could be argued that a connection to nature might be both mechanism or outcome, depending on the CMOc, although some literature depicts mechanisms as being unmeasurable and hidden (Pawson and Tilley, 1997; Westhorp, 2014). In this line of thinking, it is likely that connection to nature is a mechanism.

Outcomes

Stakeholder interviews identified outcomes in this programme theory as "*improved mental wellbeing*" (Laura) and "*reduced stress and anxiety*" (Sarah). As seen in staff interviews, this is a wide-ranging outcome and specific to each individual. One stakeholder used an example of a person they worked with:

I have worked with a lady who had severe panic attacks, she had really severe anxiety issues. Four weeks after coming to work with me one-to-one, every Thursday afternoon, four weeks after working with plants, she was a completely different person. (Gillian)

Programme Theory Two: Space to Reflect

Contexts

Stakeholder interviews supported the contextual factor of the greenspace environment providing physical space, with one stakeholder describing this as something “*you do not get in a clinic room*” (Ross). A refinement was that this context was linked to the perceived neutrality of the space, with stakeholders defining greenspace as “*a non-threatening environment*” (Gillian) and “*non-institutional*” (Hayley). Length of time on the programme was also identified by stakeholders as an important context for this programme theory. Another refinement was that age was not identified as a context like it was in the staff interviews. It is possible that age was identified by those working directly on programmes and with more in-depth knowledge about how individual-level factors may affect programmes.

Mechanisms

The mechanisms of not feeling ‘boxed in’ and having ‘space to reflect’ were supported by stakeholder interviews. One stakeholder spoke about how more traditional mental health and/or substance services can feel oppressive for clients and involve “*going into a room and shutting the door*” (Ross) whereas, on greenspace programmes, “*it’s a better dynamic there, with the environment being an active player [...] it can be the space and something to focus on while you process what it is you are working on*” (Hayley). Another stakeholder agreed with this, saying that “*outdoors gives much more opportunities for your participant to look around and feel connected to something bigger*” (Gillian). As in staff interviews, the use of metaphors was identified as a mechanism, with one interviewee explaining that this was linked to reflection:

They see nature’s life cycles in everything, not only plants, but insects, decay, death, growth, everything, and that is how they incorporate it to their own life [...] When we work with people with addictions, for example, it is very important to give them a sick plant [...] and don’t tell the participant what to do with the plant, just ask the participant questions, what will you do? Do you want to water it? Do you want to prune it? Does it need nutrients? Do you need to change the soil? It’s the best way to make obvious what might not be obvious to them. (Gillian)

Outcomes

As with staff interviews, stakeholders identified that the key outcome in this programme theory was increased sharing and ‘opening up’ by clients about their lives, challenges, and problems. This supports the refinement from the IPT which originally proposed the outcome of ‘a desire to change’:

One of the things about natural environments as a setting for health promotion is that it's a sort of neutral space, a non-institutional space, which allows people to think about things differently and have different types of conversations than they would do in a therapist's room or a doctor's setting and so on. (Hayley)

Programme Theory Three: Physical Activity

Contexts

Weather was also identified by stakeholders as an important context to be able to adapt to, and programmes should ideally have available resources for clients to use, such as kit and equipment:

There are a whole host of issues about the sort of financial and cultural capital to turn up to these things. Even things like having wellies and an outdoor coat isn't a given for most people, particularly for urban groups. (Hayley)

Similarly, availability of resources such as trained programme facilitators was described as an important context to promote engagement, particularly when working with people with existing conditions such as PSU. One stakeholder explained, “*if the leader is skilled in their communication about the activity and the health condition then a person is more likely to adhere to an activity*” (Jack). This context is similar to in the first programme theory, Escape and Getting Away, and highlights the importance of addressing initial support onto programmes and the necessity of trained individuals to facilitate this. A refinement taken from these interviews was that time commitment was said to influence physical activity outcomes. One stakeholder described this context as a “*big, big issue [...] you've got to spend enough time there for it to be beneficial*” (Hayley).

Mechanisms

The mechanism of enjoyment of activity was supported with data from the stakeholder interviews. One interviewee explained that “*when you tell someone to go and exercise, they won’t do it*” (Sarah), and the client typically needs to be interested in the activity from the outset, something echoed by another:

Physical activity by stealth is really important, that some of these things sort of integrate being active without it being the central focus [...] if you can improve people’s wellbeing and their health, why shouldn’t you offer something they would want to do, why force them into something that they were reluctant to do? (Hayley)

Endorphins from physical activity were not identified in the stakeholder interviews as a mechanism. However, it is possible that this was only identified by those working directly with clients on programmes given that a number of staff interviewees discussed this. The principal function of endorphins is to inhibit the communication of pain signals and produce a feeling of euphoria, so their effects have been compared to the effects from other opioids (Jain et al., 2019). Future work exploring client experience in substituting the highs from substances with the natural highs from physical activity could provide a deeper insight into this. Indeed, stakeholders discussed the importance of considering a variety of mechanisms within this programme theory, rather than attributing too much power to physical activity itself:

It [physical activity] is crosscut and intertwined with so many other mechanisms that it just becomes one of a really rich suite of things that people are doing that are making themselves feel better. I think there is a really strong lobby, especially in the UK, around the sorts of organisations that deliver those physical activity interventions [...] they sit around a lot of the right groups, they are involved in a lot of the right areas, so they put themselves as a prominent mechanism. I don’t disagree that it’s an active ingredient, but I think it has real prominence [...] it certainly is not the be all and end all. (Jack)

Outcomes

Increased physical activity, improved mental wellbeing, and improved physical health were all described in stakeholder interviews as outcomes within this programme theory,

with one stakeholder discussing that there appears to be a “*significant intervention effect for improved mental wellbeing as part of increased physical activity*” (Laura), and another explaining that when clients “*do more physical activity, that then effects their physical health, it can be a nice circle of impact*” (Sarah).

Programme Theory Four: Self-Efficacy

Contexts

The availability of trained and competent facilitators was supported by the stakeholder interview data as the central contextual factor in this programme theory. Without availability of facilitators, the mechanisms and outcomes in this programme theory were described as unlikely to occur:

We horticultural therapists are the facilitators. We have to teach our participants how to handle plants so they can build their self-confidence. That is the first point. If we don't achieve that first step, it is very difficult to have positive outcomes [...] it has to be delivered by a trained person.
(Gillian)

Mechanisms

Stakeholders also agreed that key mechanisms in this programme theory were empowerment and confidence through the learning of new skills, as well as the potential for re-learning old skills. One discussed how this mechanism does not often happen within more traditional treatment settings:

The traditional model of mental health treatment is a couple of people sitting in a room, one of them is called a professional and one of them is called a patient, and they talk about mothers and traumas and all sorts of stuff. And I wouldn't sort of throw the baby out with the bath water there, I think there is some value in that, but what it probably doesn't do, at least directly, is allow someone to explore opportunities and activities that might allow them to find out new things about themselves in terms of what they are able to do, and what their capacities are, and I think there is quite a lot about outdoor activities that can bring you into contact with that [...] I guess the classic model of CBT would be talking to somebody about doing things. Whereas maybe in a greenspace that would be just go and do it with them, you know, just actually go and do it. (Ross)

Similarly, another stakeholder discussed that, in greenspace programmes, *“there is probably a whole load of skills development stuff [...] you can be doing therapy and learning a skill effectively”* (Hayley). It is important to note that stakeholders spoke about different programme types and, while the activity might differ across programme types, the mechanism of empowerment through learning or re-learning appeared to remain constant.

Outcomes

Increased self-esteem was described as a key outcome, and one stakeholder discussed how this could be achieved through different types of programmes/activities:

The vehicle of going out and camping, walking, and putting up tents and chopping up sticks and making a fire and catching, whatever it might be, is just the vehicle. But, through that, what the person gets is an increased confidence through seeing that other people have confidence in them, and when they have confidence in them, they find that they can do things, which then loops back on itself in a kind of “Okay I’m good enough” sort of way. (Ross)

Stakeholders also identified the outcome of new skills being transferred to life outside of the programme, whether these were physical, psychological, or social. One interviewee spoke about how clients they had previously interacted with said that the most important change was *“the things that they can do now, and the things that they now want to do once home, talking about being more confident about being outdoors, with people, and working with tools, for instance”* (Hayley), and these changes had reportedly impacted their life positively after the programme.

Programme Theory Five: Having a Purpose

Contexts

The structure and routine of the programme was described again by stakeholders as an important contextual factor. Like in the staff interviews, routine and structure did not appear to refer to programmes being rigid and inflexible, but seemed more closely linked to being a reliable presence and something constant in a client’s life:

Getting up in the morning and having a structured day and interacting with people that you know, or have come to know quite well, is a real

motivating factor [...] you have people who have been in the house for six months and actually getting up in the morning and putting on their socks was considered a real benefit to their day. (Jack)

Stakeholders also discussed the need for programmes to be person-centred:

Each person or participant has to have very clear goals and we have to work towards those goals. It's not just going to the garden and killing time. (Gillian)

Mechanisms

The mechanisms identified by the stakeholder interviewees matched those identified by the staff interviewees. Both feelings of purpose and feelings of achievement were said to be closely linked, and responsible for related outcomes, as “a sense of purpose” (Hayley) could “change somebody’s social identity [...] a change in identity away from the negative” (Laura). One stakeholder explained that, in their opinion, clients should be responsible for something from the outset, as this facilitates feelings of purpose, particularly in those with complex health conditions:

The best results I have seen, and the fastest, is people with severe depression or anxiety. They [results] are tangible, really tangible, because they work with living organisms that respond to the care that they give. (Gillian)

Outcomes

Improved self-esteem was identified through the data as the main outcome in this programme theory, but a refinement from the stakeholder data was that increases in self-esteem, which were achieved through feelings of purpose, also appeared to be linked to future planning. However, it is important to note that this may not be an outcome seen across all clients and will likely be affected by individual differences such as the client’s desires and goals:

There might be a generalisation from the outdoor greenspace activity into more general stuff like maybe I feel like I can go to college now, or maybe it does feel like it’s worth applying for that job. (Ross)

Programme Theory Six: Relationships with Facilitators

Contexts

Stakeholders described that programmes having a 'doing with' rather than 'doing for' culture was essential for programme success, with one stakeholder discussing how they had encountered hesitancy around this in other substance use services:

We have lots of anxieties about doing stuff with people and that it might change the nature of the relationship but, in my experience, most of those feelings are pretty unfounded [...] it can be extremely helpful to go off and do things with people in that way [...] we don't want to get attached to our patients, the fact that we call them patients is othering in itself, you know? "I will be the doctor, you be the patient" [...] my experience of greenspace programmes is that those barriers are broken down a bit, spend any time kicking around in [area of greenspace], you know in a group, pretty quickly you are all having to muck in. (Ross)

Stakeholders also spoke about clients typically needing adequate time on the programme, and staff working in a trauma-informed way in relation to clients' backgrounds. It was also reported that 'trauma-informed' should not be a buzzword, and was an important context of the programmes so staff can better understand the challenges that clients may have in forming relationships:

We are talking about a group of people who tend to have had large amounts of trauma and adversity in their background, and the use of substances is a management of that [...] if you are working with somebody who has never, I mean genuinely in their life, never really had anybody who has believed in them, or thought they were worth anything, or taken the time to pay any attention to them, it might take years and years and years of you believing in them until they believe in themselves. (Ross)

Further, it was suggested that facilitators must also be aware of clients' interaction with services up to this point:

The dynamic already with their interaction with the health system could have a big influence on how they react to that referral [...] you could sort of imagine someone who has been going backwards and forwards to their

doctor for five years with mental health problems and never really quite reaching that threshold for more acute care. (Hayley)

A contextual refinement in this theory was that stakeholders discussed the need for diversity within the facilitating team. It was proposed that there should be a mix of genders, as well as ethnicities, as limited diversity across staff was described as a barrier to the mechanisms needed in this programme theory, particularly for those from different backgrounds:

If you felt you don't belong, you don't want to go, do you? It's very difficult to build those relationships if you don't have those common languages or common points of reference and support. (Hayley)

Mechanisms

As in staff interviews, decreased power imbalance was identified through the data as an important mechanism that reportedly leads to increased engagement and buy-in from clients, with one stakeholder explaining that a decrease in power imbalance can allow both facilitators and clients to “*just be a human being*” (Ross), rather than institutionalised roles such as patients and doctors/therapists. Increased trust, and feelings of safety, were also identified by stakeholders as mechanisms within this programme theory, with one describing these as the “*key variables [...] it's all underpinned by trust and connection and safety*” (Ross). A refinement was that stakeholders identified increased communication between facilitator and client as an additional mechanism in maintaining engagement and buy-in:

Staff need to communicate clearly about the duration, frequency, and regularity that it would benefit somebody [...] People got really cross if they did it for three weeks and didn't see any improvement so, for us, the evidence was around that kind of communication, the dynamic and transparency. (Jack)

Outcomes

Engagement and continued buy-in by clients were shown through the data to be the main outcomes in this programme theory, with one stakeholder discussing that continued engagement was often a result of the ‘doing with and not for’ context which was said to decrease power imbalances:

...it enhances programmes and makes a deeper sort of connection and buy-in that might mean that the stuff that he chooses to tell me about, I might learn more. And heaven knows, we may even become friends and keep in contact with each other afterwards. (Ross)

Another discussed how programmes can fail, if the right contexts and mechanisms are not in place:

A programme could be incredibly well designed but, like you say, if the leader hasn't connected with the group for whatever reason or whatever, then that can be devastating in getting the benefits that you are expecting, or the outcomes you are expecting. (Hayley)

Programme Theory Seven: Increased Communication through Shared Experiences

The stakeholder interviews confirmed the division of 'Shared Experiences' into two separate programme theories, with the first being 'Increased Communication through Shared Experiences'.

Contexts

The greenspace providing an enabling environment was discussed as a key context and programmes were described as a "vehicle" (Ross) through which change could happen. Engagement of peers on the programme was also described as an important context, as it was in staff interviews. Stakeholders spoke about how when a programme was seen as a social activity, it may be more attractive to clients, compared to individual activities. As one stakeholder stated, "*there is nothing like a group to change your mind*" (Ross). However, another stakeholder discussed how involvement of dominant peers could be detrimental:

We have some evidence from some of the gardening groups that there were really dominant members of groups which meant it was great for them, those dominant members are getting all sorts from these programmes, but then there was a whole set of people involved who just weren't enjoying themselves, didn't have any autonomy, didn't have the ability to, you know, to speak up and say "I'm doing this and let's not do it that way", and so on. (Hayley)

To try and address intergroup challenges, the existence of trained facilitators was described as a mitigating context to support client interactions and the group dynamic:

It is helpful to have someone around who is interested in group dynamics because a fair few of the people who might be on this sort of thing may be coming from group backgrounds, like families, that have not been straightforward, and the way in which they experience groups can be problematic. So, they might always feel like they are left out in a group, they might always feel like the group is against them, they might feel like they have no place in the group, that the group doesn't want them, and will, you know, re-enact that sort of drama within the group. So, it can be quite useful to have somebody there to sort of keep an eye on that sort of stuff, and find a way of talking about it, and facilitating, and making sure it doesn't just get re-enacted in problematic ways. (Ross)

Mechanisms

The process of working as a group, and sharing experiences on the greenspace programme, was described as enabling communication. One stakeholder reported, “*the greenspace gives the opportunity for your participants to communicate and work on a project together*” (Sarah), and another said clients could therefore “*learn from the other members of the group*” (Gillian).

Outcomes

Stakeholders identified that it was the mechanism of increased communication through shared experiences that led to the outcome of perceived improvements in peer and other relationships, with one saying that, in their opinion, this was the most important outcome on programmes, over and above substance use-related outcomes:

Is there a connection there, are they turning up, are they meeting with people, are they forming other dependencies? [...] Are you seeing a sort of shifting independence that the person might be interested in connecting to the service, to the people within it, to college, to other activities, to clubs, to groups, to people? I guess the idea of some greenspace programmes, it's like let's just do some stuff, and get connected, and build relationships, build huts, build bivouacs, do what you like but, fundamentally, what you are really doing is building connections and building relationships to the point where, if you do it long enough, the

substance use might take care of itself, because other things have taken its place. (Ross)

Programme Theory Eight: Reduced Isolation

The second of the divided programme theories was confirmed by stakeholder interview data as 'Reduced Isolation'.

Contexts

As seen in the programme theory above, greenspace as an enabling environment and the availability of trained facilitators to support client interactions were also identified through the data as key contextual factors within this programme theory.

Mechanisms

With an enabling environment, and trained facilitators to support the group, an increased understanding of other people's lives and experiences was described as a central mechanism, with one stakeholder discussing how clients sharing their lived experiences can be particularly beneficial as it can allow them to "*share what a programme has done for [them] as that individual, how [they] have come through the programme, and what it's helped [them] with*" (Sarah). This was also said to be linked to the mechanism of reduced stigma by self, community, and peers which was said to allow a "*feeling of belonging*" (Laura).

Outcomes

Increased understanding of others and a reduction in stigma were the mechanisms that were said to enable clients to integrate back into their communities in a way they had not been before:

They were saying things like well I did this programme and I realised that they (other people on the programme and within the community) weren't just going to spit in my face and there was that identity away from being a prisoner, or a sort of pariah, into being a member of society. (Jack)

Programme Theory Nine: COVID-19 Impact

Contexts

Like in staff interviews, COVID-19 was identified by stakeholders as a macro-level contextual factor that had affected all greenspace programmes over the course of this

project. However, there were less data from stakeholders compared to staff which may suggest that staff working directly on the programmes themselves had more of an insight about how the pandemic had affected both the running of programmes, and their clients.

Mechanisms

Stakeholders agreed that the pandemic likely had a negative impact on the provision of services which was said to contribute to clients being less trusting of services overall. Moreover, one proposed that lockdown could in fact give facilitators and other stakeholders a better understanding of how isolated clients may feel at other times:

It (lockdown) might actually give us some empathy of what it can be like for people who have been locked down their whole life. (Ross)

Outcomes

Outcomes in this programme theory were described as decreased mental wellbeing and poorer engagement with programmes, but some stakeholders said they were uncertain about the wider outcomes and the longer lasting impact on mental health services. For example, the pandemic may actually lead to larger numbers of people engaging with programmes post-pandemic who are seeking support.

Programme Theory Ten: Intervention Approach

Contexts

This programme theory was described by stakeholders to be particularly important to consider when deciding ‘for whom’ a programme is implemented for. Various interviewees felt it should be addressed in order to identify what outcomes are deemed desirable, feasible, and attainable for the client. For example, some programmes may focus on providing wider support without an explicit focus on reducing substance use, whereas other programmes may be more suited to people in recovery. One stakeholder explained that interventions should, in their opinion, target different levels of support and have a different focus, depending on the client, because there is no single intervention that will work across a population as that would be “*too simplistic*” (Laura). Deciding the programme focus was also described as essential so that the people on the programme work in a trauma-informed way, and so facilitators are confident in supporting the clients on the programme. This was said to be important since the necessary facilitator skillset will differ depending on programme focus, for example whether it is specifically a substance-use programme, or wider support programme. As mentioned in the staff

interviews, having a multidisciplinary team was described as an important context to address this in order to provide the necessary “*complex network of relationships and services and organisations*” (Jack).

Mechanisms

By deciphering programme focus, this was said to ensure a person-centred approach which reportedly enables the mechanism of feeling supported. One stakeholder spoke about how clear focus of the programme was essential, in their opinion, so that clients didn't feel “*fobbed off*” (Hayley):

If there is a lack of support, and an expectation-delivery gap, that can have an independent effect in itself, never mind the effectiveness on the programme. (Hayley)

Outcomes

According to stakeholder data, only through person-centred, trauma-informed programmes that adequately support the clients, can outcomes be achieved, rather than over promised. Outcome goals were described as needing to be individualised, based on the context of the programme, and therefore more readily accepted by clients. For example, an outcome could be reduced substance use on a recovery-based programme. One stakeholder discussed that, in their experience, “*what we are looking for really, is to change their [the client's] point of view, or the desire for the drug*” (Gillian). Another discussed how even substance-related outcomes needed to be individualised because “*there is actually a lot of difference between the ways that people experience recovery and reductions in symptoms*” (Jack).

Conversely, another interviewee said that, in their opinion, focusing explicitly on reducing substance use was “*missing the point*” (Ross), because other outcomes were more desirable for some people. For example, in holistic programmes that provide multilayers of support, clients may not feel defined by their substance use for the first time, if the programme outcomes are not specific to reductions in use. Indeed, the interviewee described single symptom outcome measures, such as quantifying substance use, as not providing enough information:

Substance misuse services, that term, it's like a big sign over the door to remind people who are coming in that this is what they are here for, and that includes both people looking for help and the people providing the

help. So, it tells the people who are providing the help, this is what you are here for, to talk about substances, and it tells the person coming in for help that what they are here for is to talk about substances. And the problem with that is a whole load of other stuff might get missed, that is, you know, actually what gave rise to the person needing to have a relationship with substances in the first place [...] it would be a red herring or a misnomer to call it a substance misuse intervention, it's got nothing to do with that, it's a relationship intervention, it's a connection intervention, a side product of which might be that the person may, in time, be less dependent on substances. (Ross)

Programme Theory Eleven: Stakeholder Buy-in

Contexts

Existence of funding availability was considered by stakeholders to be key in this programme theory because, if there is no funding available to support programmes, then, regardless of their potential, stakeholders will not buy-in to their implementation. One stakeholder explained that, overall, “*the biggest issue is money*” (Gillian). Clear objectives and outcome measures were also shown through the data to be essential. Those running the programmes were described as needing to ensure that funders, or other key stakeholders, such as those referring clients onto programmes, understand the purpose of programmes, whether their aim is reducing substance use or wider:

There is absolutely a job on the part of whoever, me, you, to educate funders about what it is that they are actually funding and, to say, you might think that you are funding a substance misuse issue, but what you are funding is a relational deficit problem. (Ross)

Another stakeholder suggested that, in some circumstances, this may mean convincing stakeholders to change expectations about what programmes can feasibly offer, “*rather than trying to impose particular outcome frameworks*” (Jack). In staff interviews, clear objectives were said to be important because some stakeholders still viewed greenspace programmes as less established than traditional treatment routes, and this could be a barrier. Similarly, a refinement from the stakeholder interviews was that existing beliefs about the programme could also have an impact. According to the data, if GPs, funders, or other relevant stakeholders already had awareness about the benefits of greenspace programmes, they were more likely to have positive feelings towards them. On the other

hand, if they had no experience of greenspace programmes, “*they are very much less likely to refer*” (Jack). One stakeholder described this context as a necessary culture shift:

It just goes against the culture, because we’ve had 100+ years of treating people with mental health problems as having an illness that needs a discrete treatment by discrete, clever professionals in discrete clinics. That’s quite a church to bring down. (Ross)

Mechanisms

The identified mechanism in this programme theory was described as increasing acceptance and feeling like the programmes were worthwhile and a “*good use of time, resources, or money*” (Ross). Interviewees discussed how this mechanism was particularly evident when stakeholders could see the wider value of programmes, for example in terms of a larger number of people being able to use programmes, or other benefits at a population level:

The whole town or area has the potential to use that space, so it’s for people to use, it’s free, so hopefully you’re reducing inequalities, it’s population level, so we are not just working at those lower individual community levels. (Sarah)

Outcomes

If stakeholders believe programmes are worthwhile, interviewees agreed that this can lead to either increased referrals onto programmes, or increased funding, as long as programme objectives and outcome measures are clear and there is money available. One interviewee spoke about how, in their experience, there appears to be a growing willingness to fund greenspace projects:

They are both projects funded at, you know, £1,000,000 plus, so they are big projects, so I suppose you can take that as an indicator that the funders like that approach. (Laura)

However, an important caveat was that this particularly project was linked to a research institution, so it is possible that this context also played a part in securing funding.

Conversely, it could be less likely for a third sector service, for example, to secure this kind of funding or buy-in.

Chapter conclusion

This chapter reported the findings from the Phase Three stakeholder interviews which enabled refinement from the staff findings. CMOs have been described in detail under programme theory headings. As discussed, refinement is an iterative process, and a second stage of qualitative interviews allowed the final testing and consolidation of programme theories. The consolidation data gleaned from stage two interviews will now be provided in Chapter Eight, along with final programme theories and CMOs for greenspace programmes that support people with their mental health and PSU.

Chapter 8: Consolidation interview findings and final consolidated programme theories

Introduction to chapter

This chapter presents the consolidated programme theories identified through the stage two interviews. These are the final programme theories which seek to explain how greenspace programmes effectively support people with their mental health and problem substance use (PSU). To aid understanding, the final consolidated programme theories are presented first at the start of the chapter (Table 11). The stage two findings are then reported in detail under the programme theory headings.

Consolidation interview findings

Table 11 shows the final consolidated programme theories and corresponding context-mechanism-outcome configurations (CMOCs) that have been refined through the two qualitative interviews stages, and which are described in detail in this chapter. These are presented as ‘if (context), then (outcome), because (mechanism)’ statements to explicitly show causality between components.

Table 11: Final consolidated programme theories and corresponding CMOCs shown as ‘if-then-because’ statements

Programme Theory Name	CMOC shown as an ‘if-then-because’ statement
Escape and Getting Away	If there is easy access to a quality greenspace environment with a planned programme, mental wellbeing will be improved and stress will be reduced, because of feelings of ‘being away’, being present, reduced rumination, feelings of awe, and a connection to nature.
Space to Reflect	If there is greenspace to provide physical space and a neutral, non-clinical backdrop for therapeutic conversations, then as long as there is adequate time spent on the programme, this results in increased discussion and opening up, because of clients no longer feeling boxed in and confined, and have space to reflect.

Physical Activity	If there are a variety of activities available, and programmes have the right resources such as staff and equipment suitable for poor weather, and if clients have enough time on the programme, then this will lead to increased engagement and improved physical and mental health, because clients will enjoy the activities they do.
Self-Efficacy	If there are available, trained facilitators to lead programmes, and the programme environment is supportive, and if clients have enough time on the programme, then clients will learn new skills and be more confident in applying skills to their lives outside of the programme, because of increased feelings of empowerment and confidence from learning new skills, or relearning old skills.
Having a Purpose	If a programme provides structure and routine and provides a person-centred focus, then clients' self-esteem will increase, because of an increased sense of purpose and changes in self-identity.
Relationships with Facilitators	If a programme has a 'doing with' and not 'doing for' culture, is trauma-informed, is of adequate length, and if facilitators are from a range of backgrounds, then clients are more like to engage with, and buy into programmes, because there is decreased power imbalance, increased communication and feelings of trust and safety, and clients feel respected.
Increased Communication through Shared Experiences	If the greenspace programme provides an enabling environment, in comparison to typical treatment environments, and if there are trained facilitators to guide group dynamics and interactions with peers, then this leads to improved relationships with peers and others, because of increased communication through shared experiences.

Reduced Isolation	If the greenspace programme provides an enabling environment, in comparison to typical treatment environments, and if there are trained facilitators to guide group dynamics, then isolation is reduced and clients integrate and 'reconnect' back into their community, because there is increased understanding of others and decreased stigma and judgement.
COVID-19 Impact	If COVID-19 and related restrictions exist, then mental wellbeing is reduced, because programmes are unable to provide the same level of support and there is reduced trust of programmes and reduced feelings of hope for the future in clients.
Intervention Approach	If programmes have an explicit focus and a multidisciplinary team approach consisting of the right expertise, then clients will feel satisfied with the programme and will be more likely to commit to the programme, because they feel adequately supported.
Stakeholder Buy-in	If there is funding available to support the continuation of programmes, if programmes have clear objectives and outcome measures, and if wider stakeholders (such as funders or those signposting onto programmes) have experience or knowledge of the benefits of greenspace, then this will lead to stakeholder buy-in, because they will believe the programmes are worthwhile.

Detailed final consolidated programme theories

Participant details and their pseudonyms are shown below in Table 12.

Table 12: Participant details and pseudonyms

Participant role	Location	Pseudonym
Programme manager	UK	Harry
Third sector practitioner	Scotland	Gemma
NHS practitioner	Scotland	Richard
NHS practitioner	Scotland	Annie
Programme manager	International	Beth

Programme Theory One: Escape and Getting Away

Ease of access, quality greenspace, and previous experience of nature were all confirmed through the data to be the main contextual factors in this programme theory. As with stage one stakeholder interviews, consolidation interviewees spoke about how ease of access was not limited to proximity:

Seating and good paths are important for access, and lighting always seems to be important. (Gemma)

Proximity was deemed important by interviewees, but one discussed how a buddy system could support clients to programmes that are further away. However, it was acknowledged that location could be a barrier, and is therefore an important context to consider in programme development. The subjectivity of what 'quality' means relative to greenspace was discussed, and there was general agreement that when greenspace has higher biodiversity and various stimuli such as bird song, and is free of litter, graffiti, and other vandalism, then it is more likely people will view it as high quality and want to spend time there. Interviewees highlighted that previous experience in nature could also include negative experiences in nature, for example if people have been attacked, or felt unsafe in a greenspace, then this could negatively impact outcomes and potentially lead to worse mental wellbeing and increased stress. This was linked to the context of needing both quality space and a planned programme as, particularly if clients had negative experiences within greenspace, the existence of the space was likely not enough to facilitate engagement. Feelings of 'being away', feelings of being present/reduced rumination, and spiritual feelings of awe were all confirmed through the data as mechanisms. One interviewee described clients as saying that greenspace programmes are "*a place to escape to, [their] own space*" (Richard). Supporting stage one stakeholder findings, connection to nature was established as a mechanism, with three of the interviewees discussing its importance:

Just being outside and connecting with nature, even if it's just outside your door. (Annie)

Another spoke about how all mechanisms were reportedly present across different programme settings, whether that was in an urban programme or a wilderness programme:

They are just different versions of getting away from your normal life activity, different ends of the spectrum, but they are basically serving the same function in that you are getting away. (Annie)

Through these mechanisms, outcomes were confirmed through the data to be improved mental wellbeing and reduced stress, with one interviewee explaining that, not only do programmes appear to reduce stress, but clients can “*feel like they are more in control of [their] stress*” (Gemma). Being in greenspace was also said to “*restore attention*” (Beth). Despite there being some criticism of Attention Restoration Theory (Ohly et al., 2016), discussed in Chapter Two, it is still a prominent theory within the research field (Hartig et al., 2014), so it is possible that attention restoration is indeed an outcome linked to this programme theory, despite it not being mentioned in interviews up until this point. This interviewee also discussed physiological outcomes related to stress, such as cortisol level, and how greenspace programmes can reduce stress hormones, heart rate, and blood pressure. Again, these outcomes have been identified within empirical literature (Li, 2019), so are potentially important, despite not being discussed in previous interviews. Given the quantitative measures that are typically used to explore both cognitive and physiological outcomes, the lack of quantitative testing may explain why these outcomes were not discussed more.

Programme Theory Two: Space to Reflect

The longer that a client took part in the programme, the more likely they were to benefit, with one staff member explaining, “*the longer we can keep people, the better we believe the outcomes will be*” (Harry). The physical space provided by the greenspace environment was also discussed as an important contextual factor within this programme theory, with one interviewee describing their interest in moving existing substance use support groups outside because groups then often feel “*less pressured as there is more space*” (Gemma). The refinement of the space being neutral and non-clinical was supported in the consolidation interviews:

In comparison with clinical appointments, where I've met people in an office environment for around forty-five minutes, or an hour, it's the natural setting, the reduced sense of the power balance between the professional and the client, it felt like a much more equal footing for the client to attend [...] it's a very non-threatening, supportive place. (Beth)

Like in the stakeholder interviews, age was not identified as a context relating to this programme theory, so was removed as a contextual factor. However, it is important to note that age could still be a micro-level individual factor that could mediate outcomes, despite not being explicitly linked to a programme theory. The key mechanisms in this programme theory were identified as the feeling of not being 'boxed in' and having space to reflect. Four of the interviewees mentioned that clients describe that they don't feel enclosed within "four walls" when on greenspace programmes. For example, one practitioner spoke about how programmes in greenspace are "much more positive on your mental health than being surrounded by four grey walls [...] I feel like you can't have headspace in a small room" (Gemma). The use of metaphors was not discussed in the consolidation interviews, but was mentioned in both staff and stakeholder interviews, so this could be a mechanism that occurs for some specific individuals rather than across a range of individuals so needs to be explored further. Consolidation interview data confirmed that the outcomes relating to this programme theory were increased opening up and discussion by the client. One interviewee spoke about how some clients felt that the typical treatment process within psychiatric care consisted of repetitive conversations, and the move outside onto a greenspace programme was "refreshing":

The clinical model is almost a self-fulfilling prophecy. Clients are so well tried and tested, you know, for your drug-using and alcohol-using customer or service user, it's "right how much have you been using? How much have you been drinking?" Very problem saturated still. Whereas, I think the feedback I get from clients is that this is refreshing, this is not about focusing, it's not about saying we are trying to run away completely from everything, but it's helping us gain perspective about where we fit in the bigger picture here, and what else is going on around my life. (Beth)

Programme Theory Three: Physical Activity

Availability of resources, including trained staff, was confirmed through the data as a necessary context:

In the same way that we have a therapist, in [the] therapist's room, we need to take that person and put them in the greenspace, and they need to be employed. They need to be trained and employed, and we can't just have it running on volunteer availability. (Gemma)

Availability of suitable equipment was also described as important and, related to this, weather was mentioned by most interviewees. As previously discussed, this is not a controllable context but should be addressed to ensure it does not negatively impact the programmes:

People that attended, they were not appropriately dressed sometimes, and we had to provide them with woolly hats and give them a spare jacket, because they just didn't fully appreciate the need to wear multiple layers [...] it's quite a challenge in itself to have anyone, with or without any sort of emotional health difficulty, to withstand a five hour day trying to keep moving outside to keep warm [...] I mean the very practicalities of just keeping warm and having appropriate clothing or ultimately having another budget for people to have work clothes and to ensure that they don't develop any sort of respiratory illness from being outside for long periods of time. (Beth)

The refinement of time on the programme as a contextual factor was confirmed by the consolidation interviews:

The physical activities would have an extremely positive effect on people's recovery outcomes, as long as they were engaged for a good period of time. (Harry)

Enjoyment of activities was confirmed through the data as the key mechanism within this programme theory, with one interviewee saying that, in their opinion, activities cannot be “too prescriptive”, and they “need to match what people actually want to do” (Richard). Another spoke about how they believed enjoyment of activity was important within residential recovery programmes where some difficult and intense work might be happening with clients, and the physical activity on greenspace programmes gave people something to look forward to. Endorphins were not spoken about as a mechanism in consolidation interviews, so were removed from this programme theory. Increased engagement with physical activity was described as the main short-term outcome; even

if this is not high intensity exercise, the client is “*getting outside, getting fresh air, moving around*” (Gemma). Self-reported improved mental health and self-reported improved physical health were described as longer-term outcomes, for example improving immune function and strength.

