Getting Ireland Walking: using systems approaches to strengthen local and national walking promotion in Ireland

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Thesis submitted to the South East Technological University in fulfilment of the requirements for the award of Doctor of Philosophy

May 2023

Declaration

I declare that the work in this PhD thesis is my own work, completed under the supervision of Prof Niamh Murphy (Department of Sport and Exercise Science, South East Technological University) and Dr Barry Lambe (Department of Sport and Exercise Science, South East Technological University). This work has not been submitted for any academic award at this, or any other, third level institution.

Signed:

Date: 09/05/2023

Acknowledgements

Thanks to Prof Niamh Murphy and Dr Barry Lambe for their time, patience, and support in hard times as supervisors. I've learned a lot from you both, and I'm grateful for the opportunities you have given me and to have had the chance to work with you on this project. Particular thanks to Barry for giving me the grá for this area of research in the first place. I wouldn't have gone down this road if it wasn't for the passion and enthusiasm you bring to your teaching which sparked my interest in this area at undergrad. Thank you.

This project wouldn't have been possible without the support of Get Ireland Walking over the last 4 years. Special thanks to Jason King for believing in and backing the research from Day 1, and to Alison Chambers in the Cork Sports Partnership for all the hard work and support with the Get Cork Walking project. I've enjoyed every minute of working with Get Ireland Walking, and I hope they are in better stead now because of this work.

Thanks to all the staff and postgrads in SETU for the support over the years, Aisling for the extended coffee breaks in the early years of the PhD, and Marie from the SETU Library for the friendly chats every morning and the "ah you're nearly there boy"-s when I was having a whinge.

"No like, what are you at?". Thanks, Kim, for asking that question. I might never have went back studying if it wasn't for it.

Thanks to my friends for the jeering which helped keep everything in perspective over the last few years. I'm going to take it that was your way of showing support.

To my father, Vinny. You've always nudged me to keep studying and I'm grateful for it. Thanks for all the support and encouragement.

To my brothers Paddy, Jack, and Reece. Ye always managed to give me a laugh when I needed it throughout this whole thing. I'm so proud to be your big brother and I love the three of ye to bits.

Ar deireadh, a Sara. Chabhraigh do neamhleithleachas, d'fhoighne, agus do thacaíocht neamhchoinníollach go mór liom ar an mbóthar seo. Bhí do chluasa agus do lámha oscailte ann dom i gcónaí nuair a theataigh said uaim agus threoraigh tú mé tríd. D'íobair tú an t-uafás chun an deis a thabhairt dom an obair seo a chur i gcrích, agus ní féidir liom buíochas a ghabháil leat i ndóthain. Tá an obair seo are fad déanta agam ar do shon.

Funding

Abstract

Physical inactivity levels remain high relative to research effort and output. An oversimplification of the approaches taken to address the complex problem of physical inactivity has been suggested to play a part in this discrepancy. To this end, multidisciplinary approaches equipped with tools and methods underpinned by systems thinking, or systems approaches, have been called for in physical activity research and practice. However, more evidence is needed which highlights the utility (or lack thereof) of systems approaches for organisations working in real-world physical activity systems. This thesis contributes new knowledge to the field of physical activity research, by highlighting real-world examples of how systems approaches were used to augment the work of Ireland's national walking promotion organisation.

In four research studies, this thesis presents how systems approaches were used to understand and enhance the work of Ireland's national walking promotion organisation, Get Ireland Walking. In Chapter 3, a conceptual mapping exercise which investigates the multifaceted contributions of the work of Get Ireland Walking to national and global targets is presented. In Chapter 4, an evaluation of the multidisciplinary partnership network of Get Ireland Walking using a cross-sectional questionnaire and social network analysis methods is presented. Chapter 5 outlines how developing a systems map for walking was used to initiate a systems approach to walking in one local area in Ireland. Finally, in Chapter 6, a list of potential data sources and indicators which could be used to monitor the multifaceted impacts of a systems approach to walking in Ireland is presented. A case study of the use of a selection of identified data sources to describe walking behaviour is presented as part of this chapter. Accompanying each research study is a reflective account from the author, who was an embedded researcher within Get Ireland Walking throughout the course of this work.

For the intended purposes of this work, the application of systems approaches proved useful for the work of Get Ireland Walking. The work of this PhD thesis provides insight into the nexus of policies and organisations which are part of the walking system in Ireland. The work of this thesis also has led to a restructuring of the framework used to guide the work of Get Ireland Walking at local and national level, to one which places a systems approach at its core. Furthermore, an example of how systems approaches can be leveraged to initiate cross-sectoral collaboration for local level walking systems is also provided. However, systems approaches may not be a panacea to all problems in the field of physical activity promotion and research. They must be accompanied by regular adaptation to context, flexibility in research designs and funding mechanisms, and supported by human and financial resources.

Table of contents

List of tables

List of figures

List of abbreviations

ACWP – Active Community Walking Programmes

AI – Artificial Intelligence

ASAPa – Australian Systems Map for Physical Activity

CAPPA – Comprehensive Analysis of Policy on Physical Activity

COVID-19 – Coronavirus-2019

GAPPA – Global Action Plan on Physical Activity 2018-2030

GCMR – Google Community Mobility Reports

GIW – Get Ireland Walking

GIWSAP – Get Ireland Walking Strategy and Action Plan 2017-2020

GRSR – Google Relative Search Rate

GT – Google Trends

HEPA-PAT – Health Enhancing Physical Activity Policy Audit Tool

HSE – Health Service Executive

IPAQ – International Physical Activity Questionnaire

ISPAH – International Society for Physical Activity and Health

LA – Local Authority

LCDC – Local Community Development Committee

LSP – Local Sports Partnership

ML – Machine Learning

NSO – National Strategic Outcome

PA – Physical Activity

SDG – Sustainable Development Goals

SETU – South East Technological University

SNA – Social Network Analysis

TA – Thematic Analysis

UN – United Nations

WHO – World Health Organisation

WIT – Waterford Institute of Technology

WPO – Walking Promotion Officer

List of appendices

List of research outputs

Peer-reviewed Publications

- **Power, D. D**., Lambe, B. M., & Murphy, N. M. (2022). Using systems science methods to enhance the work of national and local walking partnerships: practical insights from Ireland. *European Journal of Public Health*. doi: https://doi.org/10.1093/eurpub/ckac076

- **Power, D**., Lambe, B., & Murphy, N. (2023). A critical analysis of walking policy in Ireland and its contribution to international development goals. *Frontiers in Sports and Active Living*. doi: https://doi.org/10.3389/fspor.2023.1125636

- **Power, D**., Lambe, B., & Murphy, N. (2023). Trends in recreational walking trail usage in Ireland during the COVID-19 pandemic: implications for practice. *Journal of Outdoor Recreation and Tourism*. doi: https://doi.org/10.1016/j.jort.2021.100477

Conference Presentations

- **Power, D**., Chambers, A., King, J. The Get Cork Walking project: National, local, and research perspectives. Walk21 Satellite Event, Cork. September 2022.

- **Power, D.,** Lambe, B., Murphy, N. The first steps in understanding local and national level walking systems in Ireland. Walk21 Dublin. September 2022.

- **Power, D.,** Lambe, B., Murphy, N. Footfall trends on Irish trails before and during the COVID-19 Pandemic. HEPA Europe, Nice. August 2022.

- **Power, D.,** Lambe, B., Murphy, N. Trail visits in Ireland during the COVID-19 pandemic: Using multiple data sources to describe trends. ISPAH 2021. October 2021.

- **Power, D.,** Lambe, B., Murphy, N. Using a systems map to identify leverage points within a walking system: a county level example in Ireland. Waterford Institute of Technology Postgraduate Conference. Poster presentation. January 2021

- **Power, D.,** Lambe, B., Murphy, N. The process of developing a systems map for walking in Cork, Ireland. Australian Walking and Cycling Conference. Oral presentation. October 2020

Print media and other outputs

- *Get Ireland Walking! through a systems approach.* Published by the International Society for Physical Activity and Health (January 2023). https://ispah.org/get-ireland-walking-through-a-systems-approach/.

- *A pedestrian-friendly Cork would be in everyone's interests.* Retrieved from The Irish Examiner: https://www.irishexaminer.com/opinion/columnists/arid-40855355.html (Mention of research in Irish Examiner).

- *Ireland in a slump with staying active during Covid.* Retrieved from The Times: https://www.thetimes.co.uk/article/ireland-in-a-slump-with-staying-active-during-covid-kdvm9t2t0 (Mention of research in The Times UK).

- Host of Get Ireland Walking Podcast (2021).

- Get Ireland Walking. (2019). Walk Leader Toolkit. Dublin: Sport Ireland. (Commissioned research project).

Chapter 1: Introduction

This PhD is presented as a series of chapters, four of which (Chapter 3, 4, 5 & 6) are research studies. Three academic journal articles resulting from the work of this thesis are also presented. This introductory chapter provides an overview of the core topics relating to this thesis, the aims and objectives of the research, and contextual information relating to the work.

1.1 – The value of physical activity and walking

It is well established that physical activity (PA) is associated with a wide range of health (Lear et al., 2017; Singh, Pattisapu and Emery, 2020; Pascoe et al., 2020) economic (Hafner et al., 2020; Costa Santos et al., 2023), and climate benefits (Bernard et al., 2021). Globally, physical inactivity levels remain high as data suggest one in four people do not meet the World Health Organisation's recommendations for physical activity (Guthold et al., 2018). The burdens of physical inactivity are also multifaceted and extend beyond increased risk of disease (Katzmarzyk et al., 2022). For example, physical inactivity places a significant economic burden on countries globally (Ding et al., 2017). The cost of global physical inactivity is estimated to be $520bn between 2020 and 2030, and it is proposed that investment in a combination of upstream and downstream interventions to promote population levels of PA can help mitigate these costs (Costa Santos et al., 2023). Walking is a form of PA which can be undertaken for a number of purposes, including for transport or for recreation, and has been described as a gateway to more strenuous forms of PA for the most inactive (Stamatakis et al., 2018).

The physical and mental health benefits of walking are considerable and well established (Murphy et al., 2007; Kelly, Murphy and Mutrie, 2017; Kelly et al., 2018; Oja et al., 2018). However, walking has also been shown to have positive impacts on congestion in urban areas (Riggs and Steiner, 2017), the environment (Pooley et al., 2012), and the economy (Litman, 2017). To this end, it has been suggested that increased investment in walking can hold the potential to improve planetary and public health (Bull and Hardman, 2018; International Society for Physical Activity and Health, 2020). Walking as a concept is multifaceted and it is a topic of study in multiple academic disciplines including public health (Bull and

Hardman, 2018), anthropology (Peelen and Jansen, 2007; Kanellopoulou, 2017), visual arts (Pink, 2008; Edensor, 2010; Springgay and Truman, 2017) and planning (Koohsari et al., 2013). However, the full breadth of the potential societal impacts of walking have been relatively unexplored. An in-depth analysis of the wider societal impacts of increasing population levels of walking, and the work of Ireland's national walking promotion organisation, are presented in Chapter 3.

1.2 – Walking promotion and walking prevalence in Ireland

In Ireland there are over 900 registered recreational walking trails of varying terrains and distances (Sport Ireland, 2022), and a growing network of purpose built traffic free trails for cyclists and pedestrians, known as Greenways. Furthermore, walking has received significant political backing at national level in Ireland, with the government of Ireland committing €360m per annum towards creating more walkable urban areas (Government of Ireland, 2020). Recent data suggest that recreational walking is the most popular form of PA in Ireland, with almost three quarters (74%) of the population reporting that they walk at least once per week for recreation (Sport Ireland, 2021). Similar findings can be found in work published by the European Commission (2022), with data suggesting that 63% of survey respondents reported walking for at least ten minutes on 4-7 days of the week. Furthermore, walking has remained the most popular form of PA over time, even throughout the Coronavirus-2019 (COVID-19) pandemic (Sport Ireland, 2021). Data from the transport sector suggest that walking for transport in Ireland is less prevalent, with just 15% of purpose oriented journeys (i.e., for shopping or for work) in Ireland taken on foot (Department of Transport, 2020).

Organisations from multiple sectors play a role in the promotion and development of walking in Ireland. There is, however, a disjointed approach across sectors to promote walking which has led to a phenomenon whereby walking is the business of many but the responsibility of none. Get Ireland Walking (GIW), an initiative of Sport Ireland which is hosted by Mountaineering Ireland, aims to develop a vibrant culture of walking in Ireland. Following its establishment in 2013, much of Get Ireland Walking's work focused on the implementation of community based walking programmes. The early work of GIW was guided by a strategic plan, the Get Ireland

Walking Strategy and Action Plan 2017-2020 (GIWSAP) (Get Ireland Walking, 2017). Today, GIW aims to act as a catalyst to engage organisations from heterogenous sectors who have a role in the promotion and development of walking in Ireland. In 2019, GIW co-funded a PhD studentship at South East Technological University (SETU) to conduct the work presented in this thesis. The co-fund arrangement also offered the researcher the opportunity to work as an embedded practitioner and researcher within the organisation. A more detailed description of Get Ireland Walking's activities, partners, and history will be discussed in Chapter 2. A mixed methods evaluation of the national multidisciplinary organisational network of GIW is presented in Chapter 4.

1.3 – Overview of systems approaches

In the early 20th century, limitations with the traditional approach to scientific inquiry (which focuses on reducing the phenomenon under study to separate parts and analysing how they function) were highlighted (von Bertalanffy, 1972; Capra and Luis, 2014; Gates et al., 2021; Castellani and Gerrits, 2023). Systems thinking and complexity science were offered as a set of methodological and theoretical tools to assist with working with the complexity of problems under investigation in scientific fields such as mathematics, physics, ecology and leadership (Richardson, Cilliers and Lissack, 2001; Turner and Baker, 2019; Castellani and Gerrits, 2023). Hieronymi (2013) describes a system as a series of interconnected elements that achieve a purpose, and researchers in public health have begun to adopt systems thinking as a way of framing public health problems which accounts for their inherent complex and non-linear nature. Many societal problems such as physical inactivity, obesity, climate change, and more recently COVID-19, have been labelled as widespread complex problems which are the result of a multitude of interrelated and interconnected factors (Swinburn et al., 2011; Rutter et al., 2017; Bradley et al., 2020). For example, the issue of physical inactivity can be conceptualised as a system made up of interrelated elements such as individuals, organisations, policies, demographic factors, and environmental factors, all of which contribute to low levels of PA. More importantly, systems thinking, as it applies to PA promotion, acknowledges that implementing interventions in only one area of the system – such

as community based walking programmes – is not sufficient to create sustainable changes in behaviour.

Complex public health problems require multicomponent and multidisciplinary solutions, contrary to linear approaches which have been applied to date in public health (Egan and McGill, 2021). It has been noted that much of the current PA evidence base is made up of studies seeking to discover a 'silver bullet' for population PA promotion (Woltering et al., 2019; Koorts et al., 2022). To this end, much of the PA research conducted to date is guided by reductionism which aims to reduce phenomena to discrete controllable parts. However, it is suggested that PA is a complex phenomenon, which is influenced by a multitude of interrelated factors which cannot be studied in isolation (Rutter et al., 2019). Systems thinking has been suggested to facilitate researchers in approaching problems in public health holistically and move beyond reductionist viewpoints (McGill et al., 2020). Intervening across all areas of the PA system – from individual level interventions to policy and environmental interventions – is imperative to achieving global PA targets (World Health Organisation, 2018; Rutter et al., 2019). Thus, the application of systems thinking in PA research (and public health more broadly) is becoming more commonplace (Nobles et al., 2021; Clifford Astbury et al., 2021). Chapter 5 presents the process of using systems mapping – a tool commonly used in systems approaches to PA (Nau et al., 2022) – to facilitate a systems approach to walking at local level in Ireland.

1.4 – Knowledge gaps in existing evidence

The evidence base pertaining to the application of systems thinking in PA is growing, yet there remains a paucity of evidence highlighting the real-world benefit of such approaches (Nau et al., 2022). Currently, there are no examples of the application of systems approaches to specific forms of PA, such as walking or cycling. The potential benefits of systems approaches to help facilitate action across all areas of systems in public health have been described elsewhere (Luke and Stamatakis, 2012), however much of the work pertaining to the application of systems thinking in public health remains largely theoretical (Chugtai and Blanchet, 2017). There has also been a recent call for evidence which outlines how systems

approaches can be of practical value in real world contexts (Nau et al., 2022). The public and planetary health benefits of increased population levels of walking have been established (Bull and Hardman, 2018; Stamatakis, Hamer, and Murphy, 2018) and investing in walking (and cycling) has been suggested as one the International Society for Physical Activity and Health's '8 Best Investments for Physical Activity' (International Society of Physical Activity and Health, 2020). Although recent increases in walking levels in Ireland have been documented (Sport Ireland, 2021; European Commission, 2022), the lack of a concrete sectoral or disciplinary hub for walking in Ireland has led to an incoherent approach to further promoting and developing walking. This presents an opportunity to contribute to a growing literature at the intersection between systems thinking and PA, by investigating the extent to which the application of methods such as systems framing, systems mapping, social network analysis (SNA), and innovative data monitoring practices, can provide practical benefit to a real-world walking promotion organisation in Ireland.

1.5 – Aim and objectives of the research

1.5.1 – Context for thesis aims and objectives

Historically, GIW to date has operated with an annual budget of approximately €300,000 and has a few staff members. Between the period of 2013 and 2017, GIW fluctuated between two and three staff members (programme manager and national development officers) and for a period of 18 months during the implementation of the GIWSAP, the programmes manager was the only member of staff. In 2019, Get Ireland Walking and Waterford Institute of Technology (WIT) (now SETU) co-funded a PhD researcher. Two other roles were created within GIW in 2019, a full-time communications officer/administrator, and a part time Walking Promotion Officer (WPO) in Cork. During the initial stages of the PhD studentship, GIW began to move their focus beyond community based programming and aimed to act as a catalyst organisation to engage all actors who have a role in the promotion of walking in Ireland. Moreover, during the initial months of the PhD studentship, the steering committee of GIW suggested the future strategic direction of the organisation should be focused on understanding the complex nature of walking

promotion at local and national level in Ireland. Particularly, they were interested in understanding the policies which governed walking in Ireland; the organisations who play a role in the promotion and development of walking in Ireland; how multidisciplinary organisations could be engaged to work in unison; and, what forms of data are available pertaining to walking in Ireland. Get Ireland Walking, and by extension this PhD thesis, define walking to include both walking for recreation and transport.

1.5.2 – Aim

The aim of this thesis is to investigate the utility of systems approaches to understand and strengthen walking promotion at local and national level in Ireland.

1.5.3 – Objectives

The research objectives (divided across four research studies) to achieve this aim are:

Study 1: Applying a systems lens to walking policy in Ireland
- Conduct a content analysis of national and local level walking policies in Ireland.
- Assess the contribution of walking policy in Ireland to the attainment of national and international development goals.

Study 2: A partnership evaluation and social network analysis of walking promotion partnerships in Ireland
- Evaluate the perceptions of the Get Ireland Walking partners on leadership, governance, resource allocation, collaboration, and their overall experiences of the partnership.
- Conduct a social network analysis of the communication network between the partner organisations of Get Ireland Walking.
- Investigate the key organisations involved in local level walking promotion systems.

Study 3: Using systems mapping to facilitate a systems approach to walking at local level in Ireland

- Create a systems map for walking in Cork, Ireland, and categorise outcomes according to the strategic objectives of the Global Action Plan on Physical Activity 2018-2030.
- Understand stakeholders' perceived facilitators to local level systems approaches to walking.
- Monitor the ongoing processes following the development of a systems map for walking in Cork, Ireland.

Study 4: A critical assessment of data sources to monitor and evaluate a systems approach to walking in Ireland

- Develop a list of appropriate indicators which could be used to monitor a systems approach to walking in Ireland.
- Demonstrate the utility of combining publicly available data sources to describe walking in Ireland.

1.6 – Structure of the thesis

1.6.1 – Theoretical and conceptual framework

The real-world nature of this project would be limited by narrowing the methodological choices to the quantitative-qualitative dichotomy. A project of this nature benefits from what Yanchar and Williams (2006) describe as 'methodological eclecticism'. Therefore, methodological pluralism, a strategy which employs multiple methodologies, is the overall methodological approach employed in this thesis. The work conducted as part of this thesis is informed by principles of systems thinking, specifically the concept of systems being made up of interrelated components which achieve a purpose (Hieryonmi, 2013). However, the entirety of the work was not reliant on any single theory or model. An in-depth description of each of the methods used is described in each chapter.

The research design was adapted over the course of the PhD. This was due to the real-world nature of PA research, the multiple methodological approaches used, the

embedded role of the researcher within GIW, and the subsequent crisis of the COVID-19 pandemic. Therefore, the entirety of the work sits within a pragmatist paradigm. Boundaries are applied to the study of systems to determine what is in (and out) of systems under study (Baugh Littlejohns, 2023). It is important to note that boundaries can be open to interpretation (Wistow et al., 2015). Therefore, the boundaries placed on the systems under study in this PhD thesis were the result of decisions made by the research team at SETU, the programmes manager of Get Ireland Walking, and the methodological tools/frameworks used in each study. These will be discussed in each respective chapter. Figure 1.1 depicts a schematic of the four research studies included in this thesis on a continuum ranging from the conceptual to the practical application of systems approaches in local and national walking systems in Ireland. It should be noted that the processes involved in many studies overlap and they were not conducted in chronological order.

Study 1:
Applying a systems lens to walking policy in Ireland

Study 2:
A partnership evaluation and social network analysis of walking promotion partnerships in Ireland

Study 3:
Using systems mapping to facilitate a systems approach to walking at local level in Ireland

Study 4:
A critical assessment of data sources to monitor and evaluate a systems approach to walking in Ireland

Applying a systems lens

Applying systems approaches in practice

Figure 1.1 – Schematic of studies.

1.6.2 - Overview of chapters

Chapter 2 situates the thesis in context by providing a critical discussion of the literature pertaining to the topics relating to the thesis.

Chapter 3 is the first research study presented as part of this thesis. The aim of this study was to apply a systems lens to walking and the work of Get Ireland Walking to

understand their potential broader societal impacts. The work of this chapter is presented as an academic journal article titled "A critical analysis of walking policy in Ireland and its contribution to both national and international development goals" published in *Frontiers in Sports and Active Living* (Power, Lambe and Murphy, 2023). The paper describes the analysis of policies relevant to the walking system in Ireland and their alignment with national strategic outcomes and the United Nations' Sustainable Development Goals. The findings of this paper were used to inform the process of developing a systems-oriented national and local walking strategies for GIW.

Chapter 4 presents a mixed methods evaluation of the partnership network of the lead agency for walking promotion in Ireland, GIW. The organisational network was evaluated over two years using a questionnaire investigating various domains of partnership work. Furthermore, social network analysis was used to investigate the dynamic nature of communication between partners. Phone calls with local level stakeholders were also conducted to understand who the influential organisations in local walking systems were and how they differed across counties.

Chapter 5 presents the process of the use of systems mapping to engage a group of multidisciplinary stakeholders as part of a systems approach to walking at local level in Cork, Ireland. The ongoing processes following the development of the systems map were monitored for a period of approximately three years (June 2020 – April 2023) and presented as part of this chapter. The facilitators to local level systems approaches to walking were also investigated via semi-structured interviews with multiple local level stakeholders.

A published manuscript is presented following Chapter 5 which includes elements of **Chapter 4** and **Chapter 5**. The paper is titled "Using systems science methods to enhance the work of national and local walking partnerships: practical insights from Ireland" and is published in the *European Journal of Public Health* (Power, Lambe, and Murphy, 2022).

Chapter 6 presents an assessment of the available data sources in Ireland which could potentially be used to monitor and evaluate the wider impacts of a systems

approach to walking in Ireland. This chapter is presented in two parts. Firstly, a desktop exercise investigating the presence of publicly available data sources and indicators which could be used in monitoring a systems approach to walking in Ireland are presented. Secondly, a practical example of how some of the available data sources can be used in conjunction to describe walking behaviour is presented. This practical example is presented as an academic journal article titled "Trends in recreational walking trail usage in Ireland during the COVID-19 pandemic: Implications for practice" which was published in the *Journal of Outdoor Recreation and Tourism* (Power, Lambe and Murphy, 2023).

Chapter 7 provides an overall discussion of the findings of the work in light of the reviewed literature, as well as providing implications and recommendations for future research and practice.

1.7 – Reflections of an embedded researcher

Reflective accounts from researchers and practitioners about their roles in organisations/institutions have become more evident in recent times (Lindsay et al., 2007; Littlewood et al., 2014). Moreover, the notion of the 'embedded researcher' within organisations implementing systems approaches to physical activity has become popular in the field (Potts et al., 2022). Throughout the course of this thesis a reflective account of my role as an embedded researcher in Get Ireland Walking will be provided following each research study. This will involve the narrative changing from third person to the first person, to allow for a subjective account of relevant contextual factors which had a role to play in the approach taken and in the outcomes of each study. In this section, I will provide a short reflection on my role as a PhD student/researcher/practitioner at the beginning of the research process.

I joined Get Ireland Walking's small (n=2) team in September 2019 as a co-funded PhD student, providing me with a dual role allowing me to be immersed in the academic environment and in the organisational environment. The initial project idea for this PhD – as with most PhD projects working with organisations and studying phenomena in the *real world* – was different from the thesis as it currently stands. Beginning this project, I was fully aware of the implications of working with an organisation who, in part, would have a major role in the direction that the research took. Initial conversations with the programmes manager in Get Ireland Walking revolved a lot around the idea of whether or not a 'blueprint' or 'model' for walking promotion in Ireland could be developed. Some of the questions thrown on the table early on in the process were things like:

- *Who are the organisations that have a role to play in walking promotion and development in Ireland?*
- *How are they connected?*
- *What policies govern their work?*
- *How can we get organisations from different disciplines and sectors to work on walking together?*

These questions gave me an idea about the general direction which Get Ireland Walking wanted to take their work, which was definitely moving away from their focus on community based programme implementation, to working on understanding the mechanics of walking promotion and development in Ireland. Meanwhile (while wearing my PhD student hat), I am reading literature espousing the potential benefits of systems thinking, systems approaches, and systems science methods for physical activity and public health. I begin to *join the dots* between the direction that Get Ireland Walking wanted to go, and the potential for systems approaches to assist in answering some of the questions outlined above.

The decision was inevitably made to orient the PhD project towards assessing whether or not systems approaches could help address some of the problems Get Ireland Walking wanted to tackle. Over time the symbiotic relationship between my role as a PhD student and embedded researcher in an organisation trying to achieve whole of systems change, became clear. I thought that the proposed research (if carried out with integrity and a high degree of pragmatism) had the potential to contribute new applied knowledge in the field of walking related research, policy and practice.

Chapter 2: Literature review

2.1. – Introduction

This chapter provides a critical analysis of the literature pertaining to the topics of this thesis. Firstly, an overview of the current state of the physical activity (PA) and walking promotion literature will be presented. Secondly, a discussion of published examples of walking interventions, with an emphasis on global and national policy, will be presented. Thirdly, a critical discussion of systems approaches to PA will be provided with an insight into their applicability to walking promotion. Then, a discussion of the literature espousing the multiple methods and approaches to gather walking data as part of a systems approach will be presented. The final section is a summary of the literature review and rationale for the research conducted as part of this thesis.

2.2. – Overview of physical activity and walking

2.2.1 – The problem of insufficient physical activity

Globally, over a quarter of the adult population do not achieve the World Health Organisation's recommended PA levels of a minimum of 150 minutes of moderate intensity PA per week. Guthold et al's study of 1.9 million participants from 358 population-based surveys determined that 27.5% of the global population are insufficiently active (Guthold et al., 2018). Data from the Healthy Ireland survey suggest that PA levels in adults are slightly higher than global figures, with 46% of adults achieving the recommended PA guidelines (Healthy Ireland, 2019). The health benefits of PA are well established and it is suggested that those who meet the recommended PA levels have a 20%-30% lower risk of premature death (World Health Organisation, 2022), and reduction in non-communicable disease risk (Ekelund et al., 2020). Contrarily, there are negative consequences of low levels of PA beyond health related outcomes, such as global economic burden (World Health Organisation, 2022). In a recent paper, Hafner et al (2020) demonstrated through economic simulation modelling that if the entire adult population achieved the World Health Organisation's PA guidelines (>150 minutes of moderate intensity PA), there would be a global increase in gross domestic product of approximately $6 - $8.6 trillion between 2020 and 2050. However, in order for the global goal of a 15%

relative reduction in physical inactivity in adults and adolescents by 2030 set by the World Health Organisation (WHO) (World Health Organisation, 2018) to be achieved, Stamatakis and Bull (2020) argue that PA must be placed on the global 'must-do' policy agenda. Moreover, Stamatakis and Bull argue that specific focus must be placed on aligning approaches across sectors to engage those who are most inactive.

2.2.2 – The concept of physical activity

The definition of PA offered by Casperson and colleagues underpins much of the current evidence on PA to date (Casperson et al., 1985). Casperson et al (1985) describe PA 'as any form of musculoskeletal movement that results in energy expenditure' (p.126). Although the authors outline that PA, according to their definition, can be achieved through multiple forms (i.e., leisure time PA and occupational PA), the definition is bounded in biomedical and physiological roots. This, arguably, has played a role in the subsequent approaches taken in the promotion of PA. For example, the nature of PA promotion has been criticised for remaining segregated in siloes according to disciplines, policy sectors, and divisions between academia and practice (Rutter et al., 2019). Moreover, much of the global PA promotion efforts until now have been focused on reducing the burden of non-communicable diseases (World Health Organisation, 2018). This is a relevant goal for the field of PA research and promotion to work toward, given that physical inactivity is an established risk factor of non-communicable diseases and premature mortality (Lee et al., 2012; Geidl et al., 2020; Katzmarzyk et al., 2022). However, the potential for increasing population levels of PA has been suggested to harness broader impacts beyond those which are related to health and disease (Salvo et al., 2021). Recently, an alternative definition of PA has been proposed by Piggin (2020) which aims to encompass the multifaceted nature of PA:

"Physical activity involves people moving, acting and performing within culturally specific spaces and contexts, and influenced by a unique array of interests, emotions, ideas, instructions and relationships" (Piggin, 2020, p.5).

The underlying argument put forward by Piggin (2020) is that moving away from a reductionist view of PA may bring the field forward by providing scholars and practitioners with a more nuanced understanding of PA. In doing so, Piggin argues that the inherent multisectoral and interdisciplinary nature of PA can not only be acknowledged but embraced. This argument is echoed by many researchers working at the intersection between systems thinking and public health (Rutter et al., 2017; Nobles et al., 2022). The definition contrasts with the previously accepted definition of PA (Casperson et al., 1985) in a number of ways. For example, Piggin (2020) argues that PA is inherently cerebral, by highlighting the interconnectedness between PA and the human mind; inherently social, by noting the nature of how individuals more often than not do not partake in PA in isolation; inherently situated, by outlining that PA is something which can be achieved in a variety of spaces, places, and contexts; and, that PA is inherently political, by stating that opportunities for populations to be physically active can help shape the dignity, life chances, and values of communities and individuals (Piggin, 2020). There has been no updated consensus on what constitutes PA following Piggin's proposal. However, a recent global call to action by the WHO (World Health Organisation, 2022) for organisations to embrace working across sectors and disciplines to promote PA, echoes the sentiment put forward by Piggin (2020).

2.2.3 – Walking as a form of physical activity and the prevalence of walking in Ireland

O'Mara (2019) argues that walking is what makes us human. Bipedalism separates humans from other mammals and is something which we do as part of our everyday lives, work, and leisure time. Walking is also a form of PA which can be undertaken for recreational or transport-related purposes and provides a range of benefits. Early work in the field by Morris and Hardman (1997), whose seminal paper describes the physical health benefits of walking, described walking as 'the nearest activity to perfect exercise' (p.328). Globally, data suggest that approximately 64% of adults walk for at least 10 minutes on five days of the week (Hallal et al., 2012). Data vary from region to region, with data from Africa suggesting that 78% of people walk for transport daily (United Nations Environment Programme and United Nations Human Settlements Programme, 2022). In Ireland, the most comprehensive national level

walking behaviour surveillance mechanism, the Irish Sports Monitor, records population levels of sport and PA participation via self-report methods.

Overall, recreational walking levels in Ireland are close to global figures. Data from the Irish Sports Monitor, a biannual self-report survey of PA and sport participation in Ireland in a sample of approximately 8500 people, suggest an overall increase in recreational walking in recent years. Findings indicate that 64% of the population report to walk at least once a week for recreation in 2015, and 74% in 2021 (Sport Ireland, 2021). A less notable increase was found in reported transport walking. The proportion of the population which reported to walk for transport (at least once a week) increased from 46% in 2015, to 48% in 2021 (Sport Ireland, 2021). Irish data suggest that the prevalence of recreational walking increases over the lifespan, whereas the contrary is evident for walking for transport. Table 2.1 presents the mean percentage of the population, by age and gender, who reported to walk for recreation and transport between 2015 and 2021 according to Irish Sports Monitor data (Sport Ireland, 2021). Findings from another national level mobility and PA survey in Ireland, the National Travel Survey, suggest that over one-fifth (22.8%) of the population report they never make a weekly journey on foot (Central Statistics Office, 2019). It must be noted, however, there is a lack of consistent walking surveillance mechanism in Ireland. For example, the classification of regular walking for transport equates to at least once a week for 15 minutes in the Irish Sports Monitor, whereas the Census monitors the number of trips made per week 'on foot'. This inconsistency has led to an ad-hoc approach in the collection of walking data at national level, and does not facilitate the comparison of data with other domestic or international data.

Table 2.1: Percentage of the population reporting walking regularly for transport and recreation over time (by age and gender) (Source: Irish Sports Monitor, 2021).

	Age	Transport (%)				Recreation (%)			
		2015	2017	2019	2021	2015	2017	2019	2021
Male	16-19	67	67	64	66	45	52	51	67
	20-24	61	63	63	64	47	52	56	64
	25-34	52	53	52	52	49	56	61	73
	35-44	43	44	40	47	57	63	58	67
	45-54	36	41	37	43	65	65	61	72
	55-64	38	36	33	41	59	65	66	67
	65+	33	34	33	40	65	64	68	71
Female	16-19	67	72	74	64	69	72	68	83
	20-24	69	70	70	63	68	70	65	75
	25-34	54	56	49	60	64	69	74	78
	35-44	47	43	44	46	73	72	70	81
	45-54	38	41	40	43	74	77	70	82
	55-64	40	40	38	46	71	71	77	78
	65+	40	45	40	41	65	67	65	71

2.2.4 – The value of walking for individuals and society

Both walking for transport and recreation provide benefits for physical and mental health. For example, in a systematic review and meta-analysis of prospective cohort studies, Kelly et al (2014) found that walking for 11.25 MET hours per week can reduce the risk of all-cause mortality by 11%. More recently, in a large-scale meta-analysis of 15 international cohorts investigating the association between daily step counts and all-cause mortality, Paluch et al (2022) conclude that there is an inverse association between daily step counts and all-cause mortality. Similar findings were observed in a pooled analysis of self-rated walking pace and all cause mortality, cardiovascular disease and cancer mortality in a sample of over 50000 participants (Stamatakis et al., 2018). Other systematic review papers highlight the benefits of walking on a number of cardiovascular diseases risk factors including systolic and diastolic blood pressure, body mass index, body fat (Oja et al., 2018) and cancer incidence (del Pozo Cruz et al., 2022). However, the benefits of walking for

recreation are not only limited to those associated with physical health. Qualitative and quantitative studies suggest that regular walking has been shown to improve the mental (Kelly et al., 2018) and spiritual health (O'Mara, 2021) of individuals, the economic vitality of communities (Litman, 2017), and hold benefits for climate, congestion, and road deaths (World Health Organisation, 2022). Furthermore, a study conducted by Leyden et al (2023) of 1064 Dublin residents found that living in a walkable neighbourhood had direct and indirect effects on happiness of people aged 36-45 ($p=0.001$) and aged 18-35 ($p=0.007$). Tools such as the United Nations' Sustainable Development Goals (United Nations, 2015) have been used to understand the breadth of potential impacts of population level increases in PA (Salvo et al., 2021). Using similar approaches to investigate the wider impacts of population level increases in walking may help fully realise, and understand, the breadth of societal impacts which increasing walking at the population level can hold.

2.2.5 – The correlates of walking

The factors which influence walking levels are heterogenous in nature. The use of frameworks to understand the multifaceted correlates of PA has proven useful to date (Bauman et al., 2002). Although similarities can be drawn across studies in relation to the overlap between the factors that influence walking and those which influence PA, it must also be noted that similarities can be found in relation to the conceptual structuring of the multilevel correlates. For example, in a paper from Bauman and colleagues which provides operational definitions for determinants, correlates, moderators, and mediators of PA, the authors provide a list of over 50 potential correlates of PA which are segregated into six categories, ranging from the physical environment to individual characteristics such as sex and age (Bauman et al., 2002). Similarities can be drawn from studies outlining factors which influence walking, where correlates are structured according to multilevel categories ranging from individual level to systems level factors (Pikora et al., 2003; Ball et al., 2007; Götschi et al., 2017; Riggs and Steiner, 2017). Furthermore, commonly cited indices of walkability also suggest that aspects of the built environment, public transport usage rates, residential density, and employment density influence walking levels (Dalmat et al., 2021). The heterogeneity of factors which influence walking is also

noted by Hilland et al (2020). In their systematic review of papers investigating the correlates of walking among socially disadvantaged adults, evidence was found for at least 30 multi-level correlates which influence walking. Hilland et al (2020) go on to argue that interventions aiming to promote walking should target multiple correlates at multiple levels – which are often interconnected – to produce sustained changes in walking behaviour. An overview of the findings of Hilland et al (2020) can be found in Table 2.2.

Table 2.2: Correlates of walking in socially disadvantaged adults (from Hilland et al., 2020).

__Broad heading__	__Correlate__
Demographic and Biological	Age
	Sex
	Ethnicity
	Education
	Income
	Employment status
	Home ownership
	Vehicle/car access, ownership
	Years living in country of birth
	BMI or weight
	Health comorbidities
Psychological, cognitive and emotional	Self-rated health status
Social and cultural	Density or number of social ties
	Social support
	Social norms for physical activity
	Perceived community harmony/cohesion
Physical environment	Perceived access to physical activity opportunities
	Perception of park/open space accessibility/distance
	Perceived neighbourhood aesthetics
	Objective walkability
	Perceived walkability
	Perceived distance and access to destinations
	Road attributes and conditions
	Perceived road/pedestrian safety
	Perceived community/individual safety
	Fear of crime
	Perceived/Objective social disorder
	Perceived/Objective physical disorder

Although the segregation of factors that influence walking in the academic literature has assisted with developing an overall understanding of walking, it could be argued that it has influenced how organisations operate in practice. For example, a paper by Schulz et al (2015) describes the efficacy of a walking group intervention to improve

cardiovascular health and PA in disadvantaged areas in Detroit, Michigan. Schulz et al (2015) further describe the programme as being part of a larger health improvement initiative designed by local partners from the health sector. Although this paper highlights statistically significant improvements in step counts for the intervention group compared with the control over an eight week period, the authors pay little heed to potential confounding environmental factors which may have impeded or facilitated the results of the study. Part of the explanation for this may be that environmental characteristics of walking, such as permeability and urban design, are perceived to be the sole responsibility of local governments, engineers and planners (Cerin et al., 2022) whereas individual level determinants, such as motivation to walk, are the responsibility of behavioural scientists and health professionals (Matthews et al., 2012). Although there is a groundswell in approaches which aim to align expertise from multiple sectors and disciplines to address the factors which influence physical inactivity concurrently (Nobles et al., 2022), there are few examples which highlight this way of working with a specific focus on walking. Some examples do exist which highlight the interdisciplinary approach taken to the promotion and development of walking at national level in Scotland (Campbell et al., 2017), yet there is a need for further research highlighting the benefits of such approaches in other contexts.

2.2.6 – Interventions to promote walking

Similar to the factors which influence walking, interventions which are implemented to increase walking are multifaceted, and range from individual based programmes to policy and infrastructural change. In a systematic review of 48 non-randomised and randomised controlled trials promoting walking, Ogilvie et al (2007) found that the majority of studies included in their analysis were targeted at the individual level and consisted of strategies such as providing brief advice to study participants, encouraging the use of pedometers, or individualised marketing. The findings of the systematic review understandably relate to the efficacy of interventions to promote walking in a small population or sample, rather than the effectiveness of approaches at a population level (Ogilvie et al., 2007). There are examples of community level programmes which have been proven to increase walking levels across multiple contexts. The 10000 Steps programme is a community based multi-strategy PA

promotion project which originated in Australia in 2003 which aimed to address the multi-level determinants of PA through a range of techniques including behaviour change techniques, marketing strategies, and infrastructural change (Brown, Eakin, Mummery and Trost, 2003). Vandelanotte et al (2020) suggest that the sustained implementation of the 10000 Steps programme's multilevel interventions, combined with financial and human resource support, contributed to the overall success and sustainability of the intervention. Similar examples of effective community based walking programmes are reported elsewhere (Reger et al., 2002; Pelssers et al., 2013; Chaudury et al., 2020).

Although walking-related research can be found in journals relating to anthropology (Peelen and Jansen, 2007), visual arts (Pink, 2008) and planning (Koohsari et al., 2013), much of the evidence base reporting strategies to promote walking remains within the confines of experimental study designs housed within PA and public health related journals. In a systematic review of twelve studies which highlight the effectiveness of interventions which promote walking at the population level conducted by Foster and colleagues, mass media campaigns, infrastructural interventions, and environmental change approaches are suggested to be effective at increasing walking at the population level (Foster et al., 2018). The low sample size of studies included in Foster and colleagues review is indicative of the methodological challenges involved in evaluating population level interventions to promote walking. Thus, there is a paucity of evidence in this area (Panter et al., 2019). Interventions aimed at increasing population levels of walking require expertise from multiple disciplines (Ball et al., 2017), and organisations working in local and national walking promotion could benefit from adopting a more holistic view of walking to assist with working across sectors. Paths for All a national walking promotion charity in Scotland, work with stakeholders across sectors and disciplines to promote walking at national level in Scotland through the adoption of a systems-oriented framework (Paths for All, 2022), guided by the Global Action Plan on Physical Activity 2018-2020 (GAPPA) (World Health Organisation, 2018). However, little is known about how this approach to local and national walking promotion is operationalised, and whether it can provide value to organisations working in other contexts.

2.2.7 – The evolution of Get Ireland Walking, Irelands' national walking promotion organisation.

Funding for active travel related interventions in Ireland has increased in the last number of years (Government of Ireland, 2023). Get Ireland Walking (GIW), a national walking promotion initiative of Sport Ireland, was established in 2013 and is hosted within the national governing body for Irish hillwalking and mountaineering, Mountaineering Ireland. The initiative is guided by a vision of 'maximising the amount of people who walk regularly in Ireland'. During the initial stages of the development of GIW, there were seven organisational partners involved in a consultation process deciding on the aims and strategic objectives of the initiative. The initial seven organisations involved in the development and conceptualisation of the initiative were mainly from health-related sectors. These organisations were Mountaineering Ireland, the Department of Health, Healthy Ireland, the Health Service Executive, Sport Ireland, the Irish Heart Foundation, and Ireland Active.

Initially, the annual funding for GIW was relatively low, and the strategic direction of the initiative in the early stages (2013-2015) focused solely on the implementation of community-based walking programmes across Ireland. The community-based walking programmes delivered by GIW, called Active Community Walking Programmes (ACWP), involved the training of lay people as walk leaders to deliver programmes over a 12-week period through the Local Sports Partnership (LSP) network. There are 29 LSPs in Ireland, each of which aim to promote sport and PA participation in their respective communities (Sport Ireland, 2022). Prior to the delivery of ACWP nationally, six counties were involved in the piloting and evaluation of the programme. Ireland's national policy document for PA promotion, the *Get Ireland Active!* National Physical Activity Plan 2016-2020 (Healthy Ireland, 2016), included an action whereby GIW were allocated €50,000 per annum to deliver 100 programmes in communities per year over a five-year period.

In 2015, the GIW partner and collaborator network expanded from the original seven organisations, and a new steering committee was formed to focus on the development of a strategic plan for the initiative. Get Ireland Walking's first

strategic document, the Get Ireland Walking Strategy and Action Plan 2017-2020 (GIWSAP) (Get Ireland Walking, 2017), was published in 2017 and provided the direction for GIW over a four-year period. Moreover, this document provided the first example of a national level walking strategy for Ireland (Get Ireland Walking, 2017). The strategy outlined 41 actions to be delivered across seven thematic areas including: Public Awareness, Education & Communication; Children & Young People; Health; Environment; Communities; Research Monitoring & Evaluation; and Partnerships. The organisational network expanded during the formation and implementation of the GIWSAP, with 30 organisations being named as key partners or collaborators on actions within the document. The organisations involved in the development and implementation of the GIWSAP operated within more heterogeneous sectors (compared with those involved in the formation of GIW), and included organisations from transport, tourism, academia, and outdoor recreation. Get Ireland Walking's focus has changed in recent years. Currently, the body of work conducted by GIW differs to that of the work conducted following its inception in 2013. Today, GIW aims to act as a catalyst organisation to engage with organisations from multiple sectors which have a role in the promotion and development of walking in Ireland.

2.3. – Walking and physical activity policy

2.3.1 – The nature of physical activity and walking policies

Globally, there is a high prevalence of national level PA policies. Physical activity policy, as defined by Klepac-Pogrmilovic et al (2019), is any formal written policy, unwritten formal statement, guideline, manual or standard, formal procedure, or, informal policy, which may indirectly or directly impact on community or population levels of PA. In a cross-sectional study where 76 representatives from 173 countries provided data on policies pertaining to PA and sedentary behaviour in their countries, a high proportion (92%) of countries had formal written policies aimed at increasing PA levels in their respective populations (Klepac-Pogrmilovic et al., 2020). However, Klepac-Pogrmilovic and colleagues found the implementation and overall effectiveness of the policies was low to moderate (Klepac-Pogrmilovic et al., 2020). These findings may be explained by data from Lowe et al (2022), who

found that across 25 cities (in the United States of America, Australia, New Zealand, Switzerland, Denmark, Austria, Germany, Belgium, United Kingdom, Spain, Portugal, Czech Republic, Hong-Kong, Mexico, Brazil, Thailand, Vietnam, Nigeria, and India) that were implementing city planning policies to support health, few policies had measurable targets. The suggestions of Giles-Corti et al (2022) and Nau et al (2023) are pertinent here. Giles-Corti et al (2022) and Nau et al (2023) suggest that policy alignment across sectors and between policy levels, and clearly outlining measurable targets within policies, are key characteristics of successful PA policy (Giles-Corti et al., 2022; Nau et al., 2023; Pratt, Ramírez Varela and Bauman, 2023).

There are many tools available to monitor the implementation of national PA policy such as the Health Enhancing Physical Activity Policy Audit Tool (HEPA-PAT) (Bull, Milton, and Kahlmeier, 2015), the Comprehensive Analysis of Policy on Physical Activity Framework (CAPPA) (Klepac-Pogrmilovic et al., 2019), the Physical Activity Environment Policy Index (Woods et al., 2022), and the HARDWIRED criteria (Bellew et al., 2008). Findings from a recent systematic review of reviews investigating the characteristics of effective PA policies suggest that policies found to be effective in promoting PA included actions which focused on specific target groups, infrastructure, and fiscal measures (Gelius et al., 2020). Some similarities can be observed across many PA policy analysis tools on characteristics of effective PA policy. For example, the necessity for PA policy to be developed and implemented by a range of actors from multiple disciplines is suggested by many (Bellew et al., 2008; Klepac-Pogrmilovic et al., 2019; Woods et al., 2022). However, it has also been suggested that engaging organisations from different sectors and disciplines, beyond health and sport, in the development of the implementation of national PA policy is challenging (Lakerveld et al., 2020). Nonetheless, working across policy sectors to promote PA nationally is necessary if global PA targets are to be met (World Health Organisation, 2018).

In 2016, Ireland published its first PA policy, *Get Ireland Active!* National Physical Activity Plan for Ireland 2016-2020 (Healthy Ireland, 2016). The policy was the result of cross-sectoral work across multiple government departments including the Department of Health, the Department of Transport, Tourism and Sport, the Department of Children and Youth Affairs, and the Department of Education and

Skills (Healthy Ireland, 2016). Although this document represents the first policy document specifically aimed at increasing PA behaviour in Ireland, there are many policies from multiple sectors relevant to PA in Ireland. Table 2.3 highlights policies in Ireland which have actions within them which plausibly relate to PA directly and indirectly. National policies in Ireland which include actions related to PA exist within many sectors outside of health, sport, and transport. The heterogeneous nature of PA related policy points to the need for approaches to the promotion of PA which transcends disciplinary and sectoral siloes (Rutter et al., 2017; World Health Organisation, 2018; Rutter et al., 2019; International Society for Physical Activity and Health, 2020; Jebb et al., 2021).

Table 2.3: National policies relevant to physical activity in Ireland.

Policy	Policy Sector
National Physical Activity Plan	Health; Sport; Transport; Research; Education; Recreation and leisure
Wellbeing Policy Statement and Framework for Practice	Health; Work and Employment; Tourism; Sport; Research; Education; Recreation and leisure
National Sports Policy	Health; Sport; Research; Education; Recreation and leisure
National Policy Framework for Children and Young People	Health; Sport; Tourism; Work and employment; Transport; Public finance; Recreation and leisure
Design Manual for Urban Roads and Streets	Transport; Environment; Urban/rural planning and design
National Strategy for Women and Girls	Transport; Environment; Public finance; Urban/rural planning and design; Recreation and leisure
Smarter Travel – A New Transport Policy	Transport; Environment; Urban/rural planning and design
National Disability Inclusion Strategy	Education; Employment; Health; Public finance; Research; Urban/rural planning and design; Work and employment; Environment
Healthy Ireland Strategic Action Plan	Health; Work and Employment; Tourism; Sport; Research; Education; Recreation and leisure
Sharing the Vision – A Mental Health Policy for Everyone	Health; Education; Urban/Rural Planning and design; Work and employment
Walks Scheme	Environment; Urban/rural planning and design
National Planning Framework (and RSES's)	Transport; Environment; Public finance; Urban/rural planning and design; Recreation and leisure
Tourism Development and Innovation – A strategy for investment	Tourism; Recreation and leisure; Transport; Public finance
Strategy for Future Development of Greenways	Tourism; Recreation and leisure; Urban/rural planning and design
Healthy Ireland Framework	Health; Work and Employment; Tourism; Sport; Research; Education (and more)
Get Ireland Walking Action Plan 17-20	Health; Education; Transport; Environment; Urban/rural planning and design; Research

Climate Action Plan 2023	Transport; Environment; Public finance; Urban/rural planning and design; Recreation and leisure
National Outdoor Recreation Strategy 2023-2027	Environment; Urban/rural planning and design; Sport; Recreation and Leisure; Health

There are some examples of cross-sectoral policies which aim to promote walking at a national level. Scotland's national walking promotion organisation, Paths for All, have made efforts to ensure alignment between their National Walking Strategy, the global PA agenda, and to local level development plans and policies, in an effort to work towards a whole-of-systems approach to walking in Scotland (Paths for All, 2022). The work of Paths for All remains a leading example of sustained political support to incorporate both recreational and transport walking into a national policy document, something which is somewhat of an anomaly in other international examples. For example, Norway published its national walking strategy in 2012 through the Norwegian Public Road Administration (Berge, Haug and Marshall, 2012). Given the nature of the work conducted by the publishers of the report (road safety), the national walking strategy for Norway placed much of its focus the implementation of actions relating to improving pedestrian experiences in urban areas and pedestrian oriented planning practice (Berge, Haug and Marshall, 2012). Similarly, the Sydney Walking Strategy provides a city-level walking policy which focuses on the improvement and development of facilities and opportunities for residents in Sydney to increase transport walking, with little focus on recreation (City of Sydney, 2015). Ireland's national walking strategy, the aforementioned GIWSAP (Get Ireland Walking, 2017), aims to address walking for transport and recreation. Given the multiple forms which walking can take, the boundaries drawn between forming policies focusing on transport related walking or recreational walking separately, may be detrimental by further exacerbating disciplinary siloes.

2.3.2 – The application of global frameworks to physical activity policy, research, and practice

2.3.2.1 – The Global Action Plan on Physical Activity 2018-2030

The Global Action Plan on Physical Activity 2018-2030 (GAPPA) is a global call to action published by the WHO which is aimed at national governments. It advocates for governments to move towards a multisectoral approach to PA policy at national and sub-national level (World Health Organisation, 2018). The GAPPA outlines twenty specific policy actions across four strategic objectives which encompass a whole-of-systems approach to PA (World Health Organisation, 2018). The four specific strategic objectives focus on the development of environments which are conducive to PA (Create Active Environments), supporting positive social norms in relation to PA (Create Active Societies), providing opportunities to all population groups to be more physically active (Create Active People), and developing strong PA policy, data, and governance systems (Create Active Systems). Globally, research and policy circles have embraced the GAPPA as a framework to facilitate cross-sectoral approaches to PA (Walklett et al., 2022). Walklett and colleagues report that published examples exist from Ireland and Australia which highlight the use of the GAPPA as a tool to frame practical approaches to whole-of-systems approaches to PA (Walklett et al., 2022). For example, in a participatory action research study by Murphy et al (2021), researchers, policymakers and practitioners in the PA system in Ireland mapped the national PA system against the four strategic objectives of the GAPPA. Findings from Murphy and colleagues' work suggest that using the GAPPA as a framework proved useful in facilitating the identification of areas within the system of PA in Ireland which required action. Currently, there are no examples of how a framework such as the GAPPA could be operationalised to facilitate cross-sectoral action to promote walking in Ireland.

2.3.2.2 – The United Nations Sustainable Development Goals

Although working across disciplines and sectors is not a new phenomenon in public health, research interest in working with the complexities of public health problems has recently gained traction (Jebb et al., 2021; World Health Organisation, 2022). Many of the approaches taken to work with complex problems in public health require organisations to develop a shared understanding of the problem through communication, collaboration, and the development of a common goal (World Health Organisation 2022; Nau et al., 2022). On a global scale, in 2015 the United Nations (UN) published the 2030 Agenda for Sustainable Development, which

provides all member states of the UN a 'shared blueprint for peace and prosperity for people and the planet' (United Nations, 2015). At the core of the 2030 Agenda for Sustainable Development are 17 goals (Table 2.4), termed the Sustainable Development Goals (SDGs). The SDGs necessitate international, national, and local partnerships to achieve high-level goals which aim to improve health, education, reduce inequalities, tackle climate change, and end poverty across all United Nations member states (United Nations, 2015). Each goal is supported by a list of specific actions and recommended indicators to monitor progress towards the achievement of the goals (United Nations, 2015; United Nations, 2022).

Table 2.4: The United Nations Sustainable Development Goals.

Sustainable Development Goal	Description
Sustainable Development Goal 1	End poverty in all forms everywhere
Sustainable Development Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Sustainable Development Goal 3	Ensure healthy lives and promote well-being for all at all ages
Sustainable Development Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Sustainable Development Goal 5	Achieve gender equality and empower all women and girls
Sustainable Development Goal 6	Ensure availability and sustainable management of water and sanitation for all
Sustainable Development Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Sustainable Development Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Sustainable Development Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Sustainable Development Goal 10	Reduce inequality within and among countries
Sustainable Development Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable
Sustainable Development Goal 12	Ensure sustainable consumption and production patterns
Sustainable Development Goal 13	Take urgent action to combat climate change and its impacts
Sustainable Development Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Sustainable Development Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Sustainable Development Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Sustainable Development Goal 17	Strengthen the means of implementation and revitalize the global partnership for sustainable development

The multisectoral and multidisciplinary nature of the SDGs has allowed many researchers and practitioners in public health and other disciplines to adopt the goals as a framework for research and practice (Brolan, 2022). For example, in a bibliometric analysis of reports, journal articles, and government documentation relating to the attainment of SDG 2 (Zero Hunger) in four South American countries (Chile, Colombia, Mexico, and Peru), Herrera-Calderon et al (2021) found 2734 relevant documents published between 2015 and 2019. Given the volume of publications identified from only four countries relating to only one of seventeen SDGs, it may be argued that similar trends are likely to be observed across the other SDGs. Given the inherent complexity of problems such as obesity, climate change, and physical inactivity (Butland et al., 2007; Swinburn et al., 2011; Pescud et al., 2021), it is not surprising that the use of the SDGs as a way of structuring understanding of such problems is gaining popularity (Morton, Pencheon, and Bickler, 2019; Brolan, 2022). Morton, Pencheon, and Bickler (2019) argue that the SDGs can provide a useful framework for public health organisations to adopt to fully realise the breadth of impact their organisation may have. However, it could be argued – given the substantial list of SDG targets and indicators – it may be difficult for public health stakeholders to operationalise an SDG oriented approach. However, conducting SDG audits on existing policies, and using the SDGs as a roadmap for new policies, may facilitate alignment across sectors and policy levels for organisations in public health.

The relationship between the SDGs and PA has recently been explored. Salvo and colleagues (2021) used agent-based modelling, a conceptual linkage exercise, and a scoping review of the literature to explore the synergy between at-scale PA promotion and the SDGs. They found robust evidence that PA promotion could benefit 3 of the 17 SDGs, with possible benefits for 15 SDGs. A commentary piece by Bauman (2021) supports the sentiment of Salvo and colleagues who argue that the SDG global agenda has the potential to revitalise international PA promotion and research by providing a systems-oriented view of PA. Bauman's points echo those made elsewhere (Lee et al., 2021), in relation to the mismatch between the linear approaches taken to promote PA and the inherent non-linear and complex nature of the behaviour. Thus, a shift to a transdisciplinary research agenda to reducing

physical inactivity is warranted (Rutter et al., 2017; Salvo et al., 2021; Bauman, 2021).

Organisations in the broader PA sector have used the SDGs as a roadmap to determine the impact of their work and policies on the SDGs. For example, Sherry and colleagues' (2019) present a conceptual mapping exercise which found direct links between some SDGs (SDG 3; SDG 4; SDG 10; and SDG 16) and national sports policies across the 56 Commonwealth member countries (Sherry, Agius, Topple and Clark, 2019). However, the findings also allowed Sherry et al (2019) to identify opportunities for sport policies to extend their scope and contribute to other SDGs such as SDG 13 (Climate Action). Exercises such as those conducted by Sherry et al (2019) and Salvo et al (2021) can provide the opportunity to view the work of an organisation, or national level policies, through a systems-oriented lens and allows for opportunities for impact to be identified. Although investment in promoting more walking and cycling has been suggested to be one of the '8 Investments that work for Physical Activity' (International Society for Physical Activity and Health, 2020), there is little known about how walking can specifically contribute to the SDGs.