Programme Theory Four: Self-Efficacy

Since this programme theory was related to learning new skills, availability of competent facilitators was confirmed through the data to be a key contextual factor, similar to the Physical Activity programme theory. However, consolidation interviews also identified the need for a “*supportive*” and “*safe*” learning environment that meant participants were able to feel more confident about trying new activities:

What we are not doing is saying “Okay you’ve got to do that”, it’s, “if you come along, you engage as much as you can”. So, it’s all encompassing, it’s not seen as some macho testosterone-fuelled activity you know? It’s for everybody. (Harry)

Time on the programme was also described as essential during consolidation interviews, with interviewees discussing that it usually takes time for clients to feel “*comfortable enough to engage*” (Beth). However, some interviewees also explained that short-term funding can make longer programmes difficult, and some programmes can be as short as four weeks. Within the right contexts, the mechanisms in this programme theory were said to be empowerment and confidence from learning skills, or re-learning old skills. As reported in the stage one interviews, new skills could be a variety of activities. One interviewee spoke about clients learning practical conservation work such as dry stonewalling and footpath work, another spoke about learned skills being related to different coping strategies. Regardless of the skill, interviewees agreed that it was the “*huge impact on confidence*” (Gemma) that was the mechanism leading to positive outcomes. Indeed, one interviewee described the increase in confidence and empowerment as a “*catalyst for change*” (Harry). Self-esteem was previously identified as an outcome, but consolidation interviews highlighted that this was more accurately described as a mechanism. As a result of increased empowerment, confidence, and self-esteem, the main outcome in this programme theory was described as an increased application of skills to the client’s life outside of the programme. One interviewee described this as a “*spill-over*” (Gemma), when clients use newly learnt coping mechanisms in their life away from the programme. Another echoed this:

They are given transferable skills and a sense of capacity to emotionally regulate in a different way [...] There is something about working in that natural framework that helps you learn to cope with loss and helps you learn to cope with failure, because it's part of a process. (Beth)

Programme Theory Five: Having a Purpose

The structure and routine of the programme was confirmed through the data to be a key contextual factor, and one interviewee reported that clients often felt that the routine gave them purpose:

It's the structure and activity and being outside [...] having something to get up for, something to encourage [them] to just get dressed, get active. (Beth)

Consolidation interviews also highlighted the need for programmes to have a person-centred focus, and not assume a one size fits all approach:

Often, they have got a programme and they try and fit people into the programme, rather than putting the person at the centre of it. (Richard)

Feelings of purpose was discussed as a key mechanism, and interviewees spoke about how this was apparent across a range of different activities and programmes. Linked to feelings of purpose were positive changes in self-identity:

There is always a sense that activities are about distraction, but it's about meaningful and purposeful engagement [...] [clients] are almost able to give themselves respite from this tendency of excessive rumination on their problem-focused situation, that they then don't just identify as someone who self-harms or uses substances, they identify as someone who can use a set of loppers, and remove some rhododendron, and plant a tree that will grow and serve a benefit. (Beth)

The main outcome in this programme theory was said to be improved self-esteem, with one interviewee explaining: “*confidence and self-esteem, that is very much what it's about*” (Harry). Consolidation interviews also highlighted that this increase in confidence and self-esteem often had an impact on the client's future plans. For example, some greenspace programmes offer qualifications such as the John Muir award or work

directly with the Job Centre. One staff member gave an example of a client on one of their programmes:

He was a nervous wreck when he came to us, just absolutely, confidence just shattered, he wouldn't even ask if he could have a coffee. He is now working for us, and he puts that down to the approach we had on our programme. (Harry)

However, as was identified in stage one stakeholder interviews, the goal of employment or volunteering will possibly not be a goal for everyone:

For some people we have to accept that the programme is sort of the main goal for them. We take some people on as volunteers and sign them up as volunteers, and other people... we don't turn a blind eye, because they are part of the programme, but they just keep coming along, because it's right for them, and if we said "Right okay, we haven't got space for you anymore", you know, it could be extremely detrimental to their recovery. (Harry)

Programme Theory Six: Relationships with Facilitators

The main contextual factor in this programme theory was that, according to the data, the intervention should have a 'doing with' culture, with one staff member saying that if a facilitator was ordering a client what to do, rather than interacting alongside them, then this held no value, and clients often "switch off" (Harry):

...the staff member was still standing in front of the group, inside. It wasn't interactive at all. You know, it was almost like a lecture, I was just thinking we've got to move away from this [...] you get a lot of staff, I'm talking about sort of generic staff for want of a better term, who are opposed to going to do something outdoors. Well, hold on, we ask our service users to go and do that, so get your arses out there and have a go yourself. (Harry)

The need for facilitators to work in a trauma-informed way was also confirmed through the data to be essential, relative to the cultural context of the programme. One interviewee spoke about how this is important because, in their opinion, primary care professionals, with whom clients may have interacted before, sometimes do not have

the time nor background knowledge of the client to provide a trauma-informed service. Another discussed the necessity of training, in their opinion, to understand how a person's experiences may impact their engagement and relationships:

Trust will be an issue, especially if you've had negative experiences in the past with people, which probably many people have had who join these programmes [...] having some information about the person's condition and background, even in a super vague way, can help you to adapt your behaviour so that a person can maybe trust you better. (Gemma)

Diversity of facilitators on the programme was also discussed as an important contextual factor to consider:

There is less engagement from some people, Black and Asian communities for example, and some of that is thought to be due to lack of role models. So, the importance of having role models for people from different ethnicities, I think that is really important. (Annie)

The need for clients to have enough time on the programme was a final key contextual factor described. According to the data, the longer a client was on the programme, the higher the likelihood of building relationships with facilitators and subsequently engaging with the programme. Under these contexts, it was confirmed by interviewees that the key mechanisms were decreased power imbalance, and feelings of trust and safety with facilitators. One interviewee described the reduction of “*power plays*” (Harry) in greenspace programmes, in comparison to other clinical services, as fundamental. Another spoke about how, in their opinion, on greenspace programmes, “*you are all equal*” (Gemma). Communication was also said to be an important mechanism, with one interviewee explaining that the success of programmes is “*based around good conversations*” (Richard). Similarly, feeling respected was identified as a mechanism, which links closely to the other mechanisms in this programme theory. One interviewee gave an example of an interaction with a client on a conservation programme:

[The facilitator] said “why does this work for you?” And one of the clients replied, “because when I'm out here I am treated with genuine respect and dignity [...] nobody else has ever spoken to me like that. (Harry)

In turn, these mechanisms were described as leading to increased engagement from clients and increased buy-in to the programmes. For example, one interviewee spoke

about how, in their experience, “clients engage and buy into programmes when it’s being provided by someone they know and trust” (Annie).

Programme Theory Seven: Increased Communication through Shared Experiences

Greenspace as the enabling environment was confirmed through the data as a necessary context, with one staff member describing it as a “real life setting” (Harry) compared to more clinical settings. Engagement of others in the group was also identified as important, with one stakeholder saying that, from their experience, clients found it easier to take part when their peers also were. As reported in stakeholder interviews, the availability of trained facilitators was also a key contextual factor within this programme theory, with leadership being needed “on the ground” (Gemma) to support client interactions. Increased communication through shared experiences was confirmed by interviewees to be the key mechanism within this programme theory, with one stakeholder explaining, “sharing an activity probably breaks down barriers a lot” (Gemma). One stakeholder shared an example of two men on a greenspace programme who found common interests in bird watching. This shared interest allowed increased communication between them. Similarly, another interviewee (Beth) shared how taking part in farm activities together “opened up” conversations about the activities, allowing “common ground” to be found. The increase in communication was said to lead to improvements in peer and other relationships. One staff member explained that working together can allow clients to “foster relationships again” (Beth). Another spoke about how this could lead to friendship outside the programme:

You’ve got building connections as well that go beyond just what happens in the group. We’ve got a couple of walking groups where you walk with the same people, and you become friends. (Gemma)

Programme Theory Eight: Reduced Isolation

As shown in the stage one interviews, the greenspace as an enabling environment, engagement of peers, and availability of trained facilitators to support client interactions were shown through the data to be the contexts linked to this programme theory, as well as the theory above. Under these contexts, the key mechanisms that led to outcomes of reduced isolation and reintegration into the community were described as the increased understanding of others and reductions in judgement and stigma. One stakeholder explained that clients on programmes often begin to feel there is a mutual understanding

among clients, so they can feel more able to overcome “*initial social anxiety*” (Gemma). Another echoed this saying that “*feeling accepted seems to be important*” (Richard). One staff member spoke about how the work itself being done on programmes can aid in reducing stigma from the wider community:

There is still a huge amount of stigma around drugs and alcohol [...] but the work that they are doing is being seen, it's profiling for people in recovery, so it breaks down a lot of stigma. (Harry)

These mechanisms were confirmed through the data to lead to reduced isolation and clients integrating and “*reconnecting*” back into their community:

...less social isolation, more social connection, that whole sort of social connectedness angle, because a lot of people who experience social isolation, just the fact that they are with someone else, even if they are not talking, is really important. (Annie)

Programme Theory Nine: COVID-19 Impact

COVID-19 was confirmed in consolidation interviews to be an important macro-level contextual factor for greenspace programmes, with one staff member describing the pandemic as “*a real challenge*” (Harry). The impact that COVID-19 had on programmes reportedly lead to the mechanisms of reduced trust and hope for some clients, since services were unable to provide the same level of support due to “*layers of considerations with health and safety issues*” (Beth):

The garden programmes at the [hospital], they would have been running one-to-four maybe, and now they are having to run one-to-one sessions, so all of a sudden three quarters of the people can't attend. (Richard)

In turn, this was confirmed by the data to reportedly lead to reduced mental wellbeing and poorer mental health in clients, and reduced number of people on the programmes. However, the pandemic could present an opportunity to increase acceptance and engagement with greenspace programmes if they were able to adapt, given “*the inherent risk of being indoors*” (Beth). Another interviewee added that, in their opinion, engagement could increase, if services were able to adapt, because online sessions had reduced barriers relative to initial engagement, which some clients struggle with. Further, engagement could be positively affected, because people appear to have become more

aware of the benefits of nature due to increased media coverage:

All these different narratives about the need to be in nature during lockdown to maintain good emotional wellbeing [...] does that create more of a sense that service managers and funders will start to recognise the pandemic does instigate a need [...] we just keep going around the same circle and having the same challenges that exist. It seems like this is an opportunity, with COVID, we need to think differently. (Beth)

Programme Theory Ten: Intervention Approach

Explicit focus of the programme was confirmed through the data as the central context in this programme theory. One interviewee spoke about the diversity of programmes:

The groups range in support, depending on the group of people, and the kind of audience they work with [...] it's about working with the groups and finding out what is best for them. (Gemma)

As discussed in stage one interviews, explicit programme focus reportedly ensures that there is a “*multidisciplinary team*” (Beth) and the right expertise among facilitators. It can also help establish whether people can self-refer or not which was identified as an important consideration for safeguarding the clients and staff, and for ensuring that the programme actually meets needs:

We've been thinking mostly about people with milder mental health issues, so anxiety, stress, social isolation, those sorts of issues which obviously can be supported by more informal green health activities. But we've also been engaging with people like [organisation] who obviously see people with much more potentially serious mental health, addictions and so on [...] what is that person going to get, and can they trust what they are going to get, is it an appropriate level of support for their mental health needs? (Annie)

If programmes are explicit in their support, and have the right expertise within a multidisciplinary team, interviewees reported that clients would feel supported on the programme, the key mechanism in this programme theory. By feeling supported, this was said to lead to commitment to and satisfaction of individualised outcomes, with clients being described as “*much more likely then to engage with the activity*” (Annie).

One stakeholder explained that outcomes were “*different for everyone, and I think we miss that sometimes*” (Gemma). Another explained that greenspace programmes will not be “*all things to all people*” (Harry), so individualised outcomes which are specific to people’s needs takes this into account.

Programme Theory Eleven: Stakeholder Buy-in

Continued availability of funding was described in the consolidation interviews as a key context relative to buy-in, with a number of interviewees referring to funding availability as “*very stressful*”. One spoke about how the funding cycle was often detrimental in convincing stakeholder buy-in:

You’ve just built up some trust and relationships with the health professionals, with the whole kind of network, and then the funding for that runs out, and you have to start all over again. So that cycle is a challenge. (Richard)

Another echoed this point saying that, in their opinion, programmes are often short-term funded because “*the money is just not there as it used to be*” (Harry), which makes it more difficult to convince stakeholders of the benefit of programmes. Related to funding, another interviewee spoke about the importance of clear objectives and outcome measures and explained that this was sometimes not apparent:

It’s kind of disjointed sometimes, how do you pull that all together to create a real meaningful framework for justifying the need for programmes like this and funding them [...] it’s trying to allow that diversity, because you wouldn’t expect there to be the same level of consistent programme activity across all greenspace approaches, but it’s still about trying to identify the strengths and to identify what works [...] what are the activities that we can be undertaking, and what exactly is it that our service users, our participants, can gain from this? (Beth)

Stakeholder experiences of greenspace programmes was identified by interviewees as a context. One staff member spoke about how if stakeholders, such as GPs or funders, have no personal experience of how greenspace programmes can be effective, then even if there is funding available, there might still be resistance due to a lack of understanding:

There is a disconnect between people in understanding how it benefits and how it works for people. They need to get out there, because they are the people doing the referring. (Harry)

Another interviewee spoke about how stakeholder views can sometimes change once they themselves took part in programmes:

They started doing green health activities themselves, and they took cycle routes themselves through the parks and saw how they felt better. They were able to sell this much better to their patients, because it took it from the research evidence into actual practice. (Gemma)

If funding was available, programme objectives and measures were clear, and stakeholders had positive first-hand experience of time spent in greenspace, then this was said to facilitate feelings of the programmes being 'worthwhile'. This mechanism was described by one interviewee as like "a *shift in themselves*" (Gemma). In turn, if stakeholders believed programmes were worthwhile, this was said to lead to increased stakeholder buy-in. For example, one greenspace staff member said that funders would comment on how their programme "*ticked a lot of boxes*" (Harry) which led to continued funding. Other interviewees spoke about how increased buy-in could take the form of more referrals. Indeed, one interviewee spoke about how, if one GP bought into greenspace programmes, then this can enable wider buy-in:

It is passed on from prescriber to prescriber, so if one prescriber had a positive experience, they tell their colleagues, and they get in touch because they want to join [...] word of mouth has always been the most powerful tool that we have, and stories, humans are storytellers, this is how we can pass on messages. (Gemma)

Chapter conclusion

This chapter has reported the interview findings from Phase Three stage two. The chapter began by presenting the consolidated programme theories as 'if-then-because' statements to explicitly show causality between CMOs. The programme theories, consolidated through stage two interviews, were then reported in detail. The final chapter, Chapter Nine, will discuss the findings and how they relate to the existing evidence base. The chapter will also discuss implications of the findings, the strengths

and limitations of this project, and the need for future work, before ending with the project conclusions.

Chapter 9: Discussion

Introduction to chapter

The aim of this final chapter is to discuss the findings of this project and how they expand existing knowledge. The chapter will begin with a brief summary of the three project phases and their respective contributions. The key findings will then be presented and discussed relative to how they fit into and expand the wider empirical evidence and an updated version of the realist framework from Phase One will be presented. The implications of the findings will be considered, and the strengths and limitations of the study highlighted. Discussion of the future work that is needed to advance understanding will be presented, and the chapter will end with the final conclusions from the project.

Summary of project phases

The first phase of this project was a realist synthesis of greenspace programmes for mental health. The aim was to examine context-mechanism-outcome configurations (CMOCs) within these programmes to show what works, for whom, and in what circumstances. Seven programme theories were proposed under three themes of Nature, Individual Self, and Social Self, and an overarching realist framework was presented. The second phase of the project tested the proposed framework using primary survey data. The framework's transferability was also explored for use on programmes for people with problem substance use (PSU). The results showed that responses from organisations that supported people with PSU were very similar to organisations that did not support this client group but did support clients with their mental health more generally. This showed that the framework has the potential to be applicable to both greenspace programmes for mental health, for those for PSU, and for those with dual diagnosis. This was a novel finding as there is currently no framework looking to explain the CMOs necessary for greenspace programmes to be successful for people with poor mental health and PSU. However, a limitation of the second phase was that it could only test what was already proposed and did not allow identification and testing of new CMOs. Subsequently, the third phase of the project consisted of semi-structured qualitative interviews with staff on greenspace programmes and wider stakeholders which allowed deeper exploration of the causality within programme theories, further tested the transferability of the framework to programmes that support people with poor mental health and PSU, and allowed identification, refinement, and consolidation of the final set of proposed programme theories.

Discussion of findings

The greenspace setting

Perhaps unsurprisingly, given the integral part that nature plays in greenspace programmes, the health benefits derived specifically from the greenspace setting were prominent across the qualitative findings. Relative to the first programme theory, Escape and Getting Away, interviewees discussed how time spent in greenspace, in comparison to indoor settings, reduced feelings of stress. This finding is supported by a substantial amount of literature across different domains, with interdisciplinary research exploring potential pathways of greenspace and human health typically reporting at least short-term stress reduction as a key outcome of time spent in nature (Hartig et al., 2014, Markevych et al., 2017). Some studies have explored psychological stress outcomes through self-report measures when immersed in forest environments (Ikeda et al., 2021), when visiting urban greenspace (Mennis et al., 2018), and on a multitude of other greenspace programme types (Moeller et al., 2018). Specifically relating to people with problem substance use (PSU), previous research has shown horticultural therapy reduces self-reported stress in inpatient substance use treatment programmes (Lehmann et al., 2018). Further, greenspace exposure has been associated with positive physiological changes related to stress such as decreased heart rate and blood pressure (Markevych et al., 2017, Twohig-Bennet and Jones, 2018).

Greenspace is shown to provide ecosystem benefits which are related to stress reduction outcomes. Ecosystem benefits are the indirect benefits that humans gain from nature and include pollination services, air oxygenation, water retention, and climate moderation, among others (WHO, 2017). These protect against some forms of environmental harm, for example through reducing pollution and regulating temperature, which subsequently reduces the amount of stress placed on the body. This type of stress reduction was not explicitly discussed in the qualitative interviews, but previous research supports the idea that the more a person is immersed in greenspace the greater the level of passive health benefits they will receive (Coutts and Hahn, 2015). It is possible that, through taking part in greenspace programmes, participants will benefit more from ecosystem benefits compared to people on indoor interventions, which could contribute to further improved stress reduction. Although physiological outcome measures were not explicitly discussed by interviewees, these quantitative outcome measures may integrate well into the 'Escape and Getting Away' programme theory that directly relates to the greenspace setting and could be explored in future programme theory refinements.

Aside from stress reduction, previous meta-analyses support the finding that connection to nature is increased through time spent in greenspace and is also linked to improved mental wellbeing (Capaldi et al., 2014, Pritchard et al., 2020). However, this finding appears to vary between individuals, and some research shows that weekly visits to green spaces were only associated with higher contentedness and wellbeing for individuals who initially felt less connected to nature (Martin et al., 2020, Richardson et al., 2018). A number of interviewees in the current study discussed the contextual factor of prior experiences of nature, and how many clients with PSU on greenspace programmes frequently have limited prior experience of and connection to nature which could influence initial engagement. However, when drawing on findings (Martin et al., 2020, Richardson et al., 2018), it may be that this client group could benefit more than other groups who do have existing experience of nature, as long as clients are adequately supported initially and throughout the programme, and other barriers to access are addressed. Similarly, while the benefits of spending time in nature have been shown across various population groups (White et al., 2019), it seems that people with poorer mental health benefit most from spending time in greenspace (Roe and Aspinall, 2011, Rogerson et al., 2020). Previous work has also shown that time in greenspace is particularly effective for participants with experience of trauma, loss, and relationship conflicts (Bettmann et al., 2011, Russell and Phillips-Miller, 2002, Fernee et al., 2019). These studies again support the potential benefits of greenspace programmes for client groups such as people with PSU given the relationship between this and poor mental health (Hunt et al., 2016, Kingston et al., 2017, Lai et al., 2015) and trauma (McVicar et al., 2015).

In the programme theory, *Escape and Getting Away*, findings suggest that a key mechanism to improved wellbeing and reduced stress was that time spent immersed in greenspace allowed clients to feel removed from their daily lives. This idea of 'being away' is a central component in previous work underpinned by Attention Restoration Theory (ART) which holds that feelings of calm, attention restoration, and decreases in mental fatigue are achieved through time in nature (Kaplan and Kaplan, 1989). The component of 'being away', which refers to a conceptual change of feeling removed from everyday life (Kaplan and Kaplan, 1989), could be particularly important for people whose lives are complex and stressful, for example people with poor mental health and PSU. For example, findings supported the idea that time spent in a different environment could be important for those who had been involved in PSU for many years, as it gave them time out of the 'rat race', a term used by one interviewee. For people with PSU, this concept of removal to a different environment has been shown to be present in previous

interventions for substance use. For example, this mechanism can be seen within the literature for wilderness therapy, where substance use disorders are typically one of the most common primary diagnoses among clients, and many have dual diagnosis (DeMille and Montgomery, 2016, Hoag et al., 2014). In wilderness therapy, an intrinsic feature of the programmes is immersion in nature and separating clients from their everyday lives and stressors, including family, social circle, and living environments (Bettmann et al., 2016), and clients themselves have described this feeling of 'getting away' as essential in their support journey (Fernee et al., 2019). Existing wilderness therapy literature also supports other similar mechanisms within this programme theory, such as reduced rumination (McIver et al., 2018) and feelings of spirituality and awe relating to the environment (Conlon et al., 2018, Naor and Maysless, 2020). Therefore, these findings add that feelings of escape, decreased rumination, and spiritual feelings appear to be key mechanisms across a multitude of greenspace programmes for people with poor mental health and PSU across rural and urban programmes.

The current findings also identified how best to ensure participants on programmes felt as if they were 'getting away'. This involved identifying the necessary contexts through which this mechanism can be activated. As mentioned, the greenspace setting and prior experience were described as important contexts, but other key contexts were also identified. For example, greenspace was described as needing to be of 'quality', something supported by existing literature. The Public Health England (PHE) Improving Access to Greenspace review (2020) discusses the need for quality, over and above the amount, of greenspace. The report defines quality as the ecological quality and biodiversity within a greenspace. Research indicates that higher levels of biodiversity may contribute to improved mental health outcomes (Lovell et al., 2018), and findings in this current study support this, with some participants speaking about the need for a biodiverse environment with many visual stimuli to reportedly achieve health outcomes. The condition of the space is also deemed essential to ensure quality greenspace (PHE, 2020). Previous work has shown that when a greenspace is poorly maintained, with poor quality footpaths, vandalism, and litter, this negatively impacts engagement with the space (McCormack et al., 2010). Indeed, in a review of impacts and effectiveness of greenspace interventions, the WHO (2017) proposed that, to be high quality, greenspace must have: a practical design including clear entry points and maintained paths; amenities such as seating, bins, and signs; and adequate lighting, particularly during winter. Again, findings of this study support this, and many participants discussed the need for amenities such as lighting and safe paths, particularly for those who had had negative experiences such as falls or previous issues with safety in greenspace.

Further expanding on design, participants spoke about how greenspace programmes were most successful when participants could get there easily. This finding is strongly supported by previous empirical literature exploring the relationship between proximity and engagement with greenspace (Lachowycz and Jones, 2013, Sahlqvist et al, 2013, Goodman et al, 2014), and in literature exploring engagement with social prescribing programmes in general (Husk et al., 2020). Ease of access was also described as essential in detailed reports such as Edinburgh and Lothians Health Foundation's 'Green Health Prescribing: its role in Lothian's COVID-19 recovery' report (Hardie et al., 2021) and the European Centre for Environment and Human Health (ECEHH) 'Nature on Prescription' handbook (Fullam et al., 2021).

The second programme theory, Space to Reflect, drew on the benefits of the greenspace setting in explaining how the physical space provided by the programme could facilitate engagement. The description of traditional treatment settings as formal, clinical, and contained within four walls was discussed by many interviewees and is supported by wider literature (Ferneer et al., 2019, Sidenius et al., 2017, Woodford et al., 2017). Interviewees felt that, due to the physical space, this feeling of confinement is not typically experienced within greenspace programmes, and having space to reflect is a key mechanism, particularly for those who have had previous negative experiences in typical treatment settings. Further, the greenspace used on programmes was described in interviews as more neutral, in comparison to traditional treatment settings which are typically situated within organisational buildings and often seen to be inherently linked with statutory health services. This is an important finding given that mistrust of statutory health services is often cited among people who use substances (Lago et al., 2017, Paquette et al., 2018, O'Carroll and Wainwright, 2021).

Findings suggested that, in a neutral, non-clinical, open space, conversations were described as easier, and this was said to encourage clients to engage more, as well as reflect on and share more about their own lives, which could have a subsequent positive effect on their support journey. Indeed, a meta-synthesis of outdoor talking therapy programmes has suggested that these programmes are as effective, if not more effective, for certain individuals than programmes that are run indoors (Cooley et al., 2020). Further, outdoor programmes have been found to effectively support those who may not ordinarily engage with therapy (Scheinfeld et al., 2011). Like the perceived neutrality of the space, part of this may be attributed to a reduction in perceived stigma that can be attached to traditional substance use and/or mental health treatment (Russell and Phillips-Miller, 2002), with greenspace programmes described by clients as less

intimidating and more natural (Fernee et al., 2019). Despite clients feeling less confined which was said to lead to increased therapeutic conversations, current study findings highlighted that this was not typically an instant process. Mistrust of health services can be substantial for people who have been systemically marginalised and stigmatised, so clients need adequate time to build up trust with facilitators and programmes. This context is supported by literature exploring mental health and substance use interventions where increased amount of time on programmes led to higher likelihood of positive health outcomes (Beaulieu et al., 2021).

Individual-level changes

The findings highlighted how greenspace programmes can allow changes within an individual which can potentially improve overall physical and mental wellbeing. For example, increased physical activity and improved physical and mental health is frequently cited as an outcome of engagement with greenspace. The Five Ways to Wellbeing (Aked et al., 2008), a set of evidence-based public health messages that aim to improve mental health outcomes in the population, cites 'Be Active' as one of the ways to wellbeing. Both organisations and researchers have explored how time in greenspace can support the Five Ways to Wellbeing (Cumbernauld Living Landscape, 2021, Hubbard et al., 2020, iThrive, 2021). For example, greenspace has been proposed to support higher levels of physical activity, with indications that people may enjoy and be more likely to repeat an activity if it is undertaken in nature (PHE, 2020). The National Institute for Health and Care Excellence (NICE) suggests that use of greenspace should be encouraged as a way to support people of every age/ability to do more physical activity therefore improving their health and wellbeing which could aid in reducing direct, more costly interventions (PHE, 2020). Despite this, existing evidence is inconclusive regarding the relationship between greenspace and physical activity, with some studies supporting the association (Broekhuizen and Vries, 2013, Sugiyama et al., 2013), and others showing no relationship (Mytton et al., 2012). The Five Ways to Wellbeing does note that providing information about the need to undertake physical activity is likely not enough to change behaviour (Aked et al., 2008). This concept was echoed in this study's findings, with some interviewees criticising what they referred to as a 'build it and they will come' attitude and that, in their opinion, structured programmes are needed. Indeed, previous systematic reviews and evidence syntheses have suggested that increases in physical activity are only likely to occur if there are structured programmes in place, and provision of greenspace alone is unlikely to be enough to increase activity (Hunter et al., 2015, Hunter et al., 2019).

The findings reported in the third programme theory, Physical Activity, begin to unpick some of the mechanisms on greenspace programmes that may lead to increased physical activity, and subsequent physical and mental health outcomes, and the contexts needed for this to happen. In turn, this allows a better understanding of the pathway and goes some way to explaining how greenspace programmes can lead to increased physical activity, whereas passive provision of greenspace with no programmes often does not (Hunter et al., 2015, Hunter et al., 2019). Enjoyment of activity was shown to be the central mechanism within this programme theory which highlights the need for a variety of activity on offer and a person-centred approach. This concept of providing personalised options relating to care/support mirrors best practice in other mental health and PSU services (Carver et al., 2020). This shows the importance of continued person-centred care outside of traditional settings. Aside from enjoyment of activity, staff interview findings showed that increase of endorphins could be an important mechanism for people with PSU on greenspace programmes. This was reportedly because the increase of endorphins released through physical exercise could be a substitute for the chemical highs experienced through substance use. However, this mechanism was not suggested by other interviewees. Despite this, it is potentially worth exploring this mechanism in future research since endorphins activate the body's opiate receptors to reduce pain and increase pleasure (Jain et al., 2019), thereby providing a plausible mechanism.

When exploring the necessary contexts for these mechanisms, and drawing again on the proposal that provision of greenspace may not be sufficient, findings of this project highlighted the perceived importance of availability of resources such as trained leaders and suitable equipment. Availability of trained staff was linked to promoting initial engagement and subsequent enjoyment of the activity, since many clients were described as hesitant at the beginning of programmes and needing support to feel comfortable and safe in taking part. However, as well as perceived safety, the necessity of having skilled and trained staff to address possible risk on programmes is discussed in the Outdoor Mental Health Intervention Model (Richards et al., 2019). Richards and colleagues outline the need for a combination of competence, professional responsibility, and leadership in each intervention to ensure programmes are safe, ethical, and effective, and that staff must have the right qualifications and/or skill set to support clients and not put them at risk of potential harm. For example, if clients are embarking on a wilderness trek, there must be trained, competent leaders with knowledge of the activities and related risk (Richards et al., 2019). Further, in relation to people with PSU, findings highlighted the importance of programme facilitators being trained in naloxone

provision and CPR. Again, this finding emphasises the importance of acknowledging that, even if a programme is not within typical PSU treatment settings and is situated outside involving activities such as gardening, hiking, or other activities perceived as recreational, the need for staff to be trained in harm reduction responses likely remains. Resources for suitable equipment was also related to reducing harm both in terms of ensuring the correct kit and tools are used, but also for ensuring clients have the right clothing and footwear. This is an important consideration given that some people with PSU have lower body fat percentages (Mahboub et al., 2020) and may be at higher risk of harm from the cold weather when on greenspace programmes. Although not a controllable contextual factor, findings showed that weather should be taken into consideration, for example by providing appropriate clothing and footwear, and this is supported in the existing greenspace programme literature (Gabrielsen et al., 2018).

As well as changes in physical activity, interviews highlighted the potential for psychological changes. These changes were split into two programme theories relating firstly to self-efficacy, and secondly to feelings of purpose. These two programme theories have several similarities, particularly in the contexts in which the mechanisms work, but are distinguishable by having different mechanisms that lead to slightly different outcomes. According to the findings relative to the programme theory 'Self-Efficacy', clients have the opportunity to learn new skills, or rediscover old skills, which was said to be linked to feelings of self-efficacy and empowerment. This was described as then enabling clients to more confidently apply their new skills in their daily lives. This mechanism is theoretically well-established, with a wealth of research exploring how self-efficacy increases with mastering new skills (Bandura, 1977, Schunk, 1989). Findings show that learning new practical skills can aid in confidence and self-efficacy, but this mechanism was strongest when newly learnt skills had direct relevance to life outside the programme. Further, mastering new skills relative to perceived future challenges has long been shown to improve perceived future coping with threats, reduce anxiety, and reduce intrusive negative thoughts about a person's own ability to overcome challenges or threats (Ozer and Bandura, 1990). More recently, studies have shown that interventions to increase self-efficacy can support people experiencing stressful life events such as moving to university (Schütze et al., 2021), and job searching (Petruzzello et al., 2020). The findings in this study support these previous findings that an increase in self-efficacy can aid in coping with stressful circumstances. Many interviewees reported that clients on greenspace programmes become more confident in applying newly learnt skills, such as different coping strategies, to challenges they encountered in their day to day lives outside the programme. For people with PSU,

transferring skills such as different coping strategies could be particularly useful if they have previously found it difficult to manage challenges in their lives and are using drugs or alcohol as a way of dealing with trauma (Leung and Tong, 2017, Shin et al., 2018).

The findings also suggested that increases in self-efficacy, and subsequent application of skills to life outside the programme, can only happen if there is a safe learning environment. Psychologically safe environments contain three defining attributes, all of which were supported by this study's findings. Firstly, people must believe they are able to make mistakes without negative consequences; secondly, the facilitator must be skilled and supportive; and thirdly, activities must include an introduction or orientation, preparation, and clear objectives and expectations (Turner and Harder, 2018). Although much of the existing literature has focused on these environments within classrooms (O'Gorman et al., 2016) and places of work (Newman et al., 2017), findings highlight the importance of this type of environment to allow clients to embark on learning new skills while feeling psychologically safe. Additionally, time was again discussed as an important context which is perhaps unsurprising given that the longer a person undertakes a skill, the greater their ability, and the more their confidence will grow in using the skill (Jonides, 2004). This has also been evidenced in response conflicts with research showing that, over a period of time, repeatedly utilising coping strategies to deal with internalised response conflicts relating to short term gratification versus long term goals allows these conflicts to be resolved faster (Gillebaart et al., 2020). This could have direct relevance to people with PSU who are looking to reduce or stop using drugs and/or alcohol as a longer-term goal.

In comparison to the 'Self Efficacy' programme theory, findings relating to the 'Having a Purpose' programme theory show how clients can gain a sense of purpose from the activities that they do on greenspace programmes. This sense of purpose was also perceived to be linked to positive changes in self-identify, and both were described as key mechanisms. Previous research describing recovery journeys has pointed to the importance of identity change processes through which people with PSU feel less characterised solely by their substance use (Best et al., 2016, Webb et al., 2020). Abstinence-focused literature has discussed how those attending recovery groups develop new social identities associated with recovery, rather than active substance use, which can be a protective factor for future substance use (Frings et al., 2021, Webb et al., 2020) Greenspace programmes are typically lower threshold than abstinence-based programmes, although recovery programmes do exist in environments such as therapeutic communities (Devlin and Wight, 2021, Phoenix Futures, n.d.). However,

findings showed that a client's change in identity to a person who is taking part on a greenspace programme, and having responsibility on the programme, could also provide a shift in identity away from 'a person who uses substances'.

Participants spoke about how many clients reportedly felt proud of work they undertook on programmes and had a renewed sense of purpose and motivation for the activities they were doing. Again, this renewed sense of purpose has been reported in recovery-orientated, abstinence-based groups (Devlin and Wight, 2021, Dossett, 2013, McKay, 2017, Stokes et al., 2018), but this study's findings show that this mechanism is likely not limited to high threshold environments. Increases in sense of purpose and positive changes in self-identity were also described as leading to overall increased self-esteem, a relationship that has been well documented previously (Baumeister, 1999, Cast and Burke, 2002, Reitzes and Mutran, 2006). In some circumstances, increased feelings of purpose, positive identity and self-esteem were also discussed in relation to increased future planning. This concept of thinking more about the future has been identified as an outcome in greenspace studies, including those supporting people with their mental health and PSU (Lehmann et al., 2018). However, as noted in the findings of this study, future planning can look different between clients, with some wishing to undertake qualifications such as The John Muir Award, and some wishing to make other positive changes in their lives relating to relationships, substance use, or undertaking more activity outside in their own time.

Similar to the 'Self-Efficacy' programme theory, time on the programme was described as an important contextual factor, and interviewees stated that the environment had to feel safe for the client in order to initiate feelings of purpose and positive self-identity. Further, the reliability of the programme was described as a key context through which clients were provided with structure and routine. Structure and routine have previously been shown as important components in care farms for people with lived experience of poor mental health and PSU, with clients describing the programmes as providing a routine and a way to fill their day without substances (Elings and Hassink 2008; Hassink et al., 2010). Indeed, Hassink et al. (2010) reported that almost all participants with lived experience who accessed a care farm to improve their mental wellbeing acknowledged the positive effect that programme routine had on them.

Social-level changes

The findings highlighted how greenspace programmes can also facilitate changes within the social realm which can improve a person's mental wellbeing. Therapeutic

relationships have been reported to account for as much variance in therapy outcomes as the treatment modality itself (Norcross and Wampold, 2011). Indeed, in Carver et al.'s systematic review and meta-ethnography investigating effective PSU treatment from the perspective of people who are homeless (2020), authors found that the way in which services are delivered is more important than the type of service or treatment. Compassionate and non-judgemental support was consistently mentioned as an essential component of treatment services, in both abstinence-based and harm reduction settings. Participants spoke about the importance of being treated as individuals and the importance of staff treating them fairly, providing encouragement, helping them feel accepted, and being consistently available although, in reality, this was commonly not experienced (Carver et al., 2020). The finding that relationships play a crucial role in treatment and support has also been discussed in relation to greenspace programmes (Gabrielsen et al., 2018, Sidenius et al., 2017, Stevens, 2018) and further evidenced in the current study. The role of relationships was discussed in all interviews, with a number of participants stating that, in their opinion, improving relationships was the most important long-term outcome, over and above reducing substance use. In fact, some suggested that substance use outcomes could only be achieved once relationships had been built.

As reported in the 'Relationships with Facilitators' programme theory, one of the reasons that building relationships was said to be better enabled in greenspace programmes was the removal of the typical professional/client relationship, and subsequent power imbalances. Berger (2006) highlights the issue of power within the therapeutic process, proposing that traditionally the therapy space is designed, controlled, and owned by the therapist which subsequently sets up unavoidable power imbalances. Conversely, greenspace environments are described as more democratic because the space is neither owned nor controlled by facilitator or client. The participants in this study spoke about how clients often say that they feel less of a divide between themselves and the facilitators on greenspace programmes, and previous work has supported this idea of a more equitable power dynamic on outdoor programmes (Cooley et al., 2020, Fernee et al., 2019, Jordan and Marshall, 2010), and facilitators providing a supporting, rather than a leading role (McIver et al., 2018, Wilson et al., 2010).

In PSU treatment specifically, power imbalances are well documented (Collins et al., 2019, Goodhew et al., 2019), and the hierarchical professional/client relationship is common with the assumption that health care professionals hold the expertise (Patterson et al., 2009, Rance and Treloar, 2015) leading to divides between clients and health care

professionals which must be broken down in order to establish better power equity (Leppo and Perälä, 2009). In many traditional settings, however, service providers can be hesitant about challenging the status quo due to continuously reinforced beliefs that professional authority must be upheld, and only those in authority are able to make clear, systematic decisions (Lancaster et al., 2017, Rance and Treloar, 2015). Current findings showed that, on greenspace programmes, the mechanism of reduced power imbalance appeared linked to increased trust between clients and facilitators, as well as clients feeling respected, which was said to lead to increased client engagement and buy-in. This causal link is not limited to greenspace programmes since client trust has been shown to be central to buy-in and engagement with many types of health services and treatment (Carver et al., 2020, Paquette et al., 2018, O'Carroll and Wainwright, 2021).

This study's findings suggested that increased trust and reduced power imbalance are reliant on the contextual factor of the programme having a 'doing with' culture, meaning that facilitators undertake the same work as the clients, and everyone works together. Further, findings also highlighted that clients should be involved in intervention development where possible. This has shown to be successful in other greenspace programmes, since a more bottom-up approach reportedly has the capacity to empower participants and emphasises inclusion from the first interaction (McIver et al., 2018). Programme culture should also be trauma-informed, with facilitators who have working knowledge of the impact that clients' lives and experiences can have on their day-to-day interactions. Fernee et al. (2017) discussed this context relative to wilderness therapy and highlighted that a trauma-informed way of working ensures a caring and non-confrontational approach which in turn enables clients to build rapport. Clearly, the importance of acknowledging previous trauma is not specific to greenspace programmes and working in a trauma-informed way is viewed as best practice in services for poor mental health and PSU in general (Brown et al., 2013, Kirst et al., 2017). Rather, the findings in this study highlight that trauma-informed practice appears to be necessary across treatment modalities and, as mentioned previously, the change in setting in comparison to traditional treatment does not reduce the necessity.