2.3.3 – Effective partnerships in public health

The expertise needed to promote PA at a national and international scale requires the involvement of organisations from a variety of sectors, ranging from primary healthcare to urban design (Bellew, et al., 2020). Interdisciplinary partnerships are typically established with the underlying premise that organisations can achieve more together than they could individually (Corbin, Jones, & Barry, 2018; Parker, Zaragoza and Hernández-Aguado, 2019; Kriegner et al., 2021). Work conducted by Gillies (1998) conceptualised partnership in the health promotion context as a voluntary agreement between organisations from sports and public health sectors to work together towards achieving health-related outcomes. Health promotion partnerships can manifest themselves in multiple ways. However, typical interdisciplinary health promotion partnerships contain a combination of stakeholders from research, practice, and policy (Eriksson et al., 2015; Murphy, et al., 2021). The range of policy sectors involved in health promotion partnerships

often can extend beyond health to include transport, sport, planning, and disability sectors (Crist et al., 2018; Murphy et al., 2021). Despite this, disciplinary and sectoral siloes are commonplace (Nyström et al., 2018). It is suggested that greater effort must be placed on moving away from reductionist approaches public health – which have been shown to hold low potential to influence population levels of behaviour – to developing more holistic approaches to tackling problems in public health and aligning work across sectors (Rutter et al., 2017; Rutter et al., 2019; Millstein et al., 2018; Egan and McGill, 2021).

A number of factors determine the success of an interdisciplinary health promotion partnership. Johnston and Finegood (2015) outline the criteria for successful partnerships as personal connections, good governance, and management of realistic expectations. Similarities can be found in another study by Indig et al (2017) who suggest that leadership, governance, resource allocation, and collaboration are key domains for researchers to consider in the evaluation of health promotion partnerships. The importance of aligning goals and objectives in an interdisciplinary partnership in health promotion has also been stressed elsewhere (Johnston and Finegood, 2015; Gavens et al., 2017; Corbin, Jones and Barry, 2018; Seaton, et al., 2018). Many studies have also placed emphasis on the importance of inter-organisational trust within health promotion partnerships (Johnston and Finegood, 2015; Winterbauer et al., 2016; Jones & Barry, 2016). In a recent systematic review of studies focused on multisectoral public health alliances, Wiggins, Anastasiou, and Cox (2021) found that having a clear purpose and a clear plan for the evaluation of project outcomes were associated with more synergistic health promotion partnerships. Furthermore, health promotion partnerships which are engaged in consistent open communications are suggested to be more effective than those which place less emphasis on communication. For example, throughout the development of health literacy partnerships in Stoke-on-Trent in England, open communication and learning between partners was found to be a key factor in progressing the impact of partnerships on policy (Estacio et al, 2017).

2.4. – Systems approaches to physical activity

2.4.1. – The need for systems approaches to physical activity

The use of systems science methods are becoming more commonplace in public health research (El-Sayed and Galea, 2017). The mismatch between the linear cause-and-effect models of evidence used in public health and the complex non-linear nature of public health problems has been suggested to play a part in the increased adoption of systems and complexity oriented methods in public health (Rutter et al., 2017; Crane et al., 2020). The traditional model of evidence in PA and public health places substantial emphasis on the use of randomised, experimental research designs to evaluate PA interventions (Ogilvie et al., 2019; Ogilvie et al., 2020; Ramirez-Varela et al., 2021). The work of Lee and colleagues (2021) supports this, who highlight that the PA literature base is dominated by descriptive and cross-sectional studies. Although data gathered from descriptive, cross-sectional, and experimental PA intervention evaluations are important to develop our overall understanding of the phenomenon of PA, they have limited impact on population levels of PA (Fernhall et al., 2015). Furthermore, traditional experimental research designs are often not suitable for the evaluation of PA interventions which happen in real-world contexts. In other words, much of the accumulated evidence is directed towards actions within the Create Active People objective of the GAPPA, which places particular focus on providing PA opportunities for population groups in communities and other settings (World Health Organisation, 2018). However, to achieve sustained population level PA behaviour change, the concurrent implementation of interventions across all areas of the system including infrastructure, policy, and individual and community level programmes, are required.

Globally, there has been an increased interest in the use of systems thinking methodologies in tackling physical inactivity (Nobles et al., 2021; Nobles et al., 2022; Nau et al., 2022). This trend is evident more broadly in public health research. In a meta-narrative review of 557 publications on systems thinking in public health published between 1990 and 2014, Chugtai and Blanchet (2017) found that over half of the publications in the review were published after 2010. Similar research suggests that 90% of published examples of systems thinking approaches to public health have been published between 2010 and 2021 (Carey et al., 2015; Clifford Astbury et al., 2021). However, the majority of the work using systems thinking in

public health remains at the conceptual level (Bagnall et al., 2019), and Chugtai and Blanchet (2017) argue that more effort is needed to understand the practical utility of using systems approaches in public health. Although a commonly agreed upon definition of what constitutes a systems approach is not evident, a systems approach as it relates to PA, aims to incorporate expertise and resources from multiple sectors to intervene in multiple areas of a system concurrently (Bagnall et al., 2019; Nobles et al., 2022).

2.4.2. – Key elements of a systems approach to physical activity

In a recent scoping review of systems approaches to PA, Nau et al (2022) provide a description of the current state of the art of studies purporting the use of systems approaches to PA. Overall, Nau and colleagues found eight methodological approaches which were reported across six stages of a systems approach (Theorising; Prediction; Intervention development; Process evaluation; Impact evaluation; and, Unclear systems approach). A summary of each stage of a systems approach to PA is described in Table 2.5.

Table 2.5: Stages of systems approaches to physical activity (adopted from Nau et al., 2022).

Stage of systems approach	Aim
Theorising	Identify and compare stakeholder understanding of a system
	Identify and compare stakeholder understanding of how a planned/hypothesised intervention might interact within a system
Prediction	Hypothesise and simulate how an intervention may impact on and interact with a system
	Hypothesise and simulate how agents within a system react and interact in response to an intervention
Intervention development (formative)	Design interventions for real-world implementation within a system
Process evaluation	Understand how an implemented intervention interacts with and influences a system in the real world
Impact evaluation	Quantify the impacts or outcomes of an implemented intervention on key systems parameters in the real world

Nau et al (2022) go on to outline the eight methodological approaches which were found across studies included in their scoping review. The methodological approaches were system mapping, network analysis, system modelling, system framing, protocol development, generic methods, methods development, and literature synthesis (Nau et al., 2022). A summary of each methodological approach is presented in Table 2.6. Each of these approaches have different aims, require different levels of skill to implement, and provide varying levels of insight into a systems' inherent behaviour (Hovmand, 2014). While there are a plethora of methods which can be incorporated in systems approaches to public health, approaching a complex problem from a systems perspective, understanding the varying perspectives of stakeholders who operate within a system, and investigating how actors within a system are connected, are common elements of systems approaches to public health problems across contexts (Hall et al., 2021; Baugh Littlejohns, Hill and Neudorf, 2021; Luna Pinzon et al., 2022; Hulvej Rod et al., 2023; Baugh Littejohns et al., 2023). The following three sections (2.4.2.1; 2.4.2.2; and 2.4.2.3) provide an analysis of the literature pertaining to systems framing,

systems mapping, and network analysis, as they apply to systems approaches in PA and public health.

Table 2.6: Description of methodological approaches used in systems approaches to physical activity (adopted from Nau et al., 2022).

Methodological approaches used in systems approaches to physical activity	Description
Systems mapping	Theorise and illustrate a system's boundaries and interrelated parts
Network analysis	Understand the relationships between individuals or organisations relevant to a system
Systems modelling	Computational models used to simulate changes in a system over time
System framing	Approaches which have emerged from the systems thinking tradition or from attempts to apply systems theories and concepts to other public health issues
Protocol development	The design of methods which will be used for a particular part of a systems approach
Generic methods	Application of non-systems methods to a particular stage of a system
Methods development	The development or refinement of methods or tools to support a systems approach
Literature synthesis	Systematic or narrative approach to review published literature on systems approaches or methods

2.4.2.1. – Systems framing

The social ecological model progressed thinking in the PA field. The social ecological model of PA categorises factors that influence PA into different domains ranging from the individual to the policy level (King and Gonzalez, 2018). For example, factors which influence an individual's propensity to be physically active can be attributed to a range of factors which exist across multiple domains including

the individual level (i.e., biological or psychological factors), the interpersonal level (i.e., presence of support friendship network), the organisational level (i.e., opportunities to be physically active at work, school etc), the community level (i.e., built environment which is conducive to PA) and the policy level (i.e., national and local policies which support PA) (King and Gonzalez, 2018). Early advocates of the ecological approach to health promotion suggest that intervention is required across all areas of the model to meaningfully change behaviours (Stokols, 1996). While this claim has been supported in more recent years (Swinburn et al., 2011), the model of evidence in public health which dominates the literature has been criticised for applying a simplistic, linear view to complex, non-linear problems such as physical inactivity (Rutter et al., 2017). Thus, recent publications have begun to take a more complex view of public health problems by focusing on understanding the interconnections and relationships between multilevel factors which influence behaviour. For example, Waterlander et al (2020) describes the LIKE programme, a multi-component healthy living and weight management programme in Amsterdam which is underpinned by systems thinking. The authors argue that the use of systems thinking methods allows for progression beyond the abilities of the social ecological model, by accounting for the relationships and linkages between levels of a system.

The concept of systems thinking as it applies to health-related research and practice is not a new phenomenon (Peters, 2014). Broadly, systems thinking can be defined a:

"... established and emergent ideas and methods that encourage us to look at the bigger picture. Consequently, it is broadly characterized by the idea that real-world phenomena exist within systems composed of dynamic actors including people, populations and organisations, all acting and evolving in response to each other and their contexts[...]Key elements in systems thinking include: interrelationships (connections between elements of the system); multiple perspectives (the acknowledgement that understanding a system requires approaching the system from different points of view); and boundaries (definitions of what lies in the system of interest)." (World Health Organisation, 2022. p2*)*

Although the argument presented by Nau et al (2022) outlines the need to adopt a more sophisticated research agenda relating to systems approaches to PA, it must

also be noted that there can be barriers to adopting systems methods. Methods such as agent-based modelling, network analysis, and the development of causal loop diagrams, require medium to high amounts of time and methodological expertise to implement (World Health Organisation, 2022). The benefits of such methods have been demonstrated. For example, they have been shown to provide insights into the nature of connections between stakeholders within a system (Jaramillo et al., 2021), and predict and simulate the long-term outcomes of various policy options on the health behaviours of populations (Morshed et al., 2019; Salvo et al., 2021). Yet it must be noted that the core of such approaches requires the adoption of systems thinking. The World Health Organisation (2022) argue that applying a systems lens to complex problems in public health – similar to systems framing as defined by Nau et al (2022) – allows for the complexity of problems to be better appreciated, stakeholders' engagement to be improved, and can act as a subtle introduction to systems thinking for stakeholders. The work of the Irish Physical Activity Research Collaboration (I-PARC) provides a practical example of this. Murphy et al (2021) provide an account of participatory action research workshops involving multidisciplinary stakeholders used to develop a national level systems map for PA in Ireland and to facilitate cross-sectoral collaboration as part of the I-PARC project. The process involved mapping current interventions and suggested areas for improvement in the PA system in Ireland, to the strategic objectives of the GAPPA.

Expertise in systems thinking has been also been adopted in PA policy circles to assist with 'zooming out' to fully understand the system within which PA policies are embedded (Kamphuis et al. 2022). To this end, the notion of the 'embedded researcher' is becoming more commonplace in organisations who work within organisations interested in implementing systems approaches (Roelofs et al., 2019). In a paper which was the first of its kind, Potts and colleagues (2022) – each of whom were embedded researchers within organisations implementing whole of systems approaches to PA – offer their reflections on being an embedded researcher in a whole-of-systems approach. Potts et al (2022) offer recommendations for organisations hosting the embedded researcher, such as to anticipate academic bureaucracy and a need to remain adaptable and flexible throughout the process of implementing a whole of systems approach. Although there are many positive aspects of being an embedded researcher within an organisation implementing a

whole of systems approach to PA, Potts et al (2022) do relay some challenges including defining the boundaries of the system which is being evaluated and managing the competing interests of stakeholders. The issues raised by Bellew et al (2020) and Roelofs et al (2019) echo those of Potts et al (2022). Bellew and colleagues note that representation from all sectors of the system must be sought when preparing for a systems approach to PA. Not doing so runs the risk of exacerbating disciplinary siloes which may already exist (Bellew et al., 2020).

2.4.2.2. – Systems mapping

Inherent in the definition of systems thinking put forward by the World Health Organisation (2022) is the acknowledgement that organisations and sectors with a stake in any system will hold different perspectives on that system. It has been argued that a key stage of any systems approach is gaining an understanding of the varying perspectives of stakeholders in a particular system (Rutter et al., 2019; Jebb et al., 2021). One approach which has been used in many instances is the visualisation of a system through developing a systems map. Systems maps are visualisations that aim to map the factors which contribute to complex problems and the interconnections between them (Wistow et al., 2015). Systems maps can take many different forms, from quantitative forms of systems maps which can predict and model the behaviour of a system, to qualitative forms of systems maps which can act as a catalyst to engage stakeholders and facilitate consensus building (Hovmand, 2014). Below (Figure 2.1) is an example of a conceptual systems map for PA (Rutter et al., 2019). Each of the circles, or nodes, within the systems map represent a factor which influences PA, or an area within the system to intervene. The lines, in this instance, represent conceptual connections between factors. This approach of drawing connections between factors with no empirical evidence to confirm the relationship has been criticised (Nuzzo and Steele, 2019). However, systems maps of this kind do not intend to depict a fixed reality. Rather, they intend to act as a tool to facilitate novel ways of thinking about a system which can help partnerships move towards actions (Rutter et al., 2020).
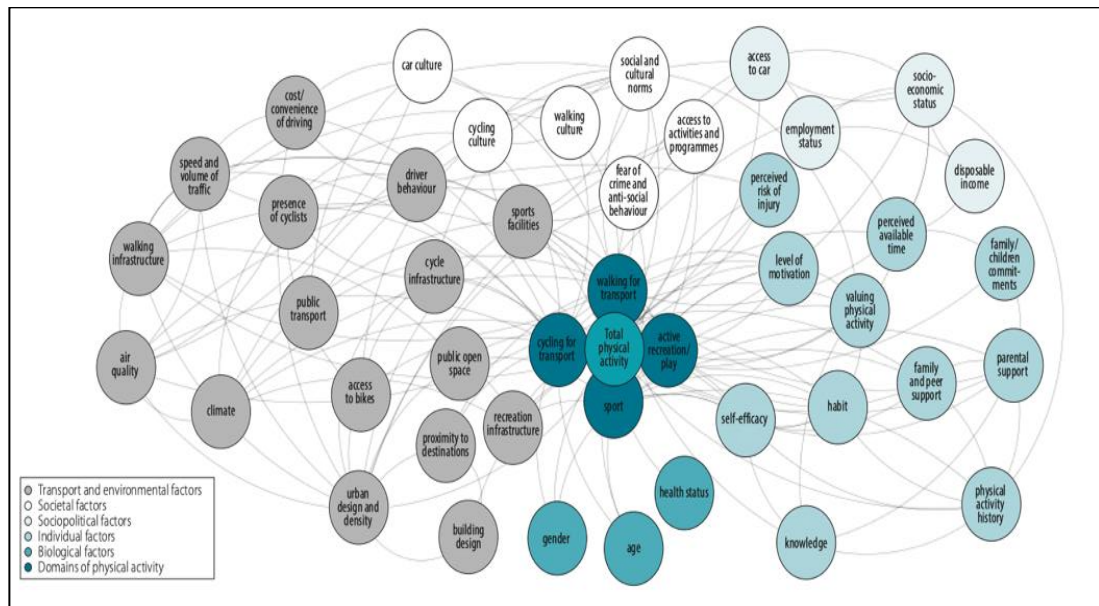
Figure 2.1: A conceptual systems map for physical activity (Rutter et al., 2019).

The process of developing a systems map can help facilitate action and the identification of areas within the system where there may be opportunities to intervene (Rutter et al., 2019; Rutter et al., 2020). Moreover, systems maps can be developed in order to identify leverage points within a system. Leverage points are areas within a system where an intervention in one area may initiate large scale changes across other areas of a system (Meadows, 2008; Nobles et al., 2021). For example, Cavill and colleagues (2020) describe the process of developing a causal loop diagram for the PA system in Doncaster in the United Kingdom. Through the development of a causal loop diagram, specific interventions were designed which targeted identified leverage points within the system pertaining to improving PA surveillance mechanisms. This process has also been demonstrated to be useful in other contexts (Allender et al., 2015; Nelson et al., 2015; Gerritsen et al., 2019; Waterlander et al., 2020). However, other approaches have used systems mapping mainly as a catalyst to engage multidisciplinary stakeholders, build consensus, and facilitate the introduction of systems thinking to stakeholders working in PA and public health systems (Rutter et al., 2019; Bellew et al., 2020; Baugh Littlejohns et al., 2023).

2.4.2.3. – Network analysis

Systems approaches to public health inherently involve stakeholders from across sectors and disciplines (Jebb et al., 2021). A component of many systems approaches to public health problems such as obesity (Allender et al., 2015) and PA (Nobles et al., 2021) is understanding how stakeholders involved in a systems approach interact. While the evaluation of interdisciplinary partnerships is not uncommon in PA research (Kirwan, Lambe and Carroll, 2013; Niven et al., 2023), the use of traditional methods such as interviews and questionnaires may not capture the dynamic nature of relationships between stakeholders in a system. A set of systems science tools which have been adopted by PA researchers as of late are social network analysis (SNA) methods. Carrington and Scott (2012) describe SNA as a 'paradigm' rather than a method, which allows one to analyse and conceptualise social life (Carrington & Scott, 2012; Marin & Wellman, 2012). Social network analysis involves the analysis of social networks where nodes are represented as individuals or organisations, and the edges between them represent social ties such as friendship, funding relationships, or collaboration (Scott and Carrington, 2012). In the context of PA and public health, network analysis has been used to understand the connections between individuals and organisations (Luke and Harris, 2007).

Typically, in PA and public health research where SNA methods are used, visualisations of the network (sociograms) are developed to help visually depict the network of interest. For example, researchers have used SNA methods to understand who the influential organisations/individuals are in relation to the control and flow of information in interdisciplinary partnerships (Buchthal, Taniguchi, Iskandar, & Maddock, 2013; Loitz, Stearns, Fraser, Storey, & Spence, 2017). Many of the insights gained from SNA in PA and public health research can be elicited via qualitative observations of the network structure, mainly through the identification of clusters and central nodes (Eddens and Fagan, 2018). For example, the work of Loitz et al (2017) used SNA to investigate the nature of networks relating to funding, coordination, and partnership in a national organisational active living promotion partnership in Alberta, Canada. Loitz et al (2017) found that one organisation was found to be central in relation to providing funding and information to other organisations within the network (Figure 2.2). It can be observed from Figure 2.2 that the central recreation node in the network holds more ties (connections) than any other node in the network and thus harnesses the most potential for diffusion of

information or resources. Furthermore, it can be observed that there are two organisations who are disconnected from the main network (Loitz et al., 2017). However, more in-depth network metrics can be calculated which provide a more nuanced understanding of the network under study (Eddens and Fagan, 2018; Hunter et al., 2019; Hunter et al., 2019; Mondal et al., 2022).
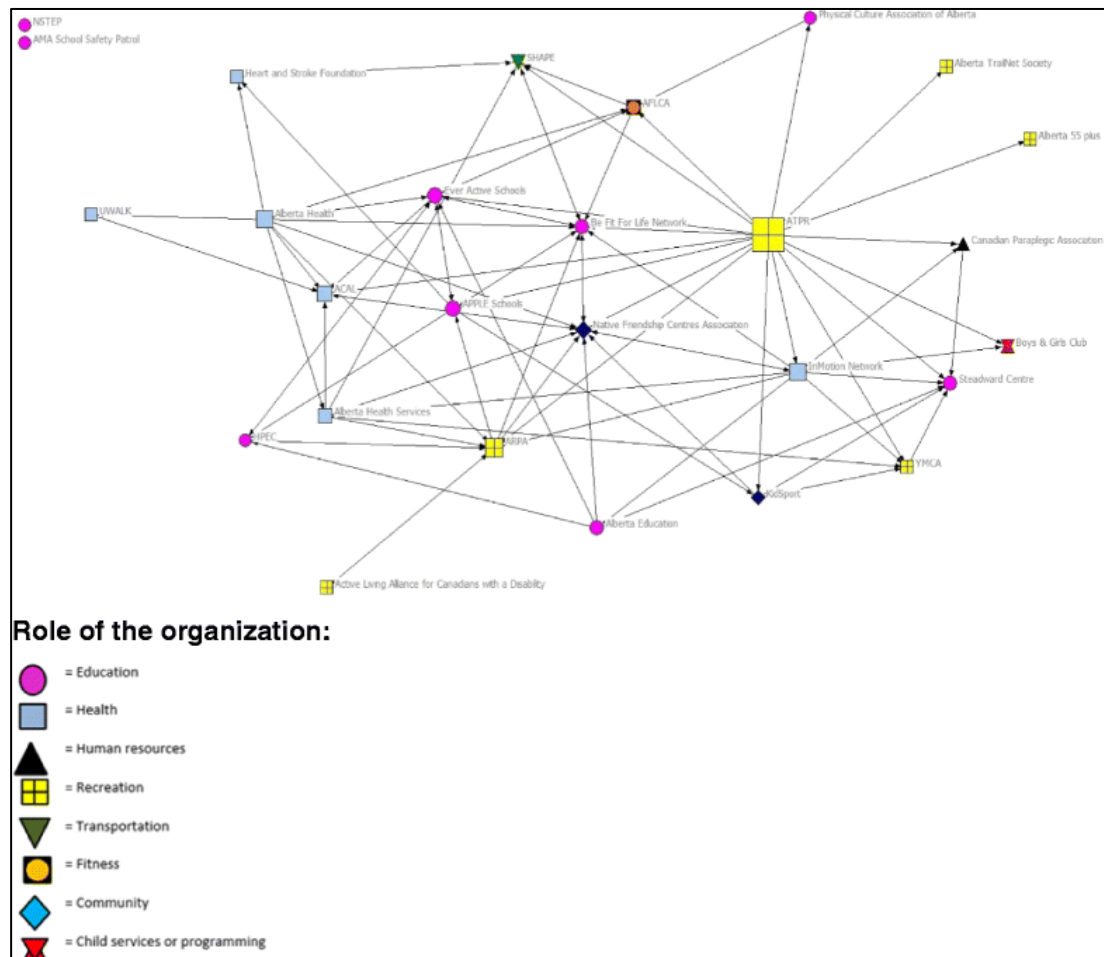
Figure 2.2 - Network diagram of partnership between active living organisations in Alberta (Loitz et al., 2017).

Calculations obtained through the implementation of SNA methods in public health organisational networks can exist at the node (characteristics about individual organisations/individuals within the network) or the network (characteristics about the network as a whole) level (Scott and Carrington, 2012). For example, various node-level centrality measures, i.e., degree, betweenness and closeness, are particularly useful for the public health and PA fields. Such metrics can allow researchers to quantitatively investigate who the 'gatekeepers' of access to resources

or information are, how quickly information/communication/resources can pass through a network, and who has the most connections to other nodes within a network (Macdonald-Wallis, Jago and Sterne, 2012; Timm, et al., 2021). Two commonly used network level measures found within recent publications employing SNA methods in PA and public health are network density and centralisation. Network density has been suggested to act as a proxy measure of the level of cohesion of a network (Mondal et al., 2022) which is calculated as a ratio of the number of connections within a network compared with the total number of possible connections. Network centralisation, or degree centralisation, is a calculation which can elicit the extent to which the network is centralised around one or a few organisations (Loitz et al., 2017). A brief description and interpretation of node and network level measures, adopted from Mondal et al (2022) is provided in Table 2.7.

Table 2.7 - Description of network measures and their meaning in partnerships in public health research (adapted from Mondal et al., 2022).

Node level	Description	Interpretation within multisectoral action in public health
Degree centrality	The number of ties coming to each node.	Key nodes act as leaders with power, resources and the ability to influence the network behaviour.
Betweenness centrality	Calculation of the extent to which nodes link other nodes together which are not linked themselves.	Identification of betweenness nodes can facilitate collaboration between actors within a network, as these nodes act as brokers or connectors.

Network level	Description	Interpretation within multisectoral action in public health
Density	Expressed as the number of ties present divided by the number of possible ties.	Lower density levels indicate that the network does not build ties or linkages with other actors. Ties are required for the flow of information or resources in the network.
Centralisation	The extent to which the network is focused on one or a few actors.	Higher centralisation means that information and resources flow through one or few actors. To increase network functionality, engagement of key actors is necessary or requires decentralisation.

In a recent study by Jaramillo et al (2021), network data were extracted from Facebook relating to Recreovia, the free recreation programme for low socioeconomic groups in Bogota (Sarmiento et al., 2017). The study investigated social cohesion in participants following the programme. Jaramillo and colleagues analysed the structure of the network over time and found that network size (number of programme participants) and the network density (social cohesion) fluctuated over time. Other work in the area used similar techniques to Jaramillo and colleagues, however data were collected using survey methods (Buchtal et al., 2014; Loitz et al.,

2017). Social network analysis methods can be useful in tracking the extent to which networks change over the lifecycle of a project or over the course of the implementation of a policy. For example, Salsberg et al (2017) used SNA to track the overall structure of a network of interdisciplinary organisations in a community-based health promotion research project. This work showed the changing dynamics in the network, namely the reduction in the influence of the academic partner, within the network over the life course of the intervention. Gaining such an understanding can have practical implications in the implementation of a community-based project. For example, organisations with a less central position, such as the academic partner in the case of Salsberg et al (2017), are not useful to act as a hub to quickly disseminate information or resources throughout a network. In a recent systematic review of PA related studies employing SNA methods, Timm et al (2021) concluded that the use of such methods provided benefits for researchers and practitioners in the field of PA promotion. However, this systematic review only identified 8 studies of sufficient quality. Thus, it must be noted that there is a paucity of research in the area of using SNA methods to understand inter-organisational PA promotion.

2.4.3. – Monitoring and evaluating a systems approach to walking

Carey et al (2015) note that there is a trade-off in relation to the adoption of new systems-oriented methodologies and approaches whilst needing to maintain a level of scientific rigour for academics in public health. This sentiment has been echoed elsewhere (Orr, Leider and Gutilla, 2021). However, given the real world complex systems in which public health problems such as physical inactivity are embedded (Nobles et al., 2021), a degree of pragmatism is recommended when structuring an evaluation of a systems approach. There is currently a lack of evidence showcasing evaluations of systems approaches to PA (Jebb et al., 2021; Nau et al., 2022). The inherent complex nature of systems approaches are not suitable to the application of traditional forms of evaluation in PA, which often determine the effectiveness of an intervention by the presence (or lack thereof) of statistically significant changes on a discrete number of health-related outcomes (Leatherdale, 2019). Systems approaches may incorporate multiple forms of interventions that can have intended and unintended consequences which require heterogenous forms of data to monitor (Nobles et al., 2022).

Researchers in PA are beginning to work towards developing a suite of tools, methodologies, and indicators which could be used in monitoring the impacts of a systems approach. For example, data collected as part of an evaluation of a whole-of-systems approach to PA in Gloucestershire did not rely solely on data eliciting PA behaviour, or one 'impact pathway' (Nobles et al., 2021: Nobles et al., 2022). Data were also collected on non-PA related data such as changes in communication between stakeholders across sectors monitored using social network analysis, and the presence of interventions across the system over time using systems mapping – all of which provide valuable information relating to impact across the whole system. The preceding sections of this literature review provided a critical discussion of the literature highlighting elements of a systems approach to walking which could gather data on non-walking behaviour such as communication and collaboration between stakeholders, policy alignment, and the presence of interventions in a system. The following section (2.4.3.1) will provide a critical discussion of literature highlighting the many forms of data which could be used to monitor walking behaviour as part of a systems approach.

2.4.3.1. – Monitoring walking behaviour as part of a systems approach to walking

Although there are methods used in the evaluation of systems approaches in public health which are relatively new to the field, the behaviour or disease (e.g., walking or obesity) must also be monitored to understand the impact of an overall systems approach. In the case of walking, many of the data collection tools and methods which are used to investigate PA behaviour can be applied specifically to measure walking. These include self-report, observational, and objective forms of measurement such as accelerometers and pedometers (Silfee et al., 2018). Examples of indirect, or proxy, methods of walking measurement have been discussed in the literature including radio-frequency identification tags, global positioning systems, smartphone applications and survey questionnaires (Merom and Korycinski, 2017; Bielański, et al., 2018; Pickering, Rossi, Hernando, & Barros, 2018). In a review paper, Madden and colleagues (2021) provides a critical assessment of the commonly used sensor methods used in recreational walking trail usage monitoring.

The examples of data collection methods outlined by Madden et al (2021) (such as passive infra-red sensors and Wi-Fi networks) are explained within their applicability to monitor recreational walking trail use in rural settings. However, these data collection tools can be found elsewhere in urban settings (Lim et al., 2015; Sapiezynski et al., 2015; Traunmueller et al., 2018). For example, Traunmeller et al (2018) compared aggregated Wi-Fi probe request data and manual counts in five areas in New York City to monitor human mobility trajectories. This study found that the differences in the counts obtained from Wi-Fi data and from manual counts ranged from -6.3% -10.4%, concluding that Wi-Fi probe request data could potentially act as a viable alternative to traditional, resource intensive, footfall/walking monitoring methods. While there is some overlap between the methods and tools outlined in Merom and Korycinski (2017) and Madden et al (2021), all authors mention the benefit of utilising multiple methods in conjunction with one another to corroborate and strengthen findings.

During the Coronavirus-2019 (COVID-19) pandemic period, there were examples of multiple indirect and direct walking measurement methods used to monitor changes in mobility and walking. The learnings from these studies may have implications for the evaluation of systems approaches to walking. It has been suggested that the use of device-based measures, mobility data, and other forms of big data, are opportunities which could allow for an exponential increase in the quantity of health behaviour related data which can be collected (Troiano, Stamatakis and Bull, 2020; Rice and Pan, 2021). In an example from Oslo, Norway, Venter and colleagues (2020) used data from STRAVA, a fitness tracking application, which provided mobility data for 175000 runners and 95000 cyclists across 5.2 million trips to explore green space use throughout periods of COVID-19 related movement restrictions. In the context of the COVID-19 pandemic period when movement restrictions were in place, the analysis of large quantities of data took place remotely through big data techniques. However, many of the big data sources pertaining to mobility are best used in conjunction with other data sources to ensure accuracy (Rambøll, 2022). Currently, there are limited examples of the use of multiple data sources in conjunction to describe walking behaviour in Ireland. The use of multiple sources of data to evaluate interventions in public health has been advocated for to assist with adopting a complexity-oriented view of public health evidence (Rutter et

al., 2017; Ogilvie et al., 2020). The use of multiple sources of data to understand walking behaviour is crucial not only for researchers, but also for businesses, planners, and those engaged in making policy decisions.

The use of passive infra-red sensors, an indirect objective form of walking measurement, has become a popular choice for researchers monitoring walking behaviours particularly in natural experiment studies. For example, McGavock et al (2019) used infrared sensors in conjunction with other data sources to gauge recreational walking trail use in Winnipeg, Canada. However, passive infra-red sensors are often subject to vandalism (Madden et al., 2021) and inaccurate counts due to inclement weather or other natural causes (Andersen, Gundersen, Wold, and Stange, 2014). Madden and colleagues (2021) outline the limitations of various forms of objective footfall and walking measurement methods, stating that some versions of passive infra-red sensors, pressure slabs, and thermal sensors provide output data solely as numbers, with little information on direction of travel and are unable to distinguish between types of users (i.e., cyclist, pedestrian). Although the work of Madden et al (2021) provides a useful overview of the landscape of data collection tools available to monitor recreational trail walking, it does not provide insight into who the data custodians (data owners) are, or the availability of the data. The reliability of passive infra-red sensors to provide accurate footfall counts on rural walking trails has been shown elsewhere (Granner & Sharpe, 2004; Ryan and Benton, 2023). However, combining counts with other forms of data is recommended to ensure the most accurate results (Ciesielski & Sterenczak, 2021; Rice & Pan, 2021; Ryan and Benton, 2023).

Subjective forms of walking measurement such as self-report questionnaires are cheap, not time consuming, and can be administered easily and efficiently (Sallis & Saelens, 2000). Therefore, subjective forms of walking measurement have become one of the more popular data collection methods utilised by researchers in recent years (Merom and Korycinski, 2017). However, the limitations of these instruments must be noted (Prince et al., 2008). Firstly, self-report questionnaires on PA behaviour are subject to recall bias (Welk, et al., 2014) and social desirability bias (Brenner & DeLamater, 2014). Other issues may arise depending on how researchers define concepts such as regular walking. Self-report questionnaires measuring PA,

such as the International Physical Activity Questionnaire (IPAQ, 2002), include questions relating to weekly walking for transport and leisure. Within an Irish context, the questions included in the Irish Sports Monitor, a national sport and PA participation survey conducted by Sport Ireland, define walking at least once a week as 'regular', which does not coincide with other international definitions of regular recreational walking (Reis, Macera, & Ainsworth, 2008; Kim & Kim, 2018; European Commission, 2022). Although the reliability and validity of self-report measures of PA has been explored (Kurtze, Rangul, Hustvedt, & Flanders, 2007; Silsbury, Goldsmith, & Rushton, 2015), walking specific self-report measurement remains relatively unexplored. Benton et al (2021) utilise a retrospective self-report instrument of walking levels in their evaluation of a natural experiment. However, these data were corroborated with observational data and trail footfall counts.

The use of artificial intelligence (AI) and machine learning (ML) techniques has been shown to be efficacious for tracking and monitoring pedestrians in Krakow, Poland (Szczepanek, 2020). Both AI and ML are methods which come from the field of cybernetics in systems and complexity science, the intellectual home of systems thinking (Castellani and Gerrits, 2023). Szczepanek (2020) utilised on-street webcams for four areas (tourist, residential and two mixed) around the city of Krakow in conjunction with a machine learning algorithm to monitor and count pedestrians. Similar approaches using machine learning algorithms have been employed to top-view video footage to monitor pedestrian mobility, albeit to track the mobility of construction workers on a construction site (Neuhausen, Pawlowski, & Konig, 2020). In the outdoor recreation sector, Staab and colleagues (2021) monitored trail visitors captured by trail cameras and machine learning based computer vision, concluding that such methods can provide accurate visitor monitoring information at low cost (Staab, Udas, Mayer, Taubenbock, & Job, 2021). These methods of 'people tracking' have been noted to be a cost-effective method of surveillance and one which may hold potential to be used in the evaluation of a systems approach to walking. Although there are some examples of machine learning methods being employed to distinguish between PA types in children (Ahmadi, Chowdhury, Pavey, & Trost, 2020) and in adults (Willetts, Hollowell, Aslett, Holmes, & Doherty, 2018), the body of evidence utilising these methods to describe walking behaviour remains relatively unexplored.

As noted previously, the largest opportunities for the many research homes of walking measurement may lie in the corroboration of multiple datasets to provide a more accurate depiction of walking behaviour. Using multiple sources of data from different disciplines and methodological approaches, may provide an opportunity for more in-depth insights to be achieved into walking behaviour, surveillance and monitoring. This mirrors the argument put forward by Ogilvie and colleagues (2020) that the body of evidence used in public health best-practice should represent a 'dry stone wall' of heterogeneous study designs and data types of 'different shapes and sizes'. Although this may be perceived as sacrificing 'scientific rigour' (Akobeng, 2005), utilising and combining multiple forms of data to inform decision making may help adopt a more holistic, systems-based approach to walking promotion and evaluation. One method of making heterogeneous walking related data accessible and usable to policy makers, researchers, and practitioners, is through the collation and curation of multiple data sources. To this end, an accessible portal of recreational trail use data has been called for by researchers at the EU level (Schagner, Maes, Brander, Paracchini, & Hartje, 2017).

TrailGazers is a trans-European project involving multiple European countries which aims to revitalise communities through the development and promotion of trails (Madden et al., 2021). The TrailGazers project involves work relating to the collation of footfall counter data with other forms of openly available data pertaining to trail use for park managers to use in a harmonised trail data dashboard (Madden et al., 2021). Although this would be beneficial to those working in outdoor recreation research and practice, there are limited examples of such resources in the Irish context. One example exists from Essex in the United Kingdom, whereby demographic data such as deprivation scores, crime rates, age and gender, are collated and presented with PA data in an interactive tool for those working in the PA system in Essex to use (Essex Learning Disability Partnership, 2021). However, much of the synthesis and harmonisation of walking data remains in the form of meta-analyses and systematic reviews (Murphy, Nevill, Murtagh, & Holder, 2007; Kassavou, Turner, & French, 2013; Hanson & Jones, 2015; Kelly, Williamson, Niven, Mutrie, & Richards, 2018). Some examples do exist within the literature of the triangulation of two or more sources of data to help elicit the reliability and

validity of various proxy measures of mobility behaviour including Google Community Mobility Reports (GCMR) (Ilin, et al., 2021) and Strava (Venter, Barton, Gundersen, & Figari, 2020). Providing system actors within the walking system with usable, accessible, and interpretable evidence from multiple sources to apply to their work and decision making via a data dashboard or portal may begin to address some of the 'siloed' thinking that exists within PA (and walking) systems (Mead, Fisher, & Kemp, 2021).

2.5. – Summary and rationale

Walking is a multifaceted form of PA which is of interest to stakeholders from many sectoral, disciplinary, and political homes. The factors which influence walking are also heterogeneous in nature, ranging from individual level factors (i.e., motivation to walk) to systems level factors (i.e., safe walkable environments). Walking has been described as 'the nearest activity to perfect exercise' (p.328) (Morris and Hardman, 1997), and the benefits of more people walking more often for public and planetary health are well described. Global PA levels are still low, and walking can act as an accessible form of PA for those who are most inactive. Moreover, investing in walking and cycling at the global scale has been identified as a key priority area amongst the global PA community (International Society for Physical Activity and Health, 2020).

As of late, research efforts have shifted towards adopting approaches which work with and embrace the inherent complexity of physical inactivity. The use of systems approaches to understand the interconnections between policies, programmes, organisations, and data which are embedded within PA systems has increased (Nau et al., 2022). More importantly, systems approaches to PA have shown the potential to alig and mobilise skills and resources from multidisciplinary stakeholders towards impacting across multiple areas of a system concurrently. However, the evidence base pertaining to the application of systems approaches to public health has been criticised for remaining at the conceptual and theoretical level (Chugtai and Blanchet, 2017; Finegood, 2020). To this end, more evidence has been called for which highlights the real-world value of such approaches (Nau et al., 2022). Moreover, there is little evidence of the application of systems approaches to

walking. Building an understanding of the utility of applying such approaches to local and national walking promotion may prove fruitful for increasing inactive populations, and thus improving public and planetary health.

This thesis aims to contribute to this gap in knowledge, by investigating the utility of systems approaches to understand and strengthen walking promotion at local and national level in Ireland.

Chapter 3: Applying a systems lens to walking policy in Ireland.

3.1 – Introduction

A policy landscape which contains policies which are aligned vertically (between policy levels) and horizontally (across policy sectors) has been identified as a key supporting factor to achieving physically active populations (Ramírez Varela et al., 2022). Global frameworks such as the United Nations' Sustainable Development Goals (United Nations, 2015) and the World Health Organisation's Global Action Plan on Physical Activity 2018-2030 (World Health Organisation, 2018) can be used to facilitate policy alignment and a systems-oriented view of physical activity (PA) promotion and research (Bauman, 2021; Salvo et al., 2021; Murphy et al., 2021).

The work of this chapter applies a systems lens to walking in Ireland, through a mixed methods study of walking policy in Ireland and its alignment, or convergence, with national strategic outcomes and international development goals. The contributions of this chapter are twofold. Firstly, this work provides an overview of the policy landscape pertaining to walking in Ireland, and a critical overview of the policy system in which the lead researcher is embedded. Secondly, the findings of the present study helped inform the development processes of Get Ireland Walking's updated strategic plan to ensure alignment with broader targets. The contents of this chapter are presented in the form of an academic journal article (Power, Lambe and Murphy, 2023). Following this, the implications of the study for research and for practice are presented.

3.2 – Aims and objectives

This chapter will address the following aim:

- Investigate the wider societal impacts of walking and the work of Get Ireland Walking.

To address this aim, several objectives will guide the work conducted within this chapter:

1. Conduct a content analysis of national and local level walking policies in Ireland.

2. Assess the contribution of walking policy in Ireland to the attainment of national and international development goals.

The aims and objectives set out in this chapter were addressed through the work presented in a published academic journal article. The citation for the paper presented below is as follows:

Power D, Lambe B and Murphy N (2023). A critical analysis of walking policy in Ireland and its contribution to both national and international development goals. Front. Sports Act. Living 5:1125636. doi: 10.3389/fspor.2023.1125636

Supplementary files relevant to this publication can be found in Appendices 1-4.

Publication 1: A critical analysis of walking policy in Ireland and its contribution to both national and international development goals (Power, Lambe and Murphy, 2023).

Abstract

Introduction: Increasing population levels of walking holds benefits for public and planetary health. While individual level interventions to promote walking have been shown to be efficacious, upstream interventions such as policies harness the greatest potential for impact at the population level. However, little is known about the nature and presence of walking policy in Ireland and the extent to which it aligns to national and global goals. This paper aims to provide an overview of local and national walking policy in Ireland and to understand the potential of Irish walking policy to contribute to national and global targets. **Methods:** This study used multiple methods to provide a critical overview of walking policy. Firstly, a six-phase process was employed to conduct a content analysis of local and national walking policy in Ireland. Secondly, conceptual linkage exercises were conducted to assess the contribution of walking, and national walking policy in Ireland, to Ireland's National Strategic Outcomes and the United Nations Sustainable Development Goals. **Results:** Overall, half (n = 13) of the counties in the Republic of Ireland were found to have no local level walking policies. Results from the content analysis suggest that counties which had walking specific local level policies (n = 2) were outdated by almost two decades. Walking was identified to hold the potential to contribute to over half (n = 6) of Ireland's National Strategic Outcomes, and over half (n = 7) of the United Nations Sustainable Development Goals. Ireland's only national level walking specific policy, the Get Ireland Walking Strategy and Action Plan 2017–2020, was identified to potentially contribute to four of Ireland's National Strategic Outcomes and three United Nations Sustainable Development Goals. **Discussion:** Multidisciplinary action is required to update walking-related policy with embedded evaluation and governance mechanisms in all local walking systems. Furthermore, given sufficient collaboration across sectors, walking policy in Ireland has the potential to contribute to a wider breadth of national and global targets beyond the health, sport, tourism, and transport sectors.

Keywords: Walking, content analysis, physical activity policy, pragmatic, Sustainable Development Goals

Introduction

The introduction of systems thinking in public health practice and research has provided stakeholders embedded within public health systems new perspectives on the interconnections between their own work, and the work of organisations from other sectors and disciplines in the system (1, 2). Many conceptual tools, such as applying a systems lens or "systems framing" have been adopted by researchers and practitioners to help stakeholders to develop a systems oriented view of the systems which they are embedded within (2, 3). Oftentimes, this involves asking stakeholders to "take a step back" and can offer stakeholders insight into the wider goals and systems that they influence/are influenced by. Physical activity (PA) policy researchers have begun to develop conceptual frameworks to assist with this notion of "zooming out" in order to understand the interconnections across policy sectors, disciplines and organisations involved in all stages of PA policy (4). At a global level, in 2015, the United Nations published the 2030 Agenda for Sustainable Development, which provides all member states of the United Nations a "shared blueprint for peace and prosperity for people and the planet" (5). At the core of the 2030 Agenda for Sustainable Development are 17 goals, termed the Sustainable Development Goals (SDGs). The SDGs require international, national, and local partnerships and policies to achieve high-level goals which aim to improve health, education, reduce inequalities, tackle climate change and end poverty across all United Nations member states (5).

The relationship between the SDGs and PA has garnered recent research attention. In a mixed methods paper, Salvo et al. (6) used agent-based modelling, a conceptual linkage exercise, and a scoping review of the literature to explore the synergy between at scale PA promotion and the SDGs. Salvo and colleagues found at scale PA promotion may hold possible benefits for 15 SDGs (6). Moreover, Bauman (7) put forward an argument which outlines the potential for the sustainable development agenda to revitalise international PA promotion and research, by facilitating a broader, more systems-oriented view of the impacts of PA. Among many factors, the lack of upstream interventions, such as policies, promoting PA has led to stagnating physical inactivity levels globally and an evidence base congested with individual level, cross sectional studies (8, 9). The recent shift towards systems

approaches to PA has begun to incorporate sectors beyond health, sport and transport in to conversations pertaining to PA (3, 10–12). However, ensuring PA policy and research decisions are transparent with global targets can supplement whole-of-systems approaches and can provide a new momentum to PA promotion (7).

Some organisations in the PA system have used the SDGs as a roadmap to determine the impact of their work and policies on the SDGs. For example, in a conceptual mapping exercise assessing the potential contribution of sports policies to the attainment of SDGs across countries in the Commonwealth, Sherry and colleagues (13) found direct links between some SDGs (SDG 3; SDG 4; SDG 10; and SDG 16) and actions within national sports policies across the Commonwealth. However, the findings also allowed Sherry and colleagues (13) to identify opportunities for sport policies to extend their scope and contribute to other SDG targets pertaining to much broader societal issues such as climate change (SDG 13). At a more granular level, Amosa and Lauff (14) determined the contribution of sport policies in Fiji and Samoa on the attainment of SDG goals through a similar conceptual mapping exercise. Amosa and Lauff found a list of context specific indicator datasets which can help monitor progress towards 132 of the 232 SDG indicators (14). Exercises such as those mentioned (6, 13, 14) can provide the opportunity to view the work of an organisation, or national level policies through an SDG lens. This, in turn, allows opportunities for data collection, intervention implementation, and policy development to be identified and informed. Although investment in promoting more walking and cycling has been suggested to be one of the "8 Investments that work for Physical Activity" (15), there is little known about how walking or cycling can specifically contribute to higher level goals.

Scotland's national walking promotion organisation, Paths for All, have made efforts to ensure alignment between the work conducted through the organisation at local and national level to global level objectives for PA outlined in the Global Action Plan for Physical Activity 2018–2030 (16, 17). In 2020, the Irish government have allocated €1 m per day to walking and cycling promotion and development (18), and there is an opportunity now to understand the potential contribution that increased walking levels may have on national and global targets. Get Ireland Walking, a national walking promotion organisation, was established in 2013 with the aim of

intertwining the work of intersectoral and multidisciplinary organisations with a direct and indirect role in walking in Ireland at national level. The work of the organisation was guided by a national level action plan, the Get Ireland Walking Strategy and Action Plan 2017–2020 (GIWSAP) (19), following its publication in 2017. Gaining an understanding of how the work of Get Ireland Walking aligns with local level walking policies, national level targets, and the global agenda would benefit the next iteration of the GIWSAP. As of October 2022, Get Ireland Walking were undergoing the development stages of a new national walking strategy— succeeding the organisations' previous document – which will be published in 2023.

This aim of this paper is to provide a critical overview of walking policy at local and national level in Ireland across multiple domains using multiple methods with the intention of informing the next iteration of national walking policy in Ireland.

Methods and materials

This paper uses a mixed methods approach to analyse local and national level walking policies in Ireland across multiple domains. Firstly, a content analysis of local and national walking policies in Ireland was conducted. Secondly, conceptual linkage exercises were carried out to identify the potential contribution of walking, and the specific work of GIW, in attaining national and global level goals. The methods utilised for both objectives are described separately below.

Objective 1: Conduct a content analysis of national and local level walking policies in Ireland

A content analysis of local and national level walking policies in Ireland was conducted using a multi-phased approach. As outlined in Figure 3.1, there were six phases involved in the content analysis of walking related policies in Ireland. The methods utilised in each phase is described below.
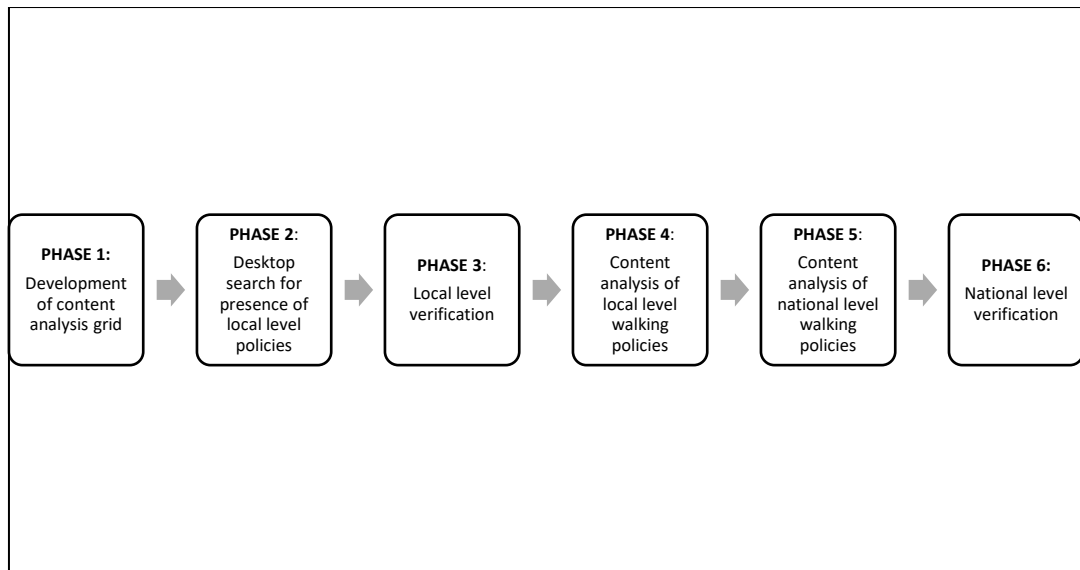
Figure 3.1: Workflow for local and national level walking policy analysis.

Phase 1: Development of content analysis grid

To assess local and national level walking policy documents, a content analysis grid
was developed and adapted from two existing PA policy audit/assessment tools. The
two tools were: (1) The HARDWIRED criteria (20); and (2) the Comprehensive
Analysis of Policy on Physical Activity (CAPPA) framework (21). The purpose of
the development of a content analysis grid was to ensure a standardised process of
assessing the quality of PA policies according to a set of indicators (22).

The CAPPA framework provides a conceptual framework within which to frame
analyses of PA policy and was developed through an extensive review of literature,
an open discussion between authors, a multiple phase Delphi process and a
consultation process with PA policy stakeholders (21). The CAPPA framework
allows researchers to situate and direct the scope of research studies relating to the
assessment and auditing of PA policies across six categories: (1) Purpose of analysis;
(2) Policy level; (3) Policy sector; (4) Type of policy; (5) Stage of policy cycle; and
(6) Scope of the analysis. The "Scope of the Analysis" section outlines over twenty
sample questions which users of the CAPPA framework can utilise to guide the
analysis of PA policy across seven areas (Availability; Context; Processes; Actors;
Political Will; Content; and Effects).

The HARDWIRED criteria are a set of characteristics of national PA-related policy which are deemed "absolutely essential" in order for PA policies to achieve successful outcomes at the population level (20). The methodology used by Bellew and colleagues (20) to develop the list of criteria comprised of a literature and policy review, audit of relevant websites, document searches and surveys of international stakeholders. The criteria are: (1) Highly consultative in development; (2) Active through multi-strategic, multi-level, partnerships; (3) Resourced adequately; (4) Developed in stand-alone and synergistic policy modes; (5) Widely communicated; (6) Independently evaluated; (7) Role-clarified and performance delineated; (8) Evidence informed and Evidence-generating; and, (9) Defined national guidelines for health enhancing physical activity. Short statements are provided for each criterion, allowing users of the HARDWIRED criteria to rate PA policies of interest in accordance with the extent they meet the criteria.

To combine both tools, questions were formulated by the lead researcher (DP) which represented the short statements outlined within each of the HARDWIRED criteria and combined with the corresponding heading of the Scope of the Analysis section in the CAPPA framework (Supplementary file S1). Following this process, a combined list of questions (n = 36) across the seven headings in the scope of the analysis section of the CAPPA framework (21) was developed. Several questions deemed to be eliciting similar information were removed and a final composite content analysis tool containing twenty-three (n = 23) questions was used to assess local and national level walking policies in Ireland (Supplementary file S1). The approach taken to PA policy content analysis replicates the process used by Daugberg and colleagues (22), who used a content analysis grid across a range of indicators to analyse the contents of 27 national PA policies in the European region.

Phase 2: Desktop search for presence of local walking polices
Formative research was conducted to provide the contextual backdrop to local and national walking policies in Ireland. Firstly, online searches of local authority websites and grey literature were conducted which aimed to investigate the presence of local level walking policies for all counties within the Republic of Ireland (n = 26). Local Authority, Local Sports Partnership, and other relevant websites were searched manually for policy documents relating to the promotion and development

of walking. Formal written policies, as per the definition offered by Klepac-Pogrmilovic et al (21), which focused specifically on the promotion and development of walking or included walking as part of an active travel or walking and cycling related strategy, were included for analysis. County Development Plans (CDP) and Local Sports Partnership Strategic Plans were not included for analysis as not all counties had published a CDP at the time of analysis and is beyond the scope of the current study.

Phase 3: Local level verification phase

An employee of all Local Sports Partnerships (n = 29) was purposively recruited (n = 18, 69% response rate) for a short follow up phone call. The purpose of the phone calls was to clarify the findings of the desktop research (Phase 2). Contact details were obtained from the openly accessible Sport Ireland directory of Local Sports Partnership contact details on the Sport Ireland website. Findings relating to the presence of walking related policies in each county were separated into three categories: (a) No walking policy document; (b) Outdated walking policy; and (c) Walking policy present (2015-present). All policy documents retrieved from the online search which met the inclusion criteria and were in the implementation phase no earlier than 2015 were included for further analysis using the adapted content analysis grid developed in Phase 1. All policies found to meet these criteria but preceded 2015 were labelled as "outdated" and not included for further analysis. Policies older than 2015 were excluded due to changes in many contextual factors including Coronavirus-2019 (COVID-19).

Phase 4: Content analysis of local level walking policies

The content of each local level walking policy was investigated by the lead researcher (DP) through the application of the content analysis grid. The use of a content analysis grid allows researchers to identify differences among documents according to a list of criteria. The lead researcher (DP) screened each local level walking policy and provided statements for each of the criterion (n = 23) outlined within the content analysis grid. The accuracy of the statements provided for each policy were clarified by the authorship team (NM & BL).

Phase 5: Content analysis of national level walking specific policies

Given the embedded role of the lead researcher (DP) within Get Ireland Walking and the academic and practical experience of the authorship team (BL & NM) in the areas of PA promotion and policy development in Ireland, there was a pre-existing knowledge base in relation to national level walking specific policies in Ireland. Get Ireland Walking's first strategic document, the GIWSAP (19), was published in 2017 and was the only national level walking specific policy document at the time of writing. The GIWSAP outlined 41 actions to be delivered across seven thematic areas by 30 multidisciplinary organisational partners.

Phase 6: National level verification
Following the process outlined in Phase 5, a senior member of the GIW staff provided additional details and substantiated the findings in an online meeting which was convened between the lead researcher (DP) and the programme manager of GIW. Specific clarification was sought on questions relating to context (Question 4), processes (Questions 6 and 7), actors (Questions 9 and 11), and political will (Question 12) (Supplementary File S1).

Objective 2: Assess the contribution of (a) walking, and (b) Get Ireland Walking's Strategy and Action Plan 2017-2020, to attaining national and global level targets.

Conceptual linkage exercises were conducted to understand the contribution of walking, and the GIWSAP, to attaining Ireland's national targets and global level targets set by the United Nations. Figure 3.2 outlines the workflow involved in the completion of all conceptual linkage exercises conducted as part of this study. The Government of Ireland published the National Development Plan 2021–2030 which outlines ten National Strategic Outcomes (NSOs) for the Irish government to achieve over a ten year period in relation to health, transport, education, and climate change (23). At the global level, the 2030 Agenda for Sustainable Development published by the United Nations outlines 17 goals, termed the Sustainable Development Goals (SDGs), which require international, national, and local partnerships to achieve high-level goals which aim to improve health, education, reduce inequalities, tackle climate change and end poverty across all United Nations member states (5).

Conceptual linkage exercises were conducted to assess how the GIWSAP may contribute to attaining national (NSOs) and global (SDGs) targets which were identified as relevant to walking. All the conceptual linkage exercises followed a similar process to that described by Salvo et al. (6), which relied on deductive logic and the expertise of researchers.

Conceptual linkage exercises 1(a) and 2(a): The contribution of walking to national and global goals

Members of the authorship team (DP & NM) are involved in forthcoming work from inFocus Consulting and Sport Ireland which identified 11 SDGs and 47 SDG targets that were related to PA, physical education, and sport policy in Ireland. These findings were used as the basis of the current study. Therefore, at the global level, 47 SDG targets from 11 SDGs were screened and rated in accordance to their relevance to walking. At the national level, 89 targets from 10 NSOs were screened and rated in accordance to their relevance to walking. Walking, in this context, means "more people walking more often" and can hold a bidirectional relationship with SDG targets. For example, SDG Target 3.4 "By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being" can be partly achieved through increased levels of PA which can be partly obtained by increases in walking levels at the population level. In another example, the SDG Target 11.7 "By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities" can offer spaces and places for people to walk more often. The lead researcher (DP) conducted the initial screening and rated each SDG and NSO target in accordance to their relevance to walking (highly relevant; partially relevant; not relevant). This rating was subjective and relied on the knowledge of the researcher and their practical experience of being embedded in a national walking promotion organisation. The accuracy of the ratings assigned to all NSO and SDG targets by the lead researcher (DP) was confirmed by the authorship team (NM & BL) and disagreements were resolved through critical discussion.