Another important finding from this study was that diversity is important among facilitators. People from Black, Asian, and other global majority groups have been shown to engage less with greenspace in general (Boyd et al., 2018, Cronin-de-Chavez et al., 2019). Relative to targeted programmes, one reason for limited engagement could be that many greenspace programmes are run by people from white backgrounds, and there are still fewer groups run by people from different ethnic groups and cultures. In

fact, it is estimated that only around 1% of summer mountain leaders and rock-climbing instructors in the UK are from global majority groups (The Outward Bound Trust, 2021). Recent research from Sport England identified six barriers to participation in greenspace programmes for people from an ethnic minority background: language; awareness; safety; culture; confidence; and perceived stigma (Sport England, n.d.). Increasing diversity within the facilitators of programmes may help mitigate some of these barriers. Women such as Zahrah Mahmood from the Hillwalking Hijabi (Mountains for the Mind, 2020), and Rhiane Fatinikun, founder of Black Girls Hike (2020), have discussed how the lack of mentors from different backgrounds can hinder a programme's success in regard to engaging a range of people from different communities as people want to have leaders, mentors, and facilitators that they can relate to.

A final point relating to the programme theory 'Relationships with Facilitators' was that time on the programme was once again described as an important context. This was said to be because relationships are often not built quickly, particularly for people who have existing complicated relationships. Bettmann et al., (2011) showed that in their study of attachment relationships within wilderness therapy populations, most of the adolescents had highly conflicting relationships with their primary caregivers and found it difficult to trust facilitators at first. Additionally, those who have had negative previous treatment experience reportedly struggled with building relationships with health care professionals quickly (Bettman et al., 2011). People with PSU can often experience systemic inequalities linked to housing, healthcare, criminalisation, and marginalisation which contribute to challenges when building new relationships with new support services (Collins et al, 2019, Dollar, 2019). Again, this highlights the importance of trauma-informed practice, alongside sufficient time on the programme, to ensure relationships are built and clients engage with, and buy into, programmes in the long run.

As well as relationships with facilitators, the relationships with clients' peers on the programme was also discussed across interviews. These peer-related social changes were split into two programme theories, one relating to increased communication skills, and the other relating to reduced isolation. Within the communication programme theory, the mechanism of increased communication was said to be the result of shared experiences between clients on the programme that facilitated working together. This mechanism was reportedly facilitated by the real-life setting that the greenspace provided, in comparison to more traditional treatment settings. This is similar to the 'Space to Reflect' programme theory where greenspace programmes were described as providing a neutral, unconfined space. A move away from the indoor clinical environment

was described as necessary in facilitating conversation between peers, a finding that has also been reported in previous work exploring peer relationships within greenspace programmes (Ferneer et al., 2017, Harper et al., 2019, McIver et al., 2018). Research has shown that greenspace programmes often provide situations where peer support is encouraged through challenging tasks, promoting dialogue in a way that rarely happens in other types of treatment/health services (Ferneer et al., 2019, McIver et al., 2018).

A contextual factor that was said to mediate shared experiences, and subsequent communication, was perceived peer engagement. Research investigating the link between self-efficacy and achievement behaviours has shown that humans often compare themselves to similar peers to assess how likely they themselves will be able to accomplish the same task (Schunk, 1989). This type of comparison has been seen in greenspace programmes, for example in wilderness therapy, where participants are less likely to try activities if they do not see others engaging (Ferneer et al., 2019). The availability of trained facilitators has been linked to other programme theories as an important contextual factor, and findings showed that it fits as a contextual factor within this programme theory too. Not only can the presence of experienced facilitators support client engagement, but findings suggest that it could also help to mitigate the potential domino effect experienced when one client disengages from the programme. Further, availability of facilitators was described as important in order to navigate challenging relationships between peers and to aid in communication. These findings support previous research where participants on greenspace programmes reported high levels of conflict at times between peers due to spending a lot of time together (Harper et al., 2019). Findings from this study suggest these difficult conversations could actually enhance communication skills, with working through conflict seen as an important part of the programme.

Through the mechanism of increased communication skills which are activated within the contexts described, thesis findings suggested that improved peer relationships were achieved. Through improved peer relationships, perceived higher levels of mental wellbeing were also reported. This association between positive peer relationships and wellbeing is well documented (Brown et al., 2021, Leigh-Hunt et al., 2017, Werner-Seidler et al., 2017). Evidence exists that suggests positive peer relationships can successfully support people with PSU (Carver et al., 2020, Miler et al., 2020), including supporting reductions in use (Mason et al., 2017). Further, recent research identified that positive peer relationships and reduced substance use is more strongly associated in greener environments (Mennis et al., 2021). Although Mennis et al.'s study looked at

greenspace within residential areas, rather than greenspace programmes, the findings from this thesis highlight the potential for the role of peer relationships in supporting reductions in substance use within a greenspace setting, in comparison to a non-green treatment setting.

The second programme theory within wider social changes is 'Reduced Isolation'. The contextual factors were the same as for the communication-related theory, but mechanisms were described as feelings of acceptance, belonging, and a reduction in perceived stigma. Feelings of acceptance and reduced stigma have been reported on greenspace programmes (Combs et al., 2016, McIver et al., 2018, Stevens, 2018), but this study suggests that these mechanisms appear to be particularly important for people with PSU who often experience higher levels of stigma compared to those with other mental health challenges (Barry et al., 2014). Stigma has been shown to be associated with maintaining PSU, increasing the likelihood of drug and alcohol related harm, and reducing the likelihood of accessing support services (Browne et al., 2016, Carver et al., 2020, Pauly et al., 2018, Wise and Phillips, 2013). Therefore, a reduction in stigma is likely a critical mechanism for this client group in achieving positive outcomes.

The mechanisms of increased understanding and reduced stigma were described as leading to reduced isolation and integration back into the community. This finding is supported by much of the existing research exploring the efficacy of greenspace programmes, with clients frequently reporting that the sense of community was the most important thing on the programme for them (Howes et al., 2018, Stevens, 2018, Woodford et al., 2017). For many, integration back into their community was said to be achieved through conservation, gardening, or other types of activity where they reportedly felt like they were contributing to the wider environment. Not only was this said to be linked to reductions in internalised stigma of the client, but the visibility of activities being undertaken was said to lead to considerably reduced stigma from others in the wider community. This finding is important given that people who use substances often report feeling isolated from their community (Christie, 2021), and some treatment services appear to increase feelings of isolation (Miler et al., 2021).

Macro-, meso-, micro-level programme theories

Macro-level: COVID-19

Realist research is iterative which allows new programme theories to be developed in response to emerging themes. This can be seen through the development of the COVID-19 programme theory. This was not identified during the initial realist synthesis and is an

example of how changing contexts can impact the way in which programmes operate. The findings suggested that the context of COVID-19 had various negative effects on programmes. Interviewees mentioned that clients appeared to lose trust in programmes due to closures, unreliability, and unpredictability, and they also reported increased feelings of hopelessness because of the pandemic. These findings have been shown in other studies exploring the effect of the pandemic on services for people who use substances. While some services were able to adapt to the changing circumstances, the pandemic brought a period of intense disruption, isolation, and confusion to many people who were reliant on services for support (Parkes et al., 2021). Despite this, opportunities may also be presented by the pandemic. Some participants in this study spoke about how increased mental health challenges as a result of the pandemic may increase footfall, particularly given the increased focus on, and awareness of, the benefits of nature through periods of lockdown. However, services must address and adapt to changing contexts in order to be dependable and stable, key components of effective treatment (Carver et al., 2020, Parkes et al., 2021). In particular, strong leadership, communication and team working, available training for staff, a focus on relationships, and active use of client feedback enables adaptation during times of crises and maintains a 'culture of care' which meets clients' needs (Parkes et al., 2021).

Meso-level: Intervention approach

Different treatment approaches were discussed previously in Chapter One, and the flexibility of greenspace programmes to provide different levels of support was highlighted as one of their benefits. Through analysis of the study findings, the meso-level programme theory of 'Intervention Approach' was proposed. What the study findings suggested was that, for clients to feel adequately supported, there should be an explicit and clearly communicated focus of the programme and a suitable multidisciplinary team approach. This decision regarding 'for whom' a programme is intended is important because while some clients may benefit from a programme that provides holistic support, but does not require a commitment to abstinence or a reduction in use, other clients may specifically seek out programmes with a abstinence focus as part of their own recovery journey. Concern was raised by interviewees that if programme aims are not explicit, then clients may have different expectations in comparison to what the programme is actually able to offer, feel unsupported, and feel dissatisfied with outcomes. These findings are supported by a recent realist review of social prescribing engagement and adherence (Husk et al., 2020), Husk et al. (2020) identified that people are much more likely to engage with a particular programme, for example greenspace

programmes, if it matches their expectations, and those with unrealistic expectations were least likely to maintain adherence.

Another concern was that if different clients with a wide range of needs and expectations were on the same programme, it could be difficult to ensure they would all be adequately supported. In particular, if clients had other medical conditions, or if they had particularly complex needs, interviewees highlighted that there should be a trained multidisciplinary team available. The necessity of a multidisciplinary team has already been discussed in Chapter Four where the Outdoor Mental Health Intervention Model was described (Richards et al., 2019). This model highlights the importance of the combination of competence, professional responsibility, and leadership in each greenspace programme in order to provide clients with adequate support (Richards et al. 2019). The model maintains that, for best practice, a multidisciplinary team approach should be adopted, and professionals should work collaboratively in the delivery of an integrated approach. Only then can programmes enhance opportunities for improved mental health and wellbeing, offer adequate support, and effectively safeguard individual clients. Better communication between those signposting clients onto programmes and the programme staff was described in the study findings as essential to ensure the person is being signposted to the right kind of support. This is supported by wider literature which has identified the need for more effective partnership working between different sectors, for example between third sector and primary care (Robinson et al., 2020), and there must be more advocacy, peer support, and training accessibility across all sectors to ensure stakeholders feel confident in referring clients, and staff on the programme feel confident in supporting clients (Garside et al., 2020, Lovell et al., 2019).

Meso-level: Stakeholder buy-in

Stakeholder buy-in was identified as another meso-level programme theory, but it is also linked to wider macro-level contextual factors such as funding availability. The challenges created by lack of secure funding and uncertainty about future provision has previously been identified through recent reports such as the Green Health Prescribing: its role in Lothian's COVID-19 recovery report (Hardie et al., 2021) and the Nature on Prescription handbook (Fullam et al., 2021). Specific to substance use, uncertainty about funding for support services has been well documented (Carver et al., 2020). Lack of secure funding dramatically reduces the perceived sustainability of programmes which means wider stakeholders are less likely to buy-in to programmes. As identified by Hardie et al., (2021), funding security would enable more innovative and collaborative approaches to provision. However, the current findings identified how stakeholder buy-

in might be best achieved with the caveat that the actual availability of funds is an uncontrollable macro-level contextual factor. Interviewees reported that having clear objectives of programmes and explicit outcome measures was important for stakeholders to feel that the programmes were worthwhile. This was said to subsequently facilitate either increased buy-in and referrals to greenspace programmes, for example with primary care professionals such as GPs who are responsible for green prescribing or, if stakeholders were linked to funding decisions, the increased likelihood of funding being awarded from what is available. These findings are supported by previous work that has shown clear objectives of programmes are necessary to convince stakeholders of programme worth, particularly given the heterogeneity of programmes that exist, as well as in order to enhance partnership working (Wheeler, 2020). Fullam and colleagues (2021) highlight that, for increased buy-in, it is crucial that the specifics of the intervention are communicated, for example, who the intervention is for, how it will benefit, the training that staff may require, and how outcomes will be measured or assessed. Interviewees in this study discussed the challenge of deciding which outcome measures were suitable. Fullam et al. (2021) acknowledge that this can be difficult as funder requirements tend to vary. However, the authors specify that programme implementers should collect outcomes with a target audience in mind since, despite advantages of both quantitative and qualitative measures, certain audiences may value one over the other which will aid in what planned outcome measures are communicated to stakeholders.

Micro-level: Individual differences

Micro-level individual differences were not configured into specific programme theories but have been mentioned many times through the project. Individual factors such as age, gender, ethnicity, and personal opinion and circumstance were previously identified as unconfigured contextual factors in the realist synthesis (Chapter Four), and survey responses also showed varying opinion about their impact on programme success (Chapter Five). Previous research has shown influence of factors such as age, for example, which appears to influence the extent to which peer behaviour is mirrored (Albert et al., 2013). This could influence a person's initial buy-in to programmes. Gender could also influence programme success. A study by van den Bosch et al. (2015) reported positive associations between exposure to greenspace and mental health in women, but not men. Another study by Combs et al. (2016) showed that female participants responded more quickly to greenspace programmes. Ethnicity has been discussed previously relating to the necessity of having mentor and programme facilitators from different backgrounds. Ethnicity and previous experiences may also

influence uptake of programmes if a person is from a background where nature is integral to the culture. For example, the normalisation of forest therapy and immersion in the forest for health within Japanese and Korean culture could have an influence on uptake and engagement of programmes compared to other cultures where there is stigma attached to the idea of nature being healing (Masterton et al., 2020).

Although individual-level factors were explicitly explored in the qualitative interviews, interviewees were mixed in their opinion about how they impacted mechanisms and outcomes. Some believed that there was no effect, whereas others agreed that effects such as age-related peer pressure existed; some men and women preferred different activities; and different ethnicities interacted with nature in different ways. Overall, it is clear that micro-level individual factors likely influence programme success in some circumstances, but their heterogeneity means that it is very difficult to develop CMOcs that are generalisable across clients. What the findings do contribute is that what works for one person might not work for others, depending on individual characteristics and experiences. For example, despite this project showing that greenspace programmes appear to work in supporting people with poor mental health and PSU, it is important to recognise that this is not a homogenous group, and micro-level individual characteristics and experiences will likely shape programme success. However, in realist research a level of pragmatism must be adhered to given that there could potentially be infinite numbers of CMOcs. By identifying these individual level factors as currently unconfigured contextual factors, this acknowledges that they likely play a role in programme success but require further exploration, possibly on a case-to-case basis.

Final combined framework

In Chapter Two this thesis described evidence of the pathways through which greenspace benefits human health. This project's findings support these pathways but further evidence specific mechanisms within the mental health pathway suggesting that the reasons why greenspace programmes can benefit is multifaceted and complex. Russell and Farnum (2004) previously suggested a programme theory for wilderness therapy that incorporated three interrelated factors of Wilderness, Physical Self, and Social Self. Bragg and Atkins (2016) posed a similar model for environmental conservation, care farming, and horticultural therapy. These models were influential in informing the original framework proposed in Chapter Four. Further, some recent work has built frameworks and logic models representing pathways for mental health, relative to greenspace programmes, more generally in the UK (Fullam et al., 2021, Edinburgh & Lothians Health Foundation, 2019), but there is still no existing framework for

greenspace programmes that support people with poor mental health and PSU. Given that a significant part of realist research is identifying 'for whom' a programme works, this is a substantial gap in the literature which this study aimed to fill.

The model presented in Chapter Four drew on existing literature, and three overarching themes, Nature, Individual Self, and Social Self, were proposed, under which the seven programme theories fell. Through analysis of the qualitative findings in Phase Three, it is clear that the original framework provided a decent initial programme theory, and through testing and refining the data over the subsequent phases, refined programme theories have been developed for greenspace programmes that support people with poor mental health and PSU. While the original three theme headings of Nature, Individual Self, and Social Self still hold, with eight refined programme theories now falling under these headings, the Phase Three findings additionally added one macro-level programme theory relating to COVID-19, and two meso-level programme theories relating to stakeholder buy-in and intervention approach. Further, the influence of micro-level influences in the success of programmes was identified. These add an essential lens in line with other social-ecological models, as discussed in Chapter One, which show how wider aspects outside the programme influence implementation and success.

As previously discussed in Chapter Four with the original framework, while it is possible for programme theories to exist independently from each other, greenspace programmes will likely work best in the circumstances where the mechanisms within each are activated simultaneously. This is supported by Pawson (2006b) who proposed that transformation may be achieved through CMOcs happening together over a period of time. It is worth mentioning that participants may choose to focus their development in one area, and this could lead to trade-offs in outcomes. For example, participants who spend time honing a particular independent skill, and therefore increasing in self-efficacy, may then experience a decrease in social skills due to time spent alone. Despite this, the findings from all phases of the project suggest that the optimum outcomes on greenspace programmes for people with poor mental health and PSU are a result of immersion in nature, individual-level changes, and social-level changes. Based on the consolidated programme theories, Figure 13 shows the updated version of the original conceptual framework proposed in Chapter Four. The key difference of this model compared to the original version in Chapter Four is that this model depicts the specific CMOcs that explain how greenspace programmes might be used to support people with poor mental health and PSU.

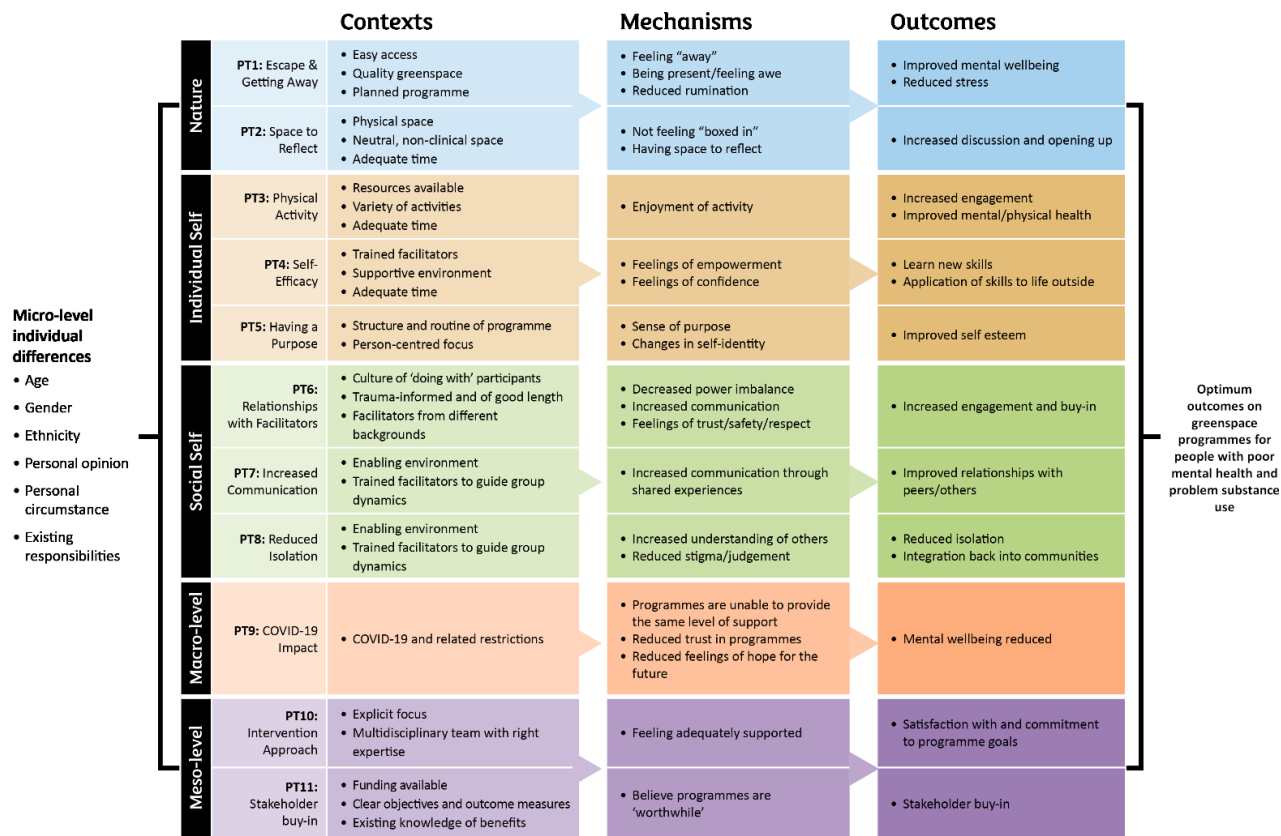


Figure 13: The updated and refined model for greenspace programmes that support people with poor mental health and PSU

Implications of findings

There are various ways in which the findings of this project contribute to the research field. Firstly, in regard to the methodological approach, realist methodology allows evidence from different disciplines to be combined together enhancing theoretical understanding of the pathways through which greenspace impacts health. The recognition of the need for interdisciplinary approaches in this field is not new, Chapter Two discussed the interdisciplinary workshop reported by Markevych et al. (2017) which proposed three pathways by which greenspace impacts health: reducing harm; restoring capacities; and building capacities. What this current project adds is a clearer understanding about how interdisciplinary pathways relate specifically to greenspace programmes. The use of realist methodology has allowed a greater theoretical understanding of the intervention process itself and the multiple pathways by which programmes appear to be successful, rather than simply reporting whether greenspace programmes are effective or not. While other multidisciplinary teams have explored the

mechanisms related to greenspace programmes and the contexts under which these mechanisms are activated (Fullam et al., 2021, Garside et al., 2020, Husk et al., 2016, Lovell et al., 2015), this study has expanded on this and explored ‘for whom’ do greenspace programmes work. The project is therefore a novel approach to understanding how greenspace programmes can be used to improve mental health and support people with PSU.

Realist research also promotes collaborative approaches which cross the boundary between academics and wider stakeholders such as those involved in programme development and implementation. As discussed previously, realist research is not about exploring participant’s stories, but about using their expertise to build programme theory. By incorporating working knowledge from practitioners within the field into the programme theories, as well as empirical evidence, this has enabled a theory-based framework to be created that is relevant outside of academia. Indeed, a briefing has been created from the findings of the Phase One realist synthesis and can be found on the ‘Become a Partner’ page on the Greenhealth.scot website (<https://www.greenhealth.scot/partner>) to aid with new programme implementations. This guide was created in collaboration with the Dundee Green Health Partnership (GHP) and The Conservation Volunteers (TCV). We consulted with practitioners on TCV programmes across Scotland which allowed us to include practitioner experience alongside research findings. This helped move the work outside of academia, into a usable and practical format. While the guide has a general mental health focus, rather than being specific to substance use support, it does highlight the interest in understanding how better to design and implement greenspace programmes and the importance of acknowledging the role of context and the causal mechanisms which lead to outcomes. There has been much interest in the guide, and it has been shared on the Edinburgh and Lothians Green Health Prescribing Microsoft Team, the webpage for the ECEHH, SHAAP, SARN, and Parks Community UK.

The findings across all three phases support continued development and implementation of greenspace programmes as a legitimate route to health for many people. Further, although there is a large amount of heterogeneity across programmes, with different activity types and settings, the mechanisms which lead to optimum outcomes appear to be similar across programmes and activated under the same necessary contexts. This supports the development of a variety of programmes depending on the needs and/or preferences of the clients, as all types of greenspace programmes appear to successfully support people’s health in similar ways. Additionally, if all programmes ‘work’ in the same

way, this suggests that there is a level of flexibility in design meaning that effective programmes could be designed while acknowledging resource limits. For example, programmes will have different resources available to them but if mechanisms are similar across programmes regardless of activity type and setting then programmes can be designed to be higher or lower cost or set in urban or rural areas, depending on what is feasible. The findings also complement the recommendations found in the most recent reports relating to greenspace programmes for mental health (Fullam et al., 2021, Garside et al., 2020, Hardie et al., 2021). To truly incorporate greenspace programmes in current health care provision, there is a need for sustained investment from wider stakeholders and more secure funding. There is a need for more effective partnership working between different sectors, and there must be more advocacy, peer support, and training accessibility across all sectors (Garside et al., 2020, Lovell et al., 2019). There must be clear guidance for programme development and clarity on what titles can be used to describe programmes, and programmes must be explicit about who they are designed to support (Richards et al., 2019). There must be awareness that greenspace programmes may exacerbate inequalities if clients' needs are not considered central to the programme, and there must be awareness of programmes being implemented more readily in certain areas than others which could negatively impact accessibility for those potentially most in need of support (Garside et al., 2020).

Importantly, the findings have shown that greenspace programmes appear to be successful in supporting people with PSU through similar causal mechanisms as identified in the original framework for mental health. Although greenspace programmes exist for people with PSU, up until this point there has been no framework showing why they are successful and in what contexts. Without this knowledge it is difficult to successfully replicate and implement new programmes. Given the transferability of the framework across project phases, the proposed intervention framework could be used to help design and implement programmes to support people with poor mental health, people with PSU, and people with dual diagnosis. Further, many of the key components that appear to make greenspace programme successful for people with poor mental health and PSU are also seen across other typical treatment pathways. For example, this chapter has discussed individual-level changes, such as increases in self-efficacy and feelings of purpose, as well as social-level changes, such as improvements in relationships, that are achieved because of person-centred care with compassionate facilitators within enabling environments that promote social cohesion. These changes have previously been identified as mechanisms in holistic PSU treatment (Carver et al., 2020, Duff et al., 2010). What greenspace programmes add to this is the therapeutic

effect of immersion in nature and how this can allow clients to feel that they are ‘getting away’ from their own lives and daily stressors, and that they have ‘space to reflect’ on their lives. Further, increased levels of physical activity can contribute to both physical and mental health. Greenspace programmes are also potentially flexible in a way that other traditional treatment is often not. For example, they may provide support without falling under the typical banner of ‘treatment’ which removes stigmatisation associated with treatment, and they can meet people where they are at, regardless of where they are on their recovery journey. The ability of greenspace programmes to support people without pre-existing requirements and criteria indicates that they could be a beneficial addition to a package of holistic care for people with both mental health and PSU problems, and further, they are often lower cost than other interventions (van den Berg, 2017).

Finally, the findings promote greenspace as a viable and sustainable nature-based solution for health in the current landscape of increasing urbanisation and the climate change crisis. By 2050, at least 70% of the world’s population are predicted to live in urban areas and without drastic action the changing environment will continue to have negative impacts on the planet (IPCC, 2021). Biodiversity is declining at a faster rate than any other time in human history (IPBES, 2019), and the maintenance and development of environments that promote biodiversity and incorporate engagement with nature is essential. The Scottish Planning Policy (2014) states that all new planned developments must take biodiversity into account, promote habitat restoration, and avoid habit destruction. The Nature Conservation (Scotland) Act 2004 requires all public bodies to consider their role in promoting biodiversity and to consult the Scottish Government’s strategy, ‘Scotland’s Biodiversity: It’s In Your Hands’ (2004). Incorporating greenspace into development plans would be a way of meeting these requirements.

Further, increased engagement with greenspace has been shown to increase pro-environmental behaviour (Alcock et al., 2020, Martin et al., 2020) and promote higher levels of support towards conservation (Alcock et al., 2020, Dutcher et al., 2007). Increasing pro-environmental attitudes is particularly important given that climate change is happening faster than previously thought (IPCC, 2021). However, to achieve positive change in environmental attitudes, greenspace interventions, such as the targeted health programmes discussed in this project, must appeal to potential clients and meet their needs. This will likely require a multidisciplinary approach and the promotion and marketing of greenspace programmes, as well as changing the physical environment (WHO, 2017). As discussed, simply providing greenspace is likely not enough to promote

a change in outcomes, and a 'build it and they will come' attitude has been deemed ineffective (Hunter et al., 2019, WHO, 2017). However, as well as local-level promotion, the importance of greenspace should receive explicit backing and commitment from high-level stakeholders, and, perhaps most importantly, continue to be built into national policy frameworks to guide future decision making and ensure wider priorities, such as climate change targets, are met (PHE, 2020, Scottish Government, 2020a).

Strengths and limitations of the project

Although greenspace programmes are increasing in popularity, there is still much to be learned about the pathways by which they are successful. A strength of this study is that it has used a realist approach which improves the understanding of the CMOcs that result in successful programmes. Additionally, the number of times that the programme theories have been refined throughout the project, using data from multiple stakeholders from different countries across Phase Two and Phase Three, means that the proposed framework is more convincing compared to approaches where only one programme theory/logic model is developed. Although some researchers, particularly in the field of social prescribing, have incorporated realist methods into their work, there is still limited understanding and evidence of how greenspace programmes may work for different client groups, such as people with PSU. To improve understanding and aid future implementation, particularly for specific client groups, further exploration of why programmes are successful, for whom, and in what circumstances, needed to be undertaken. To my knowledge, this project is the first study to use realist methodology to explore how greenspace programmes could be successful in supporting people with poor mental health and PSU. It has provided a detailed explanatory framework to facilitate partnership working, raise awareness of and increase confidence in greenspace intervention services, and communicate outcomes to service users, their families, commissioners, and other bodies of mental health and substance use professionals.

Another strength is that the focus of the project is particularly timely; mental health problems are reportedly increasing (Bebbington and McManus, 2020), and the prescription rate of anti-depressants and the demand for talking therapies is at record levels (Iacobucci, 2019). There is a clear need to establish ways to support the rising demand for mental health support while limiting rising costs. This study has shown that greenspace programmes are feasible alternatives to the development of new, more costly interventions. The focus on substance use support is also important given the current profile of drug-related, and alcohol-specific, deaths in the UK, and in Scotland specifically. In 2020 in Scotland, there were 1,339 drug-related deaths, the highest ever

been recorded, and 1,190 alcohol-specific deaths (National Records of Scotland, 2021). This project provides evidence for one type of holistic interventions which 'meet people where they are at' in their journey and are flexible enough to meet the needs of a diverse range of clients. Further, with the ongoing climate change crisis (IPCC, 2021) and increasing reports of disconnection to nature through the life course (Hand et al., 2018), detailed evidence for interventions that support the maintenance and development of quality greenspace is essential.

However, as with all research projects, limitations must also be considered. It is essential to acknowledge that greenspace programmes are not a 'silver bullet' and are part of holistic approach to addressing mental health and substance use problems. There are situations where greenspace programmes may be unsuitable for clients, and circumstances upon which they will have very little effect. For example, people with PSU can experience wider vulnerabilities and face systemic challenges such as marginalisation, trauma, insecure housing, and entrenched poverty that result in continuing inequalities (Tyndall and Dodd, 2020). Greenspace programmes were described by one interviewee in this study as a 'drop in the ocean' when acknowledging the wider, structurally violent landscape that people with PSU experience (Richardson et al., 2015). Although this project has argued that greenspace programmes provide aspects of care that other approaches do not, the limitations of what greenspace programmes provide must be made clear, and they must not be oversold.

Another limitation is that, while realist research provides in-depth exploration and explanation of the processes through which greenspace programmes may be successful, there are intrinsic constraints in the methodology. In particular, realist methodology is supported by guiding principles rather than standardised rules (Pawson et al., 2005), and it could be argued that realist methods are inherently interpretive and subjective. To address this, transparency in methods used was prioritised throughout this project, for example by submitting a protocol to PROSPERO for the realist review; ensuring clear description of the survey design process; and by keeping detailed memo boxes throughout the qualitative interviews describing refinements of programme theories which were shared with my supervisory team throughout. A further challenge is that realist research has no concrete end point since programme theories can always be tested again with new sets of participants to further refine or consolidate the theories. A decision must be made as to when to stop data collection, while accepting that there may be a number of CMOs that have not been uncovered and reported. Indeed, many realist projects are many years long and have large, multidisciplinary teams working on

a single project to undertake data collection and analysis. This was clearly not an option in my project, so it must be acknowledged that the amount of data I could collect and analyse has been limited by the timescales and constraints of a PhD.

The challenges of working and learning alone were further deepened at times due to the COVID-19 pandemic which meant all support throughout Phase Two and Phase Three was via electronic communication. While my supervisory team and I were able to navigate this challenge, no face-to-face meetings, support, training, or fieldwork for over half of my PhD required resilience and impacted what I was able to achieve. For example, as discussed throughout the thesis, the pandemic made outcome measures difficult to incorporate into the project. Originally, I had hope to gather outcome data but, given this was not possible, I asked specific interview questions about what outcomes were most important and how they could be measured. This meant outcomes were only informed by qualitative data and further work must be done to better integrate quantitative data into findings. It is worth noting, however, that robust outcome measures are reportedly challenging to gather in this field, with recent reports and reviews of greenspace programmes citing particular challenges relating to which quantitative outcomes to gather to provide the most convincing evidence (Fullam et al, 2021, Garside et al., 2020, Harper et al. 2021).

Finally, the pandemic meant that I was not able to incorporate client voice into my work. I have discussed this in Chapters One and Three, but it is important to highlight here as an overall limitation to understanding how and why greenspace programmes work for people with poor mental health and PSU. Other studies have highlighted the necessity of incorporating client voice and involving clients in the development and evaluation of greenspace programmes (Hardie et al., 2021, Harper et al., 2021).

Future research

With the above limitations in mind, two main areas of future work are suggested. Firstly, for the framework to truly represent the CMOcs through which programmes are successful, client voice must be incorporated. Although this project has suggested that the framework is transferable across different programmes, client input would aid in exploring whether this is the case, or if different activities activate different mechanisms. Other questions that client voice could aid in exploring are: why some people do not want to engage with programmes; what would encourage programme uptake; what challenges, inequalities, and structural issues clients face which impact the uptake of programmes; if different client groups identify different CMOcs; and whether different

mechanisms are activated depending on whether the programme has a prevention or recovery focus, or whether reducing substance use is not a primary outcome. The necessity of including client voice is supported in the wider literature on greenspace programmes, for example an umbrella review by Harper et al. (2021) discussed the need for increased client involvement in the design, delivery, and evaluation of outdoor therapy, as clients' previous experiences and attitudes towards environments and activities is central to the success of interventions.

Secondly, future work must consider how best to measure outcomes so that this component of the realist framework is more detailed. The new MRC/NIHR framework for developing and evaluating complex interventions (Skivington et al., 2021) describes the choice of outcome measures as a "*crucial aspect*" (p.52) in intervention development and implementation, and consideration must be given to which outcome measures to include and how best to navigate multiple outcomes at an individual and/or system level. Relative to greenspace programmes, future work should look to incorporate more quantitative outcome measures, something supported by existing evidence (Bragg and Atkins, 2016, Fullam et al., 2021, Harper et al., 2021). For example, the use of validated psychometric assessment tools and/or physiological measures could allow a deeper understanding of how greenspace programmes affect mental health and support people with PSU, and quantitative outcomes could be added into all programme theories in addition to self-reported outcomes and observational measures (Bragg and Atkins, 2016, Harper et al., 2021). Relating to substance use, programmes could incorporate the Treatment Outcomes Profile (PHE, 2018), the Elements of a Recovery Facilitating System (ERFS) measure (Bragg and Atkins, 2016), or the Recovery Star (Bragg and Atkins, 2016).

In Fullam et al.'s Nature on Prescription guide (2021), the authors discuss that quantitative evaluation is currently limited, despite a trend suggesting positive outcomes for clients of greenspace programmes. This is partly due to heterogeneity of programmes making it difficult to carry out larger scale evaluations and comparisons. However, the authors report that there are plans for work to be commissioned in this area of outcome measures, and cost-benefit analyses, for example, may facilitate comparison in a way that is not reliant on standardised questionnaires or other scientific measures typically used to measure intervention effectiveness. It is unclear how this might be applicable in the field of substance use research, so further thought must be given to how progress in measuring outcomes more generally may inform work specific to programmes that support people with PSU.

Thesis conclusion

The aim of this project was to uncover the underlying mechanisms which, triggered under particular contextual conditions, lead to desired outcomes on greenspace programmes designed to support people with their mental health and to support people with PSU. In Phase One, an original overriding theory involving seven programme theories under three themes of Nature, Individual Self, and Social Self was proposed. In Phase Two, the framework was tested with primary survey data and its transferability was explored for use on programmes for people with PSU. Findings showed that the framework has the potential to be applicable to both greenspace programmes for mental health and for PSU support. In Phase Three, qualitative interviews with staff on greenspace programmes and wider stakeholders allowed deeper exploration of the CMOcs within greenspace programmes that support people with poor mental health and PSU, and allowed identification, refinement, and consolidation of the final set of proposed programme theories. This final chapter has presented the findings of the project and explained, in detail, how they fit into and expand existing knowledge. The implications of the project have been discussed, the strengths and limitations of the study considered, and the chapter has ended with a discussion on the necessary future work that is needed to advance understanding about how greenspace programmes improve mental health and how they work for people with PSU, and in what circumstances. The findings of this project are not only theoretically novel but also have practical relevance for those designing such interventions, and provide recommendations on how to optimise, tailor, and implement, future programmes. Findings could be particularly relevant for academic researchers, health professionals, and mental health multi-disciplinary teams, and for those working in the third sector, developing and delivering greenspace programmes for people to improve their mental health and to support them with PSU.

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List of appendices

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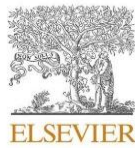
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Appendix 1: Full paper of Masterton et al. (2020)

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Greenspace interventions for mental health in clinical and non-clinical populations: What works, for whom, and in what circumstances?