Conceptual linkages exercise 1(b) and 2(b): The contribution of the Get Ireland Walking Strategy and Action Plan 2017-2020 to national and global level targets

A similar exercise was carried out to highlight the contribution of specific actions within the GIWSAP (n = 41) to global (SDG) and national (NSO) goals. Only SDG and NSO targets identified as highly relevant and partially relevant to walking in conceptual linkage exercises 1(a) and 2(a) were included for further analysis exercises 2(a) and 2(b), respectively. The United Nations SDG targets and the GIWSAP actions were linked if the successful implementation of the Get Ireland Walking action, at scale, was identified by the lead author (DP) and authorship team (NM & BL) to have the potential to contribute to attaining an SDG target. For example, SDG target 3.4 "By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being" can partly be achieved through increasing PA levels in those which are the most inactive. Get Ireland Walking implement community-based walking programmes nationally which target inactive population groups, and is an action outlined in the GIWSAP (Action 5.1) (19). The lead researcher (DP) in the current example, identified a plausible contribution of the successful implementation of Action 5.1 in the GIWSAP and the attainment of SDG target 3.4. This process was replicated for all SDG and NSO targets. The authorship team (NM & BL) confirmed the accuracy of the initial ratings of the lead researcher (DP) and disagreements were resolved through critical discussion.
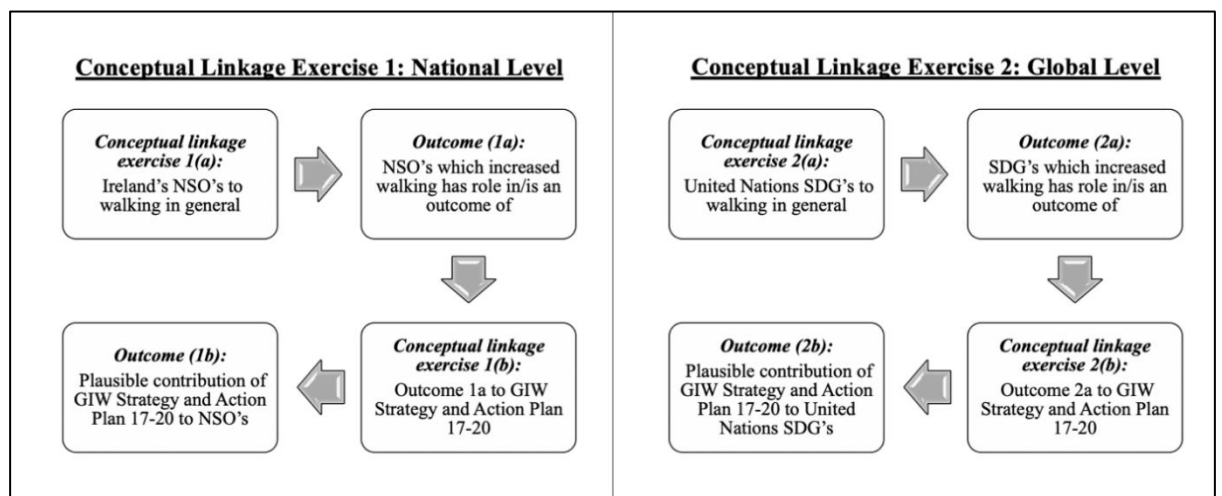
Figure 3.2: Conceptual linkage exercises workflow. (NSOs – National Strategic Outcomes; SDG's – Sustainable Development Goals).

Results

Objective 1: Conduct a content analysis of national and local level walking strategies in Ireland

Local level walking policies in Ireland

Overall, the findings from this study suggest that half (n = 13) of counties in the Republic of Ireland do not currently, or have never had, a walking related local level policy document. Figure 3.3 provides a map of the counties within the Republic of Ireland according to the presence of local level walking policies. For the counties that were found to have a local level walking policy in the implementation phase between 2015 and the time of writing (n = 8) (24–31), only one county (Cork) (24) was found to have a walking specific policy. The remaining policies contained walking related actions within a broader scope, including walking and cycling (n = 1) (29), tourism (n = 2) (28, 30), outdoor recreation (n = 2) (25, 31), urban design (n = 1) (27), and greenway development (n = 1) (26). Five counties were found to have outdated walking related policies. Of these, Waterford was the only county identified to have had a walking specific policy which, at the time of writing, was outdated by almost two decades (32). Below is a summary of results from the application of the content analysis grid to each walking related policy from 2015-present (n = 8). Full details of the content analysis can be found in Supplementary file S2.
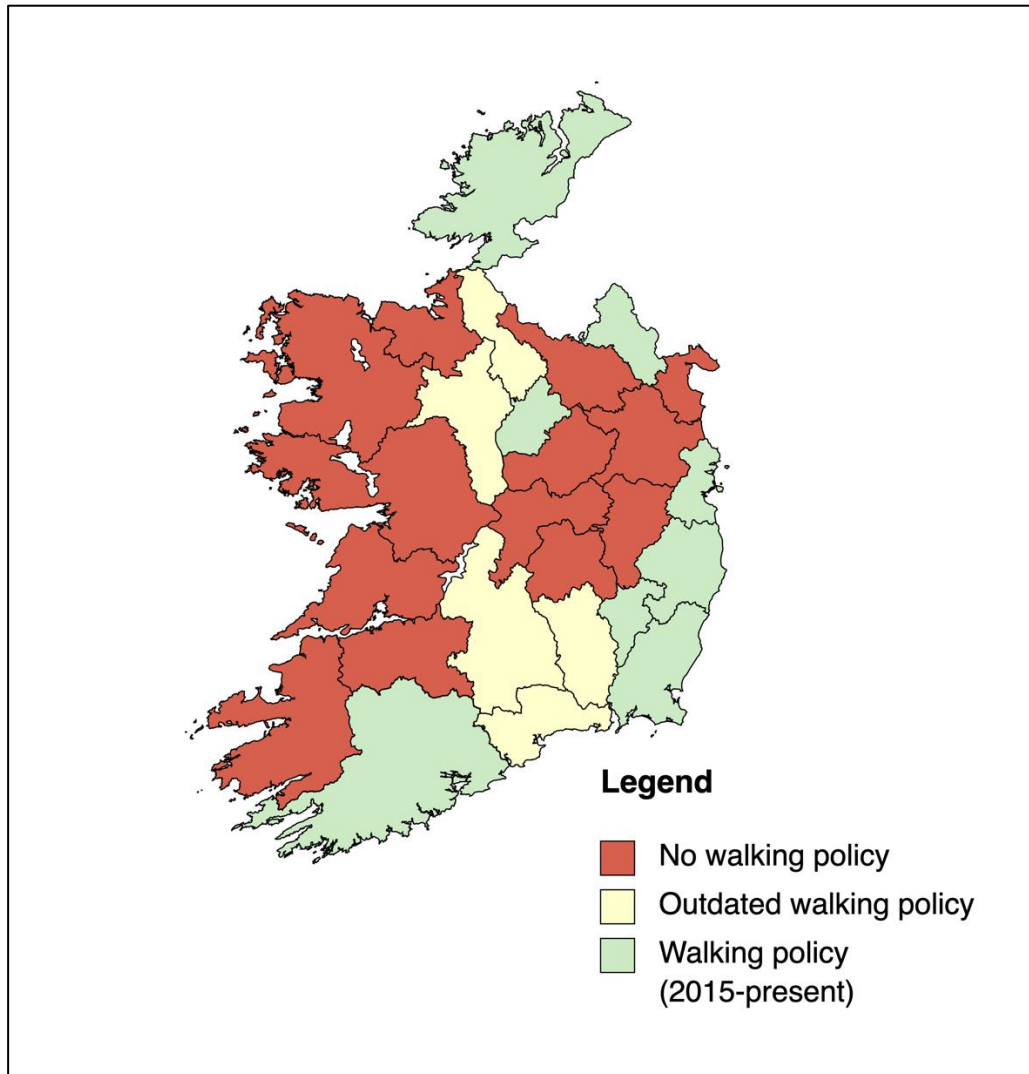
Figure 3.3: County by county breakdown of presence of walking policies. (Credit: mapchart.net).

1. Context

All local level walking related policies included in the content analysis (n = 8) were found to have outlined the broader policy context within which the policy sits. Furthermore, all policies outlined the relationship of the policy to other local and national policies from multiple sectors including health, planning, transport, and tourism. However, walking promotion and development was not the primary objective in all policies. One county (Wicklow) (31) specified the nature of funding

sources supporting the implementation of the policy, whereas the funding sources supporting the implementation of policies in all other counties was unknown.

2. Processes

All policies included in the content analysis were consultative in development. The processes involved in policy development in all eight counties involved activities such as public meetings, interviews and online questionnaires. Less than half (n = 3) of local level policies included in the analysis conducted a context specific needs assessment to direct the actions within the policies (28–30). The majority (n = 5) (24, 25, 28–31) of policies included actions relating to the development of a communications strategy to support the implementation of the policy.

3. Actors

All (n = 8) policies were multidisciplinary in nature. Organisations from multiple sectors including health, outdoor recreation, sport, local government and tourism were engaged in the development processes of all policies included in the analysis.

4. Political will

There was no information relating to sustained political and stakeholder support on an ongoing basis or in the development process of any policy included in the analysis.

5. Content

Seven of the eight policies outlined the identified timelines for the implementation period of the policy (24, 25, 27–31). One policy (Donegal) (26) specified no timeframe for implementation. Half (n = 4) (25, 28, 30, 31) of the policies included a combination of upstream and downstream actions, one policy contained predominantly downstream actions (29), two (26, 27) contained predominantly upstream actions, and one was unclear (24).

6. Effect

The evaluation and monitoring mechanisms included in most policies was poor. Over half (n = 5) (21, 24, 26, 27, 30) of the policies did not specify any mechanisms to evaluate the implementation of the policy. For those that did (n = 3), two were

found to include internal monitoring mechanisms, i.e., stakeholders self-report implementation progress (28, 29) and one highlighted a local university as a body that would assist with evaluation (25).

National level walking policies in Ireland

The following sections provides an overview of the application of the composite policy content analysis tool to the only walking specific national level strategic document in Ireland, the GIWSAP (19) (see Table 3.1).

1. Context

Get Ireland Walking received funding from Sport Ireland and Healthy Ireland in 2017. In 2018, annual funding for the initiative increased through the Dormant Account funds. The GIWSAP, at the time of publication, sat within the broader national PA policy context in Ireland. For example, Action 43 of the National Physical Activity Plan 2016–2020 (33) outlines Get Ireland Walking as a lead partner. Although Get Ireland Walking has both national and local remits, the GIWSAP was found to lack local level delivery mechanisms which feed into the implementation of the GIWSAP at national level. Given the lack of political leverage of Get Ireland Walking, there was little capacity to embed actions into interagency programmes of work to ensure accountability and transparency.

2. Processes

In order to progress the GIWSAP to the implementation phase, the Get Ireland Walking advisory group, consisting of 15 stakeholders from Sport Ireland, the Department of Health, Get Ireland Walking, the Health Service Executive, Ireland Active, the Irish Heart Foundation, and Mountaineering Ireland, developed the preliminary list of actions and nominated organisations to implement the actions as lead organisations or collaborators. Following this, a consultation process of 30 individual interviews with partner organisations were conducted in 2016 to determine the capacity for nominated organisations to act as lead partners or collaborators on assigned actions.

3. Actors

Actions within the GIWSAP were assigned to intersectoral organisations operating at multiple levels. For example, the GIWSAP engages with organisations operating at grass roots level (i.e., Local Sports Partnership network) and policymakers (i.e., Department of Health). Progress relating to the implementation of the actions within the GIWSAP were monitored through an annual self-report monitoring report completed by organisations. This was completed inconsistently over the implementation period of the GIWSAP.

4. Political will

Throughout the development process of the GIWSAP, no government official or political figure supported or engaged in the development process of the GIWSAP. However, the GIWSAP was officially launched by An Taoiseach (Prime Minister) Leo Varadkar and Minister for Health Simon Harris in 2017.

5. Content

The overall implementation period of the GIWSAP is clearly defined (2017–2020) and annual timelines are assigned to each action (i.e., completed by end of 2019). The content of the actions and thematic areas outlined within the GIWSAP varies and outlines actions and sections which focus on specific target groups (i.e., children and young people). Although lead partners and collaborators are assigned to each action, the exact roles of each organisation and what represents successful implementation is not stated.

6. Effects

The GIWSAP was not evaluated independently. However Get Ireland Walking (as an initiative of Sport Ireland) was independently evaluated in 2022. Progress on the implementation of the GIWSAP was monitored annually through stakeholders self-reporting their progress on actions according to a traffic light system. Although the Irish Sports Monitor is an established national level survey measuring self-reported recreation and transport walking, the impact of the SAP on population levels of walking in Ireland is unknown.

Table 3.1: Content analysis of the Get Ireland Walking Strategy and Action Plan 2017-2020.

Scope of policy analysis section	Composite policy audit checklist	Get Ireland Walking Strategy and Action Plan (2017-2020)
Availability	**1.** Is there a national walking strategy for Ireland?	Yes.
Context	**2.** What was the key stimulus for policy action?	The previous year (2016) saw the publication of Ireland's first National Physical Activity Plan, within which Get Ireland Walking were a key partner on delivering Action 43 aimed to increase the number of community walking programmes across the Local Sports Partnership network by 100 per annum.
	3. Were local level strategies developed according to the separation of powers doctrine?	No. However, there is work ongoing in Cork as part of a PhD project which will feed into the next iteration of the national strategy.
	4. What budget was allocated for the implementation of the policy?	No specific budget for the implementation of Strategy. In 2017, the initiative received €145k from Sport Ireland and Healthy Ireland. The Get Ireland Walking initiative was awarded an additional €100k through Dormant Accounts funding in 2018.
	5. Does the policy have a clear statement which is also embedded in other policy agendas?	The vision of Get Ireland Walking is to maximise the amount of people who walk regularly on the island of Ireland. Smarter Travel and the Design Manual for Urban Roads and Streets are both related policy documents yet outline a broader agenda.
Processes	**6.** What process did the strategy have to go through to be implemented?	Advisory group drafted initial draft of the Strategy. Individual interviews with stakeholders (n=30) from government agencies, sporting bodies, charities, and not-for-profit were conducted to

		determine actions they could they lead on and could collaborate on. Stakeholder decided whether they could lead or collaborate on specific actions.
	7. Was a stakeholder analysis and needs assessment conducted to ensure widespread representation from interdisciplinary stakeholders at the early stages of strategy development?	Members of the advisory group (n=15) (chaired by Sport Ireland) nominated relevant stakeholders to engage in the strategy development process. No reference to stakeholder analysis or needs assessment.
	8. What mechanisms are in place to support the dissemination of the strategy?	Action 1.1: Develop and implement a three-year Get Ireland Walking communications strategy. Get Ireland Walking communications strategy was published in 2019. No document outlining tailoring of Strategy content to needs of heterogenous stakeholders i.e., policymakers, researchers.
Actors	**9.** Does the strategy engage with grassroots practitioners, as well as policymakers, and define the organisational links between them?	30 partners organisations from multiple sectors mentioned as key partners and/or collaborators in the strategy. Organisations operate at levels ranging from policymakers to local level practitioners.
	10. What were the power relations between the actors involved in the development process?	Organisations involved at the consultation process, although have local level work programmes, all operate nationally. Organisations such as Department of Health, Health Service Executive and Sport Ireland are key policymaking organisations and provide core funding to other organisations on the list of partners and collaborators. For example, Local Sports

		Partnerships funded by Sport Ireland, Irish Heart Foundation part-funded through Health Service Executive.
	11. Were actions within the strategy progressed through intersectoral partnerships?	Yes, as most actions within the strategy were the responsibility of organisations from multiple sectors. However, no insight into the extent to which actions were implemented or evaluated. Progressed monitored only through self-report traffic light system (annually).
Political will	**12.** Did any political actor in power publicly express support to the development of the strategy?	An Taoiseach Leo Varadkar and Minister for Health Minister Simon Harris officially launched the Strategy in 2017.
	13. Is there a stable base of political and stakeholder support as well as sustained investment over the long term?	The Get Ireland Walking initiative is funded through dormant accounts funding, Healthy Ireland and Sport Ireland funding streams and is reviewed on an annual basis.
	14. Does the government hold regular discussions with the aim to support the implementation of the strategy?	No.
Content	**15.** Are the roles and responsibilities of organisations involved in strategy implementation well clarified and is there a common understanding of, and agreement on, how 'successful implementation' is to be defined and measured?	Organisations have been assigned as either (a) lead partners of (b) collaborators on all actions within the Strategy. No consensus on successful implementation, evaluation, or dates for accountability purposes outlined. Progressed monitored only through self-report traffic light system (annually).
	16. Does the strategy have a clear statement on the timeframe for policy implementation?	Yes (2017-2020). Annual deadlines assigned to the implementation of specific actions. Get Ireland Walking implements an operational plan internally with the support and

		guidance of the National Governing Body, Mountaineering Ireland.
	17. Does the strategy reference specific target groups?	Yes. Actions within various themes focus on children and young people, mental health service users, and community-based walking programmes for inactive populations. Lead organisations are assigned to each action.
	18. Is the policy content predominantly 'downstream' or 'upstream'?	Combination of both. There are both examples of actions which pertain to the implementation of community-based programmes (downstream) and facilitating policy alignment across sectors (upstream) mentioned within the strategy.
	19. Does the strategy outline a comprehensive approach using multiple strategies at multiple levels targeting multiple population groups?	Yes. The Strategy outlines actions which range from individual level interventions to higher level interventions.
Effects	**20.** Is the evaluation conducted by an independent body which is not connected to the government or 'policy owners'?	The overall Get Ireland Walking initiative was evaluated by a consultancy company in 2022. The evaluation involved the co-development of key performance indicators and evaluated Get Ireland Walking on progress to those key performance indicators since 2013. Self-report traffic light system was in place throughout the implementation of the Strategy results are unknown.
	21. Is there systematic surveillance of population levels of walking?	Yes. The Irish Sports Monitor monitors trends in self-reported recreational and transport walking data biannually in Ireland. Transport related walking monitored in Census every five years.

22. What kind of impact did the strategy have on walking levels?   Unknown/Not measured.

23. Were there any unintended consequences of the

implementation of the strategy?   Unknown/Not measured.

Objective 2: Assess the contribution of (a) walking, and (b) Get Ireland Walking's Strategy and Action Plan 2017-2020, to attaining national and global level targets.

The results for Objective 2 are presented in four sections. Each section relates to the outcomes of the four conceptual linkage exercises outlined in Figure 3.2 to assess the contribution of walking to attaining global and national level targets (1a and 2a), and the contribution of the GIWSAP to attaining global and national level targets (1b and 2b).

Conceptual linkage exercise 1(a): The contribution of walking in attaining national level targets in Ireland

Overall, there were 88 NSO targets across 10 NSOs which were screened by the authorship team. Following the conceptual linkage exercise, 28 NSO targets within six NSOs were identified to hold bi-directional relationships to walking. Specific target statements were identified within NSOs which were related to sustainable mobility (NSO 4), strengthening local economy (NSO 3), improving access to amenities (NSO 7), quality education and healthcare (NSO 10), intercity accessibility (NSO 2) and sustainable growth of towns and cities (NSO 1). Table 3.2 highlights the full list of NSO targets which were identified as partially or highly relevant to walking. Of the 28 NSO target statements identified as relevant to walking, over half (n = 15) of the targets were identified as highly relevant to walking.

Table 3.2: National Strategic Outcomes (NSO) and associated NSO targets identified as relevant to walking.

National Strategic Outcome	National Strategic Outcome Target Statement	NSO target relevance to walking
NSO 1: Compact Growth	1.1 - Enable urban infill development that would not otherwise occur	Partially relevant
	1.2 - Improve 'liveability' and quality of life, enabling greater densities of development to be achieved	Highly relevant
	1.3 - Encourage economic development and job creation, by creating conditions to attract internationally mobile investment and opportunities for indigenous enterprise growth	Partially relevant
	1.4 - Building on existing assets and capacity to create critical mass and scale for regional growth	Partially relevant
	1.5 - Improve accessibility to and between centres of mass and scale and better integration with their surrounding areas	Highly relevant
	1.6 - Ensure transition to more sustainable modes of travel (walking, cycling, public transport) and energy consumption (efficiency, renewables) within an urban context	Highly relevant
	1.7 - Encourage labour mobility to support employment-led growth, including affordable housing, education/skills development and improved community and family services including childcare	Partially relevant

	1.8 -Enhance the attractiveness, viability and vibrancy of smaller towns and villages and rural areas as a means of achieving more sustainable patterns and forms of development	Highly relevant
	1.9 - Ensure transition to more sustainable modes of travel (walking, cycling, public transport) and energy consumption (efficiency, renewables) within smaller towns and villages and rural areas	Highly relevant
	1.12 - Cross-boundary collaboration at county and regional level to achieve more sustainable outcomes for rural communities, e.g. applicable to shared settlements, landscapes and amenities as well as lands in state ownership	Partially relevant
NSO 2: Enhanced Regional Accessibility	2.3- Enabling more effective traffic management within and around cities and re-allocation of inner city road-space in favour of bus-based public transport services and walking/cycling facilities	Highly relevant
	2.8 - To strengthen public transport connectivity between cities and large growth towns in Ireland and Northern Ireland with improved services and reliable journey times	Partially relevant
NSO 3: Strengthened Rural Economies and Communities	3.1 - Implementation of the actions outlined in the Action Plan for Rural Development	Partially relevant
	3.3 - Implementation of a targeted Rural Regeneration and Development Fund to enable opportunities to secure the rejuvenation and re-purposing of rural towns and villages weakened by the structural changes in rural economies and settlement patterns	Partially relevant

	3.4 - Provide a quality nationwide community based public transport system in rural Ireland which responds to local needs under the Rural Transport Network and similar initiatives	Partially relevant
	3.5 – Invest in maintaining regional and local roads and strategic road improvement projects in rural areas to ensure access to critical services such as education, healthcare and employment	Partially relevant
	3.6 - Invest in greenways, blueways and peatways as part of a nationally coordinated strategy	Highly relevant
NSO 4: Sustainable mobility	4.1 - Expand attractive public transport alternatives to car transport to reduce congestion and emissions and enable the transport sector to cater for the demands associated with longer-term population and employment growth in a sustainable manner through the following measures	Highly relevant
	4.2 - Deliver the key public transport objectives of the Transport Strategy for the Greater Dublin Area 2016-2035 by investing in projects such as New Metro Link, DART Expansion Programme, BusConnects in Dublin and key bus-based projects in the other cities and towns	Partially relevant
	4.3 - Provide public transport infrastructure and services to meet the needs of smaller towns, villages and rural areas	Partially relevant
	4.4 - Develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate	Partially relevant

NSO 7: Enhanced Amenities and Heritage	7.1 - Implementation of planning and transport strategies for the five cities and other urban areas will be progressed with a major focus on improving walking and cycling routes, including continuous greenway networks and targeted measures to enhance permeability and connectivity	Highly relevant
	7.2 - The Rural and Urban Regeneration and Development Funds will support transformational public realm initiatives to give city and town centre areas back to citizens, encouraging greater city and town centre living, enhanced recreational spaces and attractiveness from a cultural, tourism and promotional perspective	Highly relevant
	7.3 - We will conserve, manage and present our heritage for its intrinsic value and as a support to economic renewal and sustainable employment	Partially relevant
	7.4 - Open up our heritage estates to public access, where possible	Highly relevant
	7.5 - Invest in and enable access to recreational facilities, including trails networks, designed and delivered with a strong emphasis on conservation, allowing the protection and preservation of our most fragile environments and providing a wellbeing benefit for all	Highly relevant
NSO 10: Access to Quality Childcare, Education and Health Services	10.1 - Provide additional investment in the schools sector to keep pace with demographic demand and to manage increasing building and site costs so that new and refurbished schools on well-located sites within or close to existing built-up areas, can meet demographic growth and the diverse needs of local population	Highly relevant

10.2 - Expand and consolidate third-level facilities at locations where this will further strengthen the capacity of those institutions to deliver the talent necessary to drive economic and social development in the regions. The consolidation of the DIT campus at Grange Gorman is a critical flagship infrastructural project for the higher education sector

Partially relevant

<u>Conceptual linkage exercise 2(a): The contribution of walking in attaining global level</u>
<u>targets</u>

Forty-seven (n=47) SDG targets from 11 SDGs were screened in accordance to their relevance to walking by the authorship team. Overall, there were 8 SDGs (SDG 3; SDG 4; SDG 8; SDG 11; SDG 12; SDG 13; SDG 16; and SDG 17) which were identified as relevant to walking. More specifically, 19 SDG targets across the 8 SDG's were found to be highly relevant (n=8, 42%) or partially relevant (n=11, 58%) to walking. The full list of SDG targets and their relevance to walking can be found in Table 3.3.

Table 3.3: Sustainable Development Goals (SDG) and associated SDG targets identified as relevant to walking.

SDG	SDG Target	SDG target relevance to walking
SDG 3: Good health and well-being	**3.4**: By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	Highly relevant
	3.5: Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	Partially relevant
	3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents	Highly relevant
	3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Partially relevant
SDG 11: Sustainable cities and communities	**11.2**: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	Highly relevant
	11.3: By 2030, enhance inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	Highly relevant
	11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Highly relevant

	11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.	Highly relevant
	11.a: Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.	Highly relevant
SDG 4: Quality Education	**4.7**: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non- violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development	Partially relevant
SDG 8: Decent work and economic growth	**8.1**: Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	Partially relevant
	8.9: By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	Highly relevant
SDG 12: Responsible consumption and production	**12.8**: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	Partially relevant
	12.2: By 2030, achieve the sustainable management and efficient use of natural resources	Partially relevant
SDG 13: Climate action	**13.2**: Integrate climate change measures into national policies, strategies and planning	Partially relevant

SDG 16: Peace, justice and strong institutions	**16.6**: Develop effective, accountable and transparent institutions at all levels	Partially relevant
	16.7: Ensure responsive, inclusive, participatory and representative decision-making at all levels	Partially relevant
SDG 17: Partnerships for the goals	**17.16**: Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilise and share knowledge, expertise, technology and financial resources, to support the achievement of the SDGs in all countries, in particular developing countries	Partially relevant
	17.17: Encourage and promote effective public, public– private and civil society partnerships, building on the experience and resourcing strategies of partnerships	Partially relevant

Conceptual linkages exercise 1(b): The contribution of the Get Ireland Walking Strategy and Action Plan 2017-2020 to Ireland's National Strategic Outcomes

The findings of the conceptual linkage exercise investigating the contribution of the GIWSAP to Ireland's national level governmental targets (NSOs), suggest that actions in six out seven of the thematic areas listed in the GIWSAP may contribute to six out of ten NSOs. Figure 3.4 provides an overview of the potential contribution of actions within the GIWSAP to NSO targets. There were a total of 17 GIWSAP actions which were identified to plausibly contribute to attaining 27 NSO targets. The most explicit contributions of actions within the GIWSAP to NSOs were between the Environment theme in the GIWSAP and NSO 1 (Compact Growth) and NSO 7 (Enhanced Amenities and Heritage). Actions within the Environment theme of the GIWSAP were found to hold the potential to contribute to five out of six of the walking related NSOs. There were no actions within the Health theme of the GIWSAP that were identified as contributing to the attainment of any NSO targets. A full list of the GIWSAP actions and their conceptual linkages with NSO targets can be found in Supplementary file S3.
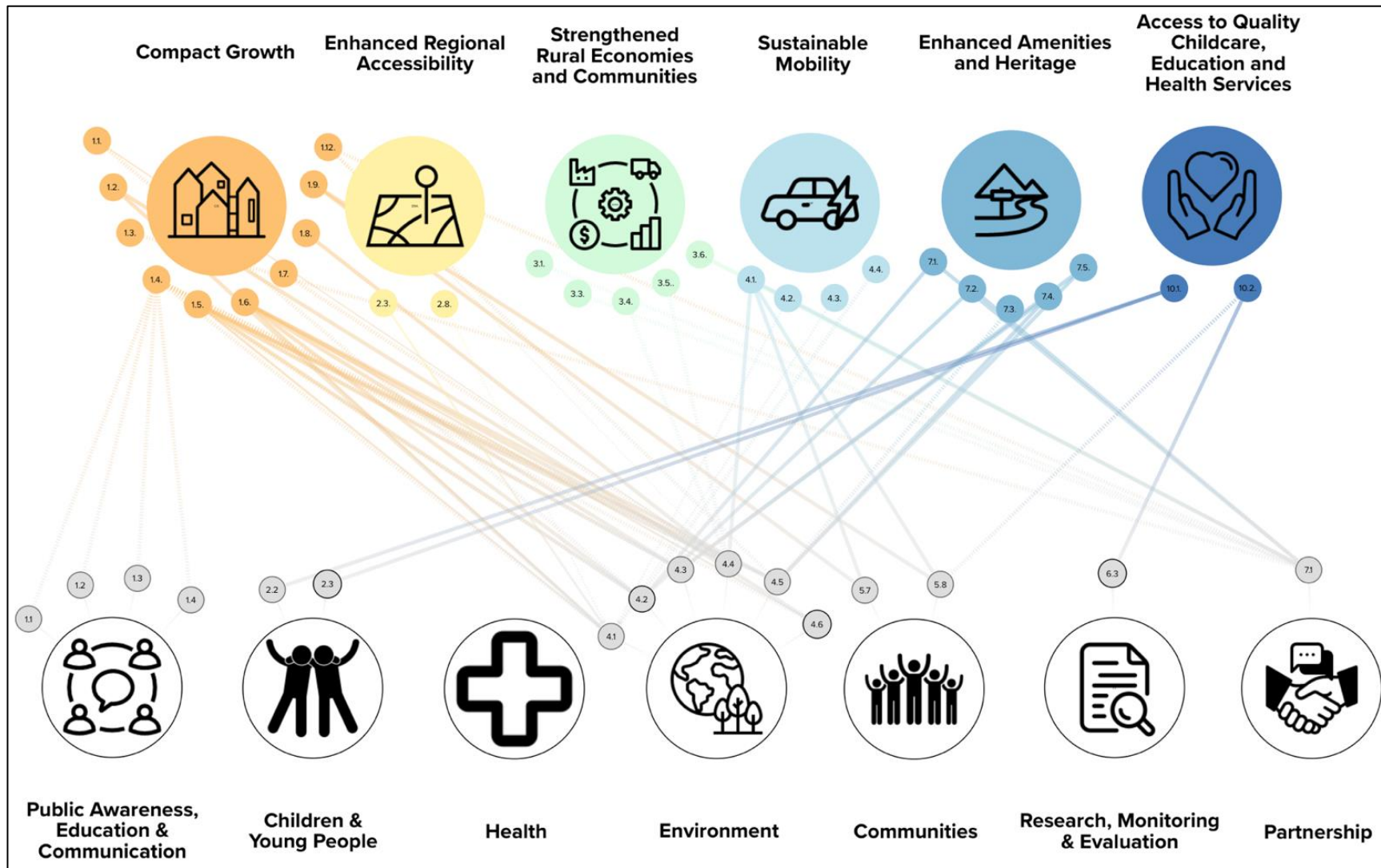
Figure 3.4: Walking related NSO's and NSO targets (Top row) and their links to actions within the themes of the Get Ireland Walking Strategy and Action Plan 2017-2020 (Bottom row) (Solid line = NSO target identified as highly relevant to walking; Dashed line = NSO target identified as partially relevant to walking.

Conceptual linkages exercise 2(b): The contribution of the Get Ireland Walking Strategy and Action Plan 2017-2020 to the United Nations Sustainable Development Goals

The findings of the conceptual linkage exercise exploring the connection between the GIWSAP and SDG targets suggest that there are ample opportunities to increase the scope of SDG relevant actions within future iterations of the GIWSAP. For example, the most explicit links between GIWSAP actions and SDG targets were identified between actions in the Environment and Communities themes with SDG 11 (Sustainable Cities and Communities) and SDG 3 (Good Health and Wellbeing), respectively. However, actions across six themes in the GIWSAP were identified as potential contributors to SDG targets across six SDG's. Figure 3.5 provides a visualisation of the actions within the GIWSAP which could plausibly contribute to the attainment of SDG targets. There was a total of twenty-three (n = 23) actions within the SAP which held partial and highly relevant links to sixteen SDG targets. There were three SDG targets (3.5; 12.2; 13.2) which were found to be partially relevant to walking, but not to actions within the GIWSAP. There were no actions within the Research, Monitoring and Evaluation theme of the GIWSAP which were relevant to any walking-related SDG targets. Similarly, there were no GIWSAP actions which held plausible links to the SDG 13 (Climate Action). Sustainable Development Goal 3 (Good Health and Wellbeing) and SDG 11 (Sustainable Cities and Communities) were found to have the highest number of SDG targets which were identified as highly relevant to actions within the SAP. All walking-related SDG targets in SDG 11 (Sustainable Cities and Communities) were found to hold highly relevant links to three actions in the Environment theme of the SAP, and one action in the Communities theme of the GIWSAP. A full list of the GIWSAP actions and their conceptual linkages with SDG targets can be found in Supplementary file S4.
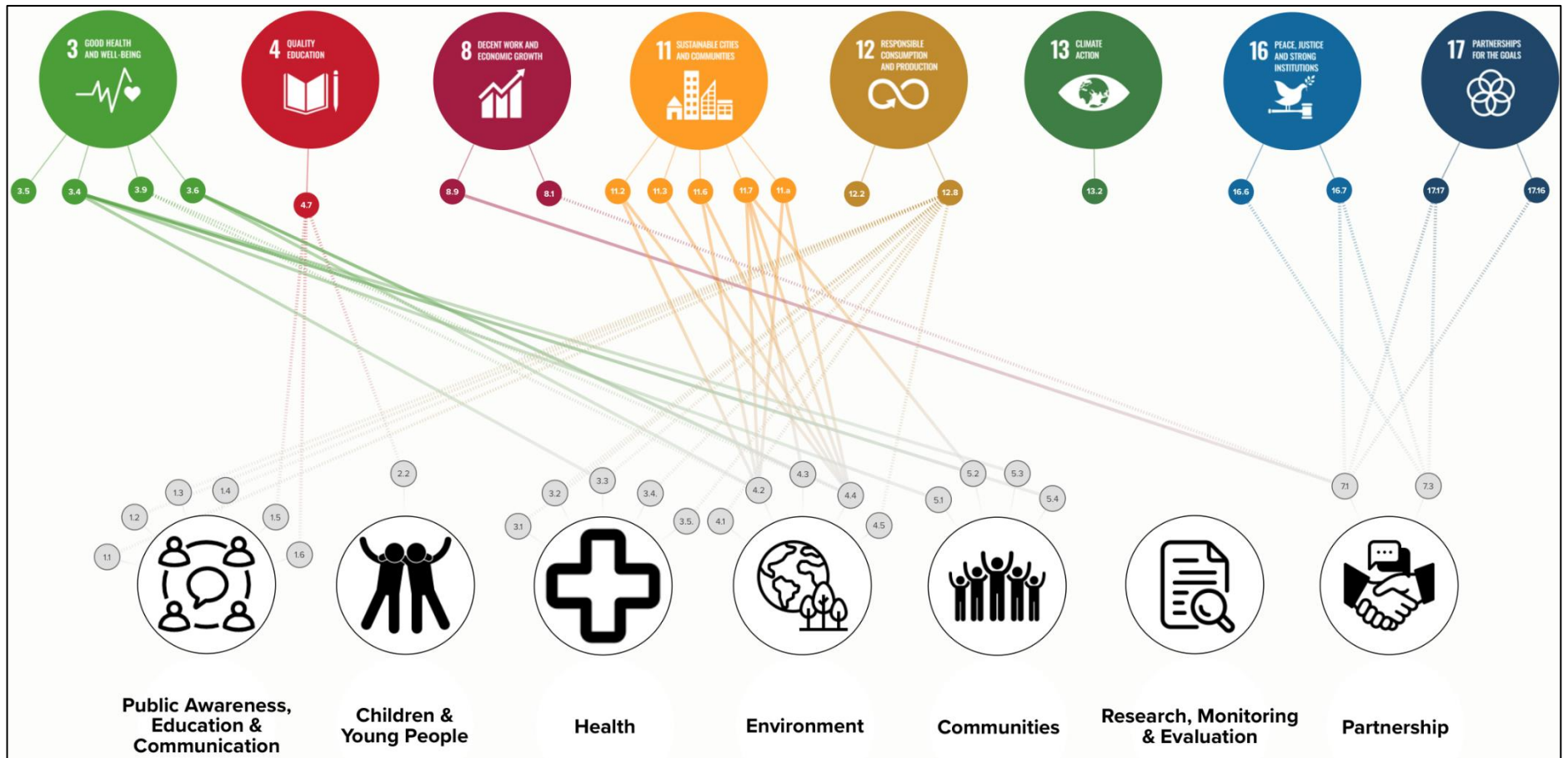
Figure 3.5: Walking related SDG's and SDG targets (Top row) and their links to actions within the Get Ireland Walking Strategy and Action Plan 2017-2020 (Bottom row) (Solid line = SDG target identified as highly relevant to walking; Dashed line = SDG target identified as partially relevant to walking).

Discussion

The aim of this study was to provide a critical overview of walking policy at local and national level in Ireland across multiple domains. The findings from this study are threefold. Firstly, the presence of walking specific local level policies is low. Furthermore, local level walking specific policies in Ireland were found to be vague in nature, lacking clarity on the roles and responsibilities of organisations and information relating to evaluation. Secondly, findings from the content analysis of national level walking policies found that the GIWSAP was, at its core, interdisciplinary in nature yet lacked clarity on the specific roles and responsibilities of organisations involved in the implementation and evaluation of the strategy. Moreover, the GIWSAP holds a national level scope, yet lacks local level delivery mechanisms to assist with the implementation. Thirdly, findings from the conceptual linkage exercises suggest that walking can contribute to many national and global targets, yet there are opportunities to increase the breadth of targets which walking, and the work of Get Ireland Walking, can have through whole-of-systems approaches.

Irish walking policy – synergies and specificities

Our results suggest that half of the counties in the Republic of Ireland have never had a local level policy with a specific walking focus. For the counties that have, five were dated before 2015, suggesting the need for renewal of some policies. The policies which underwent content analysis as part of the current study were found to be multidisciplinary in nature and were consultative in development. Bellew and colleagues (20) identify multidisciplinary action and consultation as necessities in successful PA related policy. However, ensuring strong monitoring mechanisms are embedded in PA policy is of utmost importance to the overall effectiveness of a policy (34, 35). There were very few examples of effective evaluation and monitoring mechanisms in local and national walking policies identified in the current content analysis. The lack of governance and accountability mechanisms embedded within local walking policies in Ireland found in the current study may be explained by local level walking system actors engaging in symbolic politics, where the development and publication of public policy provides an emblematic gesture to the public, with no real intention of implementation (36–38). However, the transdisciplinary nature of walking may also help explain the lack of governance and monitoring mechanisms in local walking policies in Ireland. Walking promotion and

development is not the sole responsibility of one sector, organisation, or discipline. Previous work by our research group (11) has demonstrated the potential for systems science methods, specifically systems mapping, to assist with engaging multidisciplinary stakeholders at local level in Ireland. Although Power and colleagues used systems mapping as a catalyst to engage stakeholders, systems mapping can also help identify data sources and monitoring mechanisms during the stages of developing local walking policies (39).

The results of the content analysis suggest that local level policies included walking as part of broader agendas such as walking and cycling, tourism, and outdoor recreation. Cork and Waterford were found to be the only two counties in the Republic of Ireland which had published walking specific local level policies. Interestingly, both differ in their overall focus. The Cork City Walking Strategy 2013–2018 (24) focuses on the promotion of walking for transport, whereas Step by Step: Walking Strategy for Waterford (32) focuses predominantly on recreational walking. While there are examples of transport specific walking policies in Norway (40), and acknowledging walking as its own transport mode when collecting data and devising policies is recommended (41), it must be noted that this approach to local level walking policies may exacerbate disciplinary siloes. A more systems-oriented approach to walking policy has been adopted by Paths for All, a national walking promotion charity in Scotland (17). Adopting a similar approach to walking promotion in Ireland by embedding national level policy in the global agenda with local level implementation supports may be a positive step for walking promotion in Ireland. An organisation such as Get Ireland Walking has the potential to mobilise recent increases in funding allocated to walking in Ireland (18) and to act as a national level facilitator in cultivating a systems approach to walking through engaging organisations from across sectors and disciplines.

Similar to the majority of local level walking policies, the national level GIWSAP is multidisciplinary in nature and consultative in development. Ireland's only national walking specific policy document was developed after a period of consultation with stakeholders from sport, health, education, transport, and academia. Engaging with multiple sectors has been noted as best practice in the PA policy development literature (20, 21, 42). However, a study conducted by Power et al. (11) which used social network analysis methods to evaluate the communication network between the multidisciplinary

actors involved in the implementation of the GIWSAP, found that there was a mismatch between how actors were required to communicate (based on collaborative actions in the GIWSAP) compared with how actors communicated in practice. The lack of clarity in relation to the roles and responsibilities of the stakeholders involved in the implementation of the GIWSAP may be explained by the lack of political leverage held by GIW. For example, GIW does not operate at a governmental level and has limited resources and thus does not hold the capacity to embed the GIWSAP actions within the work of collaborating organisations. For future iterations of national walking policy in Ireland, care should be taken to develop a common vision to ensure effective coordination for policy implementation (43, 44). More research is needed to understand potential for systems-oriented methods such as systems mapping and social network analysis to be embedded within PA policy evaluation plans in conjunction with more traditional methods. Doing so may help stakeholders to develop a common understanding of the policy system and to gain real time insights into the collaboration networks involved in policy implementation.

How can walking contribute to the attainment of national and global level goals?

Conceptual linkage exercises to explore the contribution of PA and sport to the United Nations SDGs have been conducted elsewhere (6, 13, 14) and the potential benefit to aligning the PA field to the SDGs has been outlined (7). The findings presented in this study build on the approaches used by Salvo et al. (6) and are applied specifically to walking. Using global and national goals as conceptual frameworks within which to view national walking policy in Ireland facilitated the identification of opportunities for deepening the potential contribution that walking can have on attaining higher-level targets. However, the contribution of the GIWSAP to national level targets in Ireland is limited. For example, the most explicit contributions of the GIWSAP to the NSOs identified were from actions within the Environments and Communities themes. It has been suggested that PA is perceived to be the sole responsibility of organisations within the health, transport, and sport sectors, when in reality, there are a plethora of sectors who have a role to play (45, 46). The policy actions included in the Environments and Communities themes in the GIWSAP can be interpreted as playing a direct and explicit role in the promotion and development of walking, for example through the implementation of community-based walking programmes (19). However, there is potential to include a wider breadth of future GIWSAP actions that play an indirect role in

attaining national level targets in Ireland with sufficient collaboration, coordination and alignment between stakeholders in the walking system.

The findings of the current study indicate that walking can possibly contribute to over half of Ireland's NSO's with ties to many sectors including urban design, planning, local government, and transport. However, the contribution of GIWSAP actions were more explicitly relevant to the tourism, health, sport, research, and outdoor recreation sectors. Yet interestingly, many of the targets outlined within each of the NSOs do not explicitly mention walking, pedestrians, or PA— yet were still identified as partially or highly relevant to walking. The lack of breadth in terms of the actions within the GIWSAP which were identified to potentially contribute to national targets may be partly explained by the context within which GIW is situated. The organisation is not an independent body and operates within Mountaineering Ireland, the national governing body for mountaineering in Ireland, whose agenda predominantly focuses on the use of mountains and trails for recreational walking. The conceptual work of Piggin is mirrored in practice here within the Irish walking system. Piggin (47) advocates for a more holistic definition of PA which could help incorporate a wider breadth of sectors in policy decisions relating to PA. The use of NSOs and SDGs to facilitate a viewpoint of walking through a broader systems-oriented lens may allow for opportunities to identify organisations and decision makers outside of those who are already engaged in walking policy in Ireland to become evident. Doing so may lead to improved future iterations of Irish walking policy which are transparent with national and global targets.

Strengths and limitations

There are some limitations in this study. Firstly, although the approach taken to the conceptual linkage exercises mirrored the methods of Salvo et al. (6), there were fewer members of the research team for this study. This may have increased the risk of omitting linkages. However, the research team included a researcher embedded in Ireland's national walking promotion organisation (DP) and experienced researchers in PA policy in Ireland (BL & NM). This research provides a platform upon which to build on and confirm or refute the findings of the conceptual linkage exercise, as the identification of indicator datasets to clarify the existence of an empirical link between national walking policy and national and global goals was beyond the scope of this study. The exclusion of Local Sports Partnership strategic plans and County Development Plans from the analysis may

have resulted in the omission of some local level walking related policy actions. The local level verification phase of the content analysis (Phase 3) only involved members of the Local Sports Partnerships network. It is plausible that individuals from other sectors may have provided different responses. However, the Local Sports Partnerships network represent a network of stakeholders embedded in local walking systems which provide the largest geographical spread, and thus were identified as the most appropriate contacts for the current study. This study is an example of how PA policy analysis tools can be used to inform the development of more effective walking strategies and policies that are aligned to national and international targets.

Conclusion

There is a need to update local and national walking policies in Ireland according to best practice criteria from international PA policy to ensure transparency and alignment across policy levels. This paper provides guidance to local and national walking systems in Ireland on (re)writing walking policies which are transparent with national and global agendas. With multidisciplinary action across walking systems, walking can help contribute to many national and global targets. Developing future policies which strengthen existing connections to national and global targets should be prioritised by local and national walking systems in Ireland.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author/s.

Ethics statement

This work is part of a PhD project which was granted ethical approval from the Ethics Committee at the School of Health Sciences, South East Technological University, Waterford.

Author contributions

DP, BL, and NM were involved in the conception and the study. DP organised the database and conducted initial phases of data analysis. BL and NM provided critical feedback on the interpretation of data. DP wrote the first draft of the manuscript.

All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fspor.2023.1125636/full#supplementary-material.

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3.3 – Implications of the research findings

<u>Implications for practice</u>

- The sectors involved in achieving global and national targets which are relevant to walking go beyond health, transport, and sport. Get Ireland Walking should focus on broadening the organisations in their network to include stakeholders from the climate, education, and business sectors.

- A more robust monitoring and evaluation mechanism utilising multiple forms of data should be embedded from the outset of the implementation of Get Ireland Walking's updated strategic plan. However, this requires a pragmatic approach given the small workforce of Get Ireland Walking and the inherent limitations in walking surveillance systems in Ireland. These issues will be discussed in Chapter 6.

- Stakeholder organisations from local level walking systems, such as local pedestrian advocacy organisations and local government representatives, should be engaged in the process of national strategy development. This will ensure local level delivery mechanisms which can assist the nationwide implementation of the next iteration of the GIW strategy.

<u>Implications for research</u>

- This study presents the results of a conceptual exercise to explore the potential linkages between the work of Get Ireland Walking and global sustainable development targets and national strategic outcomes. Sport Ireland, as the governors of Get Ireland Walking, have an opportunity to support research investigating the presence of empirical data which support or refute the conceptual linkages drawn in this study.

- Future research aimed at understanding the linkages between walking and national and global development targets should focus on developing a bank of context specific indicators to monitor progress.

3.4 – Reflections of an embedded researcher

The implementation of Get Ireland Walking's Strategy and Action Plan 2017-2020 ceased at the end of 2020. Following this, Get Ireland Walking had begun preparation to renew this document, albeit with little reference to local level operationalisation, or alignment to global goals. For a few reasons (including the COVID-19 pandemic, lack of human resources, and conflicting priorities), the launch of an updated version of a strategic plan for Get Ireland Walking was delayed. This delay proved a blessing in disguise, as it afforded me the opportunity to grow as a researcher and learn about how the next iteration of the Get Ireland Walking strategy could be better informed to ensure cross sectoral alignment.

The intention with this PhD was always to frame walking from a broader perspective, which would mean understanding the breadth of impacts that more walking could have on a societal level. I became aware of the many fields and disciplines which walking transcends over the course of this project but have always been aware that the work showcasing the promotion of walking is mainly situated within the health/sport/physical activity/transport domains. The research centre I work in at the South East Technological University, the Centre for Health Behaviour Research, was asked to participate in a project in 2022 with Sport Ireland, the national governing body for sport in Ireland, to map the impact of national sports policy in Ireland to the United Nations Sustainable Development Goals. I become involved in this work and deepened my knowledge about the ability of the Sustainable Development Goals to facilitate a systems-oriented lens on sport and physical activity in Ireland. It was ultimately my involvement in this work which led me to reexamine the processes which Get Ireland Walking were undertaking in the development of their new strategy in an attempt to broaden the lens which walking was being viewed through.

In January of 2023 I presented the results of the current study to the steering committee of Get Ireland Walking which consisted of decision makers from the sport, transport, outdoor recreation, climate, and environmental sectors. The findings were well received and stakeholders agreed this work should be incorporated into the development processes of the strategic plan. However, given tight timelines, political pressure, and lack of human resources to lead the writing of the strategy, the findings were not fully incorporated.

Specifically, little time was placed into the co-development of strategy actions, gaining commitment in relation to tasks from stakeholders, and ringfencing funding for the implementation of each action. A statement of strategy is scheduled to be launched at some point in the summer of 2023, and I can't help but feel the alignment to the United Nations Sustainable Development Goals could have been more comprehensive.

However, despite my disappointment I did learn a lot from this process. I feel as though two things helped the findings from this research reach decision makers in the first place. Firstly, my 'foot in the door' (meaning an existing previous relationship and rapport with the group) with the Get Ireland Walking steering committee who wanted to push the button on launching a strategy allowed for the recommendations resulting from this study to be fed directly into the policy making process. Secondly, there is momentum behind the use of Sustainable Development Goals within national governing bodies, and government departments in Ireland. To a certain extent there was an element of the research 'speaking their language'. It allowed us (Get Ireland Walking and the Steering Committee responsible for the publication of the strategy) to be on the same page.

The momentum behind the use of Sustainable Development Goals in physical activity research was not there when I began in 2019, and I was, in any case, uninformed of this area at that time. However, if this study was to have been conducted 6 months earlier, there may have been time to fully flesh out and think about the 'nitty gritty' details of the contents of the strategy. One thing I have learned about researching in this area has been that, oftentimes, you must be in the *right place at the right time* for things to work out. The intent of this study was to use the Sustainable Development Goals and best practice criteria to broaden the horizons and strengthen the contents of national walking policy in Ireland. I feel we got part of the way there. However, how these findings were actually incorporated into policy was more like *right place, but needed a bit more time (and resources)*.

Chapter 4: A partnership evaluation and social network analysis of walking promotion partnerships in Ireland.

4.1 – Introduction

A core component of systems approaches to physical activity (PA) is understanding how actors in a system are connected (Jebb et al., 2021; Luna Pinzon et al., 2022; Nau et al., 2022). Researchers have begun to use social network analysis (SNA) methods – a method commonly used in systems approaches to PA – to investigate how actors in a system interact (Nau et al., 2022). Get Ireland Walking (GIW) have a national multidisciplinary network of partners who work in partnership on the delivery of objectives outlined in their strategic plan. The previous chapter (Chapter 3) shone light on the multidisciplinary nature of the Get Ireland Walking Strategy and Action Plan 2017-2020 (GIWSAP) (Get Ireland Walking, 2017). However, little is known regarding how organisations responsible for the implementation of the GIWSAP interact and operate in practice. Moreover, it is unknown how the national level network of partners involved in walking promotion in Ireland is reflected at local level.

This chapter describes the process of understanding the functioning of a national-level multidisciplinary organisational walking promotion partnership in Ireland. This chapter uses a cross-sectional questionnaire, social network analysis, and phone calls with key stakeholders to investigate how Get Ireland Walking's network of partners function across multiple domains over time.

4.2 – Aims and objectives

This chapter will address the following aim:

- Assess the workings of a national walking promotion partnership in Ireland.

To address this aim, several objectives will guide the work conducted within this chapter:

1. Evaluate the perceptions of the Get Ireland Walking partners on leadership, governance, resource allocation, collaboration, and their overall experiences of the partnership.
2. Conduct a social network analysis of the communication network between the partner organisations of Get Ireland Walking.

3. Investigate the key organisations involved in local level walking promotion systems.

4.3 – Methods

4.3.1 – Research Design

This study was a mixed methods study which employed the use of questionnaires, SNA methods, and phone calls with local level stakeholders to assess the workings of a national walking promotion partnership in Ireland across multiple domains. Questionnaires were used to assess the perceptions of organisations named in the national level partnership network of GIW on multiple domains of partnership. Social network analysis methods were used to investigate network measures such as degree centrality (the number of connections each organisation has), network density (the overall cohesion in the network) and degree centralisation (the degree to which a few organisations control the network) in the communication network between partners. Questionnaires were administered at two time points (March 2021 and March 2022). To understand the nature of how national level organisational partnerships were reflected at local level, phone calls with local level stakeholders were conducted. This was achieved by collecting checklist data through phone calls with representatives from 17 counties. Phone calls were held with local representatives in each county in February/March 2022. Ethical approval for this study was granted by the School of Health Sciences Ethics Committee in Waterford Institute of Technology (now South East Technological University) (Appendix 5).

4.3.2 – Study Population and sampling

Partnership evaluation questionnaire (Objective 1)

All partner organisations of GIW in 2021 (n=33) were purposively recruited to take part in a partnership evaluation survey in March 2021 (T1) and March 2022 (T2). The network of partners increased between March 2021 and March 2022 and the updated network (n=36) were invited to participate in data collection at T2. The GIW Programmes Manager sent study information to all participants via email (Appendix 6 & 7) one week before they

received the online questionnaire via email from the researcher (Appendix 8). This process was replicated in both March 2021 and March 2022.

Social network analysis (Objective 2)

Communication network data were obtained for three networks. Firstly, the communication network as outlined within the GIWSAP (Get Ireland Walking, 2017) provided data for one network. All organisations listed in the GIWSAP (n=30) were included in this strategy defined network where organisations listed to deliver the same action were assumed to have communication ties between them. For the remaining two networks, data were collected via the national partnership evaluation questionnaire. Get Ireland Walking partner organisations at T1 (n=33) and T2 (n=36) were recruited to complete the questionnaire.

Local level walking promotion partnerships (Objective 3)

Representatives from all 29 Local Sports Partnerships (LSP) were purposively recruited to participate in a brief phone call. These calls were used to provide respondents with the chance to identify, from their perspectives, three key players in their local walking systems. Members from LSPs were chosen as representatives from local level walking systems over other stakeholders as they provide the widest geographical spread of local level stakeholders with a definitive role in their respective walking systems. All contact details of members of the LSP network were retrieved via the online repository available from Sport Ireland's website.

4.3.3 – Procedures

Partnership evaluation questionnaire (Objective 1)

To assess how the partnership works across multiple domains, a partnership evaluation questionnaire (Appendix 8) adapted from a pre-existing health promotion partnership evaluation tool (Indig et al., 2017) was administered via Qualtrics (Qualtrics, 2022). This was completed by participants in March 2021 (n=19, 58% response rate) and March 2022 (n=21, 58% response rate). The questionnaire provided respondents with a list of 34

statements relating to five domains of the partnership (Leadership; Governance; Resource Allocation; Collaboration; and Experiences of the Partnership) and required respondents to rate their level of agreement with each statement on a 7-point Likert scale (Indig et al., 2017). This tool was developed based on the results of a mixed methods approach including a review of the partnership evaluation literature and a principal component analysis of the psychometric properties of the tool (Indig et al., 2017).

Social network analysis (Objective 2)

To analyse the communication network between organisations as written in the GIWSAP using SNA methods, organisations listed as partners/collaborators on the same action were assumed to have communication ties between them. For example, Table 4.1 shows three organisations listed as partners or collaborators for Action 3.3 in the GIWSAP (Get Ireland Walking, 2017). Communication ties were assumed between these three organisations (Coillte, Mental Health Ireland and LSP's) and thus are depicted in the network diagram. In order to collect network data at T1 and T2, respondents of the national partnership questionnaire were provided with a list of all the other organisations within the GIW network and were required to list up to 10 organisations they had communicated with in the last 6 months in relation to the actions assigned to them in the GIWSAP (Get Ireland Walking, 2017). Adjacency matrices were developed for all communication networks and imported into the statistical analysis software package, R (R Core Team, 2022). An adjacency matrix represents, in this case, an organisation-by-organisation square matrix populated with 0 (representing no communication tie) and 1 (representing the presence of a communication tie) which are used to develop network diagrams.

Table 4.1: Example of action within Get Ireland Walking Strategy and Action Plan 2017-2020.

Ref.	Action	Key Partner	Collaborators	Timeframe
3.3	Support the roll-out of the Woodlands for Health programme in one additional region per annum.	Coillte, Mental Health Ireland	LSP's	2017-2020

Phone calls with representatives from LSPs (n=17, 59% response rate) in seventeen counties were conducted. Members from LSPs were chosen as representatives from local level walking systems over other stakeholders as they provide the widest geographical spread of local level stakeholders with a definitive role in their respective walking systems. The researcher followed a protocol (Appendix 9) involving an online search and phone calls with local level stakeholders. The online search acted as formative research and provided an overview of available information on the presence of walking promotion/development roles in local government. It also ascertained whether or not there was a walking specific policy document guiding local and regional level walking related work, and whether or not there was evidence of recorded interdisciplinary meetings pertaining to walking promotion on local government websites.

Phone calls involved a question (outlined in Appendix 9) requesting respondents to indicate the three most important organisations for all walking related work (including walking for recreation, walking for transport, and walking for tourism) in their county.

4.3.4 – Data analysis

Partnership evaluation questionnaire (Objective 1)

The Likert scale responses to all 34 statements were collapsed to three categories and assigned a numerical value (Disagree=0, Neutral=1 and Agree=2) and mean scores were calculated. All questionnaire data at both time points (except network data pertaining to Objective 2) were exported from Qualtrics (Qualtrics, 2022) and descriptive statistics were calculated.

Social network analysis (Objective 2)

For the SNA component of the study, network density, degree centrality, and centralisation were calculated for all three networks and network diagrams were developed using the package 'igraph' in R (Csardi and Nepusz, 2006; R Core Team, 2022). R is a statistical analysis software which is used for many purposes, including the analysis of network data.

Degree centrality was chosen due to its use as a proxy measure for popularity and importance within networks (Landherr et al., 2010). Network density was chosen due to its ability to determine the overall degree of interconnectedness of a network (Mondal et al., 2022). Network centralisation can help identify whether a network is influenced by few organisations. The suggested parameters by which to judge a networks' characteristics offered by Valente et al (2015) were used to guide the interpretation of the SNA. Valente et al (2015) suggest that for network density and network centralisation, scores below 0.30 are considered low; 0.30 to 0.50 are moderate; and levels above 0.50 are considered high. Degree centrality scores are presented as the total number of connections a node has (Appendix 10).

Local level walking promotion partnerships (Objective 3)

Respondents were contacted by phone twice (on two different dates) and were categorised as a non-response following an unsuccessful second attempt. All phone call participants were employed within the LSP in each of their respective counties. Phone call checklist data were inputted into an Excel spreadsheet for descriptive analysis.

4.4 – Results

Objective 1: Evaluate the perception of the Get Ireland Walking partners on leadership, governance, resource allocation, collaboration, and their overall experiences of the partnership.

Table 4.2 represents the overall mean scores for each of the five categories used to evaluate the GIW partnership over time. The maximum score for the Leadership category was 12, and for all other categories it was 14. A maximum score, in the case of this questionnaire, would represent participants' perceived ratings on that domain of partnership to be successful. Overall, there were decreases in the mean scores of partners' perceptions of four of the five categories (Resource Allocation; Governance; Collaboration, and, overall experience of partnership) between March 2021 and March 2022. The overall perception of the value of the partnership remained stable over time, with 74% and 71% of participants agreeing that they saw value in investing their time at T1 and T2, respectively. Furthermore, a high proportion of participants (81%) agreed at T1

that there was sharing of ideas and values between partners within the partnership, and this increased to 84% at T2. Organisations involved in the GIW partnership rated their perception of Collaboration within the partnership the highest at both time points.

Table 4.2 – Combined mean scores (SD) of partnership evaluation categories in March 2021 (T1) and March 2022 (T2). (* = Maximum score for leadership is 12, all other categories 14).