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ABSTRACT

With growing strain on mental health services, greenspace interventions could be a promising addition to current health and social care provisions as they have the potential to be widely accessible for people within their own communities and used alongside a variety of treatment plans. Despite promising progress in greenspace research, the underlying mechanisms and processes of greenspace interventions are still unclear. Without knowing these it is impossible to understand why programmes work and how best to replicate them. To address this gap this review uses realist methodology to synthesise the international evidence for greenspace interventions for mental health in both clinical and non-clinical populations. Forty-nine full text articles are included in the review and the underlying contexts, mechanisms, and outcomes of the interventions identified and refined into an original overriding theory under three themes of Nature, Individual Self, and Social Self. The interaction of these three factors represents a new conceptual framework for greenspace interventions for mental health and shows what works, for whom, and in what circumstances. The findings of this review are not only theoretically novel but they also have practical relevance for those designing such interventions including the provision of recommendations on how to optimise, tailor and implement existing interventions.

1. Introduction and background

The beneficial effect of nature on human health and wellbeing is a concept that has been widely accepted since the 1800s (Hickman, 2013). Since then international agreements and organisations such as the World Health Organisation (WHO) have supported the establishment and maintenance of urban greenspaces to promote health and wellbeing, and have reviewed their effectiveness in contributing to healthy, sustainable cities (WHO, 2017). Within public health the positive effects of greenspace are becoming increasingly publicised (van den Berg & van den Berg, 2014). The WHO defines public health as 'the science and art of preventing disease, prolonging life and promoting health through the organized efforts of society, organisations, public and private, communities and individuals' (Acheson, 1988). Public health therefore encompasses all public and private organisations and all resources that aim to positively impact the health of the whole population. From a public health perspective greenspace can be defined and characterised by its ability to provide healing and 'green care' (Haubenhofner et al., 2010). Greenspace can be used to achieve health outcomes, such as a reduction in stress or an increase in positive mood, in a variety of settings from public parks and woodlands to gardens in hospitals and care homes (Frumkin, 2013). Understanding and recognition of how greenspace can contribute to

public health is potentially significant for addressing numerous physical health-related issues, such as obesity, but is equally important to facilitating good mental health and addressing negative mental health.

The term 'mental health' is most commonly used to describe the state of a person's psychological wellbeing, running on a continuum from positive mental health to poorer mental health (Pilgrim, 2017). For this review, we are interested in how greenspace interventions might be effective in improving mental health in those who have a poor mental health diagnosis, or in those who have expressed concern about their own mental health. While 'mental health' is neither positive nor negative by definition (Pilgrim, 2017), the population inclusion criteria for our study means that the term, in this review, is more likely to represent a continuum of states from mild to moderate low mood to severe mental ill health. It is estimated that one in four people in the UK will experience a mental health problem at some point in their life, the most common being anxiety and depression (Kendrick et al., 2015). One of the benefits of using nature to aid mental health recovery is that it can be used alongside a more typical medicalised treatment plan such as talking therapy and interventions could potentially be implemented anywhere. Indeed, greenspace interventions could be a promising addition to both current health and social care provisions as they have the potential to be low-cost and widely accessible for people within their own communities

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(van den Berg & van den Berg, 2014).

Previous systematic reviews of greenspace interventions for mental health improvements have provided some evidence of their effectiveness (Bowen et al., 2016; Cipriani et al., 2017; Genter et al., 2015; Gorman and Cacciatore, 2017). Gorman and Cacciatore (2017) undertook the first systematic review of care farming, and highlighted that, while understudied, care farming appears to benefit people experiencing psychological distress and could be a feasible non-medicalised approach to improving mental health. Cipriani et al. (2017) found that 11 out of 14 horticultural therapy studies showed significant mood and performance improvements for people with mental health conditions while Genter et al. (2015) found that allotment gardening provided therapeutic benefits and improved health and wellbeing. While the effect size was small, Bowen et al. (2016) also found that wilderness adventure therapy produced statistically significant mental health improvements

in young people over ten weeks. However, in these systematic reviews it is unclear why an intervention works and what mechanisms of change lead to the desired outcomes (Norton et al., 2014). For example, a greenspace intervention designed to decrease stress might be deemed effective if it led to quantitative differences in outcome measures such as blood pressure or cortisol levels (Roe et al., 2013). From a qualitative viewpoint, an intervention that has led to participants reporting positive changes, such as lower perceived stress levels, might also be deemed effective (Ellingsen-Dalskau et al., 2016). However, without knowing the necessary components, processes and influences needed for an intervention to work, it is impossible to understand why the programmes work and how best to replicate them. More in-depth reviews such as Lovell et al. (2015) and Husk et al. (2016) have produced more detailed conceptual models of the mechanisms by which engagement with nature impacts physical and mental health. We have built on

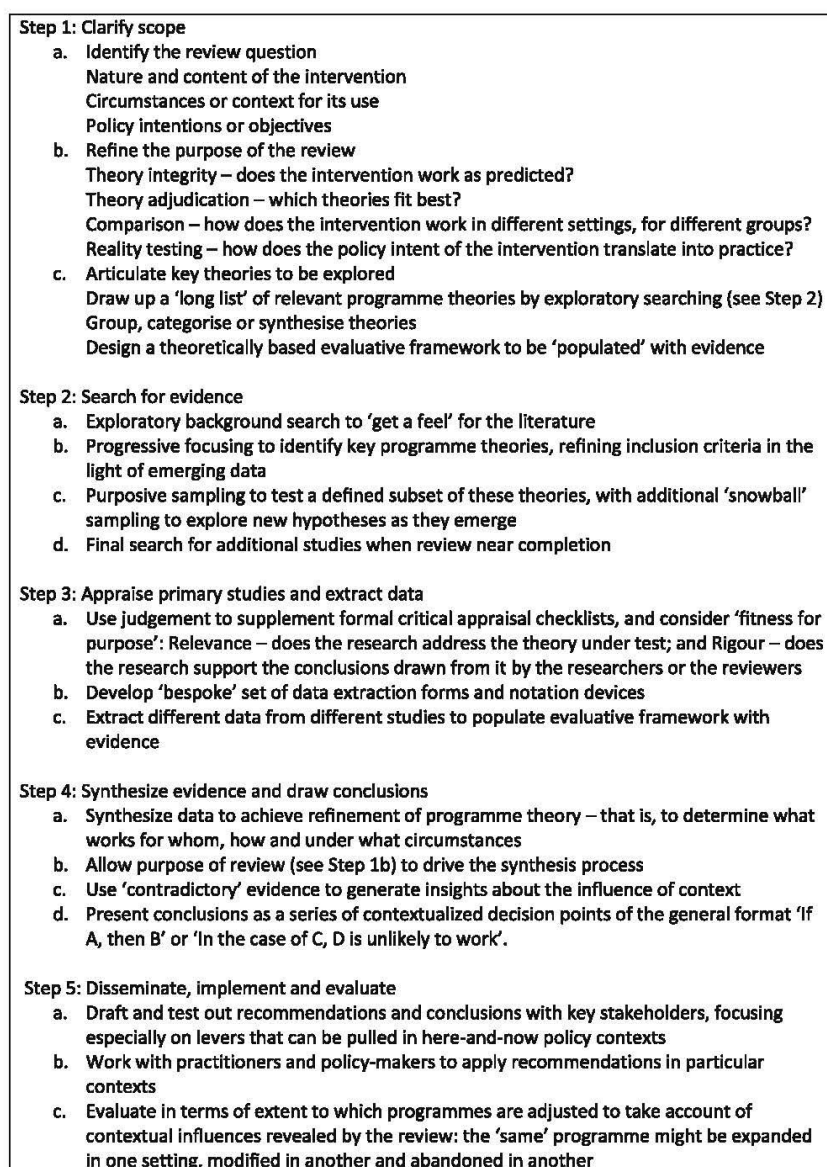


Fig. 1. Key steps in a realist review as detailed in Pawson et al. (2005).

evidence in these reviews by focusing on context, and on what works 'for whom' and 'in what circumstance'. Different contexts are likely to facilitate different mechanisms and outcomes, and what 'works' in one setting might not 'work' in a different one. To address this, realist methodology will be used to synthesise the evidence more broadly for greenspace interventions for mental health.

A realist review is defined as a 'method for studying complex interventions in response to the perceived limitations of conventional systematic review methodology. It involves identification of contexts, mechanisms and outcomes for individual programmes in order to explain differences, intended or unintended, between them' (Booth et al., 2016, p. 267). By using realist methodology, the underlying mechanisms and processes through which greenspace can improve mental health will be identified. This will allow a far greater theoretical understanding of the intervention process, rather than simply deducing whether an intervention is effective or not. Realist review methodology is becoming an increasingly popular way to synthesise public health interventions, given that they are complex by nature (Pawson et al., 2005). Wight et al. (2016) describe public health interventions as complicated and multicomponent, with many feedback loops, rather than simple, easily replicated entities. Greenspace interventions are an example of complex, public health interventions: the setting is in an uncontrolled environment, they are ideally run by multidisciplinary teams, and there are often many intervention components. The interventions may change in regard to context, and all programme components interact leading to outcomes that differ depending on such contextual factors (Wong et al., 2010). For these reasons, a realist review is the most appropriate methodology to synthesise existing greenspace interventions. Pawson et al. (2005) propose five steps which help guide the realist review process. These steps are iterative rather than sequential and each stage can influence another. For example, review questions might be refined after initial programme theory formulation, or the programme theory might be refined at any point when new evidence emerges. Steps 1–5 as reported in Pawson et al. (2005) are shown in Fig. 1.

1.1. Aims and objectives of review

The aim of this realist review is to explore what greenspace interventions work to improve mental health, how they work, why they work, for whom do they work, how does context influence mechanisms of change, and how do mechanisms of change lead to outcomes. The objective of the review, therefore, is to develop initial programme theories and then test and refine these theories using both quantitative and qualitative evidence.

1.2. Review questions

1. What interventions, theories or strategies have been used in greenspace interventions that aim to improve mental health (as defined above) in both clinical and nonclinical samples?
2. What outcome measures (O) are associated with current greenspace interventions (e.g. quality of life, increased confidence, increased mood)?
3. What are the potential mechanisms (M) that influence outcomes?
4. What is the role of context (C) in enabling/constraining the above mechanisms?
5. What is the optimal C-M-O configuration that will lead to optimal outcomes in greenspace interventions to improve mental health?

2. Methods

2.1. Formation of initial programme theory

Realist reviews aim to develop theories about how an intervention works. Central to a realist review is identifying the causal mechanisms that lead to an outcome, and in what contexts these mechanisms occur

(Wong et al., 2013). This relationship is referred to as the C-M-O configuration (CMOc). By using this methodology realist reviews provide a theory-driven approach to analysing literature and identifying causal relationships. Unlike systematic reviews, meta-analyses or qualitative evidence syntheses, realist reviews analyse quantitative, qualitative, and mixed-method data, as well as grey literature (Abrams et al., 2018). Information about 'what works' is analysed using the findings of each paper, as well as through data extraction and synthesis from other sections of the paper which may inform theoretical understanding of causal pathways. The first step of this review was initial exploration of literature and theory formulation about how greenspace interventions for mental health might be effective. This involved comparing and synthesizing relevant theories and hypothesising how a greenspace intervention is thought to work to achieve desired outcomes. This initial theory mapping provided the proposed framework for the review about what works, for whom and in what circumstances. This framework (initial programme theories, IPTs) was then tested and refined throughout the realist review process as evidence emerged.

The main IPTs were developed initially by the first author (WM) through reading existing literature on greenspace interventions for mental health, conversations with existing greenspace programme staff, and by reading relevant policy documents and reports which discuss conceptual frameworks in relation to practice. These IPTs were checked by the second author (HC) and then by the wider team (TP, KP). This ensured that all authors were involved, and in agreement with, the development of the IPTs. By using this approach, relevant contexts, mechanisms, and outcomes were identified for several different programmes and potential CMOcs developed. The guiding questions for initial theory formulation are 'what outcome measures are associated with current greenspace interventions?', 'what are the potential mechanisms that influence outcomes?', 'what is the role of context in enabling/constraining potential mechanisms?', and 'what is the optimal C-M-O configuration that will lead to optimal outcomes in greenspace interventions for mental health?' Table 1 shows the eight IPTs proposed under three identified programme theory themes of Nature, Individual Self, and Social Self. To further clarify how contexts, mechanisms, and outcomes fit together in a causal relationship, 'if-then-because' statements are included under each IPT.

2.2. Testing the explanatory framework

To test and refine programme theories a selection of relevant electronic databases were searched between May and July 2019 in order to achieve saturation of results. These were: MEDLINE, PsycINFO, GreenFile, SocINDEX, CINAHL, Health Source, SPORTDiscus, Scopus, Web of Science, Natural Science Collection, and Wiley Online Library. Searches were limited to studies published after 2000 to ensure that included evidence was current. Qualitative, quantitative, and mixed-methods papers were included. Several terms are used interchangeably for 'greenspace' and 'mental health' so a number of terms were included in the search string (see Table 2).

Grey literature was searched in June 2019 through search engines (Google, Google Scholar), grey literature databases (OpenGrey, Social Care Online), relevant organisational websites and reports (see Table 3), social media platforms such as Twitter, and through word of mouth.

2.3. Inclusion/exclusion criteria

Inclusion criteria aligned to both the research questions and IPT development, as suggested by Wong et al. (2013), refined in response to emerging data, and discussed as a team to reach agreement. All programmes had to be greenspace-based however this could include gardens, woodland, plots, parks, and other types of greenspace. All age groups were included. In terms of mental health, both non-clinical and clinical studies were included in the search strategy. Participants could have a mental health diagnosis or be self-diagnosed; as many greenspace

Table 1
Initial programme theories identified to be tested and refined.

Theme	Initial Programme Theory (IPT) number	Context (C)	Mechanism (M)	Outcome (O)
Nature	1	Nature-based location Ease of access	Feeling calm Feelings of escape Feeling removed from everyday life	Decrease anxiety Decrease stress
IPT 1: If there is easy access to a nature-based location, then participants may experience decreased anxiety and/or stress. This is because they can feel removed from everyday life, experience feelings of escape in nature, and feel calm. If the nature-based location is not easy to access, it is much less likely that people will go there.				
Nature	2	Nature-based location Ease of access	Indirect attention used	Attention restoration Decrease mental fatigue
IPT 2: If there is easy access to a nature-based location, then participants may experience a decrease in their mental fatigue, as well as feel that their attention has been restored. This is because indirect, or effortless, attention, as described in Kaplan and Kaplan's Attention Restoration Theory (Kaplan and Kaplan, 1989), is being used when immersed in nature rather than direct attention. If the nature-based location is not easy to access, it is much less likely that people will go there.				
Nature	3	Nature-based location Ease of access	Time alone to reflect	Increase in readiness to change lifestyle and/or coping strategies Increase in desire to change Increase in awareness of the need for change
IPT 3: If there is easy access to a nature-based location, then participants may experience an increase in readiness to change, an increase in desire to change, and/or an increase in awareness of the need for change. This is because the nature-based location gives participants time alone to reflect on their lives and what they want to change. If the nature-based location is not easy to access, it is much less likely that people will go there.				
Individual	4	Availability and resources for trained facilitators Access to resources	Planned structured activities Enjoyment of activities	Increased physical activity Increased physical health Improvement in mood
IPT 4: If there is the availability and the resources to provide trained facilitators, and these trainers have access to a variety of resources (such as equipment), then there will be an increase in physical activity, and a subsequent increase in physical health and improvement in mood. This is because there will be the availability of a number of different planned, structured activities from the trained facilitators, and participants can pick what they would like to do best, and therefore enjoy the activity.				
Individual	5	Availability and resources for trained facilitators	Learning new skills Feelings of self-efficacy	Confidence Confidence in ability to change and cope with challenges in life
IPT 5: If there is the availability and the resources to provide trained facilitators, then this will enable an increase in participant confidence, as well as in their confidence to change and cope with challenges in life. This is because participants are able to learn new skills from the facilitators, which lead to feelings of self-efficacy.				
Individual	6	Time on programme Availability and resources for trained facilitators	Learning new skills Feeling responsible for something	Increased self-esteem Increased vigour for life
IPT 6: If there is the availability and the resources to provide trained facilitators, and if there is adequate time spent on the programme, then participants will show an increase in self-esteem and an increase in vigour for life. This is because participants are able to learn new skills from the facilitators, as well as feelings of responsibility. The longer that the participant is able to feel responsible for something, the bigger the increase in self-esteem and vigour for life.				
Social	7	Previous experience of patient-therapist relationship Existing facilitator attitudes and/or perceived attitudes of facilitator	Feelings of rapport and trust Good relationship with facilitator	Continued engagement with, and after, the programme.
IPT 7: If facilitators have positive attitudes, then participants are more likely to engage with, and after, the programme. This is because, when participants perceive a positive attitude towards them, feelings of rapport and trust are more likely to develop, and a good relationship with the facilitator can be established. Previous experience of a patient-therapist relationship can also influence continued engagement with, and after, the programme. If there is a positive previous experience, then this can lead to engagement. This is because feelings of rapport and trust can be built quicker, and participants can more easily develop a good relationship with the facilitator.				
Social	8	Perception of how others are engaging on the programme Time on programme	Team building/teamwork exercises Feeling safe and unjudged by others with similar backgrounds Feelings of rapport Opportunities to share Opportunities to learn from others	Increased social abilities Improvements in interpersonal relationships
IPT 8: If participants perceive others to be engaging well on the programme, then this can lead to increased social abilities and improvements in interpersonal relationships. This is because, when participants perceive others to be engaging, this increases feelings of rapport between participants. This can lead participants to feel safe and unjudged by others during team building/teamwork exercises where there are opportunities to share and learn from others. Even if others are perceived to be engaging well, time spent on the programme is also important in order to achieve outcomes. This is because social improvements do not occur quickly, and interpersonal relationships take time to build.				

interventions are applied in a similar manner to specific and general populations. Programmes were included if improved mental wellbeing was an explicit intended outcome. The exclusion criteria were developed and refined in response to emerging data and again were discussed as a team to ensure consensus. A decision was made to exclude studies focused on dementia because, upon initial analysis, the CMOs appeared very different to those for mental health. It was unclear whether those with dementia had the capacity to reflect meaningfully on their experiences and if these studies could effectively answer the review questions. Furthermore, many of these studies were implemented inside and could not be described as 'greenspace' programmes.

3. Results

3.1. Search results and study characteristics

In the first stage of searching, after removing duplicates, 2119 titles and abstracts were screened against the inclusion and exclusion criteria: 2095 studies identified through database searching, 19 grey literature sources, and 5 studies through citation searching. In a realist review, the search process is iterative, and during a final search for evidence, another 8 empirical studies and 1 grey literature evaluation were identified. In total, 113 potentially eligible studies were identified in this

Table 2
Search terms in published literature.

Databases Searched	Search Terms
MEDLINE	greenspace OR "green space" OR "green care" OR
PsycINFO	greencare OR "nature therap*" OR "wilderness therap**
GreenFile	OR "outdoors behavi*ral healthcare" OR "outdoors
SocINDEX	behavi*ral therap** OR "forest bathing" OR "shinrin
CINAHL	yoku" OR "shinrin-yoku" OR "horticultur* therap** OR
Health Source	"therapeutic horticulture" OR "green exercise" OR
SPORTDiscus	ecotherap* OR "conservation therap*" OR "care farm**
Scopus	AND
Social Care Online	"mental health" OR "mental ill health" OR "mental
Web of Science	illness" OR "mental disorder" OR "mental fatigue" OR
Natural Science	psychiatric OR "psychiatric illness" OR stress OR
Collection	depression OR anxiety OR recovery OR "low mood" OR
Wiley Online Library	wellbeing

Table 3
Organisations included in search for grey literature.

UK	Europe	International
Venture Trust	Asociacion Experientia (Spain)	Enviros (USA)
Phoenix Futures		Shepherd's Hill Academy (USA)
The Wilderness Foundation		Rites of Passage (USA)
Forest Therapy Scotland		Redcliff Ascent (USA)
Cyrenians		
Venture Scotland		
The Green Team		
Youth Vision		
Venture Mor		

process so full texts were obtained. As a result of further close reading of full texts, 49 articles were identified and included. Literature searching and screening results are reported in Fig. 2 using PRISMA (Moher et al., 2009). Information provided in each study about the programmes and participants varied, and key characteristics of all included studies were recorded (Table 4 and Table 5).

3.2. Relevance and rigour

Following the guidance set in the quality standards for realist reviews (Wong et al., 2013), each study was appraised for relevance and rigour. Relevance was assessed in relation to three criteria: population, intervention, or study design; explanation of context, mechanism and outcome as individual aspects as well as in combinations; and explanation of theory. In realist reviews, studies can be included even if only a small part is relevant. This can mean that a certain amount of subjective judgement is necessary to ensure the number of included studies is not unmanageable. Similarly, in realist reviews, studies are assessed for rigour in a different way from systematic reviews: standard quality assessment tools are not used due to the risk of 'nuggets of wisdom' (Pawson, 2006a) being missed due to discarding papers deemed methodologically weak. As is advised in the quality standards (Wong et al., 2013), we identified whether the methods in each study were rigorous enough to be able to rely on the small percentage of findings that we needed to draw on and use in our review. However, as discussed in Pawson (2006a), even studies typically deemed methodologically weak can be included, with careful analysis and appraisal, since they may explicitly, or implicitly, allow insight into why an intervention did not work. To ensure that the risk of bias was reduced, a second reviewer (HB) checked a selection of included/excluded papers to ensure validity and consistency. Where there was inconsistency, a thorough discussion was held to decide whether to include or exclude the study.

3.3. Testing and refinement of programme theory

Detail on contexts, mechanisms, and outcomes of each included study were recorded in an Excel spreadsheet. Data extraction and synthesis were undertaken by the first author (WM), with results regularly discussed with the rest of the study team (HC, TP, KP) to ensure consistency, and reduce bias when refining programme theories. Ongoing conversations with greenspace organisation staff were held throughout the search and appraisal process to further ensure that programme theories accurately described the underlying mechanisms and causal pathways of the interventions. The development of IPTs into seven refined programme theories is described below. It became clear during data synthesis that IPTs did not adequately integrate the 'for whom' and 'in what circumstance' aspects of the realist method. Therefore, while the programme theory themes stayed similar, there was refinement and greater emphasis placed on these contextual factors given how essential they are for implementation and targeting. Fig. 3 shows a brief outline of how the identified programme theories fit in to three overarching themes. The seven programme theories are represented by headings which we believe best describe their core concept.

1. Escape/Getting Away

Perhaps unsurprisingly, given the integral part nature plays in the programmes, most of the included studies mentioned the importance of immersion in greenspace for mental health benefits. Fernée et al. (2018) discuss how the role of the wilderness created a calming effect on participants, in contrast to their usually chaotic lives, and how the calming environment facilitated cognitive processes such as reflection. Participants in Kogstad, Agdal, and Hopfenbeck's study (2014) described immersion in nature as feeling like a cloud had been lifted, while participants in the study by McIver et al. (2018) reported that immersion in nature helped reduce rumination and stressful, negative thoughts. One participant in O'Brien, Townsend, and Ebdens's study (2010) reported that he felt sitting on the hillside for 10 minutes was as effective as his antidepressant medication. A number of the studies made reference to well-established theories such as Attention Restoration Theory (Kaplan and Kaplan, 1989) which holds that when a person is immersed in nature this leads to feelings of calm and a reduction in mental fatigue. Previous reviews such as Berto (2014) and Hartig et al. (2014) have also supported the role of attention restoration and a reduction in mental fatigue as mechanisms in health improvement. One of the components of Attention Restoration Theory is that immersion in nature allows a person to feel removed from their everyday life and, therefore, from their everyday stressors. This feeling of escape, or 'getting away', is a key mechanism in the success of greenspace programmes. In the Nacadia Therapy Garden, service users described the garden as 'a magical world of its own' (Sidenius et al., 2017, p. 5), whereas other participants described being out in nature as 'like another world' and 'sort of like part of the world but a pocket. A haven pocket' (Stevens, 2018, p.7 & p.9 respectively).

Refinement of programme theory

IPT 1 and IPT 2, as shown in Table 1, were condensed into the above encapsulating programme theory of *Escape/Getting Away*. The greenspace setting was a key contextual factor as it provided the right supportive environment but also acted as the resource (mechanism resource), otherwise understood as the programme strategy or programme component introduced in a context. Programmes that utilise greenspace, and allow participants to feel as if they are escaping from their day-to-day lives, are shown to be particularly effective for participants with experience of trauma, anxiety, depression, suppressed anger, and other emotions, conflicts in relationships, as well as for people who explicitly state that they need help (Bettmann et al., 2011; Russell and Phillips-Miller, 2002). As well as existing diagnoses, the greenspace setting was particularly effective for participants who had previous experience of more typical treatments such as counselling (context), as

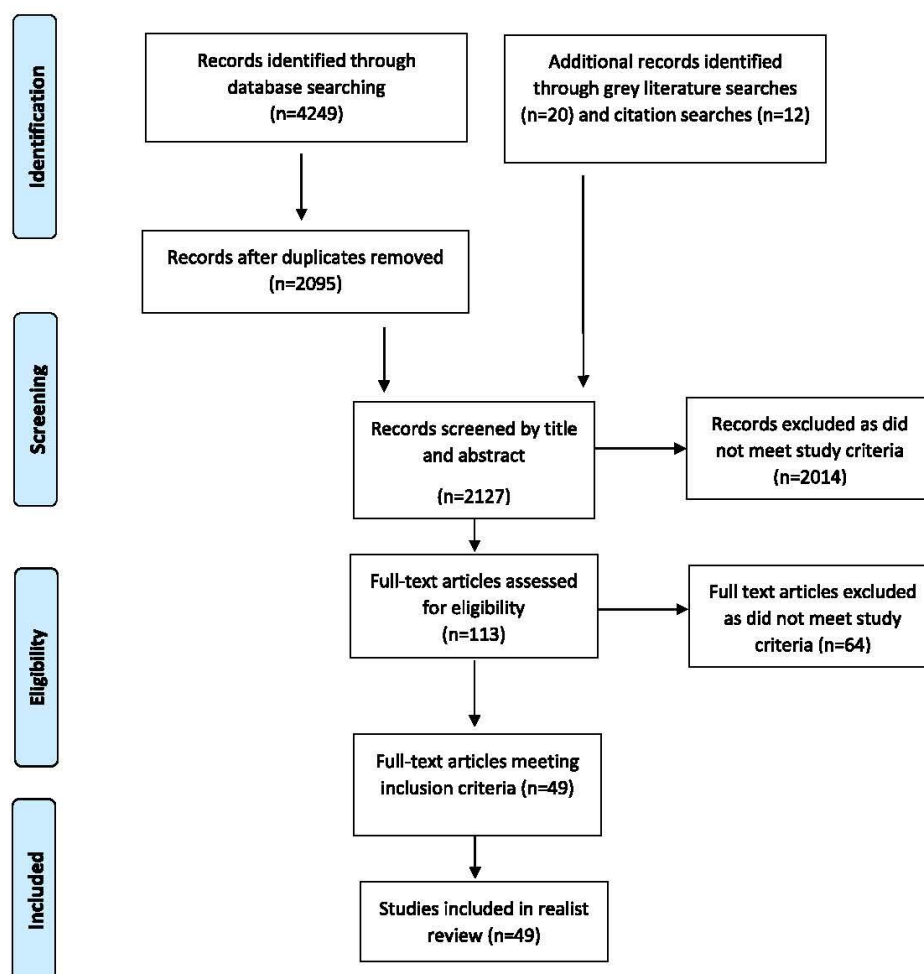


Fig. 2. PRISMA diagram.

they no longer felt as if they were confined within four walls (Ferneer et al., 2018; Granerud and Eriksson, 2014; Sidenius et al., 2017; Woodford et al., 2017). It is possible, therefore, that nature-based programmes are most appropriate for participants who have previously attended traditional therapies which they believe were unsuccessful.

The feeling of being away, relaxed, and removed from daily life, was shown to be further facilitated by sensory stimuli (context and mechanism resource) present in the environment (Adevi and Lieberg, 2012; Grahn et al., 2017; Harris, 2017; Rappe et al., 2008; Sidenius et al., 2017). There was some evidence that ease of access to the programme sites was a contextual factor, with one study highlighting that not owning a car to get to sites could be a barrier (O'Brien, 2018), and Husk et al. (2020) state that support to get to the location of the programme was necessary for success. Additionally, during a discussion with greenspace programme staff, one manager emphasised that access to minibuses could influence the ease by which the programme was attended so could be a potential contextual factor. Changes in participant reasoning (mechanism reasoning) occur as a result of introduced resources and together these constitute the programme mechanism. In this programme theory, stress levels and mental fatigue were reduced (outcomes) through indirect attention being used (mechanism reasoning), and through the participant feeling removed, relaxed, and 'getting away' from their stressors (mechanism reasoning). The WHO

report *Urban Green Space: A Review of the Evidence* (WHO, 2016) discusses the importance of taking account of gender differences in response to exposure to greenspace, however, with a previous longitudinal study by van den Bosch et al. (2015) reporting positive associations between exposure to greenspace and mental health in women, but not men. Furthermore, Combs et al. (2016) reports that female participants showed a faster decrease in stress than male participants, suggesting that a shorter stay on a programme may work for female groups. Such findings suggest that men and women may respond differently to the greenspace environment on programmes so should be considered during programme development. It is also worth noting that cultural differences can influence how well a participant engages with a greenspace programme in the first instance. For example, during conversations with greenspace programme staff, we identified that uptake of greenspace programmes such as forest therapy is much higher in Japanese and Korean culture where time in forests is an integral part of that lifestyle. The normalisation of forest therapy in these cultures will likely have an influence on uptake and engagement of programmes compared to countries where there is stigma attached to such ideas.

2. Space to Reflect

The contextual role of greenspace setting is discussed in the above

Nature
1. Escape/Getting Away
2. Space to Reflect
Individual Self
3. Physical Activity
4. Self-Efficacy
5. Having a Purpose
Social Self
6. Relationship with Facilitator
7. Shared Experiences

Fig. 3. Three programme themes and subsequent representative headings for the seven programme theories identified through data synthesis.

Escape/Getting Away programme theory and is also integral to this programme theory. In this programme theory, the greenspace environment acts as a catalyst for change, with McIver et al. (2018), and participants on the *Living Wild* programme (Venture Trust, 2019), describing nature as a mediator in preparing a person for a therapeutic experience. Sidenius et al.'s study (2017) supports this describing nature as providing a 'backdrop' where therapeutic conversations and activities were more accessible. An integral part of this programme theory is that time alone in greenspace can allow participants to reflect on their lives. This is particularly important for those with coping strategies which may be harmful to them, such as using drugs, alcohol, or self-harm (Bettmann et al., 2011). Participants on a wilderness therapy programme (Fernee et al., 2018) spoke about the physical space allowing them to reflect in a prolonged and undisturbed way, both when sitting and walking. This, in turn, can increase their awareness of the need for change in their lives (Hassink et al., 2010; McIver et al., 2018; Russell and Phillips-Miller, 2002), and how to 'live a better life' (Fieldhouse, 2003, p.90).

Refinement of programme theory

As in the *Escape/Getting Away* programme theory, the greenspace setting provided the supportive environment for the programme (context and mechanism resource). The context of adequate time spent on the programme was a refinement to this programme theory since change and reflection did not happen quickly (Kogstad et al., 2014; Pálsdóttir et al., 2014; Schreuder et al., 2014; Sidenius et al., 2017). Participants in Gabrielson et al. (2018) believed change happened due to the number of unique experiences participants have during programmes, but stated that change could take months to become apparent. Within these contexts, awareness of the need to change (outcome) was achieved by participants spending time alone and reflecting on their lives (mechanism reasoning). Additionally, the desire to change (outcome) could be facilitated by metaphors encountered within the programme (mechanism resource) and participants applying these to their own lives (mechanism reasoning). An example of this was a description of how trying to control a canoe and fight against its natural course proved more difficult than letting nature take its course around obstacles: a metaphor for trying to control life and avoid obstacles (McIver et al., 2018). Adevi and Lieberg (2012) also discussed how participants may seek out specific places in a therapy garden, depending on their emotional state. This is an important contextual factor as it highlights that the most therapeutic place for a participant to reflect is highly individual. It is, therefore, important that participants self-choose places that they have a connection with, or feel comfortable in (mechanism response). According to the staff in this garden programme,

reliance on the self-chosen places appears to create greater confidence over time (outcome). Pre-existing diagnoses were also identified as a crucial contextual refinement for this programme theory, particularly important when designing programmes for specific populations. For example, extensive time alone for reflection is not appropriate for participants with existing diagnoses such as severe depression or psychosis (Fernee et al., 2017).

3. Physical Activity

Enjoyment of physical activity appears to be the mechanism that best allows increased physical health and fitness. Two participants in Fernee et al.'s study (2018) described how, even though they felt tired during physically challenging hikes, they still felt happier when taking part and therefore found it easier to push themselves. However, caution must be taken before generalising this finding: Caulkins et al. (2006) highlighted how young women in their study appeared to benefit less from wilderness hikes compared to other participants, due to higher levels of aversion to the outdoors. Evans (2013) suggests that greenspace programmes provide participants with unique, exciting experiences which encourage people to participate. Furthermore, with increases in physical activity, improvements in mood are also seen (Bryson et al., 2013; Eriksson et al., 2011; Fernee et al., 2018; Fieldhouse, 2003; Leck et al., 2015; O'Brien, 2018; Wilson et al., 2010). This supports existing systematic reviews and meta-analyses supporting the role of physical activity on mental health (Bize et al., 2007; Penedo and Dahn, 2005; Rosenbaum et al., 2014). Conversations with service managers identified that availability of resources for equipment is an important contextual factor for successful engagement with physical activities; as programmes must be fully equipped and functional. However, Surridge et al. (2004) discuss how resources from stakeholders can also be in the form of support and advice in areas such as risk assessment and group safety. Six studies stressed the importance of having confident, adequately trained facilitators to enable and lead activities (Bloomfield, 2017; Evans, 2013; Granerud and Eriksson, 2014; Kogstad et al., 2014; O'Brien et al., 2010; Surridge et al., 2004). With a diversity of activities available, participants are more likely find an activity that they enjoy and will engage with.

Refinement of programme theory

The availability of trained facilitators (context), and availability of resources to adequately support and fund programmes and their materials (context), is imperative to provide a variety of activities to service users (mechanism resource). This allows participants to engage with activities they enjoy (mechanism reasoning), and provides person-centred approaches (Barley et al., 2012; Bloomfield, 2017; Cole and Christie, 2016; Harris, 2017; O'Brien, 2018; Schreuder et al., 2014). This enjoyment of physical activity (mechanism reasoning) facilitates engagement (outcome) and, in turn, leads to increased physical activity, improvements in physical health, and improvements in mood (outcomes). However, particularly in winter weather (context), participants who did not like spending time outside found it difficult to enjoy any aspect of the programme due to discomfort (mechanism reasoning) (Harper et al., 2019), limiting positive outcomes. However, realistic expectations of anticipated challenges did appear to be an influencing context in the lead up to programme uptake in some circumstances. Gabrielsen et al. (2018) suggest that clearly informing and preparing participants for any challenges prior to the programme commencing is advisable, in particular, ensuring participants have the right equipment (context), such as waterproof clothing and shoes.

4. Self-Efficacy

Twenty-eight studies reported that service users who learned and mastered new skills had increased self-esteem, pride, and confidence. Indeed, existing evidence supports continued learning as a mechanism for mental health improvement (Feinstein and Hammond, 2004;

Table 4
Included empirical studies in the review.

Authors	Date of Publication	Country	Title	Intervention	Available participant info	Mental health outcomes	Methods	IPT Supported
Adevi & Lieberg	2012	Sweden	Stress rehabilitation through garden therapy: A caregiver perspective on factors considered most essential to the recovery process	Horticultural Therapy	5 participants	Improvements in stress-related ill health	In-depth interviews and focus-group interviews with the rehabilitation team members of Alnarps Rehabilitation Garden in Sweden looking at their understandings of significant factors to the stress recovery process	1, 2, 3, 5, 8
Adevi & Mårtensson	2013	Sweden	Stress rehabilitation through garden therapy: The garden as a place in the recovery from stress	Horticultural Therapy	5 participants 4 female, 1 male	Improvements in stress-related ill health	Interviews with participants of Alnarps Rehabilitation Garden in Sweden who describe their experiences of horticultural therapy and what they perceive as essential for their recovery	1,2,3,4,5,6,8
Barley et al.	2012	UK	Primary care-based participatory rehabilitation: users' views of a horticultural and arts project	Horticultural Therapy	16 participants 7 female, 9 male Ages 38-91	Improved mental well-being in those with severe mental health diagnoses	Semi-structured interviews with participants of Sydenham Garden in South London looking at their views and experience of the horticultural programme	1,2,3,5,6,8
Bettman et al.	2011	USA	Adolescents in wilderness therapy: A qualitative study of attachment relationships	Wilderness Therapy	13 participants	Improvements in interpersonal relationships and well-being	An evaluation of the narratives of 13 adolescents in a wilderness therapy program in an attempt to understand their attitudes toward parents, therapists, and other adult figures	1,2,6
Bloomfield	2017	UK	What makes nature-based interventions for mental health successful?	Ecotherapy	48 participants	Improved general mental well-being	Summary of health and well-being benefits derived from A Dose of Nature project in England, UK. Key factors involved in development of interventions were discussed by authors	5,6,7,8
Bryson et al.	2013	Canada	An examination of the feasibility of adventure-based therapy in outpatient care for individuals with psychosis	Adventure Therapy	21 participants 4 female, 11 male Ages 24-48	Engagement in the recovery process, and improvements in emotional well-being, energy, self-esteem, and global health in people with schizophrenia and other psychoses	Mixed-methods pre-post design to examine the feasibility of a 6-week Rise-Up Adventure Therapy intervention in an outpatient care setting.	4,5,7,8
Caulkins et al.	2006	USA	The role of physical exercise in wilderness therapy for troubled adolescent women	Wilderness Therapy	9 female participants (6 on the programme ages 15-16, and 3 instructors)	Emotional, cognitive, and physical changes	Questionnaires were given pre-post the intervention and interviews were completed post intervention	4
Combs et al.	2016	USA	Adolescent self-assessment of an outdoor behavioural health programme: longitudinal outcomes and trajectories of change	Wilderness Therapy	659 participants 210 female, 449 male Average age: 16	Positive changes in mood, substance use, anxiety, behaviour, and attachment concerns	A qualitative case study approach was used to investigate the experience of six adolescent women and three female wilderness instructors at an established wilderness therapy program. Data were collected through participant observation, client psychological profiles, and semi-structured interviews. Research explored the emotional, cognitive, and physical impacts attributed to the backpacking component of the therapeutic process and the relationships between these impacts.	4,7,8

(continued on next page)

Table 4 (continued)

Authors	Date of Publication	Country	Title	Intervention	Available participant info	Mental health outcomes	Methods	IPT Supported
Cook	2008	USA	Residential wilderness programmes: the role of social support in influencing self-evaluations	Wilderness Therapy	13 male participants Ages 12-16	Improvements in self-evaluation, mental health, and self-esteem	an ANOVA to examine outcomes post-discharge Participants attended interviews on two separate occasions: once upon entrance into the program and then four months later. The interviews consisted of follow-up questions to survey instruments and a semi-structured interview	5,8
Davis-Berman and Berman	2012	USA	Reflections on a trip: Two decades later	Wilderness Therapy	4 participants	The impact a wilderness therapy programme had on the participants' lives and wellbeing	Longitudinal qualitative study that involves the interviews of four adults who participated in one of two 10-day wilderness therapy trips 25 years ago. Using qualitative data collection techniques, we conducted in-depth interviews. Respondents were asked to reflect on their lives, the wilderness therapy trip, and the trip's impact on them.	1,7,8
Dolgin	2014	USA	Into the Wild: A group wilderness intervention to build coping strategies in high school youth through collaboration and shared experience	Wilderness Therapy	21 participants 13 female, 8 male Ages 15-17	Mental health improvements and prevention of internalising disorders	Participants completed two narrative questionnaires to gauge intervention impact and possible preventative functions of the wilderness therapy intervention. Both the pre-narrative and post-narrative exercises included similar open-ended questions	5,8
Elings & Hassink	2008	Netherlands	Green care farms: a safe community between illness or addiction and the wider society	Care Farm	42 participants	Increased mental, physical and social wellbeing in people with psychiatric and/or addiction history	Focus group interviews on 8 different care farms. The interviews explored views and experiences on care farms	5,6,8
Eriksson et al.	2011	Sweden	Experiences of women with stress-related ill health in a therapeutic gardening programme	Horticultural Therapy	5 female participants Ages 36-52	Improvements in stress-related ill health	Participants completed 3 interviews every 3 weeks including 3 months after. The interviews explored the experiences of participants in a therapeutic garden setting	3,4,5,8
Evans	2013	UK	Investigation into the benefits and processes of adventure training among disaffected and at-risk populations	Adventure Therapy	52 participants over 3 studies	Increases in self-esteem and mental wellbeing	Thesis looking at reported benefits and processes of adventure therapy	3,4,5,6,7,8
Ferneer et al.	2017	Norway	Unpacking the black box of wilderness therapy: A realist synthesis.	Wilderness Therapy	N/A	Improvements in mental health in adolescents	A review of the primary qualitative wilderness therapy studies; empirical findings are used to test and refine a key program theory specifically for wilderness therapy	1,2,3,4,5,6,7,8
Ferneer et al.	2018	Norway	Therapy the Natural way: a realist exploration of the wilderness therapy treatment process in adolescent healthcare	Wilderness Therapy	14 participants 8 female, 6 male Ages 16-18	Mental health improvement in those who require mental health treatment (as assessed by a clinical team)	Fieldwork and interviews were combined for an in-depth investigation of the treatment process, where the objective was to acquire a deeper understanding of the opportunities that arise in the wilderness therapy setting	all
Fridhoun	2003	UK	The impact of an allotment group on mental health clients' health, wellbeing and social networking	Horticultural Therapy	9 participants 3 female, 6 male Ages 24-61	Improvements in health, mental wellbeing, and social networking	Interviews and focus group with participants looked at subjective experience and benefits of an allotment group	all
Gabrielsson et al.	2018	Norway	The effectiveness of wilderness therapy as mental health	Wilderness Therapy		Mixed methods study investigating effectiveness of wilderness therapy by		3,7,8

(continued on next page)

Table 4 (continued)

Authors	Date of Publication	Country	Title	Intervention	Available participant info	Mental health outcomes	Methods	IPT Supported
Grahn et al.	2017	Sweden	treatment for adolescents in Norway: a mixed methods evaluation	Horticultural Therapy	32 participants 21 female, 11 male Mean age: 16.5	Mental health improvement in participants with severe mental health challenges	incorporating psychometric pre, post-, and 12 month follow-up data; executive functioning data; and qualitative data from two rounds of individual participant interviews	1,2,3
			Longer nature-based rehabilitation may contribute to a faster return to work in patients with reactions to severe stress and/or depression		106 participants 96 female, 10 male Ages 22-63	Reduction in severe stress and/or depression	Quantitative questionnaires were used to gather data from participants after 8, 12, and 24-week periods of rehabilitation. Return to work data were collected before the intervention and one year after the start of rehabilitation. In addition, data were collected regarding self-assessed occupational competence, personal control, and sense of coherence	1,2,3,5,6,7,8
Granerud & Eriksson	2014	Norway	Mental health problems, recovery, and the impact of green care services: a qualitative, participant-focused approach	Green Care Services	20 participants	Mental health improvement in mental health service users	Data were obtained from interviews with participants and were analysed qualitatively in order to gain knowledge about service users' experiences of services	1,2,3,4,5,6,7,8
Harper et al.	2019	Canada	Client perspectives on wilderness therapy as a component of adolescent residential treatment for problematic substance use and mental health issues	Wilderness Therapy	148 adolescent participants	Mental health improvement and reductions in substance use	A realist approach was used to undertake thematic analysis of written open-ended responses to questions	1,2,3,4,5,6,7,8
Harris	2017	UK	The social dimensions of therapeutic horticulture	Horticultural Therapy	15 participants 8 female, 7 male	Mental health improvement in mental health service users	This study explored the views of service users participating in a horticultural therapy programme using two focus groups with mental health service users	1,5,7,8
Hassink et al.	2010	Netherlands	Care farms in the Netherlands: Attractive empowerment-oriented and strengths-based practices in the community	Care Farm	101 participants (41 service users, 33 care farmers, and 27 employees of care services which collaborate with care farms)	Quality of life and mental health improvements in people with severe mental health challenges	Interviews showed characteristics associated with care farms that seem beneficial for three different participant groups: those with severe mental health problems; those from youth care backgrounds; and frail elderly participants. Data from participant groups were analysed separately	1,2,3,5,6,7,8
Howarth et al.	2018	UK	Growing spaces: an evaluation of the mental health recovery programme using mixed methods	Horticultural Therapy	47 participants Ages 35-68	Mental health recovery	A mixed-methods approach was used and data from four semi-structured focus group interviews, 11 interviews and 20 'recovery star' datasets were collected. The findings were then triangulated to provide an understanding of the impact of the programme	1,5,6,8
Husk et al.	2020	UK	What approaches to social prescribing work, for whom, and in what circumstances? A realist review	Social Prescribing	N/A	Improvements managing health in long term conditions and in health and wellbeing	A realist approach was used to uncover the contexts, mechanisms, and outcomes relating to social prescribing. 109 studies were included in the first phase, and 34 in the second phase	1,7,8
Iancu et al.	2014	Netherlands	Mental health recovery on care farms and day centres: a qualitative comparative study of users' perspectives	Care Farm	26 participants 10 female, 16 male Mean age: 42.5	Mental health recovery	Data were collected through semi-structured interviews with participants on care farms in order to analyse and	1,2,5,6,7,8

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Table 4 (continued)

Authors	Date of publication	Country	Title	Intervention	Available participant info	Mental health outcomes	Methods	IPT Supported
Kogstad et al.	2014	Norway	Narratives of natural recovery: Youth experience of social inclusion through green care	Care Farm	9 participants 7 female, 2 male Ages 17-27	Improvements in identified recovery factors: recognition, supportive relationships, motivation, meaning, confidence, and hope	compare experiences of mental health recovery Participants from 3 different care farms were interviewed, two or more times over a two-year period. Essential beneficial factors of care farming were explored in order to better understand how the "green" element could add to more traditional recovery factors	1,5,6,7,8
Leck et al.	2015	UK	Growing well beings: the positive experience of care farms	Care Farm	216 participants 62 female, 154 male Ages <16-60+	Improved general mental wellbeing	A mixed methods design was used which allowed for the integration of quantitative measurements of change with qualitative descriptions of this change. Service users completed an initial questionnaire, 63% then provided comparative data in a follow-up questionnaire. Semi-structured interviews with 33 service users then allowed personal experiences to be detailed	1,4,5,6,8
Lehman et al.	2018	USA	Veterans in substance abuse treatment programme self-initiate box gardening as a stress reducing therapeutic modality	Horticultural Therapy	56 male participants	Stress reduction and substance use recovery	Group interviews were conducted with veterans from the last Substance Abuse Rehabilitation Treatment Program classes, as well as individual interviews with staff. Interviews explored time veterans spent in garden, frequency visited, and emotional feelings when in garden	1,2,5,6
Livingston et al.	2011	UK	A tale of the spontaneous emergence of a recovery group and the characteristics that are making it thrive: Exploring the politics and knowledge of recovery	Mountaineering	N/A	Improvements in mental wellbeing including support with recovery	A narrative report on activity-orientated recovery groups, illustrating their diversity and exploring the issues of knowledge and power	1,2,3,4,5,7,8
McIver et al.	2018	Australia	Healing fears, conquering challenges: Narrative outcomes from a wilderness therapy programme	Wilderness Therapy	19 participants 11 female, 8 male Ages 18-25	General improvements in mental health	Semi-structured interviews were conducted approximately 10 days after the WILD wilderness therapy session to investigate of the narratives of staff and residents. Participants described their experiences and views of what made the programme successful	all
O'Brien	2018	UK	Engaging with and shaping nature: A nature-based intervention for those with mental health and behavioural problems at the Westonbirt Arboretum in England	Woodland Activity	62 participants Ages 13-60	Improvements in mental health and behavioural challenges	This study used qualitative mixed methods including in-situ 'being and doing' activities with participants, interviews, and participant observations to explore participant's experiences of a multi-visit nature-based intervention at Westonbirt Arboretum in England	1,4,6,8
O'Brien et al.	2010	UK	Doing something positive: volunteers experiences of wellbeing benefits derived from practical conservation activities in nature	Conservation Activity	88 participants 25 female, 63 male Ages 16-76	General improvements in wellbeing	This study used mixed methods to explore the motivations for, barriers to, and benefits of formal practical environmental volunteering for physical, mental, and social wellbeing. Qualitative interviews and quantitative questionnaire data collection was	1,2,3,4,6,8

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Table 4 (continued)

Authors	Date of Publication	Country	Title	Intervention	Available participant Info	Mental health outcomes	Methods	IPT Supported
Pálsdóttir et al.	2014	Sweden	The journey of recovery and empowerment embraced by nature — diens' perspectives on nature-based rehabilitation in relation to the role of the natural environment Group gardening in mental outpatient care	Horticultural Therapy	43 participants 35 female, 8 male Ages 25-62	Improvements in stress-related ill health Mental health rehabilitation	undertaken while spending a day each with ten volunteer groups as they undertook their practical conservation activities 43 participants took part in semi-structured interviews to explore the role of natural environments in nature-based rehabilitation for individuals with stress-related mental disorders at the Alnarp Rehabilitation Garden in Sweden This study was a participatory study amongst mental health outpatients and their support persons gardening on a plot in Annala Manor Park in Håstuki. Ten participants completed the questionnaire about the importance and health-related effects of gardening. The researchers also attended 17 meetings to observe participants This study investigated 4 wilderness therapy programs using a multi-site case study approach and qualitative interviews to examine the wilderness therapy experience	1,2,3,4,5,6,8 1,5,6,8
Rappe et al.	2008	Finland		Horticultural Therapy	10 participants 9 female, 1 male Ages 41-64			
Russell & Phillips-Miller	2002	USA	Perspectives on the wilderness therapy process and its relation to outcome	Wilderness Therapy	12 participants 3 female, 9 male Ages 13-17	Improvements in mental health and problem behaviour	Participants were asked to look back on their half-year stay on a care farm in the Netherlands. Views were gathered by using semi-structured interviews to elicit their experiences from a salutogenic perspective Fourteen participants took part in semi-structured interviews to explore the phenomenon of participants' lived experience of the nature-based therapy garden in Macadia (University of Copenhagen)	all
Schreuder et al.	2014	Netherlands	Exploring salutogenic mechanisms of an outdoor experiential learning programme on youth care farms in the Netherlands: untapped potential? "I look at my own forest and fields in a different way": the lived experience of nature-based therapy in a therapy garden when suffering from stress-related illness	Care Farm Horticultural Therapy	11 participants 2 female, 9 male Ages 17-22 42 participants Ages 20-60	Improvements in mental health and well-being Improvements in stress-related ill health	In-depth interviews with volunteers attending Cherry Tree Nursery – a sheltered work project for people with severe mental illness in the UK – provided conceptual groupings of reported experiences Published descriptive article about the benefits of the Reflection project, a UK-based adventure therapy project Mixed methods were used to investigate whether nature-based camp experiences would increase connection to nature and promote well-being. Participants completed pre-camp and post-camp online questionnaires. Interviews explored camp experiences and social relations	1,3,5,6,7 1,2,3,5,6,7,8
Sidénus et al.	2017	Denmark	"I look at my own forest and fields in a different way": the lived experience of nature-based therapy in a therapy garden when suffering from stress-related illness	Horticultural Therapy	12 participants	Mental health rehabilitation in those with severe mental health challenges	In-depth interviews with volunteers attending Cherry Tree Nursery – a sheltered work project for people with severe mental illness in the UK – provided conceptual groupings of reported experiences	1,3,6,7,8
Stevens	2018	UK	A hypothesis framing of therapeutic horticulture for mental health rehabilitation	Horticultural Therapy	12 participants	Improvements in mental well-being	In-depth interviews with volunteers attending Cherry Tree Nursery – a sheltered work project for people with severe mental illness in the UK – provided conceptual groupings of reported experiences	1,3,5,7,8
Stridge et al.	2004	UK	Wild at heart: tapping into restorative power of great outdoors	Adventure Therapy	N/A	Improvements in mental well-being	Published descriptive article about the benefits of the Reflection project, a UK-based adventure therapy project	1,3,5,7,8
Waber et al.	2015	USA	Addressing nature-deficit disorder: a mixed method pilot study of young adults attending a wilderness camp	Wilderness Therapy	36 participants 24 female, 12 male Ages 18-31	Improvements in mental well-being and connection to nature.	Mixed methods were used to investigate whether nature-based camp experiences would increase connection to nature and promote well-being. Participants completed pre-camp and post-camp online questionnaires. Interviews explored camp experiences and social relations	1,2,3,8
Wilson et al.	2010	UK		Ecotherapy		Improvements to mental well-being, improvements to physical health,	Semi-structured interviews with clients and two focus groups with clinicians	1,4,5,8

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Table 4 (continued)

Authors	Date of Publication	Country	Title	Intervention	Available participant info	Mental health outcomes	Methods	IPT Supported
Woodford et al.	2017	Canada	Green shoots of recovery: the impact of a mental health ecotherapy programme A change of scenery: wilderness therapy treatment for inpatients in acute care	Wilderness Therapy	28 participants 10 female, 18 male Mean age: 41.9 24 participants 11 female, 13 male Ages 19-85	provision of daily structure and routine, transferable knowledge and skill acquisition, and increased social networking and social skills development Improvements in mental health	from referring services to the Branching Out ecotherapy programme were conducted Pre-programme, participants wrote personal goals for the camp experience and filled out the Positive and Negative Affect Scale. Post-programme, participants completed a client satisfaction form, the PANAS, and also provided suggested improvements	all

Hammond, 2004). Learned skills can be practical tasks, for example, learning how to look after plants was very effective for those with stress-related illness (Adevi and Lieberg, 2012; Eriksson et al., 2011), and for those without a clinical diagnosis wanting to improve wellbeing in general (O'Brien et al., 2010). Learning practical skills on wilderness therapy programmes was shown to be a particularly positive experience for young people (Fernee et al., 2018; Warber et al., 2015), and for those who were in the wilderness alone for the first time (Russell and Phillips-Miller, 2002). However, learned skills can also be skills such as self-regulation of emotion (Adevi and Mårtensson, 2013), and coping strategies (Barley et al., 2012). These psychological skills are particularly important in facilitating self-efficacy post-programme enabling service users to integrate new skills into their lives (Bryson et al., 2013; Howarth et al., 2018; Phoenix Futures, 2019; Sidenius et al., 2017). As with the programme theory for *Physical Activity*, the availability of adequately trained facilitators is necessary to enable participants to learn new skills (Bloomfield, 2017; Evans, 2013; Granerud and Eriksson, 2014; Kogstad et al., 2014; O'Brien et al., 2010; Surridge et al., 2004).

Refinement of programme theory

The availability of trained and confident facilitators (context) is necessary to enable service users to learn both practical and psychological skills (mechanism resource). As well as improved self-efficacy (mechanism reasoning), another identified change in reasoning was an increased feeling of empowerment when learning new skills (Cole and Christie, 2016; Combs et al., 2016; Howes et al., 2018; Fernee et al., 2018; Harris, 2017; Lehmann et al., 2018; McIver et al., 2018; O'Brien, 2018; Pálsdóttir et al., 2014; Woodford et al., 2017). Through this mechanism, skills development can lead to increases in pride, self-esteem, and confidence (outcome), as well as in self-efficacy for individuals to implement new skills in their life outside the programme (outcome). To ensure that this programme theory is representative of all greenspace programmes it is necessary to highlight that, whilst teaching skills such as coping with challenges were present across programme type, the type of challenges varied. For example, in wilderness therapy, adventure therapy, and care farming programmes, coping strategies focused on overcoming physical challenges (Fernee et al., 2018), while on horticultural therapy programmes, coping strategies might focus on dealing with how to manage plants or vegetables that were failing to grow or dying (Pálsdóttir et al., 2014). As previously mentioned, realistic expectations of anticipated challenges also seemed to be an important context in the lead up to programme uptake (Gabrielsen et al., 2018).

5. Having a Purpose

A number of participants on care farms spoke about the responsibility of looking after animals and how their success with this task allowed them to feel satisfied due to having a purpose (Elings and Hassink, 2008; Schreuder et al., 2014). This appears to be particularly applicable to participants on care farms who have psychiatric or addiction histories, where the work and community-like environment enables them to fill their day and have a routine (Elings and Hassink, 2008; Hassink et al., 2010). Participants in Cole and Christie's study (Cole and Christie, 2016) spoke about feeling valued and appreciated for their work, which was motivating. The availability of adequately trained facilitators is necessary for both leading and enabling participants to learn new skills, and provide guidance relating to their responsibilities (Bloomfield, 2017; Evans, 2013; Granerud and Eriksson, 2014; Kogstad et al., 2014; O'Brien et al., 2010; Surridge et al., 2004). Time spent on a programme has been shown to be correlated with achieving outcomes since change occurs slowly (Gabrielsen et al., 2018; Harris, 2017; Kogstad et al., 2014; Pálsdóttir et al., 2014; Schreuder et al., 2014; Sidenius et al., 2017), so it seems logical to suggest that time spent on the programme might be a contextual factor in this programme theory too; the longer service users were responsible for something, the higher their self-esteem.

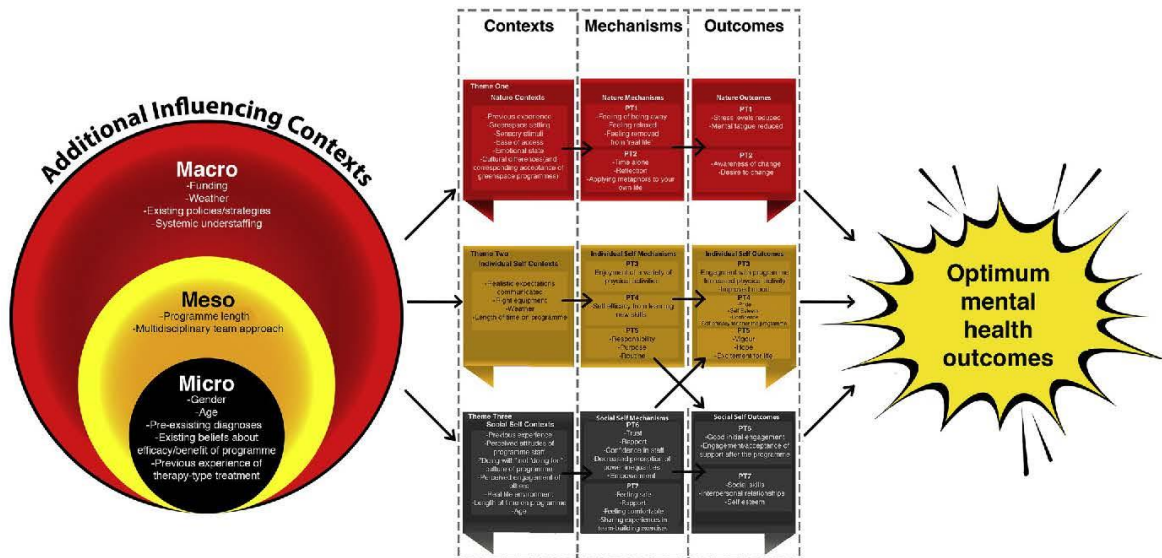


Fig. 4. A novel conceptual model developed on the basis of our review findings to show the overarching programme theory for greenspace interventions for mental health.

Both this programme theory, and the *Self-Efficacy* programme theory above, provide some explanation of why greenspace interventions may fail, in that when there is an absence of confident, trained facilitators, or an absence of programme components which allow participants to learn new skills, interventions will not be effective. While the need for programme variety has already been covered, routine and planning are also necessary. Although there is some evidence that people on greenspace programmes for leisure purposes can benefit from passive immersion in nature (Lovell et al., 2015), this might not be enough to achieve changes in mental wellbeing in those with high levels of stress/mental ill health. In a previous review by Hunter et al. (2015), greenspace interventions were shown to be most effective when there were structured programmes in place, rather than simply changing the physical environment.

Refinement of programme theory

The availability of trained and confident facilitators (context) and adequate time spent on the programme (context) are both necessary to enable individuals to learn practical and psychological skills (mechanism resource), which facilitate feelings of responsibility and purpose (mechanism reasoning), and in turn lead to increases in self-esteem and

vigour for life (outcomes). The mechanisms of feeling responsible and purposeful were seen across all programme types, however, these mechanisms were facilitated by different contexts. For example, in care farm programmes, participants felt responsible for animals and farm activities (Schreuder et al., 2014), and in horticultural therapy programmes, participants felt responsible for plants and other produce (Hassink et al., 2010). Managers of wilderness therapy and adventure therapy programmes, as well as facilitators in Surridge et al.'s study (2004), also discussed how service users felt responsible for carrying resources, even when this was challenging. Feelings of purpose were also gained from the routine that programmes provided (mechanism resource). Hassink et al. (2010) reported that almost all participants who accessed a care farm to improve their mental wellbeing acknowledged the positive effect that routine had. Similarly, service users in Iancu et al.'s study (Iancu et al., 2014) reported feeling that structure was something they were lacking before the programme. As well as feelings of purpose, participants reported increases in feelings of empowerment (mechanism reasoning). Twelve studies mentioned how this increase in empowerment led to participants feeling more hopeful and excited about life in general (outcome) (Cole and Christie, 2016; Combs et al.,

Table 5
Grey literature included in review.

Authors/ Organisation	Date	Title	Type of document	Reason for inclusion
Cole & Christie	2016	Occupational engagement in a woodland: belonging and wellbeing for mental health and mental health recovery	Presentation at College of Occupational Therapists 40th annual conference and exhibition	Ethnography and interviews of people's views on a garden therapy project who are recovering from mental health issues
World Health Organisation	2017	Urban green spaces and health: a review of evidence	Review of evidence	Relevant information regarding pathways for physical activity and contextual factors such as gender
Redcliff Ascent	2019	The role of field staff	Organisational programme web page	Relevant information regarding role of facilitator - participant relationship
Venture Trust	2019	Facing the forces of nature: a Venture Trust journey	Organisational programme web page	Relevant information regarding culture of organisation and contextual factor of environment being catalyst for change
Phoenix Futures	2019	Recovery through nature	Organisational programme web page	Relevant information regarding group culture, self-efficacy, and confidence
Howes	018	Moor health and wellbeing. An evaluation of two National Park projects: Dartmoor Naturally Healthy and Exmoor Moor to Enjoy	Evaluation of two projects	Relevant information regarding enjoyment of activities, sense of belonging, impact of learning, and relaxation in nature

2016; Gabrielsen et al., 2018; Harris, 2017; Howarth et al., 2018; Lehmann et al., 2018; O'Brien, 2018; Pálsdóttir et al., 2014; Schreuder et al., 2014; Sidenius et al., 2017; Wilson et al., 2010; Woodford et al., 2017).

6. Relationship with Facilitators

Five studies highlighted the influence of previous relationships with healthcare professionals as a contextual factor in how well participants initially engaged with programmes (Cole and Christie, 2016; Fernee et al., 2018; Granerud and Eriksson, 2014; Stevens, 2018; Woodford et al., 2017). Existing attitudes of programme facilitators were crucial in enabling mechanisms to achieve outcomes: facilitators who appeared non-judgemental, open, and genuine, enabled relationships to be built quickly with participants. Participants in one study discussed the importance of being treated without prejudice and as a person, rather than a diagnosis (Hassink et al., 2010). Through this relationship, participants were able to build rapport, trust, and confidence in facilitators, particularly crucial given many programme users had experienced difficult interpersonal relationships and problems developing trust (Evans, 2013; Fieldhouse, 2003; Iancu et al., 2014; McIver et al., 2018). Overall, the stronger the relationship between programme user and facilitator, the more likely participants were to fully engage with programmes and available aftercare support (Cole and Christie, 2016; Combs et al., 2016; Gabrielsen et al., 2018; RedCliff Ascent, 2019; Schreuder et al., 2014; Sidenius et al., 2017; Stevens, 2018).

Refinement of programme theory

Previous positive experience with healthcare professionals such as therapists (context), as well as existing positive attitudes and attributes of programme facilitators (context), influenced good initial engagement with programmes (outcome). These contextual factors enabled relationships between facilitator and participant (mechanism resource) to be built quickly, resulting in trust, confidence in the facilitator, and rapport (mechanism reasoning). However, previous negative experiences (context) can negatively impact engagement, particularly for adolescents who may show lower levels of trust towards all adult relationships after a negative experience (Bettmann et al., 2011). There is some evidence that this might be mitigated by ensuring that adequate information about the programme is provided prior to the start, and that each participant is met by a confident and friendly facilitator at the start to help engage participants (O'Brien et al., 2010). Another contextual factor was effective programmes having a culture of 'doing with' not 'doing for' people. Involvement of the facilitators in the same tasks as the service users (mechanism resource) led to decreased perceived power inequality and increased empowerment (mechanism reasonings). For example, some study participants described how facilitators would ask them what they wanted to do, eat, and which way to go allowing participants to feel empowered, decreasing power imbalances, and promoting inclusion (McIver et al., 2018). These mechanisms made continued engagement with the programme more likely (outcome), as well as acceptance of any available support after the programme (outcome).

7. Shared Experiences

As highlighted in almost all the included studies, greenspace programmes are typically undertaken in environments that promote social cohesion. It is through these shared experiences that participants experience increased social skills and improvements in interpersonal relationships. Hassink et al. (2010) reported that the community feel of the greenspace programme was the most valued aspect mentioned by the majority of participants, a finding supported by many other studies (Adevi and Mårtensson, 2013; Barley et al., 2012; Bryson et al., 2013; Cole and Christie, 2016; Combs et al., 2016; Cook, 2008; Dolgin, 2014; Fieldhouse, 2003; Gabrielsen et al., 2018; Harris, 2017; Howes et al., 2018; Iancu et al., 2014; Leck et al., 2015; O'Brien, 2018; Rappe et al., 2008; Surridge et al., 2004; Stevens, 2018; Wilson et al., 2010;

Woodford et al., 2017), as well as by conversations with service managers. Mechanisms identified in this programme theory that led to improved social outcomes were: the group environment feeling safe (Kogstad et al., 2014; Sidenius et al., 2017), lack of stigma and judgement (Combs et al., 2016; McIver et al., 2008; Stevens, 2018), increased rapport (Evans, 2013; Fernee et al., 2018; Warber et al., 2015), and trust between people on the programme, with participants feeling comfortable to express themselves (Adevi and Mårtensson, 2013). Previous systematic reviews support the role of social capital in improving mental health, both in young people (McPherson et al., 2014), and in older adults (Nyqvist et al., 2013). However, the engagement of others on the programme can be a contextual factor to be aware of, with the success of social interactions being a two-way process (Fernee et al., 2018): if a participant does not believe that other participants are engaging, they are less likely to do so. Time spent on the programme is another key contextual factor for social cohesion to occur (Fernee et al., 2018). As previously mentioned, change does not happen instantly and social changes, in particular, can take longer to occur compared to psychological, physical, physiological, or cognitive changes (Fernee et al., 2018).

Refinement of programme theory

Perceived engagement of others on the programme (context), and time spent on it (context), can both facilitate a participant's engagement with team-building activities, and other shared experiences (mechanism resource). Furthermore, the group environment might be described as more like 'real life' than traditional therapy (context) (Fieldhouse, 2003). As a result of these shared experiences in a 'real life' environment, with peers who are perceived to be engaging with the programme, participants begin to feel safe and unjudged, build trust and rapport, and feel more comfortable in trying to interact with others (mechanism reasonings). This in turn leads to improvements in social skills and in interpersonal relationships (outcomes). Three studies (Barley et al., 2012; Cook, 2008; Woodford et al., 2017) also noted that this increase in social skills also led to an increase in self-esteem (outcome). Conversely, if participants do not see others engaging well on the programme (context), then this can hinder increases in social abilities or improvements in relationships (outcome): participants feel less safe/comfortable during team exercises (mechanism reasonings), and do not have the opportunity to share or learn from others (mechanism reasonings). Age (context) can also influence the applicability of this programme theory. For example, adolescents may be more susceptible to peer influence in general, and while perceived social support can have a buffering effect on stress in adolescents, low satisfaction with social support in adolescents can increase anxiety (Dolgin, 2014). Therefore, perceived engagement and social support in programmes may be much more important in adolescent programmes compared to those with older adults. Furthermore, O'Brien et al. (2010) discussed how having people of the same age (context) on the programme facilitated cohesion (outcome), as they were able to speak about similar interests, encouraging rapport (mechanism reasoning).

3.4. What does not work

With the increase in awareness of the benefits of being outside for mental health, more greenspace programmes are embedding mental health outcomes into their aims. This increases the risk that some programmes could be claiming all types of benefits, with little evidence to support claims. Without clarity of what approaches may or may not consist of, it is difficult to distinguish practice that is ethical and effective, from programmes that over-claim benefit and put users at risk of potential harm. This potentially makes it difficult to know which programmes to enrol on, or which programmes care providers should recommend. Richards, Hardie, and Anderson (2019) suggest an Outdoor Mental Health Intervention Model outlining the importance of the combination of competence, professional responsibility, and leadership in each intervention. The model maintains that, for best practice, a

multidisciplinary team approach is adopted, and professionals work collaboratively in the delivery of an integrated approach. The authors state that programme providers should represent themselves, and their practice, using terms that can be justified and evidenced by professional training and qualifications, rather than using terms such as ‘therapy’ too loosely. Only then can programmes enhance opportunities for improved mental health and wellbeing and offer a best-fit intervention for individual clients.

There is a myriad of contextual factors which will likely influence the success of greenspace interventions, and it is not feasible to attempt to identify the many individual factors which might make a programme work, or not. However, there are certain factors which seem particularly influential in programme success. For example, as has been identified through this review, programmes based in the wilderness are often undertaken by adolescents or young adults. What seems less clear, is whether wilderness-based programmes are successful for older adults. During a conversation with a greenspace project staff member, the fear of injury or fear of falling was highlighted as the top barrier to engagement. Furthermore, although there are programmes designed specifically for older adults, such as horticultural therapy programmes, specific contextual barriers can limit their effectiveness. For example, the *Greenspace and Health Strategic Framework for Edinburgh and Lothians (Greenspace Scotland, 2019)* discusses how staffing numbers on hospital wards means that patients cannot leave the hospital to access greenspaces with the necessary support. Without staff available to support people who need assistance to and from greenspace programmes, programmes cannot be successful. While this report is specific to one geographical area, it is feasible to see how systemic understaffing will affect any greenspace programme reliant on support staff.

This review also identified that some circumstances, such as time alone in a wilderness environment, might not be appropriate for people with pre-existing diagnoses like psychosis. However, there are other circumstances where certain greenspace programmes might not be appropriate, for example, residential greenspace programmes for those on daily pick-up prescriptions. *Livingston et al. (2011)* discuss how people on methadone prescriptions can be excluded because early start times mean they cannot pick up their medication beforehand. Another example raised during a meeting with a member of staff was electronic tagging. Greenspace programmes have been successful in supporting people who have been involved in offending (*Venture Trust, 2019*), but they may be limited to where they can go if a programme does not account for this.

A person’s belief about the programme is also a driving contextual factor in initial enrolment. While some people with previous treatment experience may welcome a new approach, particularly if they feel that current treatment has not worked, others may be cynical about its reliability. *Husk et al. (2020)* reported barriers such as concerns about adequate facilities, and adequate staff experience/training. They also reported concern about the greenspace environment and whether it was an appropriate environment for people with complex needs. *Davis–Bennan and Berman (2012)* state that participants on greenspace programmes need to want to be part of the programme and have some level of self-motivation. If a person does not want to enrol on a greenspace programme because they do not believe that it will be beneficial for them, it is unclear how this can be changed, and even if it should. For example, this review has identified that one of the key mechanisms by which greenspace programmes are effective is through an increase in feelings of empowerment. In contrast, coercion and involuntary treatment has shown to threaten effectiveness of treatment (*de Valk et al., 2019*). *Harper et al. (2019)* raise concerns about how this may impact the effectiveness of youth programmes, where parents have enrolled their children, or in hospitals where primary care staff may have enrolled patients on their behalf. *Husk et al. (2020)* highlight how the power dynamic between care provider and patients can be equally influential, with some patients viewing social prescriptions, such as greenspace programmes, as an order rather than a choice. If

empowerment and agency are mechanisms that lead to successful outcomes, then by taking these away it seems unlikely programmes will be effective. However, as identified in *Husk et al. (2020)* this does not equate to leaving all responsibility for enrolment to the person potentially accessing the programme. Instead, it highlights the importance of dialogue between care provider and participant, as well as the necessity of the provider knowing what is available for recommendation. One of the concerns in this regard, however, is that short term funding makes it difficult for providers to recommend greenspace programmes, due to lack of continuity of services.

Aside from issues which impact uptake of greenspace programmes, it is important to recognise that not everyone will benefit or enjoy programmes when on them. This review has covered the necessity of a variety of activities to initially engage participants *Wilson et al. (2010)*, but *O’Brien et al. (2010)* also discuss that activities that are repetitive can cause participants to lose interest and quit. Even participants who enjoy programmes, but see no change in their condition, can become demotivated and quit (*Husk et al., 2020*). In *Husk et al.’s study (Husk et al., 2020)*, participants explicitly said that the main reason for drop-out was lack of change in health status leading to them questioning if the interventions were effective and worthwhile. Similarly, those with higher, or unrealistic, expectations of the intervention were more likely to drop out.

While we have discussed a number of challenges that may hinder the implementation of greenspace interventions, it is necessary to highlight that reporting bias was evident throughout data extraction, in many of the included studies. This finding is supported in a review of wilderness therapy programmes, where *Ferneer et al. (2017)* reported that almost all included studies reported positive results, and some even explicitly reported a reluctance to analyse negative experiences in detail. Without in-depth understanding of negative, or even neutral, experiences, and with no advice or support about how to overcome challenges, then it is unclear how beneficial research can be in informing future practice. In future research, more evidence is therefore needed regarding alternative examples which counter successful case narratives.