	T1	**T2**	**Mean difference**
Leadership*	8.4 (3.8)	8.4 (5.0)	0
Resource Allocation	10.5 (3.6)	9.0 (5.5)	-1.5
Governance	8.7 (4.6)	8.8 (5.4)	-.1
Collaboration	10.9 (4.4)	10.0 (5.7)	-.9
Experience of partnership	10.8 (3.3)	9.6 (4.9)	-1.2

Objective 2: Conduct a social network analysis of the communication network between partner organisations of Get Ireland Walking.

Table 4.3 provides an overview of the organisations who were represented in all three networks (GIWSAP, T1, and T2). Few organisations are represented in all three networks and the number of organisations present in the list of GIW partners changed over time.

Table 4.3: List of organisations who are represented in all three networks (SAP; T1, and T2).

Organisation	Sector	GIWSAP	T1	T2
Healthy Ireland	Health		●	●
Mental Health Ireland	Health	●	●	●
Gaelic Athletic Association	PA/Sport	●	●	●
Transport and Mobility Forum	Transport		●	●
Dept. of Health	Health	●		
Age and Opportunity	Health	●	●	●
Local Community Development Committee	Local government	●	●	●
Walk21	Charity		●	●
Green Schools	Education	●		
Diabetes Ireland	Health	●		
Waterford Social Prescribing Service	Health		●	●
Ireland Active	Health	●		
Irish Heart Foundation	Health	●	●	●
Sport Ireland	PA/Sport	●	●	●
Mountaineering Ireland	Outdoor recreation	●	●	●
Waterways Ireland	Outdoor recreation	●	●	●
National Healthy Cities and Counties Network	Health	●		
Education and Training Boards Ireland	Education	●		
Arthritis Ireland	Health	●		●
Men's Development Network	Health		●	●
Irish Men's Sheds Association	Charity	●		●
Coillte	Outdoor recreation	●	●	●
Gaisce	Charity	●		
Orienteering Ireland	Outdoor recreation	●		
Sulware	Other			●
Dept. Education and Skills	Education	●		
Local Authorities	Local government	●	●	●
Parkrun	PA/Sport	●		
Irish Wheelchair Association	Transport		●	●
Vision Sports Ireland	PA/Sport		●	●
Sport Ireland (Outdoors)	Outdoor recreation	●	●	●
Irish Pedestrian Network	Transport		●	

Organisation	Sector			
CARA	PA/Sport	●	●	●
Active School Flag	Education	●	●	●
Technological University Dublin	Education		●	●
National Parks and Wildlife	Outdoor recreation	●	●	●
Transport and Mobility Forum	Transport			●
Health Service Executive	Health	●	●	●
Trish Fox Design	Other			●
Nordic Fitness Ireland	Outdoor recreation			●
TidyTowns	Charity		●	●
Paths for All	Charity			●
Leading Sport Agency	PA/Sport			●
Dept. Transport, Tourism and Sport	Transport			●
Maynooth University	Education		●	●
Institute of Public Health	Health	●		
Bord na Móna	Outdoor recreation	●		
Local Sports Partnerships	PA/Sport	●	●	

Figure 4.1 represents the network diagram for the communication network between partners as defined in the GIWSAP (Get Ireland Walking, 2017). The communication network as defined within the GIWSAP had the highest network density score of all networks in this study. This network had a moderate network density score (0.41), according to the suggested thresholds outlined by Valente et al (2015). Organisations with more central positions in the network diagram represent those with the most connections (Bannister, Eppstein and Goodrich, 2012). Results show that the network was moderately centralised (0.41) around a group of 11 organisations mainly from the health (n=7) and PA/sport sectors (n=3) and one (n=1) from outdoor recreation.
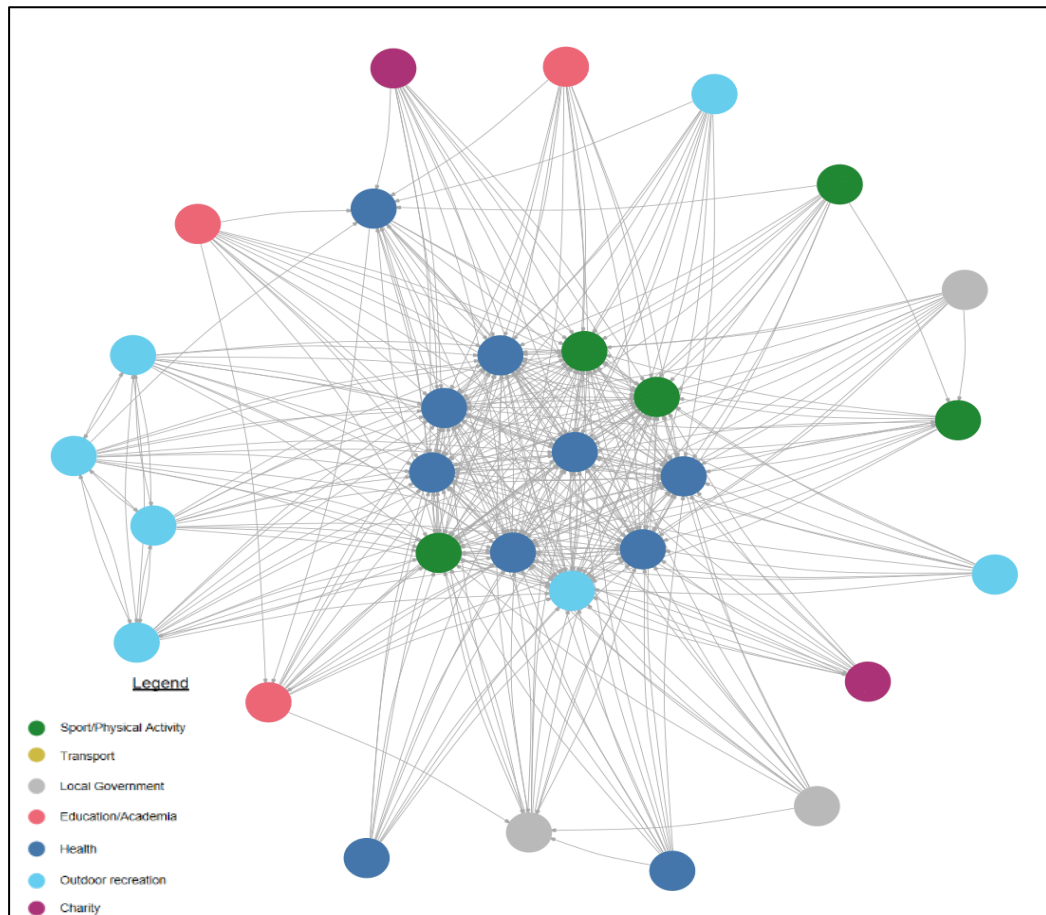
Figure 4.1: Get Ireland Walking partner communication network as defined in the Get Ireland Walking Strategy and Action Plan 2017-2020.

Figure 4.2 presents the communication networks as perceived by the GIW partner organisations at T1 in March 2021 and T2 in March 2022. As part of the questionnaire, organisations were requested to list up to 10 organisations they had communicated with in the last 6 months in relation to the GIW partnership. The network density score for the actual communication network between GIW partners at T1 was 0.13, which is considered a low level of density (Valente et al., 2015). Similarly, a low degree of centralisation (few organisations holding a high degree of influence) was observed at T1. The network centralisation score for the communication network between partners at T1 was 0.27 and thus a core group of organisations was less discernible than the network presented in Figure 4.1.

Similar to the communication network found at T1, the overall network density score of the communication network at T2 between organisations was low (0.11), which was a decrease (0.02) over time between March 2021 and March 2022. The overall centralisation score of the network at T2 was low (0.26). The number of organisations in the network

118

grew over time, with increased heterogeneity in the types of organisations present in the network at T2 compared to T1. Nodes (organisations) in central positions in the network diagrams at T1 and T2 differ from the strategy defined network (Figure 4.1), with wider representation across sectors beyond health and PA/sport. In the communication network at T2, there is an isolated node (i.e., a partner, disconnected from the rest of the network), something which was not present in the other two networks.
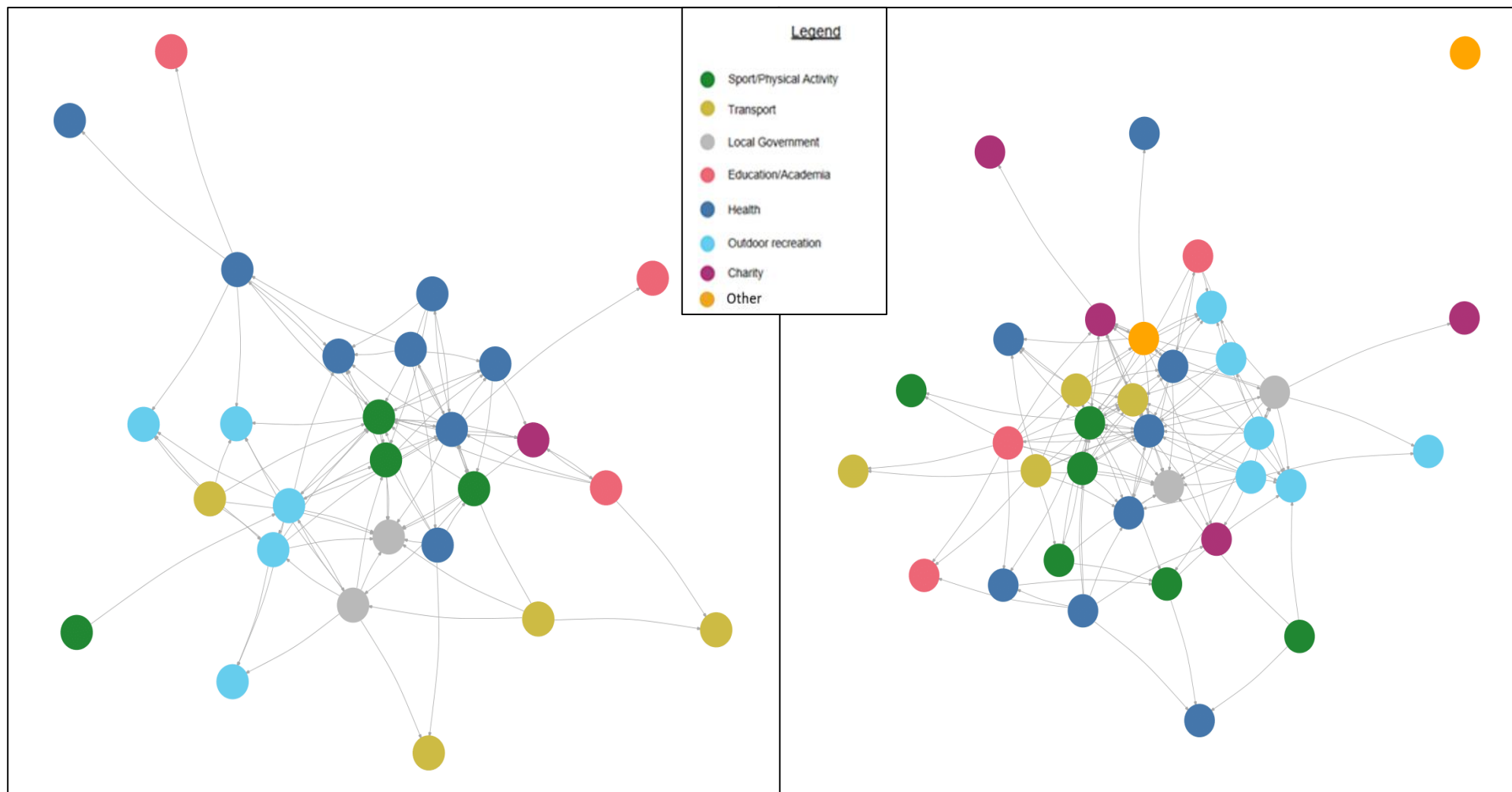
Figure 4.2: Get Ireland Walking partner communication networks at T1 (March 2021; Left) and T2 (March 2022; Right).

Objective 3: Investigate the key organisations involved in local level walking promotion systems.

Representatives from a total of 17 counties (59% response rate) participated in the phone calls. A total of six organisations were named as key players in local level walking systems: Local Sports Partnerships; Local Authorities (LAs); Local Community Development Committees (LCDC); Coillte (National forestry organisation); Local tourism organisations; and local community groups (Table 4.4). Local Authorities were mentioned by all LSP representatives (n=17) to be key players in local walking systems. Similarly, LCDCs, another local government organisation, were mentioned by 65% (n=11) of participants as key players in local walking systems. Local Sports Partnerships were the second most mentioned key player in local level walking systems, being mentioned as key players in 88% (n=14) of counties. There was heterogeneity in the specific departments within LAs which were mentioned by phone call participants. Figure 4.3 highlights the five departments which were highlighted by the participants in the phone calls. Local authority departments related to Parks, Recreation and Trails (n=7) and Tourism (n=5) were the most cited departments.

Table 4.4: Key organisations in local level walking systems by county (LSP = Local Sports Partnership; LA = Local Authority; LCDC = Local Community Development Committee).

#	County	LSP	LA	LCDC	Coillte	Local tourism	Local community groups
1	Carlow	●	●	●			
2	Cavan	●	●				
3	Clare	●	●		●		
4	Cork	●	●	●			
5	Donegal	●	●	●			
6	Dublin City	●	●	●			
7	Galway		●	●			
8	Kerry		●	●			
9	Kilkenny	●	●	●			
10	Leitrim	●	●	●			
11	Limerick	●	●		●	●	●
12	Offaly	●	●	●			
13	Waterford	●	●				●
14	Sligo		●			●	●
15	Mayo	●	●	●	●		●
16	Meath	●	●				●
17	Monaghan	●	●	●			
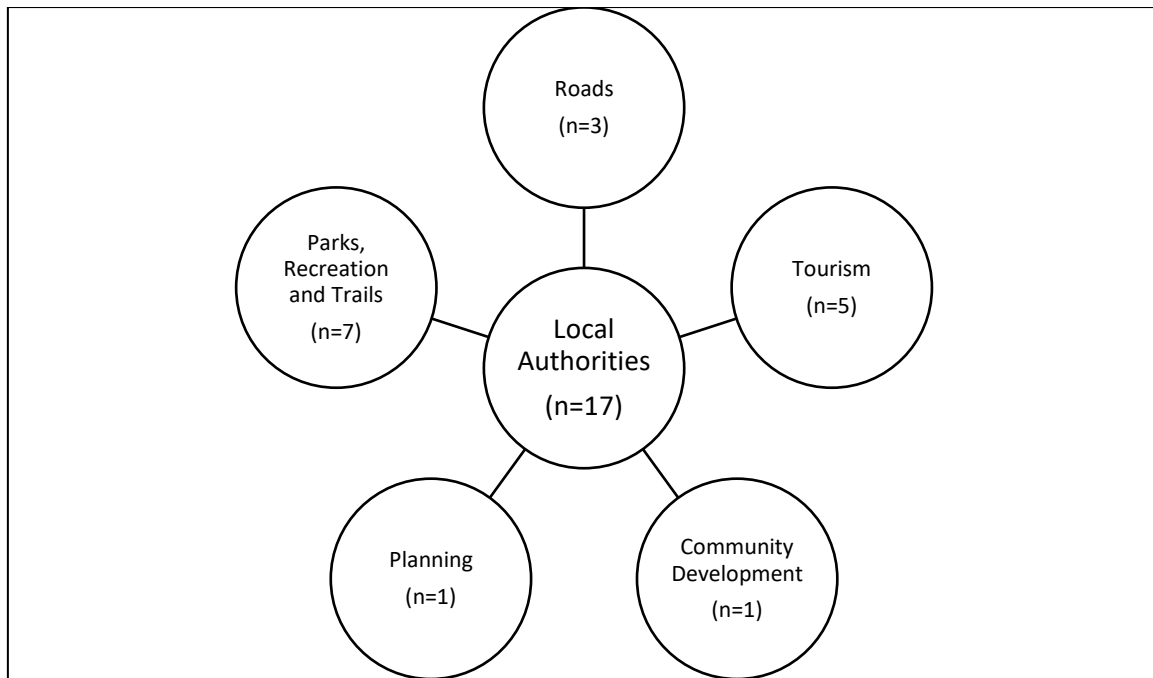
Figure 4.3: Key local authority departments relevant to walking.

4.5 – Discussion

4.5.1 – Summary of results

This study focused on assessing the workings of a national walking promotion partnership in Ireland using multiple methods. Overall, findings from the partnership evaluation questionnaire indicated high perceived ratings of leadership, resource allocation, collaboration, and governance from organisations involved in the GIW partnership. The SNA provided insight into the partnerships' communication network. Results from the SNA found that when compared with the communication network as defined within the GIWSAP (Get Ireland Walking, 2017), there was less communication between partners than intended in the GIWSAP. Furthermore, results from the SNA suggest that the organisations who were found to be central to the network as defined within the GIWSAP (Get Ireland Walking, 2017) were not perceived to have a key role in the actual network. Finally, findings from phone calls with local level stakeholders highlighted that key organisations involved in the national level partnership were found to be reflected at local level in most counties included in the study. However, there were differences in the specific departments within local government organisations across counties.

<u>Objective 1: Evaluate the perception of the Get Ireland Walking partners on leadership, governance, resource allocation, collaboration, and their overall experiences of the partnership.</u>

A component of this study set out to assess the workings of a national walking promotion partnership in Ireland across multiple domains including leadership, resources, governance, collaboration, and overall experiences of the partnership. Overall, GIW partner organisations had highly rated positive perceptions of all domains of the partnership (Table 4.3). At the time of the administration of the partnership evaluation questionnaire at T1, consultation meetings involving GIW partner organisations were being held to develop a new strategic plan. Partners' frequent communication with each other and familiarity with the aims and objectives of GIW at that time may be a reason for the high ratings of participants on each domain of the partnerships. For example, respondents at T1 rated their overall experiences of the partnership 10.8 from a maximum score of 14 (77%). These results may be explained through points raised by Graham, Sibbald and Patel (2015) who suggest that oftentimes enthusiasm to engage in interdisciplinary partnerships in public health is high during the initial stages of partnership formation. However, results presented here show a decline in overall mean scores over time for four out of five domains of partnership included in the questionnaire. Partners' perceptions of resource allocation experienced the largest relative decrease of all domains over time from 10.5/14 (75%) to 9/14 (64%). Get Ireland Walking hold low political leverage and are an organisation with less than 5 employees who operate on relatively low annual funding. Moreover, the partners are not mandated to engage in the implementation of the GIWSAP. These factors may partly explain the partners' perceptions of low resources within the network.

<u>Objective 2: Conduct a social network analysis of the communication network between partner organisations of Get Ireland Walking.</u>

Social network analysis methods have been used to improve the understanding of who the central and peripheral organisations are within PA, healthy living, and obesity prevention organisational networks (Loitz et al., 2017; McGlashan et al., 2018; Timm et al., 2021). Similar to the communication network presented here, the work of Loitz and colleagues (2017) found low density scores in funding and partnership networks in a group of

multidisciplinary stakeholders promoting active living in Alberta, Canada. Unlike the application of SNA methods presented in this study, many of the existing studies using SNA methods in PA and public health calculate multiple centrality measures including betweenness centrality, closeness centrality, and eigenvector centrality (Timm et al., 2021). Although calculating multiple centrality measures in a network can provide a nuanced understanding of the network at the node level, only degree centrality was calculated for the networks presented here as it has been described as a way of identifying nodes who are 'in the thick of things' (Freeman, 1978). In this context, gaining insight into the organisations who have the highest degree centrality provides tangible and pragmatic information for GIW, as it indicates what organisations are perceived by partners within the network to be most connected, which can act as a proxy measure for influence.

Much of the benefit of using SNA to understand the workings of organisational partnerships is the ability to monitor and visually depict the changes in partnership structures over time. Within the public health literature, SNA methods have been used to monitor not only the key organisations in funding, communication and collaboration networks, but also to understand how they change over time (Hoe et al., 2019). For example, the work of Salsberg et al (2017) monitored the changes in the network of organisations involved in a community-based health promotion research project over the course of two years. Salsberg and colleagues found that over time the academic partners' centrality in a multidisciplinary health promotion network decreased over time. In the case of the networks presented here, academic partners within the network did not play a role in the development or creation of the partnership, and thus remained at the periphery of the network over time. This is expected, given that academic partners and researchers are typically involved in programme development and implementation but cease to be involved following the end of a funding/implementation period (Estabrooks et al., 2019).

The current study adds to the SNA and PA literature by highlighting how a 'best case scenario' communication network can act as a useful comparator to assess how closely a partnership is working as planned throughout the course of the implementation of a policy. For example, the network presented in Figure 4.1 represents all communication ties between organisations expected to collaborate on actions together as defined within a national walking promotion strategy. Our results show that there is a mismatch between the strategy defined communication network and the network experienced by the partners

within it. In the strategy-defined network, there were 11 core organisations that make up part of the central group of organisations, whereas in the actual network, the focal point of the network was less discernible. Furthermore, local government organisations were found to be central in the actual communication network at T1 and T2, yet these are not well represented in the strategy defined network. This may be an oversight on the part of GIW when designing the GIWSAP (Get Ireland Walking, 2017) by underestimating the extent to which local level government organisations play a pivotal role in facilitating the flow of resources, information and governance for walking promotion in Ireland. Such insight allows partnerships to address this inconsistency, by developing mechanisms to improve the diffusion of information and communication across networks by targeting organisations who are most central (Luke and Stamatakis, 2012).

Like other work in PA and public health (Hoe et al., 2019; Jaramillo et al., 2021), SNA methods were used in the present chapter to track the changes in organisational network structure over time. Results presented here suggest that the plan for communication between organisations as defined within the SAP was not occurring in reality, which is evident through the low network density scores. A potential factor in the reduction of network density – a proxy for cohesion (Modal et al., 2022) – in the GIW partner network is the lack of monitoring mechanisms during strategic plan implementation. Providing a framework by which to monitor the progress of policy implementation in public health/PA has been shown to be useful in ensuring sustained stakeholder commitment over the lifecycle of a policy (Gelius et al., 2020). The GIWSAP (Get Ireland Walking, 2017) lacks specificity on targets, timelines, and evaluation frameworks, which may explain the decrease in overall network cohesion over time. The current findings suggest that SNA methods may be a useful way in assisting monitoring the implementation of such strategic plans.

Objective 3: Investigate the local level representation of organisations present in the national level partnership.

There were more similarities than differences between the organisations cited as key players within local and national level walking systems in Ireland. Many examples exist of comparisons between two or more districts or communities for differences in partnership structure (McGlashan et al., 2018; Mondal et al., 2022). However, there is a dearth of

research investigating whether organisations responsible for PA promotion at national level are reflected at local level, especially within an Irish context. Results of the current study suggest that LSPs, LAs and LCDCs are key players in most local level walking systems, all of whom were central to the national walking promotion networks over time (Figure 4.2). Although there seems to be a superficial level of similarity between the national and local level key players in the walking system, there are contextual differences at the local level which must be noted. Phone call participants specified the departments which were relevant to walking related work in their respective areas and these differed between counties. For example, departments relevant to the development and maintenance of parks and trails were the most commonly cited as key players at the local level. Given the recent increase in recreational walking trail usage in Ireland (Sport Ireland, 2021) strengthening communication mechanisms between LA departments responsible for the promotion and development of trails and national level organisations, such as Sport Ireland Outdoors, may help sustain the recent increases in recreational walking.

4.5.2 – Strengths and limitations

This study has a number of strengths. Firstly, it is one of the few attempts to use both traditional (partnership evaluation questionnaire) and systems science methods (SNA) to understand the workings of an interdisciplinary walking promotion partnership over time. A combination of methods has been recommended to be used in systems approaches to public health research (Rutter et al., 2017; Ogilvie et al., 2020; Jebb et al., 2021). There are examples of the use of SNA methods to understand partnership structures within public health projects in Australian (McGlashan et al., 2018), North American (Loitz et al., 2017) and Asian (Mondal et al., 2022) contexts. This study adds to the relatively sparse literature base by illustrating the use of such methods in an Irish context. Another strength of the study presented within this chapter is its focus on understanding the network of organisations involved in the walking system at multiple levels of the system. The results presented in this chapter suggest that there is similarity between the key players in the walking system at local level and national level, yet minor contextual factors exist that are specific to local counties (i.e., choice of relevant LA departments). This information can provide organisations such as GIW with valuable context-specific information when engaging with organisations at a local level. Furthermore, the evidence base pertaining to public health and systems science remains largely theoretical. This study adds to the sparse

literature base by highlighting how SNA was applied to a real-world walking promotion network.

This study also has some limitations. SNA methods are particularly sensitive to missing data (Scott and Carrington, 2012). The network diagrams presented in this chapter contain multiple missing nodes which can skew the results. For example, nodes which were missing from the SNA were non-response questionnaires and organisations who were not mentioned by others. A potential key player may have not completed the survey which ultimately could skew density and centralisation scores. Although there are ways of adjusting for missing data in SNA studies such as multiple imputation and reconstruction (Huang, Zhang and Li, 2019), the research presented here only included network actors with complete responses. It must also be noted that a SNA was conducted on the communication network only between GIW partners, and it was implied that communication ties between organisations meant work on specific actions within the GIWSAP. Organisations may communicate and this does not necessarily imply action. Furthermore, there was an omission of one statement in the list of statements under the leadership section of the partnership evaluation questionnaire at both time points due to researcher error.

In relation to the local level phone calls, there is an element of selection bias involved in the selection of representatives from LSP's over other stakeholders. For example, choosing a representative from the transport or education sector may result in the identification of organisations which are different to those named by LSP representatives. However, given the requirement for the study to include as many counties as possible, the LSP network was the most appropriate network of stakeholders to recruit as they represented a wide geographic spread of counties, all of whom had context specific knowledge of their respective local walking systems. It must also be noted that the protocol guiding the data collection during the phone call was a short-structured survey which required limited amounts of data to be collected, i.e. listing organisations who participants mentioned, and thus potentially losing some nuance. Using a more open form of qualitative data collection, such as semi-structured interviews, may provide more in-depth contextual information to each county.

4.5.3 – Implications of the research findings

<u>Implications for practice</u>

- Stronger connections are needed between representatives from local government organisations such as LAs and LCDCs, and GIW. In Get Ireland Walking's partner network as defined within the GIWSAP, organisations from Sport/PA and Health were identified as key players through the SNA, whereas organisations from local government were considered to be important at local level. Being disconnected with the 'real' key players in the network may limit the potential for GIW to create meaningful change to walking behaviours at local and national level.

- Although there were some similarities with the organisations who played a central role in the national level partnership to those at local level, specific focus must be placed on engaging with the specific departments and directorates of LAs, as they differ across counties.

- The SNA allowed for the identification of a completely isolated node from the overall communication network at T2. Encouraging organisations within the network to connect and engage with this organisation may foster meaningful ties and present opportunities to share new resources, information, and expertise throughout the network.

<u>Implications for research</u>

- Investigating other network measures such as betweenness centrality to identify who the gatekeepers to information and resources are within the network may assist with the identification of key organisations to help facilitate communication and transfer of resources.

- Given sufficient resources and research support, ongoing monitoring of the communication, resource sharing, funding, and collaboration networks over a longer period of time using SNA methods – especially over the course of the implementation of GIW's new strategic plan – could act as a useful method of monitoring implementation.

4.6 – Conclusions

The aim of this study was to assess the workings of a national walking promotion partnership in Ireland across multiple domains using a mixed methods approach. The findings from this chapter are threefold. Firstly, partners had a positive perception of the partnership across multiple domains including resource allocation, collaboration, leadership, governance, and their overall experiences of the partnership. Secondly, the SNA highlighted that the communication network of the partnership was not working as planned and that the overall structure of the communication network changed over time. Finally, findings presented here suggest that key organisations mentioned in the national level walking promotion network were mirrored at local level, although it was found that the specific departments within local authorities differed across counties. Overall, the GIW partners perceived the partnership to be effective across multiple domains yet results from the SNA suggest that communication between partners within the network could be improved.

4.7 – Reflections of an embedded researcher

My experience up until this point when speaking with colleagues within and outside of academia who work on physical activity and public health policy has provided me with a sense that (sometimes) policies are developed and written up to sit on a shelf. This, I'm sure, happens for a number of reasons. With this study, I was keen to understand whether or not this was the case with Get Ireland Walking's recently outdated Strategy and how we could improve the next iteration of the Strategy. This study was conducted right after the expiration of the Get Ireland Walking Strategy and Action Plan 2017-2020 and coincided with the initial development stages of an updated version.

Up until this point in my PhD, I was slowly learning about (and experiencing) the disjointed nature of walking promotion in Ireland from 'inside' an organisation embedded in the walking system, and 'from the outside in' from the perspective of a researcher. I was conscious moving into this study that, with the way we wanted to probe the network of partners associated with Get Ireland Walking (through the social network analysis piece, more so), there may be a reluctance from organisations to 'admit' their communication ties (or lack thereof) to other organisations within the partnership. I think a major factor in what helped us carry out this study was the openness of the Programmes Manager of Get Ireland Walking to the potential of *'bad news'* resulting from this study. Bad news, in this context, meant somewhat exposing the Get Ireland Walking partner network. The results were interesting to me as a researcher but also as an employee of Get Ireland Walking, as the disciplinary siloes I hypothesised existed within the network were found to be present. It has to be said, though, that social network analysis is a method that is commonly used in systems approaches to physical activity which requires a tad more expertise, training, and skill than traditional pen-and-paper questionnaires. Get Ireland Walking learned a lot from using it to investigate the 'who's who?' in their partnership network, but I can't say that it would be feasible for other walking systems – especially without research support – to dedicate time and resources to conduct a social network analysis of their own network(s).

In any case, in January 2023 the results from this chapter were presented to the National Steering Group of Get Ireland Walking during the processes of developing the new Strategy and Action Plan for Get Ireland Walking. The proceeding discussions led to action in the form of revisiting the organisations who are named within the updated

Strategy to include climate and environmental organisations. Thus, initial connections were developed with organisations from more heterogeneous sectors which are more inclusive of who the 'key' organisations are within local and national walking systems – not those who provide funding and resources to the initiative. It is in these moments where the positive aspects of being an embedded researcher are experienced first-hand.

Chapter 5: Using systems mapping to facilitate a systems approach to walking at local level in Ireland.

5.1 – Introduction

There are many facets to a systems approach to physical activity (PA), including developing a shared vision amongst stakeholders, framing a problem or phenomenon as a system, and understanding how actors within a system are connected (Jebb et al., 2021). Systems maps have been used as tools to help build consensus among stakeholders with varying perspectives involved in systems approaches to obesity (Allender et al., 2015) and physical inactivity (Rutter et al., 2019). There are few examples of how systems mapping can be utilised to initiate cross-sectoral collaboration among stakeholders involved in a systems approach to walking. Up until now, Chapters 3 and 4 have provided examples of how common components of systems approaches (i.e., applying a systems lens and social network analysis) can be utilised to understand aspects of the walking system in Ireland. The current chapter, Chapter 5, aims to build on these findings by using systems mapping to initiate cross-sectoral collaboration as part of a systems approach to walking at local level in Ireland.

This chapter describes the process of the development of a systems map for walking in Cork and the resulting outcomes over an approximate 3 year period. The Australian Systems Approaches to Physical Activity Systems Map (ASAPa) (Bellew et al., 2020) and the Global Action Plan for Physical Activity 2018-2030 (GAPPA) (World Health Organisation, 2018) were used to guide the process of recruiting participants, systems map development, and structuring of outcomes following the systems mapping workshops. This chapter also outlines the facilitators to local level systems approaches to walking in Ireland.

Context
This project is co-funded by Get Ireland Walking (GIW), who are a national walking promotion organisation with strong partnerships in each Local Sports Partnership (LSP) across Ireland. Cork was chosen as the county for this research to take place, as GIW had supplementary human resources on the ground in the form of a Walking Promotion Officer (WPO) who occupied a part time position within the LSP in Cork. Cork is the largest county in Ireland with a population of approximately 540000 (Central Statistics Office, 2023), and represents the geographical boundary for which the systems map was

developed. Cork is located on the south-west coast of Ireland and contains a city, multiple largely populated towns, mountain ranges, and coastal areas.

5.2 – Aims and objectives

This chapter will address the following aim:

- Investigate how systems mapping can be used to facilitate a systems approach to walking at local level.

To address this research aim, several objectives will guide the work conducted within this chapter:

1. Create a systems map for walking in Cork, Ireland, and categorise outcomes according to the strategic objectives of the Global Action Plan on Physical Activity 2018-2030.
2. Understand stakeholders' perceived facilitators to local level systems approaches to walking.
3. Monitor the ongoing processes following the development of a systems map for walking in Cork, Ireland.

5.3 – Methods

5.3.1 – Research Design

This was a mixed method study comprising two adapted participatory action research workshops and five semi structured interviews. The time period of this study ranges from June 2020 to April 2023 (Figure 5.1). The initial research design outlined two face-to-face workshops to develop the systems map for walking in Cork, Ireland. However, this was revised following the outbreak of the Coronavirus-2019 (COVID-19) in 2020 and the implementation of government movement restrictions in Ireland. Due to these restrictions, workshops were held online. In June 2020, representatives from multiple organisations and sectors in one local area (Cork) came together over two online workshops to develop a systems map for walking. Furthermore, five semi-structured interviews were conducted

with local, regional, and national level stakeholders with a role in the system of walking in Cork to triangulate the findings of the workshops, and to highlight varying perspectives on factors which can assist in the implementation of systems approaches to walking at local level in Cork. Due to the resignation of the WPO in December 2020 and the COVID-19 restrictions in Ireland, research activity was ceased until after the appointment of a new WPO in the summer of 2021. Ethical approval was granted for the study by the School of Health Sciences ethics committee in South East Technological University (SETU) (Appendix 11).
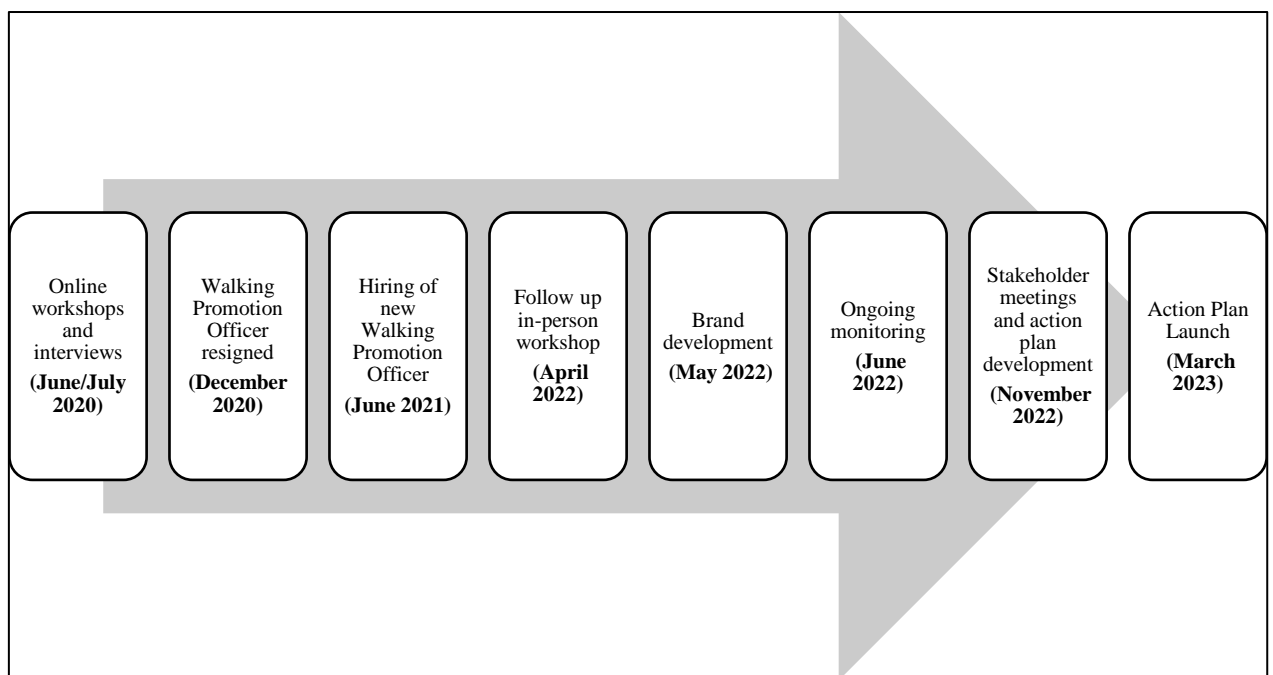
Figure 5.1 – Systems mapping process and outcomes timeline.

5.3.2 – Study population and sampling

The following sections will be divided in two parts, each describing the study population and sampling procedures for the systems mapping workshops and interviews, separately.

Systems mapping workshops

Stakeholders whose role was associated with walking, either directly or indirectly, were included in this study to gain insight into all areas of the system. Therefore, walking was broadly defined to include recreational and transport walking to ensure the inclusion of

stakeholders from multiple sectors. Local knowledge of the context from the WPO was used to purposively recruit a total of sixteen multidisciplinary stakeholders to attend two systems mapping workshops. The eight system intervention points within the ASAPa (Bellew et al., 2020) were used as a framework to guide the recruitment process of workshop participants to ensure representation from all sectors in the walking system. The eight system intervention points in the PA system outlined by Bellew and colleagues are outlined in full in Section 5.3.4. An online meeting was convened between the lead researcher and the WPO in March 2020, to identify participants whose primary area of work was within each of the system intervention points in the ASAPa (Bellew et al., 2020). An email was sent via the WPO inviting participants to take part in the workshop (Appendix 12). The roles and specific areas of work for all workshop participants are outlined in Table 5.1.

Table 5.1 – Systems mapping workshop participants and main areas of work.

#	Role	Workshop 1	Workshop 2	Main area of work
1	Walking Promotion Officer	X	X	Sport and Recreation
2	Health Promotion Officer	X	X	Primary and Secondary Healthcare
3	Programmes Manager	X	X	Sport and Recreation
4	National Programme Manager	X	X	Sport and Recreation
5	Sports consultant	X	X	Sport and Recreation
6	Rural Recreation officer		X	Sport and Recreation
7	Pedestrian advocacy		X	Transport and Human Movement Environment
8	Cyclist advocacy		X	Physical Environment, Urban Design and Liveability
9	Health Promotion Officer		X	Primary and Secondary Healthcare
10	Local Government Sport and Recreation Coordinator		X	Community-wide programmes
11	Health Promotion Officer		X	Primary and Secondary Healthcare
12	Local Tourism		X	Community-wide programmes
13	Health and Wellbeing Officer		X	Primary and Secondary Healthcare
14	Local Business		X	Workplaces
15	Secondary School Teacher		X	Education
16	Disability Sport and PA Officer		X	Sport and Recreation

Semi-structured interviews

A sub-sample of workshop participants who held national, regional, and local level perspectives on the walking system in Cork were purposively recruited to participate in the interviews to explore their perspectives on the facilitators of systems approaches to

walking in Cork. Participants were contacted via email directly with detailed information on the study and an informed consent form (Appendix 12). Five participants, whose roles are outlined in Table 5.2, agreed to participate and returned the digitally signed informed consent form prior to the interview being scheduled.

Table 5.2: Roles of interviewees.

Level of work	Role
National	National Programme Manager, national walking promotion initiative
Regional	Sports strategy consultant company, CEO
Local	Pedestrian advocacy group, Chair
Regional	Intersectoral active travel forum, co-ordinator
Local	Walking Promotion Officer

5.3.3 – Data collection tools

Note taking template

Data were collected during online workshops through the process of guided notetaking by three facilitators using a guidance sheet (Appendix 13). Notes were collated by the researcher and used to inform the development of the systems map.

Interview topic guide

Semi-structured interviews were conducted using a topic guide with six question areas (Appendix 14). The contents of the topic guide aimed to probe the factors which can assist in the implementation of systems approaches to walking in Cork. The development of the topic guide was guided by the contents of the Australian Systems Approaches to Physical Activity Systems Map (ASAPa), which includes constructs such as the political environment, commercial environment, knowledge mobilisation, and the knowledge environment.

Ongoing monitoring

The resulting outcomes of the systems mapping process were multifaceted and were monitored and observed from June 2020 until March 2023.

5.3.4 – Procedures

Systems mapping workshops

The process was guided by applying a pre-existing systems map for PA (Bellew et al., 2020) to the Cork context. The Australian Systems Approaches to Physical Activity Systems Map (ASAPa) (Bellew et al., 2020) outlines a web of factors which influence PA ranging from individual level factors (demographic status, physiology, and psychology) to systems level factors (political environment and governance, transparency and accountability) and the complex network of interconnections between them. The ASAPa outlines eight system intervention points which are areas within the PA system where interventions can be implemented across a range of sectors. The eight system intervention points are: (1) Transport and Human Movement Environment; (2) Workplaces; (3) Community-wide Programmes; (4) Education; (5) Sport and Recreation; (6) Primary and Secondary Healthcare; (7) Mass Communication and Public Education; and (8) Physical Environment, Urban Design, Liveability and Walkability. The ASAPa (Bellew et al., 2020) was developed as part of a larger two-year project, Australian Systems Approaches to Physical Activity, which comprised of four work packages. One of the work packages involved developing a conceptual systems map for PA. The project team developed the conceptual systems map for PA through engaging with outcomes of meetings with national stakeholders, and existing literature searches of publications relating to systems approaches to obesity and PA (Figure 5.2) (Bellew et al., 2020).
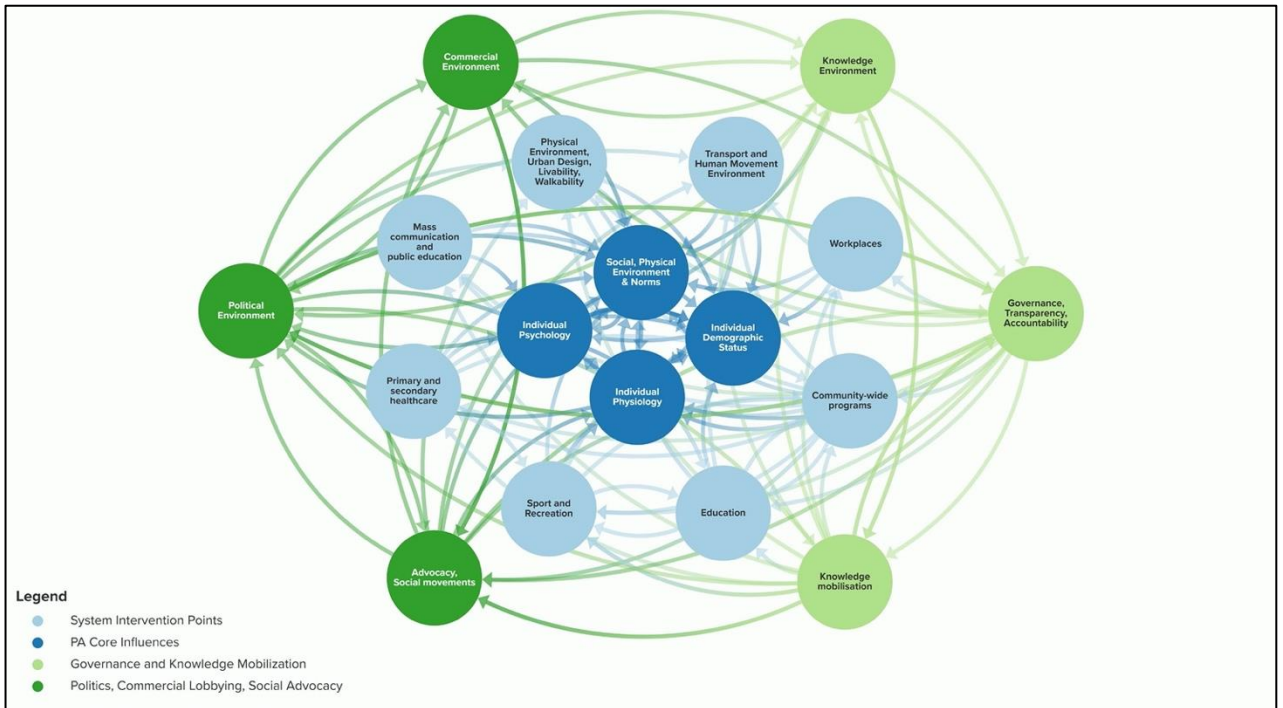
Figure 5.2 – The Australian Systems Approaches to Physical Activity (ASAPa) Systems Map Activity (Bellew et al., 2020).

Two participatory online workshops were facilitated using the Zoom video conferencing platform in June 2020 (Zoom, 2022). The central question posed to attendees of workshop one was "What interventions are currently being implemented successfully in Cork to promote walking?". Workshop one lasted 75 minutes and involved open discussion between stakeholders (n=5) focusing on examples of good practice which existed in each of the eight system intervention points of the ASAPa (Bellew et al., 2020). The main purpose of workshop one was to collate all identified examples of good practice interventions in the Cork walking system to produce the first iteration of the map, which was developed by the lead researcher via Kumu.io. Kumu.io is a user friendly data visualisation platform which can be used to develop systems maps and network diagrams (Kumu.io, 2022). The outcome of workshop 1 (first iteration of systems map for walking in Cork) intended to act as a platform to base discussions on in the second workshop with a broader group of stakeholders. The contents of the ASAPa (Bellew et al., 2020) acted as a framework upon which identified examples of good practice were overlayed to the corresponding area of the systems map. For example, the identification of successful walking programmes delivered in healthcare settings were added in the Primary and Secondary Healthcare system intervention point of the systems map. The first iteration of the systems map developed by the researcher was circulated via email to all participants

who attended workshop one for amendment and approval. Participants could access the interactive map via web-link and amend the map prior to the date of the second workshop.

Participants of workshop 2 (n=16) were sent a copy of the first iteration of the systems map for walking in Cork, a short 5-minute explanatory video explaining the purpose of the workshop, and the outcomes of workshop 1. The central question posed to stakeholders (n=16) in the second workshop was "What should be done to help increase overall walking levels going forward in Cork?". Three breakout rooms were convened by collapsing the 8 system intervention points from the ASAPa (Bellew et al., 2020) into three, with participants being allocated to each breakout room according to their expertise. Following these breakout rooms, the outcomes of the discussions were presented to the wider group for feedback and critical discussion. One facilitator was assigned to each breakout room, to help take notes and guide discussions. Prior to the workshop, the lead researcher met with each facilitator to talk through the process and answer any queries/concerns relating to the note-taking process. The breakout rooms were: (a) Recreation, Community Wide Programmes, and Mass Communication and Public Education; (b) Primary and Secondary Healthcare, Education, and Workplaces; and (c) Physical Environment, Urban Design, Liveability, and Walkability, and Transport and Human Movement Environment. Three facilitators guided the discussions and took notes in each breakout room. Workshop two lasted approximately 120 minutes. Following the second workshop, a meeting was convened between the lead researcher and the facilitators of the breakout rooms to develop a second iteration of the systems map using the Kumu.io software. The second iteration of the systems map was circulated to all workshop participants via email afterwards for amendment and approval.

Semi-structured interviews

All (n=5) interviews were held via Zoom in June/July 2020 and recorded via a Macbook Air voice recording app. Interviews ranged in length between 45 minutes and 97 minutes. The semi-structured interviews had to be hosted online due to the government movement restrictions in place in June/July 2020 due to the outbreak of COVID-19. Interviews were held concurrently to the systems mapping workshops to help elicit supporting factors to the implementation of systems approaches to walking at local level in Ireland, but also as a

supplementary data source for some of the nuance which may have been lost through the delivery of online workshops.

<u>Ongoing monitoring</u>

Outcomes resulting from the systems mapping workshops such as (but not limited to) workshops, interventions, action plans, meetings, events, and publications, were monitored by the researcher over time following the implementation of the systems mapping workshop in June 2020.

5.3.5 – Data analysis

<u>Systems mapping workshops</u>

Thematic analysis (TA) was identified as a suitable analysis technique for workshop outcomes due to its highly flexible nature which can be modified for the needs of a particular study (Braun and Clarke, 2006). The analysis of data resulting from the workshops followed the process undertaken by Murphy and colleagues (Murphy et al., 2021) who used a deductive TA approach to assign outcomes from a workshop exploring the national PA system in Ireland to the strategic objectives of the Global Action Plan for Physical Activity 2018-2030 (GAPPA) (World Health Organisation, 2018). The GAPPA is a framework for action which outlines twenty multidimensional policy actions which are encompassed within 4 strategic objectives (Create Active Societies; Create Active Environments; Create Active People; and Create Active Systems) which captures a whole-of-systems approach to increasing PA (World Health Organisation, 2018). The categorisation of examples of good practice and suggested actions identified by stakeholders in both workshops was predetermined by the specific actions outlined within the GAPPA (World Health Organisation, 2018). The lead researcher assigned each example of good practice intervention and suggested action, which were identified by stakeholders in workshops 1 and 2 respectively, to the best corresponding action within the GAPPA (World Health Organisation, 2018). Following this, a meeting with the supervisory team (NM & BL) was convened to review the categorisation of actions and to reach a consensus.

All interviews were transcribed verbatim and anonymised. Upon completion of each interview, memos were taken by the researcher outlining some initial thoughts which later helped shape the formation of codes. Anonymised interview transcripts were printed in hard copy before TA guided by the processes outlined by Braun and Clarke (2006) was conducted. Firstly, interview transcripts were read twice to allow the researcher to become familiar with the data. Upon the third reading of the transcripts, codes were written in the margins. Two 'sweeps' of coding were conducted for each interview transcript (n=5). The second 'sweep' provided the opportunity to apply greater analytical depth. No codes were predetermined before the coding process. In order to assess the rigour of the coding process, critical dialogue about the codes and the researcher's interpretation of the data were carried out between the lead researcher and a member of the supervisory team (BL). The usefulness of critical friends is outlined by Smith and McGannon (2017) as an option to assess the rigour of qualitative analysis instead of the widely used interrater reliability method. This process involves dialogue between researchers relating to their interpretations of qualitative data in order to reach a consensus through an iterative process which encourages reflexivity (Smith and McGannon, 2017).

5.4 – Results

The following section will be separated into three parts. Firstly, the development and outcomes of the systems mapping process will be described (Objective 1). Secondly, the findings of the semi-structured interviews will be outlined (Objective 2). Finally, the ongoing monitoring processes resulting from the systems mapping workshops will be presented (Objective 3).

Objective 1: Create a systems map for walking in Cork, Ireland and categorise outcomes according to the strategic objectives of the Global Action Plan for Physical Activity 2018-2030.

Workshop 1

The purpose of workshop one was to highlight current examples of good practice interventions within the system of walking in Cork, and to build a first iteration of a systems map. The first iteration of the systems map was intended to portray examples of interventions which were being implemented in the Cork walking system and thus act as a platform to base discussion with a larger group of stakeholders in workshop 2. Five participants attended the first workshop which was held via Zoom (Zoom, 2021). 39 interventions from 8 system intervention points were identified by stakeholders and used to develop the first iteration of a systems map (Appendix 15). The researcher drew initial connections between factors using the Kumu.io (Kumu.io, 2022) software and invited participants to access the map via a link and draw connections using the software after the workshop.

Workshop 2

The purpose of workshop two was to highlight suggested actions to improve the system of walking in Cork. Sixteen participants attended the workshop which was held via Zoom (Zoom, 2021) where participants explored what was needed to improve the system in each of the eight system intervention points of the ASAPa (Bellew et al., 2020). No additional examples of good practice were identified by attendees of workshop two. Overall, 19 suggested actions were identified by the stakeholders as opportunities to improve the system. The facilitators of each discussion group took hand written notes of the suggested actions that were discussed in each breakout room. Notes were shared with the lead researcher upon completion of the workshop which informed the design of the second iteration of the map. Participants were invited to access the online platform to draw connections between nodes and add additional nodes to the map to inform an updated version of the systems map (Appendix 16).

Categorisation of workshop outcomes to the Global Action Plan for Physical Activity (2018-2030).

The outcomes of workshop one (examples of existing good practice) and workshop two (suggested actions) are presented according to the quadrant and specific action of the GAPPA for which it may have the most impact (Figure 5.3). The GAPPA was used as a framework for the categorisation of outcomes in order to align with other ongoing work on

systems approaches to PA in Ireland (Murphy et al., 2021). Most examples (56%) of existing good practice within the Cork walking system were individual level community-based walking programmes (Create Active People). The majority (58%) of the suggested actions identified by the stakeholders were relevant to the Create Active Systems quadrant of the GAPPA. 21% and 16% of suggested actions fell within the Create Active People and Create Active Societies quadrants, respectively. One (5%) suggested action identified by the stakeholders fell within the Create Active Environments quadrant of the GAPPA.
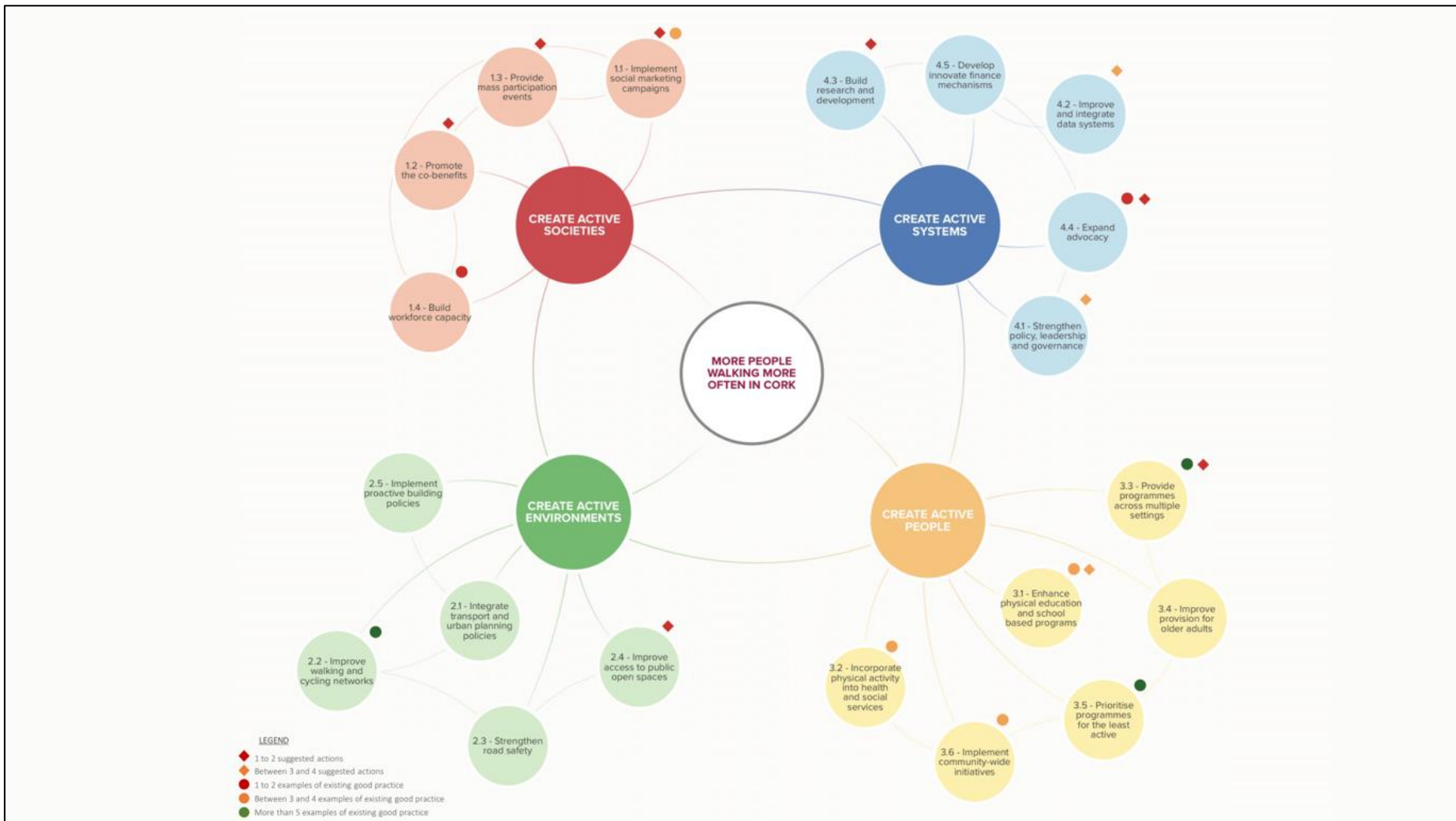
Figure 5.3 – Areas of suggested action and examples of good practice in the Cork walking system plotted on the Global Action Plan on Physical Activity 2018-2030 framework.

Objective 2: Understand stakeholders' perceived facilitators to local level systems approaches to walking.

The primary purpose of the interviews was to allow workshop participants operating at multiple systems levels (i.e., local and national level) to highlight their perspectives on what is needed in order to implement a systems approach to walking at local level in Ireland. Three main themes were identified within the semi-structured interview processes: developing a shared vision; political, commercial, and financial support; and motivated individuals.

Theme 1: Developing a shared vision

One of the key aims of using systems approaches to address complex problems is to reduce conceptual silos in which individuals and organisations often work. Although it was acknowledged during the interviews that *'people are sharing the same goals, really' (Stakeholder 5)*, the need for the alignment of policy objectives from a local to a national level is critical to adopting a systems approach. The importance of national level stakeholders' involvement in the consultation processes of local walking policy development was stressed by one interviewee:

"I think a strong - from County Development Plans working with local council and Local Authorities that's obviously the way to go, and whatever plans we put in place or whatever strategy we develop over the coming months and into next year, I think it needs to complement and allow for those partnerships to develop. That if there's a County Development Plan, that we - nationally as an initiative of Sport Ireland and Department of Health - are consulted from an early stage" (Stakeholder 1).

Having a trusting relationship between partners involved in a systems approach to walking was also noted to be of importance. It was acknowledged that while working across sectors and disciplines, stakeholders *'all need to talk to each other'* (Stakeholder 4). Although having a trusting relationship between organisations is important, communication from a reputable and trusted lead organisation can help with engagement and buy-in:

"I think at least it coming from the Local Sports Partnership [LSP], people understand what the LSP are they've been around long enough and people get it" (Stakeholder 3).

Furthermore, one stakeholder elaborated on what a trusting working relationship means to them:

"People feel like they can pick up the phone to you, or you can pick up the phone to them" (Stakeholder 1).

This stakeholder went on to mention that working with organisations outside of their own sector, as well as aligning objectives and fostering a positive working relationship, can facilitate productivity:

"So when this mapping exercise is done and we develop actions from this – as well as the lads in the Cork Local Sports Partnership [LSP] – they'll be able to keep driving those actions and keep their shoulder to the wheel on it. It's trying to identify their high priority areas of work initially and develop that relationship, develop that rapport with them, and then you can really ask them to do anything" (Stakeholder 1).

Theme 2: Political, commercial, and financial support

Many interviewees highlighted the importance of leadership from local politicians and councillors, as well as commercial partners, as facilitators to collaboration and coordination work sectors to promote walking in Cork. One interviewee mentioned that '*it takes something like that, you know, people in positions of power*' (Stakeholder 2) to facilitate collaboration between organisations. Within the local context in Cork, a large level commercial partner, the Cork Chamber of Commerce, are considered to be '*one of the most progressive chambers in the country*' (Stakeholder 4). However, smaller businesses were less supportive of engaging with organisations outside of their sector. One interviewee notes that '*the business community don't really seem to see the bigger picture*' (Stakeholder 5).

In 2020, the Green Party, who have a large interest in the promotion of active travel in Ireland, were elected into national Government (Green Party, 2020). It was said by one

stakeholder that individuals operating at a governmental level progressing walking and cycling *'can only be a plus'* (Stakeholder 1). Having authoritative figures at governmental level with a walking agenda will '*put through a few things at a national level*' (Stakeholder 3) and mirror the efforts at regional and local level in Cork.

Theme 3: Motivated individuals

Stakeholders' enthusiasm and motivation towards working collaboratively was something that was identified by interviewees as a factor which may facilitate systems approaches to walking. Systems approaches require, among other things, stakeholders to take a broader lens to the problem which they tackle in their work. One stakeholder acknowledged that *'some people in the executive get it'* (Stakeholder 3). Moreover, another stakeholder outlined that often it is not necessarily the organisations you are required to work with, it is the individuals within them, which can be detrimental to or facilitate collaboration:

"And then, I suppose, on the City Council and the HSE [Health Service Executive] side of things, eh, I suppose it depends on the person really, you know. You can talk about all these groups and organisations, but it's the people there you've to work your way into" (Stakeholder 2).

The differing personalities and perspectives of the system of walking in Cork was something that can help provide a rich and nuanced perspective on the problem:

"I think that comes back to personalities, because some people are very focused on detail to the detriment of the bigger picture, whereas some people are focused on the bigger picture and the vision, and they see the whole map [...] and you need a mix of people there. So, you'd be like, some people are focused on doing this and the details, so give them the tasks that would fit into the bigger picture, because they're not going to come up with the plan." (Stakeholder 2)

Objective 3: Monitor the ongoing processes following the development of a systems map for walking in Cork, Ireland

Establishment of Get Cork Walking Steering Committee

During the months following the online workshops in June 2020, a steering committee of ten representatives from multidisciplinary organisations was created and chaired by the part time WPO in Cork. The purpose of this steering committee is to plan the delivery and implementation of the suggested actions resulting from the workshop. Following interruptions due to staff turnover and COVID-19, four meetings were held virtually to revitalise the Get Cork Walking Steering committee between October 2021 and March 2022.

In-person workshop

The Get Cork Walking wider stakeholder group were invited to attend an in-person workshop in April 2022 which aimed to reengage stakeholders following the COVID-19 pandemic, and to assess the relevance of the outcomes from the initial systems mapping workshops in June 2020. Ten planning and preparation meetings were convened by the WPO in the lead up to the workshop in April 2022. Nineteen stakeholders from academia, health, local government, transport, education, and commerce, came together to discuss the relevance of the outcomes from the systems mapping workshop held in June 2020. This workshop aimed to facilitate more in-depth discussions relating to the implementation of the actions from the systems mapping workshops in June 2020. The outline of the workshop can be found in Appendix 17.

International conference satellite event

In September 2022, the Walk21 Conference was hosted in Ireland. The Walk21 conference is an international conference aimed at policymakers, practitioners, and researchers interested in walking. The five-day long conference was based in Dublin for the first four days, and two satellite events in other locations in Ireland were hosted on the final day of the conference. A full-day event showcasing the Get Cork Walking project was selected as one satellite event by Walk21. The event was attended by over 50 community members, academics, international conference delegates, local authority (LA) members, planners, active travel advocacy groups, and health promotion professionals. Presentations were provided from the Get Cork Walking team on the project from research, local level

facilitation, and national level coordination perspectives. Presentations from Get Cork Walking stakeholders, and international perspectives from Paths for All, Scotland's national walking promotion charity, were also given. Full details about the event are presented in Appendix 18.

Brand development

The systems approach to walking in Cork resulting from the systems mapping workshops in 2020 was termed the 'Get Cork Walking' project, and external graphic design expertise was sought by the WPO and GIW to develop a brand (see Figure 5.4) for the project. Currently, all stakeholders involved in the Get Cork Walking project have access to a suite of online branding guidelines and physical brand resources to be used for all promotional activities, events, and social media posts relevant to their work (Appendix 19). Furthermore, an infographic was designed which highlighted the multiple activities which had been delivered across the walking system in 2022 and was circulated to all partners (Figure 5.5).
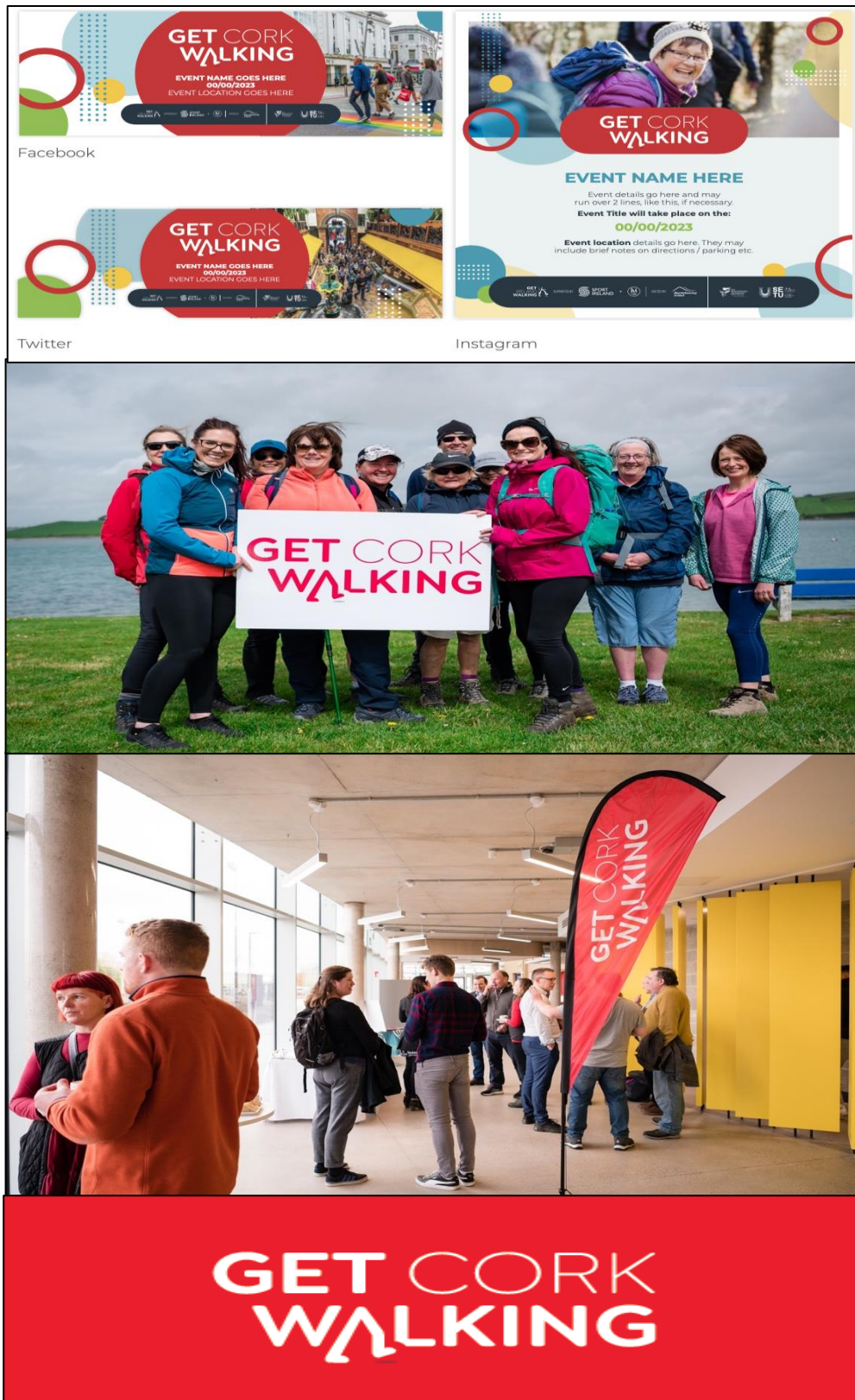
Figure 5.4 – Examples of digital and physical Get Cork Walking branding for stakeholder events.

Figure 5.5 - Activities in the Cork walking system 2022.

Get Cork Walking Action Plan 2023-2024

Following the in-person workshop held with the wider Get Cork Walking stakeholder group in April 2022, the outcomes of the workshops were used to develop a systems-oriented action plan for the upcoming year (2023-2024). The WPO convened six meetings with stakeholders from the following sectors: Health; Sport; Active Travel; Regional Development; Local Authority (City); and Local Authority (County), to clarify roles and responsibilities of organisations on assigned actions in the Action Plan. Meetings were held over a 2-week period in November 2022, and the final action plan was launched for implementation in March 2023.

The Get Cork Walking Action Plan 2023-2024 is aligned to the strategic objectives in the GAPPA (World Health Organisation, 2018) and to GIW's forthcoming national strategic plan to ensure alignment to global and national targets. The Get Cork Walking Action Plan 2023-2024 contains ten context specific action areas which outline a list of activities and measurable outputs which address the four GAPPA strategic objectives (Table 5.3). The full action plan (and photograph of launch) can be found in Appendix 20.

Table 5.3 – Get Cork Walking Action Plan 2023-2024 contents overview.

GAPPA Strategic Objective	Context specific action area	# of activities	# of measurable outputs
Create Active Societies	• Walking festivals and events • Get Cork Walking branding • Stakeholder capacity building • Walking programmes and capacity building	6	7
Create Active Systems	• Stakeholder events and communication • Get Cork Walking representation on Transport and Mobility Forum • Research and data	6	12
Create Active Environments	• Community trail development • National Sustainable Mobility Plan	2	6
Create Active People	• Education settings • Health and wellbeing settings • Youth and youth groups	7	10

5.5 – Discussion

5.5.1 – Summary of results

This was a mixed-methods study which described the processes and outcomes of developing a systems map for walking in Cork, Ireland. Furthermore, stakeholders' perceived facilitators to systems approaches to walking at local level in Cork were explored using semi-structured interviews. Stakeholders from health, sport, PA, outdoor recreation, academia, transport, and local government attended two online workshops to develop a systems map for walking in Cork. Overall, 39 examples of existing good practice interventions and 19 suggested actions to improve the system were identified in the workshops. When aligning the workshop outcomes to the strategic objectives and policy actions outlined in the GAPPA, there were discrepancies between the areas of

examples of good practice interventions and areas for suggested action. The majority of examples of good practice interventions identified within the walking system in Cork were within the Create Active People quadrant of the GAPPA, whereas most suggested actions were found to be within the Create Active Systems quadrant. Findings from semi-structured interviews revealed that developing a shared vision, having political and commercial support, and the need for motivated individuals were among some of the facilitators to systems approaches to walking. Overall, this study furthers our understanding of how a systems approach to walking might be operationalised at local level in Ireland. The following discussion is organised according to each of this study's objectives.

Objective 1: Create a systems map for walking in a large geographical area in Ireland and categorise outcomes according to the strategic objectives of the Global Action Plan for Physical Activity 2018-2030.

The work presented as part of this chapter used two existing resources to facilitate and guide the process of developing a systems map for walking in Cork. The ASAPa (Bellew et al., 2020) offered a platform upon which to base the recruitment and systems map development processes, while the strategic objectives outlined within the GAPPA were used as a framework to organise workshop outcomes and the future work of the interdisciplinary group. The benefits of developing conceptual systems maps, causal loop diagrams and other systems visualisation tools for PA and other public health problems from a 'blank canvas' have been displayed (Allender et al., 2015; Cavill et al., 2020). However, Bellew et al (2020) argue that the conceptual ASAPa can act as a useful starting point to streamline the process in other contexts. This is important, as this research was conducted in a real world setting with all stakeholders responsible for many other agendas in addition to their roles in the Cork walking system. Furthermore, the system intervention points, correlates of PA, and other elements of the conceptual systems map presented by Bellew et al (2020) are underpinned by a substantial evidence base. Using these various sections of the ASAPa allowed for a streamlined and time-efficient way of conducting conversations during the workshops described here. Furthermore, it must be noted that a combination of local context-specific knowledge from the WPO, combined with the guiding framework of the ASAPa (Bellew et al., 2020), was found to be an appropriate approach in identifying relevant stakeholders from the wider walking system.

157

Hovmand et al (2014) note that systems maps vary in terms of the degree to which they investigate the behaviour and dynamics of a system. Thus, the methods used in the development of different types of systems maps vary depending on the intended outcomes of the process. For example, the work of Hunter et al (2021) outlines a study protocol involving the development of systems-oriented interventions and policies to reduce car dependency in Belfast. One of the work packages outlined in Hunter and colleagues' paper is a group model building process whereby a causal loop diagram will be developed of the system of car dependency in Belfast. Group model building is a participatory method whereby stakeholders from multiple organisations and sectors come together to visualise their system of interest and identify feedback loops, and the explore the dynamics of a system through the development of a causal loop diagram (Hovmand, 2014). The work presented here differs from the approach outlined by Hunter and colleagues in two ways. Firstly, as the overall purpose of the systems mapping process described here was to act as a catalyst to engage stakeholders, the map itself was conceptual in nature and feedback loops, stocks and flows, and other concepts relevant to the study of system dynamics were not investigated. Secondly, the lens applied to the study presented here represents that of systems thinking, focusing more on concepts such as relationships between factors and understanding differing perspectives (Gates et al., 2021). The type of systems map developed in this study led to a superficial insight into the inherent behaviour of the system. However, the introduction of systems thinking and exploring the interconnectedness of the work of the stakeholders through the systems mapping process proved a useful first step towards a more coordinated approach across sectors, and may have been a contributing factor in stakeholder buy-in to the Get Cork Walking Action Plan 2023-2024.

Objective 2: Understand stakeholders' perceived facilitators to local level systems approaches to walking.

Bellew and colleagues (2020) suggest that, among many other factors, long term political support is crucial to the success of a whole-of-systems approach to PA. Interviews with stakeholders taking part in the systems mapping workshop suggest that political and commercial support is key for the success of a systems approach to walking in Cork. The political support required for the implementation of a successful systems approach must

exist at multiple levels, including national and local. For example, the evaluation of the We Can Move project (a whole-of-systems approach to obesity and PA) in Gloucestershire saw significant investment and support from national level organisations such as Sport England backed up by local level representation (Nobles et al., 2021). The Irish governmental reform in 2020 saw the Green Party offered a position in government who proposed €1m funding per day for walking and cycling. This was noted by interviewees as providing a basis of political support at national level, and an opportunity now exists for this financial and political support to leverage aligned intersectoral action at local level. However, it has been suggested that gaining political backing from policymakers and decision makers can sometimes be difficult given the traditional funding structures, political agendas, and the inability of systems approaches to provide 'quick' results (Jebb et al., 2021). Developing shared action plans for members of local government and other relevant stakeholders within local walking systems to communicate may help with building trust and rapport between stakeholders across sectors.

The broad interdisciplinary and multi-sectoral nature of PA can be problematic in assigning accountability or ownership to one sector or organisation (Piggin, 2020). Similarly, when framed through a systems lens (Nau et al., 2022), walking promotion in Ireland may be seen as the business of many but the responsibility of none. Developing a shared vision amongst interdisciplinary stakeholders was highlighted by interviewees as a facilitator to the implementation of a systems approach to walking at the local level in Cork. Similar findings can be observed in work by Nau, Bellew and Huckel Schneider (2020), who suggest that defining the overall purpose of a systems approach and developing governance structures from the beginning is crucial to the overall success of a systems approach. Furthermore, consistent and regular communication between organisations operating within a system has been highlighted as crucial in facilitating the sharing of resources and information across the system (Loitz et al., 2017). Potential opportunities for facilitating regular communication between organisations within a system can include regular emails, meetings and newsletters (Maitland et al., 2021). To this end, the publication of a communications strategy is an agreed outcome of the Get Cork Walking Action Plan 2023-2024, in an effort to ensure structured opportunities for organisations to collaborate and communicate efficiently over time.

Gaining an overall sense of the system, often through systems mapping or other forms of systemic inquiry, is a useful first step in helping everyone see synergies across sectors (Luna Pinzon et al., 2022). Human resources are needed to identify and gather relevant organisations embedded within a system, facilitate the systems mapping process, and continuously track and monitor the implementation of actions on an ongoing basis (Hovmand, 2014). Evans et al (2020) found that not only are a range of resources required (including financial, human and knowledge) in the implementation of systems approach to PA, but there is also a significant role in the facilitation of a systems approach. For example, bringing organisations together and forming a network across various parts of a system. The role of the WPO in position in Cork could be argued to be instrumental to the systems mapping process and the longevity of the systems approach. It could be argued that the application of the same methods in another context may not be feasible without the local level contextual knowledge and support of a WPO tasked specifically with facilitating a systems approach to walking. Stated in the work programme of the WPO are specified roles related to the facilitation of a systems approach to walking, and connecting stakeholders from multiple sectors in Cork. The research presented here has allowed practice-based insights related to the role of the WPO in the facilitation of the processes outlined here to be obtained (Ammerman, Woods Smith and Calancie, 2014). It is recommended that Sport Ireland and GIW conduct further research to fully unpack the role of the WPO.

Objective 3: Monitor the ongoing processes following the development of a systems map for walking in Cork, Ireland.

Much of the work suggesting the need for a more systems-oriented approach to public health outlines the need for heterogeneous forms of data to be used to analyse monitor systems approaches (Rutter et al., 2017; Ogilvie et al., 2020). The forms of data and methods required to evaluate a systems approach include, and can stray from, traditional forms of data and methodologies used in the evaluation of public health interventions. Thus, oftentimes funding agencies show reluctance to deviate from providing funding for interventions with proven efficacy (Bird et al., 2022). In Cork, the development of the first iteration of the systems map allowed for an understanding of the limited communication between organisations within the system. Furthermore, actions suggested by the stakeholders in the initial systems mapping workshops pointed towards the need to

increase the flexibility in stakeholders' ability to collaborate with organisations outside of their sector. The establishment of the GCW Steering Committee following the systems mapping workshops in June 2020, and the inclusion of an action area devoted to stakeholder events and communication within the Get Cork Walking Action Plan 2023-2024, aim to address a need identified by stakeholder to increase opportunities for collaboration and communication between stakeholders in the system of walking in Cork. Monitoring the frequency, type, and number of stakeholders communicating within the Get Cork Walking project may provide insightful data over time.

The first iteration of the systems map identified few examples of good practice relating to mass communication and public education interventions in the Cork walking system (Bellew et al., 2020). Public education and mass media campaigns have been identified as one of the International Society for Physical Activity and Health's eight best investments for PA (International Society for Physical Activity and Health, 2020). However, public education and mass media interventions are suggested to be useful only in the presence of interventions in other areas of the system, such as appropriate infrastructure (Grunseit et al., 2016). One of the suggested actions resulting from the workshops was relating to promoting the co-benefits of walkable neighbourhoods, cities and towns to decision makers and the public more efficiently. Walkability has been suggested to be related to health, sustainability and liveability (Baobeid, Koç and Al-Ghamdi, 2021). The coordinated promotion of the multifaceted benefits of walkability through multiple channels adopting the Get Cork Walking branding may act as an opportunity to address this gap in the system. Although causality cannot be assumed between the presence of a social marketing campaign and walking behaviour within the system, it does address a context-specific gap identified by the stakeholders who work within the Cork walking system. Utilising openly available big data may also prove useful in monitoring not only the impact of a social marketing campaign, but walking behaviour. This will be addressed in the next chapter.

5.5.2 – Strengths and limitations

There are a number of limitations of the current study which must be noted. Firstly, the stakeholders attending the systems mapping workshops influence the topics of conversation which take place within discussion groups, the content of the systems map,

and most importantly the outcomes and suggested actions which result from the workshop. For example, the workshops which were held in June 2020 saw predominantly Cork city-based stakeholders attend. Although stakeholders who work in the walking system who were based in rural areas in Cork were recruited, their lack of attendance may have narrowed the geographical focus of suggested actions from the workshop. Secondly, the type of systems mapping presented in this chapter arguably provides superficial insights into the behaviour of the system under study. For example, other published work (Cavill et al., 2020) used causal loop diagrams as a form of mapping a local level PA system in the United Kingdom. This form of systems mapping, compared with the work presented here, can provide deeper insights into specific areas of the system which may represent leverage points for action. However, the purpose of this study was to initiate cross sectoral collaboration between multidisciplinary stakeholders by using a systems map as a catalyst, not the outcome.

The strengths of this study must also be noted. One of the barriers to adopting systems thinking tools is a perceived lack of necessary skills (World Health Organisation, 2022; Jebb et al., 2021). This study highlights the ability for existing tools to be adopted to streamline the process of systems mapping – and the introduction of systems thinking – with interdisciplinary system actors in PA. Furthermore, it was decided to use existing tools when engaging stakeholders with busy schedules in the midst of a pandemic, to shorten and streamline the process. This study provides one of the few practical examples of how systems thinking tools can be used to initiate cross-sectoral collaboration as part of a systems approach in the context of PA. It also presents an example of how the GAPPA can be used to develop a context specific, system wide, action plan for walking given sufficient time and human resources. This is useful because it may provide a template which other jurisdictions potentially could adopt to provide comparable plans. This may assist in the development of a sound knowledge base in how systems approaches provide practical utility to real world PA systems (Nau et al., 2022).

5.5.3 – Implications of the research findings

<u>Implications for practice</u>

- The role of the WPO in the facilitation of the workshops, progressing workshop outcomes, and providing the local contextual knowledge was crucial. Employing WPOs, with clearly defined roles, in other areas of the country with a systems-oriented programme of work may prove a fruitful endeavour for GIW and other relevant bodies.
- The GAPPA (World Health Organisation, 2018) was a relatable and practical framework for stakeholders to use to organise the work of the stakeholders in the resulting Get Cork Walking Action Plan 2023-2024. It is recommended for future work in this area to use the GAPPA (World Health Organisation, 2018), or other relevant frameworks, to organise the outcomes of a systems approach to allow for comparison across contexts.

Implications for research

- The development of the systems map for walking in Cork described here introduced stakeholders within the system to systems thinking concepts and did not focus on elements of system dynamics. Future research could take the work presented here further, by developing a causal loop diagram of the walking system in Cork. Doing so could shine light on the benefits, of lack thereof, of using a more in-depth form of systems mapping to engage stakeholders.
- Future research could test whether the approach taken in Cork (i.e., applying the ASAPa (Bellew et al., 2020) to the Cork context) would prove useful in other areas. Doing so without the presence of a WPO on the ground facilitating the process would also provide insight into the role of the WPO in the process.
- The timeline of the current PhD project, the time missed due to the COVID-19 pandemic, and the resigning of the initial WPO after the systems mapping workshops in 2020 inhibited the monitoring and tracking of the systems approach longitudinally. There is an opportunity now to evaluate the implementation of the Get Cork Walking Action Plan 2023-2024 using various methods.

5.6 – Conclusions

Overall, the process of developing a systems map for walking in Cork proved a useful endeavour in initiating cross sectoral collaboration as part of a system approach to walking. The work of this chapter has led to multiple outcomes, including the co-development and launch of a systems oriented action plan for walking promotion in Cork which is guided by the World Health Organisations' Global Action Plan on Physical Activity 2018-2030. The systems mapping process provided a platform to build consensus and develop a common vision among multidisciplinary stakeholders. Furthermore, insights gained from the semi-structured interviews provide Get Ireland Walking with valuable information on the facilitators to local level systems approaches to walking.

5.7 – Reflections of an embedded researcher

Even though this is one of the latter chapters of this PhD thesis, this study commenced first. As a researcher, I was very much finding my feet with systems methods and learning the different forms they can take when applied to physical activity context. The initial plans for this study were to follow the steps of many others who developed systems maps, by using a group model building exercise through an in-person workshop, which COVID-19 put a halt to. Stakeholders had confirmed attendance to the in-person workshop, and methods had to be adapted to facilitate the process of developing a systems map online. I feel as though the process of adapting methods in a way required me to focus on simplifying the approach as much as possible, while still maintaining the essence of what we were trying to do – which was to use systems thinking tools with a group of stakeholders to help catalyse action. This was difficult, given that systems approaches are inherently complex (and the systems they are striving to change are complex). Moreover, I had attended an in-person physical activity systems mapping workshop in January 2020 where I experienced first-hand that a big part of the benefit of these approaches is the ability for stakeholders to get up, move around, and connect with other stakeholders informally. This is hard to replicate online, especially three months into lockdown when nobody really knew what they were doing.

The work (the PhD, and the work on the ground of the Walking Promotion Officer and others) did not stop, and as soon as was allowed stakeholders were gathered together in person in April 2022. I was surprised by the sustained buy-in from stakeholders from ~2 years previous, and new ones joining and engaging. Most importantly though, the local government representatives began to engage which was a shift from the online workshops in 2020. This is, I think, worth reflecting on. The importance of having local decision makers engaged in any systems approach is crucial, and I was disheartened at the beginning when there was a lack of engagement from them. However, throughout the pandemic relationships were maintained with local level stakeholders, the online presence of the Get Cork Walking project grew, and most importantly we had a Walking Promotion Officer on the ground whose task was to 'pull the strings' and 'join the dots'. Although there was somewhat of a new appreciation for walking and quality outdoor space post-COVID-19, I am not entirely sure what the increased engagement from local authority members in 2022 can be attributed to. Was it a result of the momentum behind the Get

Cork Walking project? Were people rejuvenated to engage in projects following a couple of years working from home? Was it the national level context of increased funding for walking and cycling? Or a combination of everything?

It is worth mentioning that initially the systems map containing nodes, edges, and boundaries, was front and centre to this work. However, the Global Action Plan on Physical Activity 2018-2030 (GAPPA) 'felt' more straightforward as a framework to structure action and was ultimately chosen instead of the previous framework. This also aligned to ongoing work at national with the Irish Physical Activity Research Collaboration (I-PARC), and local level in the Cork Local Sports Partnership. The GAPPA was formally introduced to the stakeholders as the framework which guided the work of the Get Cork Walking project at the in-person workshop in April 2022 held 2 years after the initial workshops. As it was relatively early on in the process and the in-person workshop was partly a regathering of stakeholders after COVID-19 interruptions, the change in framework did not seem to be an issue to stakeholders. In fact, I feel the use of the GAPPA was more relatable to stakeholders, maybe because of the World Health Organisation branding.

I was lucky enough to meet Prof Adrian Bauman in January 2020 where we spoke about systems approaches to physical activity and my ideas for the project more generally. He advised that the impact from this type of work can take multiple political cycles to become evident. Over the course of this study (and the entire PhD) I have learned that almost everything about systems approaches to physical activity takes time. From the delivery of workshops, to building trust and rapport with stakeholders, to the 'ah-ha!' moment that you are hoping organisations will have where they see how their work fits within the bigger picture, or when stakeholders collaborate with organisations that they have not worked with before. Things will not happen overnight. I understand that things could have looked slightly different if COVID-19 had not happened, or if I was geographically located in the system we were trying to change, but I feel patience is an important attribute for researchers, practitioners and policymakers involved in systems approaches to have. It is not enough to 'trust the process', I think constantly learning from and adapting to the process is what is needed.

Elements of Chapter 4 and Chapter 5 were combined to form an academic journal article which was published in a special issue of the European Journal of Public Health focusing on ecosystems approaches to health enhancing physical activity promotion. The paper is presented below.

The citation for the paper is as follows:

Dylan D Power, Barry M Lambe, Niamh M Murphy, Using systems science methods to enhance the work of national and local walking partnerships: practical insights from Ireland, *European Journal of Public Health*, Volume 32, Issue Supplement_1, September 2022, Pages i8–i13, https://doi.org/10.1093/eurpub/ckac076

Supplementary files relevant to this publication can be found in Appendix 21.

Publication 2: Using systems science methods to enhance the work of national and local walking partnerships: practical insights from Ireland (Power, Lambe and Murphy, 2022)

Abstract

Background: Physical activity (PA) literature is dominated by individual-level descriptive studies which are known to have limited impact on population PA levels. Leveraging systems science methods offers opportunities to approach PA in a manner which embraces its inherent complexity. This study describes how participatory systems mapping and social network analysis (SNA) were used to understand the work of local and national level walking systems in Ireland. Methods: Two adapted participatory action research workshops with multisectoral stakeholders were used to develop a systems map for walking in Cork, Ireland. The Global Action Plan for Physical Activity 2018-2030 (GAPPA) map was used as a framework to categorise workshop outcomes. Secondly, SNA methods were used to analyse the communication network between partners of GIW, a national walking promotion initiative, as defined within their strategic plan and the actual communication network as experienced by the partners. Results:
The systems mapping process allowed stakeholders to identify 19 suggested actions for the Cork walking system. The SNA found that there were considerably fewer communication ties between partners in the actual communication network than in the strategy defined network. Conclusion: The systems mapping process was a useful catalyst for engaging stakeholders in cross-sectoral communication and the GAPPA was a practical way to organise workshop outcomes. Social network analysis methods highlighted that the communication network of a national level walking promotion partnership is not working as planned. Overall, the use of systems science methods can provide practical insights for local and national level walking systems.

Keywords
Systems approaches; physical activity; walking; social network analysis; systems mapping

Introduction

Global physical activity (PA) levels remain low and have stagnated over the last number of decades[1]. Although increases in PA research funding have been recorded in some parts of the world, research outputs remain dominated by individual-level descriptive studies which provide little impact for population levels of PA [2, 3]. Recently, approaches to PA and other public health problems which embraces the inherent complexity of these problems have been called for[4]. For example, the publication of the Global Action Plan for Physical Activity 2018-2030 (GAPPA)[5] by the World Health Organisation provides practical guidance to understand the multiple influences and intervention points for national PA systems. This policy framework has been used to guide practice in Ireland where Murphy and colleagues used the GAPPA framework to form the basis of a national effort to organise and coordinate action amongst stakeholders in the PA system[6]. Globally, there is an increase in publications exploring the application of systems thinking to public health and many have advocated for systems approaches to public health problems such as PA[7,8]. Systems approaches place emphasis on cross-sectoral collaboration[8] and require diverse approaches to synthesising evidence from a range disciplines and study designs[9].

Framing PA, or specific forms of PA such as walking, from a systems perspective acknowledges that the behaviour is the result of the complex interplay between individual, socio-political, environmental, societal and biological factors[8]. Methods such as social network analysis (SNA) and participatory systems mapping offer an opportunity to explore and understand the systems which public health problems are embedded. Systems maps are visual representations of a system which are developed by engaging an interdisciplinary group of stakeholders who work within that system[8,10,11]. Social network analysis is a suite of methods that has been used as a way of investigating how interorganisational networks in public health work, by analysing measures such as degree centrality (the number of ties each stakeholder has), centralisation (the extent to which the network is centralised around few organisations) and network density (the overall degree of interconnectedness of the network) [12-15].

There is a paucity of literature highlighting the practical utility of tools such as systems maps and SNA applied to PA. Cavill and colleagues[10] developed a systems map with local level PA stakeholders in the UK to identify actionable outcomes for the system. This systems map focused on elucidating the direction of the relationships between factors,

facilitating a more in depth understanding of the inherent behaviour of the system. Although this process proved useful, little is known about the extent to which existing systems maps can be applied to other contexts, which may act as a useful starting point for researchers and practitioners in the field who may be uncertain regarding the application of systems methods[16]. Furthermore, a recent systematic review concluded that SNA not only provides benefits for researchers interested in PA, but also for practitioners involved in the promotion of PA[14]. While there are many barriers to effective multidisciplinary partnerships in public health[17], SNA methods can allow researchers to gain insight into who the gatekeepers of resources and information within PA promotion networks are.

Enhancing and increasing walking is important across several sectors and its promotion is not the job of any one agency or system. Similar to PA[11], walking is associated with transport and for human movement; for sport and recreation; for community-wide initiatives; and tourism, liveability and urban design. To this end, understanding walking promotion from a systems-based perspective may hold benefits which transcend physical and mental health[18,19]. Thus, the nature of walking-related work in Ireland is decentralised, meaning that no single organisation is responsible for all walking related programmes, infrastructure, or events and it may be seen as the concern of many yet the responsibility of none. The Irish Sports Council (now Sport Ireland) was established in 1999[20] with a remit for both sport and PA[21, 22]. In 2013, a national walking promotion organisation, GIW (GIW), was established within the national governing body for Irish hillwalking and mountaineering, Mountaineering Ireland, with the aim of coordinating the work of intersectoral organisations with a direct and indirect role in walking in Ireland. However, the national and local structures are fragmented and the dynamics of how these partnerships work is unknown.

The current work aims to utilise methods from systems science to facilitate a holistic understanding of the nature of walking promotion in Ireland. Specifically, this paper describes how two methods, participatory systems mapping and SNA, were used to understand the work of national and local walking systems in Ireland.

Methods

SNA methods were used to analyse the structure of the network between partners and collaborators in GIW's Strategy and Action Plan 2017-2020 (SAP)[23], compared with the actual communication network as experienced by the partners. An adapted participatory action research (PAR) methodology was used to develop a systems map for walking in County Cork, Ireland. Ethical approval was granted by the School of Health Sciences Ethics Committee at South East Technological University, Ireland.

Systems map development

An adapted PAR methodology using two participatory online workshops modelled from previous work[6] was used to develop a systems map for walking in County Cork, Ireland. Participatory action research is a useful way of exploring problems within public health due to the involvement of stakeholders in co-designing solutions[24].

Population and sampling

Cork (population approximately 540000) is the largest county in Ireland and was the geographical boundary for which the systems map was developed [25]. Cork is located on the south-west coast of Ireland and contains a city, multiple largely populated towns, mountain ranges and coastal areas. A local walking promotion officer assisted in purposively recruiting multidisciplinary stakeholders whose role was associated with walking, either directly or indirectly (n=32) to attend the systems mapping workshops. Therefore, walking was broadly defined to include recreational and transport walking to ensure the inclusion of stakeholders from multiple sectors. The specific areas of work for all workshop participants are outlined in supplementary file 1.

Procedures

The process was guided by applying a pre-existing systems map for PA[11] to the Cork context. The Australian Systems Approaches to Physical Activity Systems Map (ASAPa) [11] outlines a range of factors which influence PA ranging from individual level factors (demographic status, physiology, and psychology) to systems level factors (political environment and governance, transparency and accountability) and the complex network of interconnections between them. The ASAPa Systems Map for PA outlines eight system intervention points which are areas within the PA system where interventions can be

implemented. The eight system intervention points are (1) Transport and Human Movement Environment, (2) Workplaces, (3) Community-wide Programmes, (4) Education, (5) Sport and Recreation, (6) Primary and Secondary Healthcare, (7) Mass Communication and Public Education, and (8) Physical Environment, Urban Design, Liveability and Walkability[11].

Two participatory online workshops were facilitated using the Zoom video-conferencing[26] platform. The central question posed to attendees of workshop one was "What interventions are currently being implemented successfully in Cork to promote walking?". Workshop one lasted 75 minutes and involved open discussion between stakeholders (n=5) focusing on examples of good practice which existed in each of the eight system intervention points of the ASAPa Systems Map for PA[11]. The main purpose of workshop one was to develop the first iteration of the map which was designed by the lead researcher using the Kumu.io[27] software package following the collation of identified interventions. Any duplicate or conflicting suggestions were discussed and a consensus was reached by the authors before the systems map was circulated to all participants who attended workshop one for approval. Participants could access the interactive map via web-link and adjust the map prior to the second workshop.

The central question posed to stakeholders (n=16) in the second workshop was "What should be done to help increase overall walking levels going forward in Cork?". Breakout rooms were labelled by combining the 8 system intervention points from the ASAPa Systems Map for PA with participants being allocated to each breakout room according to their expertise. The breakout rooms were; (a) Recreation, Community Wide Programmes, and Mass Communication and Public Education (b) Primary and Secondary Healthcare, Education, and Workplaces (c) Physical Environment, Urban Design and Liveability, and Transport and Human Movement Environment. One facilitator was assigned per breakout room who facilitated discussion and took notes. Workshop two lasted 120 minutes. Following the second workshop, a meeting was convened between the lead researcher and the facilitators of the breakout rooms to develop a second and final iteration of the systems map using the Kumu.io[27] software, which was circulated to all workshop participants for amendment and approval.

Data analysis

Thematic analysis (TA) was used to analyse workshop outcomes due to its highly flexible nature which can be modified for the needs of a particular study[28]. The analysis of data resulting from the workshops followed the process undertaken by Murphy and colleagues[6] who used a deductive thematic analysis approach to assign outcomes from a national PA systems workshop in Ireland to the areas of the GAPPA[5]. The GAPPA[5] is a framework for action which outlines twenty multidimensional policy actions which are encompassed within 4 strategic objectives (Create Active Societies; Create Active Environments; Create Active People; and Create Active Systems) which capture a whole-of-systems approach to increasing PA. The categorisation of examples of good practice and suggested actions identified by stakeholders during workshop two was predetermined by the quadrants of the GAPPA systems map for PA and specific actions outlined within the GAPPA[5]. Consensus was reached on the appropriate quadrants and actions within the GAPPA framework by all authors.

Social network analysis

Social network analysis is a suite of tools used to understand the dynamics of various networks, ranging from biological to human social networks[12]. Social network analysis methods were used to compare the strategy defined network between organisations as written within GIW's SAP (desktop exercise) and the actual communication network as experienced by the organisations (survey).

Population and sampling

All organisations listed in the GIWSAP (n=30) were included in the strategy defined network. Partner organisations of GIW in 2021 (n=33) were purposively recruited to take part in a partnership evaluation survey in March 2021.

Procedures

To develop a network diagram for the communication network as written in the SAP, organisations listed as partners/collaborators on the same action were assumed to have communication ties between them. To collect network data for the actual communication network between partners, a partnership evaluation questionnaire (adapted from a pre-existing public health partnership evaluation tool[29]) was sent to 33 participants (n=19 responses, 70% response rate). Respondents were provided with a list of all organisations within the GIW network and were required to list up to 10 organisations they had

communicated with in the last 6 months in relation to the GIWSAP. Adjacency matrices were developed from both networks and imported into R[30.]

Data analysis

Network density, degree centrality and centralisation were calculated for both networks using the package 'igraph' in R[30]. The Fruchterman-Reingold layout was used for the network diagrams which places the nodes with the highest centrality scores in central positions[31].

Results

Systems mapping

Stakeholders identified 39 'existing examples of good practice' interventions in the Cork walking system in workshop one. A total of 19 suggested actions were identified as opportunities to improve the system of walking in Cork in workshop two. The outcomes of workshop one (examples of existing good practice) and workshop two (suggested actions) are presented according to the quadrant and specific action of the GAPPA[5] for which it may have the most impact (Figure 5.6). Most examples (56%) of existing good practice within the Cork walking system were individual level programmes (Create Active People). For example, multiple community based walking programmes were highlighted as examples of good practice by many stakeholders. The majority (58%) of the suggested actions identified by the stakeholders were relevant to the Create Active Systems quadrant of the GAPPA systems map for PA. 21% and 16% of suggested actions fell within the Create Active People and Create Active Societies quadrants, respectively. One (5%) solution fell within the Active Environment quadrant of the GAPPA systems map for PA. Examples of suggested actions include regular meetings between local government representatives and stakeholders, and integrating a standard evaluation framework throughout the evaluation of interventions in Cork.

Social network analysis

Figure 5.7 represents both network diagrams for the communication network between partners as written in the SAP (Plot 1; Figure 5.7) and the actual communication network as experienced by the partners (Plot 2; Figure 5.7). There were considerably fewer communication ties in the actual network than in the strategy defined network. The

network density score for the strategy defined network was 0.41, representing a moderate to high density score[32]. The network density score for the actual communication network partners was 0.13, which is considered a low level of density[32]. Both networks also differed on how centralised they were around few organisations. Degree centralisation scores were 26.92% (actual communication network) and 40.92% (written communication network). These scores indicate that the strategy defined network is moderately centralised around a group of 11 organisations, whereas the actual communication network had a lower centralisation score around four organisations. The 11 organisations who were central to the strategy defined communication network were from the Sport/PA, Health and Outdoor Recreation sectors. However, the actual communication network indicated that organisations from Local Government were among the central organisations in the network, contrary to the strategy defined network.

Discussion

This paper illustrates how systems science methods were used to understand local and national walking systems in Ireland. Firstly, the systems mapping process highlighted that the majority of good practice examples of interventions within the Cork walking system lie within the Create Active People (individual level) quadrant of the GAPPA framework. The systems mapping process also allowed stakeholders to identify suggested actions for their system, more than half of which were directed at the Create Active Systems quadrant. Secondly, the SNA highlighted that there were fewer communication ties in the actual communication network compared with the strategy defined network (network density) and that the communication was centralised around fewer organisations than intended (degree centralisation).

Many systems maps have been developed to understand local and national PA systems [8, 10, 11]. The systems mapping process presented here was a useful way of allowing stakeholders to situate themselves and their work within the system and more importantly, to identify tangible solutions and actions to address barriers within their system. The ability for existing systems maps, such as the ASAPa systems map for PA[11] and the GAPPA systems map for PA[5], to be applied to other contexts and provide a platform upon which to base context specific discussions is a valuable learning from this process. However, it must be highlighted that the workshop outcomes are a result of discussions between stakeholders

who were present in the workshops, and a different group of stakeholders may produce different outcomes. For example, the lack of representation from stakeholders from the areas of Transport and Human Movement, and Physical Environment, Urban Design and Liveability, may explain the few suggested actions in the Create Active Environments quadrant of the GAPPA framework[5]. Murphy et al's study[6] which describes the process of a systems approach to increase PA in Ireland is one example of using the GAPPA[5] as a framework for their analysis. GAPPA[5] provides a mechanism for organising the outcomes of systems mapping processes and may help to provide consistency across the expanding literature base investigating the application of systems science methods to public health problems. While employing a deductive thematic analysis approach may give a superficial description of data[28], the GAPPA[5] proved beneficial in providing a structure to guide the analysis. The challenge remains of tracking the overall implementation of a systems approach [16, 33]. During the months following the workshops, a steering committee of ten representatives from multidisciplinary organisations was created and chaired by a part time walking promotion officer in Cork. This steering group continues to monitor the implementation of identified actions by collecting data such as stakeholder engagement in meetings, meeting minutes, and action delivery monitoring. These results will indicate whether the systems approach was, indeed, effective in solidifying collaborative action.

The majority (58%) of the suggested actions identified by stakeholders within the walking system in Cork were situated within the Create Active Systems quadrant of the GAPPA[5]. Although stakeholders acknowledge that governance, political structures and the knowledge environment require improvement, these types of interventions have been noted as the most difficult to implement[34, 35]. Changes to the higher-level goals of systems (including stakeholders' worldviews) require sustained and adaptive multidisciplinary efforts over multiple political cycles for systems change to occur, which is not consistent with the short-term requirements of funding agencies. Furthermore, inherent to a systems approach to PA is an acknowledgement that all factors within a system are interconnected and no one policy solution to reduce physical inactivity exists[5]. The suggested actions offered by the stakeholders from the systems mapping workshop within the Create Active Systems quadrant may impact – and are interdependent – with the activities within the Create Active People quadrant. However, the lack of engagement with higher level goals is evident in the current findings. For example, the majority of the examples of good practice interventions identified within the Cork walking system were individual level programmes

and interventions, which are known to produce modest population level behaviour change[2]. The current study outlines the process by which a pre-existing systems map was applied to a novel context without placing emphasis on understanding the directionality between nodes of a systems map. Although there are benefits to increasing the specificity of the systems map to gain a deeper insight into the behaviour and inherent dynamics of the system[36], the technicalities of engaging with unfamiliar methods have been noted to be a potential deterrent for stakeholders in local and national public health systems to adopt such methods[16].

The systems mapping process allows stakeholders to get the 'lay of the land' and to allow communication networks across sectors to grow. However, what the systems mapping process does not allow for is an understanding of how stakeholders collaborate and communicate across a system. Social network analysis methods have been used to address this by understanding who the central and peripheral organisations are within PA, healthy living, and obesity prevention networks[13-15]. Similar to the work presented here, the work of Loitz and colleagues[15] found low density scores in funding and partnership networks in a group of multidisciplinary stakeholders promoting active living in Alberta, Canada. Using SNA methods in the manner presented in this paper may act as a useful way of assessing the extent to which partnerships are working as planned. For example, one network presented in this paper represents all communication ties between organisations due to collaborate on actions together as defined within a national walking promotion strategy. Our results show that there is a mismatch between the strategy-defined communication network and the network experienced by the partners within it. However, it must be noted that missing data may skew network density scores[12]. In the strategy-defined network, there were 11 core organisations that make up part of the central group of organisations, whereas in the actual network, four organisations were found to represent the focal point of the network. Furthermore, local government organisations were noted as key players in the actual communication network, yet these are not well represented in the strategy defined network. Such insight allows partnerships to address this inconsistency by developing mechanisms to improve the diffusion of information and facilitating communication across the network by targeting organisations who are most central[37,38].

The purpose of this paper was to illustrate how systems mapping and SNA were used to understand the work of local and national partnerships for walking in Ireland. This study

highlights the utility of using the systems mapping process to engage local level stakeholders, to identify suggested actions to improve the system and a structure for monitoring these actions. The practical insights gained from the SNA process are twofold. Firstly, using SNA to understand the dynamics of strategy defined communication networks provides another way of monitoring policy implementation. Secondly, SNA can identify key players in PA and public health organisational networks. Overall, this paper provides a real-world example of the application of methods from systems science to understand national and local walking systems in Ireland.

Conflicts of interest

None declared.

Data availability

The data used in this article will be shared upon reasonable request to the corresponding author.

Key points

- The process of building a systems map acts as a catalyst for cross-sectoral communication and helps identify mutually beneficial actions with multidisciplinary stakeholders in a local level walking system.
- The utilisation of existing systems maps can both accelerate the systems mapping process and ensure that the identified action points cover all levels identified in the GAPPA.
- Public health partnerships can use SNA methods to monitor the implementation of their work by identifying strengths and weaknesses in their communication networks.

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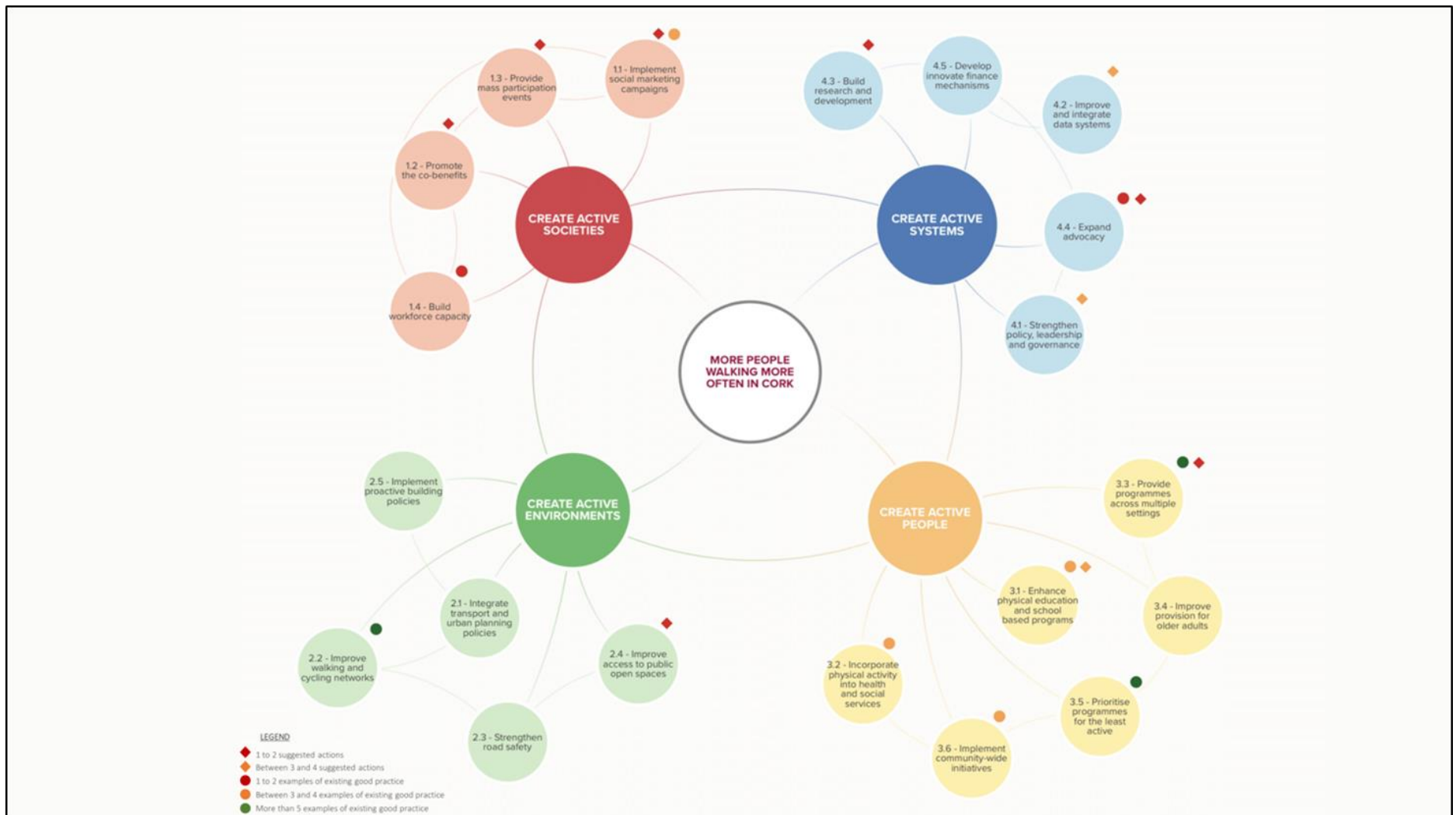
Figure 5.6: Examples of good practice and areas of suggested action plotted on the GAPPA systems map for PA.
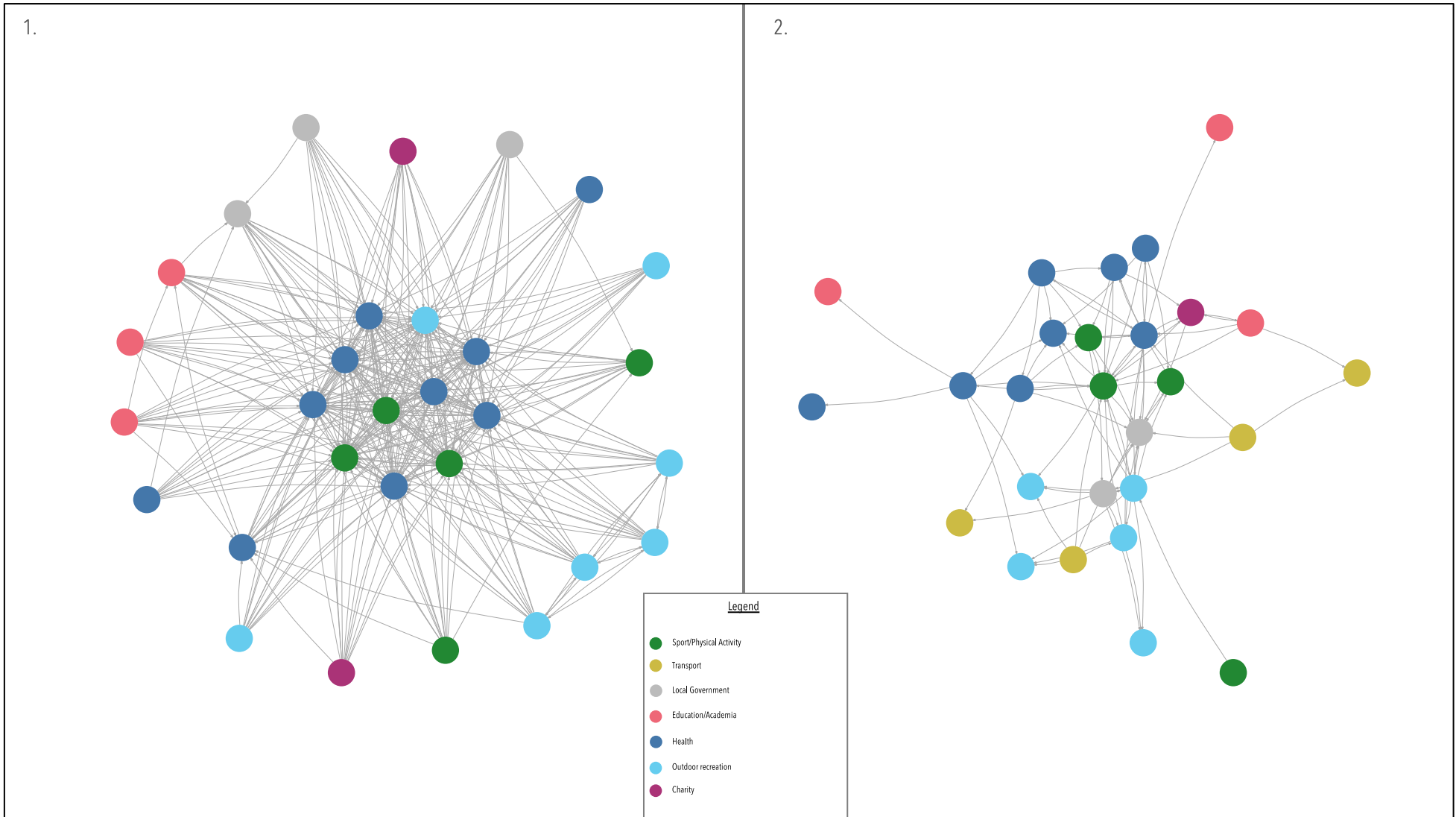
Figure 5.7: Network diagrams of (1) Strategy defined communication network and (2) Actual network experienced by the partners.

Legend

- Sport/Physical Activity
- Transport
- Local Government
- Education/Academia
- Health
- Outdoor recreation
- Charity

Chapter 6: A critical assessment of data sources to monitor and evaluate a systems approach to walking in Ireland.

6.1 – Introduction

The work preceding this chapter has described the application of a systems lens to walking policy in Ireland (Chapter 3), the use of social network analysis (SNA) to understand the nature of communication between a national walking promotion partnership (Chapter 4), and an example of how systems mapping can be used to initiate cross-sectoral collaboration as part of a systems approach to walking at local level (Chapter 5). Nau et al (2022) note that more research is needed which highlights the real-world, practical value (or lack thereof) of systems approaches to PA. The work of this thesis up until this point has aimed to fill this research gap. Monitoring and evaluating systems approaches to PA is often difficult, given that the success of a systems approach is not determined solely by changes in behaviour (i.e., changes in walking behaviour, or PA levels), but also other indicators such as collaboration between stakeholders, or the implementation of interventions across a system. Evaluating systems approaches is a challenge because it necessitates pooling of heterogeneous data, and requires flexible research designs (Jebb et al., 2021; World Health Organisation, 2022).

The chapters presented in this thesis thus far have provided insight into some of the indicators which could be useful in monitoring a systems approach to walking in Ireland, such as alignment of policies (Chapter 3), communication between stakeholders over time (Chapter 4), and the implementation of interventions at multiple points in a system (Chapter 5). This chapter aims to work towards understanding the data sources and indicators which could be used in monitoring the multifaceted impacts of a systems approach to walking in Ireland. This chapter is presented in two sections. The first section of this chapter describes the development of a list of available data sources and relevant indicators pertinent to the evaluation of a systems approach to walking in Ireland. The second part of this chapter is a practical example of how a selection of these data sources can be triangulated to describe walking behaviour. The latter section is presented in the form of an academic journal article.

6.2 – Aim and objectives

This chapter aims to:

- Investigate the presence and utility of indicators which could be used to monitor a systems approach to walking in Ireland.

To address this aim, two objectives will guide the work conducted within this chapter. These objectives are as follows:

1. Develop a list of appropriate indicators which could be used to monitor a systems approach to walking in Ireland[1].
2. Demonstrate the utility of combining publicly available data sources to describe walking in Ireland[2].

6.3 – Methods

The work conducted as part of objective 1 involved a two phased desktop web-based search clarified by expert review in order to develop a list of indicators (and data sources) which could be used to monitor a systems approach to walking in Ireland. Figure 6.1 below outlines the phases of the research. Descriptions of the processes involved in each phase are described below.

Phase 1
Government website and document search to compile preliminary list of indicators, data sources, and data custodians

Phase 2
Addition of supporting indicators and data sources following expert input
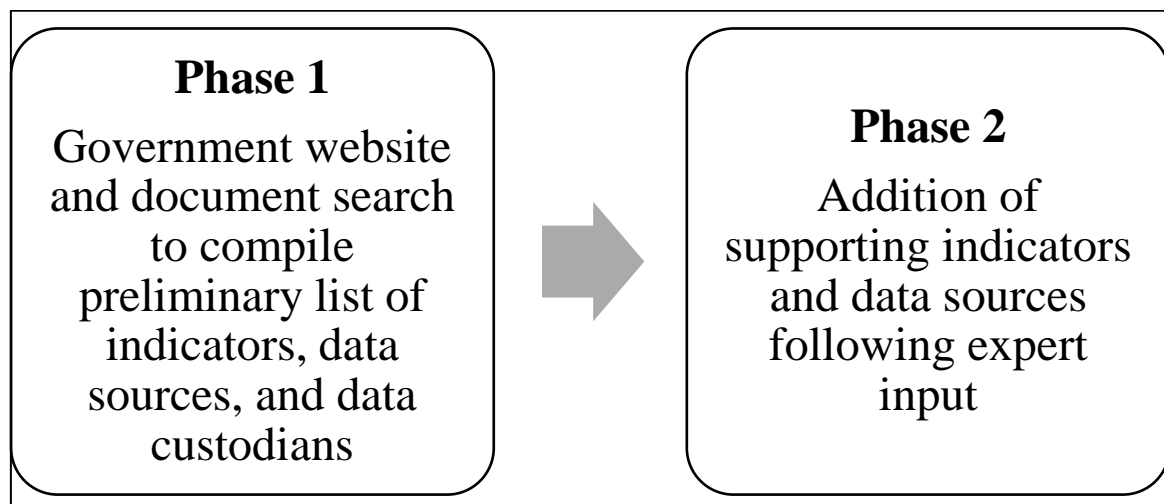
Figure 6.1: Phases involved in compiling data sources and indicator list.

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[1] Indicators, in the context of this work, are specific and measurable characteristics of a system which could potentially be used in determining the positive/negative impacts of interventions implemented on that systems' outcome (i.e., more people walking, more often).

[2] This objective has been addressed through published work (Power, Lambe and Murphy, 2023), which is presented in the proceeding section of this thesis.

Phase 1: Government website and document search to compile preliminary list of indicators, data sources, and data custodians

Desktop based searches of sub-sections of Irish government websites which hold data pertaining to active travel, environment, climate, transport, health, planning, urban design, road safety, and policing were conducted. References of reports and grey literature were also searched. Walk21, an international walking promotion and advocacy charity, recommend national level walking data to be collected across five overarching headings on nine indicators (Rambøll, 2022) (Table 6.1). Search terms used in government website searches were guided by the exact wording of the nine indicators recommended by Walk21 (see Table 6.1). If initial searches were unsuccessful in identifying data sources, alternative phrasing was used. For example, in relation to indicator *vii* (number of pedestrians killed p/100k inhabitants), alternative search terms were used including "national road safety data" and "national road accident data". Only data sources which monitored progress on the nine recommended best practice indicators (Rambøll, 2022) were recorded in Phase 1.