4. Discussion

This review contributes to international empirical research as it is a novel approach to both understanding and evaluating how greenspace interventions can be used to improve mental health. Through an iterative process, data were collected and analysed which allowed continuous development of programme theories as new data emerged. The synthesis of empirical findings allows a greater theoretical understanding of the intervention process itself, rather than reporting whether an intervention is effective or not. The theoretical findings are therefore transferable across a range of interventions and are more useful for the logical, evidence-based development of other effective interventions. To identify the context-mechanism-outcome configuration for each programme theory, the IPTs were first tested against the literature and then refined to explain how, for whom, and in what circumstances, do greenspace interventions for mental health work, or do not work.

Russell and Farnum (2004) have previously suggested a programme theory for wilderness therapy that incorporated three interrelated factors of Wilderness, Physical Self, and Social Self. This programme theory was noted, but did not prematurely influence our review since our review was of greenspace programmes in general, and not of a specific type. In-depth reviews by *Lovell et al. (2015)* and *Husk et al. (2016)* have also produced detailed conceptual models of how engagement with nature can impact physical and mental health. These models were helpful for building a deeper understanding of mechanisms and outcomes, as well as touching on some of the contextual factors which may influence programme development. Our review expands on some of the work in these models through further focus on context, additional mechanisms, and the focus on ‘for whom’ and ‘in what circumstance’. Overall, we found that Nature, Individual Self, and Social Self aptly

described the three overarching themes under which our programme theories fell. The headings of the seven programme theories identified through a thorough engagement with 49 included studies and discussions with greenspace service providers are shown in Fig. 3 under the three identified themes of Nature, Individual Self, and Social Self. The in-depth synthesis of each of the programme theories, as covered in the results, allows an understanding of the causal relationships which make up each programme theory. While it is indeed possible for programme theories to exist independently from each other, it is feasible to deduce that greenspace programmes work best in the circumstances where CMOcs are activated under each programme theory simultaneously. As Pawson (2006b) states, transformation may be achieved by the fact that CMOcs happen together in a process over time. It is worth mentioning that participants may focus their development in one area of the programme which could lead to trade-offs in outcomes. For example, participants who spend time honing a particular independent skill, and therefore increasing in self-efficacy, may actually decrease in social skills due to time spent alone. Further exploration of how mechanisms in one programme theory may affect outcomes in a separate theory is therefore recommended. However, through data synthesis, we found that 27 of the included studies explicitly reported that the interaction of nature, individual changes, and social changes, was related to best outcomes. Therefore, programmes should include adequate opportunities for development in both individual and social skills, in order to mitigate any negative effects of trade-offs.

Based on the seven programme theories, Fig. 4 visually depicts a novel conceptual framework developed on the basis of our review findings. The key differences between this conceptual framework and previously mentioned models are: firstly, showing that this framework could be an overarching programme theory for all types of greenspace programmes, and not just one type of programme; and secondly, as well as identifying programme theories about how greenspace interventions may be successful in improving mental health, within the seven programme theories we have synthesised context, mechanism, outcome configurations which allow a better causal understanding of the pathways to mental health improvement.

4.1. Strengths and limitations of the review

To our knowledge, this review is the first to use realist methodology to examine greenspace interventions for mental health where studies were not excluded based on intervention type. This allowed different types of greenspace programmes to be analysed with a realist lens and similar CMOcs to be identified across programmes. The findings highlight that greenspace programmes appear to be successful as a result of three interacting themes; Nature, Individual Self, and Social Self, regardless of programme type. In future work, interventions such as care farming, wilderness therapy, or horticultural therapy could be analysed in separate reviews which could allow the overarching conceptual framework outlined in this review to be tested and refined further. Another strength is that studies covered nine countries allowing the findings of this review to be internationally relevant.

Limitations must also be recognised when using realist methodology, particularly relating to reviews being based on guiding principles rather than standardised rules (Pawson et al., 2005). Although we have endeavoured to ensure transparency at all points of our review, for example by submitting our protocol to PROSPERO, adhering to robust quality standards (Wong et al., 2013), and through thorough documentation and in-depth discussion of key decisions, the realist review process is inherently interpretive and subjective, especially in regard to relevance and rigour assessment. Secondly, as previously mentioned, further exploration of how mechanisms in one programme theory may affect outcomes in a separate theory is recommended via future research. Thirdly, although not within the scope of the current review, future research should identify whether greenspace programmes are successful in the longer term, and whether the proposed programme

theories can also explain long term success. Finally, realist approaches can synthesise data from quantitative and qualitative methods (Wong et al., 2016; Pawson et al., 1997), and analysis is guided by data that are best suited to answer research questions. We found that in the examples we examined, the qualitative studies were regarded as higher relevance for informing programme theories compared to quantitative data due to CMOc information in these studies being more accessible. Future research should examine how best to integrate more quantitative data into programme theories, for example with physiological mechanisms and outcomes such as salivary cortisol changes, body mass, and heart rate.

5. Conclusion

This realist review has examined the contexts and mechanisms in greenspace programmes which can lead to outcomes in mental health to show what works, for whom, and in what circumstances. These configurations have been developed into an original overriding theory involving seven programme theories under three themes of Nature, Individual Self, and Social Self. The interaction of these three factors represents a new conceptual framework for greenspace interventions for mental health. The findings of this review are not only theoretically novel, but also have practical relevance for those designing such interventions, providing recommendations on how to optimise, tailor, and implement, existing interventions. These will be particularly relevant for academic researchers, health professionals, and mental health multidisciplinary teams, and for those working in the third sector, developing and delivering such interventions.

Declaration of competing interest/COI

None.

Data access statement

This study was a review of existing data, which is openly available at locations cited in the reference section. Further documentation about data access and records are available from the authors.

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Appendix 2: Full paper of Masterton et al. (2021)

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Greenspace programmes for mental health: A survey study to test what works, for whom, and in what circumstances

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ABSTRACT

The health benefits of greenspace are widely acknowledged. Greenspace programmes, defined as health programmes undertaken in outside green areas such as parks, gardens, hills, and forests, are becoming more commonplace. However, there is still limited understanding of the mechanisms by which greenspace programmes are effective. This makes future development and implementation very difficult. We recently developed and published a novel framework for greenspace programmes for mental health showing what works, for whom, and in what circumstances (Masterton et al., 2020). In this current study, the accuracy of the proposed framework was tested for the first time using primary data from greenspace organisations in Scotland. Given the link between mental health and substance use, the applicability of the framework to programmes that support people with problem substance use was also tested. A survey was designed to test the contexts, mechanisms, and outcomes identified within the previously proposed framework. The survey was completed by 64 participants to provide a general overview of the framework's applicability for programmes that support mental health, as well as for programmes that support people with problem substance use. Overall, respondents agreed with all survey statements. This suggests that the framework does effectively represent the underlying context, mechanism, outcome configurations of greenspace programmes for mental health. Furthermore, there were no differences between responses from organisations that support people with problem substance use, and organisations that do not support this client group. This shows that the framework has the potential to be applicable to both greenspace programmes for mental health and greenspace programmes for people with problem substance use. This is a novel finding as, to our knowledge, there is currently no framework looking to explain the contexts, mechanisms, and outcomes necessary for greenspace programmes to be successful for people with problem substance use.

1. Background

A growing body of evidence suggests that spending more time in nature results in improved health outcomes (Hartig et al., 2014; Twohig-Bennett & Jones, 2018). From a public health perspective, 'greenspace' can be defined and characterised by its ability to provide healing and positive physical and mental health outcomes (Haubenhofner et al., 2010). Living in areas with a higher number of green spaces, such as parks, gardens, and woodlands, for example, has been linked to lower risk of non-communicable diseases such as cardiovascular disease (Kardan et al., 2015), obesity (Halonen et al., 2014), and diabetes (Astell-Burt et al., 2014), as well as lower levels of overall mortality

(Pearce et al., 2016; Gascon et al., 2016). As well as physical health, greenspace is linked to positive mental health (Barton & Pretty, 2010; Callaghan et al., 2020; Hartig et al., 2014; Hartig & Kahn, 2016; Hystad et al., 2019). The term 'mental health' is used to describe the state of a person's psychological wellbeing ranging from positive mental health to poorer mental health, with the latter often being referred to as mental health problems (Pilgrim, 2017). Greenspace is increasingly being used both recreationally by individuals, as well as in a more structured way by organisations, to achieve positive mental health outcomes, such as reductions in stress or improvements in mood, in a variety of settings from public parks and woodlands to gardens in hospitals and care homes (Frumkin, 2013; Robinson et al., 2020). In a recent study by White et al.

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(2019), data collected from 19,806 people in England showed that those who spent 2 h in nature per week had consistently better health and wellbeing. While the direction of effect is difficult to determine, the results of this large-scale study strongly support the link between time spent in greenspace and mental health.

With the rising awareness of the association between greenspace and mental health, there are now many health programmes where greenspace plays an integral part (Lovell et al., 2015). Various programmes exist, often incorporating a number of activities defined as 'green care' including gardening or horticultural programmes; organised walks for wellbeing; forest walks and forest bathing; wilderness programmes; outdoor woodland learning; adventure programmes; nature-based mindfulness; conservation activities, and care farming (Barton et al., 2016; Haubenhofner et al., 2010; Jepson et al., 2010; Robinson et al., 2020). As well as specific physical and mental health outcomes, intended outcomes of greenspace programmes can also include supporting biodiversity (Goddard et al., 2010), increasing connectedness to nature (Liefänder et al., 2013), learning new skills (Adevi & Lieberg, 2012), and increasing social cohesion (Jennings & Bamkole, 2019).

Previous systematic reviews and meta-analyses of greenspace programmes for mental health have provided evidence of their effectiveness (Bowen & Neill, 2013; Cipriani et al., 2017; Genter et al., 2015; Goman & Cacciatore, 2017). However, while there is general agreement that greenspace programmes are associated with positive outcomes, concern has been raised over the robustness of study designs and therefore the quality of the existing evidence (Husk et al., 2016). Greenspace may have a positive effect on mental health, but from current evidence, it is not clear how greenspace programmes work, and what mechanisms of change lead to the desired outcomes (Husk et al., 2016; Norton et al., 2014). Without knowing the necessary components, processes, and influences needed for the programmes to work, it is impossible to understand why the programmes work and how best to replicate them.

1.1. Previous research: international evidence for greenspace programmes for mental health

Previous reviews (Husk et al., 2016; Lovell et al., 2015) have produced conceptual models of the mechanisms by which engagement with nature impacts physical and mental health. However, different contexts are likely to facilitate different mechanisms and outcomes meaning what 'works' in one programme might not 'work' in another. To address this gap, we recently conducted a realist review to synthesise the international evidence for greenspace programmes for mental health in both clinical and non-clinical populations (Masterton et al., 2020). The aim was to explore how greenspace programmes work, why they work, for whom, how context influences mechanisms of change, and how mechanisms of change lead to outcomes. Causation is central to a realist approach; the premise is that the outcomes of a complex intervention programme, such as changes in behaviour, are directly caused by underlying generative mechanisms, described as the invisible elements of reasoning and reaction, such as thoughts and emotions, which have been activated in the right contexts (Pawson & Tilley, 1997). Contexts can be wide ranging, for example individual, interpersonal, organisational, or institutional factors (Pawson & Tilley, 1997). This causal relationship between contexts, mechanisms, and outcomes is referred to as the context-mechanism-outcome configuration (CMOC), and these CMOCs are described as the 'programme theories' of why a programme works. Each programme will consist of a number of programme theories which will be tested and refined. Realist methodology is becoming an increasingly popular way to synthesise complex public health intervention programmes as it allows an in-depth theoretical understanding of programmes (Wong et al., 2010). Greenspace programmes are examples of complex intervention programmes because there is substantial diversity in the contexts in which they run. For example, the environment is often uncontrolled and in different settings, there are typically multidisciplinary teams involved, there are often many different

activities, and there are often different policy and funding landscapes across programmes. Further, the mechanisms that are activated, such as different emotional responses, will differ across programme participants, and the programme outcomes can be wide-ranging.

Through an in-depth synthesis of the existing international literature, seven programme theories were developed to show how greenspace programmes work under three themes of Nature, Individual Self, and Social Self (Masterton et al., 2020). The titles of the seven programme theories were: The Feeling of Escape and Getting Away; Having Space to Reflect; Physical Activity; Self-Efficacy; Having a Purpose; Relationships with Facilitators; and Shared Social Experiences. A number of contexts, mechanisms, and outcomes were included in each programme theory, and we proposed that the titles best described the core concept of each programme theory. The programme theories allowed an understanding of greenspace programmes in general and helped explain how optimum mental health outcomes, such as decreased stress, improved mood and self-esteem, and improved social cohesion, among others, could be achieved. Further, all programmes included in our review (Masterton et al., 2020) ranged from urban projects, such as garden programmes, to rural based projects, such as wilderness programmes. We suggested that it did not appear to matter what the mode of delivery was, nor where the programme was located, the contexts, mechanisms, and outcomes were still the same across programmes. However, developing a framework using realist methodology is an iterative process and programme theories are potentially changeable depending on the programme. Therefore, in this current exploratory study, the proposed framework in our review (Masterton et al., 2020) was tested for the first time using primary data to establish whether the developed programme theories that informed the framework took into account the nuances across existing greenspace programmes, and whether the framework was actually applicable across all settings. This testing is necessary as it is currently unclear if mechanisms and outcomes within the proposed programme theories (Masterton et al., 2020), such as the feeling of escape and having space to reflect, which seem to suggest the need for larger expanses of greenspace, would indeed be as applicable to urban programme settings compared to rural programme settings.

1.2. Greenspace programmes for problem substance use

As well as identifying how greenspace can improve mental health, we were interested in exploring how greenspace programmes may potentially support people with problem substance use. Problem substance use is defined as a pattern of harmful use of any substance such as alcohol and other drugs (illegal or not). The use of these substances often places a person at a higher risk of health, psychological, or social problems (EMCDDA, 2020). We propose that it is feasible to explore both mental health and problem substance use together, given that previous systematic reviews and meta-analyses have reported a strong association between the two (Hunt et al., 2016; Kingston et al., 2017; Lai et al., 2015). In some instances, the use of drugs or alcohol may be a way of trying to reduce or cope with existing symptoms of poor mental health or used as coping strategies to manage stressful life events (McVicar et al., 2015). However, the use of drugs or alcohol can also lead to poorer mental health (Adrian & Barry, 2003; Green et al., 2017; McKetin et al., 2019). Given the association, if greenspace programmes are shown to be successful in improving mental health, then this improvement could feasibly affect a person's substance use.

Previous research within the field of substance use has shown that mechanisms such as increasing feelings of empowerment and improving relationships are core components of successful substance use interventions (Mincin, 2018; Pettersen et al., 2019). If these mechanisms are also evident within greenspace programmes, again this suggests that these types of programmes could be effective in supporting people with problem substance use. However, there is currently very little existing evidence to inform how greenspace programmes that support people with problem substance use might be developed. By testing the

framework using data from greenspace programmes that report support for this client group, we explored to what extent the framework could work for problem substance use support, as well as to improve mental health. If the framework is applicable to programmes that support people with problem substance use, we propose that this is an important gap to address, because building on existing knowledge and assessing the potential for transferable programme theories may be more timely and pragmatic than attempting to develop an entirely new framework. In particular, testing the framework for use with a specific client group will provide valuable detail about 'for whom' a programme works and why, key questions in realist research.

1.3. Empirical focus of Scotland

To enable us to test the framework proposed in our previous review (Masterton et al., 2020), we chose to focus on existing greenspace programmes in Scotland. The framework was informed by data from nine countries suggesting that it was internationally relevant, however testing of the programme theories in a specific geographical context allowed us to explore this. If the framework is internationally relevant, then it should be applicable to greenspace programmes in any chosen country. The range of Scotland's greenspace is highlighted by the *Scottish Government's Planning Advice Note for Planning and Open Space (2008)*, where 11 separate classifications of greenspace were identified under the open space heading, showing that terms such as public parks and gardens, amenity greenspace, play space, sports areas, green corridors, undeveloped land, and allotments might be used instead of the term 'greenspace'. Further, with the role of greenspace growing in health improvement discourse, the number of greenspace programmes for mental wellbeing is also increasing (Edinburgh & Lothians Health Foundation, 2019). Due to the variety of greenspace settings, and growing number of programmes, gathering data from Scotland allowed us to test the framework using a range of programmes such as urban garden programmes, horticultural programmes, conservation programmes, and wilderness programmes, among others. This was particularly important in order to test our claim that the framework is applicable to greenspace programmes regardless of activity and setting.

1.4. Study aim

The first aim of this exploratory study was to test the accuracy of our proposed framework (Masterton et al., 2020) by collecting primary data from staff on greenspace programmes in Scotland. A claim in our review was that the framework should be transferable to all greenspace programmes. If the framework was indeed transferable to all programme types and settings, we would expect to see overall agreement for all programme theories from all staff, regardless of programme setting. Our second aim was to test the potential applicability of the framework to greenspace programmes for people with problem substance use.

1.5. Research questions

1. What greenspace programmes exist in Scotland, what client groups do the programmes support, and where?
2. Does the existing framework in Masterton et al. (2020) adequately represent the underlying context, mechanism, outcome configurations of greenspace programmes for mental health, when tested with data from existing greenspace programmes?
3. Is there overall agreement with the framework from staff on across different settings of greenspace programmes, from urban greenspace programmes to rural-based programmes?
4. Does the framework have the potential to be applicable to greenspace programmes for people with problem substance use?

2. Methods

2.1. Survey rationale and design

Realist approaches use multiple methods to gain insight into programme theory, therefore a survey approach was considered to be an appropriate method for an exploratory study. The rationale of using a survey was that it enabled the collection of data relatively quickly from a mix of people based in different geographical areas which was important in order to test the applicability of the framework across diverse contexts in Scotland. Using a survey also allowed statistical testing and comparison between different groups to explore the relevance of the framework for use on greenspace programmes that support people with problem substance use. The survey was designed using the JISC online survey tool (<https://www.onlinesurveys.ac.uk/>) by the lead researcher (WM) and ran between 28th January 2020 and 27th May 2020. As the COVID-19 pandemic began during our data collection phase, the use of a survey allowed us to continue data collection from a mix of people despite travel restrictions. The survey had 67 items in total which were split into three main sections: organisation information, greenspace programme information, and programme components (see Appendix 1 for the full survey document).

2.1.1. Section A: organisation information

In this section we asked the name of organisation, whether the organisation was public, private, or third sector, and which town or city the organisation was based in.

2.1.2. Section B1: greenspace programme information

To gather data about programme characteristics we asked six questions on the name of the programme, whether the programme supported mental wellbeing, whether the programme supported people with problem alcohol use and/or problem illicit drug use, what age groups could access the programme, and were there exclusion criteria for clients attending programmes.

2.1.3. Section B2: greenspace programme information

To understand what 'greenspace' meant in relation to each programme, and how the greenspace used by each programme differed, we asked four questions on the definition of area (e.g. wilderness, forest, public park, etc.), ownership (e.g. public or private), distance from nearest town or city in kilometres, and size of the greenspace each programme used in acres.

2.1.4. Section C: Programme components

The main body of the survey included 54 statements based on the seven programme theories developed in our previous review (Masterton et al., 2020). The survey was designed so that each statement tested an individual context, mechanism, or outcome discussed in the review. Seven statements representing contexts, mechanisms, and outcomes were given relative to each programme theory, and five additional statements were included at the end which represented unconfigured contextual factors identified in the realist review as important, but not yet linked to mechanisms and outcomes. Inclusion of these unconfigured contextual factors in the survey was deemed important, since any identification of diverse opinion across respondents would indicate that these factors should be explored further in future research to identify their impact on programmes. To further aid understanding of survey design, Table 1 explicitly shows the contexts, mechanisms, and outcomes within each identified programme theory in our review (Masterton et al., 2020) and maps how each of these components, as well as the five unconfigured contexts, were tested with the corresponding survey statement in this current study. It is important to note at this point that, although context, mechanisms, and outcomes typically appear as a "context + mechanism = outcome" configuration heuristic in realist research (Pawson & Tilley, 1997), and appeared as such in our

Table 1

Contexts, mechanisms, and outcomes within each identified programme theory in Masterton et al. (2020) and the corresponding survey statement in this current study.

Each programme theory and all CMO components, as evidenced in Masterton et al. (2020), including the direct quotation and page number from the review	Corresponding survey statement testing each component
<p>Escape and Getting Away (PT1): If there is easy access to a quality, spacious, greenspace environment, then there will be a reduction in stress and mental fatigue, because the participant feels calm, relaxed, and away from their day to day stressors, particularly if they have previous negative experience of traditional health services where they have felt enclosed.</p> <p>Context: Outside is a more spacious environment Direct quote: "they [participants] no longer felt as if they were confined within four walls" (p.6)</p> <p>Context: Previous experience in indoor, more traditional health services Direct quote: "the greenspace setting was particularly effective for participants who had previous experience of more typical treatments such as counselling, as they no longer felt as if they were confined within four walls" (p.5/6)</p> <p>Context: A high quality environment with various sensory stimuli Direct quote: "The feeling of being away, relaxed, and removed from daily life, was shown to be further facilitated by sensory stimuli present in the environment" (p.6)</p> <p>Mechanism: Feelings of calm Direct quote: "when a person is immersed in nature this leads to feelings of calm" (p.5)</p> <p>Mechanism: Feeling removed from daily stressor Direct quote: "immersion in nature allows a person to feel removed from their everyday life and, therefore, from their everyday stressors. This feeling of escape, or 'getting away', is a key mechanism in the success of greenspace programmes." (p.5)</p> <p>Outcome: Participant is mentally refreshed Direct quote: "In this programme theory, stress levels and mental fatigue were reduced" (p.6)</p> <p>Outcome: Participant's stress is reduced Direct quote: "In this programme theory, stress levels and mental fatigue were reduced" (p.6)</p>	<p>Escape and Getting Away (PT1) - represented by surveys statements 1 to 7</p> <ol style="list-style-type: none"> Greenspace programmes provide a more spacious environment than other therapy programmes which are typically run indoors (C) Service users who have had previous experience in indoor health services often prefer outdoor greenspace programmes because they feel less enclosed (C) The greenspace environment provides a sensory experience (C) Greenspace provides a calming effect for service users (M) Being in greenspace allows service users to feel removed from their daily stressors (M) Service users report that they feel mentally refreshed after working in greenspace (O) Service users report that they feel less stressed when working in greenspace (O)
<p>Space to Reflect (PT2): If the client accesses greenspace which provides a backdrop for therapeutic conversations, then as long as there is adequate space and time spent on the programme, this results in increased desire to change, because of increased opportunity for reflection and because participants see changes in nature around them which they attribute to changes in their own lives.</p> <p>Context: Length of programme Direct quote: "change could take months to become apparent." (p.7)</p> <p>Context: Time on programme Direct quote: "The context of adequate time spent on the programme was a refinement to this programme theory since change and reflection did not happen quickly" (p.7)</p> <p>Context: The greenspace environment facilitates conversations Direct quote: "nature was providing a 'backdrop' where therapeutic conversations and activities were more accessible." (p.7)</p> <p>Mechanism: Greenspace allows time to reflect Direct quote: "an integral part of this programme theory is that time alone in greenspace can allow participants to reflect on their lives." (p.7)</p> <p>Mechanism: Metaphors Direct quote: "the desire to change could be facilitated by metaphors encountered within the programme and participants applying these to their own lives" (p.7)</p> <p>Mechanism: Greenspace allows space to reflect Direct quote: "participants spoke about the physical space allowing them to reflect in a prolonged and undisturbed way, both when sitting and walking. This, in turn, can increase their awareness of the need for change in their lives" (p.7)</p> <p>Outcome: An increased desire to change behaviours and/or coping strategies Direct quote: "awareness of the need to change was achieved" (p.7)</p>	<p>Space to Reflect (PT2) - represented by surveys statements 8 to 14</p> <ol style="list-style-type: none"> change in service users' behaviour does not happen quickly on greenspace programmes (C) The longer service users participate in greenspace programmes, the more they benefit from them (C) Therapeutic conversations seem easier in greenspace than in other environments (C) Time alone in greenspace allows a service user time to reflect on their lives (M) Service users find that changes in plants, trees, or the environment, can represent changes in their own lives (M) The physical space on greenspace programmes allows service users space to reflect on the need for change in their lives (M) By the end of the programme, service users have a desire to change behaviours and/or coping strategies in life outside of the programme (O)
<p>Physical Activity (PT3): If there are a variety of activities available, and if participants are prepared for anticipated challenges, and if programmes have the right resources such as funding and staff, then this will lead to increased physical activity and improved mood because clients will have feelings of accomplishment and enjoy the activities they do.</p> <p>Context: Availability of experienced facilitators Direct quote: "six studies stressed the importance of having confident, adequately trained facilitators to enable and lead activities" (p.7)</p> <p>Context: Availability of funding Direct quote: "availability of resources to adequately support and fund programmes and their materials is imperative to provide a variety of activities" (p.7)</p> <p>Context: Existing awareness of physical challenges Direct quote: "realistic expectations of anticipated challenges did appear to be an influencing context in the lead up to programme uptake in some circumstances. Gabrielsen et al., (2019) suggest that clearly informing and preparing participants for any challenges prior to the programme commencing is advisable" (p.7)</p> <p>Mechanism: Variety of activities Direct quote: "With a diversity of activities available, participants are more likely find an activity that they enjoy and will engage with" (p.7)</p>	<p>Physical Activity (PT3) - represented by surveys statements 15 to 21</p> <ol style="list-style-type: none"> It is essential to have experienced facilitators leading activities in greenspace programmes (C) Greenspace programmes need secure funding in order to provide a range of activities (C) It is important to inform service users of anticipated physical challenges as this makes it easier for them to cope with these challenges when they appear (C) A variety of activities increases the likelihood of service users engaging with a programme (M)

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Table 1 (continued)

Each programme theory and all CMO components, as evidenced in Masterton et al. (2020), including the direct quotation and page number from the review	Corresponding survey statement testing each component
<p>Mechanism: Feelings of accomplishment Direct quote: “[participants] described how, even though they felt tired during physically challenging hikes, they still felt happier when taking part and therefore found it easier to push themselves.” (p.7)</p> <p>Mechanism: Enjoyment of activity Direct quote: “enjoyment of physical activity facilitates engagement and, in turn, leads to increased physical activity” (p.7)</p> <p>Outcome: Increased physical activity and mood improvement Direct quote: “with increases in physical activity, improvements in mood are also seen” (p.7)</p>	<p>19. Service users report feelings of accomplishment after a physically demanding activity (M)</p> <p>20. If a service user enjoys the activity, this will lead to increased uptake of the activity (M)</p> <p>21. Increased physical activity on the programmes leads to improvements in mood of service users (O)</p>
<p>Self-Efficacy (PT4): If there are available, experienced facilitators to lead programmes, then clients will learn new physical and psychological skills which increases self-esteem and confidence in applying new skills in their lives outside of the programme, and once it has finished, because of increased feelings of empowerment relating to their ability, particularly relating to coping with physical and psychological challenges.</p> <p>Context: Availability of experienced facilitators Direct quote: “the availability of adequately trained facilitators is necessary to enable participants to learn new skills” (p.13)</p> <p>Mechanism: Coping with challenges Direct quote: “teaching skills such as coping with challenges were present across programme type” (p.13)</p> <p>Outcome: Learnt practical and psychological skills Direct quote: “Learnt skills can be practical tasks” “Learnt skills can also be skills such as self-regulation of emotion, and coping strategies” (p.13)</p> <p>Mechanism: Feelings of empowerment Direct quote: “another identified change in reasoning was an increased feeling of empowerment when learning new skills” (p.13)</p> <p>Outcome: Confidence and self-esteem from new skills Direct quote: “service users who learned and mastered new skills had increased self-esteem, pride, and confidence” (p.7)</p> <p>Outcome: Application of skills outside of the programme Direct quote: “psychological skills are particularly important in facilitating self-efficacy post-programme enabling service users to integrate new skills into their lives” (p.13)</p> <p>Outcome: Ability to cope with challenges post-programme Direct quote: “skills development can lead to increases in pride, self-esteem, and confidence, as well as in self-efficacy for individuals to implement new skills in their life outside the programme” (p.13)</p>	<p>Self-Efficacy (PT4) - represented by surveys statements 22 to 28</p> <p>22. Experienced facilitators are important for service users to learn new skills (C)</p> <p>23. Working in greenspace requires service users to overcome challenges at times (M)</p> <p>24. Service users learn both practical and psychological skills such as goal setting, coping with challenges, and self-regulation of emotion (O)</p> <p>25. Learning new skills allows service users to feel empowered (M)</p> <p>26. Learning new skills allows service users to feel more confident about themselves (O)</p> <p>27. Skills learnt on greenspace programmes are transferable to service users' lives outside of the programme (O)</p> <p>28. Learning new skills allows service users to feel more confident in overcoming challenging circumstances after the programme ends (O)</p>
<p>Having a Purpose (PT5): If a programme provides structure, and if there are available, trained facilitators to lead programmes for an adequate length of time, then clients were more positive and excited about life, because of increased responsibility, feeling valued, and a sense of routine and purpose.</p> <p>Context: Length of time on programme Direct quote: “time spent on a programme has been shown to be correlated with achieving outcomes” (p.13)</p> <p>Context: Programmes are structured by nature Direct quote: “greenspace interventions were shown to be most effective when there were structured programmes in place” (p.14)</p> <p>Mechanism: Feelings of routine Direct quote: “Feelings of purpose were also gained from the routine that programmes provided” (p.14)</p> <p>Mechanism: Feelings of responsibility Direct quote: “The mechanisms of feeling responsible and purposeful were seen across all programme types” (p.14)</p> <p>Mechanism: Feeling valued Direct quote: “Participants spoke about feeling valued and appreciated for their work, which was motivating” (p.13)</p> <p>Mechanism: Sense of purpose Direct quote: “The mechanisms of feeling responsible and purposeful were seen across all programme types” (p.14)</p> <p>Outcome: Increased excitement for life Direct quote: “participants felt more hopeful and excited about life in general” (p.14)</p>	<p>Having a Purpose (PT5) - represented by surveys statements 29 to 35</p> <p>29. The longer a participant spends engaged in a programme, the more skills they can learn (C)</p> <p>30. Greenspace programmes are most effective in improving mental wellbeing when they are structured (C)</p> <p>31. Service users can find the routine on the programmes helpful for their mental wellbeing (M)</p> <p>32. Activities on greenspace programmes gives the service user feelings of responsibility (M)</p> <p>33. Service users feel valued on greenspace programmes (M)</p> <p>34. Service users feel a sense of purpose on greenspace programmes (M)</p> <p>35. Service users report increases in their excitement for life, after taking part in greenspace programmes (O)</p>
<p>Relationship with Facilitator (PT6): If facilitators appear non-judgemental, friendly, and confident, and meet the clients at the start of the programme who have previous negative experiences of healthcare professionals and who find it difficult to build relationships, and if facilitators do activities alongside clients, then clients are more likely to buy into programmes and engage with aftercare support, because they feel empowered, included, and that there is less of a power imbalance between facilitators and clients.</p> <p>Context: Previous experience with healthcare professionals Direct quote: “the influence of previous relationships with healthcare professionals is a contextual factor in how well participants initially engaged with programmes” (p.15)</p>	<p>Relationship with Facilitator (PT6) - represented by surveys statements 36 to 42</p> <p>36. Previous experiences with healthcare professionals can influence how a service user responds to programme staff (C)</p>

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Table 1 (continued)

Each programme theory and all CMO components, as evidenced in Masterton et al. (2020), including the direct quotation and page number from the review	Corresponding survey statement testing each component
Context: Existing challenges with building relationships Direct quote: "many programme users had experienced difficult interpersonal relationships and problems developing trust" (p.15)	37. Service users often report that they have difficulty in building relationships (C)
Context: Non-judgemental staff attitudes Outcome: Engagement Direct quote: "facilitators who appeared non-judgemental, open, and genuine, enabled relationships to be built quickly with participants." (p.15)	38. Non-judgemental, positive attitudes from staff are important in order to initially engage service users (C/O)
Context: Availability of confident and friendly staff for those with previous negative experience Direct quote: "previous negative experiences can negatively impact engagement, particularly for adolescents who may show lower levels of trust towards all adult relationships after a negative experience. There is some evidence that this might be mitigated by ensuring that each participant is met by a confident and friendly facilitator at the start to help engage participants" (p.15)	39. If a service user has previous negative experience of other health services, it is helpful for them to be met by a friendly, confident member of staff prior to the programme starting (C)
Mechanism: Feelings of empowerment and inclusion Direct quote: "some study participants described how facilitators would ask them what they wanted to do, eat, and which way to go allowing participants to feel empowered, decreasing power imbalances, and promoting inclusion" (p.15)	40. It is important to give service users choice in how they take part in the programme, as this can empower them (M)
Mechanism: Reduced feelings of power imbalance from "doing with" mentality of facilitators Direct quote: "Involvement of the facilitators in the same tasks as the service users led to decreased perceived power inequality" (p.15)	41. By taking part in greenspace activities themselves, programme staff can reduce inequalities in power between staff and service users (M)
Outcome: Continued engagement post-programme Direct quote: "the stronger the relationship between programme user and facilitator, the more likely participants were to fully engage with programmes and available aftercare support" (p.15)	42. High levels of trust and rapport between staff and service users increases the likelihood of service users accepting support after the programme (O)
Shared Experiences (PT7): If the greenspace programme provides a "real-life" environment in comparison to typical treatment environments for an adequate amount of time, and if participants saw others engaging in the programme, then participants saw increases in social skills, because they felt a sense of belonging within the group, and reduced judgement by others during shared experiences.	Shared Experiences (PT7) - represented by surveys statements 43 to 49
Context: Others engaging Direct quote: "the engagement of others on the programme can be a contextual factor to be aware of, with the success of social interactions being a two-way process" (p.15)	43. Service users are more likely to engage with the programme if they see others engaging with it (C)
Context: Time on programme Direct quote: "Time spent on the programme is another key contextual factor for social cohesion to occur. As previously mentioned, change does not happen instantly and social changes, in particular, can take longer to occur compared to psychological, physical, physiological, or cognitive changes" (p.15)	44. Service users can take a long time to build relationships with other service users (C)
Context: Greenspace as a more natural 'real life' environment Direct quote: "the group environment might be described as more like 'real life' than traditional therapy" (p.15)	45. The shared environment on a greenspace programme feels more natural than group therapy typically undertaken indoors (C)
Mechanism: Sense of belonging Direct quote: "the community feel of the greenspace programme was the most valued aspect mentioned" (p.15)	46. Service users find a sense of belonging with peers on greenspace programmes (M)
Mechanism: Feeling less judged Direct quote: "Mechanisms identified in this programme theory that led to improved social outcomes were the group environment feeling safe and lack of stigma and judgement" (p.15)	47. Service users feel like there is less judgement with peers when on greenspace programmes (M)
Mechanism: Sharing experiences Direct quote: "It is through these shared experiences that participants experience increased social skills" (p.15)	48. Greenspace programmes allow service users to have shared experiences (M)
Outcome: Increased social skills Direct quote: "It is through these shared experiences that participants experience increased social skills" (p.15)	49. Greenspace programmes allow increases in social skills (O)
Unconfigured contextual factors Small groups are preferred Gender differences in benefits gained Cultural differences in benefits gained Programmes are still seen as 'alternative' Age differences in benefits gained	Unconfigured contextual factors - represented by survey statements 50 to 54 Small groups are preferred by service users over larger groups Greenspace programmes are still seen as 'alternative' and this can limit service user engagement There are gender differences in how service users benefit from greenspace programmes There are age differences in how service users benefit from greenspace programmes There are cultural differences in how service users benefit from greenspace programmes

proposed framework (Masterton et al., 2020), they were separated into individual components in this study as it allowed us to test each of them individually and identify where exactly agreement or disagreement lay. If the configuration was kept as a whole, we would only be able to gain insight into the full configuration, rather than explore each part.

Respondents indicated on a 5-point Likert Scale (where 1 = strongly disagree and 5 = strongly agree) the extent to which they agreed or disagreed with each statement. No negatively worded items were used since previous research has shown little evidence of advantages of alternating positive and negative statements (Sauro & Lewis, 2011). Indeed, alternating positive and negative items can also be misinterpreted, confusing, and lead to a higher number of mistakes (Van Sonderen et al., 2013). To address this, statements were created to be as neutral and non-leading as possible, and all statements were discussed and agreed by the full research team.

To test the survey before distribution, a pilot survey was sent to five lay people to check for any errors and to ensure that survey items were clear and easy to understand. Minor adjustments such as wording and punctuation were made in response to suggested edits. No questions or statements were added or removed.

2.2. Participant inclusion/exclusion criteria

Survey participants were required to work on programmes which utilised outdoor greenspace as a core part of their programme. Participants working on outdoor programmes not using greenspace did not meet the inclusion criteria. Given our aim of comparing responses from those working on programmes that support people with problem substance use and those that did not, participants were not required to work on programmes that supported this client group. However, all participants had to work on programmes which had an aim of improving client mental wellbeing. Additionally, all participants had to be working on a programme based in Scotland, were service managers, programme facilitators, or in another staff role, and were over 18 years of age. Participants were required to complete an online consent form and confirm that they met the inclusion criteria prior to beginning the survey.