Table 6.1: Walk21 best practice data collection areas and indicators.

Overarching data group		Recommended best practice indicators
Accessibility	(i)	% of people living within 500m of public transport (by age/ability/gender)
Benefits	(ii)	Health benefits of walking
	(iii)	Economic benefits of walking
	(iv)	Emissions and noise benefits
Comfort & Satisfaction	(v)	% of streets with minimum 3-star pedestrian standard
	(vi)	Pedestrian satisfaction with existing walking experience (by age/ability/gender)
Safety	(vii)	# of pedestrians killed p/100k inhabitants (age/ability/gender)
Activity	(viii)	Avg. minutes spent walking per day (by age/ability/gender)
	(ix)	# of people lingering/spending time in selected public space

Phase 2: Validation and revision of indicators and data sources

Insights from four expert informants were sought to validate and revise the findings from Phase 1. Participants were purposively recruited to both consider the accuracy of the Phase 1 findings, and to suggest additional indicators suitable for monitoring a systems approach to walking in Ireland. Firstly, the supervisory team (BL & NM) – who have significant research experience in the area of PA and active travel research in Ireland – reviewed the Phase 1 findings separately, followed by discussion at a research team meeting. Additional indicators were added following this process. Then, the revised list (including additions resulting from the meeting with the supervisory team) was sent to an additional two stakeholders who hold alternative perspectives on the walking system in Ireland, i.e. a senior lecturer in civil engineering, urban design, and sustainable transport at an Irish university, and the outdoor recreation manager at Sport Ireland. All parties were provided with the list of data sources and indicators from Phase 1 via email and asked to input any

omitted/additional indicators which could be relevant to a systems approach to walking in Ireland. Additional existing indicators and data sources recommended by all four expert informants were included to compile a revised list of data sources and indicators.

6.4 – Results

Eight national level data sources were identified in Phase 1 which monitored progress on three of the recommended best practice indicators for walking data. Of these, complete national level data were found for only one indicator (% of people living within 500m of public transport by age/gender). Data pertaining to Dublin only were found for two indicators (economic benefits of walking; and, pedestrian satisfaction with existing walking experience by age/gender). Data sources were identified which gathered incomplete data for four indicators. For example, noise mapping data are collected at national level by the Environmental Protection Agency which may assist in monitoring progress on emissions and noise benefits of walking (indicator *iv*), if combined with other data. No data were found for one indicator (% of streets with minimum 3-star pedestrian standard). Twenty-eight additional supporting indicators were identified by the lead researcher and supervisory team (BL & NM) in Phase 2. Following expert input from urban design and outdoor recreation experts, four additional indicators were identified. Therefore, a total of thirty-nine potential indicators were identified which could be used in the monitoring the multifaceted impacts of a systems approach to walking in Ireland. The data sources were owned/managed by a range of organisations operating at multiple levels. Eighteen data custodians (owners of data) from multiple sectors were identified. The data custodians include: eleven government departments/agencies, one national governing body, one European governmental agency, one not-for-profit organisation, three private companies, and one research institute. The full list of indicators, data sources, and data custodians is presented in Table 6.2.

Table 6.2: Existing data sources, data custodians, and indicators for potential use in monitoring a systems approach to walking in Ireland.

Overarching data group	Walk 21 best practice indicators	Irish data sources for Walk 21 best practice indicators [data custodian]	Additional indicators [data custodian] (generated from phase 2)
Accessibility	% of people living within 500m of public transport (by age/ability/gender)	• # of people living within 500m of a public transport stop [Example: Survey/Official Maps/Crowdsourcing – Central Statistics Office] (i)	• Population distribution (by area) [Central Statistics Office] • Transport Modal Share [National Transport Authority] • Small Area Population Statistics [Central Statistics Office] • Sport Ireland Trails Map (number of trails/length/trail rating) [Sport Ireland Outdoors] • Distance (km) of recreational walking trail head from urban area [Coillte/Department of Rural and Community Development/Central Statistics Office] • Public satisfaction (%) with public transport in the city (Dublin only) [Eurostat]
*Benefits	Health benefits of walking Economic benefits of walking	• % change in greenhouse gas emissions [Example: Permanent Counters – Environmental Protection Agency] (iv)	• Greenway user count data [Local Authorities] • Percentage of population with health insurance [Health Insurance Authority]

| Emissions and noise benefits | • Noise mapping data [Example: Permanent Counters – Environmental Protection Agency] (iv)

 • Economic benefit (€) of walking and wheeling trips (Dublin Metropolitan Area Only) [Example: Crowdsourcing/Surveys/Hospital and pre-hospital accident data – National Transport Authority] (iii) | • Annual investment (€) in walking and cycling infrastructure (by area) [Department of Transport/National Transport Authority]

 • Recreational walking trail count data [Coillte/Department of Rural and Community Development]

 • # of long-term health conditions prevented (Dublin Metropolitan Area Only) [Example: Crowdsourcing/Surveys/Hospital and pre-hospital accident data – National Transport Authority] (ii)

 • # of premature deaths prevented (Dublin Metropolitan Area Only) [Example: Crowdsourcing/Surveys/Hospital and pre-hospital accident data – National Transport Authority] (ii)

 • Annual healthcare savings (€) (Dublin Metropolitan Area Only) [Example: Crowdsourcing/Surveys/Hospital and pre-hospital accident data – National Transport Authority] (ii) |

Comfort & Satisfaction	(vii) % of streets with minimum 3-star pedestrian standard (viii) (ix) Pedestrian satisfaction with existing walking experience (by age/ability/gender)	• Pedestrian satisfaction to walk in local area (Dublin only) [National Transport Authority] (vi)	• Walkability score (by area/street) [OS-WALK-EU] • Accessibility ratings of recreational walking trails [Sport Ireland Outdoors] • Walking trip purpose [National Transport Authority] • Google Relative Search Rates (by area) [Google Trends] • National road travel times [Transport Infrastructure for Ireland]
Safety	# of pedestrians killed p/100k inhabitants (age/ability/gender)	• Annual road fatalities [Example: Police Accident data – Road Safety Authority] (vii) • Annual pedestrian fatalities [Example: Annual pedestrian fatalities – An Garda Siochana] (vii)	• Perceived safety to walk in local area (Dublin only) [National Transport Authority] • National road traffic counts (by area) [Transport Infrastructure for Ireland] • Type of road traffic collisions in past 12 months* [Central Statistics Office]
Activity	Avg. minutes spent walking per day (by age/ability/gender) # of people lingering/spending time in selected public space	• Dwell time in urban areas [Example: GPS/Public Wi-Fi data in urban areas - Liquid Edge] (ix)	• Walkers' demographics (Dublin/National) [National Transport Authority/[National Transport Authority]] • National Walking Week campaigns social media analytics [Get Ireland Walking]

- % change in mobility by area (by area) [Google Community Mobility Reports]
- Community walking group participant demographics [Sport Ireland/GIW]
- Frequency of trips on foot (by area) [Strava Metro]
- Recreational walking trail count data [Coillte/Department of Rural and Community Development]
- # of days per week walking for recreation [Sport Ireland]
- # of days per week walking for transport [Sport Ireland]
- Daily weather data [Met Eireann]
- Time spent walking to work/college/school [Example: Surveys – Central Statistics Office (data available April 2023)] (viii)

6.5 – Discussion

6.5.1 – Summary of results

This was a desktop-based research exercise to investigate the availability and accessibility of existing national data sources which could be used to monitor the multifaceted impacts of a systems approach to walking in Ireland. Walk21's recommended global indicators (Rambøll, 2022) were used as a framework to gauge the extent to which data exist in Ireland on recommended best practice indicators. This study aimed to build on these recommended indicators by assessing available data sources and indicators which could be used to monitor impact across the wider walking system. Expert input from multiple stakeholders with varying perspectives on the walking system in Ireland were sought to identify additional indicators. Overall, the presence of data to monitor progress on recommended best practice walking indicators in Ireland is low. Of nine recommended best practice indicators, complete data were available to monitor progress on only one indicator (% of people living within 500m of public transport by age/gender). Dublin only data were available for two indicators. Half of the data sources which were available on Walk21's recommended indicators provided incomplete data which may be of use if triangulated with other data. Overall, there is a lack of national level data which monitors progress on most of the indicators recommended by Walk21 (Rambøll, 2022). However, the best practice indicators recommended by Walk21 place a narrow lens on walking by focusing mainly on transport and urban mobility related indicators. This study sought insight from stakeholders with varying perspectives on the walking system in Ireland and presents a list of thirty nine potential indicators which could be used in monitoring the multifaceted impacts of a systems approach to walking in Ireland.

Heterogeneity of data available to monitor systems approaches to walking in Ireland

Findings from the current study suggest that walking related data in Ireland extends beyond the traditional disciplinary and sectoral homes of sport, health and transport. Organisations in local and national walking systems technically have a suite of data which could assist in monitoring and evaluating the wider impacts of systems approaches to walking in Ireland. An example of using multiple sources of data to evaluate a complex public health intervention can be found in a longitudinal evaluation of a 20mph speed zone

intervention in Belfast city centre (Hunter et al., 2023). The intervention involved multiple phases, including an educational campaign, implementation of new legislation, the addition of road signs and markings, and enforcement by local police. Hunter and colleagues used routinely collected data on speed, traffic volume, road collisions and casualties to evaluate the impact of the intervention over time. Similarities can be found in a study which report the evaluation of systems approaches to healthy eating in Amsterdam (Waterlander et al., 2020). Waterlander and colleagues outline heterogenous data collection methods which were used in the evaluation of the LIKE programme, including literature reviews, social network analysis, health visit observations, logbooks, notes, and the evaluation of meeting minutes. This speaks to the argument of Greenhalgh and Papoutsi (2018) who suggest that researchers should move towards reframing research questions to focus on understanding the contribution of interventions on a systems' outcome, rather than focusing on attribution. This research provides organisations in Ireland with a suite of data which could assist in monitoring change across a range of indicators relevant to the walking system.

The data custodians (i.e., owners or gatekeepers of the data) of walking related data in Ireland vary significantly. For example, organisations identified as custodians of data relevant to walking range from government departments, national governing bodies, local authorities, consultancy firms, and private organisations. Therefore, the processes involved in gaining access to these data can differ across organisations. For example, data pertaining to the frequency of trips on foot by area are published by Strava can be applied for analysed (Venter et al., 2020), and data relating to annual road fatalities are easily downloadable through government websites. However, data pertaining to the use of local Greenways or recreational walking trails are owned by the local authorities and local government departments. However, the process of navigating 'red-tape' here may be arduous, even though these data offer direct insight into walking behaviour (Merom and Korycinski, 2017). The World Health Organisation (WHO) argue that strengthening data systems and research agendas should be a priority for national and subnational PA systems (World Health Organisation, 2018). It may be a worthwhile endeavour for one organisation to negotiate access to, and collate, data which is housed in multiple places. However, this task should be mandated and valued as a key intervention within a wider systems approach, as organisations such as Get Ireland Walking do not have the capacity nor resources to undertake such a task.

The importance of triangulating/combining data sources and indicators

Data published in a report published by Rambøll (2022), which provides a critical overview of walking and cycling related data globally, suggest that many of the walking-related indicators are useful to decision makers only when corroborated with other forms of data. For example, data highlighting investment in walking infrastructure, or the exposure of a walker to harmful particles in an urban area, may not provide sufficient insight for policymakers or researchers in isolation. However, triangulating multiple forms of data, and tracking impact on a range of indicators over time, is recommended in the evaluation of systems approaches to PA. This is important, given that the full impact of systems approaches on PA levels may take multiple political cycles to be fully realised (Bellew et al., 2020). Moreover, the use of multiple forms of evidence to increase understanding of phenomena in public health is recommended (Rutter et al., 2017; Ogilvie et al., 2020). Many of the indicators identified in this study have the potential to offer a deeper level of insight into local and national walking systems, if they are used in conjunction with other forms of data. Furthermore, the findings of this research build on the recommendations of Walk21, as it could be argued that they present a predominant focus on urban mobility and transport related indicators. The current work sought insight from stakeholders across the wider system of walking to develop a bank of indicators which go beyond the confines of health, sport, transport, and mobility.

Traditionally, the 'success' of interventions in public health have been determined by statistically significant changes in a select few outcomes. The evaluation and monitoring of a systems approach requires researchers in PA to look beyond behavioural outcomes to view impacts across a range of indicators. ActEarly was a systems approach to improving the health and wellbeing of young people in deprived areas in the United Kingdom. Researchers used data from cohort studies, local administrative data, and consumer data from local shops and supermarkets to evaluate various outcomes of the systems approach (Wright et al., 2019). Although the adoption of a complex systems perspective on public health evidence is recommended (Rutter et al., 2017; Pratt et al., 2023), the use of systems science methods and the corroboration of heterogeneous data requires high levels of human and technical resources (World Health Organisation, 2022). To this end, the usability of indicators identified in the current study for system actors in the walking

system in Ireland is currently unknown. Moreover, there are few examples of studies which have combined multiple indicators from a range of data sources to describe walking behaviour in Ireland.

In a report published by Jebb and colleagues (2021) which provides an overview of systems approaches in public health and offers future directions for the field, the potential applications of big data and machine learning techniques to assist in the evaluation of systems approaches is discussed. Researchers in PA have begun to use open-source big data from Google (Rice and Pan, 2021), among others, to describe PA and mobility behaviour. Indicators from big data sources were identified in the findings of this study and further exploration of their applicability and utility for national and local walking systems is warranted. For example, there is potential to triangulate openly available mobility data from Google with routinely collected data on walking behaviour in Ireland such as the Irish Sports Monitor and footfall data on Irish recreational walking trails. However, the collation and analysis of heterogeneous forms of walking data is likely to be resource intensive and complex (Rutter et al., 2017; Nau et al., 2022; World Health Organisation, 2022). The benefits of embedded researchers with research and analytical expertise for organisations implementing whole of systems approaches to PA have been documented (Potts et al., 2022). Get Ireland Walking have utilised research expertise to understand non-behavioural aspects of a systems approach to walking in Ireland, which are presented in Chapters 3, 4, and 5. It may also prove fruitful for organisations such as GIW to utilise embedded research expertise to explore the utility of combining data sources found in this study to describe walking behaviour.

6.5.2 – Strengths and limitations

The current study has one main strength. This research was an attempt to identify sources of existing data and internationally recommended walking indicators which could be used in the monitoring the heterogenous impacts of systems approaches to walking in Ireland. There are some limitations of this study which must be noted. Only four expert informants provided feedback on the composite list of data sources and indicators for monitoring a systems approach to walking in Ireland. A larger group of expert informants from more diverse disciplines may have identified additional indicators and data sources. Furthermore, it was beyond the scope of this study to investigate the quality, format,

geospatial characteristics, and data collection tools/procedures used in the collection of data identified here. Doing so would provide further insight into the accessibility and usability of data sources for researchers, practitioners, and policymakers interested in the implementation and evaluation of systems approaches to walking in Ireland.

6.5.3 – Implications of the research findings

Implications for practice

- This list provides organisations in the walking system in Ireland with a suite of existing data sources which can assist in shaping the evaluation of national and subnational systems approaches to walking.
- This study provides practitioners with direct contacts to data custodians who are gatekeepers to data, which may act as the first step in developing a one-stop-shop for walking related data in Ireland.

Implications for research

- Further research should investigate the utility of combining data sources to describe walking behaviour in multiple settings, including urban and rural areas, to triangulate and corroborate trends.
- There is an opportunity for the suite of indicators/data sources identified in this study to be assessed by a range of stakeholders in terms of their usability, accessibility, and applicability to their work.

6.6 – Conclusions

The aim of this study was to investigate the presence and utility of indicators which could be used to monitor the multifaceted impact of a systems approach to walking in Ireland. The presence of complete national level data on recommended best practice indicators for walking is low. In Ireland, incomplete data exist for many of the best practice indicators recommended by Walk21. These include the activity of walking, the perceived comfort and satisfaction of walking, and the benefits of walking. Triangulation with other forms of data is recommended, especially within the context of a systems approach to walking. An example of how this can be achieved is presented in the next section of this chapter. This study has identified that the custodians of data which could be used to monitor a systems

approach to walking in Ireland are heterogenous, and vary from government departments to private organisations. The findings from this research offer a suite of data sources and indicators for organisations to use to monitor impacts across the entire walking system.

The second objective of Chapter 6 is as follows:

- Demonstrate the utility of combining publicly available data sources to describe walking in Ireland.

As noted previously, this objective was addressed through work published in an academic journal article, and the manuscript is present below. The citation for the paper is as follows:

Power D, Lambe B and Murphy N (2023). Trends in recreational walking trail usage in Ireland during the COVID-19 pandemic: implications for practice. Journal of Outdoor Recreation and Tourism. Doi: https://doi.org/10.1016/j.jort.2021.100477.

Supplementary files relevant to this publication can be found in Appendix 22.

Publication 3: Trends in recreational walking trail usage in Ireland during the COVID-19 pandemic: implications for practice (Power, Lambe and Murphy, 2023)

Abstract

Despite its potential utility for the outdoor recreation sector, there is no centralised surveillance system for recreational walking trails in Ireland and thus trail usage in Ireland during the COVID-19 pandemic is unknown. This paper aims to report trends in footfall count data on Irish trails during the COVID-19 period and to triangulate findings with openly available mobility data. This descriptive study analysed changes in footfall counts gathered from passive infrared sensors on 33 of Ireland's recreational walking trails between January 2019 and December 2020. The relationship between Google Community Mobility Report (GCMR) data and footfall counts was analysed to corroborate trends in footfall data. Total footfall increased by 6% (p=0.024) between 2019 and 2020 on trails included in this analysis. Notably, mean trail usage was between 26% and 47% higher (p=0.002) in October-December 2020 than during the same period in 2019. A strong correlation between GCMR data from 'parks' and footfall count data was found (rho=.67, n=10, p=0.035). The conclusions of this study are twofold. Firstly, the COVID-19 pandemic increased trail usage in Ireland, especially on trails closer to urban areas and there is potential for this to be a lasting legacy. Secondly, combining multiple data sources can provide trail managers with more detailed representations of trail usage and currently these are not harmonised. Future research should examine ways to encourage sustained recreational walking trail use in new users and implement novel ways to coordinate datasets across systems to monitor visitors on Irish recreational walking trails.

Introduction

In March 2020, the World Health Organisation announced the coronavirus-19 (COVID-19) outbreak as a global pandemic (World Health Organization, 2020). Governments across the globe formulated responses to reduce the spread of the virus, including movement restrictions, the closure of schools, retail, workplaces and leisure facilities, restricted public transport and more recently, the introduction of a vaccination programme. Ireland implemented one of the most stringent containment strategies compared to its international counterparts (Hale, et al., 2021). In the months following March 2020, free movement was only allowed in the months of July and August. For all other months in 2020, movement restrictions of varying distances between 2km and 10km were mandated in the Irish population. These movement restrictions, combined with the closure of non-essential businesses, caused drastic changes in the proportion of the Irish population who worked and studied from home in 2020 (Eurofound, 2020). A recent survey found that during various stages of the COVID-19 lockdown 68% of people began to work remotely (McCarthy, Bohle-Carbonell, Ó Síocháin, & Frost, 2020). These changes to the working life of a large proportion of the Irish population had knock on effects on mobility patterns. The Central Statistics Office (2020) used aggregated anonymised mobile phone data to calculate that 75% of the Irish population remained within 10km of their home during various stages of the pandemic. In a recent systematic review of 66 studies international examining the changes in population physical activity levels before and during the COVID-19 pandemic, the majority of studies included in the review reported decreased physical activity levels during the pandemic period (Stockwell, et al., 2021). Along with changes to overall lifestyle habits, the shift in regular mobility patterns may be a factor in the documented decreases in population physical activity levels (Stockwell et al., 2021).

Due to the closure of sports clubs, leisure facilities and gyms, people were required to avail of existing infrastructure in close proximity to their home to be physically active, such as cycle paths and walking trails. Before the COVID-19 pandemic, research conducted by Sport Ireland suggested that two thirds (66%) of individuals in Ireland walked at least once per week for recreation, with recreational walking being Ireland's most popular form of physical activity (Sport Ireland, 2019). Further studies from Sport Ireland indicate that participation in recreational walking at least once a week increased to 80% during various stages of the pandemic (Sport Ireland & Ipsos MRBI, 2020). However, the small sample

size of 1000 and the nature of the self-report data limit the conclusions one can draw from the findings relating to peri-pandemic recreational walking behaviours in Ireland. Furthermore, although these data provide an indication that walking has increased over the course of the COVID-19 pandemic, the data does not differentiate between walking for transport or recreation. Similarly, it does not identify the location of where the walking takes place. Consequently, the use of Ireland's recreational walking trails throughout the same period is unknown. This mitigates against the implementation of targeted behaviour change and infrastructural measures to sustain these apparent increases. The benefits of increasing recreational trail use would extend beyond the physical and mental health benefits of engaging in physical activity in nature. Studies have highlighted that walking in nature can be a way of reducing state anxiety and increasing cognitive control (Berman, Jonides, & Kaplan, 2008; Lawton, Brymer, Clough, & Denovan, 2017; Kotera et al., 2021). In addition to the individual level benefits experienced by those who use trails for recreation and leisure, visitors to protected areas worldwide has been estimated to contribute hundreds of billions of dollars annually (Balmford et al., 2015).

Madden and colleagues define footfall as a time-series statistic which is used to calculate the number of visitors to a specific location within a defined timeframe (Madden, Ramsey, Loane, & Condell, 2021). The footfall count of a recreational walking trail is not only an insight into visitation but has also been used as a primary indicator of the economic value of a trail (Bowker, Bergstrom, & Gill, 2007). Therefore, it is imperative to ensure that data are gathered using methods which are systematic and rigorous, as well as utilising multiple sources of data to accurately depict the overall usage of a trail (Schägner, Maes, Brander, Paracchini, & Hartje, 2017). Although research on park visitation has increased in recent years (Pickering, Rossi, Hernando & Barros, 2018), Schägner et al (2017) note that our understanding and exploration of novel and systematic methods of gathering accurate footfall counts is limited. Rather, efforts are placed on understanding the economic value of various types of outdoor recreation, although footfall counts are often used as an indication of an outdoor recreation spaces' economic value. The management of recreational trails in Ireland is complex. There are a multitude of diverse organisations tasked with the maintenance, development, and monitoring of these trails. Consequently, despite the usefulness of footfall data for trails, there is no uniform method of monitoring usage across multiple trail types in the country.

Work by Cessford and Muhar (2003) and a more recent scoping study of trail sensor technologies by Madden et al (2021) provide insight into the plethora of methods which could be used by park managers in monitoring visitor numbers to recreational walking trails. Recent studies have tried to move away from traditional observational methods of visitor monitoring by utilising tools such as public Wi-Fi networks (Traunmueller, Johnson, Malik, & Kontokosta, 2018), machine learning (Staab, Udas, Mayer, Taubenböck, & Job, 2021) and microwave radars (Thórhallsdóttir, Ólafsson, & Jóhannesson, 2021) to monitor park visitation and footfall. However, as highlighted by Madden and colleagues (2021) each come with their own limitations and some may be of use to park managers when others may not. Given the limitations of existing datasets and data collection methods related to walking behaviour, such as unreliable footfall counts, self-report data and ad-hoc data collection procedures, the collation of multiple forms of data pertaining to trail use, including social media (Wood et al., 2013) and big data (Rice and Pan, 2021), has been recommended albeit with caution. For example, Google Community Mobility Reports (GCMR), an openly available source of mobility data, has been criticised due to its lack of consideration for seasonality (Rice and Pan, 2021). However, despite the inherent biases and limitations associated with openly available mobility data, many studies have utilised such data to help with understanding and managing the spread of COVID-19 (Ilin, et al., 2021) and to explore how, and where, people are recreating during various stages of the COVID-19 pandemic period (Schweizer, et al., 2021). To date in Ireland openly available mobility data have not previously been used to understand recreational walking or trail usage. Doing so may provide a broader depiction of how Irish trails were used throughout the pandemic and may help inform future decisions relating to park visitation and management strategies and intervention development.

In summary, while Ireland boasts a plethora of recreational walking trails with diverse terrains and lengths, of varying difficulties and levels of accessibility, little is known about the extent to which they were utilised over the course of the COVID-19 pandemic due to the sporadic nature of data collection and collation. Therefore, the purpose of this paper is twofold. Firstly, it aims to analyse footfall count data from 33 trails maintained by two state-owned organisations to analyse the trends in recreational trail usage before and during the period of the COVID-19 pandemic. Secondly, this study also sought to examine the relationship between the objectively measured footfall counts and openly available

mobility data (GCMR) in order to gauge the feasibility of using these data sources to corroborate trends in recreational walking trail use. Google Trends (GT) data relating to walking were also analysed to complement trends found in footfall count data

Methods

Research Design

This is a descriptive study which analysed changes in recreational walking trail use data obtained from footfall counters located on 33 recreational trails in Ireland between January 2019 and December 2020. Trail location coordinates were obtained and inputted into ArcGIS in order to obtain distances from urban areas. The trends identified in these data were compared with trends found in the openly accessible GCMR and GT datasets for the same period.

Trails

All trails included in the analysis consist of a combination of terrains including mountainous, coastal, forest and road and vary in level of difficulty and length, ranging from 8km to approximately 130km. Three trails included in the analysis were popular tourist trails (e.g., the Cliffs of Moher coastal route, the Burren Way and the Wicklow Way). A list of all trails and their characteristics can be found in Supplementary File 1.

Trail use data

Initially, footfall count data were obtained from three agencies for over 50 recreational walking trails in multiple Microsoft Excel spreadsheets. Following screening for missing data and anomalies in footfall counts (i.e., unreliable count due to a dead battery, vandalism and cobwebs over the sensor), footfall count data for 33 sites (2019 & 2020) from two state level agencies were included in the final analysis. All trails were individually calibrated according to the type of trail (linear/looped) prior to the acquisition of the data and counts were adjusted accordingly. For example, linear trail counts assumed that trail users would pass the counter twice and the final reports had taken this into account.

Google Community Mobility Reports and Google Trends data

Following the initial outbreak of COVID-19 in March 2020 Google begun releasing their Community Mobility Reports (GCMR), which are sets of aggregated anonymised mobility data which aimed to be useful in decision making relating to minimising the spread of COVID-19 (Fitzpatrick and DeSalvo, 2020). Data produced in the GCMR datasets relate to changes in mobility activity in various areas of society such as residential areas, workplace areas and parks, using aggregated anonymised sets of data from Google users who have their location history setting turned on (Google, 2021). The proportion of Google users who have their location settings turned on is currently unknown (Rice & Pan, 2021). For the purposes of this study, areas denoted as 'parks' were used in the analysis. Google defines parks as public gardens, castles, national forests, campgrounds or observation decks (Google, 2021). Google compare mobility changes to their baseline days which represent a normal value for that day of the week in each region (Google, 2021). The baseline value presented for this analysis represents the median value from the period January 3 2020 to February 6 2020. Google Trends (GT) provides data on the relative popularity of search terms or topics within a predefined time frame and geographic location inputted into the Google search engine (Google, 2021). Google Relative Search Rates (GRSR) do not represent total searches of a particular topic or search word, but the relative proportion of a search topic in relation to all search inquiries in a predefined time frame and geography. For the purposes of this paper, data pertaining to mobility in parks, and the topic of 'walking' were analysed for GCMR and GT datasets during the COVID-19 period, respectively. Google Trends data were obtained for 2019 and 2020. GCMR data were available from 1 March 2020 to 31 December 2020. To analyse these data, CSV files were downloaded from each of the respective datasets and graphs were generated using Microsoft Excel to depict trends over time.

Trail location analysis

GPS coordinates for each counter location (see Figure 6.1) were obtained from the relevant parties and inputted into ArcGIS Online, a GIS software package, in order to conduct analyses for each trail. For trails where the exact GPS coordinates were not available, the location of the trailhead was used. The Euclidean distance between the location of the sensor or trailhead and the nearest border of an urban area were calculated and categorised

as either within or outside 2km, according to the 'World Population Density Estimate 2016' ArcGIS map layer (Economic and Social Research Institute, 2021). The categorisation of within or outside 2km was chosen for our analysis as the initial movement restriction implemented by the government in March 2020 mandated the Irish population to remain within 2km from their home for a period of approximately 6 weeks.
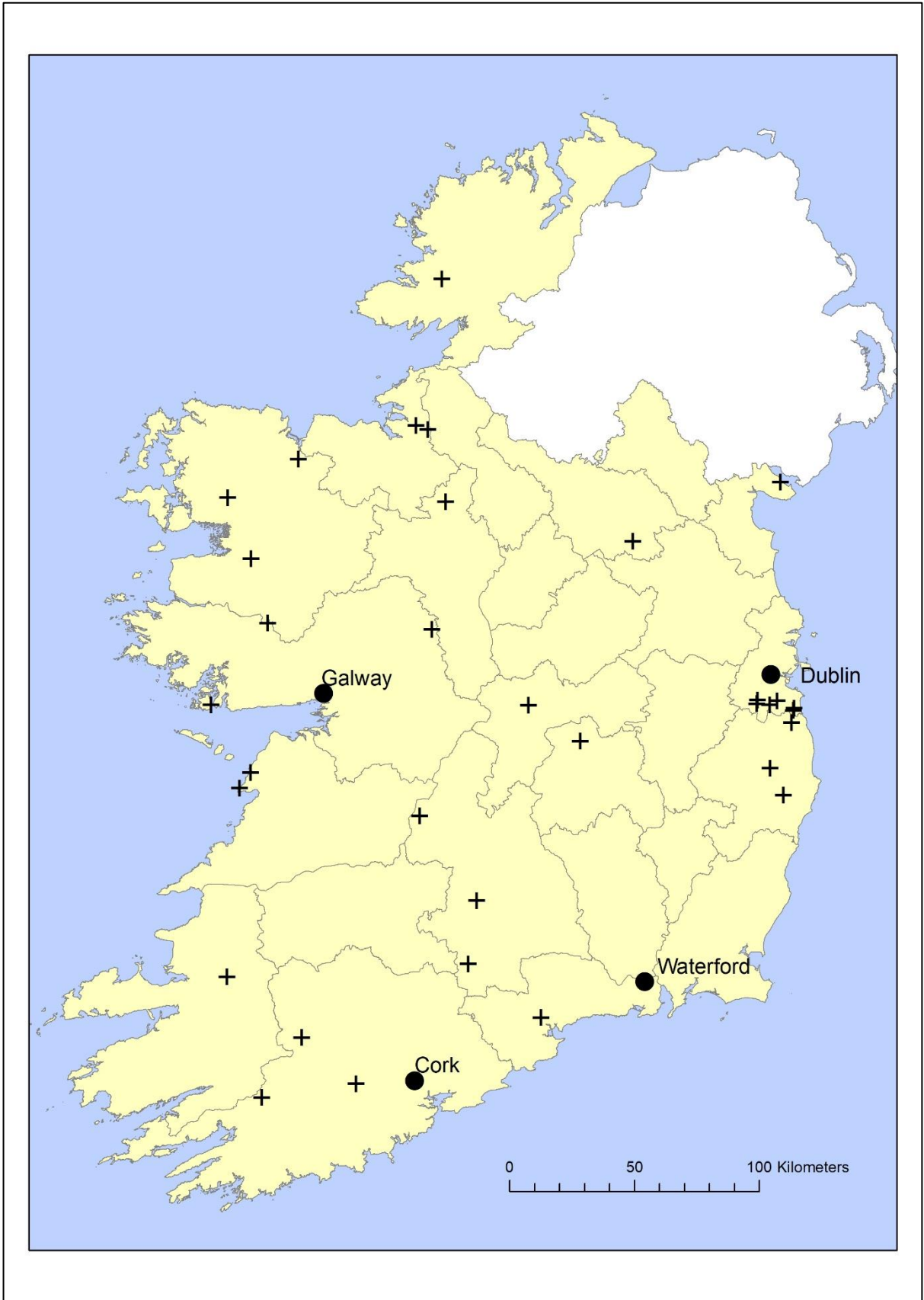
Figure 6.2: Location of each trail.

Descriptive analyses were conducted on footfall count data to highlight overall trends. In order to investigate the statistical significance of differences between monthly footfall counts, Wilcoxon signed-rank tests were employed. Spearman's correlation tests were used to obtain the correlation coefficients between percentage change in baseline for GCMR 'parks' data and percentage change in footfall counts. GCMR baseline is based on mobility in predefined societal areas from a five week period from January 3 to February 6 2019. GCMR data were available from March 2020 to December 2020 only. To coincide with the timeline of baseline values of GCMR data, the mean value of footfall counts for all trails in January 2019 and February 2019 was calculated to act as the baseline value for footfall. The temporal granularity of the data obtained for footfall counts was presented as monthly values precluding the analysis of weekly periods, similar to that used in GCMR.

Results

Did recreational trail usage change during the COVID-19 pandemic in Ireland?

Total footfall counts for all trails (n=33) increased by 6% in 2020 when compared with 2019 footfall counts. This increase was found to be statistically significant (z=-2.254, p=0.024). Footfall increased for 26 of the 33 trails whereas 7 out of 33 trails saw a decrease in 2020 from the previous year. The largest decreases were found on trails that are usually used by thousands of domestic and international tourists each year, such as the Cliffs of Moher and the Burren Way. These trails saw decreases in overall footfall of 65% and 74%, respectively. The removal of these two popular tourist trails (Burren Way and Cliffs of Moher Coastal Route), found a statistically significant increase in total footfall counts between 2020 and 2019 of 17% (z=-2.254, p=0.024).

Figure 6.2 is a depiction of all sites (n=33) and total footfall counts by month in 2020. Each grey line depicts one trail, with the red and black lines displaying the mean scores of all trails in 2019 and 2020, respectively. The most notable trend in the graph is that following the announcement of COVID-19 as a pandemic and the subsequent stay at home order issued by the government on the 27 March 2020, there was a 57% decrease in mean footfall between March 2020 and April 2020 (z=-4.154, p=.000). In the same period in

2019, there was an increase of 33% in mean footfall (z=-3.922, p=.000). As movement restrictions began to ease and intercounty and national travel were reintroduced, the mean scores of all trails in 2020 surpassed the mean scores of the same time in 2019 and remained at a higher level than the 2019 average for the remainder of the year. Our analysis illustrates the months of June, July and August in both years as the months with the highest footfall. June, July and August have been noted to be the months of the year with the lowest average rainfall in Ireland and highest temperatures (Walsh, 2012). On the 29th of June 2020 strict travel restrictions in Ireland were lifted by the Irish government, allowing travel between counties. Following these measures footfall counts (mean) peaked in August, showing a statistically significant increase between August 2019 and August 2020, the month for which footfall counts peaked in both years (z=-2.0, p=.042). During the final quarter of 2020, there was a 26% increase in mean footfall in October (z=-3.067, p=.002), a 47% increase in mean footfall in November (z=-3.141, p=.002) and a 30% increase in December (z=-3.067, p=.002) compared to the same months in 2019.
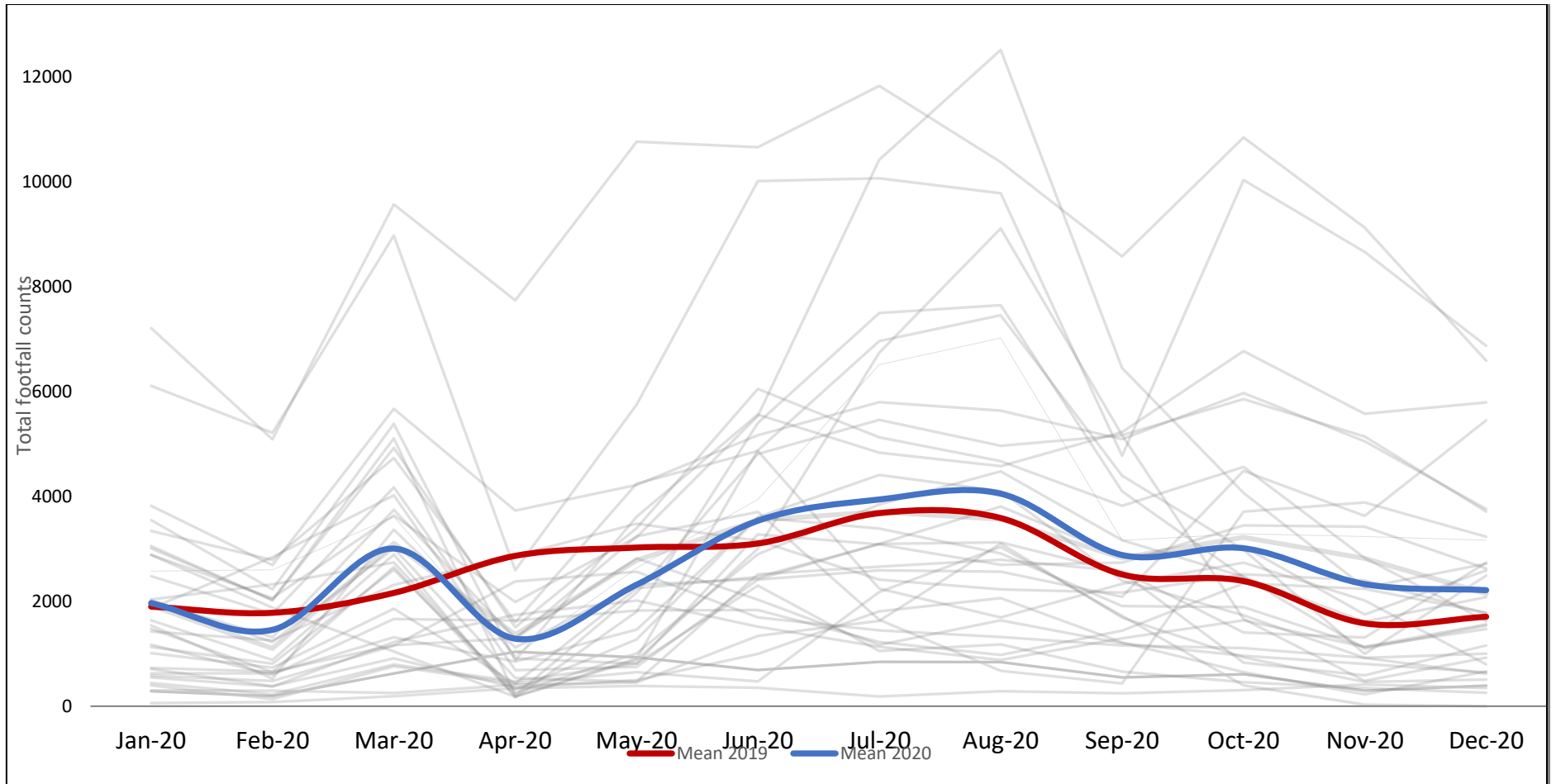
Figure 6.3: Total footfall counts by month in 2020. Each line represents one trail. Red and blue lines represent mean values for footfall counts in 2019 and 2020, respectively. Initial lockdown (16 March-14 May): closure of schools and non-essential businesses and services i.e., bars, restaurants, hotels. Strict movement restrictions (no travel <2km) from homes unless for necessary purposes– Societal reopening (15 May-11 September): Reopening of bars, restaurants, hotels etc. on a staged basis. Gradual lifting of movement restrictions (<5km from home and for essential purposes only from May 18 to full intercountry travel on July 1). Lockdown gradual reintroduction (11 September-31 December).: Closure of non-essential businesses and services, reintroduction of 5km movement restriction from 19 October – 1 Dec. Removal of some restrictions (i.e., indoor dining reintroduced, county level movement restriction) from 1 December. Strict lockdown measures reintroduced from 22 December until 12 January 21).

Was recreational trail usage higher for trails within walking distance of an urban area?

When compared with 2019, trails within 2km of urban areas saw higher mean trail usage during the June to December period in 2020. Figure 6.3 depicts the mean trail usage scores for trails within and outside a 2km distance from urban areas for 2019 and 2020. All trails saw a decrease in mean trail usage following the announcement of the COVID-19 pandemic in late March 2020. However, in April 2020, mean footfall counts on trails within 2km of urban areas were 102% higher than trails outside of this distance during the initial stringent lockdown period (Figure 6.3). Footfall counts on trails greater than 2km from an urban area were lower in April 2020 when compared to April 2019 (z=-3.5, p=.000). There was no significant difference in footfall counts on trails within 2km of an urban area during this period (z=-1.689, p=.91). As movement restrictions eased and intercountry travel resumed between May and August 2020, mean footfall counts on trails outside of 2km from urban centres saw a statistically significant increase of 130% (z=-3.393, p=.001); while trails within 2km of urban areas saw a lesser increase in mean usage of 4% which did not meet the criteria for statistical significance (z=-.459, p=.646). As movement restrictions were reintroduced in mid-September into early October and the Irish population were required to stay within 5km of their home, trails further than 2km from urban areas saw mean footfall decrease by 38% between August and October 2020 (z=-2.581, p=.010), whilst trails within 2km or less from urban areas saw an increase of 9% between the same period (z=-.711, p=.477). In October 2020, trails within 2km of an urban area had mean footfall counts that were 60% higher (z=-2.701, p=.007) than the same time in 2019. Following this period, trails within 2km of an urban area saw higher mean usage scores than those outside of 2km for the remainder of the year. In December 2020, mean footfall counts were 22% higher on trails within 2km of an urban area (z=-2.845, p=.004) and 34% higher on trails outside of this threshold (z=-1.860, p=.063) compared with December 2019.
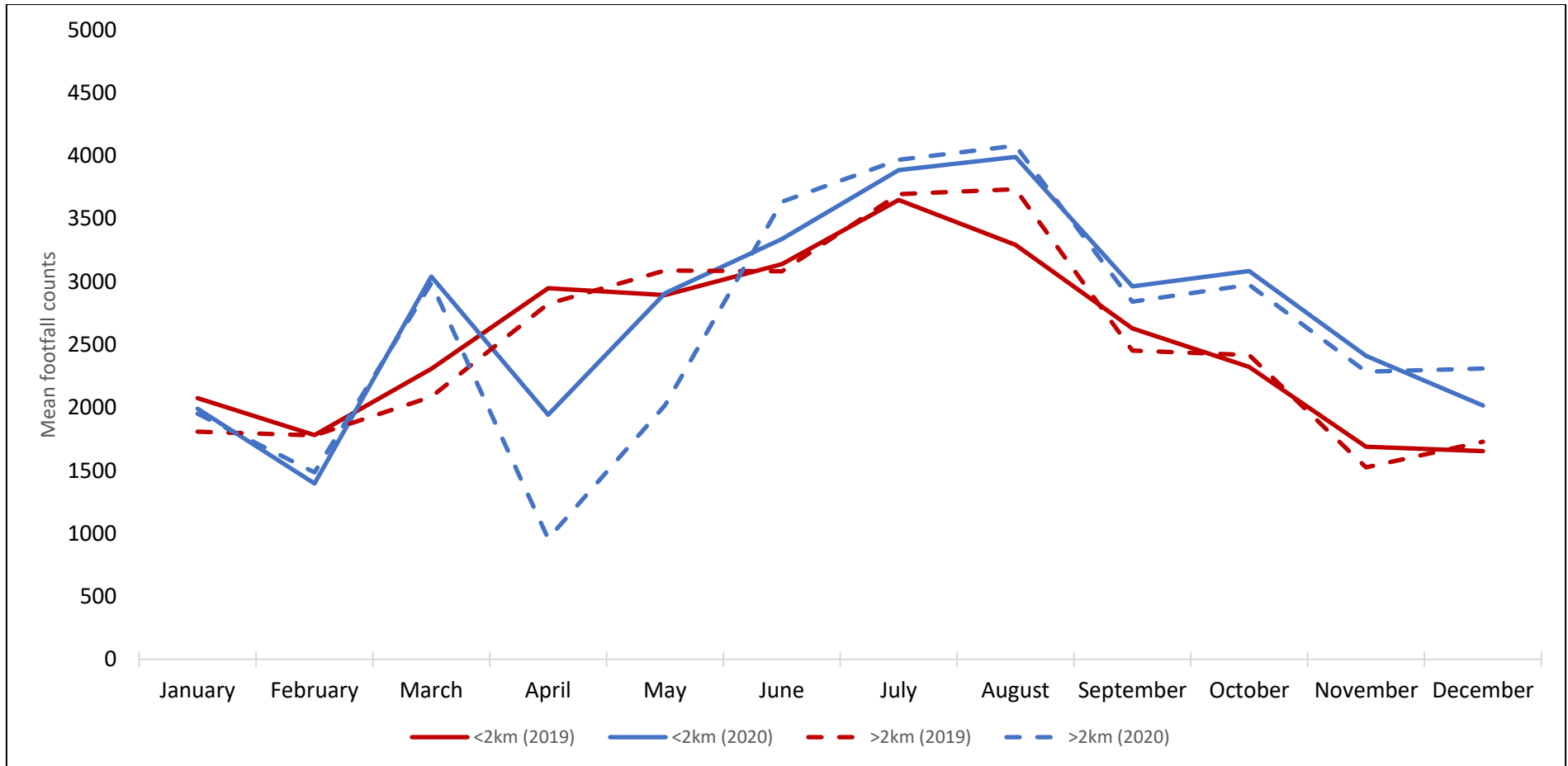
Figure 6.4: Mean footfall counts of trails within 2km and further than 2km from light urban/urban areas - 2019 and 2020. Initial lockdown (16 March-14 May): closure of schools and non-essential businesses and services i.e., bars, restaurants, hotels. Strict movement restrictions (no travel <2km) from homes unless for necessary purposes– Societal reopening (15 May-11 September): Reopening of bars, restaurants, hotels etc. on a staged basis. Gradual lifting of movement restrictions (<5km from home and for essential purposes only from May 18 to full intercountry travel on July 1). Lockdown gradual reintroduction (11 September-31 December).: Closure of non-essential businesses and services, reintroduction of 5km movement restriction from 19 October – 1 Dec. Removal of some restrictions (i.e., indoor dining reintroduced, county level movement restriction) from 1 December. Strict lockdown measures reintroduced from 22 December until 12 January 21).

Mobility in park areas as reported in GCMR data followed similar trends to total footfall counts on the trails included in our analysis during the COVID-19 pandemic. Figure 6.6 highlights mobility in parks, between March 2020 and December 2020 plotted against total footfall counts for the 33 trails included in this analysis for the same period. There was a significant positive association between the percentage change in footfall data from baseline and percentage change in GCMR park data from baseline in March to December 2020 (rho=.67, n=10, p=0.035). Both sets of data follow a similar trend: experiencing a sharp decrease following the initial stay-at-home order in March; peaking in August; and experiencing fluctuations during the lockdowns in the final four months of the year. Similar trends to those found in the analysis of footfall count data were found in GT datasets for the 2020 period. Figure 6.5 below depicts GT data, highlighting the relative search rate for the topic 'walking' in Ireland between in 2019 and 2020. Noteworthy is the sharp increase in search rates for the topic 'walking' between weeks 9 and 11 in 2020, during the initial period when the COVID-19 outbreak was declared a pandemic. The most popular time for the topic of 'walking' to be searched in Ireland in 2020 was in August, which was also the month which saw the highest footfall counts on trails included in our analysis.
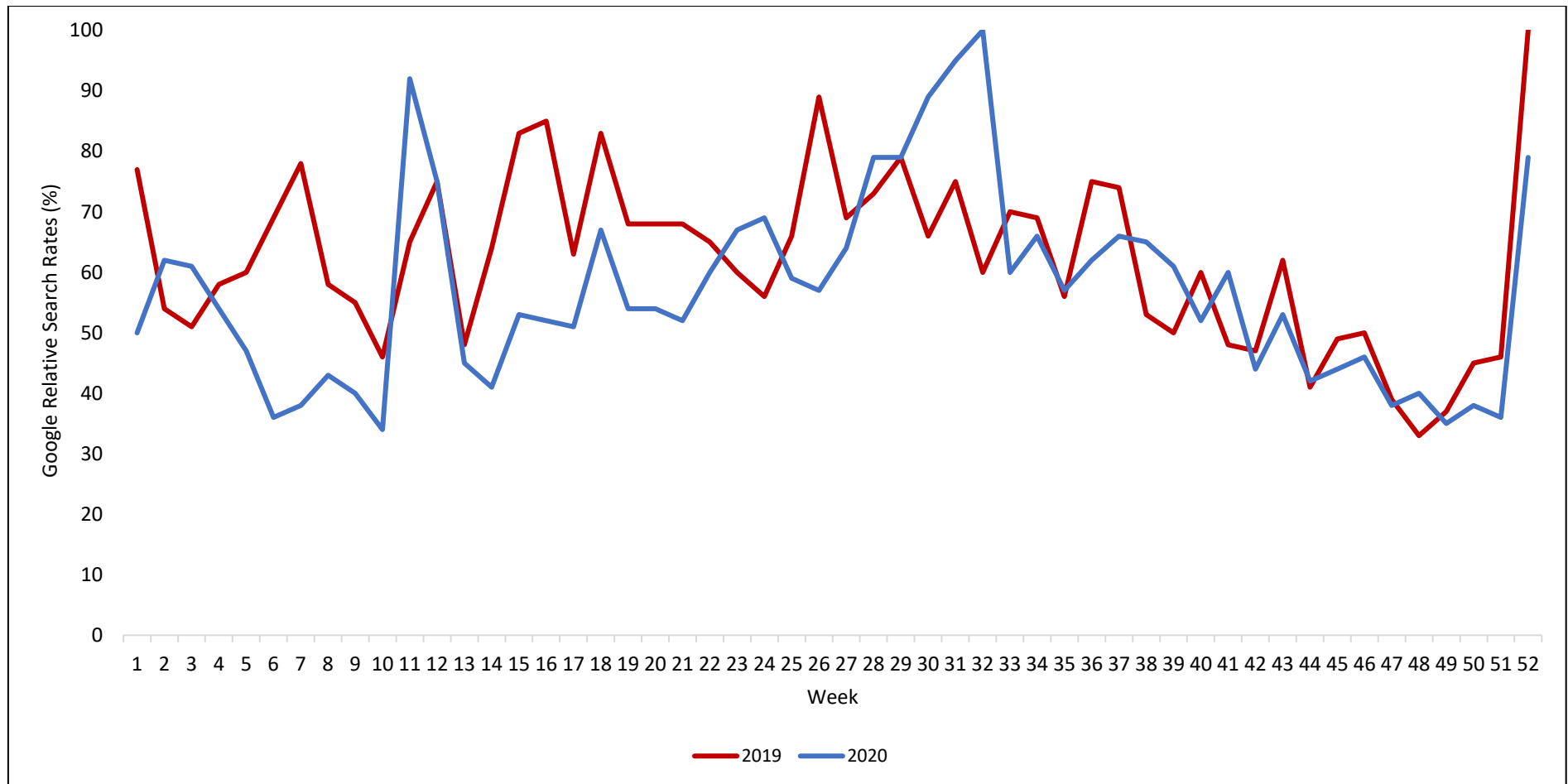
Figure 6.5: Google Relative Search Rates on the topic of 'walking' in 2019 and 2020. Initial lockdown (16 March-14 May): closure of schools and non-essential businesses and services i.e., bars, restaurants, hotels. Strict movement restrictions (no travel <2km) from homes unless for necessary purposes– Societal reopening (15 May-11 September): Reopening of bars, restaurants, hotels etc. on a staged basis. Gradual lifting of movement restrictions (<5km from home and for essential purposes only from May 18 to full intercountry travel on July 1). Lockdown gradual reintroduction (11 September-31 December).: Closure of non-essential businesses and services, reintroduction of 5km movement restriction from 19 October – 1 Dec. Removal of some restrictions (i.e., indoor dining reintroduced, county level movement restriction) from 1 December. Strict lockdown measures reintroduced from 22 December until 12 January 21).

Figure 6.6: Percentage change in footfall and percentage change in mobility in 'parks' according to GCMR data. Blue bars represent % change from baseline in GCMR data. Red line represents % change from baseline in footfall counts. Initial lockdown (16 March-14 May): closure of schools and non-essential businesses and services i.e., bars, restaurants, hotels. Strict movement restrictions (no travel <2km) from homes unless for necessary purposes. Societal reopening (15 May-11 September): Reopening of bars, restaurants, hotels etc. on a staged basis. Gradual lifting of movement restrictions (<5km from home and for essential purposes only from May 18 to full intercounty travel on July 1). Lockdown gradual reintroduction (11 September-31 December): Closure of non-essential businesses and services, reintroduction of 5km movement restriction from 19 October – 1 Dec. Removal of some restrictions (i.e., indoor dining reintroduced, county level movement restriction) from 1 December. Strict lockdown measures reintroduced from 22 December until 12 January 21).

Discussion

The overall purpose of this paper was to analyse footfall count data from 33 Irish recreational walking trails to describe trends in footfall counts before and during the COVID-19 pandemic. Furthermore, trends in openly available mobility data from GCMR and GT data were analysed to supplement and corroborate trends in footfall count data. This paper also aims to explore how data from a variety of sources may be used to understand trail usage. Our results suggest that there was a 6% overall increase i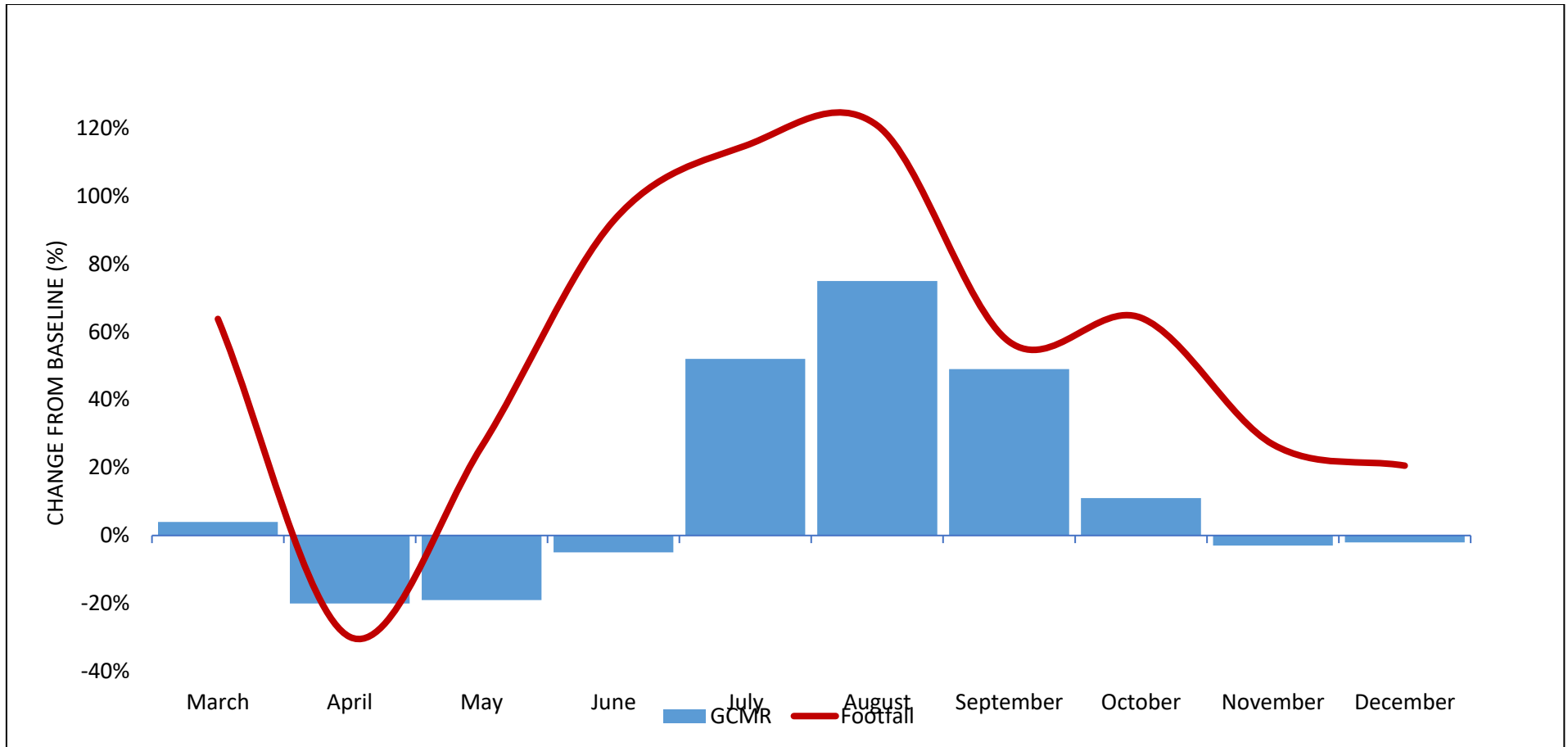n recreational trail usage in Ireland in 2020 compared to the previous year. Footfall counts fluctuated throughout the varying movement restrictions implemented by the Irish government, and trends suggest that the increase in trail usage was maintained regardless of lockdown intensity. Trails that were within 2km of an urban area were used more frequently during times of governmental movement restrictions than trails outside of 2km. Similar trends can be observed within the GCMR data when compared to footfall count data during the same period. To the authors knowledge, this is the only study of recreational walking trail usage in Ireland that has used objective footfall sensors and publicly available mobility data, notwithstanding against the contextual backdrop of the COVID-19 pandemic.

COVID-19: A catalyst for increasing trail usage in Ireland?

The findings of our analysis indicate that there was an overall increase in recreational trail usage during the COVID-19 period, which bucks international trends of decreasing physical activity levels during the pandemic (Stockwell et al., 2021). Some of the trails included in this analysis, i.e., the Cliffs of Moher coastal route and the Burren Way, are in Clare, one of the most popular tourist destinations in the country, which is visited by over one million domestic and international tourists per year (Fáilte Ireland, 2016). Given visitation to major tourist trails was reduced in 2020 due to domestic and international travel restrictions, we anticipate that the documented 6% increase in footfall found here is a conservative finding. After removing the Cliffs of Moher coastal route and the Burren Way from our analysis, we found a 17% increase in footfall counts which may be a more accurate reflection of the increase documented here. Sport Ireland reported an increase (~14%) in people walking for recreation at least once a week during the

pandemic (Sport Ireland, 2020). The trails included in our analysis that were within 2km of an urban area saw little fluctuation in footfall counts throughout 2020 compared to more remote trails. Furthermore, in December 2020, mean footfall counts of trails within 2km of urban areas were 22% higher than December in the previous year. This sustained increase in mean footfall counts in the final months of the year suggests that individuals may have chosen to maintain the habit of trail visitation, even when other physical activity and exercise options were available. It must be noted, however, that other factors including seasonal changes, weather and public holidays have been noted to contribute to annual trends in trail visitation (Genge, Innes, Wu, Wang, & Wang, 2021). However, as there were no drastic changes in total rainfall and mean temperature in Ireland between 2019 and 2020 (Met Eireann, 2021), one could argue that weather may not have been major contribution to the increase in footfall counts recorded here. However, the closure of physical activity and exercise facilities such as gyms and leisure centres during certain phases of lockdown required a shift in where the Irish population chose to recreate. Our results highlight that recreational walking trails could have acted as a substitute for previous recreation destinations. In a 2016 study, Verplanken and Roy aimed to unpack what impact changes within an individuals' life course has on promoting sustainable lifestyle behaviours. Interestingly, they concluded that moments of uproot and discontinuity within an individual's life, such as relocation, result in a temporary moment when people are more receptive to interventions to change lifestyle behaviours in a sustainable way. Within the context of this paper, the COVID-19 pandemic has resulted in significant disruption of daily life and presents an opportunity to further understand and sustain the increase in trail usage documented here.