2.3. Recruitment and setting

A total of 133 survey participants were recruited online. Initially, the survey was distributed via email to relevant existing contacts of the research team. The research team then undertook extensive mapping to identify as many greenspace organisations as possible across Scotland. This work involved searching existing databases such as the Trellis map of projects (Trellis Scotland, 2020), the Paths For All map of health walks (Paths For All, 2020), and the mapping undertaken by the four Green Health Partnerships (NatureScot, 2019). Trellis also provided contact details for organisations not in the public domain. Organisations were also identified via websites, social media (Twitter, Facebook, LinkedIn), and through word of mouth. This mapping allowed us to collate a range of greenspace organisations, including those that we knew explicitly supported groups of people with problem substance use. To ensure that as many relevant organisations were contacted as possible, including any we had not identified in our own mapping, email recipients were asked to forward the survey to other relevant organisations. The survey link was also shared via Twitter, inviting greenspace programme staff to take part if they met the inclusion criteria. This meant that it was not possible to identify how many people subsequently received the survey, and we were therefore unable to calculate the exact survey response rate. However, the respondents represented a very high proportion of the organisations we had identified through mapping. Further, given that our search for relevant organisation was extensive, this allowed us to deduce that the number of respondents from programmes identified outside of the initial mapping work who were sent the survey, but did not complete it, is likely to be low.

2.4. Data analysis

Descriptive statistics were reported to summarise the diversity of greenspace organisations and stacked bar charts showed overall patterns of responses. This allowed identification of which statements had the largest variability in answers overall. We then explored whether variability in responses could be explained by programme setting. Programme setting was identified as urban, rural, or both using reported greenspace setting in the survey (urban/rural/both), distance from town in kilometres, and examining the OS MasterMap Greenspace Layer (Ordnance Survey, 2020). Urban areas were designated as those where urban cover was shown to be the dominant land type within a 1-km grid

Table 2
Characteristics of programmes.

Programme characteristics	Overall	
	%	N
Location (Region of Scotland)		
Aberdeen & Aberdeenshire	6.3	4
Argyll & Inver Hebrides	4.7	3
Ayrshire & Arran	12.5	8
Dundee & Angus	9.4	6
Edinburgh & The Lothians	18.8	12
Greater Glasgow & Clyde Valley	18.8	12
Stirling, The Trossachs, & Forth Valley	6.3	4
Perthshire	1.6	1
The Highlands	6.3	4
Scottish Borders	1.6	1
Programme runs in different regions	14.1	9
Public/Private/Third Sector		
Public Sector	15.6	10
Private Sector	3.1	2
Third Sector	75	48
Not sure	6.3	4
Programme age range		
Children and young people (< 16)	14.1	9
Over 16	59.4	38
All age ranges	25	16
No answer	1.6	1
Does the programme aim to improve mental wellbeing?		
Yes	98.4	63
No	0	0
No answer	1.6	1
Does the programme support people with problem substance use?		
Yes - people with problem drug and alcohol use	35.9	23
Yes - people with problem alcohol use only	7.8	5
Yes - people with problem drug use only	0	0
No	39.1	25
Not sure	17.2	11
Greenspace characteristics of programmes		
Setting of greenspace programme		
Rural forest/wood/open space	23.4	15
Urban woodland/hill/forest	15.6	10
Urban park/garden/allotment	34.4	22
Other	3.1	2
Different settings used		
Greenspace size		
< 0.5 acres	7.8	5
1-1.5 acres	14.1	9
2-4 acres	12.5	8
5+ acres	46.9	30
All different sizes used	3.1	2
Not sure	14.1	9
No answer	1.6	1
Distance (in km) from nearest urban area (town or city)		
In an urban area	46.88	30
1-5 km	25.0	16
6-10 km	6.25	4
11-20 km	3.13	2
21+ km	6.25	4
Different distances depending on which area used	3.13	2
Not sure	7.81	5
No answer	1.56	1

square (Boughey et al., 2011). To test for differences in responses between programme setting we used Kruskal-Wallis ANOVAs (Siegel & Castellan, 1988). These tests were appropriate since ordinal data are not suitable for parametric tests, and Likert data are ordinal, bounded, and discrete. The dependent variable in each test was the response to survey statements and the categorical variable was the greenspace programme setting (rural/urban/both). When the Kruskal-Wallis test showed significant differences between programme settings (rural/urban/both), Mann-Whitney tests were run as post-hoc tests to determine which groups differed from each other. To control for the inflation of Type 1 error rate, a Bonferroni adjustment was used. The adjusted p-value was calculated by dividing the alpha value (0.05) by the number of comparisons made.

To examine whether there were differences in responses between programmes explicitly supporting those with problem substance use and those that did not, we firstly calculated each respondent's median response scores across the seven statements within each programme theory, as described in Table 1. When creating an overall response score for each programme theory, it is good practice to check that all combined items are measuring the same underlying construct and that the score is therefore reliable (Laerd Statistics, 2018). We ran Cronbach's Alpha which allowed us to examine the internal consistency of each programme theory. Kruskal-Wallis ANOVAs were then used to test for differences in survey responses between respondents from organisations that support people with problem substance use and those from organisations that do not. The dependent variable was median score for each programme theory, and the categorical variable was intended beneficiary group (problem alcohol use only, both drugs and alcohol, neither, not sure). 'Drugs only' was not included as a categorical variable as no organisations fell into this group. Again, Mann-Whitney tests were run as post-hoc tests to determine which groups were significantly different from each other and a Bonferroni adjustment was used to control for Type 1 errors.

3. Results

3.1. Characteristics of programmes: what exists, where, for whom, and with what focus

The survey was completed by 64 people representing 55 separate organisations. Programme characteristics including programme location, whether the programme was in the public sector, private sector, or

third sector, programme aims, and age range of clients, are reported in Table 2. Greenspace characteristics of programmes are also reported in Table 2 to highlight the diversity of greenspace used across programmes.

3.2. Overall trends for the framework

Figs. 1–8 show responses from strongly agree to strongly disagree for each statement (n=7) within each programme theory. Survey statements, as seen on the Y-axis of each graph, are shown as descriptors and represent a context (C), mechanism (M), or outcome (O) from each programme theory. The full survey statements and their corresponding descriptors are listed in Appendix 2. The percentage of respondents choosing each response from strongly agree to strongly disagree is shown on the X-axis of each graph.

Respondents showed a high level of agreement with the programme theory 'Escape/Getting Away' with 93.8%–100% of respondents agreeing or strongly agreeing with the statements aside from the statement 'less enclosed' where 64% of respondents agreed or strongly agreed (Fig. 1).

Respondents showed a high level of agreement with the programme theory 'Space to Reflect' with 75%–87.5% of respondents agreeing or strongly agreeing with the statements aside from the statement 'changing environment represents client changes' where 65.6% agreed or strongly agreed, and the statement 'change in behaviour does not happen quickly' where only 15.6% agreed or strongly agreed (Fig. 2).

Respondents showed a very high level of agreement with the programme theory 'Physical Activity' with 79.7%–93.8% of respondents agreeing or strongly agreeing with the statements. There was also a very high level of agreement for the programme theory 'Self-Efficacy' with 84.4%–100% of respondents agreeing or strongly agreeing with the statements (Figs. 3 and 4 respectively).

Respondents showed a high level of agreement with the programme theory 'Having a Purpose' with 76.6%–95.4% of respondents agreeing or strongly agreeing with the statements aside from the statement 'structured programmes are most effective' where 62.5% agreed or strongly agreed (Fig. 5).

Respondents showed a high level of agreement for the programme theory 'Relationship with Facilitator' with 84.4%–98.5% of respondents agreeing or strongly agreeing with statements aside from the statement 'previous experience with health professionals' where 67.2% agreed or strongly agreed, and the statement 'difficulty in building relationships' where 54.7% agreed or strongly agreed (Fig. 6).

Respondents showed a high level of agreement for the programme

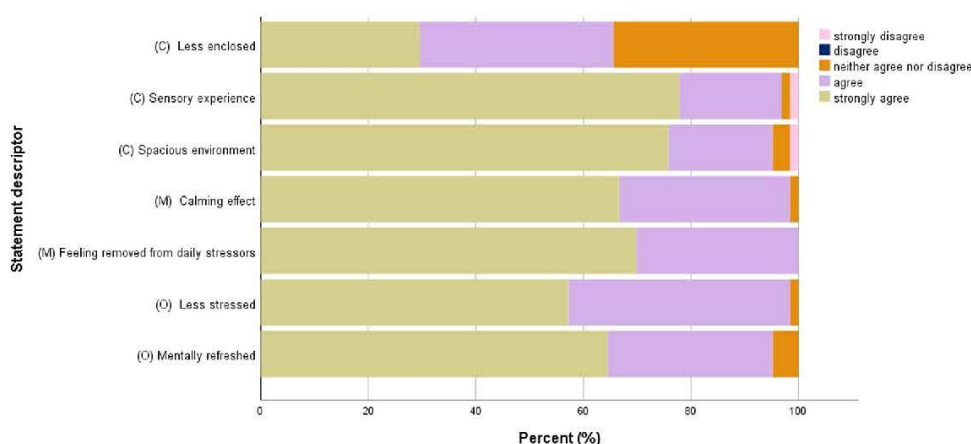


Fig. 1. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Escape/Getting Away'.

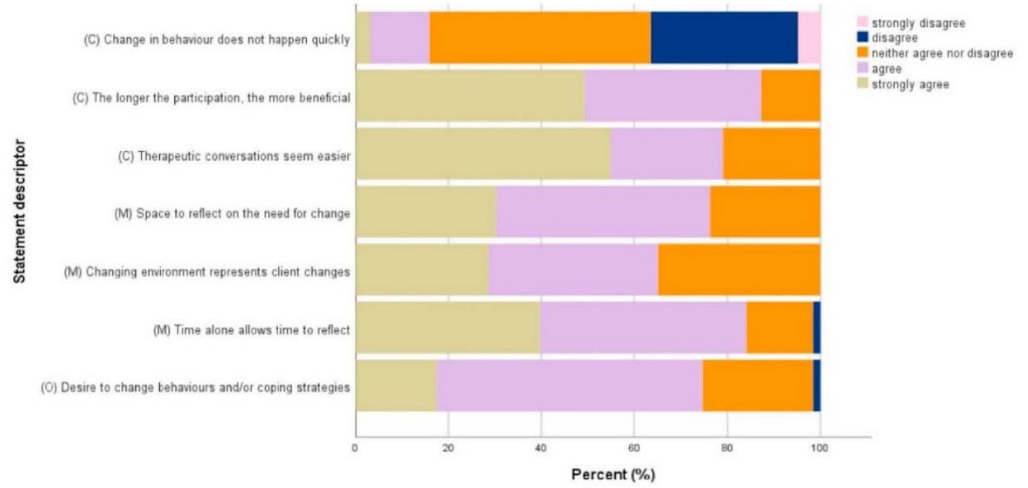


Fig. 2. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Space to Reflect'.

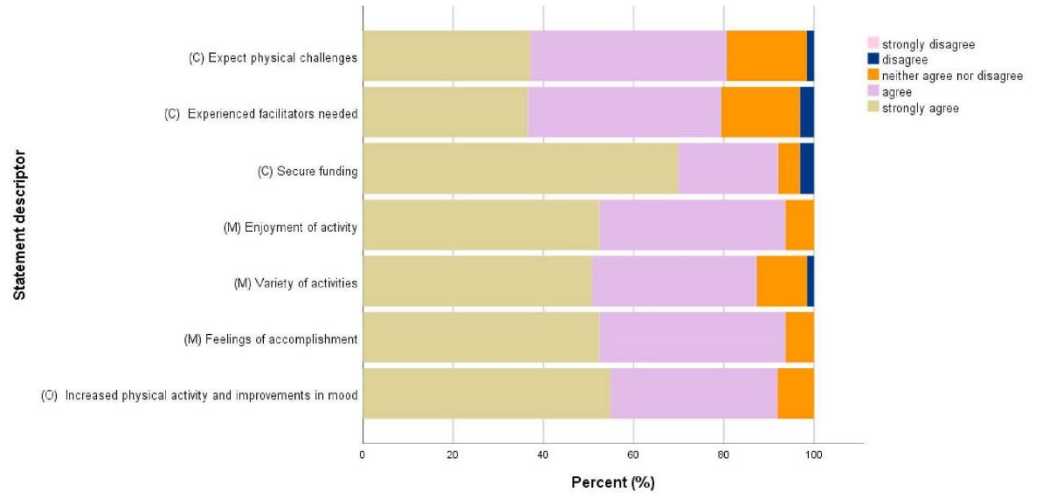


Fig. 3. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Physical Activity'.

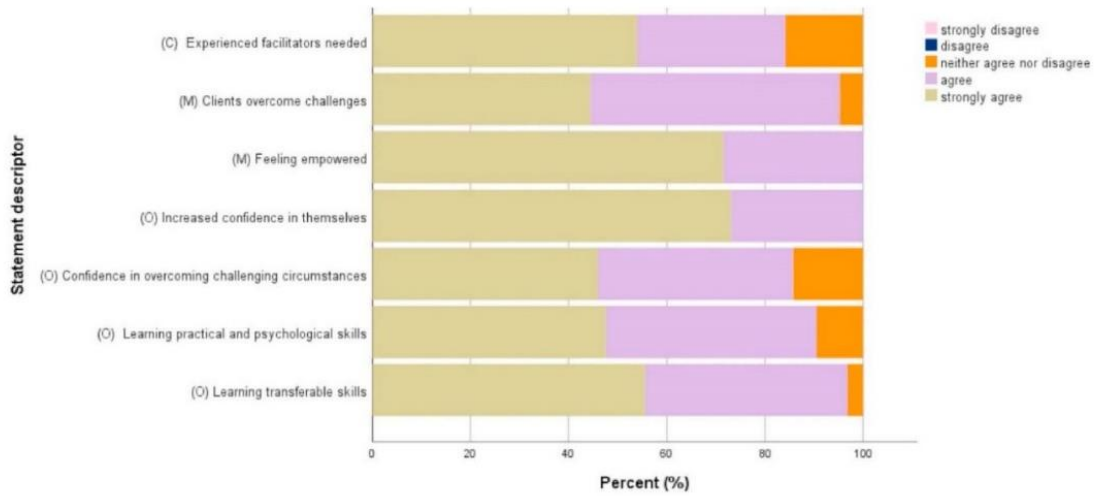


Fig. 4. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Self-Efficacy'.

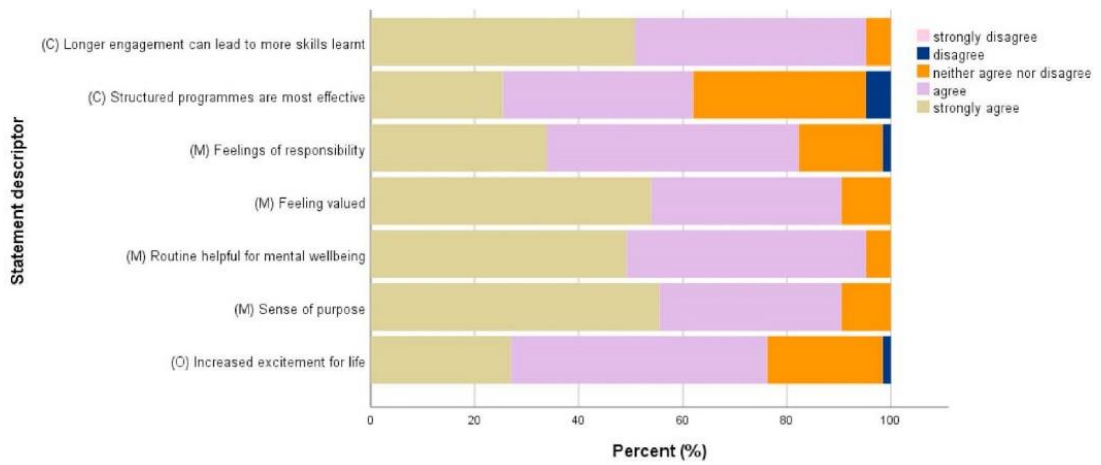


Fig. 5. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Having a Purpose'.

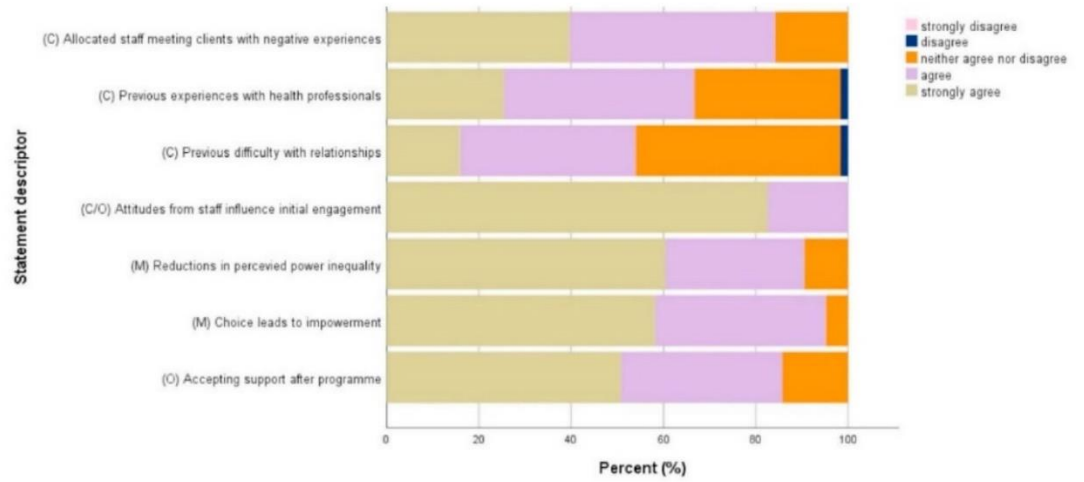


Fig. 6. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Relationship with Facilitator'.

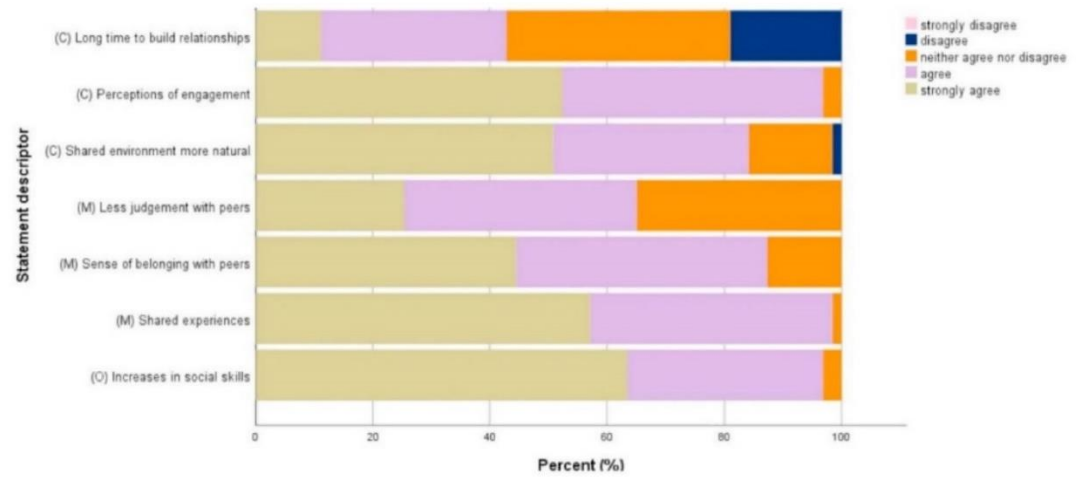


Fig. 7. Percentage of responses from strongly agree to strongly disagree for each statement within the programme theory 'Shared Experiences'.

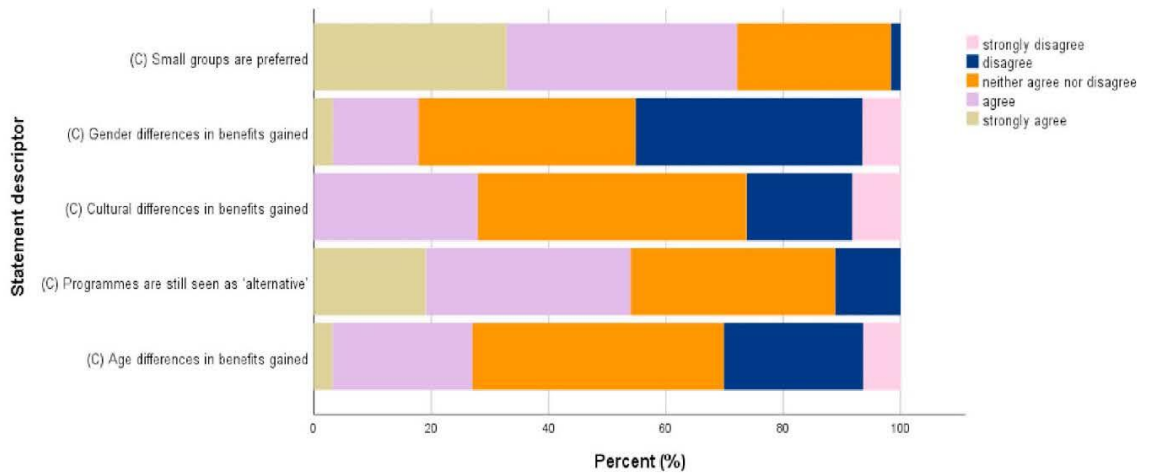


Fig. 8. Percentage of responses from strongly agree to strongly disagree for each unconfigured contextual statement.

theory 'Shared Experiences' with 84.4%–98.5% of respondents agreeing or strongly agreeing with statements aside from the statement 'less judgement with peers' where 64.1% agreed or strongly agreed, and the statement 'long time to build relationships' where only 41% agreed or strongly agreed (Fig. 7).

Finally, respondents showed a lower level of agreement with statements provided for the extra unconfigured contextual statements included in the survey. Only the statements 'small groups are preferred' and 'programmes are still seen as 'alternative' showed over 50% of respondents agreeing. Less than 26.6% of respondents agreed or strongly agreed with the other three statements. All statements showed a greater variability in responses compared to the seven programme theories (Fig. 8).

Descriptive statistics showing the number of respondents who selected each response score for the survey statements (on a 5-point Likert scale where 1 = strongly disagree and 5 = strongly agree), the corresponding percentage for each statement, and the median score for each statement are provided in Appendix 3.

3.3. Testing the transferability of the framework for different greenspace settings

A wider range of response scores for a statement demonstrated a higher variability in agreement. Despite our claim that the framework is applicable for all greenspace programmes (Masterton et al., 2020), differences in responses could be due to the setting of greenspace used. If over 30% of responses fell outside of 'agree' or 'strongly agree', we examined whether the responses differed according to whether the programme was rural-based, urban-based, or if it was based in both rural and urban settings. Of the 54 statements, 11 met the criteria and were tested. The dependent variable in each test was the survey statement and the categorical variable was the greenspace setting (rural/urban/use both).

The only statistically significant difference in responses between respondents from rural programmes, urban programmes, and programmes that use both settings was for the statement 'greenspace programmes are most effective in improving mental wellbeing when they are structured' ($\chi^2(2) = 7.29, p = 0.03$). Respondents from rural

Table 3

Kruskal-Wallis H test results showing differences in statement responses between respondent from urban programmes, rural programmes, and programmes that use both urban and rural greenspace.

Statement descriptor (see Appendix 3 for full corresponding statement)	Less enclosed	Change in behaviour does not happen quickly	Changing environment represents client changes	Structured programmes are most effective	Previous experiences with health professionals	Previous difficulty with relationships	Long time to build relationships	Less judgement with peers	Programmes are still seen as 'al ternative'	Gender differences in benefits gained	Age differences in benefits gained	Cultural differences in benefits gained
χ^2	0.43	0.36	2.51	7.29	1.44	0.003	2.86	2.30	0.44	3.25	4.10	0.42
df	2	2	2	2	2	2	2	2	2	2	2	2
p	0.81	0.83	0.28	0.03*	0.49	0.998	0.24	0.32	0.80	0.20	0.13	0.81

χ^2 Chi-square value; df degrees of freedom; p p-value.
* indicates significant p-value at <0.05.

Table 4
Cronbach's Alpha test for internal consistency of survey statements in each programme theory and for extra contextual statements.

Programme theory name	Cronbach's Alpha	Rating
1 - Escape/Getting Away	0.82	Good
2 - Space to Reflect	0.68	Acceptable
3 - Physical Activity	0.71	Good
4 - Learning New Skills	0.83	Good
5 - Having a Purpose	0.85	Good
6 - Relationship with Facilitator	0.78	Good
7 - Social Relationships	0.75	Good
Extra contextual statements	0.58	Borderline

programmes agreed more with greenspace programmes being most effective when they are structured (Mean Rank = 33.95) compared to those from urban programmes (Mean Rank = 23.06) ($U = 210.0, p < 0.01$). This remained significant with a Bonferroni adjustment ($p = 0.017$). There were no differences in agreement about the effectiveness of structured programmes between respondents from urban programmes (Mean Rank = 21.39) and from programmes that use both urban and rural greenspace (Mean Rank = 21.85) ($U = 156.5, p = 0.91$), or between respondents from rural programmes (Mean Rank = 18.25) and from programmes that use both urban and rural greenspace (Mean Rank = 12.65) ($U = 71.5, p = 0.09$).

There were no other statistically significant differences in statement responses between respondents from urban programmes and from programmes that use both urban and rural greenspace. Table 3 shows the Kruskal-Wallis H test results for all tested statements.

3.4. Testing the transferability of the framework for problem substance use

For each respondent, a total score was calculated by taking the median of the seven statements that made up each programme theory. Cronbach's Alpha confirmed internal consistency indicating that the overall scores were reliable (see Table 4). The internal consistency was good for six of the programme theories and was acceptable for one. The internal consistency for the extra contextual items was judged as acceptable but borderline, as typically a Cronbach's Alpha value of 0.6 and higher is acceptable.

There was a statistically significant difference in the total programme theory score for 'Relationship with Facilitator' between respondents from programmes that supported people with problem alcohol use only, both drugs and alcohol, neither, and/or those who were not sure ($\chi^2(2) = 9.45, p = 0.02$). Relationships with facilitators was rated as more important (a higher overall score) in programmes that

supported people with problem alcohol use (Mean Rank = 22.0), compared to programmes that did not support this client group (Mean Rank = 14.20). However, with the adjusted alpha rate ($p=0.008$) there was no significant difference ($U = 30.0, p = 0.04$). Respondents from organisations that supported people with problem alcohol use also rated relationships with facilitators as more important (Mean Rank = 12.50) compared to respondents who were not sure if their organisation supported people with problem substance use (Mean Rank = 6.68). However, with the adjusted alpha rate (0.008), again there was no significant difference ($U = 7.50, p = 0.01$). There were no significant differences between respondents from programmes that supported people with problem alcohol use only (Mean Rank = 19.0) and those that supported people with problem drug and alcohol use (Mean Rank = 13.52) ($U = 35.0, p = 0.10$); neither (Mean Rank = 19.84) and not sure (Mean Rank = 15.45) ($U = 104, p = 0.20$); or neither (Mean Rank = 22.44) and problem drug and alcohol use (Mean Rank = 26.74) ($U = 236.0, p = 0.23$).

There were no other significant differences in overall programme theory scores between respondents from programmes that supported people with problem substance use, from programmes that did not, and respondents who were not sure. Table 5 shows the Kruskal-Wallis H test results for differences in overall programme theory scores between groups.

4. Discussion

The positive influence of greenspace on mental health is now widely acknowledged and, although not without its limitations (Husk et al., 2016), much empirical research supports the association (Barton & Pretty, 2010; Callaghan et al., 2020; Hartig et al., 2014; Hartig & Kahn, 2016; Hystad et al., 2019; White et al., 2019). Globally, there are now many types of greenspace programmes for mental health (Masterton et al., 2020; Robinson et al., 2020; Barton et al., 2016). However, while greenspace may have a positive effect on mental health, it is still unclear by what pathways this occurs. In our previous paper (Masterton et al., 2020) this gap was explored, and a framework was proposed consisting of seven programme theories. In this current study, we tested the transferability of the proposed framework by collecting primary data from staff on greenspace programmes in Scotland. We also tested the applicability of the framework to greenspace programmes for people with problem substance use.

4.1. Characteristics of programmes: what exists, where, for whom, and with what focus

Across Scotland, there was a wide geographical spread of programmes, with respondents from organisations in ten different regions,

Table 5
Kruskal-Wallis H test results showing differences in overall programme theory scores between respondents from programmes that support alcohol only, drugs and alcohol, neither, and those who were not sure.

	Programme theory name							
	Escape/Getting Away	Space to Reflect	Physical Activity	Self-Efficacy	Having a Purpose	Relationship with Facilitator	Shared Experiences	Extra contextual factors
χ^2	1.67	3.85	2.28	1.17	2.88	9.45	2.41	2.38
Df	2	2	2	2	2	2	2	2
<i>p</i>	0.64	0.28	0.52	0.76	0.41	0.02*	0.49	0.50

χ^2 Chi-square value; df degrees of freedom; *p* *p*-value.
* indicates significant *p*-value at <0.05.

and with 14% of respondents indicating that their organisations ran programmes in various regions. Three quarters of the programmes were run by third sector organisations, such as charities, voluntary programmes, and social enterprises. There was a wide range of ages catered for across programmes, with one programme for under-fives, ranging to programmes for adults up to the age of 70. A quarter of respondents indicated that they provided services for all age ranges. All programmes supported clients to improve or maintain their mental wellbeing. Just under 36% of programmes supported problem alcohol and illicit drug use, approximately 8% supported problem alcohol use only, and just over 39% did not support people with problem substance use of any kind. Greenspace setting varied greatly across programmes with approximately 23% using rural greenspace, 16% using urban woodland or forests, 35% using parks, gardens, or allotments, and 23% indicating that various settings were used in the programme. The size of greenspace used in programmes ranged from less than half an acre, to over five acres. Just under half of the programmes (46.9%) were in an urban area.

The results demonstrated the heterogeneity of greenspace programmes for mental health and showed that the classification of greenspace appears to be relative to each programme, with no clear definition across programmes. The variety of greenspace identified is supported by the *Scottish Government's Planning Advice Note for Planning and Open Space (2008)*, where 11 separate classifications of greenspace are listed under the 'open space' heading. The variability in our study highlights the importance of clarity in terminology. In a previous review of 125 greenspace articles, less than half of the included articles included a definition of greenspace (Taylor & Hochuli, 2017). If there is a lack of clarity in terminology, not only will this likely lead to confusion (McIntyre et al., 2008), but could also limit research findings. For example, when exploring what aspects of greenspace are most important for health, researchers need to be explicit about what type of greenspace is being explored. Research on engagement with nature and greenspace for health may be challenging if there is little objective clarity about what nature or greenspace means within the context of that study. To address this, we suggest that the meaning of greenspace specific to each study should be explicitly communicated to better enable understanding. It is important to highlight that, from a practical viewpoint, a greater variety of greenspace programmes could be beneficial for including as many people in programmes as possible. However, a lack of consistent terminology is likely to provide challenges for service providers too, particularly when developing initiatives such as green prescriptions (Van den Berg, 2017).

It is important to note that while this study does not claim to provide in-depth mapping of programmes across Scotland, the pre-work in identifying existing programmes to recruit was extensive. Furthermore, the general trends of availability of different programmes are supported by existing databases such as the Trellis map of projects (Trellis Scotland, 2020), the Paths For All map of health walks (Paths For All, 2020), mapping undertaken by the four Green Health Partnerships (NatureScot, 2019), the MasterMap Greenspace Layer (Ordnance Survey, 2020), and previous empirical research on the geographical spread of green prescribing (Jepson et al., 2010; Robinson et al., 2020).

4.2. Generalisability of the framework to greenspace programmes for mental health in Scotland

Since programme theory development is an iterative process, the proposed programme theories from our previous review (Masterton et al., 2020) were tested in response to the new primary data. This testing was important since it was unclear if mechanisms and outcomes within our proposed programme theories, such as the feeling of escape and having space to reflect, would be as applicable to urban programme settings compared to rural programme settings. Results showed there were high levels of agreement with the survey statements overall, indicating that the results of this study strongly support the seven proposed programme theories for greenspace programmes. This suggests

that the proposed framework effectively represents the key contexts, mechanisms, and outcomes seen in greenspace programmes for mental health, as presented in our review (Masterton et al., 2020), and shown in this paper in Table 1, allowing us to understand *why* programmes work, rather than solely *if* programmes work. This finding is important as it extends the scope of the framework from representing empirical evidence only, to being a potentially useable framework in practice.

Further testing of the framework was also necessary to provide evidence for the claim that the framework was generalisable to greenspace programmes internationally. If the framework was internationally relevant, then it should be successfully applicable to greenspace programmes in any chosen country. Results showed that the framework can be taken and tested successfully in a Scottish setting with very high levels of agreement from greenspace practitioners. We propose that our findings from Scotland could be generalisable to other countries, due to the breadth of greenspace typologies as well as the variety of greenspace programmes included in the data. Many of the Scottish programmes identified for inclusion in this survey mirror programmes that were present in the realist review from different countries (Masterton et al., 2020). Therefore, if the programme theories translate well to Scottish programmes, then we suggest that the programme theories might also successfully translate to other international settings.

Despite a high level of agreement with the framework overall, the results also allowed us to identify individual statements where there was a greater variability in responses. This variability highlighted the areas of the programme theories that potentially need refinement so that the theories more accurately represent the contexts, mechanisms, or outcomes of programmes. We aimed to identify if respondents from programmes that used different greenspace settings responded to these survey statements in different ways. Previous research has reported different aspects of greenspace as being valuable for health. For example, greenspace with less air pollution, noise, and heat has been reported to be more beneficial for human health (Markevych et al., 2017). It is possible, therefore, that staff from programmes using rural spaces might see benefits faster due to higher quality greenspace in comparison to staff using urban spaces. Staff on urban programmes may therefore be more likely to agree with the statement 'change in service users' behaviour does not happen quickly on greenspace programmes'. Equally, staff from urban horticultural programmes might agree that with the statement 'service users find that changes in plants, trees, or the environment, can represent changes in their own lives', more than staff from rural programmes where clients work less directly with changing vegetation.

With this in mind, we explored whether there were significant differences in responses between respondents according to where their programmes are based (i.e. rural, urban, both). Our results showed that there was a significant difference in responses between urban programmes and rural programmes for the statement 'greenspace programmes are most effective in improving mental wellbeing when they were structured', with staff from rural programmes agreeing more with this statement than staff from urban programmes. This might be explained by rural programmes, such as wilderness or adventure programmes, needing to have more structure and planning due to higher potential risks and being longer in duration (Gabrielsen et al., 2018, 2019). There were no other significant differences in responses between groups meaning that staff from urban and rural programmes both agreed overall with the framework for how greenspace programmes work. This is an important finding since it supports our previous claim that the framework is applicable to all greenspace programmes and is transferable across urban-based projects, as well as rural-based projects (Masterton et al., 2020). This is in comparison to other models that only focus on one programme setting, such as Russell and Farnum's Wilderness Therapy Model (2004) and the Care Farm model (Hambridge, 2017). We acknowledge that there are statements that need to be explored further, for example, the additional contextual statements showed a wider range of responses in comparison to statements in the programme theories

themselves. We therefore advise a level of caution be applied when interpreting these initial results because, while greenspace setting did not appear to be linked to differences in responses, due to the heterogeneity of programmes, we were unable to categorise programmes more specifically. In future research, exploring other characteristics of programmes may allow us to identify nuances between programmes that do explain differences and help us to further refine the framework.

4.3. Transferability of the framework for problem substance use

Previous systematic reviews and meta-analyses have reported a strong association between mental health and substance use (Hunt et al., 2016; Kingston et al., 2017; Lai et al., 2015). Given the link between mental health and substance use, we were also interested in exploring the framework's transferability and whether the programme theories that explained why greenspace programmes were effective for people with poor mental health, also explained why programmes appear to be effective for supporting people with problem substance use. Our results showed that responses from organisations that support people with problem substance use were not significantly different to responses from organisations that did not support this client group. We therefore suggest that the framework may be applicable to both greenspace programmes specifically for mental health and greenspace programmes that support people with problem substance use. This is important since there is a small body of empirical research that shows beneficial outcomes on greenspace programmes for people with problem substance use (Combs et al., 2016; Harper et al., 2019; Lehmann et al., 2018). However, there is no existing framework, to our knowledge, that shows the components necessary for greenspace programmes to be successful with this client group thus making future development and implementation of programmes difficult.

4.4. Strengths, limitations, and future research

This exploratory study was a novel approach to test and operationalise our previously proposed realist framework (Masterton et al., 2020). We originally proposed that our framework was transferable to all greenspace programmes in all settings. The range of different greenspace programmes included in this study means that this contextual claim is now more convincing, as the range of programmes allowed us to analyse different greenspace programmes with a realist lens and identify similarities. A key strength of this study was that it allowed a focus on 'for whom' and 'why' greenspace programmes might be successful. The results not only showed a general consensus of the framework, they also enabled comparison between different groups to show that the framework could be appropriate for use on greenspace programmes that support people with problem substance use. These findings could subsequently inform development of an initial programme theory to take forward into a realist evaluation of greenspace programmes for substance use support.