Given that regular physical activity is the prime modality for the prevention of numerous non-communicable diseases and has also been advocated for resilience against COVID-19 (Sallis, et al., 2021) and other infectious diseases (Chastin, et al., 2021), it may be in the interest of public health to design interventions to help sustain this increase in recreational walking trail visitation. However, care should be exercised in this process. Although maximising efforts to increase trail usage may have an impact on population health and wellbeing, caution must be exercised by park managers and trail management teams to ensure trail users adhere to local

public health guidelines relating to COVID-19 such as physical distancing (Wynveen, et al., 2021). Furthermore, increases in trail and park visitation may have caused unforeseen implications for park managers relating to litter management. In a study conducted by Jones and McGinlay (2020) in the United Kingdom, a survey of 438 people living in the Peak District Area highlighted that 70% of respondents had witnessed littering in the Peak District National Park on their visits during the COVID-19 pandemic. Intensifying public outreach and education of the Leave No Trace principles by Leave No Trace Ireland may assist in minimising the impact of increased trail use on soil, wildlife, and vegetation (Leave No Trace Ireland, 2021). Minimising the impact of litter on trail aesthetics may help prevent reductions in the therapeutic effects of a trail, as research has highlighted that litter can influence a wilderness users' perception of their experience in a wilderness area or trail (Roggenbuck, Williams, & Watson, 1993).

Can openly available data sources be used to support footfall count data on Irish trails?

This study indicates that openly available mobility data may help corroborate trends in trail footfall counts in order to improve the validity of overall trends. This is important because footfall data analysed within this study came from a limited number of trails. Therefore it is not possible to draw definitive conclusions from these data alone. Indeed, the use of openly available mobility data is becoming more evident in similar studies published internationally during the time of the pandemic (Venter, Barton, Gundersen, Figari, & Nowell, 2021). As highlighted above, trends showing increased mobility in areas Google deemed as 'parks' around the time of the initial stay-at-home order in March 2020 corroborate those found in footfall counts on the trails included in this analysis. Previous work has recommend the inclusion of alternative forms of data such as social media when combined with other forms of trail monitoring data for nature-based tourism (Teles da Mota & Pickering, 2020). In a 2013 study, Wood and colleagues aimed to understand whether social media data from the website 'flickr' could be used to estimate visitation rates in 836 recreational sites around the world (Wood et al., 2013). Wood et al (2013) concluded that the social media data used in their study could serve as a reliable proxy for park visitation rates. Similarly, work conducted by Ciesielski and

Stereńczak (2021) and Hausmann et al (2017) highlight the ability for social media data to be used as a useful tool for decision makers relating to forest and park management. However, the inherent biases of using social media data and big data in conjunction with traditional trail data has been discussed elsewhere and the interpretation and use of these data must be done with caution (Elwood, Goodchild & Sui, 2012; Goodchild, 2013; Pickering, Rossi, Hernado, & Barros, 2018). Furthermore, although global smartphone ownership has increased, sociodemographic factors including age and gender have been noted to influence internet usage, smartphone ownership and social media behaviours, which may limit the overall representativeness of the openly available mobility data included in this study (Pew Research Centre, 2016).

Within the Irish context, the potential for multiple sources of data, including big data and social media, to be combined when measuring the overall usage of a trail requires further exploration within the outdoor recreation research community. Our analysis of GT data found an increased rate of searches directed towards the topic of walking in Ireland during the COVID-19 pandemic period. This may suggest that baseline knowledge of walking related routes, trails and information could be low in Ireland. Although GT does not provide any demographic data or suggest causality in terms of the increase in walking behaviour, it can provide a valuable indication of the public interest in each topic during a particular time (Jun, Yoo, & Choi, 2018). For example, GT data has been utilised by Ding and colleagues to highlight the increase in internet searches for 'exercise' during various stages of the COVID-19 pandemic across multiple geographies (Ding, del Pozo Cruz, Green, & Bauman, 2020). The heterogeneous types of data that exist which could be utilised to explore trail usage require exploration beyond those included in this paper and it must be noted that GT data may act as a useful complement to these data. The analysis conducted here simply provides insight into the utility openly available mobility data sources to help explain and corroborate trends in objective footfall sensors as opposed to using these data as proxy measures. Despite this opportunity, the multiple sources of data pertaining to recreational trail usage in Ireland are underutilised and underexplored and given Irish communities' rediscovery of trails within their vicinity over the course of the COVID-19 pandemic, gathering accurate data on footfall and

usage of these trails is as important as ever for land managers and for conservation purposes.

The need for a centralised surveillance system for trail usage data in Ireland

The potential for local authorities and researchers to utilise these robust and largescale datasets in unison, when making decisions relating to the provision and maintenance of green space is pertinent. There is a timely opportunity for data and resources to be shared across sectors and between disciplines within the recreational walking system in Ireland to aid in the development of a coordinated approach to the collection and collation of trail use data. Walking and trail use data is currently being collected by governmental and non-statutory bodies in Ireland on an ad-hoc basis and, if integrated, could help trail managers make decisions on trail maintenance, promotion and conservation strategies. Furthermore, there are multiple big datasets which gather step count and mobility data which could also be utilised by land managers to supplement trail use data such as Facebook Data for Good (Facebook Research, 2020), Fitbit (Fitbit, 2021), Apple Mobility Data (Apple, 2021) and Strava Metro (Strava, 2021). A harmonised data portal for trails and parks has been called for at the EU level (Schägner et al., 2017), yet the benefits of having a national level park and trail usage data portal has been relatively unexplored at the national level in Ireland. Embracing such 'imperfect' but pragmatic ways of gathering and synthesising data on trail usage supports the notion put forward by Ogilvie and colleagues (2020), that our model of evidence on which we base our public health decisions should resemble a 'dry-stone wall'. That is, efforts should be made to combine studies of differing methodologies, statistical approaches and heterogeneous sample populations. The same applies to monitoring visitors to parks and trails. The complexity of combining multiple data sources such as those presented here should be embraced in order to provide a more accurate depiction of Irish trail usage. In order to do so, the multisectoral and multidisciplinary organisations from health, tourism, recreation, transport and education who have a stake in the recreational walking system in Ireland must understand their roles within the system and their ability to contribute to the system.

The development of systems maps through group model building and collaborative conceptual modelling methods (Newell & Proust, 2012; Hovmand, 2014) may offer an opportunity for the stakeholders within the outdoor recreation research community to begin working beyond the confines of conceptual siloes and to understand the complexity of the systems in which they are embedded. Systems maps have been used by researchers as an exploratory tool to understand the complexities and nuances of 'wicked' public health problems such as obesity (Allender, et al., 2015) and physical activity at local (Cavill, Richardson, Faghy, Bussell, & Rutter, 2020) and national level (Rutter, Cavill, Bauman, & Bull, 2018; Bellew, et al., 2020). One purpose of systems maps is to allow system actors to gain a new perspective on the systems in which they work. However, a more practical application of a systems map is its ability to visually identify opportunities for data collection and existing data sources within a system (Friel, et al., 2017). Within the context of the recreational walking system in Ireland, the systems mapping process involving interdisciplinary stakeholders could be useful to explore currently available data sources, and opportunities for further data collection pertaining to trail use.

Strengths and Limitations

Despite the strengths of this work, there are three main limitations that must be noted. Firstly, in relation to the footfall counters that are in place on the trails, previous work has critiqued the reliability of such devices and noted that the reliability and validity of results produced from counters can vary (Cessford and Muhar, 2003; Andersen, Gundersen, Wold, & Stange, 2014; Madden et al., 2021). For example, some trails are accessible on mountain bikes and the PIR sensors are unable to distinguish between the different types of trail user. Furthermore, aggregated mobility data, similar to that of GCMR data, is also unable to distinguish between types of users (Reif & Schmücker, 2020). However, it has been noted that these data can be beneficial if used in conjunction with other forms of data pertaining to trail or park visitation, as is presented here (Ciesielski and Stereńczak, 2021; Rice and Pan, 2021). Secondly, the type of data used in the present study preclude the consideration of user level characteristics, such as their demographic profile, physical activity behaviour, reasons for using the trail and their perceived

barriers to trail use. These methodological limitations limit the potential for footfall count data alone to contribute to understanding the impact of trail usage on population level physical activity as well as informing future promotional campaigns and interventions. Thirdly, the temporal granularity, level of aggregation and length of data collection period can limit the analysis of big data (Rice and Pan, 2021). In the present study, there were differences in the temporal granularity of footfall count data and available GCMR data. However, this research represents the first effort to analyse long term empirical data pertaining to recreational walking trail use on several sites in Ireland, notwithstanding during the period of the COVID-19 pandemic. Furthermore, this study utilises multiple data sources not only to provide clarity to the trends observed in the objectively measured footfall count data, but also the ability for GCMR to be used to corroborate trends.

Conclusions

This paper provides an insight into the trends in recreational trail usage during the COVID-19 pandemic in Ireland. There are a number of key findings presented in this paper. Firstly, the analyses conducted here display an overall increase of 6% in trail usage in 2020 when compared with 2019. Trails that were within 2km of urban areas had up to 102% higher mean footfall counts than those outside of 2km during the most stringent COVID-19 lockdown phases in 2020. Not only does our analysis document the objectively measured increase in trail usage by the Irish public during various stages of the lockdown, but it also highlights the potential for openly available mobility data, such as GCMR, to be used in conjunction with footfall sensors in order to facilitate a more in-depth understanding of trends in footfall and recreational walking. Our data suggest that one potential positive legacy of COVID-19 could be the increased and sustained use of trails by the Irish population, even in the winter months. Integrating heterogeneous forms of trail use data could help trail and park managers plan evidence-based maintenance strategies for the future.

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6.7 – Reflections of an embedded researcher

My conceptualisation of the types of data you need to monitor a systems approach to walking is split in two. One element must be able to track whether or not more people are walking. The other relates to facets relevant to the wider impacts of a systems approach which are not necessarily focused on walking behaviour. For example, collaboration and communication between organisations, the presence of governance and accountability structures, the strength of partnerships, and the implementation of multiple types of interventions across different areas of the system over time. Being based in a research centre which has a major physical activity focus, a common topic of discussion between my supervisors and I was the lack of 'good' data on national level walking in Ireland. The Irish Sports Monitor is our best example of national level walking data in Ireland, which is a self-report questionnaire which asks whether or not people have walked for recreation/transport in the last 7 days. If they did, this is classed as *regular walking*. And so, a lot of our national level understanding of the popularity of recreational and transport walking in Ireland comes from the somewhat limited Irish Sports Monitor data. At the same time, I kept hearing (through colleagues in Mountaineering Ireland, or reading in magazines or news articles) about the presence of sensors which tracked footfall on Irish trails. To this end, I was somewhat frustrated with the lack of accessibility of these data, especially given that the perception was that they were in place on most trails and Greenways in Ireland.

It's hard to make a clear cut recommendation of what I would choose to include in the evaluation of a systems approach to walking at, say, national level, without knowing where an organisations priorities/resources lie. But what I can say, is that organisations (such as Get Ireland Walking) should broaden the horizons of how they evaluate the impact of their work beyond changes in walking levels going forward. I think for an organisation like Get Ireland Walking who have limited human resources, choosing feasible and practical indicators which already exist (such as those in Table 6.2), or take little resources to keep tabs on, would be useful. Social network analysis (as presented in Chapter 4) holds the potential to track communication in a network over time, but it would not be a pragmatic way of going about collecting data on interorganisational communication over time without

sufficient expertise and resources. Instead, something like a communication log, for example, could help shine light on the frequency and type of communication in a network over time. Other examples of pragmatic indicators could include keeping an action register of interventions which are implemented across a system over time, keeping record of workshop/meeting attendances, and gauging public interest in walking-related topics using Google Trends.

In any case, one of my underlying aims approaching the work of this thesis was to end up with a resource which could be of practical benefit to researchers and practitioners in the field of systems approaches to physical activity, but more importantly to stakeholders in the walking system in Ireland. The tricky bit with systems approaches – and a common point of debate – is the monitoring and evaluation of them. I am part of an international network, the Systems Evaluation Network, made up of +400 researchers, practitioners, and policy makers interested in how we can go about evaluating systems approaches to problems in public health. The discussions that take place with this group are lively, and it is quite evident that we are 'learning by doing' in this space. But it is clear that the impacts of systems approaches stray far from observing changes in one or two variables. The monitoring and evaluation of systems approaches to public health requires many sources of data and flexible approaches, which are somewhat perpendicular to the research designs used in the evaluation of physical activity interventions traditionally. Although this PhD does not include a clear-cut example of an evaluation of a systems approach like some of those which are published (i.e., WeCanMove project in Gloucestershire, or the LIKE programme in Amsterdam), I was keen for this study to help put organisations like Get Ireland Waling (and others) in better stead following the PhD. More specifically, I wanted to at least provide them with an understanding of what could be available to assist them in the evaluation of the implementation of their new national strategy, or monitoring the implementation of the Get Cork Walking Action Plan 2023-2024.

Chapter 7: Conclusions

7.1 – Introduction

The aim of this PhD thesis was to investigate the utility of systems approaches to understand and strengthen walking promotion at local and national level in Ireland. The overall aim of this chapter is to synthesise the key findings from the four research studies presented as part of this thesis. Furthermore, this chapter describes the original contributions of the work and offers direction for future research.

7.2 – Main conclusions

Presented below are four conclusions which are drawn from the work conducted as part of this PhD thesis. The conclusions are presented in light of the reviewed literature and the aims and objectives of the research.

7.2.1 – Increased effort in 'Creating Active Systems' is needed

The application of a systems lens has provided Get Ireland Walking (GIW) with a broader strategic compass and has allowed for, in the context of their own work, the process of alignment across sectors and between policy levels to be initiated. The Global Action Plan on Physical Activity 2018-2030 (GAPPA) (World Health Organisation, 2018) now provides the framework which guides the national and local work of GIW. To this end, findings from all four research studies presented in this thesis suggest that further work on Creating Active Systems (Ensuring effective governance, surveillance, and leadership for walking) is required within the walking system in Ireland. Findings from Chapter 3 suggest the potential for the work of GIW (and walking more broadly) to contribute to a wide range of societal targets beyond health and transport oriented goals, given sufficient improvement in partnerships, workplans, and legislative frameworks. As noted previously, GIW has low political leverage and should continue to invest in further research support to substantiate or refute the evidence base formed as part of this project. Furthermore, GIW should continue to coordinate and support the development of opportunities for continued national and subnational cross sectoral collaboration related to the promotion and development of walking.

The evaluation of Get Ireland Walking's national walking promotion partnership presented in Chapter 4 shone light on the lack of alignment between local and national walking systems in Ireland. Furthermore, discrepancies were identified between the organisations written to play a central role in the implementation of Ireland's only national walking strategy, the Get Ireland Walking Strategy and Action Plan 2017-2020 (GIWSAP) (Get Ireland Walking, 2017), and those who played a central role in its implementation in reality. The local government departments/directorates identified as relevant to the promotion and development of walking within local government organisations differ across local areas in Ireland. Learnings from Chapter 5 showcased the difficulty in obtaining buy-in from local decision makers, especially when there is a lack of mandate for them to engage. Get Ireland Walking do not hold the political leverage to mandate organisations to implement actions in their strategic plans. However, they do have an opportunity to incorporate the findings from this work into their practice to increase buy-in from local level decision makers. For example, GIW should streamline their communications with local governments by tailoring their interactions to the departments and directorates which were identified as relevant to waking in Chapter 4.

7.2.2 – Facilitators of the adoption of systems approaches within the work of Get Ireland Walking

The use of the GAPPA as a framework to structure outcomes from a systems mapping workshop was found to be useful in identifying areas for future work within one local waking system. Currently, Sport Ireland are delivering the 'Active Cities' project in the five metropolitan areas in Ireland (Dublin; Galway; Limerick; Waterford; and, Cork). Local level roles (Active Cities Coordinators) are in place in each of these counties, whose role is to promote active living across each local area. More importantly, Active Cities Coordinators' work programmes are structured according to the four strategic objectives of the GAPPA. Although the adoption of the GAPPA as a framework by stakeholders involved in the Get Cork Walking

project (presented in Chapter 5) may have been mediated by the World Health Organisation (WHO) 'branding', the role of Cork as an Active City cannot be overlooked. A core responsibility of the Walking Promotion Officer (WPO), who is embedded within the Cork Local Sports Partnership (LSP), is to facilitate the systems approach to walking at local level. Moreover, the Active Cities Coordinator for Cork – whose work programme is structured by the GAPPA– is also embedded within the Cork LSP. It could be argued that the Cork LSP's prior exposure to the GAPPA was a factor which facilitated the processes presented in Chapter 5, from developing a systems map for walking in 2020, to the publication of a local walking strategy for Cork (structured by the GAPPA) in 2023.

The contents of the research presented in this thesis – which aimed to understand whether systems approaches could be of use to the work of a national walking promotion organisation – held a symbiotic relationship with the work of GIW. This implies that the direction taken by GIW as an organisation influenced the direction of the research, and vice versa. The nature of the application of systems approaches such as social network analysis (Chapter 4), systems mapping (Chapter 5), and systems framing (Chapter 3), were required to be pragmatic and flexible in accordance with the many contextual factors influencing the work of GIW. However, the role of sustained investment in human and financial resources, and stakeholders' willingness to engage cannot be overlooked. It could be argued that the role of the WPO in Cork, the role of the embedded researcher, and a willing programmes manager, played a contributing factor to how systems approaches were incorporated into the work of GIW at local and national level. Nonetheless, these approaches provided benefits to the work of GIW by augmenting the organisations involved in national walking strategy development; initiating cross-sectoral work as part of a systems approach to walking at local level; and, providing insight into the nature of how organisations associated with GIW communicate and interact over time. However, the long-term impacts of the application of these approaches over time remains to be seen.

7.2.3 – The future direction of Get Ireland Walking

Get Ireland Walking now have an opportunity to incorporate learnings from the work presented here in upcoming policy being implemented nationally. Get Ireland Walking is one component of the system of walking in Ireland, and they do not hold the capacity to develop, implement, and evaluate a national walking strategy for Ireland as an organisation with 3 full time staff members. For now, Get Ireland Walking's strengths lie in their extensive network of organisations who operate at multiple levels, from local community groups to government departments. Chapter 3 shone light on how walking can often 'play second fiddle' when combined with as part of a wider agenda in local policies, such as walking and cycling, active travel, or outdoor recreation. The implementation and delivery of Local Sports Plans (an objective within Ireland's National Sports Policy 2018-2027), County Outdoor Recreation Plans (an objective within Ireland's National Outdoor Recreation Strategy 2023-2027), and Local Pedestrian Enhancement Plans (an action within the Ireland's National Sustainable Mobility Policy 2022-2025) will be implemented in all counties starting in 2023. Given the current resource constraints of GIW, effort should be placed towards aligning local and national agendas, by advocating for multidisciplinary action– by showcasing the work of this thesis or otherwise – prior to the implementation of these national policy actions at local level.

It is important to be realistic regarding the impact an organisation such as GIW (with <5 employees) can have on global sustainable development targets. Providing opportunities for stakeholders from different areas of the walking system in Ireland to communicate (i.e., stakeholder events, conferences) may increase buy-in and interest to systems approaches to walking, but these measures alone are unlikely to sustain commitment over the long term. Increasing the flexibility in programmes of work to support stakeholders' involvement in systems approaches to walking are more likely to help fully realise and understand the benefits of such approaches. In Ireland, piecemeal and short-term funding in PA and sport continues to be the norm, which encourages the implementation and evaluation of small-scale interventions. In the case of the current project, the role of the embedded researcher in GIW has offered an insight into the potential for research, particularly influenced by systems

thinking/approaches, to influence the work of the organisation nationally and locally from 'the inside out'. This project presents an example of how this research culture could be changed through the support of embedded researchers over a long period. There is now potential for GIW to ring-fence additional investment to support further research or development roles to advance and monitor the findings of this work longitudinally.

7.2.4 – Perfect may be the enemy of the good when applying systems approaches

The work of this thesis has uncovered that there is an abundance of ongoing work in the walking system in Ireland, yet more must be done to fully realise the public and planetary health benefits of more people walking more often. It has been argued that oftentimes the complexity of public health problems is used as a 'rhetorical smokescreen' for political inaction (Savona et al., 2021). Moreover, the notion of the complexity dilemma – the inability to understand a system made up of multiple interacting components without reducing it into smaller subsystems – is pertinent to the ad-hoc approach to walking promotion in Ireland to date (Newell and Proust, 2018). By taking a pragmatic approach to the use of systems methods and tools, the findings of this work confirm the complex nature of the walking system in Ireland in a number of ways including the heterogeneous types of data available to understand walking, the connections between the multidisciplinary organisations who have a role in its promotion, and the political, theoretical, and sectoral homes within which walking sits. Up until now, little effort has been made to understand or positively influence the walking system in Ireland using systems approaches and techniques. The launch of the Get Cork Walking Action Plan and the forthcoming national Get Ireland Walking Strategy, are examples of how taking a flexible approach to the application of systems approaches helped GIW push beyond disciplinary siloes.

Get Ireland Walking are embedded within a complex system made up of many interrelated parts. Through the employment of an embedded researcher, GIW sought to (among other things) gain an understanding of their role in the walking system in

Ireland, as well as its inherent complexity. The real-world nature of this project, notwithstanding the outbreak of Coronavirus-2019 (COVID-19), did not facilitate an exemplary application of systems science methodologies and theory to walking promotion in Ireland. Given the time, resource, and socio-political constraints, the work of this thesis took a pragmatic and flexible approach to the use of systems approaches to improve national and local walking policy and practice in Ireland. More evidence has been called for which highlights how useful (or not) systems approaches can be for PA promotion, and the studies presented in this thesis partially addresses this gap. However, whether the approaches taken in this thesis will create positive and sustained changes in walking behaviour in Ireland remains to be seen. This may become evident after multiple political cycles. However, maintaining the status quo of a disjointed approach to promoting PA is unlikely to achieve global PA targets (Rutter et al., 2019). This research has progressed policy and practice beyond the confines of siloed working for one key organisation in the walking system in Ireland.

7.3 – Original contributions of the research

This research provides several original contributions to knowledge, practice, and research in the field of PA. In part, the contributions made by this body of work were made possible due to the co-funded nature of the PhD project between the academic institution (South East Technological University) and practice organisation (GIW). This research provides examples of how systems approaches can be of value to organisations in a real-world PA system, something which has been identified as a gap in the literature (Nau et al., 2022). The stand out original contribution of this research is that it progresses the application of systems approaches to PA beyond the conceptual (Chugtai and Blanchet, 2017). Another unique aspect to the work presented as part of this thesis is that it provides, to our knowledge, some of the only existing evidence of applying systems approaches to the promotion of walking. To date, systems approaches, tools, and methods have only been used to explore PA more broadly.

This research also provides original contributions in terms of how it has shaped practice for a one organisation in the walking system in Ireland. The findings of this research suggest that the use of conceptual systems mapping can act as a catalyst for cross-sectoral engagement and the first stage of a systems approach to walking. As a result of the work presented here, Cork is Ireland's only county with a systems-oriented local level action plan for walking promotion which is aligned to national (Get Ireland Walking's updated strategy) and global (Global Action Plan on Physical Activity 2018-2030) agendas. The work presented in Chapter 4 presents a novel application of SNA methods to compare the 'best case scenario' for communication/collaboration in Get Ireland Walking's multidisciplinary partnership, to the communication which is happening in reality. This provided GIW with the impetus to expand the network of organisations involved in their updated strategy development to include organisations from climate, environment, and transport sectors.

7.4 – Opportunities for future research

There are ample potential avenues for further research which build on the findings of the work presented here. In relation to the policy analysis of Irish walking policies presented in Chapter 3, conceptual links between the United Nations Sustainable Development Goals targets, and actions within Get Ireland Walking's national strategic plan were identified. There is opportunity to further solidify these connections by identifying the presence of empirical data which supports or refutes the connections identified in Chapter 3. In relation to the work presented in Chapter 5, there is potential for further research to replicate the processes implemented in Cork to initiate cross sectoral collaboration as part of a systems approach to walking in other counties. Aiming to replicate these processes without the assistance of a local level WPO may shine light on the roles of both the process itself, and the role of the WPO. The current work provides the formative work which a future evaluation of a systems approach can be built upon. For example, there is now opportunity to longitudinally monitor the implementation of the Get Cork Walking Action Plan 2023-2024, using indicators and data sources identified in Chapter 6.

Moreover, exploring stakeholders' perceptions of the usability/applicability of indicators identified in Chapter 6 to their work may be warranted.

7.5 – Conclusion

The use of systems approaches in PA research continues to gain popularity, yet evidence of their value to real world PA systems is only now emerging (Nau et al., 2022). Through the application of systems approaches, the work conducted as part of this PhD thesis has helped developed an initial understanding of the nexus of policies, organisations, interventions, and data sources present in local and national walking systems in Ireland. This work has also initiated policy and practice change for the work of Ireland's national walking promotion organisation, Get Ireland Walking. Specifically, the findings of this PhD thesis has resulted in placing a systems approach at the core of the local and national work conducted by Get Ireland Walking. Overall, this thesis has contributed to the knowledge base on how systems approaches can be useful to organisations in real-world PA systems.

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Appendices

Appendix 1: Development of composite policy content analysis tool.

CAPPA (Scope of Analysis subheading)	CAPPA example questions	HARDWIRED example questions	Composite list questions
Availability: Analysis of whether a policy exists or not (e.g., the presence of a national PA plan)	Example questions: -Is there a national walking strategy for Ireland?	Proposed HARDWIRED questions: N/A	**1.** Is there a national walking strategy for Ireland/[name of county]?
Context: Analysis of the economic, environmental, legal, political, social, and any other circumstances relevant to a policy or a stage of policy cycle	Example questions (CAPPA): -What budget was allocated for the implementation of the policy? -What was the key stimulus for policy action? -What are the dominant values held by the body endorsing the strategy? -What influence does private sector have on policy making process? -Were local level strategies developed according to the separation of powers doctrine?	Proposed HARDWIRED questions: D_1 – Does the policy have a clear statement which is also embedded in other policy agendas? R_1 – Is there a stable base of political and stakeholder support as well as sustained investment over the long term?	**2.** What was the key stimulus for policy action? **3.** Were local level strategies developed according to the separation of powers doctrine? **4.** What budget was allocated for the implementation of the policy? **5.** Does the policy have a clear statement which is also embedded in other policy agendas?
Processes: Analysis of the procedures, mechanisms, and/or actions in a given stage of the policy cycle.	Example questions (CAPPA): -What process did the strategy have to go through to be implemented? -What mechanisms are in place to support the dissemination of the strategy? -Did the development process allow for suggestions and improvements to be made? -Which mechanisms were in place in the development stage of the strategy?	Proposed HARDWIRED questions: **H** – Was a stakeholder analysis and needs assessment conducted to ensure widespread representation from interdisciplinary stakeholders at the early stages of strategy development? **W** – Was communication of the contents of the strategy tailored before disseminating with different target groups?	**6.** What process did the strategy have to go through to be implemented? **7.** Was a stakeholder analysis and needs assessment conducted to ensure widespread representation from interdisciplinary stakeholders at the early stages of strategy development? **8.** What mechanisms are in place to support the dissemination of the strategy?
Actors: Analysis of the stakeholders in a given stage of a policy cycle.	Example questions (CAPPA): -Who were the bodies involved in the development of the policy?	Proposed HARDWIRED questions: **H** – Does the strategy engage with grassroots practitioners, as well as	**9.** Does the strategy engage with grassroots practitioners, as well as policymakers, and define the organisational links between them?

	-Which bodies proposed the strategy? -What were the power relations between the actors involved in the development process? -Are any non-governmental organisations assisting in the implementation of the policy?	policymakers, and define the organisational links between them? **A** – Were actions within the strategy progressed through intersectoral partnerships?	**10.** What were the power relations between the actors involved in the development process? **11.** Were actions within the strategy progressed through intersectoral partnerships?
Political will: Analysis of the level of political support and/or commitment to a policy in a given stage of the policy cycle.	Example questions (CAPPA): -Did any political actor in power publicly express support to the development of the strategy? -Did the Government demonstrate political will to support the implementation of the strategy? -Does the government hold regular discussions with the aim to support the implementation of the strategy?	Proposed HARDWIRED questions: R_1 – Is there a stable base of political and stakeholder support as well as sustained investment over the long term?	**12.** Did any political actor in power publicly express support to the development of the strategy? **13.** Is there a stable base of political and stakeholder support as well as sustained investment over the long term? **14.** Does the government hold regular discussions with the aim to support the implementation of the strategy?
Content: Analysis of the wording and substantive information included in a specific policy.	Example questions (CAPPA): -Does the strategy reference specific target groups? -Does the strategy have a clear statement on the timeframe for policy implementation? -Does the strategy mention joint collaboration at different levels of government? -Are the national PA recommendations in your country fully in line with the WHO recommendations for PAfH? -Is the policy content predominantly 'downstream' or 'upstream'?	Proposed HARDWIRED questions: R_2 – Are the roles and responsibilities of organisations involved in strategy implementation well clarified and is there a common understanding of and agreement on how 'successful implementation' is to be defined and measured? **A** – Does the strategy outline a comprehensive approach using multiple strategies at multiple levels targeting multiple population groups? D_2 – Are national PA guidelines widely disseminated and adapted	**15.** Are the roles and responsibilities of organisations involved in strategy implementation well clarified and is there a common understanding of and agreement on how 'successful implementation' is to be defined and measured? **16.** Does the strategy have a clear statement on the timeframe for policy implementation? **17.** Does the strategy reference specific target groups? **18.** Is the policy content predominantly 'downstream' or 'upstream'? **19.** Does the strategy outline a comprehensive approach using multiple strategies at multiple levels targeting multiple population groups?

		according to different population groups?	
Effects: Analysis of the economic, environmental, public health, social, and other potential impacts of policy.	Example questions (CAPPA): -What kind of impact did the strategy have on walking levels? -Were there any unintended consequences of the implementation of the strategy?	Proposed HARDWIRED questions: **E** – Is there systematic surveillance of population levels of walking? **I** – Is the evaluation conducted by an independent body which is not connected to the government or 'policy owners'?	**20.** Is the evaluation conducted by an independent body which is not connected to the government or 'policy owners'? **21.** Is there systematic surveillance of population levels of walking? **22.** What kind of impact did the strategy have on walking levels? **23.** Were there any unintended consequences of the implementation of the strategy?

Appendix 2: Local level walking policies content analysis results.

Scope of policy analysis section	Content analysis grid criteria	Cork: Cork City Walking Strategy 2013-2018	Carlow: County Carlow's Outdoor Recreation Strategy 2020-2023	Donegal: North West Greenway Plan 2015	Dublin: The Heart of Dublin – City Centre Public Realm Master Plan 2016	Longford: County Longford Tourism Statement of Strategy and Work Programme 2017-2022	Monaghan: County Walking & Cycling Strategy 2021-2026	Wexford: County Wexford Tourism Strategy 2019-2023	Wicklow: County Wicklow Recreation Strategy 2020-2025
Availability	1. Is there a national walking specific strategy for Ireland/[name of county]?	Yes.	No.	No.	No.	No.	No.	No.	No.
Context	2. What was the key stimulus for policy action?	County wide decline in the prevalence of walking for transport and increase in the use of private car for transport purposes.	Recognition of contribution of outdoor recreation to local economy.	Increasing demand for Greenway development in the North West Cross Border region.	Updating previous version of Public Realm Strategy for Dublin 2012.	To grow tourism to the county (p2).	<10% of people in Monaghan commute by walking or cycling. To increase walking for recreation and for tourism.	Economic benefits of tourism to local economy.	Update new strategy. Economic benefits of tourism to local economy.
	3. Were local level strategies developed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	according to the separation of powers doctrine?								
	4. What budget was allocated for the implementation of the policy?	Not specified	Not specified.	Not specified. However, a list of funding sources from NI, ROI, cross-border, and EU sources are listed in section 6.1 (p74).	Not specified.	Not specified.	Not specified. Active Travel Unit mentioned.	Not specified. Page 104 suggested list of funding sources to support implementation.	Output 3.1 (p44) €20m external funding over the lifetime of the plan
	5. Does the policy have a clear statement which is also embedded in other policy agendas?	CCWS linked with the following policies: -Smarter Travel -DMURS -Cork City and County Development Plans -Unspecified regional policies -Unspecified national policies	Yes. Noted that this strategy is 'framed' by 11 local and national policies from multiple sectors including sport, health, tourism and commerce.	Yes. Page 32-33, provides objectives, vision, and EU, NI and ROI policy contexts.	Clear statement of vision. No reference to connection to other policies.	Yes. Page 7 lists the broader policy context in which it sits. All tourism and regional development policies mentioned.	Yes. Section 2 (page8) contains a policy review of related national, regional, and local policies.	Yes. Section 2 (page 13) context at national and local level.	Clear statement of vision. Page 14 contextual analysis references policies from multiple sectors.

Processes	**6.** What process did the strategy have to go through to be implemented?	Stakeholder consultations were conducted with stakeholders from local government, health, the Garda Síochána, transport, academia, tourism, sport, roads, planning, environmental advocacy. Number of consultation unknown.	Public and individual meetings, online questionnaires and consumer surveys with individuals, clubs, organisation representatives.	Not specified. Sustrans lead the preparation of the document.	Survey, case studies, consultation.	Not specified.	Online submissions (presumably due to COVID). Page 32 mentions 'consultation' which involves online submissions. Appendix III (p59) contains list of submissions.	Interviews with 17 tourism and outdoor recreation stakeholders. 2 workshops and 1 world café with traders, industry partners and community members.	Consultation with n=700 stakeholders and community members through individual meetings, group meetings, public forums and online questionnaires.
	7. Was a stakeholder analysis and needs assessment conducted to ensure widespread representation from interdisciplinary stakeholders at the early	Not stated.	Not stated.	Not stated.	Not stated.	SWOT Analysis conducted to identify a programme of work.	SWOT Analysis conducted.	Section 3 (p31) situational analysis and SWOT analysis conducted.	Not stated.

	stages of strategy development?								
	8. What mechanisms are in place to support the dissemination of the strategy?	Page 49 action a (ii) Establishing a communications strategy for the project. Presence unknown.	Action included on p34 outlining the development and publication of a communications strategy.	No.	Not specified.	Page 25 action e6.4.4. to develop a communications strategy to support the implementation of the plan	Not specified.	Page 102 – develop a communication plan.	Objective 2.7 – Review of Wicklow Outdoors online platform and plan; updated online strategy to profile outdoor recreation; a visual, data and marketing materials repository.
Actors	**9.** Does the strategy engage with grassroots practitioners, as well as policymakers, and define the organisational links between them?	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.	Yes. No clarified definition of organisational links between stakeholders.
	10. What were the power relations between the actors involved	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.

	in the development process?							
	11. Were actions within the strategy progressed through intersectoral partnerships?	Not specified.	Actions were assigned to multisectoral organisational teams. Progress unknown. Lack of representation from transport organisations.	Actions were assigned to multisectoral organisational teams. Progress unknown.	Not specified.	Actions were assigned to multisectoral organisational teams. Progress unknown.	Actions were assigned to multisectoral organisational teams. Progress unknown.	Actions were assigned to multisectoral organisational teams. Progress unknown.	Actions were assigned to multisectoral organisational teams. Progress unknown.
Political will	**12.** Did any political actor in power publicly express support to the development of the strategy?	Not specified.	Not specified.	Not specified.	Not specified.	Not specified. Local councillors provided foreword.	Not specified.	Not specified.	Not specified.
	13. Is there a stable base of political and stakeholder support as well as sustained investment over the long term?	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.
	14. Does the government hold regular discussions with the aim to support the	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.

	implementation of the strategy?							
Content	**15.** Are the roles and responsibilities of organisations involved in strategy implementation well clarified and is there a common understanding of and agreement on how 'successful implementation' is to be defined and measured?	No.	Yes. Lead organisations and partners specified for each action and Key Performance Indicator outlined for each action.	Yes. Lead organisations and partners specified for each action, key Performance Indicator and estimated costs outlined for each action.	No.	No. Page 26 mentions a list of organisations.	Yes. Action plan (beginning p38) outlines responsibilities of each organisation to each action. Success and timelines also defined.	Yes (page 96). Organisations specified for each action, key Performance Indicator outlined for each action.	Yes(from p26). Organisations specified as lead or partners, actions and outputs defined.
	16. Does the strategy have a clear statement on the timeframe for policy implementation?	Yes (2013-2018)	Yes (2020-2023)	No.	Yes (2016-2022)	Yes (2017-2022).	Yes (2021-2026)	Yes (2019-2023)	Yes (2020-2025)
	17. Does the strategy reference	Yes.	Yes.	No.	Yes.	No.	Yes.	Yes.	Yes.

	specific target groups?								
	18. Is the policy content predominantly 'downstream' or 'upstream'?	Unknown.	Combination.	Upstream.	Upstream.	Combination.	Downstream.	Combination.	Combination.
	19. Does the strategy outline a comprehensive approach using multiple strategies at multiple levels targeting multiple population groups?	No. Majority of actions are within planning/urban design/transport sectors.	Yes. Lack of representation from transport organisations.	No. This strategy is focused on infrastructure development.	No. All actions within urban design/transport sector.	Unclear.	Yes. Lack of representation from academia and education.	Unclear.	Yes.
Effects	**20.** Is the evaluation conducted by an independent body which is not connected to the government or 'policy owners'?	Not specified.	P33 Strategic Area 'Research and Insights' – lead partner IT Carlow (now SETU).	Not specified.	Not specified.	No. Monitoring of implementation of the strategy is the responsibility of lead organisations named on each action.	No. Page 51 Section Evaluation – note that 'we' (i.e. Monaghan County Council) will conduct evaluation.	Not specified.	Not specified.
	21. Is there systematic surveillance of	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.

	population levels of walking?								
	22. What kind of impact did the strategy have on walking levels?	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.
	23. Were there any unintended consequences of the implementation of the strategy?	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.

Appendix 3: National Strategic Objectives and Get Ireland Walking Strategy and Action Plan 2017-2020 – Conceptual linkage outcomes.

National Strategic Objectives (NSO)	NSO Target Statement	Relevance to walking	Related GIW SAP 17-20 Actions
NSO 1: Compact Growth	1.10 - Enable urban infill development that would not otherwise occur	Partially relevant	4.2; 4.4
	1.2 - Improve 'liveability' and quality of life, enabling greater densities of development to be achieved	Highly relevant	4.1 4.6
	1.3 - Encourage economic development and job creation, by creating conditions to attract internationally mobile investment and opportunities for indigenous enterprise growth	Partially relevant	7.1
	1.4 - Building on existing assets and capacity to create critical mass and scale for regional growth	Partially relevant	4.1-4.6; 1.1-1.4
	1.5 - Improve accessibility to and between centres of mass and scale and better integration with their surrounding areas	Highly relevant	4.1-4.6

	1.6 -Ensure transition to more sustainable modes of travel (walking, cycling, public transport) and energy consumption (efficiency, renewables) within an urban context	Highly relevant	4.1-4.6
	1.7 - Encourage labour mobility to support employment-led growth, including affordable housing, education/skills development and improved community and family services including childcare	Partially relevant	4.4
	1.8 -Enhance the attractiveness, viability and vibrancy of smaller towns and villages and rural areas as a means of achieving more sustainable patterns and forms of development	Highly relevant	4.4
	1.9 - Ensure transition to more sustainable modes of travel (walking, cycling, public transport) and energy consumption (efficiency, renewables) within smaller towns and villages and rural areas	Highly relevant	5.8; 5.7
	1.12 - Cross-boundary collaboration at county and regional level to achieve more sustainable outcomes for rural communities, e.g. applicable to shared settlements, landscapes and amenities as well as lands in state ownership	Partially relevant	4.5; 4.4; 7.1
NSO 2: Enhanced	2.3 - Enabling more effective traffic management within and around cities and re-allocation of inner city road-space in favour of bus-based public transport services and walking/cycling facilities	Highly relevant	4.1

Regional Accessibility	2.8 - To strengthen public transport connectivity between cities and large growth towns in Ireland and Northern Ireland with improved services and reliable journey times	Partially relevant	4.1
NSO 3: Strengthened Rural Economies and Communities	3.1 - Implementation of the actions outlined in the Action Plan for Rural Development	Partially relevant	7.1
	3.3 - Implementation of a targeted Rural Regeneration and Development Fund to enable opportunities to secure the rejuvenation and re-purposing of rural towns and villages weakened by the structural changes in rural economies and settlement patterns	Partially relevant	7.1
	3.4 - Provide a quality nationwide community based public transport system in rural Ireland which responds to local needs under the Rural Transport Network and similar initiatives	Partially relevant	4.4
	3.5 – Invest in maintaining regional and local roads and strategic road improvement projects in rural areas to ensure access to critical services such as education, healthcare and employment	Partially relevant	4.4
	3.6 - Invest in greenways, blueways and peatways as part of a nationally coordinated strategy	Highly relevant	7.1
	4.1 - Expand attractive public transport alternatives to car transport to reduce congestion and emissions and enable the transport sector to cater for	Highly relevant	4.4; 7.1; 5.7; 5.8

NSO 4: Sustainable mobility	the demands associated with longer-term population and employment growth in a sustainable manner through the following measures		
	4.2 - Deliver the key public transport objectives of the Transport Strategy for the Greater Dublin Area 2016-2035 by investing in projects such as New Metro Link, DART Expansion Programme, BusConnects in Dublin and key bus-based projects in the other cities and towns	Partially relevant	4.1
	4.3 - Provide public transport infrastructure and services to meet the needs of smaller towns, villages and rural areas	Partially relevant	4.1
	4.4 - Develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate	Partially relevant	4.1
NSO 7: Enhanced Amenities and Heritage	7.1 - Implementation of planning and transport strategies for the five cities and other urban areas will be progressed with a major focus on improving walking and cycling routes, including continuous greenway networks and targeted measures to enhance permeability and connectivity	Highly relevant	4.2; 7.1
	7.2 - The Rural and Urban Regeneration and Development Funds will support transformational public realm initiatives to give city and town centre areas back to citizens, encouraging greater city and town centre	Highly relevant	4.2; 7.1

	living, enhanced recreational spaces and attractiveness from a cultural, tourism and promotional perspective		
	7.3 - We will conserve, manage and present our heritage for its intrinsic value and as a support to economic renewal and sustainable employment	Partially relevant	4.5
	7.4 - Open up our heritage estates to public access, where possible	Highly relevant	4.5; 4.3
	7.5 - Invest in and enable access to recreational facilities, including trails networks, designed and delivered with a strong emphasis on conservation, allowing the protection and preservation of our most fragile environments and providing a wellbeing benefit for all	Highly relevant	4.3; 4.5
NSO 10: Access to Quality Childcare, Education and Health Services	10.1 - Provide additional investment in the schools sector to keep pace with demographic demand and to manage increasing building and site costs so that new and refurbished schools on well-located sites within or close to existing built-up areas, can meet demographic growth and the diverse needs of local population	Highly relevant	2.3; 2.2;
	10.2 - Expand and consolidate third-level facilities at locations where this will further strengthen the capacity of those institutions to deliver the talent necessary to drive economic and social development in the regions. The consolidation of the DIT campus at Grange Gorman is a critical flagship infrastructural project for the higher education sector	Partially relevant	5.8; 6.3

Appendix 4: United Nations Sustainable Development Goals and Get Ireland Walking Strategy and Action Plan 2017-2020 – Conceptual linkage outcomes.

Sustainable Development Goals	Sustainable Development Goal Targets	Related Get Ireland Walking Strategy and Action Plan 2017-2020
SDG 3 (Good Health and Wellbeing)	3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.3; 5.1–5.4
SDG 3 (Good Health and Wellbeing)	3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	-
SDG 3 (Good Health and Wellbeing)	3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	4.2; 4.3; 4.4
SDG 3 (Good Health and Wellbeing)	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	4.2; 4.4
SDG 4 (Quality Education)	4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non- violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development	1.5; 1.6; 2.2
SDG 8 (Decent Work and Economic Growth)	8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	7.1
SDG 8 (Decent Work and Economic Growth)	8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	7.1
SDG 11 (Sustainable Cities and Communities)	11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning	4.2; 4.4
SDG 11 (Sustainable Cities and Communities)	11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	4.2; 4.4
SDG 11 (Sustainable Cities and Communities)	11.3 By 2030, enhance inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning and management in all countries"	4.4

SDG 11 (Sustainable Cities and Communities)	11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	4.2; 4.4
SDG 11 (Sustainable Cities and Communities)	11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities"	4.2; 4.3; 4.4; 5.2
SDG 12 (Responsible Consumption and Production)	12.2 By 2030, achieve the sustainable management and efficient use of natural resources	-
SDG 12 (Responsible Consumption and Production)	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	1.1–1.4; 3.1–3.5; 4.1; 4.5
SDG 13 (Climate Action)	13.2 Integrate climate change measures into national policies, strategies and planning	-
SDG 16 (Peace, Justice and Strong Institutions)	16.6 Develop effective, accountable and transparent institutions at all levels	7.3
SDG 16 (Peace, Justice and Strong Institutions)	16.7 Ensure responsive, inclusive, participatory and representative decision- making at all levels	7.1; 7.3
SDG 17 (Partnerships for the Goals)	17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilise and share knowledge, expertise, technology and financial resources, to support the achievement of the SDGs in all countries, in particular developing countries	7.1
SDG 17 (Partnerships for the Goals)	17.17 Encourage and promote effective public, public– private and civil society partnerships, building on the experience and resourcing strategies of partnerships"	7.1; 7.3

Appendix 5: Letter of ethical approval for partnership evaluation study.

Mr Dylan Power
118 Alder Avenue
Monvoy Valley
Tramore
Co. Waterford

19th February 2021

Dear Dylan,

Thank you for bringing your project titled "Getting Ireland Walking: An implementation science evaluation of a cross-sectoral innovation" to the attention of the School of Health Sciences Research Ethics Committee.

I am pleased to inform you that we fully approve WIT's participation in this project and we will convey this to Academic Council.

We wish you well in the work ahead.

Yours sincerely

Dr Michael Harrison
Chairperson, School of Health Sciences Research Ethics Committee

Appendix 6: Information email sent to organisations from Get Ireland Walking.
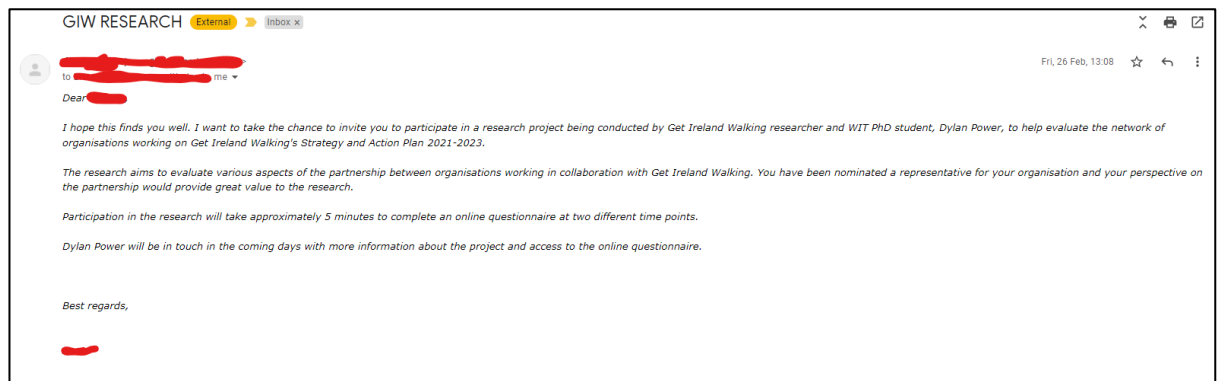
Appendix 7: Email invitation and reminder sent to organisations.
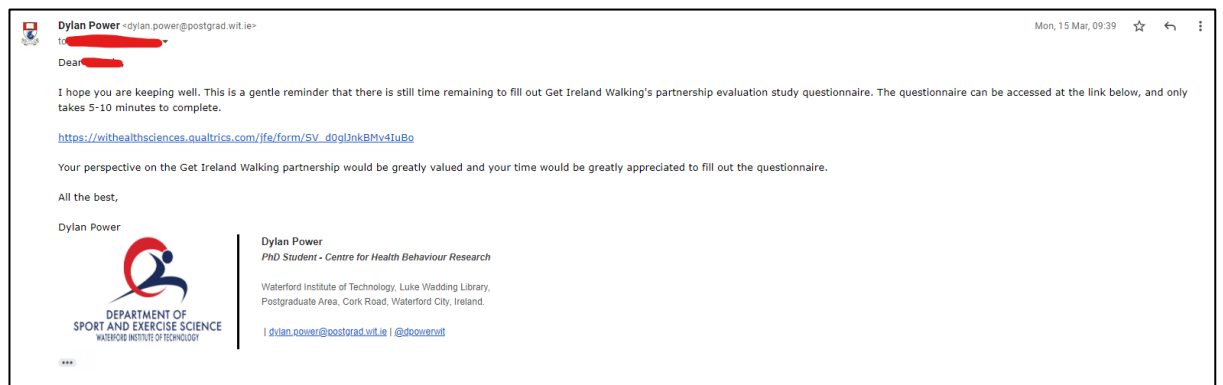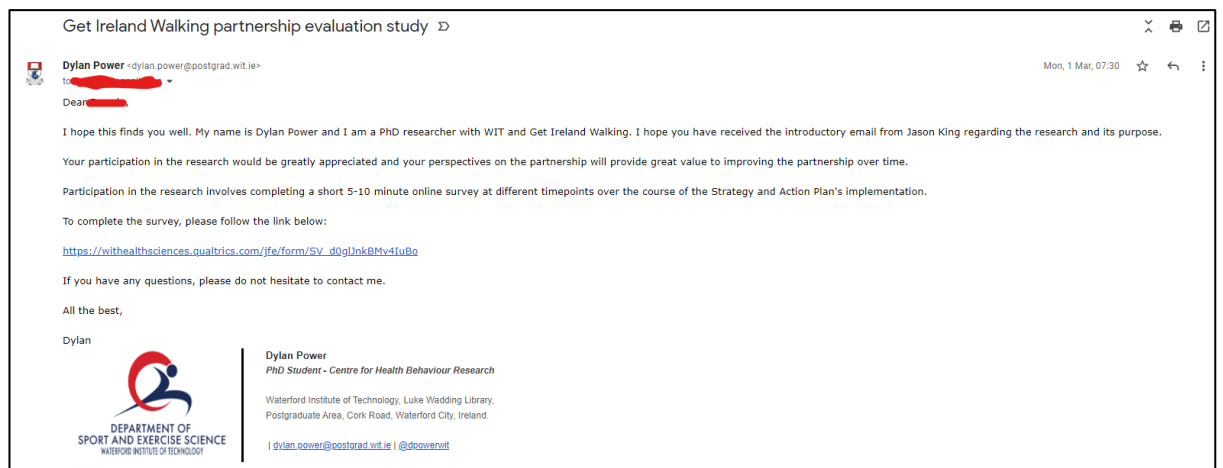
Appendix 8: Partnership evaluation questionnaire and informed consent form.

Get Ireland Walking Partnership Evaluation Questionnaire

Informed Consent

You have been asked to complete this online questionnaire on behalf of your organisation as part of a network analysis study in a PhD project being carried out by a student (Dylan Power) at Waterford Institute of Technology and in conjunction with Get Ireland Walking. The purpose of a network analysis is to understand the structure of a network and how information and resources flow between them. The potential outcomes of this research are to identify who the key players are within the network of organisations who promote walking in Ireland, understand the overall usage of Get Ireland Walking's Strategy and Action Plan and identify areas for capacity building within the network. You are under no obligation to participate in this research. To help you to decide whether or not to participate, you need to fully understand what is required of you and what the research entails. This is called an informed consent.

What is this research about?

This research aims to provide insight into the current network of organisations that promote walking in Ireland and to map out and evaluate the funding, partnership and coordination relationships between them. Social network analyses have been conducted in public health research in the past, in areas such as active living promotion, but little work has been conducted to analyse the networks of organisations that promote specific forms of physical activity. In gaining such an insight into the organisational network, the overall structure, and key players within the network can be identified. This information will be of great use to policy makers, practitioners and researchers in the areas of walking promotion in Ireland

What does participation involve?

Participation in the study involves completing this online questionnaire which takes between **5-10 minutes** to complete. The questionnaire aims to understand your relationships with other organisations in the network, your use of the Get Ireland Walking Strategy and Action Plan and some basic demographic questions. Only Mr

Dylan Power and his supervisors, Dr Niamh Murphy and Dr Barry Lambe will have access to the data collected.

Information used will not be identifiable. Information used in publications may include participant's role (i.e. Academic, Policy Maker, City Planner). Only Mr Dylan Power and his supervisory team Dr Niamh Murphy and Dr Barry Lambe will have access to this list of participant names and roles. No identifiable information will be used in any final publication or resources developed from this project. <u>Your individual answers will not be reported.</u>

Who will have access to the data? Data collected from the questionnaire will be collated into an Excel sheet Mr Dylan Power and his supervisory team (Dr Niamh Murphy and Dr Barry Lambe) from Waterford IT will have access to this information. All records will be kept at Waterford IT for five years after the study has been completed. After this time, all data will be permanently and securely destroyed.

Confidentiality will be ensured as much as possible within the confines of the law.

Any information used in the preparation of the project report, research publication, or any other resource will be anonymous and not linked to any personal or organizational information you provide. All data, including any personal information, will be kept strictly confidential and secure (files will be held on a WIT OneDrive and will be password protected). Only Dylan Power will have access to passwords. No information will be available to third parties at any point.

All information will be treated as strictly confidential and no information will be provided to any other party without your written permission. All information held by Waterford IT is subject to the terms of the Freedom of Information Act 2018, and the Data Protection Act 2018. You can find information about this on the Institute's

website:http://www.wit.ie/about_wit/for_staff/foi_useful_resources http://www.wit.ie/about_wit/for_staff/data_protection.

Can I withdraw from the study? Participation in the study is voluntary and you can withdraw your data within 2 weeks of submitting your questionnaire response.

Contact details:

If you have any questions about the research you can contact Dylan Power by:

Email: dylan.power@postgrad.wit.ie

Phone: 0838229832

Proceeding to the questionnaire implies your consent to participate

○ Proceed

Q1 What is your job title?

Q2 What organisation do you work for?

Q3 Please select the type of organisation you work for:

▼ Government (1) ... Private Sector (4)

Q4 What is your primary area of work?

▼ Health (1) ... Other (9)

Q5 To what extent are the actions assigned to your organisation within the GIW Strategy and Action Plan integrated with your annual work plan?

Not at all integrated   Fully integrated

0   10 20 30 40 50 60 70 80 90 100

Q6 Please list up to 10 organisations you have contacted in the last 6 months regarding the actions assigned to you in the GIW Strategy and Action Plan.

1 (1)	▼ Active School Flag (1) ... Waterways Ireland (29)
2 (2)	▼ Active School Flag (1) ... Waterways Ireland (29)
3 (3)	▼ Active School Flag (1) ... Waterways Ireland (29)
4 (4)	▼ Active School Flag (1) ... Waterways Ireland (29)
5 (5)	▼ Active School Flag (1) ... Waterways Ireland (29)
6 (6)	▼ Active School Flag (1) ... Waterways Ireland (29)
7 (7)	▼ Active School Flag (1) ... Waterways Ireland (29)
8 (8)	▼ Active School Flag (1) ... Waterways Ireland (29)
9 (9)	▼ Active School Flag (1) ... Waterways Ireland (29)
10 (10)	▼ Active School Flag (1) ... Waterways Ireland (29)

Q7 Leadership (Strategic direction and leadership)

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Neutral (4)	Slightly agree (5)	Agree (6)	Strongly agree (7)
There is a clear vision for the GIW partners (1)	○	○	○	○	○	○	○
There is clear communication of the goals of the partnership (2)	○	○	○	○	○	○	○
There is enthusiasm for achieving the partnerships' goals. (3)	○	○	○	○	○	○	○
Leaders commit resources to achieve the goals of the partnership (4)	○	○	○	○	○	○	○
There is responsibility taken for the outcomes by leaders (5)	○	○	○	○	○	○	○
There is strategic leadership for the actions assigned to your organisations within the Strategy and Action Plan (6)	○	○	○	○	○	○	○

Q8 Resources (financial, Human resources, time, data, facilities)

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Neutral (4)	Slightly agree (5)	Agree (6)	Strongly agree (7)
Adequate financial resources are available (1)	◯	◯	◯	◯	◯	◯	◯
Necessary skills are available in the partnership (2)	◯	◯	◯	◯	◯	◯	◯
Available skills are used effectively (3)	◯	◯	◯	◯	◯	◯	◯
Adequate leadership support is available (4)	◯	◯	◯	◯	◯	◯	◯
Adequate staff time is allocated (5)	◯	◯	◯	◯	◯	◯	◯
Resources are allocated for effective communication (6)	◯	◯	◯	◯	◯	◯	◯
The benefits of allocating resources to the GIW Strategy and Action Plan actions outweigh the costs (7)	◯	◯	◯	◯	◯	◯	◯
There is a fair process for recognising shared achievements (8)	◯	◯	◯	◯	◯	◯	◯

Q9 Governance (guidelines and processes for implementation of actions within the Strategy and Action Plan)

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Neutral (4)	Slightly agree (5)	Agree (6)	Strongly agree (7)
There are defined roles and responsibilities (1)	○	○	○	○	○	○	○
There are clear communication mechanisms among GIW partners (2)	○	○	○	○	○	○	○
There is a clear process for planning and implementing activities (3)	○	○	○	○	○	○	○
There is a clear process for shared decision making (4)	○	○	○	○	○	○	○
There is an effective process for managing conflict (5)	○	○	○	○	○	○	○
There is a clear framework for monitoring progress (6)	○	○	○	○	○	○	○
There is a fair process for recognising shared achievements (7)	○	○	○	○	○	○	○

Q10 Collaboration (how partners work together in the partnership)

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Neutral (4)	Slightly agree (5)	Agree (6)	Strongly agree (7)
There is trust and respect among partners (1)	○	○	○	○	○	○	○
There are identified shared benefits from working together (2)	○	○	○	○	○	○	○
There is sharing of ideas, resources and skills among partners (3)	○	○	○	○	○	○	○
There is collaboration to solve problems (4)	○	○	○	○	○	○	○
There is effective communication among partners (5)	○	○	○	○	○	○	○
There are new strengthened working relationships among partners (6)	○	○	○	○	○	○	○
There are new strengthened working relationships among partners (7)	○	○	○	○	○	○	○

Q11 Experience of partnership (your personal experience of the partnership)

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Neutral (4)	Slightly agree (5)	Agree (6)	Strongly agree (7)
I understand what the partnership is trying to achieve (1)	○	○	○	○	○	○	○
I see value in committing my time to the partnership (2)	○	○	○	○	○	○	○
I understand my roles and responsibilities in the partnership (3)	○	○	○	○	○	○	○
My abilities are used effectively in the partnership (4)	○	○	○	○	○	○	○
I receive the information I need to contribute meaningfully (5)	○	○	○	○	○	○	○
I feel respected and valued as a member of the partnership (6)	○	○	○	○	○	○	○
I believe the partners are achieving more together than they could alone (7)	○	○	○	○	○	○	○

Appendix 9: Protocol: Local level partnership evaluation data collection procedures

Project and sample outline

This project aims to evaluate the local and national organisational partnerships that promote walking in Ireland. This study is part of a larger PhD project conducted by Dylan Power (Waterford Institute of Technology and Get Ireland Walking). Currently, data has been collected for the national level network using a questionnaire. An aim of the study is to compare differences and similarities between aspects of local and national walking promotion networks. This document provides a protocol by which the local level data collection will be followed. There are two elements to the data collection: (a) desktop online search and (b) phone call checklist. In order to obtain a broad perspective on the nature of walking promotion at local level, walking of all kinds (transport, recreation, leisure) and the subsequent strategies and partnerships relevant to their promotion are of interest in this study.

Sample: Participants will be chosen from each member of the LSP network (n=29).

Local Sports Partnership network (n=29) (Counties with "*" include RRO's)

Carlow
Cavan
Clare *
Cork *
Donegal *
Dublin City
Dun Laoighre-Rathdown
Fingal
Galway *
Kerry *
Kildare
Kilkenny *
Laois *
Leitrim *

Limerick
Longford
Louth
Mayo *
Meath
Monaghan
Offaly
Roscommon *
South Dublin
Tipperary *
Waterford
Westmeath
Wexford
Wicklow *
Sligo *

Stage 1: Formative Research

The purpose of the formative desktop search is to investigate the presence of various local level governance, leadership and strategic partnership structures at local level relating to walking. This component (desktop review) involves searching Local Authority, Local Sports Partnership and other relevant websites to determine the following:

Whether there is (or was) a dedicated role in the Local Authorities for the promotion of walking?

Whether there is (or was) the presence of a local (county) level walking strategy, action plan or guiding document specific to your county? If so, has it been implemented and evaluated? Who was responsible for it?

Whether there is (or was) the presence of a regional level walking strategy, action plan or guiding document specific to your county? If so, has it been implemented and evaluated? Who was responsible for it?

Is there evidence of recorded interdisciplinary meetings on county council or other related websites which involve interdisciplinary groups focusing on walking related work?

Stage 2: Phone call

The purpose of the phone call is to clarify any missing information from the desktop review and to understand the local level organisations who are key players in walking related work in each respective county. Furthermore, this part of the study aims to provide information relating to what extent the national walking networks are reflected at local level and how that may differ between counties. Other than clarifying any missing information from the desktop phase, this phone call will involve asking participants one central question (with prompts, if necessary) and notes will be taken by the researcher on participants responses. Phone call times will (aim to) be prearranged at a time which suits the LSP contact person via email.   The question posed to participants is as follows:

Who are the main organisations involved in walking related work in your county?

Prompts:

Primary & Secondary Healthcare

Physical Environment, Urban Design and Liveability

Transport and Human Movement Environment

Community Wide Programmes

Recreation

Mass Communication and Public Education

Education

1(a): Who would you say are the 'top 3' most important organisations?

1(b): What do you think would help in bringing together the organisations who do walking related work in your county to work alongside each other?

Prompts:

Alignment of local, regional and national policy objectives

Political and commercial support

Trust and rapport between organisations

Use of existing platforms to build buy-in

Current governmental structure

Poor communication channels

Restrictive structures in state level organisations

Institutionalisation

Centralised approaches of state level organisations

Ambiguity around who is accountable

Perception of system (Gut Instinct)

Personalities

**A spreadsheet containing information relating to these three questions will be compiled.

Appendix 10: Degree centrality scores.

Strategy defined network	
ASF	5
A&O	4
AI	6
CARA	2
Coillte	7
GAA	10
DTTS	11
HSE	8
HI	17
IHF	3
IMSA	4
IPN	2
IWA	8
LSA	5
LA's	13
LCDC	11
MU	4
MDN	1
MHI	11
MI	8
NPW	2
NFI	9
PfA	1
SI	16
SIO	7
Sulware	0
TUD	8
TidyTowns	1
TMF	10
TFD	10
VSI	3
Walk21	9
WIT	3
WSPS	7
WI	8

Network T1	
MU	1
ASF	4
A&O	6
CARA	6
Coillte	4
GAA	7
HI	13
HSE	7
IHF	6
IPN	2
IWA	5
LA's	11
LCDC's	9
MDN	1
MHI	7
MI	5
NPW	3
WSPS	6
SIO	11
TidyTowns	2
TMF	4
TUD	4
VSI	1
Walk21	5
WIT	1
WI	8
SI	15

Network T2	
ASF	18
A&o	29
AI	29
CARA	13
Coillte	14
DoE	13
DI	11
ETBs	12
GAA	29
Gaisce	12
GS	14
HSE	29
IA	29
IHF	29
IMSA	11
LSP's	29
MHI	29
MI	29
HC&C	12
OI	12
Parkrun	13
SI	29
NTO	11
WI	15
DoH	29
LA's	14
LCDC	12
IPH	12
BNM	14
NPW	14

Appendix 11: Systems mapping study ethics letter.

Dylan Power
Brosna
4 Market Street
Tramore
Co. Waterford
X91 R277

9th June 2020

Dear Dylan,

Thank you for bringing your project "Getting Ireland Walking – an implementation science evaluation of a cross sectoral innovation" to the attention of the School of Health Sciences Research Ethics Committee.

I am pleased to inform you that we fully approve WIT's participation in this project and we will convey this to Academic Council.

We wish you well in the work ahead.

Yours sincerely

Dr Michael Harrison
Chairperson, School of Health Sciences Research Ethics Committee

Appendix 12A: Informed consent form for semi-structured interviews (1/2).

<u>**Informed Consent Form – Semi-structured interviews**</u>

Research Subject: Semi-structured interviews – Walking promotion in Cork

Informed Consent

You have been asked to attend a semi structured interview as part of a PhD project being carried out by a student (Dylan Power) at Waterford Institute of Technology and in conjunction with Get Ireland Walking. The purpose of interview is to gain an insight into your experiences of walking promotion in Cork your understanding of systems-based approaches to walking promotion. Short term and long-term consequences of the current COVID-19 pandemic will be explored also. The outcomes of the research intend to be used in the design and implementation of systems-based approaches to walking promotion in Cork, as well as providing the necessary contextual information necessary to effectively design interventions. You are under no obligation to participate in this research.

What does participation involve?

Participation in the study involves participating in a semi-structured interview. The interview will be recorded and will take place over Zoom or by phone and will take place on an agreed date between you and the researcher (Dylan Power). The interview will be transcribed verbatim and Mr Dylan Power and his supervisors, Dr Niamh Murphy and Dr Barry Lambe will have access to the transcripts. Once transcribed and verified, the recording will be deleted.

Information used will not be identifiable.

Information used in publications may include participant's role (i.e. Academic, Policy Maker, City Planner). Interview participant names, organisations and contact details will be kept in a password protected file that only Mr Dylan Power and his supervisory team Dr Niamh Murphy and Dr Barry Lambe will have access to. No identifiable information (i.e. quotes that may disclose your identity) will be used in any final publication or resources developed from this project.

Who will have access to the data from the workshop?

Data collected from the interview will be in the form of interview transcript and notes made by the researcher at the time of interview. Mr Dylan Power and his supervisory team (Dr Niamh Murphy and Dr Barry Lambe) from Waterford IT will have access to this information. All records will be kept at Waterford IT for five years after the study has been completed.

Appendix 12A: Informed consent form for semi-structured interviews (2/2).

After this time, all data will be permanently and securely destroyed: hard copies will be shredded, and soft files will be deleted.

Absolute confidentiality is assured and will be maintained.
Any information used in the preparation of the project report, research publication, or any other resource will be anonymous and not linked to any personal or organizational information you provide. All data, including any personal information, will be kept strictly confidential and secured: computer files will be password protected, and any hard copies will be kept in a locked cabinet. Only Dylan Power and his project supervisors, Dr Niamh Murphy and Dr Barry Lambe will have access to keys and passwords. No information will be available to third parties at any point.

All information will be treated as strictly confidential and no information will be provided to any other party without your written permission. All information held by Waterford IT is subject to the terms of the Freedom of Information Act 2018, and the Data Protection Act 2018. You can find information about this on the Institute's website:
http://www.wit.ie/about_wit/for_staff/foi_useful_resources
http://www.wit.ie/about_wit/for_staff/data_protection.

Can I withdraw from the study?
Participation in the study is voluntary and you can withdraw at any time. You can withdraw from the interview at any time and can withdraw your transcript up to two months post interview.

Contact details
If you have any questions about the research you can contact Dylan Power by:
Email: dylan.power@postgrad.wit.ie
Phone: 0838229832

For any questions or concerns you do not wish to discuss with Dylan Power you can contact Dr Niamh Murphy or Dr Barry Lambe by:
Email: nmurphy@wit.ie / blambe@wit.ie
Phone: 051-834141 /

Appendix 12B: Emails and consent form for systems mapping workshops.

Workshop 1

Hi all,

Hope all is well. I have been doing some thinking regarding how I will approach running my workshop during Cork Walking Week at the end of next month. Considering that the workshop will play out differently online than it will in person, I will need to have significant preparation done prior to running the Zoom workshop. This preparation will come in the form of a compilation of readings for the participants and the development of **a preliminary systems map of walking in Cork** - for which, I will need the help of the Steering Committee.

Attached is an example of a systems map for physical activity in Australia, in which there are many factors from 4 categories [(i) Politics, commercial lobbying and social advocacy, (ii) Governance and Knowledge Mobilisation, (iii) Core Influences and (iv) System Intervention Points.] that all have an influence on how physically active people are.

The light blue, or system intervention points, are various policy and programme interventions that are implemented within a system to increase, in our case, walking in Cork. Before hosting the workshop during Cork Walking Week, I would **love your help to identify some of theses system intervention points** to develop a draft map.

I am proposing a **Zoom meeting on Thursday 28th of May** @ 10:00-11:00am where we can work together to begin developing a draft systems map for walking in Cork.

Please let me know whether or not you can attend this date.

I will be in touch with more details in the next week or so.

All the best,

Dylan

Dylan Power
PhD Student - Centre for Health Behaviour Research

Waterford Institute of Technology, Luke Wadding Library,
Postgraduate Area, Cork Road, Waterford City, Ireland.

+353838229832 | dylan.power@postgrad.wit.ie | @dpowerwit

Workshop 2

Dear ▨▨▨▨,

I am pleased to inform you that you have been invited to attend an online participatory workshop to develop a system map for walking in Cork. This workshop will take place on **June 25th** and is an integral part of a PhD. project being carried out by PhD. candidate Dylan Power at **Waterford Institute of Technology** in conjunction with **Get Ireland Walking.**

Purpose & Anticipated Outcomes
The purpose of this workshop is to gather a broad range of stakeholders who operate within the system to come together to discuss and develop a visualisation of the entire system of walking in Cork. Visualising the complex and interrelated nature of the system of walking promotion in Cork can help identify novel interventions and solutions to help promote walking from a more non-linear and systems-based perspective.

How do I consent to take part in this workshop?
Further information relating to data protection etc. can be found in the attachment below. To consent to take part in the workshop, click here.

If you have any further questions, please contact Dylan Power (dylan.power@postgrad.wit.ie)

Thank you, ▨▨▨

Consent form – systems mapping workshop

Informed Consent

You have been asked to attend a series of workshops to develop a system map for walking in Cork as part of a PhD project being carried out by a student (Dylan Power) at Waterford Institute of Technology and in conjunction with Get Ireland Walking. The purpose of the workshop is to gather a broad range of stakeholders who operate within a system to come together to discuss and develop a visualisation of the system.

What is this research about?

A whole of system approach to walking promotion aims to move away from traditional methods of intervention design and evaluation by looking at walking promotion as a broad, interrelated complex system. In doing so, consensus must be achieved between all stakeholders operating within the system of walking promotion in Ireland about what the problem at hand (walking promotion in Ireland) looks like. This will be done through the development of a system map.

What does participation involve?

Participation in the study involves attending two-hour long workshops on Zoom on 25/06/20 and TBC. The first workshop will explore potential interventions which could be implemented within the system and the second workshop will entail refining of the system map followed by discussion around potential leverage points and action areas.

Information used will not be identifiable.

Information used in publications may include participant's role (i.e. Academic, Policy Maker, City Planner). No identifiable information (i.e. quotes that may disclose your identity) will be used in any final publication or resources developed from this project.

Can I withdraw from the study?

Participation in the study is voluntary and you can withdraw at any time. You can withdraw either of the workshops at any time.

Contact details

If you have any questions about the research or need more information you can contact Dylan Power by:

Email: dylan.power@postgrad.wit.ie

Phone: 0838229832

For any questions or concerns you do not wish to discuss with Dylan Power you can contact Dr Niamh Murphy or Dr Barry Lambe by:

Email: nmurphy@wit.ie / blambe@wit.ie

Phone: 051-834141 /

Appendix 13: Facilitator guidance sheet.

- Your role as a facilitator is to **guide discussions** in your breakout room, **to take note of any meaningful points made** by participants in your group and to **report back to the group afterwards**.

GROUPS

- Participants will be assigned to **three** groups facilitated by Facilitator 1, Facilitator 2 and Facilitator 3. The groups are as follows:

FACILITATOR	DISCUSSION TOPICS
Facilitator 1	- Primary & Secondary Healthcare - Workplaces - Education
Facilitator 2	- Recreation - Community-wide programmes - Mass communication & Public Education
Facilitator 3	- Physical Environment, Urban Design and Liveability - Transport & Human Movement Environment

QUESTIONS

Questions aim to be **exploratory** in nature and **probe potential solutions to gaps** in the map or ways the system can be improved. The list of questions (and probes) for each group and recommended time for each are as follows:

QUESTIONS	TIME	PROBES
- What is being done well here? - What can we do better?	10 min	• Evaluation/implementation

			• Collaboration
- What are the key influences/activities/mechanisms that could help maximise impact here?	15 min		• What structures need to be put in place? • Communication channels • Political support • Commercial support
- Where are the areas of biggest opportunity for impact here?	15 min		• Geographical • SES Groups • Partnership formation • Data collection methods

Use the remaining 5 minutes to wrap up discussions and make note of **3/5 key points to be relayed back to the main group**.

NOTETAKING

Taking notes is a key role in our job as facilitators. Key discussion points we take note of during the group discussions will be crucial for the development of the second draft of the map and ultimately the actions that will come from it. **Things to look out for and take note of are:**

-Power dynamics between organisations

-Comments related to sources of data/data collection methods

-Potential ideas for new interventions

-Comments relating to stakeholders' resources/capacity

-Key partnerships (or lack thereof)

-Interventions missing from the current map

-Any other relevant points.

FEEDBACK

Following the questions, facilitators will be required to feedback to the group **3/5 key points** regarding how their group felt they could influence that section of the system. Thank you very much for your help! Any questions please let me know.

Dylan

Appendix 14: Interview topic guide.

INTRO QUESTIONS

-How did you get involved in walking/walking promotion in Cork?

-Can you tell me about your personal experiences as a pedestrian in Cork?

Probes:

What is it like to walk around Cork? When you are walking around your area of Cork, is it an enjoyable experience?

COLLABORATIVE WORKING

-How do you think working with organisations outside of your sector could help address the complex problem of walking in Cork?

Probes:

How would this way of working make a difference? Does it address a need?

Challenges Potential outcomes

WALKING AND COVID-19

-What do you see as the long-term impacts of COVID-19 on walking (your role?) in Cork?

Probes:

Pedestrianisation of streets – how can these changes be sustained? Narrative around public space has changed – how can we work together to capitalise on it?

CONTEXT

-Does the current context support or take away from how walking is currently promoted in Cork?

Probes:

Missing partnerships/governance structures?

Political environment

Commercial Environment

CLOSE

-What hopes and dreams would you like to see at the end of this process for Cork?

Appendix 15: Systems Map Version 1.
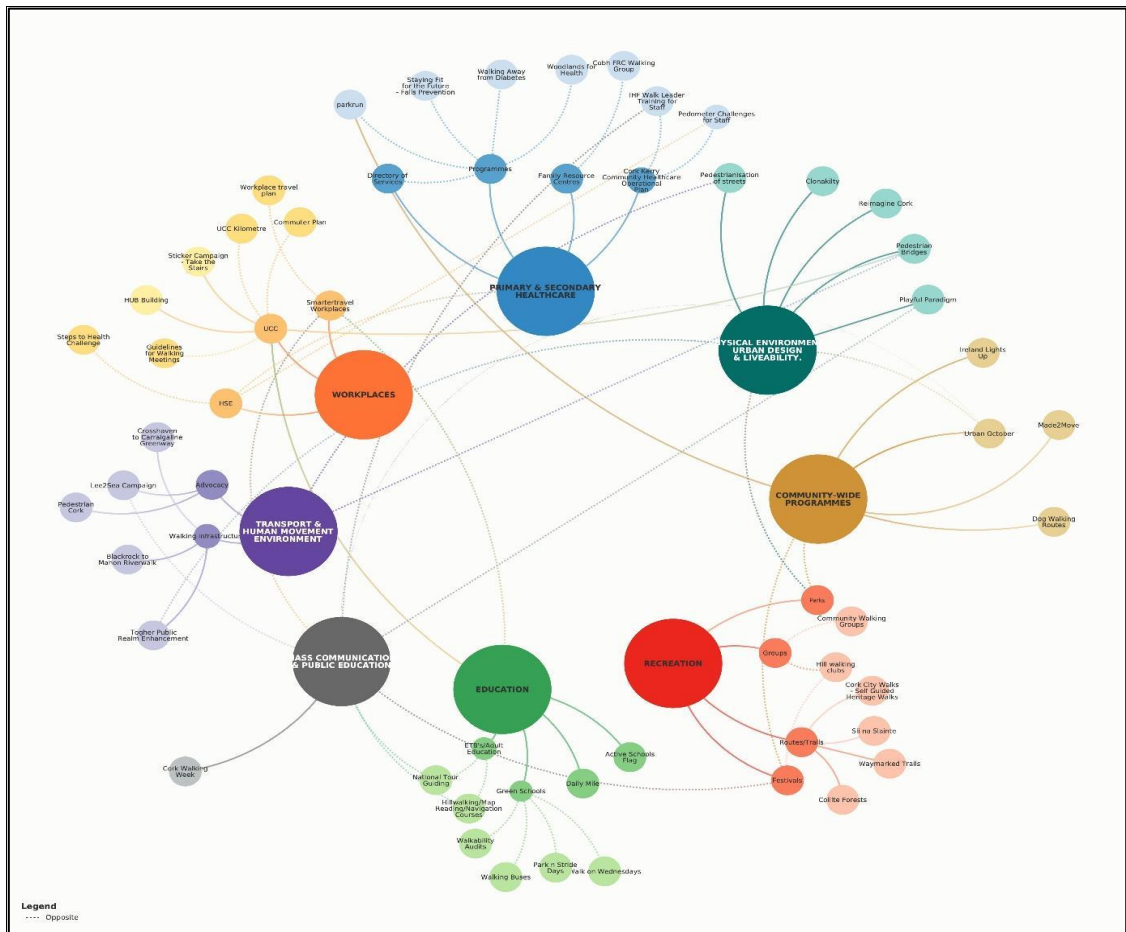
Appendix 16: Systems Map Version 2.
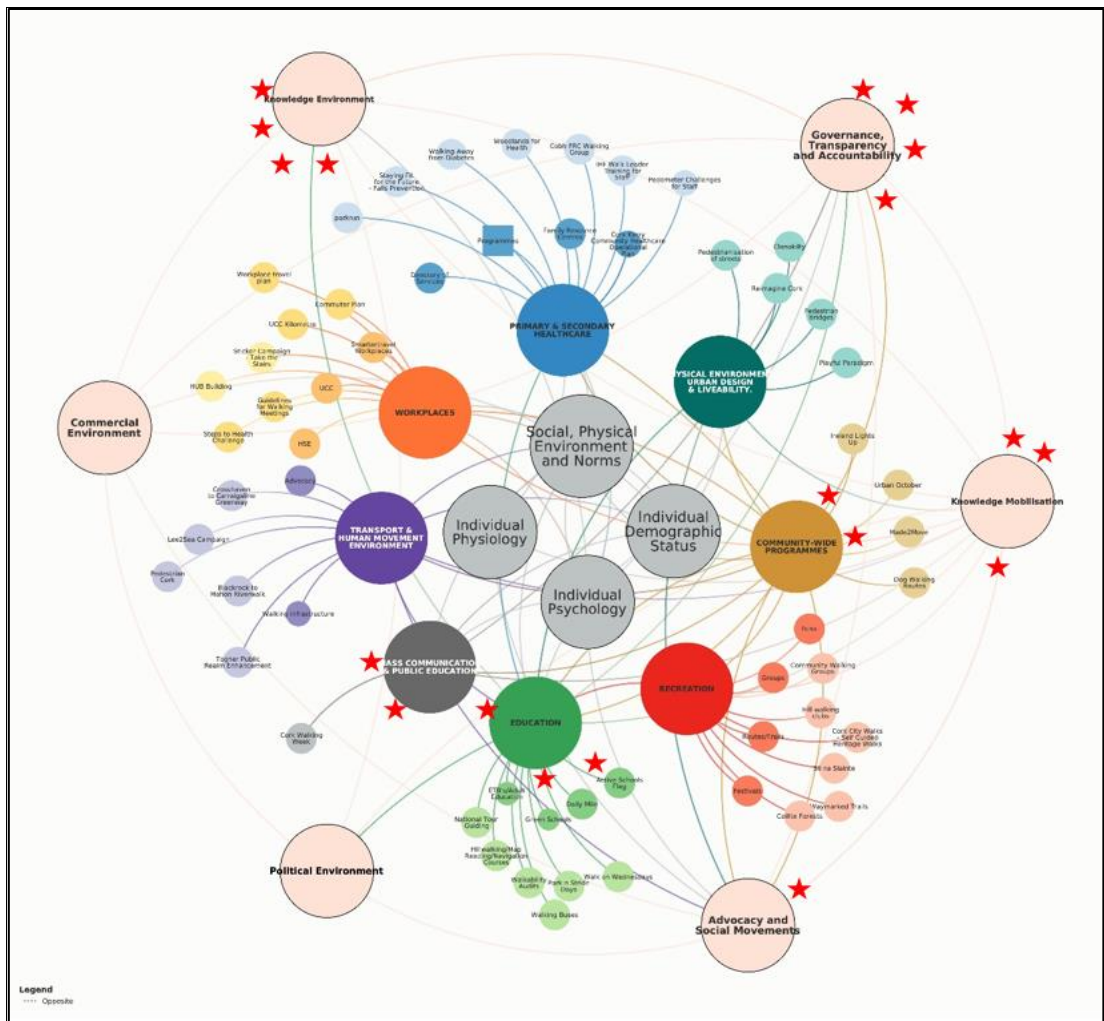
Appendix 17: Get Cork Walking in-person workshop booklet and photograph.

GET CORK WALKING

AGENDA
Thursday 7TH April 2022 UCC

09:15 Arrival for 09:30 start
Welcome tea/coffee on arrival

09:30 Start & introduction to programme
from Jason King (Get Ireland Walking)

09:55 Walk 21
Bronwen Thornton

10:10 GAPPA Framework
Dylan Power

10:20 Review of previous actions
(group work)

11.00 Looking onwards & greatest
potential for impact (group work)

12.00 Timelines, next steps
& stakeholder committment

12:20 Review of
GAPPA framework

12:30 Summary of session
& next steps

Please note: A light lunch
will be served during the session

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GET CORK WALKING

Using systems approaches to enhance local walking partnerships

RESEARCH AIMS

The aim of the research is to **develop a model for walking promotion** in terms of the necessary partnerships, resources, policies and programmes required at a county level.

This is actioned by Get Ireland Walking (GIW) who fund a part time walking development officer with Cork Sports Partnership (CSP) and a PhD researcher with Waterford Institute of Technology (WIT).

Cork will act as the model county with the **intention of scaling up nationally.**

The first step of the research was to develop a systems map of the factors that influence walking in Cork.

WHAT IS A SYSTEMS MAP?

A systems map is a **visualisation of a complex problem.**

Systems maps have been created for complex societal problems such as obesity, climate change and physical inactivity

This research is **developing a systems map for walking in Cork** in order to facilitate the first steps of a systems approach to walking at local level in Ireland.

PROGRESS TO DATE

Multiple organisations have been consulted and attended online systems Mapping workshops in June 2020.

This led to the identification of **19 actionable outcomes, or solutions,** for the Cork walking system.

Furthermore, **a steering committee comprised of a multidisciplinary group of stakeholder**s was developed following these workshops.

WHERE TO NEXT?

The next step of this research is to prioritise the outcomes of the workshops and understand how intersectoral organisations in Cork can come together to work towards their implementation.

The Global Action Plan for Physical Activity will be used as a framework to organise the actions and directions of future work.

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GET CORK WALKING

Using systems approaches to enhance local walking partnerships

Create Active Societies

1.1 Implement social marketing campaigns

1.2 Promote the co-benefits

1.3 Provide mass participation events

1.4 Build workforce capacity

Create Active Systems

4.1 Strengthen policy, leadership & governance

4.2 Improve & integrate data systems

4.3 Build research & development

4.4 Expand advocacy

4.5 Develop innovate finance mechanisms

More people walking more often in Cork

Create Active Environments

2.1 Integrate transport & urban planning policies

2.2 Improve walking & cycling networks

2.3 Strengthen road safety

2.4 Improve access to pulic open spaces

2.5 Implement proactive building policies

Create Active People

3.1 Enhance physical ed. & school based programmes

3.2 Incorporate physical activity into health & social services

3.3 Provide programmes across multiple settings

3.4 Improve provision for older adults

3.5 Prioritise programmes for the least active

3.6 Implement community wide initiatives

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335

GET CORK WALKING

Using systems approaches to enhance local walking partnerships

What is being done already?

2: ENVIRONMENT

2.2 Improve walking & cycling networks
Slí na Sláinte routes
Waymarked trails
Coillte forests
Dog walking routes
Pedestrian Bridges
Pedestrianised areas of CC
UCC Kilometre
Crosshaven to Carrigaline Greenway
Blackrock to Mahon Riverwalk
Togher Public Realm Enhancement

1: SOCIETIES

1.1 Implement social marketing campaigns	1.4 Build workforce capacity
Urban October campaign	Navigation courses
Reimagine Cork Campaign	National Tour Guiding courses
Cork Walking Week	

3: PEOPLE

3.1 Enhance physical ed. & school based programmes	3.2 Incorporate physical activity into health & social services	3.3 Provide programmes across multiple settings	3.5 Prioritise programmes for the least active	3.6 Implement community wide initiatives
Green Schools	Cork/Kerry Community Healthcare Operational Plan	Hill walking clubs	Community walking groups	Ireland Lights Up campaign
Guidelines for walking meetings	Family Resource Centre	Cork City Walks	Made2Move programmes	Playful Paradigm
Active Schools Flag	Directory of Services	Commuter plan	Cobh Walking Group	parkrun
		Workplace travel plan	Woodlands for Health	
		Smartertravel workplaces	Walking Away from Diabetes	
			Staying fit for the Future Falls prevention	
			Sticker campaign - take the stairs	
			Steps to Health challenge	

4: SYSTEMS

4.4 Expand advocacy
Lee2Sea campaigns
Pedestrian Cork

These are examples of suggested actions to improve the Cork walking system identified by stakeholders in workshops in 2020

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GET CORK WALKING

Using systems approaches to enhance local walking partnerships

> Which of the **19 solutions** do you think could be easily implemented before the **end of 2022?**

These are examples of suggested actions to improve the Cork walking system identified by stakeholders in workshops in 2020

1: SOCIETIES

1.1 Implement social marketing campaigns	1.2 Promote the co-benefits	1.3 Provide mass participation events
Use alternative media platforms to promote walking	Increase the use of evidence in advertising/ messaging	Create walking links with Cork City Marathon

2: ENVIRONMENT

2.4 Improve access to public open spaces
Create public transport links with campus walks

3: PEOPLE

3.1 Enhance physical ed. & school based programmes	3.3 Provide programmes across multiple settings
Increase reach of GIW schools packs	Co-produce programmes for ethnic minority groups
Communication campaigns in schools	
Increase communication channels between primary and secondary schools	

4: SYSTEMS

4.1 Strengthen policy, leadership & governance	4.2 Improve & integrate data systems	4.3 Build research & development	4.4 Expand advocacy
Regular meetings between LA and steering group	Connect with traders	Use of IPARC standard evaluation framwork to evaluate programmes	Family-friendly public consultation times
Gardaí involvement	Utilise unconventional data sources	Utilise best practice case studies from abroad.	Public education: walkability
Reframe communication with LA's	Online portal of walking related resources		
	Use of technology to map walkable areas/routes		

GET CORK
WALKING

Appendix 18: Walk21 Satellite event itinerary and photograph.
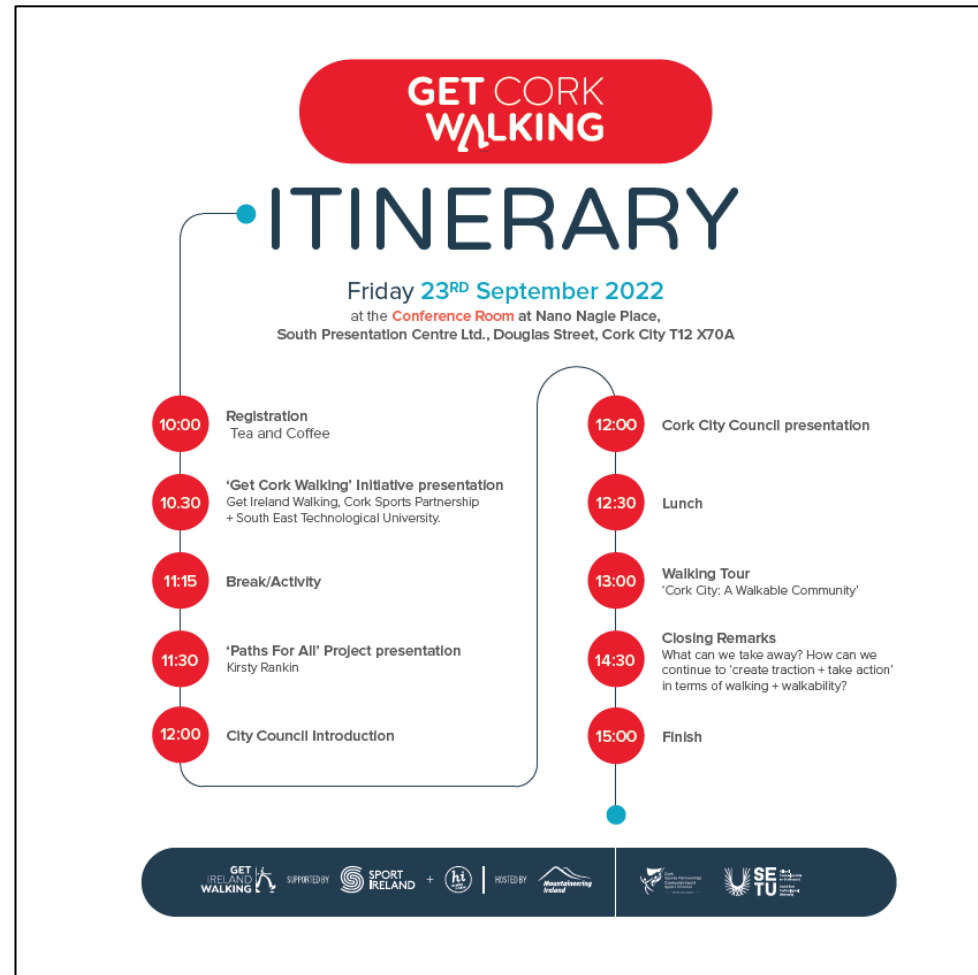
Appendix 19: Get Cork Walking stakeholder branding guidelines.

CONTENTS

01 Logomark

02 Typography

03 Colour

04 Graphic Identifiers

05 photography

06 Social Media

LOGO

Logo Mark

The Get Cork Walking logo mark must act as a robust representative of the brand in every circumstance of its use.

The following pages present guidelines for its use in various scenarios. The logo lock up appears as shown on the following pages.

The lock-up should not be adjusted whatsoever.

Footstep

The Get Cork Walking logo mark has a shadow beneath the foot stepping forward.

The shadow **always** should be darker than the background.

LOGO MARK

Logo mark

Logo mark - Reversed

GET CORK
WALKING

LOGO

Minimum Clear space

A minimum clear space all round the brand mark ensures clear visibility and maintains its integrity amongst other brands.

Minimum size

In order for the brand mark to be clearly legible in print or digital applications, it should never appear smaller than its minimum size of 20mm.

Logo Mark - Minimum Clear Space

Logo Mark - Minimum Size

GET CORK
WALKING

GET CORK
WALKING

20mm
Print

75px
Sceen

LOGO MARK

04

345

Partner Logos

In certain scenarios, the Get Cork Walking logo will appear alongside its partner logos.

In these instances, the composition shown here should be used. The Get Cork Walking logo and the partner logos should be the same height. The 'W' from the Get Cork Walking logo should be used to space out the elements of the composition as illustrateed above. The logos should appear in their own individual brand colours, or all black, or all white.

Colour

Reverse - Including Get Cork Walking Logo

Reverse - Without Get Cork Walking Logo

LOGO MARK

05

346

Logo Do's and Don'ts!

The Get Cork Walking logo should not be altered.

The logo standards outlined here should apply across all content produced by Get Ireland Walking. These standards should also be applied for cobranding and partnerships

X

GET CORK **WALKING**

No drop shadows

X

GET CORK WALKING

Do not place colour logo on a photographic or colour background

X

GET CORK WALKING

Do not place the logo on any shapes or objects.

✓

GET CORK WALKING

The logo should appear white on coloured or photographic backgrounds

X

GET CORK WALKING

Do not change the colour of the logo or apply any stokes or outlines around the logo

X

GET CORK WALKING

Do not rearrange the logo elements

X

GET CORK WALKING

do not rotate or skew the logo, do not place the logo at an angle

✓

GET CORK **WALKING**

Keep the logo lock-up as it appears - do not alter.

06

LOGO MARK

347

GET CORK WALKING

Headings: Varela Rounded

Varela Rounded is used for Get Cork Walking Headings.

Varela Rounded is a web font and can be used for both printed and digital collatoral. The font can be downloaded for free, by clicking the link below:

Download Varela Rounded

Copy: Monserrat

Montserrat is a highly legible font that should be used for minor headings and continuous text.

Montserrat is a web font and can be used for both printed and digital collatoral. The font can be downloaded, for free, by clicking the link below:

Download Montserrat

TYPOGRAPHY

TYPOGRAPHY

Headings: Varela Rounded

a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9

Copy: Montserrat Light

a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9

Copy: Montserrat Medium

a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9

07

348

GET CORK
WALKING

Colour

A vibrant colour palette has been chosen to reflect the Get Cork Walking identity.

Get Cork Walking has a primary and secondary palette.

These colours have become a recognisable identity for the brand.

COLOUR

COLOUR

Primary palette

C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f

Secondary palette

C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f

Tints and neutrals palette

C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f
C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	C 50 M 0 Y 100 K 0 R 141 G 198 B 63 # 8dc63f	

08

349
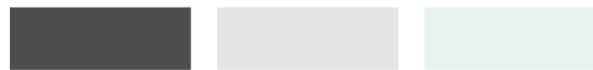
GRAPHIC IDENTIFIERS

Graphic Identifiers

Get Cork Walking has a suite of Graphic Elements that can be used to enhance inphographics, presentations and documents such as reports.

The suite of Graphic Identifiers can be expanded upon as needed, but any new Shapes or Icons should maintain the style illustrated on the following pages.

PHOTOGRAPHY 1

Photography

Get Cork Walking needs to represent a range of walking scenarios.

From technical hiking and organised group walks to shoppers and families. The images need to work across a range of scenarios and demographics.

PHOTOGRAPHY

10

GET CORK
WALKING

PHOTOGRAPHY 2

Photography

Get Cork Walking needs to represent a range of walking scenarios.

From technical hiking and organised group walks to shoppers and families. The images need to work across a range of scenarios and demographics.

SOCIAL MEDIA

SOCIAL MEDIA

The Get Cork Walking logo mark should be used as the Avatar across all Social Media platforms.

The background colour of the avatar should be the Get Cork Walking Red.

However when an event or a public holiday such as Easter, Christmas etc. needs to be highlighted, an appropriate colour can be selected from the Get Cork Walking Palette to celebrate the event.

Circular Avatar using the logo mark for easy identification

Facebook

Instagram

SOCIAL MEDIA

12

SOCIAL MEDIA BANNERS

Banner design examples

Facebook

Twitter
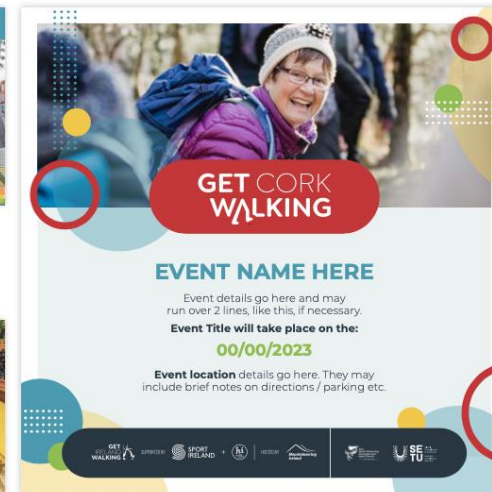
Instagram

Appendix 20: Get Cork Walking Action Plan 2023-2024 and launch photograph.

GET CORK WALKING

CONTENTS

GET IRELAND WALKING

SUPPORTED BY SPORT IRELAND + hi Healthy Ireland

HOSTED BY Mountaineering Ireland

Cork Sports Partnership Comhpháirtíocht Spóirt Chorcaí — SPORT IRELAND —

SETU Ollscoil Teicneolaíochta an Oirdheiscirt South East Technological University

357

INTRODUCTION

Get Ireland Walking was established in 2013 as an initiative of Sport Ireland, hosted by Mountaineering Ireland, to unify and enable the efforts of all organisations interested in the promotion of walking in Ireland. The implementation of GIW's first strategic document, the GIW Strategy and Action Plan 2017-2020, saw the initiative step in the right direction and lead the efforts of national and local walking promotion in Ireland. Walking promotion is the 'business of many but the responsibility of none', and a major focus of GIW's efforts since its inception has been to engage with stakeholders from across sectors and disciplines to come together and approach walking from a more holistic perspective.

In 2019, GIW employed a researcher and a Walking Promotion Officer in Cork, tasked with developing a whole-of-systems approach to walking at local level in Cork. At the core of a systems approach is the belief that more can be achieved by breaking down disciplinary siloes working across sectors. In 2020, stakeholders from sport, health, local government, urban design, planning, disability organisations, and tourism, came together to develop a systems map of the Cork walking system. This allowed for an insight into areas in the Cork system which were going well, and the identification of areas which needed improvement. Cork was chosen as a suitable location to conduct the research due to the multitude of areas which would need to be considered as part of a systems approach to walking including a large city, multiple populated towns and rural areas.

Since this research began in 2020, the Get Cork Walking project team have continuously engaged with stakeholders from across the walking system in Cork to develop this action plan. The Get Cork Walking Project team has been embedded in, and led by, the Cork Sports Partnership thanks to the support of a Walking Promotion Officer for Cork. The Get Cork Walking Action Plan 2023 represents Ireland's first example of a local level action plan outlining a whole-of-systems approach to walking.

This action plan is aligned to the strategic objectives and actions outlined in the World Health Organisation's Global Action Plan on Physical Activity 2018-2030 and the United Nations Sustainable Development Goals, to ensure impact across all areas of the walking system.

The potential for walking to positively impact public and planetary health is well known. However, multidisciplinary action is required to fully realise the full benefit that more people walking more often, can have for health, the planet, and society. The Get Cork Action Plan 2023 aims to lead the way by engaging working across sectors and disciplines by delivering a whole-of-systems approach to walking.

– **Dylan Power**
  PhD Researcher - Centre for Health Behaviour Research
  South East Technological University

FOREWORD

On behalf of Get Ireland Walking we are truly excited and energised by the Get Cork Walking Project and the amazing work being carried on the ground by all the stakeholders across Cork City and County. Over the past four years we have been welcomed with open arms into the rebel county where they fully engaged with the phases and stages of the research project. Cork proudly showcased their innovative and impactful projects on the ground across multiple sectors.

This Action Plan for Cork will allow all partners to effectively co-deliver on key projects and celebrate the work and the activity of walking through gatherings, campaigns and events throughout the year. We envisage this systems approach to walking promotion will act as a mechanism to deliver local and national goals whilst contributing to the United Nations Sustainable Development Goals. We are utilising the Global Action Plan for Physical Activity (GAPPA) Framework to support and guide our work. We view the GAPPA quadrants: Systems, Societies, Environment and People as engaging and cross-sectoral, and are applicable to all stakeholders with a vested interest in walking promotion and development.

The innovative approach Cork has taken using a systems model provides other counties an opportunity to explore the framework and its outcomes in their walking promotion efforts and utilize the evidence base that now exists and continues to evolve.

I would like to take this opportunity to thank Dylan Power PhD Researcher with Get Ireland Walking, the South-East Technological University and Dylan's Supervisors Prof. Niamh Murphy and Dr. Barry Lambe for their guidance and mentoring support. I would like to thank Alison Chambers, Walking Promotion Officer with the Cork Sports Partnership for her role in bringing the stakeholders together and building capacity for the project in Cork. Alison's role and contributions have been vital to the success of the project to date. Thank you to Kristine Meenaghan and her team at the Cork Sports Partnership for their support from the beginning and the Get Ireland Walking Steering group, led and chaired by Louise Burke, Director of Participation with Sport Ireland; our colleagues and friends in Healthy Ireland for their continued support for the past ten years. Finally, thank you to all the stakeholders and collaborators for the Get Cork Walking Project across the City and County,

With thanks and gratitude,

- **Jason King**
  National Programme Manager
  Get Ireland Walking

GET CORK WALKING

ABBREVIATIONS

ASF: Active Schools Flag

CETB: Cork Education and Training Board

CSP: Cork Sports Partnership

GAA: Gaelic Athletic Association

GCW: Get Cork Walking

GIW: Get Ireland Walking

GS: Green-Schools

HI: Healthy Ireland

HSE: Health Service Executive

MHI: Mental Health ireland

MI: Mountaineering Ireland

MTU: Munster Technological University

NSMP: Nation Sustainable Mobility Plan

RRO: Rural Recreational Officers

SETU: South East Technological University

TMF: Transport and Mobility Forum

TU Dublin: Technological University Dublin

UCC: University College Cork

WCDP: West Cork Development Partnership

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GET CORK WALKING

Create Active: Societies

Objective 1.1: Implement social marketing campaigns

Objective 1.2: Promote the co-benefits

Objective 1.3: Provide mass participation events

Objective 1.4: Build workforce capacity

Action Area 1: Walking festivals and events

Activities

1 Relevant organizations to work together to host and promote a Cork Walking Festival in September 2023.

2 Establish a planning committee early in 2023 to plan elements of the festival including marketing, events and promotions.

3 Relevant stakeholders to support the delivery of regional walking events around Cork.

Outputs

1 1x week long multicomponent walking festival to take place in September 2023. Cork Bike Week to be used as a model.

2 5 regional walking events or challenges to take place throughout 2023 around Cork City and County.

What does success look like?

1 Multifaceted walking festivals hosted in Cork which align to National Walking Week and engage multiple population groups in multiple activities.

Lead organisation(s): TMF; GIW; CSP
Collaborators: County Council; City Council; HSE

GET CORK WALKING

Create Active:
Societies

Objective 1.1:
Implement social
marketing campaigns

Objective 1.2:
Promote the co-benefits

Objective 1.3:
Provide mass
participation events

Objective 1.4:
Build workforce capacity

Action Area 2:
Get Cork Walking
branding

Activities

1

Develop a Get Cork Walking branding guidelines
document including logos, relevant images, and
colour pallets using the national GIW branding
as a framework.

Outputs

1

Zip file containing logos and other
relevant branding material which can
be shared with stakeholders.

What does success look like?

1

Stakeholders across all sectors increasing
public awareness of the Get Cork Walking project.

Lead organisation(s): GIW; TrishFoxDesign
Collaborators: CSP; SETU

GET CORK WALKING

Create Active:
Societies

Objective 1.1:
Implement social
marketing campaigns

Objective 1.2:
Promote the co-benefits

Objective 1.3:
Provide mass
participation events

Objective 1.4:
Build workforce capacity

Action Area 3:
Walking programmes
and capacity building

Activities

1 Provide training opportunities for community walk leaders in multiple settings.

2 Begin the process of conducting GIS mapping of walking routes for major employers in Cork City and County.

Outputs

1 5x Active Community Walking Programmes throughout Cork City and County.

2 3x Activator Pole courses to the community.

3 5x Walk your Way courses in multiple settings across Cork.

4 Identification of a large employer who will pilot the promotion of mapped walking routes of varying distances for staff to and from the workplace.

What does success look like?

1 Increasing capacity of individuals in multiple settings to lead, and engage in, walking activities in communities, workplaces and schools in Cork.

Lead organisation(s): GIW; CSP
Collaborators: Cork County Council; HSE; Cork City Council; Cork Chamber

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364

GET CORK
WALKING

Create Active:
Systems

GET CORK WALKING

Create Active:
Systems

Objective 4.1:
Strengthen policy,
leadership & governance

Objective 4.2:
Improve & integrate
data systems

Objective 4.3:
Build research
& development

Objective 4.4:
Expand advocacy

Action Area 1:
Stakeholder events
and communication

Activities

1 Provide progress updates for the entire Get Cork Walking stakeholder network on a regular basis.

2 Provide communication structures for Get Cork Walking stakeholders.

3 Continue to expand the stakeholder network to include other organizations that have a vested interest in walking across Cork City and County, while continuing to re-engage with those involved in the past.

Outputs

1 2x Online meetings.

3 An annual report for the Get Cork Walking project.

5 Publication of a communication strategy to support the implementation of the Get Cork Walking Action Plan.

2 1x in-person stakeholder gathering (Dec. 2023).

4 Host the Cork Walking Forum.

6 Develop a charter which can be signed by organisations and stakeholders interested in contributing to the promotion of walking and walkability across Cork.

What does success look like?

1 Increased networking opportunities for stakeholders and a celebration of the work of the wider system in Cork.

Lead organisation(s): GIW; CSP
Collaborators: All Stakeholders

366

GET CORK WALKING

Create Active: Systems

Objective 4.1:
Strengthen policy, leadership & governance

Objective 4.2:
Improve & integrate data systems

Objective 4.3:
Build research & development

Objective 4.4:
Expand advocacy

Action Area 2:
Get Cork Walking representation on TMF

Activities

1

Ensure communication and cooperation between the work of the TMF and the Get Cork Walking project.

Outputs

1

Representation of the Get Cork Walking Team at TMF meetings regularly.

2

The Get Cork Walking Team to act as a voice for pedestrians within the TMF and support relevant submissions particularly pertaining to major policy documents both local and national.

What does success look like?

1

Increased communication and cooperation relating to resources, data, and activities of the Get Cork Walking project with Active Travel stakeholders in Cork.

Lead organisation(s): TMF; GIW; CSP
Collaborators: SETU

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GET CORK WALKING

Create Active:
Systems

Objective 4.1:
Strengthen policy,
leadership & governance

Objective 4.2:
Improve & integrate
data systems

Objective 4.3:
Build research
& development

Objective 4.4:
Expand advocacy

Action Area 3:
Research and data

Activities

1 Provide opportunities for undergraduate researchers in Third Level Institutions to engage in research support for the Get Cork Walking project.

2 Share knowledge gained from the Get Cork Walking project to a wider research, practice, and policy audience.

Outputs

1 Formalise Final Year Project agreement between MTU Department of SLCS and CSP.

3 Consider viable ways to track footfall around Cork City and County including possible funding streams.

2 Relevant stakeholders to meet to discuss permeability audits of relevant areas around Cork City and County.

4 Disseminate the work of the Get Cork Walking project as part of academic publications, presentations, and non-academic dissemination (i.e. blog posts, interviews, print media).

What does success look like?

1 Development of evidence base informing and supporting the activities of the Get Cork Walking project.

Lead organisation(s): CSP; MTU; UCC; SETU
Collaborators: TMF; Cork City Council; Cork County Council

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GET CORK WALKING

Create Active:
Environments

Objective 2.2:
Improve walking
& cycling networks

Objective 2.4:
Improve access to
public open space

Action Area 1:
Community trail development

Activities

1

Build capacity in communities to advocate for the development of local trails.

Outputs

1

Retrieve stepwise process of trail development from Cork County Council and/or Rural Recreational Officers.

2

Consolidation of key components of the trail development process.

3

Develop a Toolkit for communities to initiate the process of advocating for trail development in local areas.

4

Consider and evaluate the possible development of an Activator Pole Trail in Cork. Identification of suitable locations for an Activator Pole Trail in Cork.

What does success look like?

1

A streamlined process for local communities to develop trails in their local area.

Lead organisation(s): Sport Ireland; Mountaineerring Ireland; GIW; RRO's and Cork County Council **Collaborators:** CSP; Regional Development Agencies

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GET CORK
WALKING

Create Active:
Environments

Objective 2.2:
Improve walking
& cycling networks

Objective 2.4:
Improve access to
public open space

Action Area 2:
National Sustainable
Mobility Plan

Activities

1

Identify how this particular stakeholder group
can contribute towards the delivery of Action
17 and Action 26 of the NSMP.

Outputs

1

Consult with Walk21
Legacy Group and
TU Dublin before Q2
2023 for guidance
on NSMP action
implementation.

2

Identification of
relevant directorates
in the City Council
and County Council
and establishment
of a working group.

What does success look like?

1

Initiating the process of showcasing Cork as a model county in the delivery
of objectives in national policy.

Lead organisation(s): City Council; County Council; TU Dublin
Collaborators: GIW; TMF; CSP; Walk21 Legacy Group

GET CORK WALKING

Create Active:
People

Objective 3.1:
Enhance physical education and school based programmes.

Objective 3.3:
Provide programmes across multiple settings.

Action Area 1:
Education settings

Activities

1 Provide opportunities for students in primary schools through to university students to engage in walking to and during school/university.

2 Identify under-served demographics within the schools system and put actions in place to increase walking in those particular groups.

Outputs

1 Increased promotion of Walking Buses in suitable schools around Cork.

2 Relevant stakeholders to deliver various schools walking initiatives across schools in Cork City and County.

3 Host meetings with MTU Healthy Campus and UCC Green Campus leads to identify the role of walking promotion in Cork Universities.

4 Increased provision and promotion of walking resources for schools available from relevant stakeholders.

What does success look like?

1 Development of opportunities for children and young people to engage in walking related activities in school and university.

Lead organisation(s): Green Schools, CSP; ASF
Collaborators: GIW; UCC; MTU; TMF

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GET CORK WALKING

Create Active:
People

Objective 3.1:
Enhance physical education and school based programmes.

Objective 3.3:
Provide programmes across multiple settings.

Action Area 2:
Health and Wellbeing

Activities

1 Improve pathway for health and social care professionals to refer patients to local community walking groups .

2 Integrate walking opportunities for population groups in community healthcare settings.

2 Re-evaluate and consider national published documents and action plans regarding physical activity referral in healthcare settings.

Outputs

1 Consult with relevant stakeholders in Q2 2023 on best practice regarding health and social care professional referral pathways around walking for physical and mental health.

2 Pilot 1 walking programme in County Cork as part of local suicide prevention programmes.

3 Pilot 1 walking programme in County Cork as part of local addiction services supports.

4 Explore and identify other population groups that may need more specific walking-based programmes developed.

What does success look like?

1 Integration of walking and walking related activities as complementary activities integral to any physical or mental health treatments.

Lead organisation(s): HSE; Social Prescribers; Cork Kerry Community Healthcare; Avondhu Blackwater Partnership; IRD Duhallow; West Cork Development Partnership
Collaborators: GIW; CSP; Paths for All; MHI

GET CORK WALKING

Create Active:
People

Objective 3.1:
Enhance physical education and school based programmes.

Objective 3.3:
Provide programmes across multiple settings.

Action Area 3:
Youth and Youth Groups

Activities

1
Link with youth and youth groups to hear their voice around walking and physical activity with the help of relevant stakeholders.

2
Develop and promote walking resources relevant to this demographic and suitable for their needs.

Outputs

1
Identification of relevant Youth Groups and organisations which can contribute to the development of initiatives and interventions to suit their needs.

2
Host 1 World Café with local youth groups to co-develop targeted context specific walking initiatives.

What does success look like?

1
Increased interest in walking for health and sustainability within the younger generation living in Cork City and County.

Lead organisation(s): CETB, CSP and GIW
Collaborators: HSE

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GET CORK
WALKING

GAPPA
Framework

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GAPPA Framework

More people walking more often in Cork

Create Active Societies
1.1 Implement social marketing campaigns
1.2 Promote the co-benefits
1.3 Provide mass participation events
1.4 Build workforce capacity

Create Active Systems
4.1 Strengthen policy, leadership & governance
4.2 Improve & integrate data systems
4.3 Build research & development
4.4 Expand advocacy
4.5 Develop innovative finance mechanisms

Create Active Environments
2.1 Integrate transport & urban planning policies
2.2 Improve walking & cycling networks
2.3 Strengthen road safety
2.4 Improve access to public open spaces
2.5 Implement proactive building policies

Create Active People
3.1 Enhance physical ed. & school based programmes
3.2 Incorporate physical activity into health & social services
3.3 Provide programmes across multiple settings
3.4 Improve provision for older adults
3.5 Prioritise programmes for the least active
3.6 Implement community wide initiatives

GET CORK WALKING

PARTNERS + COLLABORATORS

Active Cities	Education and Training Board	Mountaineering Ireland
Avondhu Blackwater Partnership	Gaelic Athletic Association	Munster Technological University
Cork City Council	Green Party Cork	Paths For All, Scotland
Cork Chamber of Commerce	Green-Schools	South East Technological University
Cork County Council	Health Service Executive	Sport Ireland
Cork Healthy Cities and Counties	Healthy Ireland	Transport and Mobility Forum
Cork Kerry Community Healthcare	IRD Duhallow	University College Cork
Cork Pedestrian Network	Lee2Sea	Walk21 Legacy Group
Cork Sports Partnership	Mental Health Ireland	West Cork Development Partnership

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Appendix 21: List of participants at systems mapping workshops.

#	Role	WS1	WS2	Main area of work
1	Walking Promotion Officer	X	X	Sport and Recreation
2	Health Promotion Officer	X	X	Primary and Secondary Healthcare
3	Programmes Manager	X	X	Sport and Recreation
4	National Programme Manager	X	X	Sport and Recreation
5	Sports consultant	X	X	Sport and Recreation
6	Rural Recreation		X	Sport and Recreation
7	Advocacy		X	Transport and Human Movement Environment
8	Advocacy		X	Physical Environment, Urban Design and Liveability
9	Health Promotion Officer		X	Primary and Secondary Healthcare
10	Local Government Sport and Recreation Coordinator		X	Community-wide programmes
11	Health Promotion Officer		X	Primary and Secondary Healthcare
12	Local Tourism		X	Community-wide programmes
13	Health and Wellbeing Officer		X	Primary and Secondary Healthcare
14	Local Business		X	Workplaces
15	Secondary School Teacher		X	Education
16	Disability Sport and PA Officer		X	Sport and Recreation

Appendix 22: Trail characteristics.

Trail name	Approximate length (km)	Terrain	Distance from urban area (km)	Total Footfall Counts	
				2019	2020
Avondale Forest Park	2	Forest	2.4	26863	28902
Barnaslingan Wood	1.5	Forest	4	36663	33381
Belleek	4	Forest	1.9	94279	108335
Colligan Wood	3.5	Forest	5.3	34519	43525
Cong Forest	2.3	Forest	10	83682	57757
Crone Wood	6	Forest	4.5	21362	23261
Cruagh Wood	5	Forest	3.5	34007	53971
Farran Forest Park*	0.2 - 3	Forest	10	46502	33385
Gougane Barra Forest Park*	0.5 – 2.5	Mix (Forest/Mountain)	18	19527	36038
Glenbarrow*	4.5 – 10.5	Mix (Forest/Road)	8.4	29470	37114
Hazelwood	3	Forest	2.7	80698	88830
Letterkeen Loop	12	Mix (Mountain/Forest/Tracks)	11	7942	11365
Marl Bog	3	Forest	1	16476	18735
Glengarra*	2 - 7	Forest	12	14887	22510
Glanageenty Wood*	4 - 9	Forest	11	20448	32099
Deerpark*	1.1 – 4.2	Forest	0	46401	56589
Kiltipper Park	0.9	Mix (Paths/Forest/Tracks)	.83	21816	31425
Kilmashogue	10	Mix (Forest/Mountain/Tracks)	2	16353	28875
Rathmichael Wood	1.7	Forest	.5	15180	14968
Glenasmole Valley	8.5	Mix (Paths/Tracks/Forest)	.8	31622	47657
Bluestack Way	65	Mix (Forest/Tracks /Road/Mountain)	1.5	12787	15415

Burren Way	114	Mix (Road/Mountain/Coastal)	9	39970	10204
Cliffs of Moher Coastal Route	20	Mix (Coastal/Road)	9	97080	33952
Croagh Patrick Heritage Trail	63	Mix (Road/Forest/Tracks/Field/Mountain)	7.5	2833	3196
Duhallow Way	48	Mix	1	11679	15115
Lough Derg Way	68	Mix (Road/Forest)	6	17360	28429
Offaly Way	37	Mix (Road/Forest)	7	15798	23040
Slí Chonamara	8	Mix (Road/Coastal)	5	4123	7293
Sligo Way	78	Mix (Forest/Tracks/Road)	8	8412	9000
Suck Valley Way	105	Mix (Tracks/Forest/Road/Field)	15	19786	27980
The Tain Way	40	Mix (Road/Forest/Tracks/Mountain)	1.5	10379	10475
Wicklow Way	130	Mix (Mountain/Road/Tracks/Forest)	1.5	21595	20095
Lough Key Forest Park	4	Forest	4	38761	42701

"*" – Denotes sites with multiple trails of varying lengths