Some limitations and the need for future work must also be acknowledged. Firstly, because the survey was distributed both by the researchers and within respondents' networks, it was not possible to identify how many people subsequently received the survey. We were therefore unable to calculate the overall survey response rate. However, as mentioned, our extensive search for organisations to recruit allowed an overview of the number of existing greenspace organisations in Scotland, therefore we believe that the response rate to be fairly high, since the included organisations represented a very high proportion of the organisations we identified through mapping. As with all surveys, we were reliant on respondents accurately reporting their answers and cannot guarantee that respondents will interpret the statements in the way we expect. One potential issue was that we did not explicitly ask how many people with problem substance use there were on the programmes. Therefore, although we know which organisations would be open to supporting this client group, we cannot be certain that

respondents were answering with active knowledge about what works or does not work for people with problem substance use. However, our mapping exercise means that we are confident that the programmes that reportedly support people with problem substance use, do actively support this client group.

Further research is needed to better explain apparent differences in responses between some of the survey statements. The survey tested what has already been proposed, and so was unable to identify any new contexts, mechanisms, or outcomes that may be relevant to the overall framework. Additionally, testing contexts, mechanisms, and outcomes separately has implications. Although the reason we did this was to explore individual aspects of the configuration, it could be argued that contexts are only relevant when linked to a specific mechanism and, when they are split, this could result in a loss of understanding about why a context is important. The premise of realist research is establishing causality between contexts, mechanisms, and outcomes, so future work is needed to test the components as full configurations in order to see how they work as programmes theories. Indeed, future qualitative work could enable a deeper exploration of the causality within programme theories, identification of new contexts, mechanisms, or outcomes, and allow unanswered questions to be addressed. It is also important to note that respondent agreement does not confirm that the contexts, mechanisms, and outcomes are ontologically 'real', only that they are agreed upon by this specific group of respondents. This limitation is inherent to all realist research and it is important to be clear that, while programme theories do allow predictions about why programmes work, they are potentially fallible (Pawson & Tilley, 1997). This is another reason why future work is imperative, so that the contexts, mechanisms, and outcomes continue to be tested and refined in order to provide further evidence for the proposed programme theories.

Another important point is that respondents may be basing their answers on generic greenspace programmes delivered by their organisation as a whole, rather than specific programmes. This may mean that nuances between programmes are not picked up, again this is something which should be explored in future work. For example, although we previously proposed that programme activity should not influence contexts, mechanisms, or outcomes, follow up work may look to explore if this is the case, or if there are differences between specific activity types, rather than across rural and urban programmes more generally. This was not possible in this project due to the heterogeneity of programmes thereby limiting our ability to categorise programmes other than urban, rural, or both. Due to heterogeneity, testing between activity type would likely require a large sample size in future work. Finally, the survey only represents one country, and while we suggest that results could translate to an international context, further testing of this claim must take place in future work. In particular, contexts within lower-income and middle-income countries will differ from high-income countries. For example, the health care infrastructure and differing cultural values and uses of greenspace may influence implementation and use across different countries. If the framework is indeed transferable internationally, further work needs to be undertaken to be explicit about whether this does in fact include all countries, or only high-income countries.

5. Conclusion

The mental health benefits of greenspace are widely acknowledged, however, there is still limited understanding of the mechanisms by which greenspace programmes are effective making future development and implementation difficult. We recently developed and published a novel framework for greenspace programmes for mental health (Masterton et al., 2020). We identified key programme theories comprising of contexts, mechanisms, and outcomes that showed what works, for whom, and in what circumstances. The current study tested our proposed framework using primary data from 64 staff of greenspace organisations in Scotland. We were able to identify what exists, where, and

with what focus, and our results supported the proposed realist framework. Given the link between mental health and substance use, we were also interested in exploring the framework's transferability for use on programmes for people with problem substance use. We were interested in exploring whether the programme theories for greenspace programmes for positive mental health, were applicable to programmes that support people with problem substance use. Our results showed that responses from organisations that supported people with problem substance use were not statistically different from organisations that did not support this client group. This shows that the framework has the potential to be applicable to both greenspace programmes for mental health and greenspace programmes for problem substance use support. This is a novel finding as, to our knowledge, there is currently no framework that aids understanding of the contexts, mechanisms, and outcomes necessary for greenspace programmes to be successful for people with problem substance use.

Acknowledgments

This work was supported by the Economic and Social Research Council. The authors would like to thank all programme staff who completed the survey.

Appendices. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.healthplace.2021.102669>.

Declarations of interest

None.

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Appendix 3: Letters of ethical approval from GUEP



Wendy Masterton
Faculty of Natural Sciences
University of Stirling
FK9 4LA

20 December 2019

General University Ethics Panel (GUEP)
University of Stirling
Stirling
FK9 4LA
Scotland UK

E: GUEP@stir.ac.uk

Dear Wendy

Re: Greenspace programmes for mental wellbeing across Scotland: A mapping of services to show what exists, where, for whom, and with what focus. – GUEP 799

Thank you for your very quick response and submission of minor amendments to the above project. These have now been approved by Chairs Action.

Please note that if any of your proposal changes, a further submission (amendment) to GUEP will be necessary.

Please ensure that your research complies with University of Stirling policy on storage of research data which is available at:

<https://www.stir.ac.uk/about/professional-services/information-services-and-library/current-students-and-staff/researchers/research-data/plan-and-design/our-policy/>

If you have not already done so, I would also strongly encourage you to complete the Research Integrity training which is available at: <https://canvas.stir.ac.uk/enroll/CJ43KW>

Please be aware that research approved by GUEP may be audited to ensure the research has proceeded in the manner approved. The selection of projects to audit will be done at random.

If you have any further queries, please do not hesitate to contact the Committee by email to guep@stir.ac.uk.

Yours sincerely,

Pp.

A handwritten signature in blue ink that reads 'Claire Exley'.

On behalf of GUEP
Professor Iain MacRury
Deputy Chair of GUEP

Wendy Masterton
Faculty of Natural Sciences/
Faculty of Social Sciences
University of Stirling
FK9 4LA

General University Ethics Panel (GUEP)
University of Stirling
Stirling
FK9 4LA
Scotland UK

E: GUEP@stir.ac.uk

21 August 2020

Dear Wendy

Re: Greenspace programmes for improving mental health and supporting reductions in problem substance use: a realist evaluation of what works, for whom, and in what circumstances. – GUEP (19 20) 959

Thank you for your submission of the above to the General University Ethics Panel.

The ethical approaches of this project have been approved by GUEP, however please see advisory notes below:

- Debrief sheet not necessary.
 - The 'PIS Wider stakeholders' form states the following:
'All research at the University of Stirling is reviewed by an independent group of people called a Research Ethics Committee which is there to protect your safety, rights, wellbeing and dignity. This study has been granted ethical approval by the General University Ethics Committee (GUEP).'
- It is important to note that it is the researcher who has the responsibility to protect the safety, rights, wellbeing and dignity of respondents.

Please ensure that your research complies with University of Stirling policy on storage of research data which is available at:

<https://www.stir.ac.uk/about/professional-services/information-services-and-library/current-students-and-staff/researchers/research-data/plan-and-design/our-policy/>

If you have not already done so, I would also strongly encourage you to complete the Research Integrity training which is available at: <https://canvas.stir.ac.uk/enroll/CJ43KW>

Please note that should any of your proposal change, a further submission (amendment) to GUEP will be necessary.

If you have any further queries, please do not hesitate to contact the Committee by email to guep@stir.ac.uk.

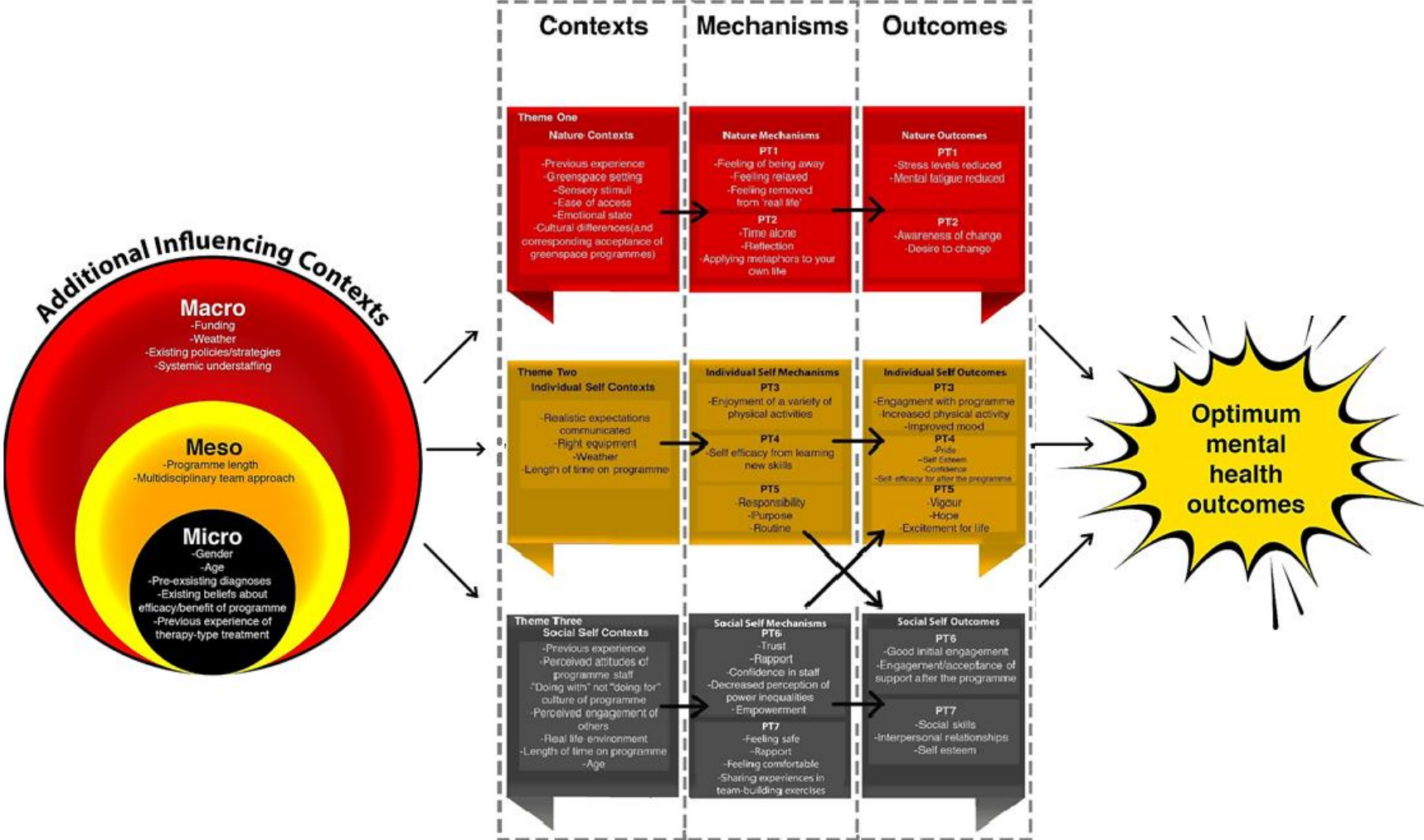
Yours sincerely,

Pp



On behalf of GUEP
Dr William Munro
Deputy Chair of GUEP

Appendix 4: Original overarching framework for greenspace programmes for mental health



Appendix 5: Stakeholder PIS for qualitative interviews *

Version 1.



Participant Information Sheet for wider stakeholders whose work is directly related to greenspace programmes for mental health and problem substance use

1. Title of the research

Greenspace programmes for improving mental health and supporting reductions in problem substance use: a realist evaluation of what works, for whom, and in what circumstances.

2. Background, aims of project

We would like to invite you to take part in this study by researchers at the University of Stirling. Before you decide whether you would like to participate or not, we would like to explain why this study is being conducted and what your involvement would entail. If you have any questions about the study, please ask a member of the research team (their details are at the end of the document).

With growing strain on mental health services, greenspace interventions/programmes could be a promising addition to current health and social care provisions. Despite there being a general agreement that greenspace interventions are beneficial for mental health, from current evidence it is not clear how greenspace interventions work and what mechanisms of change lead to the desired outcomes. Without knowing this, we are limited in our understanding of why the programmes work and therefore how best to replicate them.

We have recently proposed a framework for greenspace programmes for mental health, showing what works, for whom, and in what circumstances (see summary document). We have also suggested that this framework could be usable for greenspace programmes that support people with problem substance use. Our aim in this current study is to gain insight from greenspace programme staff and wider stakeholders about important aspects of greenspace programmes so that we can develop our framework further and explore how greenspace programmes can successfully be designed and implemented to support mental health and support reductions in problem substance use.

3. Why have I been invited to take part?

We want to get the views of people whose work is directly related to greenspace programmes that support mental health and support people with problem substance use but are not necessarily delivering programmes themselves. We are interested in finding out a bit more about your work, as well as finding out your opinion on what makes greenspace programmes successful for this client group. This study is part of a PhD research project being undertaken by Wendy Masterton, a postgraduate researcher at the University of Stirling. The research team also consists of Dr Tessa Parkes, Professor Kirsty Park, and Dr Hannah Carver, all also from the University of Stirling.

4. Do I have to take part?

Participation is voluntary, you do not have to participate if you do not want to. If you do decide to take part, you can withdraw your participation up to 48 hours after the interview, without needing to explain, and without any negative effect, by advising the researcher of this decision. We will then withdraw your interview data from the study. If you withdraw after 48 hours, then it will not be possible to withdraw your data. If you decide to take part, you will be given this information sheet to keep and be asked to sign a consent form.

5. What will happen if I take part?

Your participation will involve a telephone, MS Teams, or Zoom interview (whichever you prefer) conducted by a researcher which will last around 30-45 minutes. The interview will be conducted at a time most suitable for you. You will be asked questions about the components of greenspace programmes (see summary document), what makes programmes successful, or not, in your opinion, and what differences might be seen across different programmes. The interview will be audio-recorded, with your permission, to ensure that the information is accurately recorded, and then transcribed. The recordings and transcripts will only be accessible to select members of the research team and all data will be stored securely.

6. Are there any potential risks in taking part?

If you take part in an interview, you will be asked questions relating to mental health and problem substance use. None of these questions will be personal, however, you do not have to answer any questions you do not want to and if you would prefer not to continue the interview then it would be stopped.

7. Are there any benefits in taking part?

You will not necessarily directly benefit from taking part in the study, although some people enjoy the experience. You will be providing us with important information which could help inform future development and implementation of greenspace programmes for this client group.

8. What information will you collect about me?

We will collect some basic information about you, so that we know who the data belongs to (name and email address/phone numbers). We will record gender and age band (not exact age), but this will not be provided alongside any views and will be held separately from all interview transcripts. This is to show how diverse the group of people were that we spoke to in the research. We are only interested in your views about key components of greenspace programmes for mental health and problem substance use, so you do not need to share any personal details about yourself. All data will be anonymised and processed in accordance with the General Data Protection Regulation (GDPR). Under GDPR the legal basis for processing your personal data will be public interest/the official authority of the University.

9. What happens to the data I provide?

Only the research team will have access to your data apart from a transcriber who will type up the recording of the interview. She is external to the University of Stirling. She will also access the audio recordings from interviews, which may include some personal data and has signed a confidentiality agreement. The audio files from the interview will only be used to transcribe the interviews and will not be available to anyone else. The audio files will be deleted after they have been transcribed and the transcripts will be archived for 10 years after last use (which is normal practice). All data will be kept confidential and all identifiable information will be removed, to prevent participants being identified. We might use direct quotes in study outputs, but these will have names and other identifiable data removed. The research team will take great care to try to make sure that individuals are not be identifiable in any report or publication. However, it is important to be aware that sometimes an individual might recognise themselves when they read a quote or someone who knows them well might also recognise them.

Confidentiality will be adhered to, except in circumstances where a person is being harmed or abused. If you disclose information about yourself or another person being harmed or abused, the researcher will have to break confidentiality and inform the Study Lead, Wendy Masterton's, primary supervisor, Dr Tessa Parkes.

10. Will the research be published?

The research may be published in an academic journal upon completion. The University of Stirling is committed to making the outputs of research publicly accessible and supports this commitment through our online open access repository STORRE. Unless funder/publisher requirements prevent us, this research will be publicly disseminated through our open access repository. The research may also be presented at relevant conferences. If the research is not published, access to the study report will be made available via the research team if requested and we will provide study briefings to those who take part as a thank you for their involvement.

11. Who is organising and funding the research?

The Economic and Social Research Council (ESRC) is funding this research as part of the Study Lead, Wendy Masterton's, PhD project.

12. Who has reviewed this research project?

All research at the University of Stirling is reviewed by an independent group of people called a Research Ethics Committee which is there to protect your safety, rights, wellbeing and dignity. This study has been granted ethical approval by the General University Ethics Committee (GUEP), approval number: (19 20) 959

13. Your rights

You have the right to request to see a copy of the information we hold about you and to request corrections or deletions of the information that is no longer required. You have the right to withdraw from this project at any time without giving reasons and without consequences to you. You also have the right to object to us processing relevant personal data, however, please note that once the data are being analysed and/or results published it will not be possible to remove your data from the study.

14. Who do I contact if I have concerns about this study or I wish to complain?

If you would like to discuss the research with someone, or have any concerns about the study, please contact the Study Lead, Wendy Masterton, on wendy.masterton@stir.ac.uk; or Wendy's primary supervisor, Dr Tessa Parkes, on t.s.parkes@stir.ac.uk. If you wish to speak to someone independent of the study, you can do this by contacting Professor Alison Bowes (Dean of Faculty of Social Sciences, University of Stirling, on a.m.bowes@stir.ac.uk).

You have the right to lodge a complaint against the University regarding data protection issues with the Information Commissioner's Office (<https://ico.org.uk/concerns/>). The University's Data Protection Officer is Joanna Morrow, Deputy Secretary. If you have any questions relating to data protection these can be addressed to data.protection@stir.ac.uk in the first instance.

15. Who do I contact for more information about the study?

If you have any questions about the study or if you would like to participate, you can contact:

Study Lead

Wendy Masterton
wendy.masterton@stir.ac.uk

Primary supervisor

Dr Tessa Parkes
t.s.parkes@stir.ac.uk

Supervisor

Professor Kirsty Park
k.j.park@stir.ac.uk

Supervisor

Dr Hannah Carver
hannah.carver@stir.ac.uk

Appendix 6: Staff PIS for qualitative interviews *

Version 1.



Participant Information Sheet for staff working on greenspace programmes

1. Title of the research

Greenspace programmes for improving mental health and supporting reductions in problem substance use: a realist evaluation of what works, for whom, and in what circumstances.

2. Background, aims of project

We would like to invite you to take part in this study by researchers at the University of Stirling. Before you decide whether you would like to participate or not, we would like to explain why this study is being conducted and what your involvement would entail. If you have any questions about the study, please ask a member of the research team (their details are at the end of the document).

With growing strain on mental health services, greenspace interventions/programmes could be a promising addition to current health and social care provisions. Despite there being a general agreement that greenspace interventions are beneficial for mental health, from current evidence it is not clear how greenspace interventions work and what mechanisms of change lead to the desired outcomes. Without knowing this, we are limited in our understanding of why the programmes work and therefore how best to replicate them.

We have recently proposed a framework for greenspace programmes for mental health, showing what works, for whom, and in what circumstances (see summary document). We have also suggested that this framework could be usable for greenspace programmes that support people with problem substance use. Our aim in this current study is to gain insight from greenspace programme staff and wider stakeholders about important aspects of greenspace programmes so that we can develop our framework further and explore how greenspace programmes can successfully be designed and implemented to support mental health and support reductions in problem substance use.

3. Why have I been invited to take part?

We want to get the views of staff members working on greenspace programmes that support mental health and support people with problem substance use. We are interested in finding out a bit more about your organisation and what services it provides and for whom, as well as finding out your opinion on what makes greenspace programmes successful in improving mental health and supporting people with problem substance use. This study is part of a PhD research project being undertaken by Wendy Masterton, a postgraduate researcher at the University of Stirling. The research team also consists of Dr Tessa Parkes, Professor Kirsty Park, and Dr Hannah Carver, all also from the University of Stirling.

4. Do I have to take part?

Participation is voluntary, you do not have to participate if you do not want to. If you do decide to take part, you can withdraw your participation up to 48 hours after the interview, without needing to explain, and without any negative effect, by advising the researcher of this decision. We will then withdraw your interview data from the study. If you withdraw after 48 hours, then it will not be possible to withdraw your data. If you decide to take part, you will be given this information sheet to keep and be asked to sign a consent form.

5. What will happen if I take part?

Your participation will involve a telephone, MS Teams, or Zoom interview (whichever you prefer) conducted by a researcher which will last around 30-45 minutes. The interview will be conducted at a time most suitable for you. You will be asked questions about the components of greenspace programmes (see summary document), what makes programmes successful, or not, in your opinion, and what differences might be seen across different programmes. The interview will be audio-recorded, with your permission, to ensure that the information is accurately recorded, and then transcribed. The recordings and transcripts will only be accessible to the research team and all data will be stored securely.

6. Are there any potential risks in taking part?

If you take part in an interview, you will be asked questions relating to mental health and problem substance use. None of these questions will be personal, however, you do not have to answer any questions you do not want to and if you would prefer not to continue the interview then it would be stopped.

7. Are there any benefits in taking part?

You will not necessarily directly benefit from taking part in the study, although some people enjoy the experience. You will be providing us with important information which could help inform future development and implementation of greenspace programmes for this client group.

8. What information will you collect about me?

We will collect some basic information about you, so that we know who the data belongs to (name and email address/phone numbers). This will not be provided alongside any views and will be held separately from all interview transcripts. This is to show how diverse the group of people were that we spoke to in the research. We are only interested in your views about key components of greenspace programmes for mental health and problem substance use, so you do not need to share any personal details about yourself. All data will be anonymised and processed in accordance with the General Data Protection Regulation (GDPR). Under GDPR the legal basis for processing your personal data will be public interest/the official authority of the University.

9. What happens to the data I provide?

Only the research team will have access to your data apart from a transcriber who will type up the recording of the interview. She is external to the University of Stirling. She will access the audio recordings from interviews, which may include some personal data, and has signed a confidentiality agreement. The audio files from the interview will only be used to transcribe the interviews and will not be available to anyone else. The audio files will be deleted after they have been transcribed and the transcripts will be archived for 10 years after last use (which is normal practice). All data will be kept confidential and all identifiable information will be removed, to prevent participants being identified. We might use direct quotes in study outputs, but these will have names and other identifiable data removed. The research team will take great care to try to make sure that individuals are not identifiable in any report or publication. However, it is important to be aware that sometimes an individual might recognise themselves when they read a quote or someone who knows them well might also recognise them.

Confidentiality will be adhered to, except in circumstances where a person is being harmed or abused. If you disclose information about yourself or another person being harmed or abused, the researcher will have to break confidentiality and inform the Study Lead, Wendy Masterton's, primary supervisor, Dr Tessa Parkes. We would also have to inform your line manager.

10. Will the research be published?

The research may be published in an academic journal upon completion. The University of Stirling is committed to making the outputs of research publicly accessible and supports this commitment through our online open access repository STORRE. Unless funder/publisher requirements prevent us, this research will be publicly disseminated through our open access repository. The research may also be presented at relevant conferences. If the research is not published, access to the study report will be made available via the research team if requested and we will provide study briefings to those who take part as a thank you for their involvement.

11. Who is organising and funding the research?

The Economic and Social Research Council (ESRC) is funding this research as part of the Study Lead, Wendy Masterton's, PhD project.

12. Who has reviewed this research project?

This study has been granted ethical approval by the University of Stirling's General University Ethics Committee (GUEP), approval number: (19 20) 959.

13. Your rights

You have the right to request to see a copy of the information we hold about you and to request corrections or deletions of the information that is no longer required. You have the right to withdraw from this project at any time without giving reasons and without consequences to you.

Version 1.



You also have the right to object to us processing relevant personal data, however, please note that once the data are being analysed and/or results published it will not be possible to remove your data from the study.

14. Who do I contact if I have concerns about this study or I wish to complain?

If you would like to discuss the research with someone, or have any concerns about the study, please contact the Study Lead, Wendy Masterton, on wendy.masterton@stir.ac.uk; or Wendy's primary supervisor, Dr Tessa Parkes, on t.s.parkes@stir.ac.uk. If you wish to speak to someone independent of the study, you can do this by contacting Professor Alison Bowes (Dean of Faculty of Social Sciences, University of Stirling, on a.m.bowes@stir.ac.uk).

You have the right to lodge a complaint against the University regarding data protection issues with the Information Commissioner's Office (<https://ico.org.uk/concerns/>). The University's Data Protection Officer is Joanna Morrow, Deputy Secretary. If you have any questions relating to data protection these can be addressed to data.protection@stir.ac.uk in the first instance.

15. Who do I contact for more information about the study?

If you have any questions about the study or if you would like to participate, you can contact:

Study Lead

Wendy Masterton
wendy.masterton@stir.ac.uk

Primary supervisor

Dr Tessa Parkes
t.s.parkes@stir.ac.uk

Supervisor

Professor Kirsty Park
k.i.park@stir.ac.uk

Supervisor

Dr Hannah Carver
hannah.carver@stir.ac.uk

**The PIS was a PDF file sent to participants, therefore it appears in its PDF format in these appendices*

Appendix 7: Interview schedule for Phase Three

Black text = stage one and stage two interview questions

Blue text = refined and added questions in stage two only

1. Can you give me a brief overview of your role?

OUTCOMES

2. What do you consider to be the main desired outcomes/goals on greenspace programmes for mental health and PSU?

Probes

Do you think that desired outcomes/results are the same for all people on the programme?

In what ways are they different?

What differences are there in outcomes for gender/age/ethnicity/different MH diagnoses?

3. How do you measure mental health/substance use outcomes/results in your service?

Probes

Could they be measured any differently?

How do you think outcomes could best be measured on a new programme?

4. Some programmes offer wider support, and some are more targeted. As soon as it is labelled a 'mental health programme' or 'substance use support', it can become medicalised. How might the programme label have an effect?

Probes

Do you think programmes should specify intended outcomes?

Do you think there are challenges around that?

MECHANISMS

5. What are the most important aspects of the programme for mental health?

6. What are the most important aspects of the programme supporting people with PSU?

You have spoken about the outcomes of programmes, and I am really interested in how these outcomes are achieved. We have identified some mechanisms by which we believe programmes to be successful and so I was wondering if you could discuss your opinion on some of these. There is no right or wrong answer so feel free to disagree or expand on any section.

7. Do you think that greenspace programmes allow participants the feeling of getting away and the feeling of being removed from their everyday lives and stressors?

Probes

What kind of feelings do you think the green environment evokes in participants?

What do you think it is about the greenspace environment that is beneficial?

8. Do you believe the participants can use the greenspace as a space for reflection?

Probes

What are your thoughts on participants feeling that they are not closed in by four walls as in traditional mental health or substance use services?

9. Do you think that the programmes increase a connection to nature?

Probes

Do you think that the connection to nature influences participants?

Do you think it is harder for participants who have had no previous experience with being in nature to engage with programmes?

10. Physical activity is often part of greenspace programmes, but what needs to be in place for physical activity to happen and to be appealing to participants?

Probes

How important is it to have trained facilitators to lead sessions?

Do you think it is important to offer a range of activities?

Do you think there are barriers to physical activity? For example, weather, discomfort, physical challenges? How could they be addressed?

11. Do you think that the participants can learn both physical and psychological skills on the programme, and can you give examples? (e.g. self regulation, coping with challenges, social skills)

Probes

How are new skills helpful outside the programme in their own lives?

12. Feelings of responsibility and purpose appear to increase in many greenspace programmes, how do you think that carries into their lives outside the programme?

Probes

Do you think that the routine of the programmes is helpful?

13. What is it about relationships with facilitators that is important on greenspace programmes?

Probes

Participants may have had negative experiences before with healthcare providers or have experienced failures with safeguarding, and this can lead to challenges with trust. How best can that be addressed to encourage participants to take part?

How can programme facilitators actively reduce the power inequality and promote empowerment?

How can programme facilitators best support people at the end of the programme?

14. How do greenspace programmes allow increases in social skills and reduced isolation?

Probes

Do you think that greenspace programmes can help reduce stigma within the group, and how?

How do you think other group members can influence engagement? How can this be managed?

Do you think there should be a range of ages and expertise within a group?

CONTEXTS

15. We've seen that greenspace programmes work differently in different places. What is it about the way one organisation works compared to another organisations that makes a difference to implementation?

Probes

Location, funding, size of group, staffing, client groups, quantity or quality of greenspace

16. In your opinion, what is a 'quality' greenspace, what aspects do you think are crucial within a space to promote or encourage use?

Probes

What facilities e.g. toilets are needed?

What about lighting, seating areas, level paths?

Do you think people prefer biodiverse green spaces?

17. Could you talk about how you think the existing view of greenspace programmes by primary care professionals impacts the success of programmes?

Probes

Do you think those in primary care accept greenspace programmes as effective for health care?

Do you think it is easy to convince stakeholders of their worth?

How can stakeholders be convinced to buy-in?

Does that affect funding?

How could programmes be better promoted?

18. What are the other challenges or barriers in the success of the programme?

Probes

Are programmes successful for everyone? Are there limitations?

Have you seen any challenges with access to programmes, is accessibility and/or transport an issue?

19. If you could change something about a programme to make it work more effectively, what would you change and why?

20. How has Covid-19 affected greenspace programmes?

FINAL QUESTION

21. What else do you think we need to know, to really understand how this programme has worked here?

Appendix 8: Consent form for Phase Three

GUEP Approval Number: (19 20) 959

Participant number []

Research Project Title: Greenspace programmes for improving mental health and supporting reductions in problem substance use: a realist evaluation of what works, for whom, and in what circumstances.

<p>Please put your initials in each box to confirm that you agree to each statement. For questions that are optional please leave the box blank.</p>	
<p>I confirm that I have read and understood the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.</p>	
<p>I understand that my participation is voluntary and that I am free to withdraw at any time during interview and withdraw my data within 48 hours of it without giving a reason, and without any penalty. I understand that beyond 48 hours it will not be possible to remove my data from the study.</p>	
<p>I understand that while all information will be kept confidential, the researcher will break confidentiality if they feel that myself or another person is being harmed or at risk of being harmed.</p>	
<p>I understand that my data will be pseudoanonymised, and I give permission for members of the research team to have access to my pseudoanonymised responses.</p> <p><i>(Pseudoanonymised means that we will remove any identifiable information from the transcript, such as names, locations and services but you could still be identified from the stories you tell).</i></p>	
<p>I consent to being audio recorded if giving an interview <i>(this is optional – if you do not wish to be audio-recorded, notes will be taken instead).</i></p>	
<p>I understand how the audio recordings will be used in research outputs. I am aware that I will not be named in any research outputs, but I could be identified by myself or by people I know well through the stories I tell.</p>	
<p>I give permission to be quoted directly in the research publication and understand that all identifiable information will be removed from these quotes, and my real name will not be used. I understand that I could still be identified by myself or by people I know well <i>(this is optional – if you do not wish for your quotes to be used, please let the researcher know and we will ensure that no quotes are used).</i></p>	
<p>I agree to take part in this study.</p>	

Name of Participant

Signature:

Date:

Name of Researcher

Signature:

Date:

Appendix 9: Survey distributed to participants

Section A: Organisation information

In this section of the survey, you will be asked questions about your organisation. This will allow the research team to understand who your organisation is and where it located.

1. Name of organisation

2. Type of organisation
 - Public Sector
 - Private Sector
 - Third Sector
 - Not sure

3. What is the name of the town/city your organisation is based in?

Section B: Greenspace programme information

Please think about the programme that you are involved with which uses greenspace. If you are involved with more than one greenspace programme, please answer these questions thinking about the greenspace programme that you are involved with most regularly.

1. What is the name of the programme?

2. Does the programme aim to improve the mental wellbeing of participants?
 - Yes
 - No
 - Not sure

3. Does the programme provide support for those with problem alcohol use?
 - Yes
 - No
 - Not sure

4. Does the programme provide support for those with problem illicit drug use?
 - Yes
 - No
 - Not sure
5. What age groups can access this programme?
6. Are there any exclusion criteria for service users on the programme?

The next four questions relate to the greenspace that your organisation uses. We are interested in understanding different types of greenspace that are used across programmes. If you use more than one area of greenspace, please answer these questions about the area that you use most regularly.

7. Is the greenspace you use:
 - Privately owned
 - Public
 - Not sure
8. How would you most accurately describe the greenspace you use?
 - Rural wood
 - Rural forest
 - Rural hills or mountains
 - Rural open space
 - Urban woodland
 - Urban hill
 - Public park
 - Private park
 - Public gardens
 - Private gardens
 - Farm
 - Allotment
 - Other (please specify)
 - Not sure
9. Size of greenspace (for information, a UK football pitch is around 2 acres)
 - < 0.5 acres
 - 1-1.5 acres
 - 2-4 acres
 - 5+ acres
 - Not sure

10. Distance (in km) from nearest urban area (town or city)

- It is in an urban area
- 1-5km
- 6-10km
- 11-20km
- 21+ km
- Not sure

Section C: Programme components

In this section of the survey, you will be shown 54 brief statements about greenspace programmes. Please indicate if you agree or disagree with the statements when thinking about the greenspace programme you are involved with. There is no right or wrong answer.

1. Greenspace programmes provide a more spacious environment than other therapy programmes which are typically run indoors

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

2. Service users who have had previous experience in indoor health services often prefer outdoor greenspace programmes because they feel less enclosed

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

3. The greenspace environment provides a sensory experience

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

4. Greenspace provides a calming effect on service users

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

5. Being in greenspace allows service users to feel removed from their daily stressors

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

6. Service users report that they feel mentally refreshed after working in greenspace

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

7. Service users report that they feel less stressed when working in greenspace

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

8. Change in service users' behaviour etc does not happen quickly on greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

9. The longer service users participate in greenspace programmes, the more they benefit from them

- Strongly Disagree

- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

10. Therapeutic conversations seem easier in greenspace than in other environments

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

11. Time alone in greenspace allows a service user time to reflect on their lives

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

12. Service users find that changes in plants, trees, or the environment, can represent changes in their own lives

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

13. The physical space on greenspace programmes allows service users space to reflect on the need for change in their lives

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

14. By the end of greenspace programmes, service users tend to have a desire to change their behaviours and/or coping strategies in life outside the programme

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree

- Strongly agree

15. It is essential to have experienced facilitators leading activities in greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

16. Greenspace programmes need secure funding in order to provide a range of activities

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

17. It is important to inform service users of anticipated physical challenges as this makes it easier for them to cope with these challenges when they appear

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

18. A variety of activities increases the likelihood of service users engaging with a programme

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

19. Service users report feelings of accomplishment after a physically demanding activity

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

20. If a service user enjoys the activity, this will lead to increased uptake of the activity

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

21. Increased physical activity on the programmes leads to improvements in mood of service users

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

22. Experienced facilitators are important for service users to learn new skills

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

23. Working in greenspace requires service users to overcome challenges at times

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

24. Service users learn both practical *and* psychological skills such as goal setting, coping with challenges, and self-regulation of emotion

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

25. Learning new skills allows service users to feel empowered

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree

- Strongly agree

26. Learning new skills allows service users to feel more confident about themselves

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

27. Skills learnt on greenspace programmes are transferable to service users' lives outside of the programme

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

28. Learning new skills allows service users to feel more confident in overcoming challenging circumstances after the programme ends

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

29. The longer a participant spends engaged in a programme, the more skills they can learn

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

30. Greenspace programmes are most effective in improving mental wellbeing when they are structured

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

31. Service users can find the routine on the programmes helpful for their mental wellbeing

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

32. Activities on greenspace programmes gives the service user feelings of responsibility

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

33. Service users feel valued on greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

34. Service users feel a sense of purpose on greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

35. Service users report increases in their excitement for life, after taking part in greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

36. Previous experiences with healthcare professionals can influence how a service user responds to programme staff

- Strongly Disagree

- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

37. Service users often report that they have difficulty in building relationships

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

38. Non-judgemental, positive attitudes from staff are important in order to initially engage service users

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

39. If a service user has previous negative experience of other health services, it is helpful for them to be met by a named, confident member of staff prior to the programme starting

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

40. It is important to give service users choice in how they take part in the programme, as this can empower them

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

41. By taking part in greenspace activities themselves, programme staff can reduce inequalities in power between staff and service users

- Strongly Disagree
- Disagree
- Neither agree nor disagree

- Agree
- Strongly agree

42. High levels of trust and rapport between staff and service users increases the likelihood of service users accepting support after the programme

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

43. Service users are more likely to engage with the programme if they see others engaging with it

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

44. Service users can take a long time to build relationships with other service users

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

45. The shared environment on a greenspace programme feels more natural than group therapy typically undertaken indoors

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

46. Service users find a sense of belonging with peers on greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

47. Service users feel like there is less judgement with peers when on greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

48. Greenspace programmes allow service users to have shared experiences

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

49. Greenspace programmes allow increases in social skills

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

50. Small groups are preferred by service users over larger groups

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

51. Greenspace is still seen as 'alternative' and this can limit service user engagement

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

52. There are gender differences in how service users benefit from greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree

- Agree
- Strongly agree

53. There are age differences in how service users benefit from greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

54. There are cultural differences in how service users benefit from greenspace programmes

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree