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Developing and Utilising the Physical Activity Environment Policy Index: A Tool to Advance the Implementation of Physical Activity Policy in Ireland.

by

Kevin Volf, MSc. BSc.

A thesis submitted to the University of Limerick in fulfilment of the requirement for the degree
of Doctor of Philosophy

University of Limerick

Supervisors: Prof. Catherine Woods & Prof. Ann MacPhail

Submitted to the University of Limerick, May 2024

Abstract

Physical activity is one of the most impactful health behaviours in terms of preventing premature mortality. Supplementing the impact on mortality is the effect that PA has on morbidity and potentially on other beneficial societal outcomes. Unfortunately, the vision of communities and societies which enjoy the full benefits of widespread physical activity participation is not one that is being substantively realised. Research, and action, is required to ameliorate this problem.

Theory suggests that public policy can support the achievement of health sustaining levels of physical activity by the general population. However, it is not clear which policies best support physical activity outcomes. Further, audits of existing national level physical activity policies suggest that policy is often poorly implemented. My research contributes to the development of Physical Activity Environment Policy Index (PA-EPI), a new policy research tool that enables the assessment of policy implementation by researchers and the benchmarking and comparison of policy implementation across polities.

To provide scientific evidence for the PA-EPI's development, a systematic review protocol was developed. This protocol outlines the methodology for a series of systematic reviews which identify the evidence behind policies and their effectiveness in supporting physical activity outcomes.

Guided by this protocol, four systematic reviews were conducted. The systematic reviews recommended various policy actions as effective in promoting physical activity in Sport, Education, Transport and Mass Media settings.

The findings of these reviews informed the development of the PA-EPI. This evidence was synthesized with other forms of evidence in an iterative four-step process culminating in the final PA-EPI framework and monitoring tool and an associated eight-step process for using the tool.

The PA-EPI tool was then utilised to perform a policy implementation assessment in Ireland. This identified implementation gaps in the domains of Transport, Urban Design, Healthcare and Health-in-all-policies. Based on these findings a list of recommended implementation actions was formulated and dissemination to a panel of national stakeholders.

This project has contributed to the development of a tool which supports physical activity policy implementation research. The PA-EPI is not merely a tool for research, however, but also for physical activity advocacy. The success of the PA-EPI project depends on fostering partnerships with national physical activity stakeholders and policymakers and, over the long term, adoption by the international physical activity research and advocacy community. Future research using the PA-EPI should integrate these insights and investigate promoting health equity within the process and learning from the process how to improve PA policy in the future.

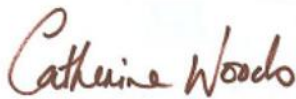
Declaration

I hereby declare that the work in this thesis is my own and was completed with the counsel of my supervisors, Professor Catherine Woods and Professor Ann MacPhail of the Department of Physical Education and Sport Sciences at the University of Limerick.

Chapters three to six, and the appendices, contain material that has been published elsewhere. As each of these chapters were prepared independently for publication in academic journals, some information may be repeated. Further, chapters three to six are products of collaborative research efforts with multiple contributing authors. A statement of my individual contribution to each of these chapters is provided below, and at the beginning of each chapter.

Handwritten signature of Kevin Volf in black ink on a light grey background.

Kevin Volf, December 2023

Handwritten signature of Catherine Woods in brown ink.

Prof Catherine Woods, January 2024

Handwritten signature of Ann MacPhail in black ink.

Prof Ann MacPhail, January 2024

Statements of Contribution – chapters on which I am first author.

Chapter three (published on HRB Open, volume 3)

- I contributed to the conceptualisation of the protocol by participating in the PEN WP1.2 roundtable discussions where research questions and methods were agreed.
- In collaboration with PEN research team, I developed the proposed review methods (as reported in the protocol) including the search strategy and eligibility criteria. Development of the search terms included: undertaking content analysis on the seven best investments document, (specifically the “‘Whole of School’ programmes” and “Sport for All” sections on which the University of Limerick team led), piloting the proposed search terms on online databases and provided feedback to the group on the information that was retrieved. Further, I consulted with a faculty librarian to validate the search strategy.
- I led on drafting and critical revision of the manuscript and responding to peer review.
- I submitted the manuscript for publication.

Chapter four (published in the International Journal of Sport Policy and Politics, volume 14)

- I developed the methods utilised in the Sport review including the research question, the search strategy, the data collection method and the data synthesis method.
- I led on data collection, by running the database searches, reviewing all titles and abstracts in the first round of screening and all full text documents in the second round.
- I led on data extraction, quality assessment and data synthesis.
- I led on drafting and critical revision of the manuscript and responding to peer review.
- I submitted the manuscript for publication.
- I contributed to critical revision of the study manuscript.

Chapter six (published in Health Research Policy and Systems, volume 21)

- I led on data collection by searching for evidence of policy implementation and creating the evidence document.
- I led on the development and distribution of all questionnaires circulated to policymakers and independent stakeholders.
- I conducted all data analyses.

- I organised the implementation action recommendation workshop.
- I led on writing the manuscript and dissemination materials and responding to peer review.

Statement of Contribution – chapter on which I am not first author.

Chapter five (published in the European Journal of Public Health, volume 32)

- I contributed to data collection by assisting with the identification and review of policy documents.
- I assisted in the development of the questionnaires utilised for consultation with academic and policymaking experts.
- I participated in the workshops in which the wording of the GPSs was agreed.

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I would like to thank my close collaborators on the PEN WP1. In alphabetical order: Dr Nicolette Den Braver, Dr Sarah Forberger, Dr Peter Gelius, Dr Janas Harrington, Dr Jeroen Lakerveld, Dr Sven Messing and Professor Joanna Żukowska. I would also like to thank Dr Stefanie Vandevijvere who provided me with some critical feedback on the weighting systems design presented in chapter seven.

I'd like to thank all members of the national coalition who gave up their time to participate in my study and especially those who travelled to Dublin to participate in workshops.

Finally, it should be clear from what I have written in this thesis that I value community and social connection as much as I value physical activity. Throughout the last couple of years, I have not had enough of either. I'd like to acknowledge the friends and family who I may have neglected over the last few years. My mother Nóirín and my siblings Adam, Robbie and Lizzie. My partner Marie McAuliffe and her family who housed me during the Covid lockdown. My childhood friend Gearóid Moore and my colleagues in the Faculty of Education and Health Sciences. Thank you for your patience with me. I promise that I'll try to be better company going forward.

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List of Works

This programme of research consists of the following peer-reviewed journal articles. HRB Open Research is a service which enables open access publication for research funded by the Health Research Board (HRB) of Ireland. HRB Open Research does not have an impact factor. All other journal articles listed below were published in Q1 academic journals. Minor editorial modifications have been made to the published articles for the inclusion of the articles as chapters in this thesis. One paper on which I am not first author (chapter five) is presented as it is central to the overall body of work.

Volf, K., Kelly, L., García Bengoechea, E., Casey, B., Gobis, A., Lakerveld, J., Żukowska, J., Gelius, P., Messing, S., Forberger, S., Woods, C.B. (2022) ‘Policy Evaluation Network (PEN): Protocol for systematic literature reviews examining the evidence for impact of policies on physical activity across seven different policy domains [version 4; peer review: 3 approved]’, HRB Open Research, 3(62), available: <https://hrbopenresearch.org/articles/3-62/v4> (**chapter 3, 6 citations on Google Scholar by the 6th of April 2024**).

Volf, K., Kelly, L., García Bengoechea, E., Casey, B., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Den Braver, N.R., Żukowska, J., Woods, C. (2022) ‘Evidence of the impact of sport policies on physical activity and sport participation: a systematic mixed studies review’, *International Journal of Sport Policy and Politics*, 1–16, Available: <https://doi.org/10.1080/19406940.2022.2127835> Impact factor: 2.1 (**chapter 4, 12 citations on Google Scholar by the 6th of April 2024**).

Woods, C.B., Kelly, L., **Volf, K.,** Gelius, P., Messing, S., Forberger, S., Lakerveld, J., den Braver, N.R., Żukowska, J. and García Bengoechea, E., 2022. The Physical Activity Environment Policy Index for monitoring government policies and actions to improve physical activity. *European journal of public health*, 32(Supplement_4), pp.iv50-iv58. Impact factor: 4.4 (**chapter 5, 12 citations on Google Scholar by the 6th of April 2024**).

Volf, K., Kelly, L., Van Hoyer, A., Bengoechea, E.G., MacPhail, A. and Woods, C.B., 2023. Assessing the implementation of physical activity-promoting public policies in Ireland: A Study using the Physical Activity Environment Policy Index (PA-EPI). *Health Res Policy Sys* 21, 63

(2023). <https://doi.org/10.1186/s12961-023-01013-6>. Impact factor: 4.0 (**chapter 6, 1 citation on Google Scholar by the 6th of April 2024**).

Additional journal papers

The following papers contributed to the development of the PA-EPI framework utilised in this thesis by providing evidence of effective physical activity policies. As the thesis author is not the first author, these are referred to rather than presented in full. This is to ensure conformity with the thesis specifications of the Faculty of Education and Health Sciences at the University of Limerick which limit the number of articles presented in a thesis on which the thesis author is not the first author.

Den Braver, N.R., Garcia Bengoechea, E., Messing, S., Kelly, L., Schoonmade, L.J., **Volf, K.**, Żukowska, J., Gelius, P., Forberger, S., Woods, C.B. and Lakerveld, J., 2022. The impact of mass-media campaigns on physical activity: a review of reviews through a policy lens. *European Journal of Public Health*, 32(Supplement_4), pp.iv71-iv83. Impact factor: 4.4 (**14 citations on Google Scholar by the 6th of April 2024**).

Woods, C.B., **Volf, K.**, Kelly, L., Casey, B., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Żukowska, J. and Bengoechea, E.G., 2021. The evidence for the impact of policy on physical activity outcomes within the school setting: a systematic review. *Journal of sport and health science*, 10(3), pp.263-276. Impact factor: 12.2 (**60 citations on Google Scholar by the 6th of April 2024**).

Żukowska, J., Gobis, A., Krajewski, P., Morawiak, A., Okraszewska, R., Woods, C.B., **Volf, K.**, Kelly, L., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., García Bengoechea, E. (2022) 'Which transport policies increase physical activity of the whole of society? A Systematic Review', *Journal of Transport & Health*, 27(101488) Impact factor: 3.6 (**20 citations on Google Scholar by the 6th of April 2024**).

Technical reports

Woods C, Kelly L, **Volf K**, García Bengoechea E, and Van Hoye A, for the PA-EPI Irish Research Team. Policies for tackling inactivity and creating healthier physical activity environments in Ireland: PA-EPI 2022 ISBN: 978-1-3999-3361-2 (published)

Volf K, Kelly L, García Bengoechea E, Gelius P, Forberger S, Messing S, Lakerveld J, Den Braver NR, Żukowska J, Woods CB, on behalf of the PEN consortium. The Physical Activity Environment Policy Index (PA-EPI): Evidence Document for Ireland 2022. Limerick, Ireland 2022. [online] Available: https://www.jpi-pen.eu/images/elements/pa-epi/PA_EPI_evidence_document_confidential.pdf [Accessed 28 Dec 2023].

Blog posts

K Volf (February 18th, 2021) “There’s Nothing Stupid About Football”, Father Ted & Sport For All Available: <https://pess.blog/2021/02/18/theres-nothing-stupid-about-football-father-ted-sport-for-all-kevin-volf/>

K Volf (February 9th, 2022) Promoting Participation in Sport Through Public Policy. Available: <https://pess.blog/2022/02/09/promoting-participation-in-sport-through-public-policy-kevin-volf/>

K Volf (October 19th, 2022) Evidence of the Impact of Sport Policies on Physical Activity and Sport Participation: A Systematic Mixed Studies Review <https://pess.blog/2022/10/19/evidence-of-the-impact-of-sport-policies-on-physical-activity-and-sport-participation-a-systematic-mixed-studies-review-kevin-volf/>

K Volf (December 15th, 2022) How can public policy support mass-media campaigns that promote physical activity? Available: <https://pess.blog/2022/12/15/how-can-public-policy-support-mass-media-campaigns-that-promote-physical-activity-dr-kevin-volf/>

K Volf (February 3rd, 2023) A Short Overview of the WHO’s Global Status Report on Physical Activity. Available: <https://pess.blog/2023/02/03/a-short-overview-of-the-whos-global-status-report-on-physical-activity-kevin-volf/>

K Volf (May 18th, 2023) Knowing, Teaching, Learning. A Reflection on Supervising my First Student. Available: <https://pess.blog/2023/05/18/knowing-teaching-learning-a-reflection-on-supervising-my-first-student-kevin-volf/>

K Volf (August 11th, 2023) The Benefits of Erasmus Mobility Programmes. Available: <https://pess.blog/2023/08/11/the-benefits-of-erasmus-mobility-programmes-kevin-volf/>

Conference presentations

K Volf, L Kelly, E García Bengoechea, A Gobis, J Lakerveld, J Żukowska, P Gelius, S Messing, S Forberger, C Woods (2020) *Systematic review examining the evidence for impact of school policies on physical activity*, [Oral Presentation, online due coronavirus epidemic], 16th World Congress on Public Health / 13th European Public Health Conference [Online].

K Volf (9th June 2021) *Evidence of impactful Sport-for-All Policies: A Systematic Review*. [Oral Presentation, online due coronavirus epidemic], ISBNPA XChange 2021. [Online]

C Woods and **K Volf** (11th June 2022) Evaluating the implementation of physical activity-promoting public policies in Ireland: A Pilot Study using the Physical Activity Environment Policy Index (PA-EPI) [Oral Presentation] PEPAYS. UL, Limerick, Ireland.

K Volf (24th April 2022) Sport policy impact on physical activity: a systematic review (HRI research week) [Poster Presentation] UL, Limerick, Ireland.

J Żukowska, S Messing, **K Volf**, C Woods (1st September 2022) *Evidence of the impact of Sport Policies on physical activity and sport participation: A Systematic Mixed Studies Review* [Oral presentation within a symposium], HEPA Europe. Nice, France.

C Woods, A Van Hoye, S Messing, **K Volf**, M Pratt (16th June 2023) *Assessing the implementation of physical activity-promoting public policies in Ireland: A Study using the Physical Activity Environment Policy Index* [Oral presentation within a symposium] ISBNPA 2023. Uppsala, Sweden.

K Volf and C Woods (11th September 2023) Protocol for assessing implementation of physical activity policies by national governments using the Physical Activity Environment Policy Index (PA-EPI). HEPA Europe. Leuven, Belgium.

K Volf and C Woods (November 2023) Development of a Physical Activity Environment Policy Index (PA-EPI) composite implementation [ePoster] 16th European Public Health Conference. Dublin, Ireland

Symposia / invited presentations

L Kelly, **K Volf**, J Żukowska (15th June 2021) *The Impact of Sport Policies on Physical Activity and Sport Participation*. Symposium: Improving food and physical activity environments to build a stronger European Health Union (World Obesity Federation, World Café)

K Volf (31st March 2022) *The PA EPI; A Tool for Promoting Physical Activity through Public Policy* Faculty of Education and Health Sciences Thesis in three competition. UL, Limerick, Ireland.

K Volf (12th May 2022) The PA EPI; A Tool for Promoting Physical Activity through Public Policy HRI conversations. UL, Limerick, Ireland.

CWoods; P Gelius; S Messing; L Kelly; J Żukowska; N den Braver, **K Volf** and G Starc (15th June 2022) The development and implementation of the Physical Activity Environment Policy Index (PA-EPI) Future directions for nutrition and physical activity policies to prevent NCDs across Europe Conference. Brussels. Brussels, Belgium.

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LIST OF ABBREVIATIONS

AC: Agreement Coefficient

AMSTAR: A MeaSurement Tool to Assess systematic Reviews

APS: Active People Survey

BPEs: Best Practice Exemplars

CAPPA: Comprehensive Analysis of Policy on Physical Activity

CASP: Critical Appraisal Skills Programme

CHD: Coronary Heart Disease

CI: Confidence Interval

CSPPA: Children's Sport Participation & Physical Activity

DEDIPAC: Determinants of Diet and Physical Activity

EBM: Evidence Based Medicine

EBP: Evidence Based Policy

EDI: Equity Diversity and Inclusion

EGB: Enrique García Bengoechea

EPAS: European Physical Activity Strategy

EPAG: European Physical Activity Guidelines

FSI: Free Swimming Initiative

Food EPI: Food Environment Policy Index

GAA: Gaelic Athletic Association

GAPPA: Global Action Plan on Physical Activity

GDR: German Democratic Republic

GBD: Global Burden of Disease

GHG: Greenhouse Gases

GoPA: Global Observatory for Physical Activity

GPS: Good Practice Statements

HEPA PAT: Health Enhancing Physical Activity Policy Audit Tool

HRB: Health Research Board

HSE: Health Service Executive

IPCC: Intergovernmental Panel on Climate Change

IRR: Interrater Reliability

ISBN: International Standard Book Number

ISBNPA: International Society Behavioral Nutrition and Physical Activity

ISPAH: International Society Physical Activity and Health

INFORMAS: International Network for Food and Obesity / Non-communicable Diseases Research, Monitoring and Action Support

JPI HDHL: Joint Programming Initiative Healthy Diet Healthy Life

MECC: Making Every Contact Count

MMAT: Mixed Methods Appraisal Tool

NCDs: Non-Communicable Disease

NGO: Non-governmental Organizations

NOPA: Nutrition, Obesity and Physical Activity

NPAP: National Physical Activity Plan

PA: Physical Activity

PA-EPI: Physical Activity Environment Policy Index

PEN: Policy Evaluation Network

PEN WP1: Policy Evaluation Network Work Package One

PhD: Doctor of Philosophy

QR: Quality Rating

SDGs: Sustainable Development Goals

TILDA: The Irish Longitudinal Study on Ageing

UK: United Kingdom

UNESCO: United Nations Educational, Scientific and Cultural Organization

URL: Uniform Resource Locator

VPN: Virtual Private Network

WCP: Workplace Challenge Programme

WCRF: World Cancer Research Fund

WHO: World Health Organization

WHOROE: World Health Organization Regional Office for Europe

Chapter 1 Introduction

To improve the readability of this document, each chapter begins with a chapter overview. This chapter overview outlines my purposes in writing the chapter and describes the chapter contents in brief. For chapters containing published content (chapters three to six), this chapter overview is preceded by a reference to the published manuscript and a statement of my contribution to the research described.

1.1 Chapter Overview

Chapter one has two aims. First, to provide necessary background information for understanding the general research topic (physical activity policy) and its practical importance. Second, to provide an overview of the research described in subsequent chapters.

In this chapter, I introduce the concept of physical activity (PA). I draw attention to the essential properties of PA and argue for PA to be treated as a public health concern and a pursuit which can serve the common good. To demonstrate how PA impacts public health, I draw upon literature concerning mortality and morbidity effects of PA. I provide two examples of how supporting PA can serve the common good: through climate mitigation and increased social capital and lay out some research into the economic benefits of PA. I then argue for an upstream population approach to PA promotion which places emphasises the Government's role in supporting PA opportunities through the implementation of public policies. Finally, I discuss the challenges of promoting PA via government action and identify evidence of effectiveness and implementation as key research gaps.

These arguments provide the rationale for why the research described in in subsequent chapters is necessary. Two research questions, relating to the two research gaps, are drawn up. I conclude the chapter with a brief overview of the entire thesis, noting which research question each chapter is seeking to address, and a diagram which enables readers to visualise how the different chapters relate to one another.

1.2 What is Physical Activity?

What is Physical Activity (PA)? Perhaps the simplest, and certainly the most influential, definition of PA was put forward by Caspersen and colleagues (1985) who defined it as: “any bodily movement produced by skeletal muscles that results in energy expenditure” (p.126). This definition allows PA to be identified and points to how PA can be measured. A 30-minute run can be identified as PA, as can a 15-minute walk since both require bodily movement produced by the skeletal muscles. Further, the latter can be identified as a lesser quantity of PA as the shorter duration and lower intensity of the activity results in less energy expenditure. These differences in energy expenditure between activities can be confirmed with scientific instruments and techniques, such as doubly labelled water or indirect calorimetry (Schoeller and Van Santen 1982; Gaesser *et al.*, 2022), but it can also be reasonably inferred when utilising measurement systems that involve observation or self-report. These properties have allowed epidemiologists to study the dose-response relationships between PA and health outcomes confirming that more PA is (generally) better for health. This definition also usefully distinguishes PA from related concepts. For example, it allows PA to be distinguished from the concept of ‘exercise’, which is sometimes used as a synonym for PA in general conversation or non-academic literature. According to Caspersen, exercise can be defined as “physical activity that is planned, structured, repetitive, and purposive in the sense that improvement or maintenance of one or more components of physical fitness is an objective” (1985, p128). Hence, exercise is properly understood as a subcategory of PA. The explicit distinction between PA generally and subcategories of PA, like exercise, is useful for public health promoters. Distinguishing exercise in this way highlights that PA does not need to be targeted towards physical fitness. PA can be undertaken, for example, for transport or recreational purposes and it does not need to be especially effortful or burdensome. If PA can be undertaken in the pursuit of other objectives, while supporting health in the process, promoting PA is consistent with the mantra that health promoters should ‘make the healthy choice the easy choice’ (Milio, 1976).

The Caspersen definition of PA has been subject to critique. Piggin (2020) calls on researchers to reflect on the adequacy of this definition as it may not align with the properties of PA with which one is primarily concerned. Piggin draws attention to other ‘inherent’ properties of PA such as its cerebral and social nature. To emphasise these important properties Piggin proposes an

alternative definition 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” (2020; p.5).

This alternative definition is described by Piggin as broader, emphasizes the complexity of PA in comparison to the narrow and ‘reductionist’ Caspersen definition. However, this definition arguably introduces stipulations that cause unnecessary complications. For example, the stipulation that PA occurs ‘within culturally specific spaces and contexts’ may confuse as it implies that movement, action or performance that does not take place in a culturally specific space or context is not PA. It can be argued that is not clear that movement undertaken for the purposes of transportation (for example) always occurs in a space or a context that could be usefully described as ‘culturally specific’. The Piggin definition, therefore, is either more restrictive than the Caspersen definition or less clear. There is an argument for favouring the relative parsimony of the Caspersen definition for simplicity and conceptual clarity.

However, the Piggin critique makes points that are highly relevant to this thesis. First, because PA is inherently cerebral and emotional, it should be motivated or freely chosen. There is literature that demonstrates that PA undertaken voluntarily has differential health benefits to intense PA required for work purposes (Holtermann *et al.*, 2012). This does not, in my view, exclude so-called Occupational PA from the general category of PA but the fact that there are considerations, other than volume, that dictate the extent to which PA is health-enhancing limits the strategies that are acceptable for promoting PA from a health perspective. It requires the stipulation that when this thesis discusses the imperative of promoting PA, the subcategory of PA that is Health-enhancing PA is favoured. Second, Piggin argues that the Caspersen definition limits PA to an epidemiological and biomedical discourse. It is obvious that a whole of society approach is required to promote PA. Therefore the ‘co-benefits’ of PA must be emphasised.

To conclude, in exploring what PA is, two perspectives are revealed. PA can be described simply as bodily movement which results in energy expenditure or as people moving as part of complex social and cultural pursuits. PA is generally health-enhancing when performed under one’s own volition but the reasons to value PA are not limited to the effects of health outcomes alone. Both perspectives inform the following section which elucidate the reasons for promoting PA.

1.3 Why Promote Physical Activity?

1.3.1 The physical activity case from epidemiology

Having discussed what PA is, it is time to lay out the normative case for seeking to developing environments which enable people to be physically active. This begins by outlining the health benefits of PA, not because I assigns greater or lesser importance to these benefits, but rather as a reflection of the development of academic interest in PA first as a public health concern, and later as a concept with wider benefits.

Seminal work in the field of epidemiology demonstrated that inactivity is a major risk factor for particular health outcomes. The first condition whose incidence was demonstrated to be contingent on activity levels was coronary heart disease (CHD) (Powell *et al.*, 2011). The pioneering work in this regard was conducted by Morris and colleagues (1953). By testing a series of research hypotheses on the relationship between PA and CHD, Morris and colleagues identified disparate outcomes between workers whose work promoted physical activity and workers whose work promoted inactivity (for example: London bus conductors and bus drivers respectively) (Morris *et al.*, 1953). The work of Professor Morris and his team was important, not merely for investigating the relationship between PA and CHD, but for disaggregating this independent effect from other posited risk factors like work stress (Paffenbarger *et al.*, 2001).

Since these early studies evidence on the protective effects of PA for CHD were conducted, a host of other health conditions and risk factors has built up. (Powell *et al.*, 2011; Lee *et al.*, 2012). Mechanisms of action have been posited and investigated and dose-response curves have been identified. Though prevention of any one of these pathologies linked with inactivity would be of epidemiological interest, the multifaceted health benefits raise the question of the impact of PA on overall mortality. Point estimates of the toll of inactivity differ. An often-cited article published in the *Lancet* in 2012 estimated inactivity to be responsible for five million deaths per annum (Lee *et al.*, 2012), while estimates from the Global Burden of Disease (GBD) study have variously estimated the toll of inactivity at 3.2 and 1.2 million deaths per year (Lim *et al.*, 2012; Global Burden of Disease Collaborators 2020). These disparities have been the subject of rigorous debate between PA researchers and scientists on the GBD study (Kyu *et al.*, 2016; Stamatakis *et al.*, 2021). However, even the most conservative of estimates indicate that

inactivity costs millions of lives every year (GBD, 2020). This places PA among the most impactful public health issues in terms of potentially preventable premature mortality.

Supplementing the impact on mortality is the effect that PA has on rates of morbidity (described by Murray and Chen as “illness, disability, handicap, and other compromised states of well-being” (p481) (1992). Scientific evidence links PA to the preventative or ameliorative effects on diabetes (Aune *et al.*, 2015), osteoporosis (Pinheiro *et al.*, 2020), sarcopenia (Oliveira *et al.*, 2020), anxiety (Herring *et al.*, 2010; McDowell *et al.*, 2019), dementia (Guure *et al.*, 2017), and depression (Dishman *et al.*, 2021; Pearce *et al.*, 2022). These factors contribute to increased wellbeing for people who are physically active.

Hence, PA has been demonstrated to be a concern that impacts morbidity and mortality, and at a similar level as other major public health topics (Kohl *et al.*, 2012). To conclude this section, PA is a pressing public health concern because of its scientifically established properties which add years to life and life to years. These proven health impacts provide justification for investment in efforts to increase the dose of PA that the population is habitually receiving. Such efforts are referred to as PA promotion efforts or PA promotion throughout the remainder of this chapter.

1.3.2 The case for physical activity promotion from societal benefit

Though the author finds the public health case for investing in PA compelling, there are reasons to highlight the wider benefits of PA for society. One reason for acknowledging these wider benefits is that it is a defence against the charge that PA promotion contributes to an authoritarian medicalization of everyday life (Zola, 1972; Crawford, 1980). The primary reason, however, comes from the requirements of the solutions hypothesized to be effective in promoting PA. As the Piggan definition of PA suggests, total PA is determined by the amount of PA undertaken in a multiplicity of different contexts and settings. A person who increases the amount of PA undertaken as part of sporting activity, for example, may have this gain offset by a decrease in the amount of PA undertaken for transport and vice versa. Further, people have different lifestyles, at least partly because of their different life opportunities, and frequent disparate settings for varying lengths of time. Hence, no single action can support a meaningful increase in PA for everybody. Essentially, PA promotion is a battle that is fought on many different fronts which, by implication, requires commitment from many different stakeholders. This is an issue

which will be returned to in chapter eight. To appeal to disparate stakeholders, it is prudent to highlight how promoting PA may also support the interests that all members have in common. Put simply, PA promotion can serve the common good.

One way that PA promotes the common good, is through supporting climate action. Climate change has emerged as an issue which impacts everybody. There are multiple interacting risks from climate change including, but not limited to, increased water scarcity, reduced food production and availability and lost biodiversity through species extinction (IPCC, 2023). These damages are increasingly irreversible even in the long term. The principal cause of these deleterious changes is greenhouse gas emissions (GHGs) arising from human activity (IPCC 2023). Transport has been identified as a priority sector in which reductions in emissions can be made (Brand *et al.*, 2014) and routine household travel over short distances constitutes a large portion of transport sector GHG emissions (Frank *et al.*, 2010). Researchers have proposed that policies designed to increase demand for active transport can concomitantly decrease demand for travel by car and thereby reduce emissions (de Nazelle *et al.*, 2010; Frank *et al.*, 2010; Watts *et al.*, 2021). Hence, strategies to support PA can contribute to the achieving climate targets and combating climate change. Additional benefits of these strategies include the reduced air pollution in urban settings that these policies have been demonstrated to deliver (Rojas-Rueda *et al.*, 2011).

Another way that PA promotes the common good, is through the development of social capital. The term ‘social capital’, though generally referring to “the benefits derived from social connections” has multiple different conceptions (Gelderblom, 2018; p1309). For the purposes of this thesis, the conception of social capital that is most interesting is the ‘community level’ social capital concept envisaged by Robert Putnam. Putnam and colleagues developed their concept of social capital based on a study of political institutions in Italy (Putnam *et al.*, 1993). They observed that some regions were characterised by greater participation in voluntary organisations. These networks contributed to trust and reciprocity within these regions. The advantages of living in the regions characterised by high voluntary participation (in essence, regions with a high ‘stock’ of social capital) are great. Citizens feel empowered to participate in public life. Consequentially, such regions are more democratic, more economically prosperous, less burdened by organised crime and more successful in implementing public policy (Putnam *et*

al., 1993). The most common voluntary associations were sports clubs. A key conclusion of this work is that voluntary organisations (notably sport clubs) create social capital leading to better governance. Community PA initiatives events like Parkrun, which organises free weekly running events, have been identified with building social capital (Wiltshire and Stevinson, 2018) as have football and running interventions (Ottesen *et al.*, 2010). Moreover, other interventions that promote PA have been linked to social capital as well. Mixed-use neighbourhood designs have been shown to create a context which facilitates civic participation and social capital (Leyden, 2003). Hence, promoting PA can have the byproduct of facilitating more empowered and democratic communities.

To conclude this section, the practice of promoting physical activity has numerous benefits not limited to health benefit. PA promotion can support climate change mitigation and increased social capital. By implication the existence of widespread and avoidable inactivity is problematic. The problem of inactivity should be prevented by promoting the benefits of PA to the greatest possible extent.

1.3.3 Economic arguments for promoting physical activity

Opposition to initiatives that promote PA may argue that processes that promote inactivity are necessary for economic prosperity. Physical Education within the school curriculum, it might be argued, must be reduced to make room for subjects that equip students with the skills required to be productive within a competitive, knowledge-based economy. Similarly, it might be argued that reliance on private motorised vehicles as a primary mode of transportation is necessary for many households to minimise journey times and inconvenience or that pedestrianisation of a city centre will harm local businesses. These arguments paint a picture of the widespread achievement of health sustaining level of PA as being emblematic of inefficiency; when PA is removed it allows goals to be achieved in a less time or labour-intensive manner.

While acknowledging that inactivity is more prevalent in high-income countries (HICs) (Guthold *et al.*, 2016), this section argues that neglecting PA is a false economy. The costs arising from inactivity are very substantial and undermine or outweigh any perceived benefit that may be derived from practices that reduce PA. The most obvious example is the increased cost of healthcare services provided to a population suffering from the burden of preventable NCDs.

Santos and colleagues (2023) estimated that the global cost of treating new cases of NCDs, attributable to inactivity, to public health systems will be \$520 billion between 2020 and 2030 if current trends continue. This figure, which is composed predominantly from costs accruing in HICs, speaks to a very considerable burden being placed on already overburdened health care systems from reducing PA in various domains of life. However, it is only a limited part of the greater picture as it only estimates the cost of treating new cases of NCDs and not existing cases. Further, the cost of treatment of NCDs is often not borne by public health care system but rather by the private sector or even the household (Ding *et al.*, 2016). It's also possible that NCDs are not treated at all. Most new cases of NCDs are predicted to occur in low-income and middle-income countries (LMICs) which do not have the health care coverage needed to treat these new cases.

Expanding the focus, treatment is only one component of the cost of illness arising from inactivity. Ding and colleagues (2016) estimated that premature mortality alone cost \$13.7 billion in 2013 in lost productivity. This estimate was unable to provide cost estimates for lost productivity due to absenteeism, presenteeism and informal care. A final point is that focussing on cost of illness can underestimate the economic impact of PA (Hafner *et al.*, 2020). For example: according to a study conducted by Sheffield Hallam University's Sport Industry Research Centre (SIRC), the 'sport economy' added €3.3 billion in value to the Irish economy in 2018 through, *inter alia*, promoting job creation and volunteering (Sport Ireland and SIRC, 2021). Second order economic benefits of increased PA, including effects like increased consumption and savings, are substantial and are estimated to contribute hundreds of billions of dollars to the global economy (Hafner *et al.*, 2020).

1.4 How can Physical Inactivity as a Problem be Addressed?

1.4.1 Adoption of a population approach

The previous sections have laid out the case that increased PA is desirable leading to the conclusion that PA should be promoted. Unfortunately, this vision of communities and societies which enjoy the full benefits of broad PA participation is not one that is being substantively realised. Pre-pandemic trend data indicates that PA levels are stagnant globally for decades

(Guthold *et al.*, 2018). Clearly, the PA and exercise interventions that have been deployed to address the problem of inactivity thus far have been of limited impact.

As noted, a feature of the trend data is that inactivity is more prevalent in HICs (Guthold *et al.*, 2018). It has been postulated, that as societies industrialise, tasks which stimulate health-enhancing PA are gradually reduced or eliminated (Bouchard *et al.*, 2012). This creates a tendency towards environments that are sterile rather than stimulative regarding PA. While these trends towards industrialisation (may) have broad economic benefits, the tendency towards lost PA opportunities is a problematic unintended consequence (due to the loss of the PA benefits outlined in the previous section). These trend data point to a more impactful method for promoting PA; the environments in which whole populations move, act and perform need to be reshaped so that the lost PA opportunities are reintroduced or replaced (Bouchard *et al.*, 2012). In essence, the environment is a key driver of inactivity.

This thesis is in line with ecological and socio-ecological models (SEMs) of health promotion which focus on people's interactions with their environments to understand behaviour (Sallis and Owen, 1997; Sallis *et al.*, 2006). According to SEMs, various factors affect behaviours; however, environments limit the range of behaviours by demanding or discouraging certain actions (Sallis *et al.*, 1998). This contrasts with models that are commonly used to promote healthy behaviours which draw attention to individual level factors like motivation and self-efficacy (for example: the Theory of Planned Behaviour). While important, these individual factors are not exhaustive of the determinants of behaviour. Adopting SEMs provides a more holistic description of the factors which influence behaviours and outcomes. This has the advantage of drawing attention to upstream and contextual factors. SEMs have some drawbacks. Since determinants at various levels are recognised, it becomes difficult to prescribe action. Indeed, it supports the conclusion that promoting health behaviours requires complicated, multi-faceted interventions whose effects may be difficult to evaluate. However, they also support a key insight: while intrapersonal and interpersonal factors exert a strong influence on individual's behaviours, social and physical environments impact a greater number of people.

The *population approach* is a prevention strategy conceived by public health epidemiologists. A key insight of the population approach is that the prevalence and incidence of a public health

concern is determined by the entire population's exposure to key determinants (Rose, 2001). These population-level determinants of incidence are different to the causes of individual cases. An example is given by the eminent epidemiologist Geoffrey Rose. The systolic blood pressure values in Kenyan nomads and London civil servants are both represented by a distribution which follows a bell curve (Rose, 2001). This distribution shape is the product of individual variation and predispositions. However, due to differences in exposure to population level determinants of health, the mean value for systolic blood pressure is substantially higher in London civil servants. These population level differences have great impact on health outcomes. The population approach is sometimes advocated using the 'upstream' metaphor (McMahon, 2022). This metaphor contrasts 'downstream' interventions, often underpinned by psychological theories concerning individual beliefs, with 'upstream' approaches which account for unhealthy environments and social context (McMahon, 2022). Hence, it is argued, it is a mistake to base a public health strategy on the identification and control of individual risk factors alone.

It is the author's contention that an upstream, ecological, approach aiming at the whole populations is required to reintroduce a normal level of exposure to PA opportunities into everyday environments. As PA occurs, or fails to occur, in different settings throughout the day this will require multiple actions across multiple different domains. For example, transport systems should be reoriented around active forms of transport (rather than motorised vehicles), equitable Physical Education opportunities should be provided for all school children and active play should be encouraged. A high-level multi-faceted response is required.

1.4.2 Public Policy

Public policy is one of the most promising approaches for promoting PA (Sallis *et al.*, 1998; Woods and Mutrie 2012). Alongside the benefit of affecting the whole population, and therefore affecting people who are typically regarded as difficult to reach, policy solutions are more sustainable (Swinburn *et al.*, 2011). This is because public policy can influence 'default' behaviours, reducing the burden on individuals (Swinburn *et al.*, 2011).

Unlike the concept of PA, where the Caspersen definition predominates, there is great variability in the scientific literature on how the concept of 'policy' and 'public policy' should be defined (Cochran *et al.*, 2011; Klepac Pogrmilovic *et al.*, 2018). The word public is sometimes added to

policy to stipulate that the policy in question is that of government¹ (see, for example, Kelly *et al.*, 2022; definition below). Depending on context, this stipulation may be unnecessary, and the terms ‘policy’ and ‘public policy’ are often used interchangeably (see, for example, Cochran *et al.*, 2011 p2).

To tease out some essential features of policy, a few contrasting conceptualisations are presented here. On the one hand, Woods and Mutrie define policy as ‘a statement of intent’ (2012; p 95). Similarly, Birkland (2020) defines public policy as: ‘a statement by government—at whatever level, in whatever form—of what it intends to do about a public problem’ (p32). These definitions centre intention (stated, if not actual) as core to policy. By contrast, Thomas Dye defines public policy as: ‘whatever governments choose to do or not to do’ (Dye, 2014; p3). This definition centres action and lacks any indication that intention, goal-orientation, or purpose are even necessary components of public policy. Indeed, Dye argues that public policy often lacks clear purpose.

While it may be the case that public policy lacks a clear purpose, a policy may have multiple benefits and therefore support multiple goals. As noted above, a policy of increasing active transport may increase PA and lower GHG emissions. It may also be perceived as necessary to provide a mode of transportation for people who lack cars. However, it is also true that public policy must have some goal or purpose assigned to it to be judged as a success or as a failure. The definition that informs this work, therefore, is provided by Lakerveld and colleagues (2020) and states that policies are: “decisions, plans and actions that are enforced by national or regional governments which may directly or indirectly achieve specific health goals within a society”. The characterisation of policies as ‘decisions, plans and actions’ reflects the fact that public policy exists in different states and is the subject of ongoing policy processes. Within the overall policy process there may be two subprocesses a process of policy articulation and a process of policy actualisation. The observation that policy may directly or indirectly achieve health goals (in this case increased population PA) reflects the fact that policy may operate through co-benefits or as an unintended positive consequence. A policy has been assigned the purpose of promoting PA can be referred to as PA policy.

¹ As opposed to a private business or some other social grouping which may also have policies.

1.4.3 Enactment of public policy

1.4.3.1 Policy research

The development of academic interest in PA policy is traceable to the mid-1990s (Rütten *et al.*, 2016; Pratt *et al.*, 2023). Early publications have focussed on influencing the policy process to place PA on the agenda (Woods and Mutrie 2012). Leading scholars referred to PA as the ‘Cinderella’ of the public health issues, characterised by a lack of research and policy attention relative to its importance (Yancey and Sallis, 2009; Bull and Bauman, 2011). These efforts preceded a major increase in the amount of research attention to PA policy in the mid-2010s which is indicated by an exponential increase in policy-relevant publications (Rütten *et al.*, 2016).

1.4.3.2 Policy actualisation

This increase in PA policy research reflects recognition of inactivity as a problem. Problem recognition, however, is only one element in agenda setting for public policy. According to Kingdon (1996) policy is affected by three streams or processes: problems, policies and politics. Achieving real policy impact will require policy coupling of all three streams. The research in this thesis will seek to couple the problem of inactivity to policy solutions. This will be done by investigating two issues that underpin the two research questions: the evidence for effective policy and the policy implementation gap. The research will also contribute to coupling the third stream, by supporting the development of a coalition of PA stakeholders in Ireland. A key issue with PA policy is that the community of PA stakeholders is fragmented. A fragmented policy community leads to fragmented, and therefore less effective, policy (Kingdon, 1996) so action is necessary to support policy impact on PA outcomes. These agenda setting and coalition building efforts will remain an ongoing concern for PA researchers and promoters in Ireland due to the nature of the policy process (Cairney and Oliver, 2017; Oliver *et al.*, 2022)

1.4.4 Evidence of effectiveness challenge

The first key challenge for policy approaches to PA promotion, specifically policy approaches that shape the environment, is the limited evidence base for effective policies. It is a well attested fact that research activity is biased in favour of individual level interventions rather than population actions (Rutter *et al.*, 2017). This is in line with a phenomenon named the ‘inverse

evidence law’ or the observation that research evidence is predominantly generated around the interventions which are least likely to be effective (Ogilvie *et al.*, 2005).

1.4.5 Implementation challenge

Policy approaches tend to be more difficult to implement than more convention individual focused approaches (Swinburn *et al.*, 2011). The problem of a lack of effective implementation of PA policies is now being recognised (Pratt *et al.*, 2019). The challenge of implementing PA is recognised as being particularly difficult due to the necessity of cross sectoral action mentioned in section 1.2. Therefore, any project for assessing PA policy implementation should seek to explore multiple sectors.

1.5 Research aims of thesis

Physical activity is a policy issue that requires a multisectoral approach. There are two major knowledge gaps which hamper PA policy: unclear evidence of policy effectiveness and the issue of multisectoral policy implementation. The purpose of this thesis is to ameliorate these two major knowledge gaps. This purpose informs the two specific research questions: i) *what policies impact physical activity outcomes?* and ii) *how have these policies applied in the Irish context?* These knowledge gaps should be resolved for the practice of implementing PA policy to have reliable positive effects. Hence, the thesis objectives were: to conduct a series of systematic reviews in the areas of sport, education, transport and mass media investigating the impact of policy on PA outcomes; to develop a research tool (the Physical Activity Environment Policy Index or PA-EPI), incorporating the findings of these systematic reviews; to specify a process for using the tool in collaboration with national stakeholders and to use the tool to study the implementation of PA policy in Ireland.

The research undertaken and described in this thesis was enabled by the establishment of Policy Evaluation Network (PEN). PEN was a research consortium consisting of researchers from eight different European countries and New Zealand. PEN was funded to advance knowledge on the implementation and impact of public policies that promote health behaviours (Lakerveld *et al.*, 2020). One of the aims of PEN was to develop the PA-EPI tool (Woods *et al.*, 2022). The tasks of the PEN consortium were separated into seven ‘work packages’. The task of developing the PA-

EPI was assigned to PA researchers working on PEN work package one (PEN WP1). The PA-EPI is the framework which enables the two policy issues to be investigated.

The methodology adopted, and the methods utilised are laid out in detail in Chapter two. This includes a justification of the methods utilised and an explanation of the role and value of the PA-EPI.

Chapters three and four describe research contributing to the amelioration of the issue of the unclear evidence of effectiveness. A protocol for a series of systematic reviews is shown in chapter three and one of those reviews, is presented in chapter four. Three other systematic reviews were also conducted to provide evidence of effective PA policies (see figure 1.1) but are not presented in full in chapter four. The overarching research question that links these chapters is: *what policies impact physical activity outcomes?*

Chapter five provides an overview of the development of the Physical Activity Environment Policy Index (PA-EPI) framework. The framework was developed using, *inter alia*, the policy insights generated from the systematic reviews whose protocol is outlined in chapter three. The evidence from these reviews was synthesised with other evidence to develop a vital part of the PA-EPI, a list of Good Practice Statements (GPSs). By presenting the list of GPSs, an answer is provided to this first research question of the thesis (*what policies impact physical activity outcomes*).

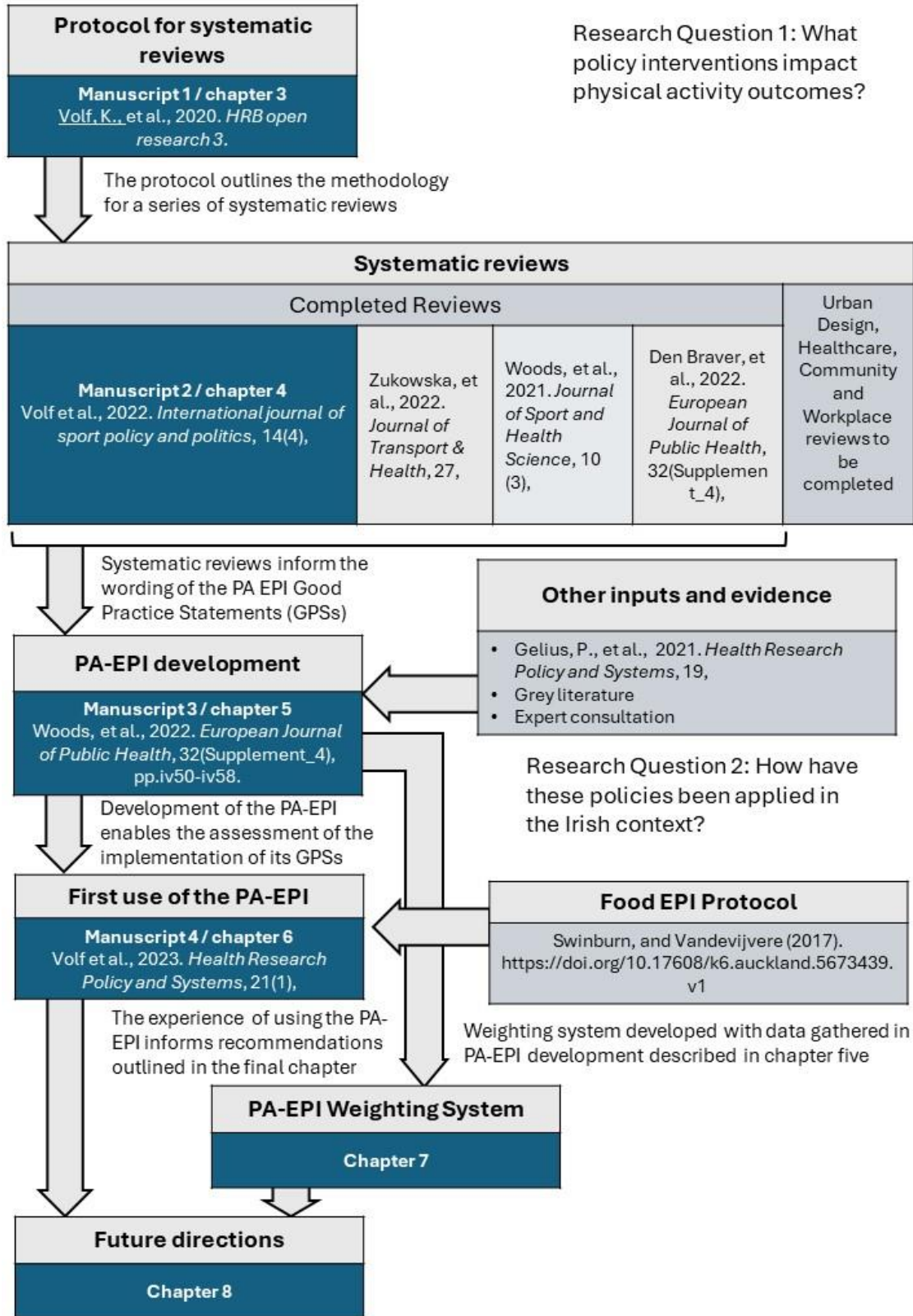
Chapter six seeks to contribute to addressing the second issue, the issue of implementation, by *applying* the PA-EPI framework. A second research question is asked: *how have these policies been applied in the Irish context?* Answering this second research question requires the involvement of a national coalition of stakeholders with an interest in PA policy in Ireland including persons who are responsible for policy development and independent stakeholders. While the answer to this research question is idiographic, the *process* of answering this question using the PA-EPI can be adapted by research teams working on policy implementation in other jurisdictions.

In chapter seven a proposal for weighting the GPSs of the PA-EPI based on importance is presented. A weighting system allows a composite PA-EPI score to be calculated and incentivises

action on the most impactful GPSs. Other methods for weighting the GPSs to reflect PA policy priorities are discussed.

In the final chapter of the thesis, future directions are discussed. The research presented in this thesis is intended, not merely to contribute to knowledge of effective PA policy implementation, but ultimately to support *real* PA policy implementation. Important lessons from undertaking this research are highlighted and implications for future PA-EPI related research *and practice* are discussed. These include, most notably, considerations for ensuring the sustainable impact of PA-EPI research and ensuring health equity is supported in the processes. Figure 1.1 illustrates how the chapters of the thesis inform or enable one another (figure 1.1).

Figure 1.1 Thesis chapters overview.



Chapter 2 Methodology

2.1 Chapter Overview

This chapter is intended to provide a detailed justification of the research approaches undertaken in support of this thesis.

As truth is the first virtue of all systems of thought (Rawls 1971) this chapter begins by providing a detailed overview of the epistemological assumptions which guide the research. A pragmatic theory of truth, which reconciles the demands of the research programme described in subsequent chapters and the author's realist intuitions, is described. Throughout the second half of the chapter, the methods used for addressing the two research questions (*'what policy interventions impact physical activity outcomes?'* and *'how have these policies been applied in the Irish context?'*) are defended. The first research question concerns evidence of policy effectiveness. The strengths of the systematic literature review as a method for informing public policy is discussed. An overview of the Food EPI, the tool which inspired the PA-EPI framework and the process utilised to address the second research question, is provided (see section 2.2.4). Justifications for drawing lessons from the Food EPI framework and applying them to the field of PA policy research are provided along with an overview of different research tools available to PA policy researchers. This chapter provides an overview of how the second research question, concerning the issue of policy implementation in Ireland, was addressed by using the PA-EPI in a process which combines research and advocacy. The Accountability Framework (Kraak *et al.*, 2014) is introduced as a model for guiding engagement with policymakers.

2.2 A general reflection on the research activities described in this thesis

The author proports to describe the proceeds of ‘scientific research’ in this thesis; therefore, it seems necessary to clarify what is understood by this phrase. Scientific research can be understood as a rigorous form of inquiry which seeks to generate knowledge. The requirements of rigour are contingent, depending on the research question and the methods that are appropriate for answering it. However, a common standard for all purportedly scientific research is that the researcher accedes to evaluation of their methods by qualified third parties. For proper evaluation to take place, scientific research must be documented with detail and accuracy (Greenwood and Levin 2007). Knowledge is commonly defined as ‘justified true belief’². Therefore, this chapter articulates how truth can be understood and justifies the methods described in the four academic papers which are detailed in chapters three to six of this thesis.

2.2.1 What are truth and knowledge?

The author’s preliminary intuition was that the truth of a belief or conclusion can be defined in terms of its correspondence with reality. This describes the ‘correspondence’ theory of truth (Rorty 1995). However, a question arises when one appeals to the correspondence theory: how does one know that the outputs of their system of inquiry (or any system of inquiry) correspond to reality?³ It was clear from first formulation that the research questions examined by the author’s research would be investigated, in large part, by adapting existing and documented research method guidance. The systematic review method (Page *et al.*, 2021) was to be adapted to the question of policy effectiveness and the process described in the Food EPI protocol (Swinburn and Vandevijvere, 2017; see section 2.3.3 below) was to be adapted for the question of implementation, (these methods are discussed further later in the chapter). How can a claim that these research methods allow us generates knowledge be defended?

These reflections caused the author to reconsider the validity of the correspondence theory of truth. The link between the methods used in this thesis and truth-seeking is made clear by the

² The author is aware that this definition was critiqued by Gettier in 1963 (Gettier 1963). The author’s interpretation of the problem of so-called ‘Gettier cases’ is that poor justifications can sometimes be inadequate to prevent beliefs being ‘incidentally’ true. Hence, what is required for knowledge strictly speaking, is not merely justification but sufficiently rigorous justifications.

³ This problem is known as the ‘comparison’ objection to the correspondence theory of truth (McDermid, 1998). 1

insights from an alternative theory put forward by the pragmatist philosopher Charles Sanders Peirce⁴. According to Peirce, (Haack, 1997) who was an ontological realist⁵, inquiry is fundamentally motivated by doubt. Doubting is an ‘uneasy’ state of mind associated with a desire to transition to, or attain, a state of belief (Peirce, 1877; 1878). Unfortunately, Peirce notes, belief also can prove to be an unstable state as doubt can reemerge. Inquiry, therefore, strives for the achievement of a permanent belief. According to Peirce, truth is, in effect, the realisation of this permanent belief. Further, Peirce argues, in the long term the only method capable of realising this method is scientific research (Peirce 1877; Vickers 1980).

The Peircean theory of truth provides a more compelling account of how the scientific methods can be utilised to access truth and thereby generate knowledge than the correspondence theory. To summarise, knowledge has three conditions: justified true belief (with the caveat that not all justifications are sufficiently rigorous). Scientific research is a form of rigorous inquiry which seeks to create knowledge. This is achieved by providing justification for beliefs through scientific evidence. Whether these justified beliefs constitute knowledge is contingent on our ability to doubt over the long term, since reasonable doubt is the arbiter of truth. The author does not seek to claim that the conclusions of this thesis concerning the two research questions are beyond doubt. However, by providing rigorous justifications for favouring certain conclusions regarding policy effectiveness and its implementation in Ireland, it is posited that doubt over these questions is reduced.

2.2.2 Methods

To support his argument that scientific research is the most appropriate method for achieving truth, Peirce describes several other strategies for achieving stable beliefs and demonstrates why they fail (1877). The ‘method of tenacity’, for example, consists of simply insisting dogmatically that a preferred belief is correct and refusing to entertain alternative visions. However, this method proves inadequate for permanently eliminating doubt because:

⁴ Peirce is also credited with establishing the philosophical tradition of pragmatism in the 1870s (James, 1898; Haack, 2009). Pragmatism can be described generally as a philosophical tradition that emphasises consideration of the practical effects of any theoretical conceptualisations on the conduct of life (Peirce, 1905).

⁵ It is important to stipulate that Peirce’s realist ontology, and his theory of truth, are not shared by all researchers and philosophers in the Pragmatist tradition (see Haack 1997).

“The man who adopts it will find that other men think differently from him, and it will be apt to occur to him, in some saner moment, that their opinions are quite as good as his own” (Peirce, 1877; p44).

This example illustrates that a common source of doubt, in the methods of which Peirce describes, is awareness of the dissenting opinions of other people. This insight supports the idea that rigorous research should consider, not merely the best available evidence from the researcher’s point of view, but also what other informed persons think of the evidence. This justifies the high value placed on both expert opinion and scholarly consensus in this research.

2.2.3 Systematic literature review (Research question 1)

When considering the first research question (*what policies impact physical activity outcomes?*) two facts support the use of the systematic literature review (or simply, ‘systematic review’) as a research method. First, this question cannot be answered with an evaluation of a single intervention. There are too many conceivable interventions that one could evaluate and, as argued in the introduction chapter, no single intervention is sufficient in any case. What is required is a method for accessing the breadth of the existing policy research. These features of the research question recommend review studies (Pawson, 2006) which are a type of secondary data analysis which involve analysing relevant scientific literature.

Second, one should be aware that this question is an application of the concept of evidence-based policymaking (EBP). EBP is a concept that can be broken down into two concerns: generating evidence for policy and ensuring its use (Young *et al.*, 2002; Nutley *et al.*, 2009). The question of the impact of PA policy represents corresponds to the first of these concerns.

EBP is widely considered to be inspired by the Evidence Based Medicine (EBM) movement that emerged in the 1990s (Oliver *et al.*, 2014), though the concern with evidence utilisation has been an issue of scholarly debate since at least the 1970s (see, for example, Caplan, 1979; Weiss, 1979). The EBM movement is associated with a ‘hierarchy of evidence’, with the systematic review method being viewed as the highest form of research evidence and research evidence being seen as superior to the other forms of evidence such as expert testimony. Similarly, the

systematic review is considered by many to be the strongest form of evidence for policy (Young *et al.*, 2002; Brownson *et al.*, 2009).

A systematic review is defined as “a review that uses explicit, systematic methods to collate and synthesise findings of studies that address a clearly formulated question” (Page, 2021; p3). Review studies provide an overview of the relevant literature on a topic or research question. Literature is accessed using several strategies, though primarily through online databases. *Systematic* reviews are typically guided by a protocol outlining the research methods the research intends to utilise. This review protocol promotes transparency and transferability (Young *et al.*, 2002). Further, the systematic and transparent nature of the systematic review makes it scientific, according to the definition provided earlier, and reduces the risk of being misled by retrieving a biased selection of the relevant literature (Oxman *et al.*, 2009).

These two considerations provide the rationale for utilising the systematic review to answer the first research question. A protocol was developed to guide the review and is displayed in chapter three. A search strategy was developed to answer the research question. To narrow the scope of the search to the literature on the most effective policies it was decided that several reviews would be undertaken each with their own domain-specific research question. The scope of the different reviews would be defined by the best investments for PA, according to the International Society for Physical Activity and Health (ISPAH) a professional society for PA researchers and practitioners. Chapter four displays a review investigating which sport policies are effective in promoting PA. The reviews, along with other forms of evidence outlined in chapter five, informed the development of the PA-EPI tool. The PA-EPI is the framework which will relate policy evidence generation to evidence utilization.

2.2.4 Food EPI adaptation. Background and rationale for the development of the PA-EPI

As noted in the introduction, the PA-EPI was developed by the research team with which the author is affiliated in collaboration with other research teams from across Europe as part of the Policy Evaluation Network (PEN) research consortium. The process of development is described in chapter five. The PA-EPI is inspired by the Food Environment Policy Index (or Food EPI), a framework developed by the International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS). INFORMAS is a network of researchers with an

interesting in improving the environments that influence food consumption decisions (Swinburn, *et al.*, 2013a). The Food EPI was developed to support healthier food environments by assessing the actions of one of the major shapers of food environments – the national government (Swinburn, *et al.*, 2013b).

There are several reasons for adapting the Food EPI model to PA policy. First, the Food EPI is a model which has been successful in influencing the policy process. The Food EPI has proven to be a popular tool for policy analysis and advocacy. It has been used, at the time of writing this chapter, in over 40 countries on six continents (International Network for Food and Obesity / Non-communicable Diseases Research Monitoring and Action Support 2023a). A time perspective of more than a decade is recommended to understand policy impact (Sabatier, 1988), suggesting that the point at which the impact of the Food EPI can be properly evaluated is now being reached in some of the countries, but the Food EPI has demonstrated success over a range of short- and medium-term policy outcomes including securing engagement from government and nongovernment stakeholders and supporting policy decisions (Kwon *et al.*, 2022). This success is likely to be influenced by the fact that the process of using the Food EPI was designed to promote engagement with stakeholders (Sacks *et al.*, 2021), which is in line with policy theory (Weiss, 1979; Sabatier 1988). The success of the Food EPI provides a justification for adapting it to the field of PA policy research.

A second reason stems from the observation that the Food EPI structure appears well suited for addressing some of the problems of PA policy identified in the introductory chapter. There are two overarching components to the Food EPI: the ‘policy’ component and the ‘infrastructure support’ component. Each component contains within it a series of ‘domains’. The domains under the ‘policy’ component are framed to correspond to aspects of the food environment that can be influenced by government. The ‘infrastructure support’ domains are further upstream and facilitate deeper policy development and implementation processes with the final ‘health-in-all-policies’ domain reflecting the fact that all government sectors need to work together to achieve health (Swinburn *et al.*, 2013b). Each domain has within it a series of indicators, called ‘good

practice statements'. The Good Practice Statements (GPSs) represented a desired state of affairs⁶ and can be used to measure progress towards that desired goal. Hence, 'good practice' policies are prescribed and the question that is asked concerns the *implementation* of good practice⁷. The full list of GPSs gives a comprehensive picture of government action. Recall that PA is a behaviour determined by the totality of behaviour in multiple different environments and that a cross sectoral policy response is required to influence total PA behaviour of the population. The structure of the Food EPI is interesting because it demonstrates how government action that requires multiple sectors working together can be analysed. Further, the formatting of indicators of implementation as statements of good practice allows researchers to do something very important. It allows policy implementation to be reported on a continuum from 'not at all implemented' to 'fully implemented' reflecting the extent to which a policy is implemented. The ability of the GPSs of the Food EPI to demonstrate varying degrees of implementation is much more informative than an indicator that reports implementation as a simple binary (implemented / not implemented).

A third reason relates to the opportunities and potential synergies of the PA-EPI framework with existing PA policy research resources. PA policy research is a maturing field with frameworks for categorising and communicating policy research (Klepac Pogrmilovic *et al.*, 2018). The various resources and tools that support the development and utilisation of the PA-EPI are mentioned in chapter five this thesis. For these reasons, the PA-EPI framework was utilised to address the second research question of this thesis.

There are some important differences between the problems of promoting healthy diets and the requirements of promoting PA. The environmental factors that determine eating habits are different to the factors that influence PA. Food labelling domain, for example, is not a policy domain that can be effectively replicated in PA. The policy instruments that are recommended to promote PA are, in general, 'softer' instruments than those associated with other health-related

⁶ For example: the first GPS reads: "Clear population intake targets, with appropriate strategies, have been established for the unhealthy nutrients of concern (usually salt, saturated and trans fat, and/or added sugar) to meet the World Health Organization and national recommended daily intake levels. (Swinburn *et al.*, 2013b; p28)

⁷ Implementation refers the extent to which policies are translated into practice. An additional benefit of this system is that, assuming the GPSs are based on good evidence of effectiveness and scholarly consensus, the availability of this tool supports both timely and long-term engagement with the policy process. This is an important consideration for policy research (Cairney and Oliver; 2017; Oliver *et al.*, 2022).

behaviours with a greater focus on guideline development and awareness campaigns rather than regulations and measures to control pricing (Gelius et al., 2022). Second, a settings-based approach, reflecting the different settings that PA takes place (transport settings, workplace settings, leisure settings), is appropriate for promoting PA rather than different aspects of the food environment (labelling, prices). This division makes a PA national coalition more fragmented than a food coalition. For this reason, the coalition *building* elements of the PA-EPI process should be emphasised.

Adaptation of the Food EPI to the challenge of PA required some food-specific domains of the framework to be replaced with PA-specific domains. The infrastructure-support domains are primarily based on WHO literature on the requirements for effective health systems and are broadly applicable to any public health issues. These domains, and the GPSs within them, were retained and received only minor adaptations. The policy domains by contrast were specific to the issue of promoting healthy food environments and new domains and GPSs, which the evidence indicates are important for PA promotion, had to be developed. The process of developing the PA-EPI from the Food EPI template is outlined in chapter five.

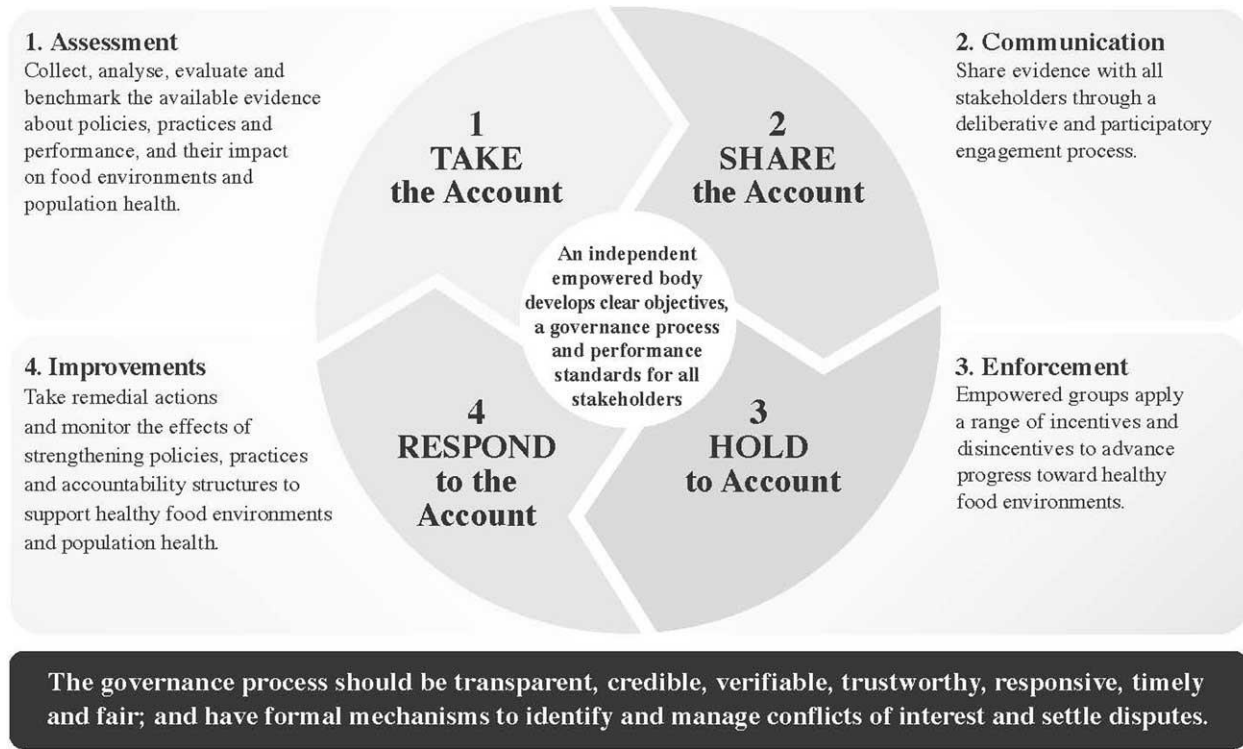
2.2.5 Policy implementation and the role of coalition building (Research question 2)

When considering the second research question (*how have these policies been applied in the Irish context?*) two considerations come to mind. First, while the first research question is concerned with the *generalisable* (knowledge that is to some extent applicable in all contexts) the second deals with the *particular* (problems that arise when implementing policy in a specific context). Policy is determined by the decision-making context (Oliver *et al.*, 2014) and, therefore, the implementation of PA policy can only be assessed on a case-by-case basis (though implementation can be assessed at the national regional or local level depending on the structure of government). PA policy in the Republic of Ireland was the first case of government policy implementation being assessed using the PA-EPI. Second, (and relatedly) while the first question is a straightforward research question relatively unincumbered by political considerations, the second entails advocacy. This is because, as policy science informs us, a simple normative relationship between evidence and policy enactment cannot be assumed (Bambra 2013).

Therefore, in answering the second research question, energy is expended not merely in *assessing* policy implementation and providing recommendations but in *ensuring* it as far as possible. INFORMAS published guidance for utilising the PA-EPI framework. The (modifiable) process described provides a roadmap for conducting research and advocacy and informs the process undertaken in chapter six. A collaborative process is utilised, where researchers partner with other PA stakeholders to generate and use knowledge on PA policy implementation. This is in line with political science theories which highlight the importance of partnership between policy researchers and the knowledge users i.e. policymakers or government officials (Bambra, 2013). However, the process is unusual for PA policy research as the group of stakeholders, and potential knowledge users, are included: non-government independent stakeholders. For this reason, PA-EPI studies, should be understood as a form of codesign research (O'Reilly *et al.*, 2023) or research where the development and implementation of interventions engages and empowers the people who the intervention is intended to serve.

A final note on the PA-EPI process; the process is envisaged as part of a larger process of long-term engagement with policymakers and the policy process. This longer process is described by the Accountability Framework (Kraak *et al.*, 2014), a cyclical framework with four stages: assessment, communication, enforcement and improvement (or 'take the account', 'share the account', 'hold to account' and 'response to account', see figure 1.2). The process of undertaking a PA-EPI study involves assessment of policy implementation and the communication of the assessment results to stakeholders, corresponding to the first and second stages of the Accountability Framework cycle. Considerations for holding to account are considered in the chapters seven and eight. It is envisaged that PA-EPI studies are repeated periodically, continuing the cycle of accountability.

Figure 2.1 Accountability Framework developed by Kraak et al., 2014.



QDESIGN

Chapter 3 Protocol for systematic literature reviews examining the evidence for impact of policies on physical activity across seven different policy domains (Paper one)

A version of this chapter was published as a paper with HRB Open. The reference is given below.⁸

Manuscript one

Volf K, Kelly L, García Bengoechea E et al., Policy Evaluation Network (PEN): Protocol for systematic literature reviews examining the evidence for impact of policies on physical activity across seven different policy domains [version 4; peer review: 3 approved]. *HRB Open Res* 2022, 3:62 (<https://doi.org/10.12688/hrbopenres.13089.4>)

Statement of Contribution

KV contributed to this protocol as follows:

- Contributed to the conceptualisation of the protocol by participating in the PEN WP1.2 roundtable discussions where research questions and methods were agreed.
- In collaboration with PEN research team, developed the proposed review methods (as reported in the protocol) including the search strategy and eligibility criteria. Development of the search terms included: undertaking content analysis on the seven best investments document, (specifically the “‘Whole of School’ programmes” and “Sport for All” sections) on which the University of Limerick team led), piloting the proposed search terms on online databases and provided feedback to the group on the information that was retrieved. Further, the author consulted with a faculty librarian to validate the search strategy.
- Led on drafting and critical revision of the manuscript and responding to peer review.
- Is lead author and submitted the manuscript for publication.

⁸ Minor changes have been made to the published chapters to locate them within the thesis. Numbering has been added to the subsections of this chapter which is not present in the version published on HRB Open.

Chapter Overview

The aim of this chapter is to contribute to answering the first research question (*what policy interventions impact physical activity outcomes?*) by ensuring rigour in the research process. It is considered best research practice for researchers seeking to conduct a systematic review to publish a systematic review protocol (Moher *et al.*, 2016). A protocol is a document which prespecifies the research questions and methods which researchers intend to utilise in a systematic review. The practice of creating a protocol in advance provides transparency and ensures rigour by allowing the identification of biases introduced by selective reporting (Moher *et al.*, 2016).

It was decided by the PEN consortium⁹ that the policy domains of the PA-EPI tool were to be based on the ‘best investments’ for PA. The ‘best investments’ were promulgated by the International Society for Physical Activity and Health’s (ISPAHs) and reflect an expert consensus on interventions that are effective in promoting PA (‘Investments that Work for Physical Activity’ 2012). Initially, seven best investments for PA were announced, hence the reference to ‘seven best investments’ in this chapter (‘Education’, ‘Transport’, ‘Urban Design’, ‘Healthcare’, ‘Mass Media’, ‘Community’ and ‘Sport’). However, in light of the evolving research evidence, and academic debate, an updated ‘best investments’ document was published after the protocol had been submitted for peer review (ISPAH, 2020). This updated document contained an additional best investment – PA interventions in workplaces.

To provide evidence of effectiveness for each of the policy domains of the PA-EPI, PEN WP1 decided to undertake a series of systematic reviews based on the eight best investments. Since the reviews have a common purpose, they were to be prespecified by a single common protocol. Therefore, a review of policies affecting PA in school settings was to be conducted, a review of policies affecting transport settings and so forth.

This chapter presents the protocol for a series of planned PEN reviews focusing specifically on the question of policy effectiveness and, more particularly, on policies affecting *settings* corresponding to the ISPAH best investments. A settings-based approach is appropriate for

⁹ Specifically, the researchers tasked with PA-EPI development or PEN work package 1.2.

informing the PA-EPI since the settings approach employs insights from Social Ecological Models, notably that people and populations interact with their environments (Mittelmark, 2014).

Contribution of the chapter to the state of the art and to the thesis

As the introduction chapter sets out, there appears to be a relative paucity of evidence in the academic literature for effective PA policies. This contrasts with the volume of literature on more downstream PA interventions, typically based on behaviour change approaches. The problem presented by this situation is that it is unclear which of the interventions described in the PA literature are effective at a policy level (Hagger and Weed, 2019). The protocol contributes to the state of the art by enabling research into what works at this level.

Second, this is the first systematic review protocol to prespecify the methods for *several* reviews of PA policy effectiveness guided by the ‘Best Investments’ for PA. This required search terms and eligibility criteria relevant for several different policy domains to be developed. This task was undertaken in collaboration with researchers with experience in different policy domains. The benefit of such a protocol is that duplication of effort is avoided by the research teams working on the different systematic reviews. Otherwise, the development of several different review protocols would have been required.

This protocol provides the specifications for the systematic review presented in chapter four, as well as three other published systematic reviews which are described in the final section of that chapter. Together, these reviews informed the development of the PA-EPI, a process which is detailed in chapter five.

3.1 Published abstract

Introduction: Over 40 million deaths annually are due to noncommunicable diseases, 15 million of these are premature deaths and physical inactivity contributes an estimated 9% to this figure. Global responses have included the Sustainable Development Goals (SDGs) and the Global Action Plan on Physical Activity (GAPPA). Both point to policy action on physical activity (PA) to address change, yet the impact of policy on PA outcomes is unknown. The protocol described outlines the methodology for systematic literature reviews that will be undertaken by the Policy Evaluation Network (PEN) to address this knowledge gap.

Methods: The seven best investments for promotion of population PA identified in the Toronto Charter highlighted seven policy domains (schools, transport, urban design, primary health care systems, public education, community-wide programmes and sport) which will form the basis of these PEN reviews. Seven individual scientific literature searches across six electronic databases will be conducted. Each will use the key concepts of policy, PA, evaluation and a distinct concept for each of the seven policy domains. This will be supplemented with a search of the reference list of included articles. Methodological quality will be assessed and overall effectiveness for each included study will be described according to pre-determined criteria.

Conclusions: Each review will provide policy makers with a list of policy statements and corresponding actions which the evidence has determined impact on PA directly or indirectly. By collating the evidence, and demonstrating the depth of the science base which informs these policy recommendations, each review will provide guidance to policymakers to use evidence-based or evidence-informed policies to achieve the 15% relative reduction in physical inactivity as defined by GAPPA.

Keywords: physical activity, policy, protocol, systematic review, evaluation

3.2 Introduction

Physical activity (PA) is defined as “any bodily movement produced by skeletal muscles that requires energy expenditure” (Caspersen *et al.*, 1985). The relationship between PA levels and health outcomes is well established (Rütten *et al.*, 2016). Insufficient PA has been identified by the World Health Organisation (WHO) as the fourth leading risk factor for mortality worldwide (WHO, 2009) and in 2012 it was estimated that 9% (range 5.1 – 12.5%) of global premature mortality can be attributed to physical inactivity (Lee *et al.*, 2012). The European region has been strongly affected by the costs of inactivity, absorbing 16.9% of the disability that inactivity causes, through its contribution to morbidity from coronary heart disease (CHD), cancer, stroke and diabetes, and 21.8% of the healthcare cost (Ding *et al.*, 2016).

This epidemiological evidence reveals inactivity to be a substantial public health issue and advocacy by public health specialists and the academic community has demanded policy responses to this issue. For the purposes of this document, policy should be understood as “decisions, plans, and actions that are implemented by national or regional governments to achieve specific health promotion goals within a society” (Lakerveld *et al.*, 2020). As indicated by the WHO (WHO Regional Office for Europe 2010), policy can give support, coherence and visibility at the political level, while making it possible for the organisations involved at national, regional, and local levels – e.g., national government sectors, regional or local authorities, stakeholders, and the private sector – to be logical and consistent in their actions to achieve a shared goal. This applies to food and PA environments, systems and behaviours (WHO Regional Office for Europe, 2010). In order to reflect the complexity of the policies that may affect the PA policy environment, Lakerveld & colleagues (2020) distinguish between “direct” policies, which refers to policies where improving the PA environment and increasing participation is the primary aim, and “indirect” policies, where the primary aim of the policy is not to increase PA but this may occur as a co-benefit of successful implementation.

The International Society for Physical Activity and Health (ISPAH) was established in 2009 (Kohl *et al.*, 2012) At its third biennial congress ISPAH promulgated the Toronto Charter calling for political commitment to achieving greater opportunities for PA (Bull *et al.*, 2010). To guide action on this issue the Charter was subsequently accompanied by a document titled Non-

Communicable Disease Prevention: Investments that Work for Physical Activity (ISPAH, 2012). This document declared seven domains which evidence suggested could be effectively targeted to increase PA opportunities. These were whole-of-school programmes, transport policies and systems, urban design regulations and infrastructure, primary health care, public education, community-wide programmes and sport systems and programmes that promote ‘sport for all’. These seven domains provide a policy setting structure for systematic literature review search.

Over recent years there has been an acceleration in the production of policy responses to the epidemics of inactivity and sedentary behaviour (Klepac Pogrmilovic *et al.*, 2018). The Global Observatory for Physical Activity (GoPA) reports that, by 2013, 139 countries were members of its PA advocacy alliance and 26.6% of these countries had already published a stand-alone PA plan (Ramirez Varela *et al.*, 2016). Furthermore, in 2013, the WHO published a document which recognised PA as a part of the global effort to combat non-communicable diseases (NCDs) (WHO, 2013). Another development promoted by the WHO in the field of PA policy is the proliferation of audits of policy responses to inactivity using a tool titled the Health-Enhancing Physical Activity Policy Audit Tool (HEPA PAT).

A significant development occurred in 2017 when, in response to demands for direction on the problem of physical inactivity, the WHO committed to publishing a stand-alone action plan on this issue. This commitment was realised in 2018 when the WHO published the Global Action Plan on Physical Activity (GAPPA), which targeted an even more ambitious PA target than the previous NCD plan (WHO, 2018).

The recent rise in the number of national PA policies allows research into the question of which of these policies are effective in improving PA outcomes. A scoping review published in 2016 provided evidence that research into policy effectiveness lagged behind research that links PA to health and research that links PA interventions to behaviour (Rütten *et al.*, 2016). However, with the increase in the number of PA policies there may have been a concomitant rise in research examining the effectiveness of these policies. Furthermore, to the best available knowledge, no project has linked existing policy statements with research that corroborates or discredits the effectiveness of these statements.

As part of the Joint Programming Initiative “A Healthy Diet for a Healthy Life” (JPI HDHL), researchers from 28 institutes in seven European countries (France, Germany, Ireland, Italy, Norway, Poland, and the Netherlands) and New Zealand combine their expertise to form a Policy Evaluation Network (PEN) (Lakerveld *et al.*, 2020; see <https://www.jpi-pen.eu/>). PEN’s vision is to provide Europe with tools to identify, evaluate and benchmark policies designed to directly or indirectly address unhealthy lifestyle behaviours which contribute to overweight and obesity, while accounting for existing health inequities. Using structured evaluation principles and methods, PEN will examine the content, implementation and impact of lifestyle policies across Europe and will build on existing knowledge. PEN will provide an overview of the ‘best’ public policies most likely to sustainably support more favourable health behaviours.

This protocol paper outlines the methodology for seven complementary systematic literature reviews as part of PEN. Each review is designed to determine the impact of policy, either directly or indirectly, on physical activity outcomes across the different policy domains identified in the “Seven Best Investments” (ISPAH, 2012). These policy domains are whole-of-school programmes, transport policies and systems, urban design regulations and infrastructure, primary health care, public education, community-wide programmes involving multiple settings and sport systems and programmes that promote ‘sport for all’. These reviews will provide evidence supporting the development of a tool named the Physical Activity Environment Policy Index (PA-EPI), based on similar principles to an existing tool called the Food Environment Policy Index (Food EPI) (Swinburn, *et al.*, 2013a). The PA-EPI will provide policy makers with a list of policy statements and corresponding actions which the evidence has determined improve PA outcomes across domains. The aim of each PEN review is to evaluate the status of the evidence base for the impact of policy on PA outcomes across the different policy domains identified in the “seven best investments”.

3.3 Methods

Original material examining the evidence of what works in terms of direct and indirect policies to increase PA will be identified in the following ways:

(1) A search, with no date restrictions, of the following electronic databases: four specialized sport science or biomedical databases, MEDLINE (Ebsco), SportDiscus, CINAHL, and

Cochrane library, and two general social science databases, Web of Science and Scopus. Search results will be limited to articles that are identified through searching the titles and abstracts.

(2) Manual reference checks of identified original studies.

(3) Publicly available English-language resources and documents of major national and international stakeholders will be searched to identify existing reviews and position papers discussing the evidence of what works in terms of direct and indirect policies for increasing PA, e.g., the WHO's European database on Nutrition, Obesity and Physical Activity (NOPA), Global Action Plan on Physical Activity (GAPPA), the European Physical Activity Strategy (EPAS) (WHO Regional Office for Europe 2016) and the European Physical Activity Guidelines (EPAG) (European Commission 2008).

A content analysis was performed on the Toronto Charter complementary document (ISPAH, 2012). These 'investments' identified the policy domains or sectors in which policies are made that could directly or indirectly impact on physical activity, i.e., schools, transport, urban design, healthcare, public education, the community and sport. This document was searched for key words to be included in the search syntax. Researchers consulted with librarians and other research staff for suggestions on search terms.

The search of electronic databases will comprise seven individual searches (corresponding to the seven best investments), each one to be run on each of the databases. The seven searches will be formed by combining the same basic search strategy (i.e. general eligibility criteria) with seven distinct search concepts (i.e. specific eligibility criteria for each domain). The basic search strategy will consist of three search concepts (Table 3.1): search concept one (C1), which will combine synonyms for the keyword "policy" with the Boolean Operator "OR"; search concept two (C2), which will do the same with the keyword "physical activity"; and search concept three (C3), which will do the same for the keyword "impact". The three search terms will be combined with the Boolean operator "AND".

Table 3.1 General search terms.

Keyword	Synonyms
“Policy”	(MH "Policy") OR (MH "Public Policy") OR (MH "Policy Making") OR (“policy”) OR (“policies”) OR (“national policy”) OR (“national framework”) OR (“policy framework”) OR (“policy action”) OR (“legislation”) OR (“strategy”) OR (“policy making”)
“Physical Activity”	(MH "Exercise") OR (MH “Sedentary Behavior”) OR (“physical activit*”) OR (“physical inactivity”) OR (“play”) OR (“physical education”) OR (“sedentar*”) OR (“sitting”) OR (“healthy lifestyle”) OR (“health initiative”)
“Impact”	(“evaluat*”) OR (“impact”) OR (“appraisal”) OR (“effect*”) OR (“assessment”)

Abbreviations: 'MH' = MeSH Heading.

Each of the seven searches will further be combined with a specific search term constructed to reflect only one of the seven best investments declared in the document Non-Communicable Disease Prevention: Investments that Work for Physical Activity (ISPAH, 2012) (Table 3.2). It is proposed that individual systematic literature reviews will be performed for each of the seven best investment domains, with an initial review focusing on schools and subsequent reviews focusing on ‘transport’, ‘public education’ and ‘sport’ domains in the first instance.

Table 3.2 Specific Search terms based on each of the seven best investments document (ISPAH, 2012).

1. “Whole of School Approach”	“Whole-of-school” OR “Whole School” OR “Whole of School” OR WSCC OR “school intervention” OR “school based intervention” OR “school initiative” OR “school based initiative” OR “school program*” OR “School health” OR “Wellness” OR “well-being”
2. “Transport	“active transport*” OR “walk*” OR “cyclist*” OR “bik*” OR “bicycl*”

Policy”	OR “cyclist” OR “cycling” OR "active travel*" OR “commute*” OR "transport mode" OR "transportation mode" OR "travel mode" OR “pedestrian*” OR "traffic volume" OR "traffic count" OR “transport plan*” OR “road safety” OR “public transport” OR “transport systems
3. “Urban Design”	MH “Environment Design” OR MH “Environment” OR MH “Environment and Public Health” OR “urban design” OR “urban environment” OR “built environment” OR “mixed-use development” OR “footpaths” OR “bikeways” OR “street network*” OR “green spac*” OR “green areas” OR “green network” OR “blue spac*” OR “recreational spac*” OR “urban plan*” OR “public amenit*” OR “network infrastructure”
4. “Primary Health care systems”	“primary health” OR “Primary care” OR “health care” OR “health system”
5. “Public Education”	“public education” OR “mass media” OR “mass communication” OR “social marketing” OR broadcast* OR MH “Communications Media” OR MH “Social Media” OR “media” OR “health campaigns” OR “public education”
6. “Community Programmes”	“Whole-of-community” OR “Community-wide programs” “community building” OR “community strengthening” OR "community development" OR "community empowerment" OR "community network*" OR "coalition building" OR "community capacit*" OR "community”
7. “Sport Programmes”	“health promoting clubs” OR “sport*” OR “athletics”

Abbreviations: 'MH' = MeSH Heading.

The following criteria will be applied for searches in databases: language will be limited to English language only.

3.3.1 Eligibility criteria

In order to answer our research question some eligibility criteria were developed to screen out irrelevant documents. Studies will be included based on the following criteria for 1) type of study, 2) participants/population, 3) exposure/intervention, and 4) outcomes.

General eligibility criteria were formulated as well as “specific” eligibility criteria for each of the seven searches. Publications that do not meet the “general” eligibility criteria will be excluded from review. Publications that do not meet the “specific” eligibility criteria will be set aside and possibly reassigned to a different search category if they are not duplicates of any publication already included in that search category.

Types of study to be included/excluded. No limitations regarding study type will be placed as long as the study design allows the research questions to be addressed. In addition, reviews using a comprehensive search strategy (including systematic, scoping and realist reviews) and analysing original research on the evidence of what works, in terms of direct and indirect policies for increasing PA; and reviews and policy analysis documents issued by major national and international organisations addressing recommendations referring to the same evidence will be eligible for inclusion. Studies will be excluded based on the following criteria: a direct or indirect form of policy intervention is not identifiable; no information is provided regarding the effects of the policy under consideration on the desired outcomes.

Condition or domain being studied. Reviews examining the evidence of what works in terms of direct and indirect policies on PA.

Participants/population. Eligibility criteria relating to population characteristics are described in Table 3.3.

Table 3.3 Population related inclusion criteria.

General criteria	School specific criteria	Transport specific criteria	Urban design specific criteria	Primary health care specific criteria	Public education specific criteria	Community programmes specific criteria	Sport programmes specific criteria
The study intervention targets the general human population or parts of it that are relevant for the respective review	The study intervention targets students and staff in the school setting .	The study intervention targets the commuters and their preferred mode of transport .	The study intervention targets the residents of urban areas	The study intervention targets patients or primary care professionals	The study intervention targets the general population through public outreach and mass communication.	The study intervention targets the general population in the community setting.	The study intervention targets the general population in sport settings .

Exposure(s), intervention(s). Policies that aim to have a direct or indirect effect on PA behaviour of target groups and populations and on the PA environment that support the behaviour under consideration.

Grey literature/Other: Similar to the empirical studies, included grey literature will need to make reference to the impact of PA policy in the relevant domain.

Context. These systematic reviews are performed as a task of PEN. PEN's vision is to provide Europe with tools to identify, evaluate and benchmark policies designed to directly or indirectly address physical inactivity. Further information on PEN is available at www.jpi-pen.eu or Lakerveld & colleagues (2020)

Main outcome(s). All study designs (e.g., reviews, empirical evidence) and grey literature/other must include the following outcome(s); a changes in PA (or proxy, e.g. fitness), assessed by means of self-report or wearable devices (e.g., accelerometer); a change in features of the physical and social environment (e.g., facilities, equipment, action plans, programmes) hypothesised to lead to changes in PA outcomes as a result of a policy intervention.

3.3.2 Study selection and data extraction

Download of title and abstract records. Titles and abstracts identified by the search will be downloaded as "Endnote import" (extension.enw) files or other file formats compatible with our software. They will be uploaded to Endnote X9, a citation management software, and Rayyan (Ouzzani *et al.*, 2016), an online software dedicated to managing reviews. Other freely available alternative software includes Mendeley reference manager or Zotero. Once records have been uploaded to Rayyan, the software will identify duplicate articles and one of the two identical articles will be removed. The remaining articles will undergo the first round of screening by two researchers in a shared Rayyan account.

Title and abstract review. Title and abstract reviews will be performed by at least one reviewer and checked by another reviewer. Checking will involve reviewing title and abstracts decisions to establish whether the second reviewer concurs with the screening decision. Discrepancies will be resolved by discussion to reach consensus, in consultation with a third researcher when necessary. The screening process will involve comparing the information presented in the title

and abstract to the eligibility criteria. Titles and abstracts that appear to conform to the eligibility criteria will be deemed eligible for full text review while those that do not will be discarded from the next stage of the data extraction process.

Download of full articles. Full text articles will be downloaded using the resources provided by their Institution. If a full text record cannot be acquired using these resources, researchers will investigate whether they can be located through use of other libraries to which the research team has access. If a full text article cannot be located through any of these library resources, the authors will be contacted through whichever channels can be identified from the information in the title and abstract.

Full text review. Full text reviews will be performed by at least one reviewer and checked by a second reviewer. The authors involved in screening and risk of bias will differ between the different reviews; however, the authors involved in full text screening will be the same authors with responsibility for title and abstract screening. Discrepancies will be resolved by discussion to reach consensus, in consultation with a third researcher when necessary. The following information will be extracted: first author, year of publication, country, study design, data collection method, sample, recruitment/setting, sample size, and response rate.

3.3.3 Risk of bias (quality) assessment

Risk of bias will be assessed by at least one reviewer and checked by another reviewer. Discrepancies will be resolved by discussion to reach consensus, in consultation with a third researcher when necessary. The results of the quality assessment will be narratively incorporated into the synthesis process. A descriptive summary using the criteria described below will be presented at study level and discussed in the review. Furthermore, the methodological quality will be narratively summarized at review level.

The quality of the included quantitative studies, inclusive of randomised, non-randomised and observational studies (encompassing both longitudinal and cross-sectional studies) will be assessed by means of an adapted ‘Downs and Black’ checklist tool (Downs and Black 1998). This tool is apt to assess common biases in a range of study types as noted. The checklist will be

modified to meet the aims of this review with some items deemed non applicable and subsequently removed.

The AMSTAR tool will be used for the assessment of systematic reviews and comprehensive reviews with a rigorous search strategy including reviews of reviews. This tool consists of 11 items and has good face and content validity for appraising the methodological quality of systematic reviews (Shea *et al.*, 2007). Not all items are applicable to every type of review being assessed and quality ratings will take account of this circumstance. Similar to Messing and colleagues (2019), to assess the quality of included studies, we will calculate percentage values for each study. Each study will be assessed by a tool appropriate for its study design and these percentage values will be calculated based on the percentages of criteria met by a study, which will be particular to the tool used to assess it.

3.3.4 Strategy for data synthesis

A narrative synthesis will be used to interpret and analyse the data. The results of the data synthesis will be presented in a table. Within this table, a list of short descriptive statements will be compiled based on the policy actions identified in the scientific literature. Evidence on the effectiveness of these policy actions will then be described using a method used by Panter & colleagues (Panter *et al.*, 2019). Specifically, when a study presents quantitative evidence about the effectiveness of one policy action a symbol will be assigned next to that particular policy action in the table. There are four categories of symbols reflecting the four possible outcomes: “significantly positive evidence” (+), “significantly negative evidence” (-), “no significance test” (?) or “inconclusive” (0). In summary, the data synthesis table will display three types of data: brief policy statements, codes which help visualise the number and direction of effects found in the literature supporting those statements, and the supporting references. In addition, data extraction tables will be designed to distinguish any demographic, environmental or other variables pertinent to synthesising the data. For example, in the schools’ review, data extraction columns will be included to reflect evidence of effectiveness stratified by gender, school level (primary, secondary, combined) or socio-economic status where appropriate.

Finally, for the included reviews and policy analysis documents, the main findings stated in the discussion and conclusions section will be extracted. Main findings of the articles will be copied

into a single table along with a reference to the article itself, and details of the overall risk of bias of the study from which the information is extracted. The synthesised data will be presented in a six-column table with the different columns presenting information on the reference, study description, study type, main findings or outcomes, risk of bias and category of evidence, respectively.

3.3.5 Dissemination

Study findings will be presented at professional networking events such as the World Congress on Public Health. Manuscripts will be prepared for publication in scientific peer-reviewed journals and presented at academic conferences.

3.4 Conclusion

An aim of this project is to assist policymakers to achieve the GAPP target of a 15% relative reduction in the prevalence of insufficient PA (WHO, 2018). The aim of the planned work is to determine the level and type of evidence reported in the international scientific literature for policies that contribute directly or indirectly to increasing PA within 7 priority domains identified as best investments for PA (ISPAH, 2012). This will be achieved through searches electronic databases and extensive snowballing techniques. By providing this evidence, these reviews will support the development of the PA-EPI. The PA-EPI in turn will support policy makers by facilitating the benchmarking of policies which work towards achieving this target. Achieving this target will provide health benefits such as reduced premature mortality as well as substantial co-benefits such as contributing to a sustainable environment and quality education (WHO, 2018). We anticipate that the recommendations will mirror and expand upon some of the prescriptions made in GAPP, the European Physical Activity Strategy or by experts in the PA community.

Chapter 4 Evidence of the impact of sport policies on physical activity and sport participation: a systematic mixed studies review (Paper two)

This chapter is based on a manuscript for a sport policy review which was published in the *International Journal of Sport Policy and Politics*. Three other reviews, of effective PA policy in the Education, Transport and Mass Media domains, were also completed. My contribution to the delivery of these reviews, and their contribution to the development of the PA-EPI is discussed in the final subsection of this chapter. As I had a secondary role in the delivery of these three additional reviews, I am not listed as first author. These reviews are not, therefore, presented as independent chapters. This is in conformity with thesis specifications for the Faculty of Education and Health Sciences at the University of Limerick which limit the number of chapters on which the thesis author is not primary author.

The reference for the sport review manuscript, published in the *International Journal of Sport Policy and Politics*, is provided below. References and abstracts for the three other reviews are presented in appendix A1.

Manuscript two

Volf, K., Kelly, L., García Bengoechea, E., Casey, B., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Den Braver, N.R., Żukowska, J. and Woods, C., 2022. Evidence of the impact of sport policies on physical activity and sport participation: a systematic mixed studies review. *International journal of sport policy and politics*, 14(4), pp.697-712.¹⁰

Statement of Contribution

KV contributed to the ‘Sport’ review as follows:

- Developed the methods utilised in the Sport review including the research question, the search strategy, data collection method and data synthesis method.

¹⁰ Minor changes have been made from the version of this manuscript that was published in the *International Journal of Sport Policy and Politics*. The subsections are numbered differently. The word ‘supplements’ has been changed to ‘appendices’ throughout. This is to align the text with University of Limerick thesis specifications.

- Led on data collection, by running the database searches, reviewing all titles and abstracts in the first round of screening and all full text documents in the second round.
- Led on data extraction, quality assessment and data synthesis.
- Led on drafting and critical revision of the manuscript and responding to peer review.
- Is lead author and submitted the manuscript for publication.

KV contributed to the ‘Education’ review as follows:

- Developed the methods utilised in the review including the research question, the search strategy, data collection method and data synthesis method.
- Contributed to data collection by reviewing all titles and abstracts in the first round of screening and all full text documents in the second round.
- Contributed to data extraction and synthesis.
- The thesis author contributed to drafting and critical revision of the manuscript and responding to peer review.

KV contributed to the ‘Transport’ review. A statement corroborating this account of the thesis authors contribution was signed by the lead author of the transport review and is presented in the appendices (Appendix A1). KV contributed to the ‘Transport’ review as follows:

- Contributed to the development of the study design including search strategy development, development of data extraction method and data synthesis method.
- Performed preliminary searches for scientific literature.
- Provided feedback on drafts of the manuscript

KV contributed to the ‘Mass Media’ review. A statement corroborating this account of the thesis authors contribution was signed by the lead author of the Mass Media review. This statement is also presented in the appendices (Appendix A1). KV contributed to the ‘Mass Media’ review as follows:

- Contributed to the development of the study design including search strategy development and development of data extraction method.
- Performed preliminary searches for scientific literature

- Provided feedback on drafts of the manuscript.

Chapter Overview

The aim of the research set out in this chapter was to investigate the question of which policies are effective in promoting PA in sport settings. Following the identification of a need for several systematic reviews corresponding to the best investments for PA, and the publication of the systematic reviews protocol, the tasks involved in undertaking a series of reviews were assigned to the members of PEN WP1.2. It was decided that KV would focus on the review of policies affecting PA in sport settings (the ‘Sport’ review).

Contribution of the chapter to the state of the art and to the thesis

It seems intuitive that sport contributes to increased PA; however, it is unclear how policymakers can use public policy to promote widespread sport participation. To my knowledge, no study has reviewed the evidence for which sport policies are effective in promoting PA outcomes using a pluralistic approach that includes both qualitative and quantitative designs. This represents a knowledge gap. The research described in this chapter contributes to scientific knowledge by identifying public policies, targeting sport settings, which promote PA. Given the popularity of sport as a means of being physically active, the evidence of effective sport policies published in academic journals is surprisingly limited. However, there is evidence that some policies can be effective in promoting PA, notably a sport for all policy orientation which ensures access to sport facilities for the whole population is associated with positive participation outcomes. There is also evidence suggesting unintended consequences of particular sport policies and the research raises questions about whether sport policies can increase the PA levels of the least active.

The evidence from the Sport review, and the three other reviews described in this chapter, contributes to the overall thesis by informing the wording of several of the Good Practice Statements (GPSs) of the PA-EPI. For example, the wording of the second GPS in the Sport domain of the PA-EPI (“There are national and/or subnational evidence informed policies or action plans in place that ensure equitable access to sport and recreation spaces and places for all”) is informed by the findings of this sport review.

4.1 Published abstract

Participation in sport contributes to increased physical activity (PA) levels. Increasing PA is a public health concern due to its recognised impact on health outcomes. International policy actors such as the Council of Europe, the World Health Organisation (WHO) and the International Society for Physical Activity and Health (ISPAH) have recommended that ‘sport for all’ is promoted both for public health and as a basic right. This review aims to evaluate sport related policies aimed at maximising the opportunity to participate in PA and sporting activity. Six electronic databases were systematically searched for quantitative, qualitative and review studies investigating how public sport policy affects PA outcomes. The scientific literature was screened according to predetermined eligibility criteria. Following study selection and data extraction, the quality was assessed using modified versions of existing quality assessment tools. Results were synthesised and the context in which policy actions occurred analysed using the Context and Implementation of Complex Interventions (CICI) framework. Database searches identified 3705 unique articles. A total of 93 full-text articles were assessed, with 22 meeting our inclusion criteria. Seven unique ‘policy actions’ were identified and were categorised into the ‘policy areas’ Facilities, Financial, Collaboration and Exhortation. Policy actions to promote PA and sport participation have demonstrated qualified success but there is limited evidence of success in engaging hard to reach groups. Therefore, policymakers utilising sport to increase PA should treat it as a complementary intervention alongside other policy actions based on a systems perspective.

Keywords: Sport for all, public policy, physical activity

4.2 Introduction

Physical activity (PA) is associated with numerous positive health outcomes (WHO, 2018). PA has been linked to reduced all-cause mortality (Ekelund *et al.*, 2016; Strain *et al.*, 2020), improve mental health outcomes (Biddle and Asare, 2011; McDowell *et al.*, 2018; McDowell *et al.*, 2019) and immune response (Chastin *et al.*, 2021). The most important effect physical activity has on public health, however, is in reducing the burden of non-communicable diseases (Lee *et al.*, 2012; Wahid *et al.*, 2016; WHO, 2018). In recognition of the health benefits of PA, the WHO has published guidelines specifying the minimum levels of PA required to realise health benefits (WHO, 2020a). The WHO also notes that large numbers of people are not achieving these threshold levels of PA, in essence they are inactive (WHO, 2018).

The relationship between sport participation and PA is supported by research (Eime *et al.*, 2015; Hebert *et al.*, 2015; Kokko *et al.*, 2019). Stamm and Lambrecht (2005) state that sport is the most important contributor to overall physical activity levels in Switzerland. In the United Kingdom, research into PA profiles indicates a relationship between the proportion of moderate to vigorous physical activity (MVPA) acquired through sport and leisure time PA and the proportion of a population achieving PA guidelines, with males aged 16 – 24 achieving a greater proportion of their MVPA through these forms of PA and, concurrently, achieving the guidelines in the greatest numbers (Belanger *et al.*, 2011). These data support the argument that a lack of sport related physical activity is often not compensated for by physical activity in other domains of life (Stamm and Lamprecht, 2005).

Since improved health is evidentially connected to the agenda of maximising state welfare (Heinemann, 2005), it is not surprising that sport participation has received considerable attention as a public health intervention. The human rights organisation the Council of Europe recommended its member states pursue so-called ‘Sport for all’ policies (Council of Europe, 1976) and in 2007 the European Commission issued a white paper on sport declaring a need to utilise the potential of sports to promote health-enhancing physical activity (HEPA) (European Commission, 2007). The WHO’s Regional Office for Europe published documents that recognise investment in sports (WHO, 2011), while the International Society for Physical Activity and

Health (ISPAH) identified sport and recreation for all as a policy priority in its Eight Investments That Work for Physical Activity (ISPAH, 2020). In 2018, the WHO published the Global Action Plan on Physical Activity (GAPPA; WHO, 2018) which articulated an ambitious goal of achieving a 15% relative reduction in the prevalence of inactivity by 2030 and linked the promotion of PA to the UN's Sustainable Development Goals (SDGs).

Despite the commitments made by European countries (Heinemann, 2005) to pursue the Council of Europe's vision of 'Sport for all', there is evidence to suggest that increases in population levels of sport participation have stagnated since the mid-1990s in most European countries (van Bottenburg *et al.*, 2005). The evidence shows that the proportion of the European population who never participate in sporting activity has increased from approximately 40% (van Bottenburg *et al.*, 2005) to approximately 46% (European Commission, 2018). Furthermore, studies of engagement with sport reveal persistent patterns of non-participation. Two patterns that are well recognised are that females are consistently reported to participate in sport at lower rates than males and that participation is consistently shown to decline with age (Downward 2007; Hovemann and Wicker, 2009; European Commission, 2018). Research on determinants of sport participation demonstrates that these patterns are not universal; age does not significantly predict participation in all European countries and females in some contexts participate significantly more than men (Hovemann and Wicker, 2009).

The non-universality of these patterns supports the assertion by Van Bottenburg and colleagues (2005) that age and sex inequalities in sport participation are not fixed phenomena that cannot be changed. These patterns suggest that, despite the declarations of the desirability of making sport available to all, the opportunity to participate in sport is not equally distributed in Europe. Participation is hindered by variables such as financial constraints and social structure (Strandbu *et al.*, 2019).

In 2019, the Policy Evaluation Network (PEN; www.jpi-pen.eu) was established to research policies that reduce physical inactivity, sedentary behaviour and unhealthy diets. One of the objectives of PEN is to gather evidence on the effectiveness of policy actions in the eight domains identified in ISPAH's best investment document (International Society for Physical Activity and Health). This information will be brought together into a list of evidence grounded

policy indicators titled the Physical Activity Environment Policy Index (PA-EPI). This tool will then be utilised to benchmark the extent to which public policy supports an environment that is conducive to PA as part of a cross sectoral systems-based approach.

It has been stated that policy interest in sport as a means to promote PA has outstripped research interest in this topic (Mansfield and Piggin, 2016; Hoekman and Scheerder, 2021). This may lead to a situation where policies of unclear effectiveness are promoted as a means to solve the problem of inactivity. To our knowledge, no review has collated evidence about the effectiveness of public policy in promoting sport participation to influence PA behaviour using evidence from different study designs. The purpose of this paper, therefore, is to evaluate the status of the evidence base for the impact of policy on PA outcomes within the Sport for All policy domain. In order to provide information about the context within which policy actions occurred and were evaluated the Context and Implementation of Complex Interventions (CICI) framework was utilised as a tool to extract information about contextual factors interacting with the policy action. The CICI framework was developed to embed context into public health interventions and hence is suited to the task of interpreting how policy effectiveness is influenced by these factors (Pfadenhauer *et al.*, 2017). The context dimension of CICI provides a typology of seven categories of contextual factor which are considered throughout this discussion section of this review: geographical, epidemiological, socio-cultural, socio-economic, ethical, political and legal. Sport was defined broadly as any recreational activity identified as such in the literature. Hence the question with which this review concerns itself is: which sport related policy actions have demonstrated impact in advancing sport and PA participation in the general population?

4.3 Methods

4.3.1 Search details

This review adhered to an adaptation of a previously published PEN protocol (PROSPERO; CRD42020156630), which builds on a review of policies to promote PA in the school setting. A formal protocol, adhering to PRISMA reporting guidelines was published (Volf *et al.*, 2022). A search of six electronic databases was conducted on the 28th of August 2020: MEDLINE (Ebsco), SportDiscus, CINAHL Complete, Cochrane Library, Web of Science and Scopus. The databases were selected to identify literature from both biomedical and social science journals.

Search terms expressing ‘policy’ related keywords were used in combination with search terms related to PA, impact and sport. Details of the full search terms utilised are presented in appendix A2. Following the screening of studies, the database search was supplemented by searching the reference lists of all papers included in the data synthesis for further studies.

4.3.2 Screening process

Records retrieved by the database search were screened utilising the online software Rayyan (Ouzzani *et al.*, 2016). Duplicates were removed and titles and abstracts were screened by two independent reviewers (KV and LK) and disagreements were resolved by a third reviewer (EGB). Hence, retrieved items were screened by no less than two reviewers working independently. Three reviewers (KV, LK and BC) independently conducted an appraisal of the included full texts, consulting a fourth reviewer (EGB) to resolve disagreements.

4.3.3 Eligibility criteria

Only academic journal articles were considered for inclusion. Studies were excluded if they were unavailable in the English language, or if they consisted of editorials or commentaries.

For the purposes of this review, the term ‘general population’ refers to the large number of persons who derive health benefit from increased participation in recreational sport. This includes persons who have been identified as inactive or part of a subgroup which is identified as at risk of inactivity. It also includes persons whose level of activity is unspecified or unremarkable. Studies where the participants were described as highly proficient in sport, however, (for example: through the use of descriptors like ‘athlete’, ‘semi-professional’, or ‘elite’) were excluded. With regard to policy intervention, studies were excluded if there was no identifiable policy level action. Lakerveld and colleagues (2020), define policies as ‘decisions, plans, and actions that are enforced by national or regional governments or their agencies (including at the local level) which may directly or indirectly achieve specific health goals within a society’. Direct policy refers to policies where the primary aim is improving the PA environment and increasing PA participation. ‘Indirect’ policy refers to policies where the primary aim is not to increase PA levels, but this may occur as a co-benefit of successful implementation. The practical implication of this definition of policy for this review is that,

while evidence of a specific government document is not required for inclusion, the paper must include the evaluation of some action that is traceable to public bodies or organisations which are publicly owned or publicly sponsored. Weed (2016) presents a logic model for sport as a theoretically efficacious public health investment. In this model, sport participation is theorised to increase PA, which in turn is hypothesised to improve health outcomes. Hence sport participation is considered a reliable proxy for PA participation in this review. Outcome-based eligibility criteria limited inclusion to papers that reported on: changes in PA/Sport participation behaviour assessed by self-report, wearable device or observation, or change in features of the physical and social environment (e.g. facilities, equipment, programmes) hypothesised to lead directly or indirectly to changes in PA outcomes as a result of a policy intervention.

4.3.4 Data extraction and quality assessment

Studies included following full-text screening were subject to a data extraction process undertaken independently by KV and LK, which identified key features of the study. Data extraction was undertaken using a modified version of a data extraction form utilised in a previous study (Woods *et al.*, 2021). The information identified from each paper included: study design and country in which the study took place, summary demographics of the sample used (including age and sex), policy description and issuer, evidence of impact and the timescale of study in months.

Quality was assessed for every paper included in data synthesis. The Downs and Black checklist (Downs and Black 1998) was adopted as it can be easily adapted to assess the quality of a range of quantitative study designs. For qualitative studies, the CASP Qualitative studies checklist (Critical Appraisal Skills Programme 2019) was used to assess quality. The Mixed Methods Appraisal Tool (MMAT) (Hong *et al.*, 2019) was used to assess the quality of studies using a mixed-methods design. Every included paper was assessed by at least one reviewer (KV, BC, EGB or CW). Assessment of the quality of each paper is incorporated into table 4.1.

4.3.5 Data synthesis

The specific strategy for the data synthesis of quantitative studies draws upon a coding system used by Panter and Colleagues (Panter *et al.*, 2019) and Woods *et al.*, (Woods *et al.*, 2021). For

all quantitative studies, the policy action under study was summarised in a single sentence and codes were assigned. The codes were developed to indicate the effect and significance of the effect of a policy action on PA outcomes. The different types of codes were: positive and significant (+), negative and significant (-), non-significant (?) or no significance test was conducted (?). The number of codes provides an indication of how well-validated a policy action is, while the types of codes indicate whether the policy action was found to be effective. Policy actions were grouped into inductively generated ‘policy areas’ displayed in table 4.1.

4.3.6 Interpretation of contextual factors

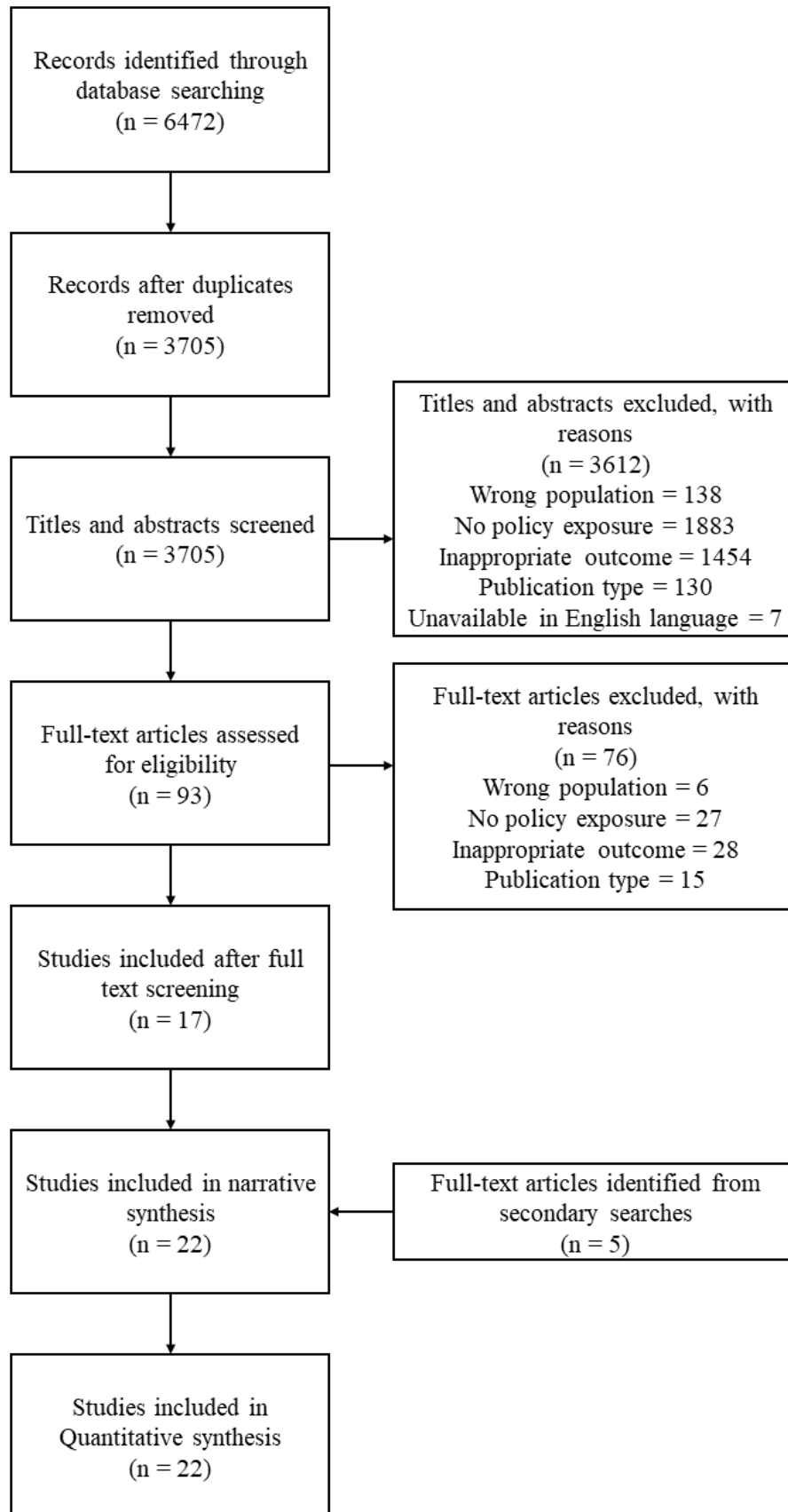
The seven categories of the CICI framework, as defined by Pfadenhauer and colleagues (2017), were utilised as a lens to extract data on the interactions of the contextual factors with the policy actions. Data on contextual factors identified from all the different study designs is reported in appendix A4 and in the discussion. The contextual factors identified include the factors which sport policy actions can alter to improve the PA environment and factors that impact the effectiveness of sport policy.

4.4 Results

4.4.1 Search results

The database search identified 6,472 records, of which 3,705 were screened following the removal of duplicates. Following title and abstract and full-text screening seventeen studies from the database search were included in the final analysis. The complementary search of references yielded a further 5 studies. As part of a secondary search to retrieve eligible studies we may have missed through the database search, an additional study (Foley *et al.*, 2021), was included after it was identified through a professional society website. This brought the total number of included papers to 22. The screening process is presented in figure 4.1.

Figure 4.1 Flow chart displaying the screening process



4.4.2 Study descriptors and characteristics

Amongst the included 22 papers, 10 studies were identified that used exclusively quantitative methods for analysis (appendix A3). Eight of these studies used pre-post designs (Bullough *et al.*, 2015; Kokolakakis *et al.*, 2015; Verhoef *et al.*, 2016; Weed 2016; Ishkineeva and Ozerova 2017; Higgerson *et al.*, 2018; Ikramullah *et al.*, 2018; Foley *et al.*, 2021), while two used a cross-sectional design (Ståhl *et al.*, 2002; Slater *et al.*, 2014). No studies using randomised designs were identified.

Supplementing the quantitative papers, were three studies combining both quantitative and qualitative methods (Bolton and Martin 2013; Chen and Henry 2016; Cummins *et al.*, 2018). These were also included in the quantitative synthesis displayed in table 4.1.

Five studies using exclusively qualitative methods (Wang and Theodoraki 2007; Flintoff, 2008; Eime and Payne, 2009; Makinen *et al.*, 2016; Dashper *et al.*, 2019) and four review studies (Priest *et al.*, 2008; Weed *et al.*, 2012, 2015; Lindsey and Bacon, 2016) were set aside to provide contextual information that illuminates the findings of the quantitative studies. Details of these studies are provided in appendix A3.

Studies were conducted most commonly in the United Kingdom (UK), which accounted for 10 of the 13 papers in the quantitative synthesis (77%) (Bolton and Martin, 2013; Bullough *et al.*, 2015; Kokolakakis *et al.*, 2015; Chen and Henry, 2016; Verhoef *et al.*, 2016; Weed, 2016, Cummins *et al.*, 2018 ; Higgerson *et al.*, 2018, Ikramullah *et al.*, 2018). Other countries in which studies of the impact of sport policies were identified were Finland, the United States of America, Germany, and Russia. The most commonly utilised data was from visits to swimming or leisure centres and data from the Active People Survey (APS) which collected data on sport participation from 2005 and to 2016 in the UK.

4.4.3 Quantitative data synthesis

Seven distinct policy actions with supporting evidence were identified. These were grouped into four ‘policy areas’ inductively generated (Table 4.1). The four policy areas were ‘Facilities (1 action), ‘Financial’ (2 actions), ‘Collaboration’ (2 actions) and ‘Exhortation’ (2 actions). The evidence for effectiveness of policy on PA outcomes is presented by 14 evidence codes

distributed across the seven policy actions. The direction of effects for all studies that reported results based on quantitative data are summarised in table 4.1.

Table 4.1 Data synthesis.

FACILITIES			QR
Build multipurpose sport infrastructure and facilities	+	Ishkineeva and Ozerova, 2017	29%
		Ståhl <i>et al.</i> , 2002	73%
		Cummins <i>et al.</i> , 2018	86%
	?	Weed, 2016	56%
FINANCIAL			
Provide free access for identified target groups (under 16s and over 60s or people on benefits)	+	Higgerson <i>et al.</i> , 2018	75%
	?	Bullough <i>et al.</i> , 2015	33%
		Verhoef <i>et al.</i> , 2016	77%
		Bolton and Martin, 2013	59%
	-	Kokolakakis <i>et al.</i> , 2015	57%
Provide a voucher programme subsidising structured PA and sports	+	Foley <i>et al.</i> , 2021	
COLLABORATION			
Fund programmes that collaborate with county sports partnerships to increase sport participation in hard-to-reach groups	?	Ikramullah <i>et al.</i> , 2018	43%
Promote detailed shared use agreements	+	Slater <i>et al.</i> , 2014	83%
EXHORTATION			
Combine free access with outreach measures	+	Higgerson <i>et al.</i> , 2018	75%
Leverage sporting mega-events to promote physical activity	?	Chen and Henry, 2016	53%

Abbreviations: QR = Quality Rating

4.4.3.1 Facilities

Within this policy area evidence for a single policy action ‘build sport facilities’ with four evidence codes (36%) was found. Significant positive evidence of effect was reported by three

studies (Ståhl *et al.*, 2002, Ishkineeva and Ozerova, 2017, Cummins *et al.*, 2018) and one study (Weed, 2016) reported outcomes for a time series analysis without a significance test.

4.4.3.2 *Financial*

Accounting for 6 of the 14 codes (43%), the most frequently studied policies were attempts to promote sport participation by manipulating the financial barriers to entry. In this policy area, three distinct policy actions were identified, including the highly studied action ‘Provide free access for identified target groups’ (5 codes). The evidence for this action was equivocal with one study declaring that the intervention increased PA in hard-to-reach or disadvantaged groups (Higgerson *et al.*, 2018) and one study asserting that the policy had an overall negative effect on adult participation arguing that the programme led to a displacement of regular attendees, who exhibited a greater level of engagement (Kokolakakis *et al.*, 2015). A further three studies investigated the provision of free swimming opportunities without a significance test associated with changes in participation or PA behaviour. However, one study identified free swimming as a cost-effective policy action from a health system perspective due to the health benefits caused by increased PA behaviour (Verhoef *et al.*, 2016). A further study declared an increase in participation from baseline (Bolton and Martin, 2013) while one study found that a free-swimming initiative increased attendance by existing members but did not result in increased participation of new swimmers (Bullough *et al.*, 2015).

A study by Foley and colleagues (2021) investigated the state action of providing vouchers to subsidise structured PA including sport to children and adolescents. The vouchers were valued at up to 100 Australian Dollars. The study found a significant positive effect of the intervention over 6 months but concluded that more work is required to reduce inequities in participation.

4.4.3.3 *Collaboration*

There were two policy actions within this policy area each with a single evidence code (14% of all evidence codes). One study (Ikramullah *et al.*, 2018) reported on the success of the ‘Sportivate’ policy in the UK. The Sportivate initiative was aimed at increasing participation by funding community sports partnerships to focus on key target demographics in certain key target demographics, young people, women and girls and people with disabilities. The study demonstrated that Sportivate had immediate success in increasing participation figures but that

participation outcomes started to stagnate. They conclude that there were shortcomings with regards to the programme's sustainability. Another study (Slater *et al.*, 2014) investigated the policy of cities and private organisations entering into agreements with schools to use their facilities to run sports programmes. This study reported a small significant increase in PA which increased if the contract contained specific provisions such as specifying which facilities can be utilised at which times. This area was evaluated by studies deploying a qualitative design with Flintoff (2008), Eime and Payne (2009) and Mäkinen and colleagues (2016) evaluating policy initiatives seeking to harness the sport sector for participation goals. A common theme of these studies was the difficulty of steering the sports clubs to emphasise priority targets of the policymakers. This area was also the subject of a review by Lindsey and Bacon (2016). The review concluded that initiatives designed to increase youth sport participation through establishing sport partnerships lacked innovation in these initiatives, and there was a lack of evidence of impact on participation.

4.4.3.4 *Exhortation*

The two actions in the policy area 'public interest in sport' each had an individual code, representing 14% of the available evidence. Chen and colleagues (2016) sought to leverage an event, the 2012 London Olympics, by implementing a competitive Workplace Challenge Programme (WCP) to increase participation in sport and PA. The WCP had a cash prize and was reported as successfully increasing sport and PA participation, though without a significance test. As noted, Higgerson and colleagues (2018) examined the combination of a free swimming initiative (mentioned above) with media outreach measures. In addition to the quantitative evidence provided, a qualitative study (Wang and Theodoraki, 2007) that investigated attempts to promote sports participation through a sporting mega-event, by building sports facilities and training sports instructors reported that stakeholders were satisfied that there was an effect on sport participation. However, these efforts had drawbacks such as exacerbating an existing disparity of sport participation opportunities between urban and rural areas. Furthermore, two review studies (Weed *et al.*, 2012; 2015) investigated policy actions that attempted to drive sport participation utilising the London Olympics. They concluded that hosting the Olympics can affect sport participation patterns if appropriate policy actions aimed at harnessing the events were implemented prior to the games (the so-called 'pregnancy period'). However, the studies

conclude that the main effect seems to be on people who are moderately active in sport or who have been active in the past.

4.5 Discussion

This review identifies areas with underlying policy actions within sport settings which have been shown to increase PA or sport participation. This discussion will consider how interactions with contextual factors might have limited the effectiveness of policy actions. An important concept is the ‘inequality paradox’ (Allebeck, 2008; Frohlich and Potvin, 2008). The inequality paradox is a critique of health promotion interventions which seek to reduce health risks across the entire population (the population-based approach). According to Frohlich and Potvin (2008) persons who are at a lower risk of adverse health outcomes are better positioned to respond positively to population-based interventions. This has the adverse consequence of increasing inequality in health outcomes. Frohlich and Potvin advocate complementing population-based approaches with so-called vulnerable population approaches. Vulnerable populations are defined as ‘populations that share social characteristics that put them at higher risk of risks’ (Frohlich and Potvin, 2008, p. 2). The size of these unintended consequences may vary between polities depending on the underlying characteristics of a population to which policy interventions are applied.

The European Commission has described the sports movement as a tool for enhancing PA with ‘a greater influence than any other social movement’ (European Commission, 2007). However, some academic commentators have expressed scepticism about the ability of sport policy as a tool for public health amongst the segments of the population who are vulnerable to inactivity (Coalter 2013; Spaaij *et al.*, 2015). Weed (2016), who provides the efficacy model that is assumed throughout this review, notes that while the efficacy model of sport participation is well supported, the effectiveness of sport policy is not. Weed (2016) also highlights a trend of PA increasing in the United Kingdom despite stagnant sport participation levels as second tier evidence suggesting that prioritising policies designed to increase sport participation may be detrimental to the agenda of increasing PA levels. It is argued that policies that promote sport participation come with an opportunity cost. The view taken in this review, however, is that insufficient PA is a complex public health problem that requires many actions across many

sectors. This is in line with ISPAHs recommendation to promote PA through eight different best investments as part of a systems-based approach (ISPAH). Adopting this perspective, promoting PA through sport participation should be regarded as complementary to other policy actions rather than obstructive.

A further concern is raised by the arguments of Coalter (2013) who states that participation in sport may be ‘epiphenomenal’. In essence, participation in sport is contingent on structural factors that are outside of the influence of traditionally conceived sport policy, such as social class. This is supported by Spaaij and colleagues (2015) who argued that sport is a site of reproduction of social stratification. Further, as mentioned in the introduction, there is a substantial literature on social determinants of sport participation (Hartmann-Tews, 2006; Downward, 2007; Hovemann and Wicker 2009; Scheerder and Vos, 2011). Hence, supporting participation in sport may have implications for the equity of PA outcomes.

4.5.1 Facility availability

The most popular action identified was to supply sport facilities. A cross-sectional study by Ståhl and colleagues (2002) found that the area corresponding to the former East Germany, which pursued a policy prioritising elite athlete development, had fewer sport sites per inhabitant than countries, like Finland and West Germany, that pursued a sport for all policy. Similarly, in Russia, a cross-sectional study documents a correlation between growth in sports infrastructure and participation (Ishkineeva and Ozerova, 2017). These suggest that building sport facilities is an effective policy to increase participation in these formerly Eastern Bloc states.

However, Weed (2016) has argued that the policies of increasing the stock of facilities undertaken in the UK in the 1970s may have increased participation only in persons who are already interested in sport. This suggests that direct provision of sport facilities may be an ineffective, and expensive, intervention when ‘latent demand’ for sport infrastructure is satiated. Furthermore, this intervention will not stimulate participation in the most inactive populations. The data presented by Weed (2016) does suggest, however, that the policies of building of facilities pursued between 1977 and 1990 coincided with an increase in sport participation. Taken together, these studies suggest that the geographical context, the availability of facilities, limited sport participation opportunities, and hence PA and that public policy of building and

increasing access was successful in ameliorating this factor. However, the utility of this policy is limited by the proportion of the population who display willingness to use the facilities, determined by socio cultural factors.

This is in line with other literature that suggests that broadening the range of possible activities, and including the opportunity for individualised, non-competitive or non-traditional forms of recreation, may be an effective approach (Lindsey and Bacon, 2016). A second strategy identified in a review of sports initiatives in the UK was local consultation while planning the development and provision of activities (Audrey *et al.*, 2012). This was identified as particularly important for targeting ‘semi sporty youths, who may have a narrow range of sporting interests (Lindsey and Bacon, 2016).

4.5.2 Financial barriers and incentives

The other policy action which was frequently cited in the literature identified in this review was reducing the financial constraints associated with sport participation. Utilising the CICI framework this action may be regarded as an attempt to use policy to reduce the socio-economic barriers to participation. The most popular action was to eliminate fees for certain target subpopulations (persons under 16 or over 65) in local authority-owned facilities and in swimming pools. Studies of the determinants of sport participation suggest that promoting swimming may be an effective way of achieving high population levels of PA. Swimming is popular with groups who are less likely to participate in sport, for example, females and people with children who are of school age or in infancy (Downward, 2007; Downward and Riordan, 2007).

As detailed above, the findings from different studies of the benefits of Free Swimming Initiatives (FSIs) launched first in Wales in 2003 and then in England in 2009, are somewhat contradictory. Encouragingly, several studies indicate FSIs stimulated attendance by people who were not habitual swimmers before the introduction of the policy (Bolton and Martin, 2013, Kokolakis *et al.*, 2015, Higgerson *et al.*, 2018). However, Bullough and colleagues (2015) contradict the finding that uptake is primarily in new participants, arguing that the greatest impact is on ‘market penetration’ (frequency of swimming) rather than ‘market development’

(uptake by new participants), although this study received a lower quality rating than the other studies assessing the impact of FSIs.

The tentative conclusion drawn from these contradictory results is that the policy is somewhat effective in removing barriers to participation. Kokolakis and colleagues (2015) identify elevated levels of participation in civic and cultural activities as a characteristic of the regular participants who were displaced in their study by new participants. Therefore, based on the evidence reviewed, we suggest that the policies of providing free access effectively targets socio-economic aspects of access and participation but are limited by socio-cultural factors such as self-segregation. Therefore, there is an argument for its implementation to improve equity in PA outcomes but they should be considered as part of a package of measures. There is a further caveat that increasing the frequency of participation may be more difficult than uptake.

Another intervention that utilises financial incentives is voucher programmes to incentivise sport and PA participation. This was reported as significantly effective in increasing PA in children aged four to 18 (Foley *et al.*, 2021). The effect appears uniform across demographics though the authors note that children of more disadvantaged socioeconomic backgrounds were underrepresented in the cohort.

4.5.3 Organised sports may not hold the keys to the kingdom

Sports clubs are organisations whose core business is engaging people in sporting activity. Previous research has revealed a strong association between club membership and the odds of participating in at least mostly intensive sports and PA (Grix *et al.*, 2013). As Heinemann (2005) argues, sports often receive public subsidies which guarantee their existence. Therefore, funding arrangements could also be utilised to support the government's welfarist goals in their activities. This review presents evidence of the effectiveness of policy actions that attempted to take advantage of this circumstance to steer sports organisation towards priority target groups. However, there is some evidence that sports clubs have limitations in their ability to promote health via increased PA.

Ikramullah and colleagues (2018) argue that to ensure sustainability of programmes like Sportivate, policymakers should consider that organisational resources and capacity might limit

the deliverer's ability to realise the participation outcomes demanded. The qualitative papers included in this review concur and provide greater detail on the mechanism underlying the reported difficulty steering sports organisations to target particular demographics such as young people or underrepresented groups. Broad reform of organised sports in Finland failed to achieve a shift in focus in line with the government's priorities and hence failed to substantially impact the performance targets set out by the government (Makinen *et al.*, 2016). Indeed, sports federations in Finland increased their fundraising activities, reducing the contribution of public performance-based funding to their budgets. Similarly, an Australian study reports that a government-funded initiative to promote sports uptake by linking community sports clubs and schools was hampered by 'a lack of interest' by sports clubs in sending their 'overworked volunteers' to run school clinics (Eime and Payne, 2009).

These findings suggest that a top-down approach where the public authority attempts to steer sports organisations in their preferred direction have not been successful due to factors relating to power and the ability of these organisations to summon the required resources; in essence, the political context. However, providing organised sport with greater freedom to pursue its agenda may not be an effective way to achieve sport for all outcomes either. Flintoff reports issues with the development of activities by a school sport partnership that was established in the UK as it was dominated by competitive activities which have 'traditionally been viewed as "male" sports'. Furthermore, persons responsible for implementation were opposed to targeted approaches believing it was 'unfair and 'unworkable'. Flintoff notes that a feature of successful sport programmes is that participants choose to attend (Flintoff, 2008). Furthermore, studies have demonstrated that sports clubs are more successful in attracting membership from higher-income families (Eime *et al.*, 2013) and people from higher occupational classes (Carmichael *et al.*, 2013). This indicates that there are socio-cultural factors influencing whether organised sports will struggle to influence hard to reach or unmotivated people.

Objections made by clubs over capacity issues and the profiles of active club members support arguments made by some commentators that the essential purpose of sports clubs is incongruous with sport for all policy goals (Coalter, 2013). However, alternatives to organised sports are increasing in prominence. Studies of participation note that more flexible forms of participation outside of the membership of traditional sports organisations are becoming more common

(Heinemann, 2005; Deelen *et al.*, 2016). The recognised trend of ‘individualisation’ supports the claim made by several authors who have reported that increases in participation in underrepresented groups can be driven by opportunities outside of the traditional sport sector (Theeboom *et al.*, 2010; Coalter, 2013). While this may increase PA, this trend implies that these groups, and the community at large, will not benefit from social opportunities that membership in organised sports can provide.

4.5.4 Stimulating demand

Discussion has thus far been limited to actions that may reduce the barriers to sport participation. However, Kokolakis and colleagues (2015) point out that it is simplistic to assume that the population is inherently motivated to participate in sport and PA. Actions that have sought to stimulate desire to participate in sport and PA have frequently been centred around sports events. These events have been used as a window of opportunity to increase investment in sport. One study (Chen and Henry, 2016) reports that an initiative seeking to leverage the 2012 London Olympics by promoting sports in the workplace had positive effects, while two others report increased sport participation rates (Wang and Theodoraki, 2007) and reduced risk of inactivity (Cummins *et al.*, 2018) following development work in anticipation of the Beijing and London Olympics respectively.

A review of the evidence for a ‘demonstration effect’ on sport participation from hosting the Olympics reported that an event, if properly leveraged in the period immediately prior to hosting, can inspire greater frequency of sport participation and reengagement of lapsed sport participants (Weed *et al.*, 2015). However, the study cautions that such efforts are unlikely to inspire new participants to sport.

4.6 Limitations

There are reasons to recommend that the findings are interpreted with caution. Pawson (2006) describes policy evaluation research as a cottage industry characterised by research units who depend upon research commissions. Evidence of the effectiveness of policies to promote sport participation may therefore be dependent on what research evaluation is commissioned leading to a piecemeal body of evidence. Furthermore, research may be collected and evaluated without

resulting in a scientific publication. This review, however, only considers evidence published in academic journals. Therefore, our conclusions should be considered with a recognition of the limitations of data availability. A recommendation for future research is that particular actions, such as a policy of building facilities or subsidising access to leisure facilities, are explored with reviews utilising realist methods described by Pawson (2006). According to Pawson, realist reviews go beyond merely answering ‘what works’ in order to answer the more intricate question ‘what works for whom under what circumstances’ (Pawson, 2006; p. 25). A point of difference between realist methods and traditional reviews is that realist reviews make greater use of administrative and grey literature to explore the particular circumstances of a policy or programme.

A potential second limitation is the strong representation of studies from the United Kingdom, with ten studies in the quantitative synthesis investigating the impact of policy actions in the UK during the period between 2004 and 2015. A reason so many studies originate from the UK may be that this corresponds to the period immediately before and after the hosting of the 2012 London Olympics, allegedly the first Olympics to target widespread participation (Weed *et al.*, 2015). While the studies in this review report broadly positive outcomes the overall rate of participation in sport in the UK was relatively stagnant during this period (Weed, 2016). This would suggest that the objective of using the Olympics to increase participation was a failure. However, it is possible that an even more important factor determining sport participation during this period was the macroeconomic policies of severe austerity which were imposed on the UK by successive governments post 2008. These policies led to reduced spending on social benefits and local authority spending on programmes similar to those described in this review (Audrey *et al.*, 2012). It has been suggested that about 40% of the population are stubbornly resistant to participation in sport in the United Kingdom (Weed, 2016). This figure reflects the European average for non-participation, though some countries have lower levels. It has been suggested that the class structures of a society may be a powerful contextual factor that limits what sport policy can achieve (Coalter, 2013). The context of hosting the London Olympics, the period of austerity and the particular class structure of the United Kingdom are all contextual factors that limit the generalisability of the findings of this review.

4.7 Conclusion

The review suggests that there are policy actions that can increase sport participation. This finding is based on studies of generally moderate quality. Building sports facilities, reducing financial constraints and stimulating demand through sports events have all demonstrated qualified success. However, there is evidence that sports policies are more effective in increasing participation frequency in moderately active persons with a moderate level of inherent motivation than in stimulating participation in the least active. A theme that emerged is that while increasing the supply of sports opportunities can reduce the barriers to participation in people who are at least moderately motivated, the effectiveness of this approach will be impacted by the number of people in the population who are unmotivated to participate in sport. Furthermore, policy actions that have achieved some success in reaching less active groups, such as initiatives providing free access to certain target demographics, may have the effect of stimulating participation in some demographics while displacing others. Targeting the factors that facilitate motivation to participate in these demographics may be an effective way to increase overall sport participation. Unfortunately, the measures that have facilitated interest in participation (e.g. harnessing sports events like the Olympics) seem to be less effective in unmotivated subgroups. It has been theorised that unmotivated people do not relate to people that are presented as role models for sport participation. Studies on policy interventions that can effectively target the unmotivated are lacking thus far. A general conclusion is that there are identifiable reasons by which policies promoting traditional sports are likely to be ineffective in various demographics. It is recommended that future policy actions support participation in informal and flexible forms of recreational activity are explored as trends identified by van Bottenburg et al., (2005), Theeboom and colleagues (2010), Coalter (2013) and Weed (2016) indicate this may be where future gains are realised and mechanisms identified by Flintoff (2008) and Lindsay and Bacon (2016) demonstrate that these activities may have greater potential in promoting PA in groups underrepresented in competitive sports. Furthermore, it is recommended that the sports environment is considered as a subsystem alongside other policies designed to promote PA as part of a broader systems perspective.

4.8 Other systematic reviews undertaken using the protocol presented in chapter three

As mentioned in the chapter overview, three other reviews (corresponding to the Education, Transport and Mass Media domains) were also completed to inform the development of the PA-EPI. The ‘Education’ review (into policy actions in school settings) was completed and published in 2021, prior to the completion of the ‘sport’ review. This review was an opportunity for me to learn the methods and procedures for conducting systematic reviews and I was heavily involved in data collection and analysis. The ‘Transport’ and ‘Mass Media’ reviews were published after the ‘sport’ review. I had a supporting role and supplied critical feedback on these reviews. The abstracts of these three reviews are presented in the appendices alongside references for the published study manuscripts and statements of contribution signed by the first author on each study (appendix A1).

These reviews informed the GPSs of the PA-EPI. For example, the wording of the first GPS of the PA-EPI (‘evidence informed, quality mandatory physical education that promotes and supports the ideals of equity, diversity and inclusion and adheres to defined standards is part of the curricula in all schools’) was influenced by a recommendation from the Education review which highlighted the importance of a mandatory minimum time in PE and adherence to specific PE standards. The wording of each GPS of the PA-EPI was revised several times, in a process outlined in chapter five, using evidence from different sources including the systematic reviews (where evidence was available) and the grey policy literature.

Chapter 5 The Physical Activity Environment Policy Index for monitoring government policies and actions to improve physical activity (Paper three)

This chapter is based on a manuscript¹¹ which was published in the European Journal of Public Health. The reference is given below.

Manuscript three

Woods, C.B., Kelly, L., Volf, K., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Den Braver, N.R., Żukowska, J. and García Bengoechea, E., 2022. The Physical Activity Environment Policy Index for monitoring government policies and actions to improve physical activity. *European journal of public health*, 32(Supplement_4), pp.iv50-iv58.

Statement of Contribution

KV contributed to this study as follows:

- Contributed to data collection by assisting with the identification and review of policy documents.
- Assisted in the development of the questionnaires utilised for consultation with academic and policymaking experts.
- Participated in the workshops in which the wording of the Good Practice Statements (GPSs) was agreed.
- Contributed to critical revision of the study manuscript.

¹¹ Similar to chapter 4, some minor changes have been made. The subsections have been numbered in line with the rest of the thesis. The words “[see appendix A7]” has been added to subsection 5.3. The words “on determinants of PA” have been removed from the description of the Horodyska and colleagues (2015) study.

Chapter Overview

The aim of the research presented in this chapter was to develop the final PA-EPI framework and tool. The development process involved integrating the evidence collected from the systematic reviews (described in chapter four) with evidence from a review of policy documents. A prototype PA-EPI was developed based on the structure of the INFORMAS Food EPI. This prototype consisted of a list of candidate GPSs for the final PA-EPI. Based on consultation with academic and policy experts the wordings of the GPSs were finalised, and the final list of GPSs was reduced to 45. The PA-EPI framework and tool was conceived with an associated process for utilising the framework in mind. This process is described briefly in this chapter and expanded upon in subsequent chapters.

Contribution of the chapter to the state of the art and to the thesis

Previous chapters have highlighted that there is a gap in our knowledge concerning policies that are effective in promoting PA. The research described in this chapter led to the creation of the PA-EPI framework and its 45 GPSs. In light of the different types of evidence utilised to develop them, the GPSs of the PA-EPI represent a scientific consensus on which public policies governments should preferably use in promoting PA.

The PA-EPI framework also enables future research. The PA-EPI GPSs are designed to allow policy in a polity area? under study to be compared to international best practice. This can be done on a Likert-type scale allowing the relative extent of public policy implementation to be quantified. This provides a more nuanced and informative picture than a measure that conceives of implementation as a simple binary (implemented / not implemented). The process for utilising the PA-EPI has major benefits for PA research and advocacy which are detailed in subsequent chapters.

Therefore, the development of a final PA-EPI framework was necessary to answer the first research question of the thesis (regarding policy effectiveness) and to enable the research required to answer the second research question.

5.1 Published abstract

Background: A multifaceted response, including government action, is essential to improve population levels of physical activity (PA). This article describes the development process of the ‘Physical Activity Environment Policy Index’ (PA-EPI) monitoring framework, a tool to assess government policies and actions for creating a healthy PA environment.

Methods: An iterative process was undertaken. This involved a review of policy documents from authoritative organizations, a PA policy audit of four European countries, and a systematic review of scientific literature. This was followed by an online consultation with academic experts (N = 101; 20 countries, 72% response rate), and policymakers (N = 40, 4 EU countries). During this process, consensus workshops were conducted, where quantitative and qualitative data, alongside theoretical and pragmatic considerations, were used to inform PA-EPI development.

Results: The PA-EPI is conceptualized as a two-component ‘policy’ and ‘infrastructure support’ framework. The two-components comprise eight policy and seven infrastructure support domains. The policy domains are education, transport, urban design, healthcare, public education (including mass media), sport for all, workplaces and community. The infrastructure support domains are leadership, governance, monitoring and intelligence, funding and resources, platforms for interaction, workforce development and health-in-all-policies. Forty-five ‘good practice statements’ or indicators of ideal good practice within each domain conclude the PA-EPI. A potential eight-step process for conducting the PA-EPI is described.

Conclusions: Once pre-tested and piloted in several countries of various sizes and income levels, the PA-EPI good practice statements will evolve into benchmarks established by governments at the forefront of creating and implementing policies to address inactivity.

5.2 Introduction

Worldwide, 71% of all deaths are attributed to non-communicable diseases (NCDs) (World Health Organization 2020b), with the combined burden of physical inactivity, poor (quality) diet and high body mass index accounting for 11.9% of disability adjusted life years in 2019 (GBD 2019 Risk Factors Collaborators 2020). The World Health Organization's (WHO) Global Action Plan for the prevention and control of NCDs 2013–20 set a target of a reduction of NCD-related mortality by 25% by the year 2025 and identified increasing population levels of physical activity as necessary to achieve this goal. The importance of addressing physical inactivity as a public health priority has grown, as evidenced in the establishment of the Active Healthy Kids Global Alliance,(Active Healthy Kids Global Alliance 2021) the Global Observatory for Physical Activity (GoPA!)(Varela *et al.*, 2017); and the European Union/WHO PA factsheets to monitor the state of PA surveillance, research and policy worldwide (Whiting *et al.*, 2021; World Health Organisation Regional Office for Europe 2021). The 74th World Health Assembly in April 2021, a midpoint evaluation of the WHO NCD action plan, documented good progress at a country level regarding the introduction of national policies for PA, but minimal progress on addressing population levels of physical inactivity (WHO, 2021). Indeed, trend data over the last decade show no reduction, at a national and global level, of the high proportion of the population that remains inactive or do not meet WHO PA guidelines, of at least 150 min moderate-to-vigorous PA per week for adults (Guthold *et al.*, 2018). The WHO Global Action Plan on Physical Activity 2018–30 has set a target of a 15% relative reduction in the prevalence of population inactivity by 2030 and linked the promotion of PA to the UN's Sustainable Development Goals (WHO, 2018).

A substantial body of literature exists on solutions that can potentially address this inactivity challenge. An ecological and multi-level, (Swinburn *et al.*, 1999; Sallis *et al.*, 2006) as well as a comprehensive whole system approach (WHO, 2018) has been recommended. These approaches have been used previously to successfully reduce the use of tobacco products (Institute of Medicine, 2001) and develop food environments supportive of healthy dietary behaviours (Swinburn *et al.*, 2013b). To address physical inactivity, a 'healthy' PA environment is paramount. The PA environment is defined, for the purpose of this article, as the collective physical, economic, political and sociocultural contexts, opportunities and conditions that influence one's PA choices and behaviours. An unhealthy PA environment may be caused by a

lack of ‘upstream’ policy progress in domains known to have a positive impact on PA behaviour, and when combined with a lack of effective infrastructure support for policy implementation (Swinburn *et al.*, 2013b), then the inactivity pandemic (Kohl *et al.*, 2012) is likely to sustain, as the ‘system’ or environment remains unchanged despite best ‘downstream’ or programmatic efforts. To better understand the PA policy environment, we selected eight policy domains, representing multiple sectors, based on the ISPAH’s Eight Investments that work for PA (ISPAH, 2020). ISPAH provides good evidence of effectiveness for each of these domains, and a rationale for investment in these areas due to their worldwide applicability and their potential to tackle inactivity if addressed comprehensively through a systems approach. These domains are transport, urban design, education, healthcare, community-wide programmes, sport and recreation for all, workplaces and public education. Public policy interventions can help with the creation of a supportive environment for PA (Swinburn *et al.*, 1999). Government policy action can use a systems approach to leverage and integrate multiple sectors—such as those listed above—in partnership to create a healthy PA environment with sustainable effects. However, there is a knowledge gap regarding how to independently assess government progress in implementing public policies within these domains to create this healthy PA environment.

The public sector refers to all levels of government, from international to local, and while we mainly refer here to national governments, our findings can also be applied to sub-national levels, where relevant. Policies are defined as ‘decisions, plans, and actions that are enforced by national or regional governments or their agencies (including at the local level), which may directly or indirectly achieve specific (health) goals within a society’ (Lakerveld *et al.*, 2020). While policy research in the field of physical activity and public health is relatively recent, there has been a rapid growth in research describing national policy approaches to PA. This has shown that many countries worldwide have formal written PA policies, guidelines, monitoring systems and national PA targets (Klepac Pogrmilovic *et al.*, 2020). A recent survey of officials representing national ministries in the EU Physical Activity Focal Point Network indicated that governments appreciate regular, systematic and comparative monitoring of their national PA policies (Tcymbal *et al.*, 2022). According to the focal points, results from monitoring systems are useful to take stock of the situation in their own countries, to gain insights into developments in other countries, to foster communication between sectors and to develop for national policy. However, knowledge of the status, implementation and effectiveness of policies that can promote

PA at a country level is still limited, with no clear guidance on which policies governments should preferably use in different settings or under various preconditions (Gelius, *et al.*, 2021). In addition, research on the role of sub-national or local government in the implementation of these national policies, or indeed in locally developed policies to promote PA, is inadequate (Noël Racine *et al.*, 2020). Research is needed on what constitutes best practice public sector policies to promote PA, and on how to evaluate their impacts and their level of implementation (Klepac Pogrmilovic *et al.*, 2019).

The Comprehensive Analysis of Policy on Physical Activity (CAPPa) was developed to guide research related to PA policy analysis. It consists of six categories including purpose of the analysis, policy level, policy sector, type of policy, stage of policy cycle and scope of the analysis (Klepac Pogrmilovic *et al.*, 2019). A follow-up systematic review identified several instruments for the purpose of PA policy auditing (the documentation of the presence or absence of policies and their component parts), and for assessment of national-level PA policies (Klepac Pogrmilovic, *et al.*, 2019). However, the authors noted that none of the instruments covered all six components of the CAPPa framework (Klepac Pogrmilovic *et al.*, 2019). Additionally, no reference was made to instruments that would facilitate evaluation of implementation of public sector policies related to PA, independent of government.

The ‘Policy Evaluation Network’ (PEN) is a multi-disciplinary research network established for the monitoring, benchmarking and evaluation of policies that affect diet, PA and sedentary behaviour with a standardized approach across Europe (Lakerveld *et al.*, 2020). This manuscript is based on learnings from the INFORMAS Food-EPI, (Swinburn *et al.*, 2013b) adapted to answer the question ‘How much progress have governments made towards good practice in improving the PA environment and implementing physical inactivity/NCD prevention policies and actions?’ This involved the development of the first ‘Physical Activity Environment Policy Index’ (PA-EPI), which this article describes. The PA-EPI is a tool that can be used to monitor and benchmark public sector PA policies and actions, the latter involving a panel of experts independent of government policy makers. This article also outlines the projected steps in the use of the PA-EPI to compare government policies, over time and across countries, to stimulate actions to improve the healthiness of the physical activity environment. These steps are modelled

after the INFORMAS monitoring framework (Swinburn, *et al.*, 2013a) currently used in 30 countries worldwide (see: <https://www.informas.org/countries/>).

5.3 Development of a PA-EPI framework for monitoring government policies and actions

Overall, the development of the PA-EPI involved an iterative process consisting of four steps. Step 1 involved desk-based research on key policy documents, PA policy audits and a scientific literature review, to generate the PA-EPI framework and create a draft PA-EPI monitoring tool. An online consultation process was organized for step three involving academic experts and policymaker experts to revise and refine, as appropriate, the PA-EPI monitoring tool. Throughout the process, PEN consensus workshops were undertaken to synthesize the information generated (steps two and four). The four steps are further detailed below:

Step 1: Policy document review, policy audit and scientific literature synthesis

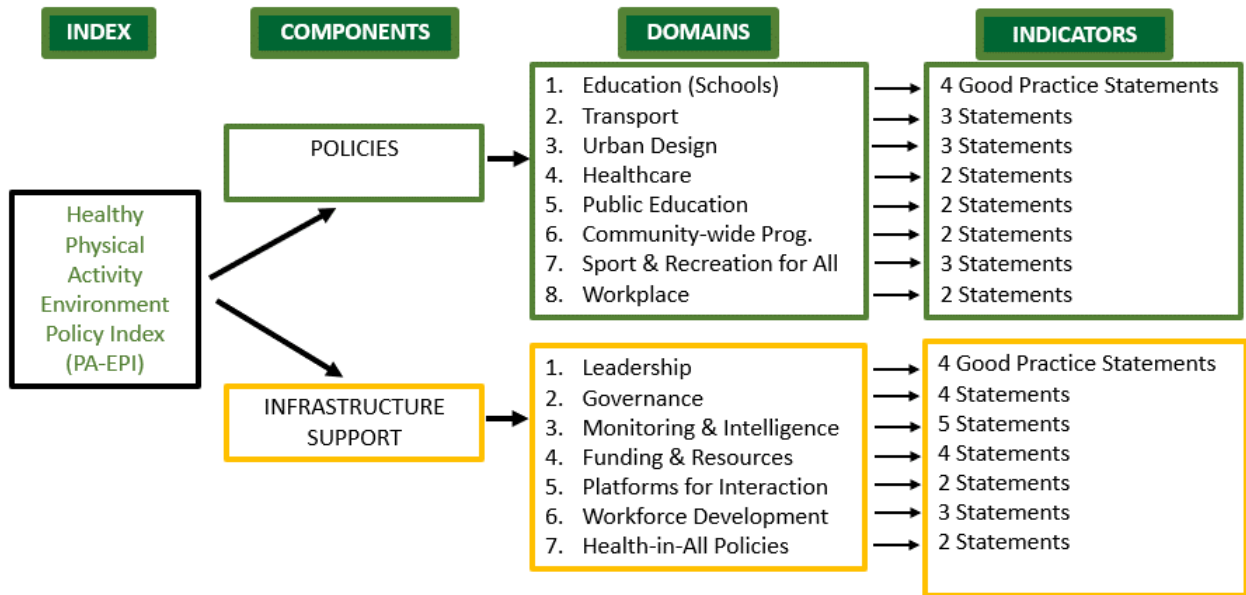
Three methodologies were used, (i) policy document review, (ii) policy audit and (iii) a review of the scientific literature. Using tacit knowledge of the research team and in consultation with PEN experts, we identified and reviewed policy documents, such as authoritative evidence-based reports or expert committee documents on the promotion of PA from international and supranational organizations (e.g. WHO, UNESCO, World Health Assembly and Council of Europe), national government agencies (e.g. Departments of Health, Sport, Transport etc.), global non-government organizations (e.g. World Cancer Research Foundation) and professional societies (e.g. International Society of Physical Activity and Health) for their recommendations in relation to improving the PA environment and PA behaviour (see appendices). In addition, to understand the status of PA policy development more fully, we audited national PA policies in four European countries using the HEPA PAT, a tool provided by WHO that facilitates a country-specific situational analysis and international comparison (Gelius *et al.*, 2021). This provided us with a detailed knowledge of governments' policy-making structures and how they engage in agenda-setting, policy formulation, decision-making, policy implementation and policy evaluation. It also allowed us to identify key PA policymakers for the online consultation phase of the PA-EPI development. In parallel, to assess the level and quality of peer-reviewed support for the impact of public policies on PA, we consolidated the evidence from existing literature

reviews, including from the DEDIPAC systematic reviews (e.g. Horodyska *et al.*, 2015) and where gaps were found, we undertook new reviews of empirical (Woods *et al.*, 2021; Volf *et al.*, 2022; Żukowska *et al.*, 2022) and an umbrella review (Den Braver *et al.*, 2022). PEN researchers mapped, reviewed and synthesized all policy actions and recommendations from these three methodologies during an extensive inductive and deductive process. This led to the development of the PA-EPI framework.

Step 2: PEN consensus on the PA-EPI framework prototype

The proposed PA-EPI framework was conceptualized as including two-components ‘policy’ and ‘infrastructure support’. Within the framework’s two components, eight policy and seven infrastructure support domains were created (figure 5.1). The policy domains align with ISPAH’s ‘Eight investments that work for physical activity’, (ISPAH, 2020) and are education, transport, urban design, healthcare, public education (including mass media), sport for all, workplaces and community. The infrastructure support domains align with those of the INFORMAS Food-EPI, (Swinburn *et al.*, 2013b) and are leadership, governance, monitoring and intelligence, funding and resources, platforms for interaction, workforce development and health-in-all-policies. The latter were based on the existing WHO system-building blocks (WHO, 2007a), with an additional ‘health in- all-policies’ (or ‘policy alignment’) domain added to emphasize the importance of considering health in the development of non-health policies (WHO, 2007b). Each of the 15 PA-EPI domains contains an ‘ideal good practice’, as well as examples of ‘good practice statements’ (or indicators of this ideal good practice). These statements were formulated following consensus workshops by the PEN researchers, based on the specific recommendations derived from the three methodological processes described above, and using an iterative process. Thus, 15 examples of ideal good practice, comprised of 53 good practice statements (30 for the policy domain and 23 for infrastructure support) were included in the prototype PA-EPI framework.

Figure 5.1 The PA-EPI framework (including the final number of good practice statements for each domain (N = 45))



Step 3: Academic and policymaker expert consultation

A strength of the formulation of the PA-EPI good practice statements was their foundation in policy documents, policy practice and/or scientific evidence. However, for added rigor and credibility, a further expert consultation with individuals beyond the PEN network was deemed necessary. Ethical approval was obtained from the Research Ethics Committee of the Faculty of Education and Health Sciences, University of Limerick (2021_03_04_EHS [see appendix A8]), and with participant consent, we conducted an online consultation process with academic and policymaker experts. Academic experts were identified through the PEN network and authorship of publications identified in Step 1. Inclusion criteria were substantial track record (number of years of experience and/or number of peer-reviewed publications) in PA policy research and/or in policy domain specific policy research. Policymaker experts were recruited from the four PEN countries who completed the HEPA PAT (Gelius *et al.*, 2021) in Step 1 (Ireland, Germany, The Netherlands and Poland). A quota sampling technique (Sharma, 2017) was used with the aim of having at least one policymaker per PA-EPI policy domain, ideally per country. Recruitment involved emailing each expert to invite them to participate in the consultation process.

The online consultation had two aims. Aim 1 was to gather opinion and advice regarding the formulation and the evidence base for the ideal good practice and the good practice statements, consequently only academic experts were invited. Every identified expert was invited to complete an online PA-EPI survey, this involved reading each statement and recommending its inclusion or removal from the PA-EPI tool. If the statement was recommended for inclusion, experts could select 'should be totally changed', 'kept with some adaptation' or 'kept without change'. For each response, experts provided a rationale and suggestions on alternative wording, where relevant. Academic experts (N=101) from 20 countries were invited; 72% (n=73) replied, and of this number, 71% (n=52) completed, 19% (n=14) partially completed and 10% (n=7) declined to complete the survey. Experts provided 885 qualitative comments and this data were used to improve the wording of the good practice statements. Feedback from experts also requested greater clarity on terminology, on the intended/desired PA-EPI policy level to be addressed (national or sub-national), and on the implementation/evaluation aspect of the PA-EPI. Full analysis of expert responses determined a decrease in the PA-EPI policy domain good practice statements from 30 to 26, while the infrastructure domain statements increased from 23 to 26 statements. This revised tool formed the basis for the next phase, of the online consultation.

The second aim of the online consultation was to reduce the number of good practice statements further based on both academic and policymaker evaluation of each statement for its importance, feasibility and ease of assessment for improving the PA environment and/or PA behaviour. A 10-point Likert scale was used to evaluate each statement on (i) its importance for increasing population levels of PA (relatively unimportant to extremely important), (ii) how feasible (practical, achievable) it is for governments to implement this good practice statement (relatively unfeasible to extremely feasible) and (iii) how easy it is for governments to assess the extent of implementation of the good practice statement (not at all easy to assess to very easy to assess). Experts could also provide feedback on the tool overall. All 66 academic experts who consented to Stage 1 of the online consultation were invited to Stage 2, and 75% (n=50) participated. For policymakers, our aim was to have at least one national policymaker per policy domain per country. More PA policy experts in the traditional health (n=16), sport (n=7) and education (n=5) policy domains, in comparison to the less traditional areas of transport (n=2), urban design (n=2), community (n=4), public education (n=3) or workplace (n=0) were recruited. Overall, with 40 policymakers contributing, we were confident in the policymaker reviews of the

good practice statements based on the consultation criteria. Table 5.1 shows the policy and the infrastructure support domain median scores by group across the criteria of importance, feasibility and ease of assessment. Data analysis placed 21 good practice statements below the median in all three criteria, importance, feasibility and ease of assessment, for both groups (appendix A7) and were therefore removed from further analysis.

Table 5.1 Domain good practice statement (median) scores following Academic and Policymaker Expert Consultation. Note: I, importance; F, feasibility; A, ease of assessment.

Policy domains	I	F	A	Median	I	F	A	Median
Education	9.1	7.3	7.3	8.0	8.6	7.0	6.6	7.3
Transport	9.0	7.0	7.4	7.9	8.4	7.0	6.5	7.2
Urban design	9.0	6.4	6.8	7.4	8.6	6.0	5.9	6.8
Sport & Recreation for All	8.1	6.8	6.8	7.2	8.3	7.2	6.6	7.4
Healthcare	8.2	6.4	6.6	7.1	8.0	6.6	6.0	6.8
Public education/mass media	7.5	6.8	6.	6.9	7.5	6.8	6.3	6.9
Workplace	8.1	6.3	6.4	6.9	8.1	6.7	6.0	6.8
Community	7.9	6.4	6.0	6.8	8.3	7.1	6.7	7.3
Policy domain median	8.2	6.6	6.7	7.2	8.3	6.9	6.4	7.0
Infrastructure support domains								
Leadership	8.9	7.0	7.2	7.8	8.4	7.0	6.7	7.4
Monitoring and intelligence	9.2	7.0	7.0	7.7	8.3	6.6	6.5	7.2
Workforce development	8.5	6.9	6.9	7.4	7.9	6.2	6.2	6.8
Funding and resources	8.8	6.1	7.1	7.3	8.1	6.3	6.5	7.0

Health-in-all policies	8.8	6.0	6.1	7.0	6.0	8.1	5.8	6.0
Governance	8.5	6.4	5.9	6.9	8.0	7.2	6.8	7.3
Platforms for interaction	8.3	6.1	5.9	6.9	7.7	5.6	5.6	6.5
Infrastructure support domain median	8.8	6.4	6.9	7.3	8.0	6.6	6.5	7.0
Overall median	8.7	6.7	6.8		8.2	6.8	6.4	

Step 4: PEN consensus on the PA-EPI framework and monitoring tool

Upon completion of the consultation, a full-day online consensus workshop took place amongst PEN researchers to review academic and policymaker data and reach consensus on the final good practice statements to be included in the PA-EPI. Criteria for good practice statement inclusion involved a review of (i) quantitative data (i.e. median scores obtained from the online consultation), (ii) qualitative data (from the online consultation), (iii) theoretical considerations for tool representativeness of policy and infrastructure domains (a minimum of two good practice statements per domain was agreed) and (iv) pragmatic concerns with regard to the usability of the tool vs. evidence for statement inclusion. The overall conceptualization of the PA-EPI framework remained unchanged from its prototype (figure 5.1), as well as its two-components ‘Policies’ (with eight domains) and ‘Infrastructure support’ (with seven domains). The consensus workshop led to an agreement on the formulation of the 15 PA-EPI domains’ ideal good practice, and on 45 good practice statements. All were deemed important, feasible and assessable according to the academic experts, policymaker experts and the PEN research team involved in the development process.

5.4 The resulting PA-EPI framework

All PA-EPI domains were deemed relevant to evaluating government progress towards good practice in improving the PA environment and PA behaviour by implementing respective policies and actions. Table 5.2 presents the final formulation of ideal good practice within the PA-EPI policy domains of education, transport, urban design, healthcare, community-wide programmes,

sport and recreation for all, workplaces and public education (including mass media). This provides the context within which to address the inactivity challenge, in part through policy action. The PA-EPI good practice statements, which are the indicators of ideal good practice are also presented in table 5.2 and provide a monitoring tool for assessment of implementation of policies and actions in which programmes or environmental changes within these settings can be tendered, developed, financed and carried out (Gelius *et al.*, 2020). Within the infrastructure support domain, the WHO ‘system building blocks’ are represented (WHO, 2007a). Table 5.3 outlines ideal good practice and the good practice statements for the PA-EPI infrastructure support domains. These include leadership, governance, monitoring and intelligence, funding and resources, platforms for interaction, developing workforce capacity and health-in-all-policies and are aligned with the Food-EPI, though tailored to PA. Each is a responsibility for governments and statements of good practice call for accountability, transparency, citizen participation, regularity and adequacy in relation to monitoring, resourcing, development and promotion of PA for all.

Table 5.2 PA-EPI policy domains and statements of good practice (n = 21)

Domains	Proposed good practice in each domain	Proposed good practice statements
Education (schools)	There are public policies implemented that aim to impact on healthy physical activity environments and promote and support physical activity within the school setting.	<p>E01–evidence informed, quality mandatory physical education that promotes and supports the ideals of equity, diversity and inclusion and adheres to defined standards is part of the curricula in all schools.</p> <p>E02–national and/or sub-national initiatives are in place to promote and support school-related physical activity both at school and in other settings. These initiatives should employ an inter-sectoral approach and collaborative multi-agency partnerships (e.g. links with out-of-school sports clubs, active breaks/recess and walking clubs).</p> <p>E03–there are shared use agreements that utilize school spaces. Community access is supported by initiatives to promote and support opportunities for physical activity for all persons outside of normal school hours.</p> <p>E04–national and/or sub-national policies are in place to promote and support safe active travel to and from school.</p>
Transport	There are public policies to promote and support active mobility for people of all ages and abilities.	<p>T01–regulations are in place that provide a variety of infrastructures to support safe walking and/or cycling and/or wheeling, including measures to calm speed, reduce vehicle traffic and enhance active mobility.</p> <p>T02–there is a funded implementation plan, led by the appropriate level/s</p>

of government, to achieve improvements in active travel and increased use of public transport.

T03—guidelines and tools to support infrastructure for active mobility and/or transport plans and systems that encourage physical activity are promoted and disseminated.

Urban design There are public policies enacted at appropriate level/s of government to ensure that evidence-informed urban design principles are implemented to promote and support physical activity and active mobility for people of all ages and abilities.

UD01—policies or regulations that take a ‘health in all’ approach are adopted to reallocate space from motorized transport to active travel and/or recreation purposes.

UD02—governments adopt land use policies, and planning processes, consistent with principles of mixed land use, compact urban design and/or provision of green open spaces to support physical activity and reduce motorized transport.

UD03—there are guidelines and/or regulations that improve universal and equitable access to safe outdoor and indoor spaces and facilities where people can be physically active.

Healthcare Public policies implemented within healthcare settings promote and support physical activity, e.g. by providing guidelines and regulations, applying digital health technologies and targeting at-risk groups like older adults.

H01—guidelines and regulations in healthcare include routine screening for physical activity and, for all insufficiently active patients, brief advice and referral to appropriately trained practitioners and/or physical activity opportunities.

H03—there are consistent policies for promoting and supporting physical activity in primary and secondary healthcare settings among at-risk groups, such as people with type 2 diabetes and older adults (e.g. protocols for the assessment of the physical activity capacity; accessible, affordable and tailored physical activity programmes; and training for caregivers for delivering physical activity programmes within residential aged care).

Public
education/mass
media

There are national and/or sub-national public policies implemented to ensure enactment of media/education campaigns that actively promote and support increasing physical activity levels for all ages and abilities.

MM01—there are national and/or sub-national public policies in place that ensure media and education campaigns that promote, and support physical activity are sustained and monitored (e.g. by making them part of, or aligning them with, a national action plan on physical activity and the physical activity guidelines).

MM02—there are clear, consistent policies to ensure that multiple media modes/channels (e.g. via posters, social media, radio as well as TV) combined with complementary community initiatives are used to promote the benefits of physical activity and disseminate guidelines, which align with the WHO physical activity recommendations.

Community

There are policies and programmes that promote and support physical activity for all ages and abilities, consistent with relevant recommendations, e.g. by supporting the implementation of whole-of-community events and approaches and promoting the shared use of public spaces

C02—public policies are in place to support the implementation of whole-of-community approaches to promote physical activity and networking to strengthen resources and exchange experiences (e.g. WHO Healthy Cities, Active Cities, Partnerships for Healthy Cities).

and facilities.

C03—there are public policies in place to foster partnerships for shared use of public spaces and facilities for community-based and community-led physical activity programmes.

Sport &
Recreation for
All

There are evidence-informed public policies implemented to promote and support sport and recreation for all.

SP01—there are national and/or sub-national evidence-informed ‘Sport and Recreation for All’ policies that prioritize investment in initiatives that target the least active, as well as disadvantaged groups.

SP02—there are national and/or sub-national evidence-informed policies or action plans in place that ensure equitable access to sport and recreation spaces and places for all.

SP03—there is government support for programmes designed to encourage sports clubs to promote health-enhancing physical activity and other health behaviours (e.g. ‘sports clubs for health’ and ‘health promoting sport clubs’).

Workplace

There are national and/or sub-national policies implemented related to the workplace that promote and support increasing physical activity (e.g. cycle to work initiatives, physically active workplaces) and promote a culture of health for all employees.

W01—there are national and/or sub-national policy initiatives and infrastructure development programmes in place to promote and support safe active travel to and from the workplace.

W02—there are concepts and regulations for buildings, plots and the environment in place that promote and support employers to create physically active workplace environments through building design and

provision of adequate facilities (both indoor and outdoor).

Table 5.3 PA-EPI infrastructure support domains and statements of good practice (n = 24) adapted from the Food-EPI (Swinburn, Vandevijvere, et al., 2013)

Domain	Proposed good practice in each domain	Proposed good practice statements
Leadership	The political leadership ensures that there is strong support for the vision, planning, communication, implementation and evaluation of policies to create health-promoting policy environments to improve population physical activity and reduce related inequalities.	<p>L01—there is strong, visible, political support (at the head of state/cabinet level) for creating health-promoting policy environments to improve population levels of physical activity and reduce inactivity related non-communicable diseases and their related inequalities. Political responsibility for health-related physical activity is clearly allocated within the governmental structures.</p> <p>L02—there is a comprehensive up-to-date plan (including timeline, targets, funding, priority policy and programme strategies) linked to national needs and priorities to increase population physical activity.</p> <p>L03—priorities are given to reduce inequalities in relation to inactivity related non-communicable diseases in the comprehensive plan (above).</p> <p>L04—there are clearly defined, evidenced informed population physical activity guidelines for all age groups and for people living with non-</p>

communicable diseases, pregnant women and people with disabilities.

Governance	There are government structures in place to ensure transparency and accountability and encourage broad community participation when developing and implementing policies and actions to create healthy physical activity environments and improve population physical activity.	<p>G01—there are reliable procedures to restrict commercial influences related to physical activity environments where there are conflicts of interest with improving population physical activity levels (e.g. restricting lobbying influences that limit physical activity opportunities).</p> <p>G02—there are procedures in place for using evidence in the development of physical activity policies.</p> <p>G03—the government ensures access to and regular dissemination of physical activity guidelines and key documents to the public.</p> <p>G04—the government fosters the cooperation and coordination of all sectors to align with strategic plans to improve the physical activity environment, and where appropriate, promotes civil society participation to develop and implement these plans.</p>
Monitoring and intelligence	There is regular monitoring of population physical activity levels and physical activity environments, systematically linked to the regular monitoring of physical inactivity related non-communicable diseases. Ideally, monitoring should be consistent over time, integrated and occur annually, with more extensive surveys at least every 5 years (e.g. to allow data analysis across all jurisdictions, priority groups). Additionally,	<p>MI01—there is regular monitoring of physical activity levels across the life-course based on representative samples, against guidelines/standards/targets.</p> <p>MI02—there is regular monitoring of physical activity environments across all eight policy domains (e.g. walkability and built environment).</p>

policies and major programmes should be evaluated regularly.

MI03–physical activity monitoring is systematically linked to the regular monitoring of non-communicable diseases and their related inequalities.

MI04–there is regular research and evaluation of policies and major programmes to assess their effectiveness, process and impact on achieving the goals of the physical activity and health plans.

MI05–progress towards reducing health inequalities related to social and economic determinants of physical activity is regularly monitored.

Funding and resources

Government funding to support physical activity promotion and research is clearly identified, monitored and sufficient. It is aimed at improving population PA levels, creating active environments, counteracting non-communicable diseases and reducing inequalities.

FR01–the budget spent on physical activity promotion across all policy domains is clearly identified and periodically monitored.

FR02–there is a sufficient proportion of total health spending assigned to population physical activity promotion.

FR03–a sufficient proportion of total research spending is assigned to population physical activity promotion.

FR04–a secure funding stream is available for at least one statutory health promotion agency with an objective to improve population physical activity.

Platforms for

There are coordination platforms and opportunities for synergies across government departments, levels of government

PI01–there are robust coordination mechanisms across departments and levels of government to ensure policy coherence, alignment and

interaction and other sectors (e.g. National Government Organizations, private sector and academia) such that policies and actions in physical activity are coherent, efficient and effective in improving environments, population physical activity, reducing inactivity related non-communicable diseases and their related inequities.

integration of physical activity, and inactivity related non-communicable disease prevention policies across governments.

PI03—there are structures and mechanisms for regular, meaningful and inclusive interactions between government and civil society (academia, professional organizations, public-interest, non-governmental organizations and citizens) on physical activity policies and other strategies to improve population physical activity and health.

Workforce development Governments have set up systems that provide a platform for population physical activity expertise to ensure that the formulation, implementation and evaluation of physical activity policies and programmes meet population needs.

WD01—to address the challenge of population physical inactivity, there are sufficient resources and people with necessary skills within the government’ s workforce (across all eight policy domains).

WD02—opportunities for training and professional development are provided to relevant individuals across multiple sectors (e.g. the eight ‘Policy’ domains) regarding the fundamentals of physical activity, its role in public health and effective strategies for physical activity promotion.

WD03—support and training systems are in place for relevant professionals (e.g. guidelines, toolkits, training workshops/modules/courses). To ensure uptake, accrediting agencies for professional education, and professional licencing entities should include minimum requirements for initial and continuing education in this domain.

Health-in-All
policies

There are processes in place to ensure policy coherence and alignment, and that population health impacts are explicitly considered in the development of all relevant government policies.

- HIAP01—there are processes in place to ensure that population physical activity and related health outcomes are explicitly and transparently considered and prioritized in the development of all government policies.
- HIAP02—there are processes (e.g. health impact assessments) to assess and consider health impacts during the development of policies indirectly related to physical activity.

5.5 Potential process for applying the PA-EPI

Emulating the INFORMAS process developed for the Food-EPI (figure 5.2), the process of conducting the PA-EPI could involve eight steps: (i) analyse context (national or sub-national), (ii) collect relevant information to generate an ‘evidence document’ of implementation of policies and actions by using the PA-EPI good practice statements, (iii) evidence-ground the policies and actions, (iv) validate the evidence with government officials, (v) rate the implementation of policies and actions using the PA-EPI, (vi) weigh, aggregate and calculate the PA-EPI score, (vii) qualify, comment and recommend and (viii) translate the results for government and stakeholders (for more details see: (Swinburn *et al.*, 2013b). The purpose of an ‘evidence document’ is to showcase government progress and provide concrete examples as evidence of action or inaction on policy implementation. Conducting the PA-EPI would involve establishing a ‘national coalition’, a group of non-government public health and/or other domains stakeholders to manage the process or, alternatively, select or nominate an existing public health NGO or association to take the lead. This group would rate their government’s recent progress on the creation of a healthy PA environment that is the degree of implementation of policy and infrastructure support in their country against the international best practice for the PA-EPI good practice statements. A 4-point scale for the assessment of level of implementation is used by the Food-EPI (Djojoseparto *et al.*, 2022). This scale attributes scores of high, medium, low or none/very little implementation to each good practice statement depending on the quality—strength and comprehensiveness—of the information provided in the evidence document in comparison to international best practice. Ideally, this benchmarking would be a regular, and if possible national event, with scores collated and disseminated publicly. Government ministers and their staff would be sent their scores and rankings, highlighting examples of good progress by their government as well as areas for development to change ill practice to good practice and/or to match or exceed other countries or states. The Active Healthy Kids Global Alliance (Active Healthy Kids Global Alliance, 2021) and the Global Observatory for Physical Activity (Varela *et al.*, 2017) are related initiatives; however, their remit is broader as they monitor global progress in PA surveillance, research over time, with policy indicators as only one of many aspects surveyed. The PA-EPI has a more comprehensive focus on policy. Specifically, it assesses current levels of policy implementation rather than recent progress over

time, as the latter may disadvantage governments that already made good progress in the past. However, these initiatives are useful for generating media coverage and responses from bureaucrats and politicians. The Food-EPI has already shown how this process is valuable for stimulating discussion and action nationally (Djojosoeparto *et al.*, 2022).

Figure 5.2 Process for assessing the policies and actions of governments to create healthy physical activity environments and determining the government Healthy PA-EPI (adapted from Swinburn *et al.*, 2013b)



However, country-specific adaptations might be necessary to account for differences in political culture, to achieve a maximum of stakeholder involvement to build policy capacity, and to ensure high-level political support for an adequate policy response. Initial applications of the PA-EPI should consider these issues, reflect upon and test different options for conducting the PA-EPI and identify their specific strengths and weaknesses. Changing the PA-EPI will compromise comparability and this will also need to be considered. The final step in assessing the level of government policy implementation in the proposed monitoring framework is to combine implementation indicators from all domains across both components into one summary index. Using learnings from INFORMAS and other indexes designed to monitor progress in public health challenges, the relative weighting for each domain and aggregation of individual scores according to defined criteria will assist in this process (Swinburn, *et al.*, 2013b).

5.6 Future developments and implementation considerations

This article builds on existing work (Swinburn, *et al.*, 2013b) and, to the authors' knowledge, is the first attempt at developing a tool that aims to assess the extent of implementation of

government policies and actions, with the goal of creating a policy index to assess the healthiness of the PA environment. The conceptual framework and the good practice statements are sufficiently detailed and specific to be used in future PA-EPI rating workshops. However, the final PA-EPI will need to support each good practice statement with specific ‘definitions and scope’ (intended to reduce ambiguity when assessing whether the good practice was implemented successfully), and with examples of international best practice that demonstrate successful implementation of policies that promote PA. These could evolve over time to become benchmarks for monitoring purposes.

Environment policy index development is a dynamic process. As evidence is gathered internationally on the extent of policy implementation by governments at the forefront of the creation of healthy PA environments, concrete examples of best practice are expected to emerge, yielding international benchmark exemplars of best practice. Over time, these benchmarks will strengthen, as governments strive to progressively enhance PA environments, as has been the case for food environments (Djojosoeparto *et al.*, 2022) and tobacco control (WHO, 2003).

The Food-EPI has shown that the process of conducting an environment policy index is a relatively simple process for small countries (e.g. Ireland) or countries with a not strongly pronounced federalism. It can be more complex for larger countries and countries with federal structures without central authority (e.g. Germany) (Swinburn, *et al.*, 2013b). Where the responsibility for PA policies is covered by different levels of government, e.g. federal, state and/or local authorities, the implementation of the PA-EPI tool may be more challenging and may require adaptation to cater for the specific needs of the country. In addition, application of the PA-EPI beyond Europe warrants evaluation. The proposed PA-EPI will also need to be tested for functionality, usability, policy relevance, reliability and robustness. The good practice statements and the mechanisms for allocating ratings (as described above), while advised by the Food-EPI process, will require further development in terms of clarity and testing with the proposed national coalitions and government officials. This will also require additional funding and resources to carry out the exercise efficiently and sustainably.

In time, while the primary aim of the PA-EPI is to assess the extent of implementation of government policies and actions to create healthy PA environments, it may also be used for

country comparison or benchmarking government policies. A strength of the proposed practice is that, instead of setting a theoretical standard which may never get implemented into practice, a real world, real time comparison can be made by rating the extent of implementation of government action against existing international best practice. This has succeeded in catalysing action in the food environment, where 12 countries and the European Union have all completed a Food-EPI and have compared best practice between countries. Pilot testing the instrument in high-, medium- and low-income countries will provide insight into the extent that good practice can be made comparable across countries. Like the Food-EPI, the PA-EPI will likely continue to evolve as benchmarks get higher and higher, i.e. a score achieved 1 year may not imply the same level of policy implementation as the same score in the next, because the goalposts will keep moving. Regular updated versions of the good practice statements will be required to keep pace with the changing benchmarks and to improve comparability across countries. Additionally, systems for ensuring quality control and comparability of PA-EPI scores across countries will also need to be considered.

5.7 Conclusions

PA promotion has become an important agenda point for public health agencies. However, the implementation of PA policies poses a few important questions, not least concerning who is responsible for putting policy into practice. The PA-EPI framework includes a ‘policy’ and an ‘infrastructure support’ component. Within the policy component there are eight policy domains and within infrastructure support there are seven domains. Each domain has an ‘ideal good practice’, which is underpinned by several good practice statements or indicators. Together they comprise the PA-EPI, a mechanism for monitoring the extent of implementation of government policies and actions to create healthy PA environments. The proposed PA-EPI enables national and international benchmarking and comparisons of public sector policies. It will help identify the major implementation gaps and prioritize actions needed to address critical gaps in government policies and infrastructure support for implementation. This will, in turn, assist in holding governments accountable for their role in the development of a healthy PA environment.

Chapter 6 Assessing the implementation of physical activity-promoting public policies in the Republic of Ireland: A Study using the Physical Activity Environment Policy Index (PA-EPI; Paper four)

This chapter is based on a manuscript which was published in the academic journal *Health Research Policy and Systems*¹². The reference for this publication is given below.

Manuscript four

Volf, K., Kelly, L., Van Hoye, A., García Bengoechea, E., MacPhail, A., Woods, C.B. and PEN Consortium, 2023. Assessing the implementation of physical activity-promoting public policies in the Republic of Ireland: a study using the Physical Activity Environment Policy Index (PA-EPI). *Health Research Policy and Systems*, 21(1), p.63.

Statement of Contribution

KV contributed to this study as follows:

- Led on data collection by searching for evidence of policy implementation and creating the evidence document.
- Led on the development and distribution of all questionnaires circulated to policymakers and independent stakeholders.
- Conducted all data analyses.
- Organised the workshop.
- Led on writing the manuscript and dissemination materials and responding to peer review.
- Is lead author and submitted the manuscript for publication.

¹² As with the previous published chapters, the subsections have been numbered in line with the rest of the thesis. The words [appendix A8] have been added in the methods section.

Chapter Overview

The purpose of this chapter is to present the first study to utilise the PA-EPI and its findings. The study involved a multi-stage process which combined desk-based searches for policy evidence with online consultation and workshops. These research activities had several outputs: an evidence document detailing the evidence of implementation for each of the 45 GPSs in Ireland, a PA-EPI score card which describes the extent to which the PA-EPI GPSs are implemented in Ireland in practice (relative to international best practice exemplars) and a list of priority recommendations for improving PA policy implementation in Ireland.

Contribution of the chapter to the state of the art and to the thesis

Research suggests that PA policy is often poorly implemented (Pratt, 2023). However, the extent to which effective policy has been implemented will vary from context to context. Further, in a particular context, some policy actions may be well-implemented while others may be poorly implemented. This creates ambiguity concerning which policies could be better implemented and where.

The research in this chapter provides resources for understanding policy implementation in Ireland. An evidence document showcasing, inter alia, international Best Practice Exemplars (BPEs) for PA policy and Ireland's PA policies and their implementation was created. The evidence of implementation, and of implementation gaps, was presented to policymakers in Ireland. A list of priority implementation recommendations was developed in collaboration with informed PA stakeholders in Ireland and presented to policymakers. At time of writing several of these recommendations are being enacted. The research in this chapter answers the second research question of the thesis: *how have these policies been applied in the Irish context?*

6.1 Published abstract

Background: Government policy can promote physical activity (PA) as part of a multilevel systems-based approach. The Physical Activity Environment Policy Index (PA-EPI) is a monitoring framework which assesses the implementation of government policy by drawing on the experience of national stakeholders. This study is the first to assess the extent of policy implementation in the Republic of Ireland using the PA-EPI tool, and to provide information on how policy implementation can be improved, with the intention of maximising its impact on population levels of PA.

Methods: This mixed methods research study, comprising eight steps, was carried out in 2022. Information documenting the evidence for implementation of PA policy, across all 45 PA-EPI indicators, was collected via systematic document analysis, and validated via survey and interview with government officials. Thirty-two non-government stakeholders rated this evidence on a 5-point Likert scale. Aggregated scores were reviewed by stakeholders who collectively identified and prioritised critical implementation gaps.

Results: Of the 45 PA-EPI indicators, one received an implementation rating of “None / Very Little”, 25 received a rating of “Low” and 19 received a “Medium” rating. No indicator was rated as fully implemented. The indicators that received the highest level of implementation related to sustained mass media campaigns promoting PA and PA monitoring. Ten priority recommendations were developed.

Conclusions: This study reveals substantial implementation gaps for PA policy in the Republic of Ireland. It provides recommendations for policy action to address these gaps. In time, studies utilising the PA-EPI will enable cross country comparison and benchmarking of PA policy implementation, incentivizing improved PA policy creation and implementation.

Keywords: Physical Activity, Public Policy, Implementation Science; Benchmarking; Stakeholder Participation

6.2 Introduction

Physical activity (PA) contributes to reduced mortality (Ekelund *et al.*, 2016) improved mental health outcomes (McDowell *et al.*, 2019; Gianfredi *et al.*, 2020), lower burden of disease from non-communicable diseases (Katzmarzyk *et al.*, 2022) (NCDs) and from infectious diseases (Sallis *et al.*, 2021). PA participation has also been linked to social outcomes such as increased happiness (Castellanos-García *et al.*, 2022) and social capital (Fu *et al.*, 2018). Hence, enabling people to engage in PA provides opportunity for people to exercise a greater element of control over their own health and wellbeing.

In light of these health and social benefits, the WHO has published global targets seeking to promote PA (WHO, 2018). The Global Action Plan on Physical Activity (GAPPA) aims for 15% relative reduction in inactivity by 2025 (WHO, 2018). However, studies of trends in PA levels reveal that inactivity levels have remained stubbornly unchanged thus far in the twenty-first century (Hallal *et al.*, 2012; Guthold *et al.*, 2018). This suggests that if these trends continue, the GAPPA target will not be met (WHO, 2022). Therefore, new strategies for supporting healthy PA behaviours are required (Guthold *et al.*, 2018).

It has been argued that strategies targeting the so-called ‘upstream’ barriers to PA should be pursued (Lakerveld *et al.*, 2020). In essence, this requires a strategy of building and implementing public policy (WHO, 1986; 1988) in the domain of PA. Theoretical support for this idea comes from ecological models, widely used in public health research (Golden *et al.*, 2015), which highlight the importance of policy action (for example: Sallis and colleagues (Sallis *et al.*, 2006)). Empirical support comes from review studies which identify social and environmental factors which influence population PA levels (Woods *et al.*, 2021; Den Braver *et al.*, 2022; Volf *et al.*, 2022; Żukowska *et al.*, 2022). These findings suggest that policy action is necessary to affect changes to these environments to empower people to engage in healthier PA behaviours. Policy actions have been defined by Kelly and colleagues as “actual options selected by policymakers. Public policy actions are specific actions put into place by any level of government or associated agencies to achieve the public health objective. They may be written into broad strategies, action plans, official guidelines/notifications, calls to action, legislation or rules and regulations. A policy action may have its own exclusive policy document or may be

part of a larger document.” (Kelly *et al.*, 2022)[iv14] The WHO began to issue PA policy guidance documents in the mid-2000s (Gelius *et al.*, 2022) and the number of policies promoting PA has increased (Klepac Pogrmilovic *et al.*, 2019), with over 90% of countries globally having a national PA policy, though evidence exists that PA policy is not effectively operationalised (Sallis *et al.*, 2016; Klepac Pogrmilovic *et al.*, 2020).

Alongside the rise in national PA policies, there has been a concomitant rise in the number of scientific publications concerning PA policy since the mid-2000s. This indicates the development of PA policy research as a scientific field (Rütten *et al.*, 2016; Klepac Pogrmilovic *et al.*, 2019). The maturing of PA policy research is also evidenced by the development of tools like the WHO’s Health Enhancing Physical Activity Policy Audit Tool (Bull *et al.*, 2015; HEPA PAT), which facilitates comparative policy research, or the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework which categorises PA policy research according to purpose of analysis, policy level under analysis, policy sector, type of policy, stage of the policy cycle and scope of the analysis (Klepac Pogrmilovic *et al.*, 2019).

Rütten and colleagues (2016) highlight that there have been relatively few studies into how policymaking processes influence PA policy interventions. An example of how the policy process can influence PA intervention is through the extent of policy implementation (in essence, the processes by which policies are put into effect (Howlett *et al.*, 2009) [p12]). Research is needed to examine the extent to which policies that exist on paper are implemented in practice.

The Physical Activity Environment Policy Index (PA-EPI) is a monitoring framework recently developed to assess government policies and actions for creating a healthy PA environment (defined as the ‘context, opportunities and conditions that influence one’s PA choices and behaviours’ (Woods *et al.*, 2022) [p4]). The process of developing and validating the PA-EPI framework is described by Woods and colleagues (2022). The PA-EPI is conceptualised as a two-component ‘policy’ and ‘infrastructure support’ framework. The two components comprise eight policy and seven infrastructure support domains. The policy domains are education, transport, urban design, healthcare, public education (including mass media), sport for all, workplaces and community. The infrastructure support domains are leadership, governance, monitoring and intelligence, funding and resources, platforms for interaction, workforce

development, and health-in-all-policies. Forty-five ‘good practice statements’ (GPS) or indicators of ideal good practice within each domain concludes the PA-EPI. The eight-step process of conducting the PA-EPI will allow countries to identify areas of strength and weakness in the implementation of their national PA promoting policies, and potential actions needed to address critical implementation gaps. The PA-EPI results will provide data and examples of good practice in PA policy implementation, and it is envisaged that in time these examples will evolve to benchmarks as countries share knowledge and expertise on effective implementation processes.

The Republic of Ireland is the first country to have the extent of the implementation of its PA policies assessed using the PA-EPI. According to the Global Observatory for Physical Activity, less than half (46%) of the population of the Republic of Ireland engages in sufficient PA to meet health recommendations, and inactivity contributes to 8.4% of all deaths in Ireland (Ramirez Varela *et al.*, 2021). Identifying implementation gaps in the PA policy response is part of the solution to increasing the proportion of the population meeting the PA guidelines, and to reducing the impact of inactivity. This study has two aims: the first is to identify critical implementation gaps by assessing the extent of PA policy implementation in the Republic of Ireland, and the second is to identify and prioritise actions that can strengthen policy implementation in Ireland.

6.3 Methods

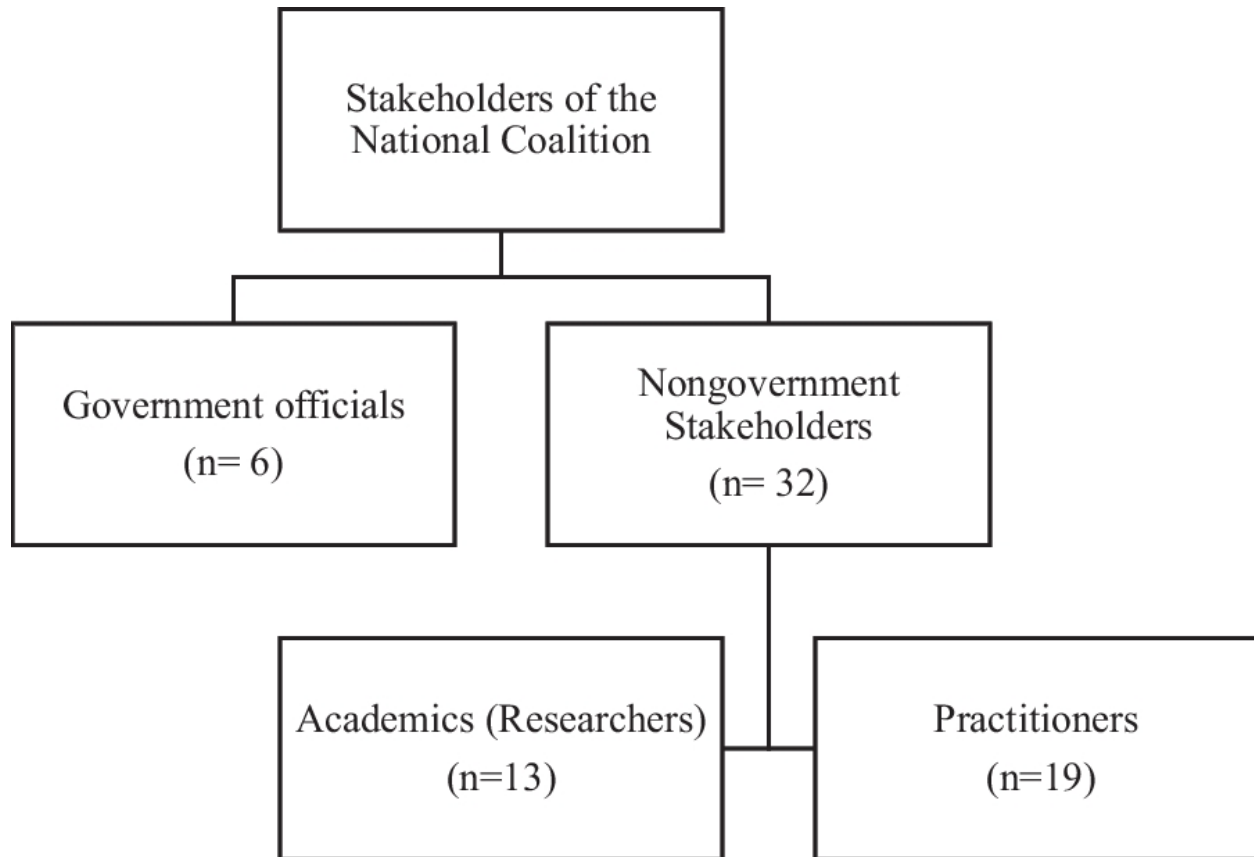
6.3.1 Study Design

This study is a sequential process, which combines both qualitative and quantitative methods. The INFORMAS network (International Network for Food and Obesity / Non-communicable Diseases Research Monitoring and Action Support, 2023b) developed the Food -EPI, on which the PA-EPI is based. They also designed a detailed eight step process for completion of the Food EPI, which has been accomplished in 40 countries worldwide (International Network for Food and Obesity / Non-communicable Diseases Research Monitoring and Action Support 2023a). Figure 5.2, see chapter five, presents this eight step process, which was adapted for completion of the PA-EPI (Woods *et al.*, 2022).

In brief, steps one to four involve the creation of an evidence document and its validation with government officials (see details below). Once complete and validated, quantitative data collection aimed at assessing the extent of implementation of the GPSs, using the evidence document, is undertaken by non-government PA stakeholders (step 5; see details below). From this ratings data, critical gaps in the implementation of PA policy are identified (step 6). The final two steps involve making recommendations for implementation actions (step 7), and dissemination of the PA-EPI results (step 8). Ethical approval for this study was necessary as steps four, five and seven required data collection from human subjects. Ethical approval was obtained from the Research Ethics Committee of the Faculty of Education and Health Sciences at the University of Limerick (2022_02_01_EHS) [appendix 8].

The recruitment of a coalition of national stakeholders, two mutually exclusive groups: government officials and a panel of non-government PA stakeholders is an important part of the PA-EPI process. The ‘government officials’ group include civil servants affiliated with governmental departments and high-ranking employees of state agencies. The inclusion of government officials is necessary to ensure that information on PA policy within the PA-EPI evidence document is comprehensive and accurate. The non-government PA stakeholders include researchers with knowledge of the PA environment and practitioners working for organisations promoting PA. The inclusion of non-government stakeholders supports engagement of civil society with the PA policy process (figure 6.1).

Figure 6.1 Categorisation of stakeholders



6.3.2 Study Procedure

To conduct the PA-EPI process in the Republic of Ireland, the eight steps briefly described above were followed.

Step One: Analysing Context

The first step of the process is to analyse the context of the country under study and decide which of the GPSs to utilise in the policy assessment and to begin drafting the evidence document. Some indicators of the PA-EPI may not be relevant for jurisdictions where there is substantial decision-making power devolved to subnational levels of government.

The Republic of Ireland is a unitary state with two levels of government, national and local level, established in accordance with Article 28A of the Constitution of Ireland. However, the local level of government has responsibility for a limited number of functions and its autonomy from national government is amongst the most limited in the EU (Ladner *et al.*, 2016). Due to the level

of involvement by national government for all indicators, the full list of PA-EPI indicators was retained without adaptation.

Step Two: Collecting Relevant Information

Step two involves collecting examples of implemented PA policies for each of the PA-EPI indicators from anywhere in the world. These were sourced from an analysis of WHO documents (for example, (World Health Organisation Regional Office for Europe 2018)), the academic literature and the PA policy experts consulted as part of the PA-EPI development process (Woods *et al.*, 2022). These examples are presented in the PA-EPI evidence document as Best Practice Exemplars (BPEs). They allow for comparison to the evidence of implementation to the country being studied, in this case the Republic of Ireland.

To collect national evidence of PA policy implementation in Ireland, several methods were used. Searches for evidence of implementation were undertaken in 2022. The first method was an audit of Ireland's policy context for PA using the WHO Health Enhancing Physical Activity Policy Audit Tool (HEPA PAT) (Gelius *et al.*, 2021). The HEPA PAT identified national policies pertinent to the promotion of PA, and provided information on the key policy documents (e.g. 'Get Ireland Active': Ireland's National PA Action Plan) and agencies (e.g., Sport Ireland, Healthy Ireland) tasked with policy implementation. The second method, supplemented the HEPA PAT evidence, with internet searches of webpages of government departments and state agencies. A third method, which occurred simultaneously with internet searches, was extensive snowballing using the documents already identified. This involved reference checks of the included documents as well as searches using the titles of the documents to identify related documents such as action plans or implementation reports. Details of how the three methods were combined are displayed in the appendices (appendix A9).

The following was considered suitable evidence for inclusion in the evidence document: excerpts from formal written policy documents, (including statutes, guidelines and curricula), information from the websites of government departments or state agencies, information from websites identified with initiatives or programmes cited in written documents and academic literature describing PA policy implementation in the Republic of Ireland.

The following evidence was excluded from the evidence document: evidence of policies of local government and policies of non-governmental bodies unrelated to public policy. Decisions on whether to include evidence in the evidence document were also informed by the wording and scope of the indicators, which is outlined in the evidence document.

Step Three: Evidence-grounding the Actions

The third step was to extract information from the policy documents identified to populate the 'Evidence of implementation in Ireland' sections of the PA-EPI evidence document. Documents were scanned for lists or tables (for example: lists of actions) and keyword searches were performed within the documents based on the wording of each GPS. This evidence of implementation identified was summarised in short paragraphs and presented as tables for each of the 45 GPSs. As per protocol, draft one of the Irish PA-EPI Evidence Document was reviewed repeatedly by the research team before being prepared for validation by government officials.

Step Four: Validating Evidence with Government Officials

A purposive sample of government officials from different departments and agencies of the civil service was identified based on their roles, and/or prior collaborations with the PA research community in Ireland. The government officials were civil servants who had acted as representatives for their departments and agencies at PA events and whose role was identified from publicly available information. The research team reached out to the government officials via email and asked them to ensure the completeness of the evidence document. The email contained a link to an online questionnaire developed using Qualtrics software. Participants were provided with information about the study by a video embedded on the first page of the questionnaire, followed by a request for informed consent. If participants required further information researchers answered their questions over a phone conversation. The questionnaire presented the government officials with the 45 GPSs of the PA-EPI, each on separate pages, above the evidence of implementation corresponding to the GPSs. Beneath the evidence of implementation, was a questionnaire item which allowed the government officials to indicate amendments that needed to be made to make the evidence of implementation comprehensive. An example of the questionnaire layout is provided in figure 6.2 (a and b). Six government officials

were contacted and four (two male, two female) provided feedback on the evidence document, resulting in 72 individual comments being made. The research team reviewed the comments and any relevant information identified as missing was carefully considered and added to a final draft of the evidence document.

Figure 6.2 a and b Example from questionnaire sent to policy-makers

a



T03 Guidelines and tools to support infrastructure for active mobility and/or transport plans and systems that encourage physical activity are promoted and disseminated.

National Cycle Manual

The National Cycle Manual (2011), published by the National Transport Authority aims to encourage more people to cycle for transport by improving the 'cycling offer'. The manual is a 226-page document with seven sections (The Basics, Legislation and Policy, Planning for the Bicycle, Designing for the Bicycle, Getting the Details Right, Maintenance, Tools and Checklists) for planners on how to incorporate cycling into transport systems (National Transport Authority, 2011). The working group for the draft manual included representatives from Kildare, Laois and South Dublin county councils, Limerick and Dublin city councils, the Dublin Transportation Office, the Quality Bus Network Project Office, the National Roads Authority and An Garda Síochana. It is available at the website: www.cyclemanual.ie.

Design Manual for Urban Roads and Street

The Design Manual for Urban Roads and Street (2013), prepared by the former Department of Transport, Tourism and Sport and the former Department of Environment, Community and Local Government, provides advice on prioritising vulnerable road users (i.e. pedestrians and cyclists) (Department of Transport, Tourism and Sport and Department of Environment, Community and Local Government, 2013).

References

1. The evidence provided for this statement is complete

2. The evidence provided for this statement is incomplete

b



If you selected option 2, please provide your reason(s) in this space.



Step Five: Rating the Government Policies and Actions using the PA-EPI

The fifth step was to assess the extent of implementation of the PA-EPI GPSs in the Republic of Ireland. A similar process to that used in the validation step was utilised for acquiring informed consent from participants in this step. Non-government PA stakeholders were identified either from their roles as researchers who have published on the topic PA in the Republic of Ireland or from their roles as PA promoters representing non-governmental organisations operating in Ireland. Non-government stakeholders were recruited via email and asked to complete an online questionnaire. Thirty-two individuals were contacted: thirteen were academics (41%) and nineteen of the non-government stakeholders were practitioners (59%). Practitioners included persons with a role promoting PA for local government or for non-governmental organisations. Sixteen non-government stakeholders (50%) rated the extent of implementation of the GPSs of the PA-EPI in Ireland. Participants who accessed the questionnaire were asked to rate the evidence of implementation for each of the GPSs on a five-point scale. Participants were also provided with a “cannot rate” option and the opportunity to comment on the implementation of each of the GPSs. An example of the format of the questionnaire is provided in figure 6.3.

Figure 6.3 Example from the implementation rating questionnaire sent to non-government stakeholders.



Good Practice Statement #25

Leadership 04 There are clearly defined, evidenced informed population physical activity guidelines for all age groups and for people living with non-communicable diseases, pregnant women, and people with disabilities.

International Good Practice Examples

France

The Government of France's guidelines (Actualisation des repères du PNNS - Révisions des repères relatifs à l'activité physique et à la sédentarité) are based on the WHO 2010 guidelines and contains recommendations for children (<5 years), Adults (18-64 years), Older adults(≥ 65 years), Frail and very elderly adults (≥ 85 years), Pregnant and breastfeeding women, People with disabilities, People with chronic diseases, Children and adolescents (5-17 years), and Postmenopausal women [WHO Europe physical activity fact sheet, 2018].

Evidence of Implementation in Ireland

The National Guidelines on Physical Activity for Ireland

The following guidelines for physical activity were issued by the Department of Health and Children and the Health Service Executive in 2009:

- "All children and young people [aged 2 - 18] should be active, at a moderate to vigorous level, for at least 60 minutes every day. Include muscle-strengthening, flexibility and bone-strengthening exercises 3 times a week" (Department of Health and Children and Health Service Executive, 2009 p10).
- Adults (aged 18-64) should engage in "at least 30 minutes a day of moderate activity on 5 days a week (or 150 minutes a week)." (Department of Health and Children and Health Service Executive, 2009 p13).
- Older people (aged over 65) should engage in "at least 30 minutes a day of moderate intensity activity on five days a week, or 150 minutes a week. Focus on aerobic activity, muscle-strengthening and balance" (Department of Health and Children and Health Service Executive, 2009 p15).
- Adults with disabilities should "Be as active as your ability allows. Aim to meet adult guidelines of at least 30 minutes of moderate-intensity activity on 5 days a week" (Department of Health and Children and Health Service Executive, 2009 p16).

Get Ireland Active! The National Physical Activity Plan for Ireland

Action 18 of the National Physical Activity Plan (NPAP) states that new guidelines on physical activity will be developed for children aged 0 - 5 years of age (Healthy Ireland, 2016).

Having read the evidence of implementation in Ireland and guided by the international good practice examples, use your own judgement and experience to rate the extent of implementation of this good practice statement in Ireland.

None/very little (<20% implemented)

Low (20-40% implemented)

Medium (40-60% implemented)

High (60%-80% implemented)

Very High (80-100% implemented)

Cannot Rate

Additional Feedback

Please add any additional feedback you may have on the evidence of implementation in Ireland (optional).

←

→

Step Six: Weight, Sum and Calculate rating scores

The ratings scores were downloaded by the research team and the median rating was calculated for every indicator. Median was preferred over the mean as a measure of central tendency. The computed median scores were then utilised to categorise extent of implementation as “very little/none”, “low”, “medium” or “high”. Interrater Reliability (IRR; Gwet’s AC2 coefficient) was calculated for the implementation ratings using Agreestat software. The IRR for the implementation ratings was 0.554 (95% CI: 0.495 - 0.612; percentage agreement 87%). The comments provided by the non-government stakeholders were also downloaded and implementation recommendations were extracted from these comments.

Step Seven: Qualify, Comment and Recommend

The seventh step involved a one-day workshop to recommend policy implementation actions. All stakeholders were invited to attend in-person or online through Microsoft Teams. Six non-government stakeholders and two government officials participated in the workshop. Attendees were presented with the median rating scores for the implementation of the GPSs in the Republic of Ireland and the implementation recommendations extracted from the comments in the previous phase and asked to contribute further recommendations. Attendees debated the wording of implementation recommendations. Some implementation recommendations were removed and wording of some of the implementation recommendations was revised by the research team considering attendees’ recommendations. The revised list of implementation recommendations was circulated to all workshop attendees by the research team via email for confirmation. Following the finalisation of wording, a questionnaire was sent around to all non-government stakeholders asking them to select five implementation recommendations from the policy domains and rank them based on the criteria of importance, achievability and equity. These criteria are an adaptation of the criteria described by Vandevijvere and Swinburn (2017) in a protocol developed to guide researchers on how to use the Food EPI (mentioned previously). These criteria are displayed in supplemental file S3. Participants were also asked to select five implementation recommendations from the infrastructure support domains and rank them based on importance and achievability. Fifteen non-government stakeholders (47%) voted on the implementation recommendations generated at the workshop. The scores for importance and achievability were inverted (so the top ranked recommendation from an individual rating

received a score of 5 and the fifth ranked recommendation received a score of 1) and summed together. The five implementation recommendations with the highest summed score were selected as the ‘priority’ implementation recommendations. The process of summation was conducted for recommendations on both the ‘policy’ and ‘infrastructure support’ components of the PA-EPI yielding a total of ten priority implementation recommendations.

Step Eight: Translate results for Government and Stakeholders

An in-person dissemination workshop was conducted, and all participants were invited to attend. The workshop was a joint event organised in collaboration with other research teams involved in health promotion research in Ireland, including research utilising the Food EPI tool. The workshop featured guest speakers with expertise in researching healthy diet and PA promotion and a panel discussion between prominent Food and PA policy stakeholders. The research team presented research underpinning the development of the PA-EPI and the implementation and prioritisation findings. A dissemination report presenting the findings was published and copies were provided to all workshop attendees. Electronic versions of the dissemination materials were uploaded to the internet on a website associated with the project (www.jpi-pen.eu).

6.4 Results

The process generates three outputs: i) the evidence document that contains information describing the implementation PA-promoting public policy in Ireland, ii) an implementation scorecard presenting the rating of the implementation status of PA policy in the Republic of Ireland (according to expert opinion) and iii) a list of implementation actions for improving the healthiness of the PA environment in the Republic of Ireland. The evidence document can be accessed online at <https://www.jpi-pen.eu/pa-epi.html>. The results of the implementation rating exercise are described in section 3.1 and the results of prioritisation exercise are described in 3.2.

6.4.1 Level of implementation of physical activity environment policy in Ireland

The ‘policy’ subdomain of the PA-EPI framework contains 21 of the 45 GPSs. Twelve of the 21 GPSs (57%) received a low implementation score and 8 (38%) received a medium implementation score. One indicator (5%) received a “Very little / none” implementation rating from the expert panel. Three of the policy domains, Transport, Urban Design and Healthcare,

were rated as having a ‘low’ level of implementation on every indicator. Two of the policy domains, Community and Sport were rated as having a ‘medium’ level of implementation on every indicator. These results are displayed in Figure 6.4.

Figure 6.4 Results of the implementation rating for the policy-related domains of the PA-EPI in Ireland. The wording of each indicator is paraphrased to limit the amount of text within the graphic.

PA-EPI Subdomains	Indicators (paraphrased)	Level of Implementation			
		Very little (<25%)	Low (25 - 50%)	Medium (50 - 75%)	High (75 -
Education	Evidence informed, quality mandatory physical education in all schools.				
	Initiatives are in place to promote and support school-related physical activity.				
	Shared use agreements utilise school spaces.				
Transport	Policies are in place to promote and support safe active travel to school.				
	Regulations support safe walking and/or cycling and/or wheeling.				
	Funded implementation plan to achieve active travel.				
Urban Design	Guidelines for active mobility are promoted and disseminated.				
	Policies reallocate space from motorised transport to active travel.				
	Governments adopt principles of mixed land use.				
Healthcare	Regulations equitable improve access to safe outdoor and indoor spaces.				
	Regulations in healthcare include routine screening for physical activity.				
Mass Media	Policies promote physical activity in healthcare settings among at-risk groups.				
	Policies ensure media campaigns that promote physical activity are sustained.				
Community	Policies ensure that multiple media modes/channels are used.				
	Policies support the implementation of whole-of-community approaches.				
Sport	Policies foster partnerships for shared use of public spaces and facilities.				
	Sport policies prioritise investment in initiatives that target the least active.				
	Policies ensure equitable access to sport and recreation spaces and places.				
Workplace	Programs encourage sports clubs to promote physical activity.				
	Policies promote and support safe active travel to and from the workplace.				
	Regulations for buildings support physically active workplace environments.				

The ‘infrastructure support’ subdomains contain 24 of the 45 GPSs. Thirteen of the GPSs received a low score and 11 received a medium implementation score. One of the infrastructure support domains, Health in all Policies, was rated as having a ‘low’ level of implementation on every indicator and one, Platforms for Interaction was rated as having a ‘medium’ level of implementation on every indicator. These results are displayed in Figure 6.5.

Figure 6.5 Results of the implementation rating for the infrastructure support-related domains of the PA-EPI in Ireland. The wording of each indicator is paraphrased to limit the amount of text within the graphic.

PA-EPI Subdomains	Indicators (paraphrased)	Level of Implementation			
		Very little (<25%)	Low (25 - 50%)	Medium (50 - 75%)	High (75 - 100%)
Leadership	Political support for creating health-promoting policy environments.				
	Plan linked to national needs to increase physical activity.				
	Priorities are given to reduce inequalities in the plan.				
	Physical activity guidelines for all age groups.				
Governance	Restricting commercial influence on policy development.				
	Evidence in physical activity policies.				
	Government ensures dissemination of physical activity guidelines to public.				
	Government fosters the cooperation of all sectors to improve physical activity.				
Monitoring & Intelligence	Regular monitoring of physical activity levels across the life-course.				
	Regular monitoring of physical activity environments* across all 8 domains.				
	Monitoring linked to the regular monitoring of NCDs.				
	Evaluation of programmes & policies.				
	Monitoring progress towards reducing health inequalities.				
Funding & Resourcing	Budget spent on physical activity promotion is clearly identified.				
	Sufficient proportion of total health spending is assigned to physical activity.				
	Sufficient proportion of research spending is assigned to physical activity.				
	Statutory health promotion agency.				
Platforms for interaction	Robust coordination to ensure policy integration of physical activity policies.				
	Regular and inclusive interactions between government and civil society.				
Workforce Development	Sufficient resources and skills within the government's workforce.				
	Training and professional development provided regarding physical activity.				
	Professional licensing entities for initial and continuing education.				
Health in all Policies	Physical activity considered and prioritised in the development of policies.				
	Consider health impacts of policies indirectly related to physical activity.				

None of the indicators received the highest categorisation of implementation status. The highest scoring indicator in the policy domains was the first indicator in the ‘Mass Media’ subdomain, which pertains to public policies for sustaining mass media campaigns. The action of promoting PA through media campaigns is mentioned in several policy documents including the National Sports Policy (Department of Transport Tourism and Sport, 2018) and NPAP (Healthy Ireland, 2016). Further, the Republic of Ireland has various media campaigns that promote PA, including the ‘Let’s Get Back’ campaign which encouraged the Irish public to be physically active during the COVID-19 emergency.

The highest scoring indicator in the infrastructure support domains was the first indicator in the ‘Monitoring and Intelligence’ subdomain, which pertains to the monitoring of PA levels across the life course. The Republic of Ireland has several surveys which collect data on PA levels, focussing on different stages of the life course. The Children’s Sport Participation & Physical Activity (CSPPA) study (Woods *et al.*, 2018), for example, examines sport and PA participation in children aged 10 – 19 while the Irish Longitudinal Study on Ageing (TILDA; Trinity College Dublin 2022) includes data collection on PA in an older population. However, the other indicators in the monitoring and intelligence subdomain, (i.e., the monitoring of PA environments, the monitoring of links between PA outcomes and NCDs, the monitoring of the outcomes of PA policy and the monitoring of inequality-related determinants of PA) all received a low rating.

The low implementation scores for the indicators related to Transport, Urban Design, Healthcare and Health in all Policies identifies a need for heightened efforts to address the implementation gaps in these domains.

6.4.2 Prioritisation of implementation actions

The top five implementation recommendations for policy and infrastructure support based on importance and achievability are presented in tables 6.1 and 6.2. Regarding policy domains, the expert panel recommended that positions with responsibility for promoting PA be established in school, and health and social care settings. They also recommended increasing the capacity of

health and social care staff to promote PA, replacing standalone PA campaigns with a long term coordinated effort to promote PA opportunities in the media and the establishment of minimum criteria for inclusion before application for sport capital grant are considered (table 6.1).

Regarding the infrastructure supports the panel recommended increased funding for long term PA projects for the monitoring programme outcomes. They also recommended ensuring representation across lifespan, gender and socio-economic background in the decision-making process and to dissociate physical activity from unhealthy brands. The most highly rated recommendation, both in terms of importance and achievability, was to update the Irish PA guidelines to reflect recent advances in PA guideline development (table 6.2).

Figure 6.6 Prioritization of recommendations on the policy-related subdomains

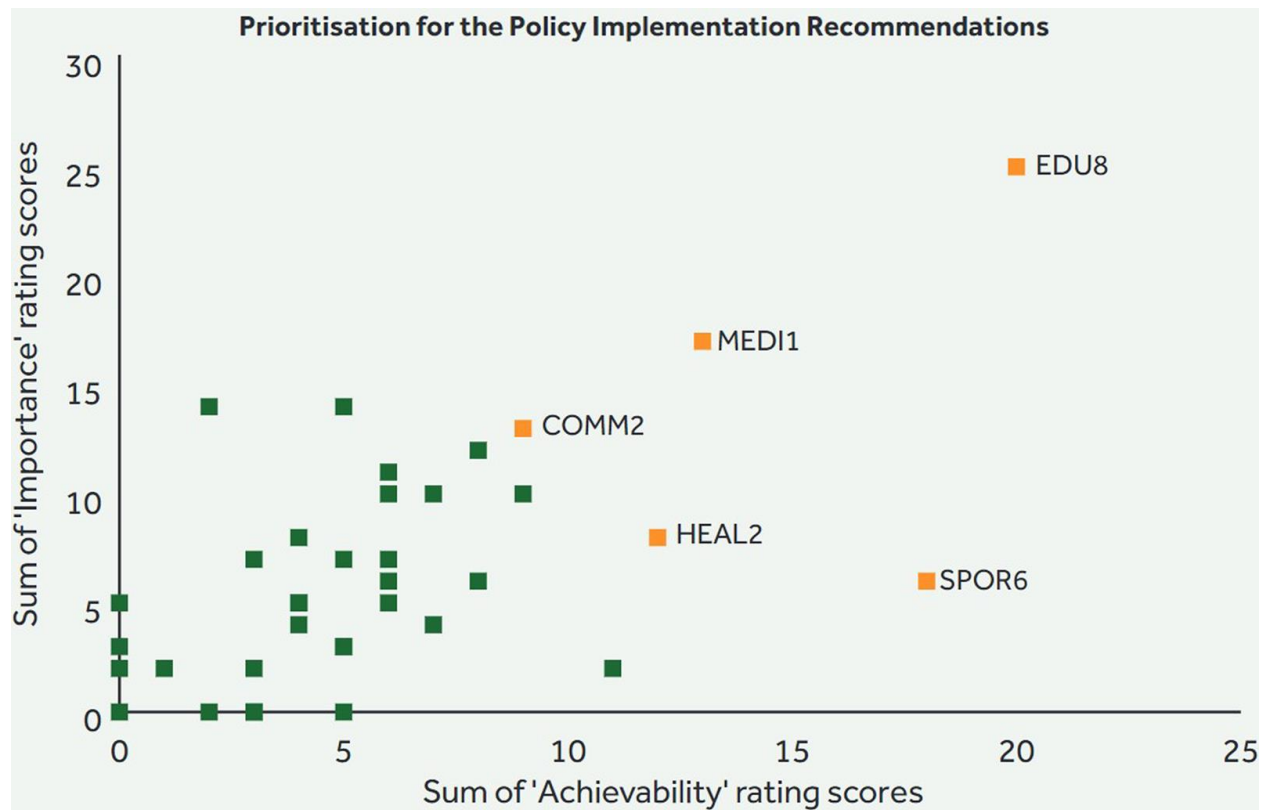


Figure 6.7 Prioritization of recommendations on the infrastructure support-related subdomains

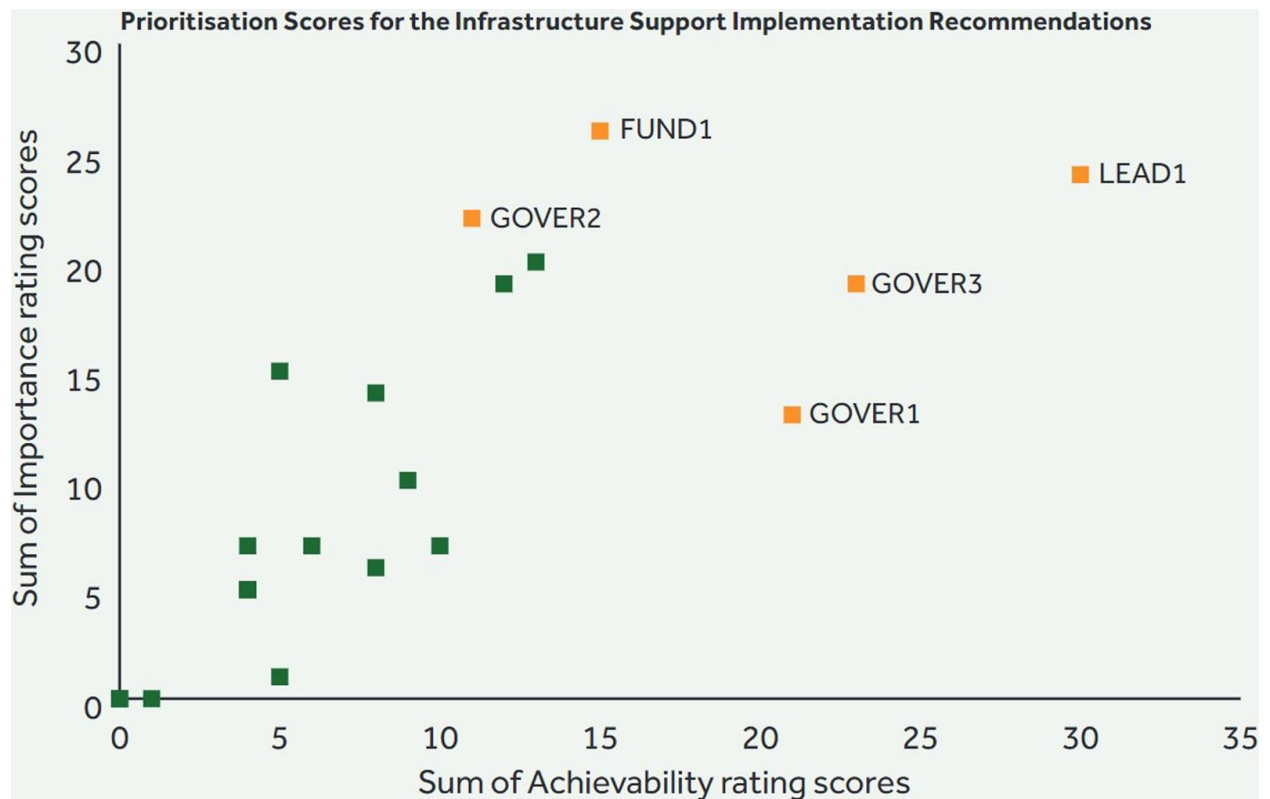


Table 6.1 Implementation actions to support healthy physical activity environments relating to the policy domains.

1. Leadership in schools [EDU8]

Allocate a post of responsibility for a physical activity lead in every school, at both primary and post primary levels.

2. Coordinated media campaign [MEDI1]

Foster cross governmental sustainable resourcing to replace standalone individual physical activity campaigns with a comprehensive, coordinated, multisector long-term multi-media/mode campaign using clear evidence informed consistent messaging over several years.

3. Minimum inclusivity standards [SPOR6]

Establish a set of minimum inclusion and accessibility standards to be incorporated into the scoring system of the Sports Capital and Equipment Programme.

4. Connected community programmes [COMM2]

Improve connection between communities and healthcare services in regard to physical activity participation by increasing the resourcing and/or staffing, with a go-to person for physical activity in the community.

5. Capacity of healthcare staff [HEAL2]

Build capacity of staff across health and social care setting to promote awareness of physical activity benefits and opportunities.

Table 6.2 Implementation actions to support healthy physical activity environments relating to the infrastructure support domains.

1. Update guidelines [LEAD1]

Update the Irish Physical Activity Guidelines in line with revised international guidelines.

2. Representation in decision making [GOVER3]

Have representation across the lifespan, gender and socio-economic background in the development and decision making processes related to physical activity policies.

3. Funding for outcome monitoring [FUND1]

Provide long term funding for physical activity programmes to support tracking of evidence, outcomes and implementation.

4. Research programme for special populations [GOVER1]

Implement a physical activity research and monitoring programme specific to special populations, in particular for disabled persons.

5. Dissociate from unhealthy products [GOVER2]

Dissociate physical activity from unhealthy products and brands promoting unhealthy products.

6.5 Discussion

This study is the first to assess the extent of implementation of government policy actions which improve the PA environment. The process of assessing government actions generated an evidence document providing an overview of the government actions in place which supported PA, revealed areas of relative strength as well as gaps in implementation, and provided priority

recommendations for strengthening PA policy implementation in the future. The evidence document was praised by stakeholders who participated in the study for providing them with an overview of the available policy documents in Ireland, which is an important contribution of the work in and of itself.

Complementarity of the PA-EPI with other Policy Research Resources

The process of generating the evidence document was supported by previous work using the HEPA PAT. The HEPA PAT has been recommended as a comprehensive tool for performing PA policy analysis (Klepac Pogrmilovic *et al.*, 2019) and it has been utilised in other European countries to conduct analyses of PA policy. However, reviewers of extant PA policy tools have noted that the PAT is “more suitable for an audit than an assessment” (Klepac Pogrmilovic *et al.*, 2019) (p9), and further, that researchers should look into the possibility of complementary tools. This study highlights the complementarity of the PA-EPI tool with other instruments available to PA policy researchers, like the HEPA PAT. It also demonstrates the additional benefit of using the PA-EPI for benchmarking and analysing the state of policy implementation. PA-EPI studies can provide unique information on implementation gaps that should be targeted to develop supportive PA environments.

Implementation strengths and gaps

The results of this study reveal that the infrastructure support domains were judged to be better implemented than the policy domains. This is a nearly universal pattern for studies utilising the Food EPI (Vandevijvere *et al.*, 2019; Djojosoeparto *et al.*, 2022). Further studies will reveal whether a similar pattern emerges for the PA-EPI as well and hopefully provide insight into the dynamics underlying these patterns. The implementation status of the indicators suggest that the Republic of Ireland can build on its relative strengths in the Mass Media and Monitoring and Intelligence domains. However, the results of the study also suggest that there are implementation gaps regarding Transport, Urban Design, Healthcare and Health in all Policies.

The low implementation ratings in the Healthcare domain appears to corroborate previous research on PA promotion by healthcare professionals in Ireland. Cantwell and colleagues (Cantwell *et al.*, 2018) reported that most healthcare professionals, in Ireland, did not provide cancer patients with PA advice that aligned with guidelines, while Cunningham and O’Sullivan

(Cunningham and O’Sullivan, 2021) report that only 30% of healthcare professionals, Northern Ireland and the Republic, report receiving adequate training for prescribing PA to older adults. The Republic of Ireland has a policy for promoting PA, among other lifestyle risk factors in healthcare settings, Making Every Contact Count (MECC). The findings of this study, and others which we have cited above, suggest that the implementation of MECC has not been a success. This may be explained, at least in part, by the fact that an internal report commissioned by the HSE found that the health service lacked organisational readiness for this intervention prior to its enactment. It is unsurprising, therefore, that the expert panel recommended that increasing the capacity of staff across health and social care setting to promote awareness of physical activity and better connecting community PA programmes and healthcare be implemented as a priority.

Prioritisation

The panel of non-government experts prioritised actions in the policy and infrastructure support components of the PA-EPI. In the policy domains the panel recommended implementation actions in the Education, Healthcare, Mass Media, Community and Sport domains. A difference between the PA-EPI and the Food EPI is that policy domains of the PA-EPI arguably represent a greater number of independent health promoting settings than the Food EPI. There is a potential equity concern as targeting different settings may have disproportionate benefits for different demographics. A potential method for promoting equity is to limit the number of actions prioritised per domain.

Some of the highest prioritised actions corresponded to indicators that had a relatively strong implementation rating. An implementation recommendation that received a high prioritisation rating was the proposal to establish a long term coordinated effort to promote PA opportunities in the media. It is also noteworthy that stakeholders did not prioritise implementation recommendations in the Urban Design or Transport domains despite the identified implementation gaps in these domains. Future research may explore apparent discrepancies between identified gaps and prioritised implementation recommendations.

Strengths and limitations

This study is the first to utilise the PA-EPI tool to generate insight into PA policy and hence addresses a knowledge gap regarding the assessment of government action on the issue of PA.

The PA-EPI is a pioneering approach in the domain of PA policy and is based on internationally developed and validated methods used in the domain of food policy. A second strength of the study is the independence of the stakeholders involved in rating and prioritisation. The research process engaged government officials to ensure that the evidence document is comprehensive and the rating of implementation was conducted by people who were not incentivised to provide positive findings as government officials tasked with performing a self-assessment. A third strength is that the PA-EPI process promotes capacity building. By engaging with government and non-governmental stakeholders from across sectors the PA-EPI process promotes network building around the issue of PA. Further, the evidence document is a valuable resource for policymakers and non-governmental PA stakeholders.

This study has some limitations. The workshop component was attended by a small sample of stakeholders (n = 7 stakeholders, representing the Education, Sport, Community and Health sectors). Attendance at the workshop may have been affected by scheduling conflicts and the legacy of the COVID-19 pandemic or rates at that time may have affected the willingness of stakeholders to participate in an in-person workshop. The small sample creates the possibility that a particular viewpoint is overrepresented in the output of this exercise. The challenge of potential selection bias has been previously reported by Yamaguchi and colleagues (Yamaguchi *et al.*, 2022) used the same eight step process in completing the Food EPI in Japan. Researchers need to consider, in early stages of the process, how to ensure that the stakeholders involved in the later stages represent a variety of perspectives with differing domains of expertise. A second limitation is that the non-government stakeholders involved in the prioritisation exercise (n = 13) may have been presented with too many implementation recommendations. Further, the implementation recommendations were not evenly distributed across the domains with many recommendations pertaining to the Education domain which in turn led to focus on one part of the life course. The number of recommendations presented *may have* biased the results of the prioritisation exercise to favour actions which target children and younger demographics. While the number of recommendations provided to non-government stakeholders was reduced as part of the workshop, this process should be made highly rigorous to avoid any concerns. Researchers should consider methods for limiting the number of recommendations presented for prioritisation both in total and per domain. A third limitation is the availability of information on best practice exemplars used for comparison in the evidence document. Early studies utilising the Food EPI

tool noted that policies put forward as BPEs were often not evaluated for real world impact and hence not ideal ‘gold standards’ (Vanderlee *et al.*, 2019). A benefit of conducting further assessments utilising the PA-EPI is that it will provide concrete examples of good practice for review and replication by other countries to address implementation gaps.

Recommendations for future studies

A study of the relative contributions of the GPSs and policy subdomains is needed to develop a weightings system for the PA-EPI. The weighting system would assign a relative importance for each of the GPSs for creating healthy PA environments and allow the calculation of a single PA-EPI score for implementation at step six of the progress. This score facilitates cross comparison of national PA-EPI implementation ratings and advance the use of the PA-EPI as a PA policy benchmarking tool. Though the ratings provided by the expert panel in this study suggest that there is substantial scope to improve implementation status of PA policy in Ireland, future studies can confirm whether the Republic of Ireland is a pioneer on this issue. The benchmarking feature of the PA-EPI tool addresses a noted gap in the PA policy research literature (Gelius *et al.*, 2020).

Scoping reviews have demonstrated that PA policy research is overwhelmingly conducted in a few high-income countries (Rütten *et al.*, 2016; Klepac Pogrmilovic *et al.*, 2018), indicating that the field of PA policy research needs to diversify. Further, inactivity is increasing in developing countries as the dynamics that drive inactivity in developed countries emerge or are adopted (Rütten *et al.*, 2013). Therefore, testing the PA-EPI process in low and middle income countries should be a priority for future research.

6.6 Conclusion

This study is the first to undertake a process of PA policy assessment using the PA-EPI tool. The study had two aims: (i) to assess PA policy implementation in the Republic of Ireland and (ii) to prioritise implementation actions for the future. Regarding the former, the extent of implementation was assessed for each of the 45 indicators of the PA-EPI and the results of these assessments suggests that PA policy in the domains of Transport, Urban Design, Healthcare have a low level of implementation in Ireland. By contrast the domains of Mass Media and Monitoring and Intelligence were perceived by non-government PA stakeholders to be better

implemented in Ireland. Regarding the latter, priority actions were suggested by prioritisation workshop attendees and a short list of recommendations, targeting different domains of the PA-EPI, are highlighted in this article. This study contributes to understanding of why public policy may fail to achieve the environment necessary for sustained improvements in population PA. It also provides a roadmap for improved policy implementation in Ireland. The utilisation of non-government stakeholders has the potential to increase civil society's input to the PA policy agenda.

Chapter 7 PA-EPI indicators weight system proposal

7.1 Chapter Overview

This chapter discusses methods for weighting the Good Practice Statements (GPSs) of the PA-EPI based on criteria of policy priority or importance. A weighting system utilising data on the impact of GPSs on population PA outcomes, collected as part of the PA-EPI development process, is proposed. Weightings systems based on alternative priorities are proposed, but these would require additional data collection to be actionable.

7.2 Introduction

There is a danger that the actions which are taken by governments are those which are perceived to be easiest to implement rather than the most impactful. Therefore, a universal system that informs policymakers of the expected impact of implementing the indicators of the PA-EPI is required. INFORMAS developed a method for facilitating global monitoring and benchmarking and thereby focussing effort on the most effective policies for supporting healthy diets (Mahesh *et al.*, 2018). Relative contributions for the various policy domains and indicators of the Food EPI to healthy environments were derived based on expert consensus. These estimates of contribution are intended as weightings, which when combined with implementation scorecard data, provide a ‘composite score’ or a summary measure of the expected impact of a government’s policy implementation. Since a method for developing a system for deriving weightings and applying them to PA-EPI score card data does not exist, the focus of this chapter is to propose and test a potential PA-EPI weightings method.

The GPSs of the PA-EPI allow independent PA experts to assess the extent of implementation of physical activity policies in comparison to international best practice, and to recommend priority policies for future implementation that could improve the physical activity environment. As part of the development of the PA-EPI tool (described in chapter five) a consultation was undertaken with academic and policy experts. Candidates for the expert sample selected were based on either a substantial track record of publishing academic literature (academic experts) or domain-specific PA policy experience (policy experts). Data were gathered from this sample by asking them to rate the importance of each of the PA-EPI GPSs on a 10-point Likert scale (ranging from 1 = relatively unimportant to 10 = extremely important) *based on perceived impact on population PA*. Secondary data analysis was performed on this data to transform it into importance weightings.

7.3 Methods

To develop the weightings system, the level of agreement amongst experts on the relative importance of the indicators considered. Gwet’s AC2 is a statistic which calculating level of agreement. Gwet’s AC2 is ‘weighted’ to account for the partial agreement that is present when different raters do not select the same value on an ordinal scale but nevertheless select values that

are close together rather than far apart. This statistic is further suitable for calculating the agreement within the importance data as it can accommodate three or more raters and it can handle missing values. An analysis was conducted by uploading data to the online software available at the website: <https://www.agreestat.com/>.

Once agreement has been calculated, weightings can be calculated for each indicator, based on the importance ratings data. The mean importance ratings for each GPS are utilised and all calculations can be conducted in Microsoft Excel. These mean importance ratings are, in turn, utilised to calculate the mean for all mean importance ratings. This ‘mean of means’ value is subtracted from each of the individual GPS mean importance ratings to acquire a measure their distance from the mean of means. This process can be described using equation 1:

$$\omega_i = (\bar{x}_i - \sum \bar{x}_n) + 2 \quad 1$$

Where

ω_i is the weighting assigned to a GPS i

\bar{x}_i is the mean importance rating score for GPS i

and

$\sum \bar{x}_n$ is the mean of all 45 mean importance rating scores.

The weightings calculated using this method are provided in table 7.1. These weightings can be combined with data from PA-EPI studies to derive a weighted composite implementation score. It is necessary to define the maximum possible composite implementation scores to transform the composite implementation score into a meaningful percentage. The maximum score is calculated simply by adding all the calculated weightings together. Hence the method for calculating the maximum possible composite implementation weighting score is described by equation 2:

$$C_{max} = \sum \omega_i + \omega_j \dots \omega_n \quad 2$$

Where

ω_i is the weighting assigned to a GPS i

and

C_{max} is the maximum possible weighting score for all GPSs combined.

By performing these calculations on the weightings, a maximum composite implementation score of 90 is calculated. Domain specific maximum composite scores can also be calculated for each of the policy domains using the same weightings. Domain specific maximum composite weighting scores for the policy domains of the PA-EPI are displayed in table 7.2.

Recall that the PA-EPI process requires an implementation scorecard to be developed. This requires rating the extent of implementation of GPS by government and assigning the GPSs to an implementation quartile based on those ratings (described in section 7.5.1.6). The weightings system is conceived so that the implementation quartile for a GPS provides a number which can be multiplied by the GPSs weightings. The products of these multiplications would be the *weighted* implementation score for each GPS. Each GPS placed in the “None / Very Little” quartile is assigned a factor of 0.25, GPSs’ in the “Low” quartile are assigned a number of 0.5, GPSs’ in the “medium” quartile are assigned a number of 0.75 and GPSs’ in the “High” quartile are assigned a number of 1. Once weighted implementation scores have been calculated for all GPSs they can be summed together to get a single composite implementation score. Hence, the process of combining weightings with implementation data to derive a composite implementation score can be described using the equation 3.

$$C = \sum(\omega_i \times f_i) + (\omega_j \times f_j) \dots (\omega_n \times f_n) \quad 3$$

Where

C is the composite implementation score

ω_i is the weighting assigned to a GPS i

and

f_i is the number assigned to the GPS I based on its implementation quartile.

The composite implementation score is transformed into a percentage by subtracting the minimum possible implementation score from it. The resultant number is then dividing it by the range and multiplying by one hundred. This is described using equation 4:

$$C_{\%} = (C / C_{max}) \times 100 \quad 4$$

Where

$C_{\%}$ is the composite score transformed into a percentage.

C is the composite implementation score

and

C_{max} is the maximum possible weighting score for all GPSs combined.

7.4 Results (when applied to Ireland’s PA-EPI data)

The level of agreement was found to be good (AC2 = 0.954 [95%CI: 0.949 – 0.96]). Agreement calculations were run separately for experts with academic and policymaking experience. The level of agreement was similar within the two groups (academics: AC2 = 0.930 [95%CI: 0.918 – 0.941]; policymakers: AC2 = 9.321 [95%CI: 0.92 – 0.942])

Tables 7.1 and 7.2 displaying how this weighting system can be applied to the PA policy implementation data for the Republic of Ireland (displayed in figures 6.6 and 6.7 in chapter six). Based on this data, a composite implementation score of 53.90 was calculated for the Republic of Ireland. When this output is transformed into a percentage using equation 4 the result is an implementation rating of 59.88%. The Republic of Ireland could improve this score if it improved its implementation rating on some heavily weighted GPSs, for example the first GPS in the Education domain (E01) and the Transport domain (T01), in a follow up PA-EPI study.

Table 7.1 Weighting for the GPSs and composite implementation rating for Ireland.

Indicator code	Weighting (ω_i)	Implementation quartile (based on implementation in Ireland score) (f_i)	Weighting x implementation quartile ($\omega_i \times f_i$)
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E01	2.74	2 Low (Multiply weighting by 0.5)	1.37
E02	2.13	3 Medium (Multiply weighting by 0.75)	1.60
E03	1.96	2 Low (Multiply weighting by 0.5)	0.98
E04	2.52	2 Low (Multiply weighting by 0.5)	1.26
T01	2.87	2 Low (Multiply weighting by 0.5)	1.44
T02	2.32	2 Low (Multiply weighting by 0.5)	1.16
T03	1.65	2 Low (Multiply weighting by 0.5)	0.83
UD01	2.43	2 Low (Multiply weighting by 0.5)	1.21
UD02	2.47	2 Low (Multiply weighting by 0.5)	1.24
UD03	1.70	2 Low (Multiply weighting by 0.5)	0.85
H01	1.69	2 Low (Multiply weighting by 0.5)	0.84
H02	1.90	2 Low (Multiply weighting by 0.5)	0.95
MM01	1.20	3 Medium (Multiply weighting by 0.75)	0.90
MM02	1.05	2 Low (Multiply weighting by 0.5)	0.53
C01	1.58	3 Medium (Multiply weighting by 0.75)	1.19
C02	1.83	3 Medium (Multiply weighting by 0.75)	1.38
SP01	2.22	3 Medium (Multiply weighting by 0.75)	1.67
SP02	2.20	3 Medium (Multiply weighting by 0.75)	1.65
SP03	1.44	3 Medium (Multiply weighting by 0.75)	1.08
W01	2.23	3 Medium (Multiply weighting by 0.75)	1.67
W02	1.68	1 Very little / none (Multiply weighting by 0.25)	0.42
L01	2.54	3 Medium (Multiply weighting by 0.75)	1.90
L02	2.23	3 Medium (Multiply weighting by 0.75)	1.67
L03	2.11	2 Low (Multiply weighting by 0.5)	1.06
L04	2.18	3 Medium (Multiply weighting by 0.75)	1.64

G01	1.79	2 Low (Multiply weighting by 0.5)	0.89
G02	2.18	3 Medium (Multiply weighting by 0.75)	1.63
G03	1.54	3 Medium (Multiply weighting by 0.75)	1.15
G04	2.16	3 Medium (Multiply weighting by 0.75)	1.62
Mi01	2.37	3 Medium (Multiply weighting by 0.75)	1.78
Mi02	2.00	2 Low (Multiply weighting by 0.5)	1.00
Mi03	1.73	2 Low (Multiply weighting by 0.5)	0.86
Mi04	2.39	2 Low (Multiply weighting by 0.5)	1.19
Mi05	2.28	2 Low (Multiply weighting by 0.5)	1.14
FR01	2.12	2 Low (Multiply weighting by 0.5)	1.06
FR02	2.37	2 Low (Multiply weighting by 0.5)	1.19
FR03	1.80	2 Low (Multiply weighting by 0.5)	0.90
FR04	1.86	3 Medium (Multiply weighting by 0.75)	1.40
PI01	2.01	3 Medium (Multiply weighting by 0.75)	1.51
PI02	1.54	3 Medium (Multiply weighting by 0.75)	1.15
WD01	1.48	2 Low (Multiply weighting by 0.5)	0.74
WD02	1.76	2 Low (Multiply weighting by 0.5)	0.88
WD03	1.83	Medium (Multiply weighting by 0.75)	1.38
HIAP01	2.09	2 Low (Multiply weighting by 0.5)	1.04
HIAP02	1.83	2 Low (Multiply weighting by 0.5)	0.92
			C 53.90 / 90 = 59.88%

Table 7.2 Weightings for the Policy domains and implementation date for Ireland.

Domain	Maximum composite	Composite weightings	Composite weightings
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	weightings (C_{max})	for domain implementation in Ireland (C)	as percentages $(C\%)$
Education	9.35	5.21	55.69%
Transport	6.84	3.42	50%
Urban Design	6.60	3.30	50%
Healthcare	3.58	1.79	50%
Mass Media	2.25	1.42	63.32%
Community	3.42	2.56	75%
Sport	5.86	4.39	75%
Workplace	3.91	2.09	53.56%

7.5 Discussion

A method for weighting implementation scores on the different GPS of the PA-EPI is presented in this chapter. This method utilises data on the importance of the GPSs for achieving population level impact on PA outcomes collected as part of the PA-EPI development which is described in chapter five. The weightings method is applied to data on PA policy implementation in Ireland (collected as part of the study described in chapter six) and a composite implementation score is presented. Ireland's implementation composite score would be considerably higher if the implementation status of the heavily weighted GPSs in the education, transport and urban design domains improved.

The weightings proposal described above can be utilised to focus effort on the GPSs perceived by experts as the most impactful in promoting population PA. However, weightings systems

could be designed to reflect other priorities. Some PA researchers advocate adopting a perspective that shifts the focus away from ‘population’ PA to ‘sustainable’ PA, which favours PA according to its ecological impact (Bjørnara *et al.*, 2017; Abu-Omar *et al.*, 2023). An alternative weightings system could be developed which assigns weighting to the GPSs based on evidence of their environmental impact.

Another alternative is to develop a weightings system for the PA-EPI based on considerations of equity. The case was made in the introduction chapter that a population approach to PA is needed since it has the greatest impact on outcomes. However, the population approach has been critiqued on the basis that its use might exacerbate health inequalities (Frohlich and Potvin, 2008). It has been argued that complementary strategies for ensuring equitable outcomes are required (Frohlich and Potvin, 2008). Therefore, a system could be developed to weight the GPSs to account for the extent to which the GPS is associated with variability in distribution of PA outcomes. These alternatives would require further study as the data on sustainability and equity was not collected as part of the development of the PA-EPI framework and its GPSs’ and is therefore not presently available.

A strength of the method is that a measure of the agreement amongst participants was taken, and agreement was found to be high. This supports the reliability of the importance data, on which the weighting system is based, and thereby supports the trustworthiness of the system itself. A limitation is that the ratings are based on secondary analysis of ratings of *perceived* importance of the GPSs rather than direct measures of policy impact. Future research might investigate methods for validating the importance ratings. A second limitation is that, while the sample of experts who rated the importance of the GPSs was selected based on knowledge of PA policy, there was limited representation from LMICs. This may bias the importance ratings towards policies which are impactful only in HICs.

Chapter 8 Discussion & Conclusion

8.1 Chapter Overview

The final chapter of the thesis was written to discuss the implications of the research presented. Lessons for policymakers and researchers are discussed including actions for increasing the capacity of PA researchers to promote policy implementation in collaboration with a national coalition of PA stakeholders. Continued ongoing engagement by PA policy researchers with the policy process is advocated.

8.2 Intended contribution.

This thesis is a form of action research or research intended to help practitioners (Lewin, 1946). The practitioners are the members of the national coalition who endeavour to promote PA through their activities at a national or local level. These include practitioners who were in PA promotion in various settings including education, transport and healthcare. The thesis aims to support real, impactful population level PA promotion through public policy. This is done by answering two key research questions concerning PA policy. The first question (*‘what policies impact physical activity outcomes?’*) is important to policymakers and is answered by synthesising scientific evidence on which PA policies are effective. Answering this question allowed a tool to be developed (the PA-EPI). This tool allowed the second research question (*‘how have these policies been applied in the Irish context?’*) to be answered. Answering this research question supports improved policy implementation in Ireland specifically, but the lessons learned from the process of answering the question are relevant to *all* researchers and practitioners interested in using the PA-EPI. Replicating the process undertaken in Ireland can support PA promotion by; supporting networking within national PA policy communities, enabling advocates and people with experience and expertise in PA promotion to speak to policymakers and developing information on national policy implementation through the PA-EPI scorecards and the evidence document. The following messages arise from the experience of developing and utilising the PA-EPI for the first time and may be valuable to PA stakeholders.

8.3 What was found – messages relating to policy impact.

Chapters four and five of this thesis were devoted to answering the question of policy effectiveness. This process culminated in the 45 GPSs of the PA-EPI which serve as an answer to the question of which public policies can be regarded as effective. These statements were crafted using a variety of evidence sources including academic literature and grey literature and the most effective GPSs were selected based on expert consultation. The following messages are generally recommended to policymakers involved in developing PA policy based on the research undertaken to answer this question.

Message 1 Prioritise policies which ensure access to sport facilities to facilitate sport participation (and thereby PA) over elite athlete development

In chapter four, evidence was presented demonstrating that policies which increase the supply of sport facilities can positively impact PA outcomes. In this section, the implication that differing sport policy *priorities* may impact sport participation outcomes is discussed further. Arguably, the most interesting paper identified through the systematic reviews was Ståhl and colleagues (2002). This paper was the only one identified in the Sport review which compared outcomes in different countries, specifically Finland and Germany. This is noteworthy because Finland is the exemplary case of ‘sport for all’ policies while East Germany, the area corresponding to the former German Democratic Republic (GDR), is the exemplary case of sport policies that focussed on ensuring the success of elite athletes in international competition. The study identified differences in PA outcomes between Finland and Germany and attributes these differences to differences in policy.

The GDR example illustrates how sport policies which are effective in achieving international sporting success, can hinder overall sport participation. Despite winning numerous Olympic medals, GDR's success came at the expense of mass sport participation, as evidenced by differences in physical activity frequency among Finns, West Germans, and East Germans in the study by Ståhl and colleagues (2002).

There are various mechanisms through which public policy targeting international competition success may reduce sport participation. Grix (2008) notes that the *supply* of facilities and sport equipment to the public was inadequate and, further, that *access* to existing facilities was restricted to the public to make them available for promising athletes in the GDR. Evidence from the PEN review of PA promoting policies in school settings underlines the importance of permission to access the existing sport infrastructure. Shared use agreements (where school facilities are usable by the local community on evenings and weekends) were identified as an effective strategy for promoting PA (Woods *et al.*, 2022). This evidence supports the wording of GPS SP02, which calls for policies which “ensure equitable access to sport and recreation spaces and places for all”, and GPS E03 which calls for shared use agreements which support PA opportunities.

The National Sport Policy of Ireland aims to achieve *both* increased participation and more success in international competition. The statement from the Minister for State for Tourism and Sport claims that the inspirational effect of high performance athletes will encourage people to get more active, clearly implying that these two objectives are mutually reinforcing. This is *not* a conclusion which is supported by this thesis. Policy that prioritises widespread participation over investment in high performance athletes is recommended.

Message 2 Investment in sport provision has an important, but limited, role in promoting overall PA

In chapter four, a limitation on the effectiveness of sport investment as a method for promoting PA is mentioned. Weed (2016) found that UK sport participation plateaued in the 1990s, despite continued policy efforts. However, *the number of people meeting PA guidelines increased* after sport participation plateaued. The explanation for sport participation stagnating is that 'latent' demand for sport sets a threshold on the proportion of the population that will take up sport opportunities. Weed implies that the factors determining demand are not easily addressed through policy interventions and concludes that sport is ineffective as a public health intervention. The contention of this section is that sport investment remains valuable for promoting physical activity and public health, despite the demand constraint.

Sport investment, while not reaching the entire population, still impacts a substantial segment of it. The extent of this impact *varies* based on the policies which are adopted, as highlighted in the previous section. Further, the people who take up sport opportunities benefit from them. The fact that sport participation leads to PA is not in dispute and group sport participation can have ancillary benefits, such as increased social capital, which may not accrue via more individualised forms of PA.

A concern is that there are opportunity costs associated with investment in sport. The availability of sport opportunities does not guarantee their use (Hillsdon *et al.*, 2007). Investment in *multi-faceted* PA infrastructure can mitigate underutilization risks. Further, the impact of investment in sport can be maximised with an understanding of demand factors such as preferences and barriers. This highlights the importance of the monitoring and intelligence subdomain of the PA-EPI. Surveys like the Irish Sport Monitor (ISM) and the Children's Sport Participation and

Physical Activity (CSPPA) survey in Ireland provide valuable insights into activity patterns and preferences (Sport Ireland, 2022). Finally, the disconnect between sport and overall PA in the UK is explained by the fact that sport settings are just one setting in which people can be physically active, but since these investment in sport opportunities can secure health-enhancing PA it is appropriate to endorse the message that sport provision has a place *within a broader multisectoral PA promotion strategy*.

Message 3 Supporting traditional sports provision is unlikely to reduce inequalities in participation outcomes between groups.

The profile of people who are most likely to participate in traditional sports is well known. Research has identified relationships between levels of participation and gender, socioeconomic status and education. Public policy may aim to reduce disparities in participation outcomes between groups. For example: the National Sport Policy of Ireland targets the elimination of participation disparities between men and women by 2027. Initiatives designed to incentivise or encourage sport providers to broaden their appeal to underrepresented groups have met with failure (Makinen *et al.*, 2016; Flintoff, 2008). The message to policymakers is that these strategies do not seem to work; however, the reasons *why* they do not work is of academic interest.

Various theories may explain why disparities in participation arise. It may be the case that social factors influence who is *able* to respond to different PA messages and opportunities. Participation differences between people of different socio-economic backgrounds are consistent with fundamental causes theory (Link and Phelan, 1995). According to this theory, socio-economic factors dictate access to resources which can be used to maintain health. Therefore, these factors should be perceived as the most fundamental factors affecting health since they provide flexible protection against multiple disease mechanisms. Fundamental causes may explain the problem of ‘activity switching’ (Weed *et al.*, 2015) where, in response to new information or opportunities, people who are already somewhat active take up a new activity while the inactive are unaffected. This results in no important, utilitarian increase in participation. Alternatively, group differences in disposition towards different PA forms may be the product of social norms. Bourdieu’s concept of class habitus has been used to explain

different in PA behaviours between groups (Wiltshire *et al.*, 2019). These two theories are examples of alternative means by which unequal outcomes may arise. They are not mutually exclusionary. Interdependencies and interaction effects may be studied utilising a systems perspective. However, the use of systems approaches in PA Policy research is still in its infancy (Rigby, 2022) and most of the existing systems-informed work is descriptive rather than focused on intervention (Nau *et al.*, 2022). Systems perspectives may hold the potential to generate new insights into PA policy effects.

Message 4 Displacement of existing users of services is a potential consequence of targeted PA programmes

A topic that is frequently discussed in policy studies literature is the danger of negative unintended consequences and whether these dangers can be anticipated (Oliver *et al.*, 2019a). This subsection provides some discussion of some potentially unexpected effects of implementing sport policies. A proposed method for increasing equity in health outcomes is through programmes aimed at vulnerable populations (Frohlich and Potvin, 2008). As the discussion around message three illustrates, there have been unsuccessful attempts to incentivise sports clubs to target more hard-to-reach populations. It is possible that these attempts at promoting PA were unsuccessful due to the complicating effect of the differing priorities of the actors involved in the implementation process (Misener and Misener, 2016).

Free Swimming Initiatives may be an easier programme to implement. In the UK, a policy was developed that allowed certain groups (e.g. persons over 60 years of age) to swim in swimming pools owned by local authorities free of charge. The chapter four sport review synthesises findings from various evaluations of these initiatives from across the UK. Positive outcomes were reported in various studies (e.g. Bolton and Martin, 2012; Higgerson *et al.*, 2018) such as increased participation in swimming by young people. However, these were contradicted by other studies (e.g. Kokolakis *et al.*, 2015). A ‘crowding out effect’, where existing users of swimming facilities are deterred from participating in swimming by the presence of new arrivals, was proposed as a potential mechanism explaining how a free swimming initiative could have a negative impact on rates of swimming participation. This raises the question of how policymakers can respond to the problem of unintended consequences.

According to Oliver and colleagues (2019a) it may be possible to ameliorate the threat of unintended negative consequences through better use of consultation with appropriate policy stakeholders. This speaks to the importance of consultation with service users during early phases of a project's delivery (i.e. formulation and piloting). It should be noted that some negative unintended consequences may be acceptable. If a targeted programme is effective in increasing PA a hard-to-reach population, some level of displacement may be an acceptable trade-off especially if displaced users are able to maintain health sustaining levels of PA through other means.

Message 5 Different types of evidence are necessary for holistic policy research

It was noted in the methods chapter that the research questions that are the subject of this thesis reflect an *ideal*, set out in the phrase 'Evidence-Based Policy' or EBP. EBP can be understood simply as the aspiration for rigorous evidence to be developed and utilised to inform policy. However, the phrase also refers to a *movement* with views concerning what is required to realise this aspiration (Head, 2010).

Critical commentaries (Welch, 2014) have been written which object to the methods and methodology advocated by the EBP movement¹³. Perhaps the most salient critique is of how the EBP movement defines 'evidence'. The EBP movement promotes a hierarchy of evidence. Research evidence is promoted over other kinds of evidence and certain types of research evidence are preferred over others (Hammersley, 2013). The hierarchy of research evidence is often depicted as a pyramid with Systematic Reviews at the top, followed by Randomised Control Trials (RCTs), then cohort studies with expert opinion at the bottom. The hierarchy privileges quantitative designs over qualitative (Hammersley, 2013) and more highly controlled studies, which are less likely to be contaminated by pre-existing or incidental differences, over less tightly controlled designs (Parkhurst and Abeyasinghe 2016). This ensures greater confidence in a causal effect (Doleac 2019). Critics of this view have noted that it originates in the Evidence-based Medicine (EBM) movement, and query whether it such a model is suitable for

¹³ More radical critiques have even questioned the aspiration towards EBP (Welch, 2014; Hammersley 2013).

research intended to inform policy (Hammersley, 2013; Parkhurst and Abeysinghe 2016). Rather, it has been argued, the best evidence depends on the question being asked (Hammersley, 2013; Parkhurst and Abeysinghe, 2016) though some literature suggests that evidence hierarchy may be appropriate for answering the fundamental, decontextualised, question of policy effectiveness (Cairney and Oliver, 2017).

The experience of conducting systematic reviews makes clear that, even for a question of policy effectiveness, the idea of a permanent stable hierarchy with RCTs at the top should not be accepted uncritically. One practical reason for this is that RCT evidence is, too often, simply unavailable. For example: a 2008 review sought evidence from controlled studies evaluating the effect of interventions for increasing sport participation delivered through sport organisations (Priest *et al.*, 2008). No suitable studies were identified. The sport policy review study presented in chapter four has a more liberal interpretation of what constitutes relevant research evidence with various study designs informing the conclusions. However, no evidence was identified from RCT designs, despite the somewhat broader research question. Timeliness of evidence is an important factor determining how evidence is utilised in public policy (Pawson, 2006; Cairney and Oliver, 2017) but there appears to be no evidence at all from this type of research design to support or deny any policy for promoting sport participation. Developing the PA-EPI would not have been possible by relying on research from the highest levels of the evidence hierarchy alone.

A more fundamental problem is that, even if evidence from controlled designs is available, these designs seem poorly equipped to deal with problems that are relevant to policy effectiveness. The problems of negative unintended consequences have been discussed earlier in this chapter. A defence of the model adopted from EBM may note that clinical research often requires monitoring and reporting of adverse treatment effects (Oliver *et al.*, 2019a), and thus unintended consequences may be identified through controlled design. However, policy action may generate ‘out of scope’ unintended consequences. These are unintended consequences affecting persons not targeted by the intervention (Oliver *et al.*, 2019a). A potential example is discussed in the previous subsection (Kokolakakis *et al.*, 2015). It is difficult to envisage how an experimental design can anticipate these kinds of effects. This suggests that experience and testimony from users and relevant stakeholders are necessary to provide a holistic picture of a policy’s effects.

This latter concern highlights the importance of testimony and debate in producing knowledge. This speaks to a need for methodological pluralism, incorporating qualitative and mixed methods designs in policy effectiveness research.

8.4 What was found – messages relating to policy implementation and PA-EPI use

The answer to the second research question, *how have these policies applied in the Irish context*, can be identified in the PA-EPI scorecard which identifies implementation gaps in different policy domains. The findings of this study are not limited to the identified implementation gaps, however. Following the development of the PA-EPI scorecard, the PA-EPI process continued for another couple of stages. These extra steps of the PA-EPI process asked how PA policy implementation could be strengthened going forward and sought to increase the likelihood of policymakers acting on the implementation recommendations. The output of this exercise is a list of priority implementation recommendations. Further, lessons were learned through the undertaking the PA-EPI process. While the messages related to policy impact were generally recommended to policymakers, the following messages are primarily aimed at people interested in using the PA-EPI for research and advocacy.

Message 6 Preparatory work needs to be undertaken at the start of the process

In Chapter 5, a draft process for utilizing the PA-EPI, based on INFORMAS materials, was presented (Figure 5.2). Upon reflection, the original PA-EPI process underemphasized several preparatory tasks which are needed to ensure PA-EPI is completed in a timely manner. For example, universities and research institutions generally require approval from a recognised research ethics committee for any research involving human subjects. It is important that approval is secured prior to the initiation of any formal correspondence with members of the national coalition as part of the study¹⁴. This was not emphasized in the draft PA-EPI protocol represented by figure 5.2 in chapter five. Hence, a protocol amendment is proposed. The first step (‘analyse context’) should be renamed ‘prepare for study’. The purpose of this step is conceived as planning to anticipate threats to the completion or validity of the PA-EPI process.

¹⁴ However, it may be possible (and in the interests of timeliness, advisable) for the research team to initiate the web-based searches for policy information while the application is being processed (see message seven on the iterative nature of the early stages of the process).

Research teams using the PA-EPI can minimise additional threats by considering what can be labelled ‘permissions’, ‘process’ and ‘partners’ (as well as the considering the national context, the original purpose of the step, as mentioned in the next section). The need to secure permission to research has been mentioned. The specific regulations will differ between jurisdictions but acquiring formal approval from a research ethics committee typically requires disclosing (1) how the research team intends to recruit research participants, (2) how explicit informed consent to participate in the research will be obtained and (3) how participant confidentiality will be protected.

Considering the process involves anticipating potential bottlenecks and developing a realistic timeline for completing the PA-EPI process. This involves considering important dates like deadlines for data collection (described in subsequent stages) and workshop dates. As highlighted in the next section, the first phase will involve iterations and returns to previously explored territory as new information and evidence is uncovered or provided. For the latter phases researchers should allocate sufficient time for government officials and stakeholders to respond to requests and for the research team to process feedback and correspondence.

Considering partners requires the research team to identify the two mutually exclusive sets of partners who will be recruited to perform certain roles within the process: government officials and independent stakeholders. The government officials can be identified from prior engagement with physical activity researchers and from their role within the civil service¹⁵. Various PA policy monitoring tools have been developed that rely on engagement with government to varying degrees (Messing *et al.*, 2023). An experienced research team may have worked with government officials on previous PA projects. The selection of government officials should be based upon a judgement of *responsibility* for the development and implementation of PA policy. The group of independent stakeholders should include members from different sectors and interest groups. The size of this group may vary but should include representation from (1) academia, (2) non-governmental organisations (NGOs), nonprofits and advocacy groups and (3) front line workers who have experience implementing PA initiatives at a different level of government. Stakeholders invited to participate in the study should be supportive of the goal of promoting PA via public policy. To ensure that the independent stakeholders are a diverse and

¹⁵ The civil service refers to public administration including government departments and agencies.

multisectoral group, the sample should include persons with specific knowledge of each of the eight policy domains.

Message 7 Completing the PA-EPI is an iterative process

The first use of the PA-EPI revealed that the process doesn't strictly unfold sequentially, involving iterations and revisions, particularly in the early evidence document compilation stages. This observation also suggests that the process can be understood as consisting of different phases, broader than the eight steps, with distinct purposes.

The first step of the process (initially labelled 'analyse context,') required clarity on the government level being studied. Government responsibility for policy development or implementation can be federalised, shared or devolved. Since responsibility for implementing a particular GPS may not lie entirely with the level of government under study, it was envisaged that GPSs could be removed or separated into several indicators based on the research team's consideration of context. A difficulty is that, in theory, this precedes work in which the research team is likely to increase their knowledge of the policymaking context (through their work in creating an evidence document chronicling government PA policy and its implementation). Therefore, it may be reasonable to reconsider decisions made at step one while the evidence document is being completed. The learning that occurs through creating evidence document may inform other decisions as well. For example: ideas concerning who to recruit to the national coalition may be generated as information is uncovered. Further, the process of searching for evidence and validating it with policymakers will require ongoing revisions to the evidence document.

Message 8 The steps of the PA-EPI process can be categorised into phases

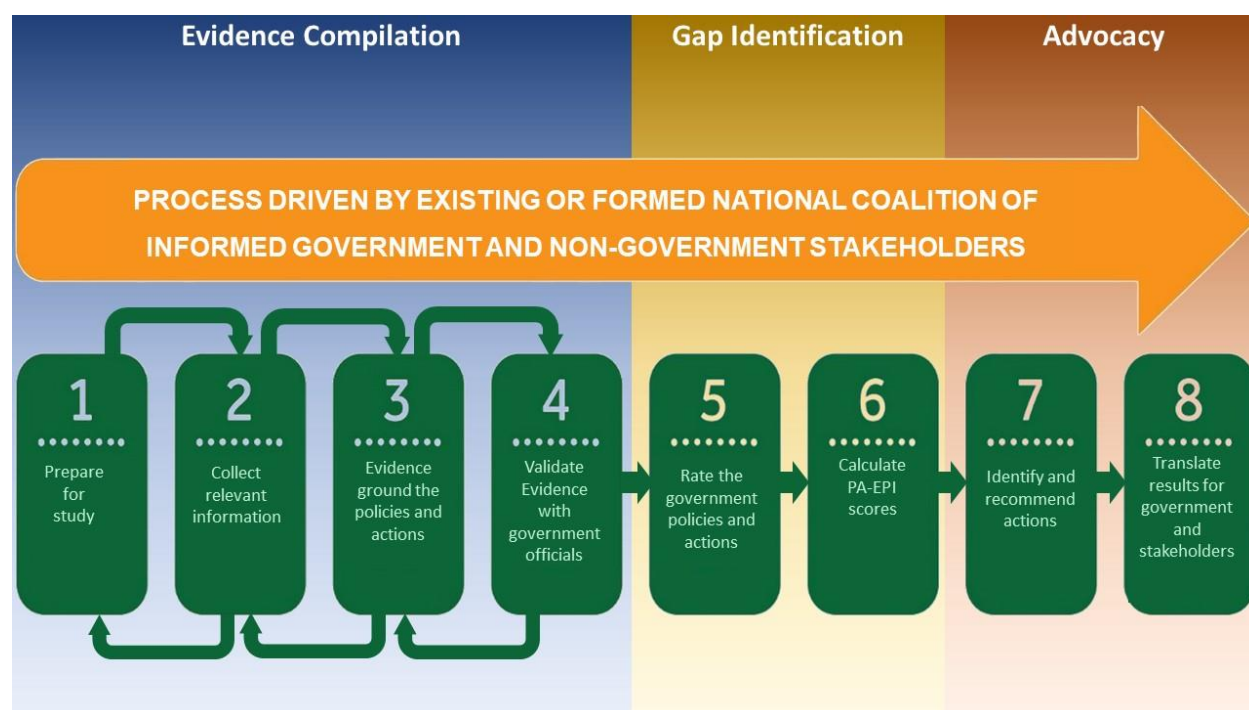
The process steps can be categorised into broader phases with distinct purposes. Three broad phases are proposed. The first, 'evidence compilation' is completed when the research team, in collaboration with government officials, finalise the evidence document. This phase is somewhat iterative and is likely to involve considerable learning about different aspects of government policy by the research team.

The next two phases unfold in a more sequential manner. In the second phase, gap identification, the extent of implementation of the GPSs is charted based on ratings data provided by a different stakeholder group to the government officials - independent PA stakeholders. The knowledge of the extent of policy implementation generated in this phase is intended to be useful for researchers, policymakers and PA advocates.

As mentioned in the introduction, the research presented in this thesis is intended to support real PA policy implementation. The third phase of the PA-EPI process is labelled the ‘advocacy’ phase and reflects a shift in focus from current policy implementation to future action. This phase involves workshops and dissemination activities with both groups of stakeholders present: government officials and independent stakeholders. In this phase, actions for strengthening implementation action are proposed, discussed, prioritised and disseminated. PA advocates from countries of all income levels have highlighted increased collaboration between stakeholders across sectors as a vital support for PA promotion (Murphy *et al.*, 2023). The workshops undertaken as part of the study process are opportunities for further networking to increase capacity for advocacy amongst the coalition. Therefore, the research team should consider strategies to maximise networking within the coalition during these workshop sessions.

Based on these reflections on the PA-EPI process, figure 8.1 displays some suggested changes to the conceptualisation of the PA-EPI process initially laid out in figure 5.2. Arrows have been added to demonstrate that the early steps are iterative while the later steps are more sequential, three headings which reflect the major phases of the process have been added: evidence compilation, gap identification and advocacy and the label on the first step of the process has been changed from ‘analyse context’ to ‘prepare for study’.

Figure 8.1 Revised PA-EPI process



Message 9 A sustainable national coalition is necessary to ensure that progress on PA policy is maintained.

Research using the PA-EPI tool contributes to ongoing PA policy improvement, with additional actions needed to ensure effective utilization of PA-EPI evidence. The cyclical accountability framework, mentioned in the methods chapter, involves four steps: 'take the account,' 'share the account,' 'hold to account,' and 'respond to account'. Following assessment of policy implementation using the PA-EPI ('taking the account') and dissemination of the assessment's findings to government ('sharing the account'), the framework requires empowered groups apply incentives and disincentives ('holding to account') to ensure that remedial action is taken to strengthen policy ('responding to action'). Researchers should consider methods for 'holding to account' and ensuring policymakers 'respond to the account' once the eight step PA-EPI process have been concluded.

To 'hold to account' it may be prudent to build upon the networks with policymakers and independent stakeholders developed throughout the PA-EPI process. There is substantial academic literature attesting to the difficulty of maintaining a stable coalition of stakeholders,

especially when cooperation between different sectoral actors is required. Research demonstrates that the complexity of the issue may cause inactivity to be perceived as “everyone’s business but nobody’s responsibility” (Rigby *et al.*, 2022). Inviting policymakers to workshops and dissemination events is key to ensuring ownership of the issue in their work. Studies have demonstrated that including PA stakeholders in these exercises can assist PA stakeholders to identify and define their roles within the PA promotion landscape (Murphy *et al.*, 2021).

To enable policymakers to ‘respond to the account’ it may be prudent to suggest further meetings with policymakers to discuss how the implementation recommendations align with the current policy agenda and how the research team and independent actors can assist in the enactment of the implementation recommendations. Since the accountability framework is cyclical, it is advisable that the PA-EPI study is repeated as part of the cycle every four or five years (resources permitting). This will enable progress on implementation to be charted.

Message 10 Coordination is required at an international level

To generate attention on a health issue a health policy community should develop global institutions (Shiffman, 2009). Certain tasks can only be done effectively at a global level. Developing a common source of Best Practice Exemplars (BPEs) is an example of one such task. BPEs are examples of PA policies from across the global that serve as illustrations of good practice. In chapter six, BPEs were included in the Irish PA policy evidence document used to provide benchmarks against which policy implementation can be compared. By providing this comparison, BPEs enable the rating of policy implementation. Examples of best practice are highly valued by policymakers, notably in the EU, as they can be utilised as models for effective policymaking (Blake *et al.*, 2021). Increasing the *availability* of examples of effective policy implementation, therefore, provides a highly valuable service for the research team and for key PA policy stakeholders.

To complete the research described in chapter six, BPEs were derived from various sources, including resources from the Global Observatory on Physical Activity (GoPA!), the World Cancer Research Foundation’s (WCRF’s) searchable MOVING database (World Cancer Research Fund International, 2020) and materials published by the WHO’s Regional Office for Europe. However, sourcing and developing BPEs for each of the GPSs is a time-consuming

activity for research teams. Designating a single online list or database as the primary source of BPEs would have numerous advantages. It would greatly expedite the PA-EPI process for researchers and avoid a certain level of duplication of effort as different research teams would not have to repeat the task of sourcing BPEs for their studies. Further, research teams that have used the PA-EPI could send information on the well implemented policies in their own countries, to the database management team. This would allow the list to be constantly updated with the best evidence for effective, well-implemented policies. Further, the database could be used to ensure BPE quality, as a procedure could be developed for identifying which proposed BPEs are best. BPEs could be selected for display in evidence documents based on evidence of implementation and effectiveness. The availability of economic evaluations, for example, demonstrating cost-effectiveness of a proposed BPE could be a consideration when selecting BPEs. This cost-effectiveness information could also be showcased in the evidence document.

Message 11 Consideration of fairness and equity should be introduced into the PA-EPI process

Health equity, the absence of differences in health profiles that are “unnecessary and avoidable but, in addition, are also considered unfair and unjust” (Whitehead, 1992) p219) is recognised as a vital consideration in public policy. Health status greatly impacts wellbeing and influences our capabilities and ability to exercise freedoms, making health equity a social justice concern (Sen, 2002). Since there is a limit to the extent that health can be improved in people who are already healthy, an approach to PA promotion that considers health equity conforms with utilitarian priorities as well. An increase in the proportion of people meeting guideline levels of PA that is primarily caused by a change in the PA behaviours of the least active has far greater population health benefits than a similar sized increase that is driven by people who are somewhat active (Mizdrak *et al.*, 2021).

Government action is needed to secure health equity for disadvantaged groups and individuals with limited resources (Ball *et al.*, 2015). Since the PA-EPI process is intended to influence government policy, consideration for health equity needs to be included. Further research may investigate whether the GPSs of the PA-EPI need to be adapted to better support health equity.

It is important to consider equity in the PA-EPI process. The advocacy phase is vital as this is the phase which is designed to target future actions and decision making. Further, the advocacy

phase includes in-person workshops which represent an opportunity to discuss equity concerns in the presence of key PA policymakers. An important action going forward is to ensure adequate representation from disadvantaged groups at these forums. Incorporating an equity perspective into the process may be usefully described as expanding the remit of PA-EPI research from action research to participatory action research.

Message 12 The PA-EPI domains of Transport, Urban Design, Healthcare and Health in all Policies were rated as poorly implemented in Ireland

The results of chapter six suggest policies in some domains are better implemented than others in Ireland. It is noticeable that no GPS in the Transport, Urban Design, Health and Health in all Policies domains was considered to be well implemented by independent stakeholders while the GPSs in the Community and Sport domains were all considered comparatively well-implemented. The GPSs that are well implemented may be studied for lessons on how to effectively implement PA policies or provide Best Practice Exemplars (BPEs) for other research teams utilising the PA-EPI (see message 10). However, it is noteworthy that no GPS was categorised as fully implemented by independent stakeholders.

A potential question for PA policymakers and stakeholders in Ireland is to explore *why* some GPSs received a low implementation rating. Policies are typically implemented by creating programmes (Pressman and Wildavsky, 1984). These programmes embody the policy goals, objectives and theories articulated in policy documents. For example: the policy of promoting PA in school settings, is represented in Ireland by the establishment and expansion of the Active School Flag (ASF) programme. A low implementation rating implies either no policy commitments (and therefore, nothing to implement) or the implementation actions presented are perceived by the independent stakeholders to be insufficient for achieving the policy. The evidence document can be used to identify whether there are programmes currently in place for the low scoring GPSs. Follow up evaluation may identify barriers to implementation impacting the programmes corresponding to these GPSs.

The possibility that the results of the implementation assessment were influenced by bias or error must also be considered. One possibility is that raters are influenced by how information is presented in the evidence document. If the evidence document is not sufficiently comprehensive,

this may impact the validity of the rating. This underlines the importance of validation by policymakers to ensure that the account provided in the evidence document is comprehensive. Further, instructions to raters need to make clear that the evidence document is a support, and the implementation rating is based upon the rater's own experience.

Message 13 Recommended implementation actions are not strongly related to identified implementation gaps

In step seven of the PA-EPI process, described in chapter six, independent stakeholders were asked to recommend actions to strengthen the implementation of PA policy in Ireland. A list of suggested actions was compiled, from which a shorter list of *priority* implementation actions was drawn based on data supplied by the independent stakeholders. Curiously, the priority implementation actions are not strongly associated with the most noticeable implementation gaps in Ireland. For example, the prioritised implementation actions did not include any recommendations for advancing the implementation of active transport policies, despite the fact that the GPSs in the transport domain all received a low implementation rating.

A potential threat is that PA-EPI process outputs are influenced by sectoral interests. Raters may be motivated to rate particular indicators as poorly implemented relative to others for activist purposes. This is unlikely to have been a factor in the implementation ratings step of the process (step five) as the low scoring domains were not overrepresented within the national coalition. Further, the agreement coefficient for the ratings data indicates a reasonable level of agreement between raters. However, it was noted previously that the sample of independent stakeholders that were able to attend the workshop step (step seven) of the process was small (n=6). The workshop is an opportunity to recommend and discuss actions in the presence of policymakers and, therefore, an advocacy opportunity. There is a danger that actions which are proposed are too narrowly focussed on the sectoral interests of the parties who are present and vocal at the workshop. For this reason, strategies are required to maximise attendance at the workshop by all independent stakeholders and the research team should moderate in a manner that enables all participants to be heard. It is important that the panel of independent stakeholders rating the extent of implementation is balanced between the different policy domains to minimise this

possibility. A process evaluation, of the PA-EPI research process, may incorporate a short questionnaire gauging satisfaction with the process.

8.5 Strengths and limitations

Various tools exist which enable researchers to analyse PA policy. The PA-EPI tool is the first to focus specifically on policy implementation. This addresses an important gap, as policy implementation is recognised as a challenge for PA advocates. Further, policy implementation is conceived on a spectrum ranging from not at all implemented to fully implemented. This is a more nuanced and informative picture, then conceiving implementation as a binary (implemented / not implemented). This is consistent with the notion that implementation can be improved incrementally and credits policymakers appropriately for the progress that has been achieved in promoting PA.

A second strength is the synthesis of different types of evidence in the development of the PA-EPI. There is debate about the extent to which a hierarchy of evidence, which originated in the Evidence Based Medicine movement, is to be defended in policy research. Research suggests that typically policymakers have a broader conception of what is considered relevant information for decision-making than researchers and particularly value local information over rigorous reviews and studies which researchers favour (Oliver and de Vocht, 2017). Hence, what academics consider the most compelling research evidence is seldom the primary information which informs policymaking (Aro *et al.*, 2015). The PA-EPI reconciles the evidence concerns of both academics and policymakers by measuring local implementation of policy against best practice as informed by rigorous scientific research and international best practice.

A third strength worth noting is the broad, intersectoral focus and the fact that the PA-EPI process provides an opportunity to develop the coalitions necessary to promote PA policy. As noted in the introduction, collaboration with partners from different sectors is a particularly salient challenge for PA policy. Unfortunately, responsibility for PA policy is often delegated to actors working in the health sector only and intersectoral cooperation is limited. The structure of PA-EPI tool recognises the importance of multiple settings in promoting PA and the process contributes to PA policy practice through its explicit requirement for working in partnership.

A limitation is the cross-sectional nature of the PA-EPI study and the difficulty of developing on effective measures of enforcement and evaluation. Follow up studies are required as per the Accountability Framework (Kraak *et al.*, 2014). However, sustainable funding is required for such studies to take place.

A second limitation relates to the limited amount of evidence of effectiveness provided by systematic reviews. The evidence of policy effectiveness is a burgeoning field, and the conclusions of the systematic review are conditional based on, *inter alia*, the availability of evidence in peer reviewed academic journals. Hopefully the scientific literature concerning which PA policies are impactful will continue to expand. This may create a situation where the GPSs of the PA-EPI may need to be reviewed or revised in light of emerging evidence.

Similarly, the assessment of the extent of implementation and the recommendations for implementation actions made by independent stakeholders is influenced by the quality of evidence presented to them in the evidence document. This includes both the evidence of implementation in Ireland and the strength of the international best practice exemplars used for benchmarking. This highlights the importance of knowledge of aspirational policy implementation. The generation of this knowledge can only be achieved through collaboration with other members of the PA research community and continued development and maintenance of that evidence base.

A final concern in the PA-EPI process is the threat posed by stakeholder non-engagement. This issue is germane to any collaborative research practice (Oliver *et al.*, 2019b). Communicating the benefits of the process to stakeholders is a challenge but is important for maximising responsiveness. A factor that complicates this somewhat is that the PA-EPI process seeks to ensure accountability, while building long term relationships. The food EPI was developed by researchers with extensive experience in policy advocacy in cooperation within a more tightly knit policy community. While there are some established platforms for interaction in Ireland, (notably the Irish Physical Activity Research Collaboration [I-PARC] and its annual conference) the PA-EPI will be utilised in contexts where professional relationships are less well established and potentially more fragile. There is a danger that unwelcome findings may damage key

professional relationships causing stakeholders to disengage from the process. To ameliorate this threat, researchers should seek to represent findings as a support for future practice.

8.6 Conclusions

PA is officially recognised as a policy problem. Formal written PA policies have been published in dozens of countries around the world (Klepac-Pogrmilovic *et al.*, 2020). The process of compiling an evidence document reveals that national governments have many policies which, in theory, support PA. Researchers can continue to support and consolidate progress in PA policy by turning to questions of policy effectiveness (defined in terms of impact on PA outcomes) and implementation (the extent to which policy has been realised in practice). By addressing these two questions, researchers can assist in securing real world accountability of policymakers on this important issue.

PA researchers can maximise the likelihood of productive engagement with the policy process by learning from successful initiatives in related disciplines. The Food EPI is an example of a successful initiative. The research showcased in this thesis supports future research into PA policy implementation by contributing to the development and utilisation of a PA-EPI tool based on the Food EPI example.

Maximising the impact of future research using the PA-EPI will require research teams to develop partnerships with national PA stakeholders. This includes stakeholders both within and outside of government and from across a range of sectors. The names of the policy domains of the PA-EPI provide an indication of the different sectors from which partners should be recruited to achieve an effective coalition. Securing buy-in from key stakeholders will require researchers to convince them of the value of the PA-EPI process. Both policymakers and independent stakeholders can benefit from participating in this process in which information on the extent of policy implementation is generated and exchanged. However, the co-benefits of action on PA should also be emphasized to appeal to sectoral concerns. Further, future research may investigate how the PA-EPI process can be adapted to address other important social concerns such as health equity.

Researchers will need to share the products of PA-EPI research widely. The knowledge to be shared is not limited to the findings of PA-EPI studies concerning government policy implementation. These can be shared at academic conferences and through academic journals as was done for the PA-EPI manuscript which forms the basis of chapter five. Rather mechanisms are required to ensure that examples of good practice, policies that are well implemented according to PA-EPI studies, are shared with other researchers and PA stakeholders globally. The forthcoming IMPAQT project will extend the work of the PEN project by undertaking PA-EPI studies in six different European countries. This will greatly support future policy research and contribute to the growth of knowledge concerning effective, well-implemented PA policy.

References

- Abu-Omar, K., Chevance, G., Tcymbal, A., Gelius, P., Messing, S. (2023) ‘Physical activity promotion, human and planetary health – a conceptual framework and suggested research priorities’, *The Journal of Climate Change and Health*, 13, 100262, available: <https://www.sciencedirect.com/science/article/pii/S2667278223000615> [accessed 6 Apr 2024].
- Active Healthy Kids Global Alliance (2021) Home [online], available: <https://www.activehealthykids.org/> [accessed 6 Dec 2021].
- Allebeck, P. (2008) ‘The prevention paradox or the inequality paradox?’, *European Journal of Public Health*, 18(3), 215, available: <https://doi.org/10.1093/eurpub/ckn048>.
- Aro, A.R., Bertram, M., Hämäläinen, R.-M., Van De Goor, I., Skovgaard, T., Valente, A., Castellani, T., Chereches, R., Edwards, N., Consortium, on behalf of the R., Aro, A.R., Bertram, M., Jakobsen, M.W., Loncarevic, N., Gulis, G., Skovgaard, T., van de Goor, I.A.M., Spitters, H., Quanjel, M., Jansen, J., Dorgelo, A., Ståhl, T., Hämäläinen, R.-M., Villa, T., Chereches, R.M., Rus, D., Sandu, P., Marton-Vasarhely, E.O., Valente, A., Castellani, T., Bianchi, F., Cori, L., Edwards, N., Viehbeck, S., Roelofs, S., Jørgensen, T., Glümer, C., Lau, C.J., Talbot-Smith, A., Aitken, S., Wichbold, C., Syed, A.M., Merry, A., Consortium, on behalf of the R. (2016) ‘Integrating research evidence and physical activity policy making—REPOPA project’, *Health Promotion International*, 31(2), 430–439, available: <https://doi.org/10.1093/heapro/dav002>.
- Audrey, S., Wheeler, B.W., Mills, J., Ben-Shlomo, Y. (2012) ‘Health promotion and the social gradient: the free swimming initiative for children and young people in Bristol’, *Public Health*, 126(11), 976–981, available: <https://doi.org/10.1016/j.puhe.2012.07.008>.
- Aune, D., Norat, T., Leitzmann, M., Tonstad, S., Vatten, L.J. (2015) ‘Physical activity and the risk of type 2 diabetes: a systematic review and dose–response meta-analysis’, *European Journal of Epidemiology*, 30, 529–542, available: <https://doi.org/10.1007/s10654-015-0056-z>.

- Ball, K., Carver, A., Downing, K., Jackson, M., O'Rourke, K. (2015) 'Addressing the social determinants of inequities in physical activity and sedentary behaviours', *Health Promotion International*, 30(suppl_2), ii8–ii19, available: <https://doi.org/10.1093/heapro/dav022>.
- Bambra, C. (2013) 'The primacy of politics: the rise and fall of evidence-based public health policy?'. *Journal of Public Health*, 35(4), 486–487, available: <https://doi.org/10.1093/pubmed/fdt113>.
- Bélanger, M., Townsend, N. and Foster, C., (2011). 'Age-related differences in physical activity profiles of English adults'. *Preventive medicine*, 52(3-4), 247–249, available: <https://doi.org/10.1016/j.ypmed.2011.02.008>.
- Biddle, S.J.H., Asare, M. (2011) 'Physical activity and mental health in children and adolescents: a review of reviews', *British Journal of Sports Medicine*, 45(11), 886–895, available: <https://doi.org/10.1136/bjsports-2011-090185>.
- Birkland, T.A. (2020) *An Introduction to the Policy Process. Theories, Concepts and Models of Public Policy Making*, 5th ed, New York, USA: Routledge.
- Bjørnarå, H.B., Torstveit, M.K., Stea, T.H., Bere, E. (2017) 'Is there such a thing as sustainable physical activity?', *Scandinavian Journal of Medicine & Science in Sports*, 27(3), 366–372, available: <https://doi.org/10.1111/sms.12669>.
- Blake, O., Glaser, M., Bertolini, L., te Brömmelstroet, M. (2021) 'How policies become best practices: a case study of best practice making in an EU knowledge sharing project', *European Planning Studies*, 29(7), 1251–1271, available: <https://doi.org/10.1080/09654313.2020.1840523>.
- Bolton, N., Martin, S. (2013) 'The policy and politics of free swimming', *International Journal of Sport Policy and Politics*, 5(3), 445–463, available: <https://doi.org/10.1080/19406940.2012.656689>.
- van Bottenburg, M., Rijnen, B., van Sterkenburg, J.C. (2005) *Sports Participation in the European Union: Trends and Differences*, Arko Sports Media/WHJ Mulier Institute.

- Bouchard, C., Blair, S.N., Haskell, W. (2012) ‘Why Study Physical Activity and Health?’, in Bouchard, C., Blair, S.N. and Haskell, W., eds., *Physical Activity and Health*, Human Kinetics.
- Brand, C., Goodman, A., Ogilvie, D., on behalf of the iConnect consortium (2014) ‘Evaluating the impacts of new walking and cycling infrastructure on carbon dioxide emissions from motorized travel: a controlled longitudinal study’, *Applied Energy*, 128, 284–295, available: <https://doi.org/10.1016/j.apenergy.2014.04.072>.
- Den Braver, N., García Bengoechea, E., Messing, S., Kelly, L., Schoonmade, L.J., Volf, K., Żukowska, J., Gelius, P., Forberger, S., Woods, C.B., Lakerveld, J. (2022) ‘The impact of mass-media campaigns on physical activity: a review of reviews through a policy lens’, *European Journal of Public Health*, 32(Supplement_4), iv71–iv83, available: <https://doi.org/10.1093/eurpub/ckac085>.
- Brownson, R.C., Fielding, J.E., Maylahn, C.M. (2009) ‘Evidence-Based Public Health: A Fundamental Concept for Public Health Practice’, *Annual Review of Public Health*, 30(1), 175–201, available: <https://doi.org/10.1146/annurev.publhealth.031308.100134>.
- Bull, F., Gauvin, L., Bauman, A., Shilton, T., Kohl, H.W., Salmon, A. (2010) ‘The Toronto Charter for Physical Activity: A Global Call for Action’ *Journal of Physical Activity and Health*, 7(4), 421–422, available: <https://doi.org/10.1123/jpah.7.4.421>
- Bull, F.C., Bauman, A.E. (2011) ‘Physical inactivity: the “Cinderella” risk factor for noncommunicable disease prevention’, *Journal of Health Communication*, 16 Suppl 2, 13–26, available: <https://doi.org/10.1080/10810730.2011.601226>.
- Bull, F.C., Milton, K., Kahlmeier, S. (2015) Health-Enhancing Physical Activity (HEPA) Policy Audit Tool (PAT) Version 2 [online], available: https://www.euro.who.int/__data/assets/pdf_file/0010/286795/Health-enhancing_physical_activityHEPApolicy_audit_toolPATVersion_2.pdf [accessed 4 Oct 2022].
- Bullough, S., Davies, L.E., Barrett, D. (2015) ‘The impact of a community free swimming

programme for young people (under 19) in England’, *Sport Management Review*, 18(1), 32–44, available: <https://doi.org/10.1016/j.smr.2014.09.001>.

Cairney, P., Oliver, K. (2017) ‘Evidence-based policymaking is not like evidence-based medicine, so how far should you go to bridge the divide between evidence and policy?’, *Health Research Policy and Systems*, 15(1), 1–11, available: <https://doi.org/10.1186/s12961-017-0192-x>.

Cantwell, M., Walsh, D., Furlong, B., Moyna, N., McCaffrey, N., Boran, L., Smyth, S., Woods, C. (2018) ‘Healthcare professionals’ knowledge and practice of physical activity promotion in cancer care: challenges and solutions’, *European Journal of Cancer Care*, 27(2), e12795.

Caplan, N. (1979) ‘The Two-Communities Theory and Knowledge Utilization’, *American Behavioral Scientist*, 22(3), 459–470, available: <https://doi.org/10.1177/000276427902200308>.

Carmichael, F., Grix, J., Marqués, D.P. (2013) ‘The Olympic legacy and participation in sport: an interim assessment of Sport England’s Active People Survey for sports studies research’, *International Journal of Sport Policy and Politics*, 5(2), 229–244, available: <https://doi.org/10.1080/19406940.2012.656675>.

Caspersen, C.J., Powell, K.E., Christenson, G.M. (1985) ‘Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research’, *Public Health Reports*, 100(2), 126–131, available: <https://doi.org/10.1111/ecc.12795>.

Castellanos-García, P., Lera-López, F., Sánchez-Santos, J.M. (2022) ‘Light, moderate and vigorous physical activities: New insights into a virtuous circle with happiness’, *European Journal of Sport Science*, 1–11, available: <https://doi.org/10.1080/17461391.2022.2089053>.

Chastin, S.F.M., Abaraogu, U., Bourgois, J.G., Dall, P.M., Darnborough, J., Duncan, E., Dumortier, J., Pavón, D.J., McParland, J., Roberts, N.J., Hamer, M. (2021) ‘Effects of Regular Physical Activity on the Immune System, Vaccination and Risk of Community-Acquired Infectious Disease in the General Population: Systematic Review and Meta-Analysis’, *Sports Medicine*, 51(8), 1673–1686, available: <https://doi.org/10.1007/s40279->

021-01466-1.

Chen, S., Henry, I. (2016) 'Evaluating the London 2012 Games' impact on sport participation in a non-hosting region: a practical application of realist evaluation', *Leisure Studies*, 35(5), 685–707, available: <https://doi.org/10.1080/02614367.2015.1040827>.

Coalter, F. (2013) 'Game plan and the spirit level: the class ceiling and the limits of sports policy?', *International Journal of Sport Policy and Politics*, 5(1), 3–19, available: <https://doi.org/10.1080/19406940.2012.656690>.

Cochran, C.E., Mayer, L.C., Carr, T.R., Cayer, N.J., McKenzie, M.J., Peck, L.R. (2011) *American Public Policy: An Introduction*, 10th ed, Wadsworth, Cengage Learning: Boston, USA.

Council of Europe (1976) 'European Sport for All Charter', in *Resolution (76) 41 of the Committee of Ministers, Principles for a Policy for Sport for All*, Strasburg, 1–3.

Crawford, R. (1980) 'Healthism and the medicalization of everyday life', *International Journal of Health Services*, 10(3), 365–388, available: <https://doi.org/10.2190/3H2H-3XJN-3KAY-G9NY>.

Critical Appraisal Skills Programme (2019) CASP Qualitative Studies Checklist [online], available: <https://casp-uk.net/casp-tools-checklists/> [accessed 5 Mar 2021].

Cummins, S., Clark, C., Lewis, D., Smith, N., Thompson, C., Smuk, M., Stansfeld, S., Taylor, S., Fahy, A., Greenhalgh, T. (2018) 'The effects of the London 2012 Olympics and related urban regeneration on physical and mental health: the ORiEL mixed-methods evaluation of a natural experiment', *Public Health Research*, 6(12), 1–248, available: <https://doi.org/10.3310/phr06120>.

Cunningham, C., O'Sullivan, R. (2021) 'Healthcare Professionals Promotion of Physical Activity with Older Adults: A Survey of Knowledge and Routine Practice', *International Journal of Environmental Research and Public Health*, 18(11), 6064, available: <https://doi.org/10.3390/ijerph18116064>.

- Dashper, K., Fletcher, T., Long, J. (2019) 'Intelligent investment'? Welsh sport policy and the (in) visibility of 'race', *Leisure Studies*, 38(6), 762–774, available: <https://doi.org/10.1080/02614367.2019.1653355>.
- Deelen, I., Ettema, D., Dijst, M. (2016) 'Too busy or too far away? The importance of subjective constraints and spatial factors for sports frequency', *Managing Sport and Leisure*, 21(4), 239–264, available: <https://doi.org/10.1080/23750472.2016.1255563>.
- Department of Transport Tourism and Sport (2018) National Sports Policy 2018 – 2027 [online], available: <https://assets.gov.ie/15979/04e0f52cee5f47ee9c01003cf559e98d.pdf> [accessed 7 Oct 2022].
- Ding, D., Lawson, K.D., Kolbe-Alexander, T.L., Finkelstein, E.A., Katzmarzyk, P.T., Van Mechelen, W., Pratt, M., Committee, L.P.A.S. 2 E. (2016) 'The economic burden of physical inactivity: a global analysis of major non-communicable diseases', *The Lancet*, 388(10051), 1311–1324, available: [https://doi.org/10.1016/S0140-6736\(16\)30383-X](https://doi.org/10.1016/S0140-6736(16)30383-X).
- Dishman, R.K., McDowell, C.P., Herring, M.P. (2021) 'Customary physical activity and odds of depression: a systematic review and meta-analysis of 111 prospective cohort studies', *British Journal of Sports Medicine*, 55(16), 926–934, available: <https://doi.org/10.1136/bjsports-2020-103140>.
- Djojoseparto, S.K., Kamphuis, C.B.M., Vandevijvere, S., Murrin, C., Stanley, I., Romaniuk, P., Harrington, J.M., Poelman, M.P., Consortium, P.E.N. (2022) 'Strength of EU-level food environment policies and priority recommendations to create healthy food environments', *European Journal of Public Health*, 32(3), 504–511, available: <https://doi.org/10.1093/eurpub/ckac010>.
- Doleac, J.L. (2019) 'Evidence-based policy' should reflect a hierarchy of evidence', *Journal of Policy Analysis and Management*, 38(2), 517–519, available: <https://doi.org/10.1002/pam.22118>.
- Downs, S.H., Black, N. (1998) 'The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care

interventions.’, *Journal of Epidemiology & Community Health*, 52(6), 377–384, available: <https://doi.org/10.1136/jech.52.6.377>.

Downward, P. (2007) ‘Exploring the economic choice to participate in sport: Results from the 2002 general household survey’, *International Review of Applied Economics*, 21(5), 633–653.

Downward, P., Riordan, J. (2007) ‘Social interactions and the demand for sport: An economic analysis’, *Contemporary Economic Policy*, 25(4), 518–537, available: <https://doi.org/10.1080/02692170701474710>.

Dye, T.R. (2014) *Understanding Public Policy*, 14th ed, Harlow, UK: Pearson Education Limited.

Eime, R.M., Harvey, J.T., Charity, M.J., Casey, M.M., Van Uffelen, J.G.Z., Payne, W.R. (2015) ‘The contribution of sport participation to overall health enhancing physical activity levels in Australia: a population-based study’, *BioMed Central Public Health*, 15(1), 1–12.

Eime, R.M., Harvey, J.T., Craike, M.J., Symons, C.M., Payne, W.R. (2013) ‘Family support and ease of access link socio-economic status and sports club membership in adolescent girls: a mediation study’, *International Journal of Behavioral Nutrition and Physical Activity*, 10(50), 1–12, available: <https://doi.org/10.1186/s12889-015-2156-9>.

Eime, R.M., Payne, W.R. (2009) ‘Linking participants in school-based sport programs to community clubs’, *Journal of Science and Medicine in Sport*, 12(2), 293–299, available: <https://doi.org/10.1016/j.jsams.2007.11.003>.

Ekelund, U., Steene-Johannessen, J., Brown, W.J., Fagerland, M.W., Owen, N., Powell, K.E., Bauman, A., Lee, I.M., Ding, D., Heath, G., Hallal, P.C., Kohl, H.W., Pratt, M., Reis, R., Sallis, J., Aadahl, M., Blot, W.J., Chey, T., Deka, A., Dunstan, D., Ford, E.S., Færch, K., Inoue, M., Katzmarzyk, P.T., Keadle, S.K., Matthews, C.E., Martinez, D., Patel, A. V., Pavey, T., Petersen, C.B., Van Der Ploeg, H., Rangul, V., Sethi, P., Sund, E.R., Westgate, K., Wijndaele, K., Yi-Park, S. (2016) ‘Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of

data from more than 1 million men and women’, *The Lancet*, 388(10051), 1302–1310, available: [http://dx.doi.org/10.1016/S0140-6736\(16\)30370-1](http://dx.doi.org/10.1016/S0140-6736(16)30370-1).

European Commission (2007) *White Paper on Sport*, [online], available: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52007DC0391> [accessed 6 Apr 2024].

European Commission (2008) EU Physical Activity Guidelines: Recommended Policy Actions in Support of Health-Enhancing Physical Activity [online], available: https://ec.europa.eu/assets/eac/sport/library/policy_documents/eu-physical-activity-guidelines-2008_en.pdf [accessed 31 Jan 2024].

European Commission (2017) *Sport and Physical Activity - Report* [online], available: <http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/special/surveyky/2164> [accessed 6 Apr 2024].

Flintoff, A. (2008) ‘Targeting Mr average: participation, gender equity and school sport partnerships’, *Sport, Education & Society*, 13(4), 393–411, available: <https://doi.org/10.1080/13573320802445017>.

Foley, B.C., Owen, K.B., Bauman, A.E., Bellew, W., Reece, L.J. (2021) ‘Effects of the Active Kids voucher program on children and adolescents’ physical activity: a natural experiment evaluating a state-wide intervention’, *BioMed Central Public Health*, 21(1), 1–16, available: <https://doi.org/10.1186/s12889-020-10060-5>.

Frank, L.D., Greenwald, M.J., Winkelman, S., Chapman, J., Kavage, S. (2010) ‘Carbonless footprints: promoting health and climate stabilization through active transportation’, *Preventive Medicine*, 50, S99–S105, available: <https://doi.org/10.1016/j.ypmed.2009.09.025>.

Frohlich, K.L., Potvin, L. (2008) ‘Transcending the Known in Public Health Practice’, *American Journal of Public Health*, 98(2), 216–221, available: <https://doi.org/10.2105/AJPH.2007.114777>.

Fu, C., Wang, C., Yang, F., Cui, D., Wang, Q., Mao, Z. (2018) ‘Association between social capital and physical activity among community-dwelling elderly in Wuhan, China’,

International Journal of Gerontology, 12(2), 155–159, available:
<https://doi.org/10.1016/j.ijge.2017.10.001>.

Gaesser, G.A., Poole, D.C., Angadi, S.S. (2022) ‘Measuring human energy expenditure: public health application to counter inactivity’, *British Medical Journal*, 379, available:
<https://doi.org/10.1136/bmj.o2937>.

GBD 2019 Risk Factors Collaborators (2020) ‘Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019’, *The Lancet*, 396(10258), 1223–1249, available: [https://doi.org/10.1016/S0140-6736\(20\)30752-2](https://doi.org/10.1016/S0140-6736(20)30752-2).

Gelderblom, D. (2018) ‘The limits to bridging social capital: Power, social context and the theory of Robert Putnam’, *The Sociological Review*, 66(6), 1309–1324, available:
<https://doi.org/10.1177/0038026118765360>.

Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Mansergh, F., Wendel-Vos, W., Żukowska, J., Woods, C. (2021) ‘The added value of using the HEPA PAT for physical activity policy monitoring: a four-country comparison’, *Health Research Policy and Systems*, 19(1), 1–12, available: <https://doi.org/10.1186/s12961-021-00681-6>.

Gelius, P., Messing, S., Goodwin, L., Schow, D., Abu-Omar, K. (2020) ‘What are effective policies for promoting physical activity? A systematic review of reviews’, *Preventive Medicine Reports*, 18, 101095, available: <https://doi.org/10.1016/j.pmedr.2020.101095>.

Gelius, P., Messing, S., Tcymbal, A., Whiting, S., Breda, J., Abu-Omar, K. (2022) ‘Policy Instruments for Health Promotion: A Comparison of WHO Policy Guidance for Tobacco, Alcohol, Nutrition and Physical Activity’, *International Journal of Health Policy and Management*, 11(9) 1863–1873, available: <https://doi.org/10.34172/ijhpm.2021.95>.

Gettier, E.L. (1963) ‘Is justified true belief knowledge?’, *Analysis*, 23(6), 121–123, available:
<https://doi.org/10.1093/analys/23.6.121>.

Gianfredi, V., Blandi, L., Cacitti, S., Minelli, M., Signorelli, C., Amerio, A., Odone, A. (2020) ‘Depression and objectively measured physical activity: A systematic review and meta-

analysis’, *International Journal of Environmental Research and Public Health*, 17(10), available: <https://doi.org/10.3390/ijerph17103738>.

Global Burden of Disease Collaborators (2020) ‘Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019’, *The Lancet*, 396(10258), 1223–1249, available: [https://doi.org/10.1016/S0140-6736\(20\)30752-2](https://doi.org/10.1016/S0140-6736(20)30752-2).

Golden, S.D., McLeroy, K.R., Green, L.W., Earp, J.A.L., Lieberman, L.D. (2015) ‘Upending the Social Ecological Model to Guide Health Promotion Efforts Toward Policy and Environmental Change’, *Health Education & Behavior*, 42(1_suppl), 8S-14S, available: <https://doi.org/10.1177/1090198115575098>.

Greenwood, D., Levin, M. (2007) ‘*Introduction to Action Research*’, 2nd Ed, Thousand Oaks, CA: SAGE.

Grix, J. (2008) ‘The Decline of Mass Sport Provision in the German Democratic Republic’, *The International Journal of the History of Sport*, 25(4), 406–420, available: <https://doi.org/10.1080/09523360701814755>.

Guthold, R., Stevens, G.A., Riley, L.M., Bull, F.C. (2018) ‘Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants’, *The Lancet Global Health*, 6(10), e1077–e1086, available: [https://doi.org/10.1016/S2214-109X\(18\)30357-7](https://doi.org/10.1016/S2214-109X(18)30357-7).

Guure, C.B., Ibrahim, N.A., Adam, M.B., Said, S.M. (2017) ‘Impact of physical activity on cognitive decline, dementia, and its subtypes: meta-analysis of prospective studies’, *BioMed Research International*, 2017, available: <https://doi.org/10.1155/2017/9016924>.

Haack, S. (1997) ‘Vulgar Rortyism’, *The New Criterion*, 16(3), 67–70, available: <https://newcriterion.com/article/vulgar-rortyism/> [accessed 10 Apr 2024].

Haack, S. (2009) ‘The meaning of pragmatism: the ethics of terminology and the language of philosophy’, *Teorema: Revista Internacional de Filosofía*, 9–29, <http://www.jstor.org/stable/43046783> [accessed 10 Apr 2024].

- Hafner, M., Yerushalmi, E., Stepanek, M., Phillips, W., Pollard, J., Deshpande, A., Whitmore, M., Millard, F., Subel, S. and Van Stolk, C., (2020). Estimating the global economic benefits of physically active populations over 30 years (2020–2050). *British Journal of Sports Medicine*, 54(24), 1482-1487, available: <https://doi.org/10.1136/bjsports-2020-102590>.
- Hagger, M.S., Weed, M. (2019) ‘DEBATE: Do interventions based on behavioral theory work in the real world?’, *International Journal of Behavioral Nutrition and Physical Activity*, 16(1), 1–10, available: <https://doi.org/10.1186/s12966-019-0795-4>.
- Hallal, P.C., Andersen, L.B., Bull, F.C., Guthold, R., Haskell, W., Ekelund, U. (2012) ‘Global physical activity levels: surveillance progress, pitfalls, and prospects’, *The Lancet*, 380(9838), 247–257, available: [https://doi.org/10.1016/S0140-6736\(12\)60646-1](https://doi.org/10.1016/S0140-6736(12)60646-1).
- Hammersley, M. (2013) *The Myth of Research-Based Policy and Practice*, London, UK: SAGE.
- Hartmann-Tews, I. (2006) ‘Social stratification in sport and sport policy in the European Union’, *European Journal for Sport and Society*, 3(2), 109–124, available: <https://doi.org/10.1080/16138171.2006.11687784>.
- Head, B.W. (2010) ‘Reconsidering evidence-based policy: Key issues and challenges’, *Policy and Society*, 29(2) 77-94 available: <https://doi.org/10.1016/j.polsoc.2010.03.001>.
- Healthy Ireland (2016) *Get Ireland Active! National Physical Activity Plan for Ireland*, [online] available: <https://www.gov.ie/en/policy-information/b60202-national-physical-activity/> [accessed 6 Apr 2024].
- Hebert, J.J., Møller, N.C., Andersen, L.B., Wedderkopp, N. (2015) ‘Organized sport participation is associated with higher levels of overall health-related physical activity in children (CHAMPS study-DK)’, *PLoS One*, 10(8), e0134621, available: <https://doi.org/10.1371/journal.pone.0134621>.
- Heinemann, K. (2005) ‘Sport and the welfare state in Europe’, *European Journal of Sport Science*, 5(4), 181–188, available: <https://doi.org/10.1080/17461390500344347>.

- Herring, M.P., O'Connor, P.J., Dishman, R.K. (2010) 'The effect of exercise training on anxiety symptoms among patients: a systematic review', *Archives of Internal Medicine*, 170(4), 321–331, available: <https://doi.org/10.1001/archinternmed.2009.530>.
- Higgerson, J., Halliday, E., Ortiz-Nunez, A., Brown, R., Barr, B. (2018) 'Impact of free access to leisure facilities and community outreach on inequalities in physical activity: a quasi-experimental study', *Journal of Epidemiology and Community Health*, 72(3), 252–258, available: <https://doi.org/10.1136/jech-2017-209882>.
- Hillsdon, M., Panter, J., Foster, C., Jones, A. (2007) 'Equitable access to exercise facilities', *American Journal of Preventive Medicine*, 32(6), 506–508, available: <https://doi.org/10.1016/j.amepre.2007.02.018>.
- Hoekman, R., Scheerder, J. (2021) 'Sport policy practice and outcome: theoretical and empirical approaches', *European Journal for Sport and Society*, 18(2), 103–113, available: <https://doi.org/10.1080/16138171.2021.1926772>.
- Holtermann, A., Hansen, J.V., Burr, H., Sogaard, K., Sjøgaard, G. (2012) 'The health paradox of occupational and leisure-time physical activity', *British Journal of Sports Medicine*, 46(4), 291–295, available: <https://doi.org/10.1136/bjism.2010.079582>.
- Hong, Q.N., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P.P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M.C., Vedel, I. (2019) 'Improving the content validity of the mixed methods appraisal tool: a modified e-Delphi study', *Journal of Clinical Epidemiology*, 111, 49–59, available: <https://doi.org/10.1016/j.jclinepi.2019.03.008>.
- Horodyska, K., Luszczynska, A., Hayes, C.B., O'Shea, M.P., Langøien, L.J., Roos, G., van den Berg, M., Hendriksen, M., De Bourdeaudhuij, I., Brug, J. (2015) 'Implementation conditions for diet and physical activity interventions and policies: an umbrella review', *BioMed Central Public Health*, 15(1), 1250, available: <https://doi.org/10.1186/s12889-015-2585-5>.
- Hovemann, G., Wicker, P. (2009) 'Determinants of sport participation in the European Union',

European Journal for Sport and Society, 6(1), 51–59, available:
<https://doi.org/10.1080/16138171.2009.11687827>.

Howlett, M., Ramesh, M., Perl, A. (2009) *Studying Public Policy Policy Cycles & Policy Subsystems*, 3rd ed, Toronto, Canada: Oxford University Press.

Ikramullah, A., Koutrou, N., Pappous, A.S. (2018) ‘Sportivate: A Case Study of Sports Policy Implementation and Impact on the Sustainability of Community Physical Activity Programmes’, *The International Journal of Sport and Society*, 9(3), 1–20, available:
<https://doi.org/10.18848/2152-7857/CGP/v09i03/1-20>.

Institute of Medicine (2001) *Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences*, Washington, DC, USA: National Academies Press (US).

International Network for Food and Obesity / Non-communicable Diseases Research Monitoring and Action Support (2023a) *Countries* [online], available:
<https://www.informas.org/countries/> [accessed 14 May 2023].

International Network for Food and Obesity / Non-communicable Diseases Research Monitoring and Action Support (2023b) *What Is INFORMAS?* [online], available:
<https://www.informas.org/about-informas/> [accessed 14 May 2023].

International Society for Physical Activity and Health (2020) *ISPAH’s Eight Investments That Work for Physical Activity* [online], available: <https://www.ispah.org/resources/key-resources/8-investments/> [accessed 14 Apr 2021].

‘Investments that Work for Physical Activity’ (2012) *British Journal of Sports Medicine*, 46(10), 709 LP – 712, available: <http://bjsm.bmj.com/content/46/10/709.abstract> [accessed 6 Apr 2024].

IPCC (2023) *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Geneva, Switzerland, available: <https://www.ipcc.ch/report/ar6/syr/resources/how-to-cite-this-report/> [accessed 6 Apr 2024].

- Ishkineeva, A.K.F., Ozerova, K. (2017) 'Impact of sports infrastructure on public health: Quantitative analysis', *Revista QUID*, (1), 853–858, available: <https://dialnet.unirioja.es/servlet/articulo?codigo=6145536> [accessed 10 Apr 2024].
- James, W. (1898) 'Philosophical Conceptions and Practical Results' in McDermott, J.J. ed., *The Writings of William James A Comprehensive Addition* New York, USA: Random House 345-361.
- Katzmarzyk, P.T., Friedenreich, C., Shiroma, E.J., Lee, I.M. (2022) 'Physical inactivity and non-communicable disease burden in low-income, middle-income and high-income countries', *British Journal of Sports Medicine*, 56(2), 101–106, available: <https://doi.org/10.1136/bjsports-2020-103640>.
- Kelly, L., Twohig, C., Woods, C.B., Luszczynska, A., Murrin, C., Lien, N., Meshkovska, B., Kamphuis, C.B.M., Poelman, M.P., Terragani, L., Forberger, S., Hebestreit, A., Ahrens, W., Harrington, J.M., consortium, on behalf of the P.E.N. (2022) 'Reaching consensus on definitions for food and physical activity policies: experience from the Policy Evaluation Network', *European Journal of Public Health*, 32(Supplement_4), iv10–iv20, available: <https://doi.org/10.1093/eurpub/ckac147>.
- Klepac Pogrmilovic, B., O'Sullivan, G., Milton, K., Biddle, S.J.H., Bauman, A., Bellew, W., Cavill, N., Kahlmeier, S., Kelly, M.P., Mutrie, N., Pratt, M., Rutter, H., Ramirez Varela, A., Woods, C., Pedisic, Z. (2019) 'The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework', *International Journal of Behavioral Nutrition and Physical Activity*, 16(1), 60, available: <https://www.ncbi.nlm.nih.gov/pubmed/31375132> [accessed 6 Apr 2024].
- Klepac Pogrmilovic, B., O'Sullivan, G., Milton, K., Biddle, S.J.H., Bauman, A., Bull, F., Kahlmeier, S., Pratt, M., Pedisic, Z. (2018) 'A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies', *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 123, available: <https://www.ncbi.nlm.nih.gov/pubmed/30486826> [accessed 6 Apr 2024].

- Klepac Pogrmilovic, B., O’Sullivan, G., Milton, K., Biddle, S.J.H., Pedisic, Z. (2019) ‘A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies’, *Health Research Policy and Systems*, 17(1), 1–12, available: <https://doi.org/10.1186/s12961-019-0492-4>.
- Klepac Pogrmilovic, B., Ramirez Varela, A., Pratt, M., Milton, K., Bauman, A., Biddle, S.J.H., Pedisic, Z. (2020) ‘National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness’, *International Journal of Behavioral Nutrition and Physical Activity*, 17(1), 1–13, available: <https://doi.org/10.1186/s12966-020-01022-6>.
- Kohl, H.W., Craig, C.L., Lambert, E.V., Inoue, S., Alkandari, J.R., Leetongin, G., Kahlmeier, S. (2012) ‘The pandemic of physical inactivity: global action for public health’, *The Lancet*, 380(9838), 294–305, available: [https://doi.org/10.1016/S0140-6736\(12\)60898-8](https://doi.org/10.1016/S0140-6736(12)60898-8).
- Kokko, S., Martin, L., Geidne, S., Van Hove, A., Lane, A., Meganck, J., Scheerder, J., Seghers, J., Villberg, J., Kudlacek, M. (2019) ‘Does sports club participation contribute to physical activity among children and adolescents? A comparison across six European countries’, *Scandinavian Journal of Public Health*, 47(8), 851–858, available: <https://doi.org/10.1177/1403494818786110>.
- Kokolakakis, T., Pappous, A.S., Meadows, S. (2015) ‘The impact of the free swimming programme in a local community in the South East of England: giving with one hand, taking away with the other’, *International Journal of Environmental Research and Public Health*, 12(4), 4461–4480, available: <https://doi.org/10.3390/ijerph120404461>.
- Kraak, V.I., Swinburn, B., Lawrence, M., Harrison, P. (2014) ‘An accountability framework to promote healthy food environments’, *Public Health Nutrition*, 17(11), 2467–2483, available: <https://doi.org/10.1017/S1368980014000093>.
- Kwon, J., Reeve, E., Mann, D., Swinburn, B., Sacks, G. (2022) ‘Benchmarking for accountability on obesity prevention: evaluation of the Healthy Food Environment Policy Index (Food-EPI) in Australia (2016–2020)’, *Public Health Nutrition*, 25(2), 488–497, available: <https://doi.org/10.1017/S136898002100447X>.

- Kyu, H.H., Bachman, V.F., Alexander, L.T., Mumford, J.E., Afshin, A., Estep, K., Veerman, J.L., Delwiche, K., Iannarone, M.L., Moyer, M.L. (2016) 'Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: systematic review and dose-response meta-analysis for the Global Burden of Disease Study 2013', *British Medical Journal*, 354, available: <https://doi.org/10.1136/bmj.i3857>.
- Ladner, A., Keuffer, N., Baldersheim, H. (2016) 'Measuring Local Autonomy in 39 Countries (1990–2014)', *Regional and Federal Studies*, 26(3), 321–357, available: <https://doi.org/10.1080/13597566.2016.1214911>.
- Lakerveld, J., Woods, C., Hebestreit, A., Brenner, H., Flechtner-Mors, M., Harrington, J.M., Kamphuis, C.B.M., Laxy, M., Luszczynska, A., Mazzocchi, M., Murrin, C., Poelman, M., Steenhuis, I., Roos, G., Steinacker, J.M., Stock, C.C., van Lenthe, F., Zeeb, H., Żukowska, J., Ahrens, W. (2020) 'Advancing the evidence base for public policies impacting on dietary behaviour, physical activity and sedentary behaviour in Europe: The Policy Evaluation Network promoting a multidisciplinary approach', *Food Policy*, 96(101873), available: <https://doi.org/10.1016/j.foodpol.2020.101873>.
- Lee, I.M., Shiroma, E.J., Lobelo, F., Puska, P., Blair, S.N., Katzmarzyk, P.T. (2012) 'Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy', *The Lancet*, 380(9838), 219–229, available: [https://doi.org/10.1016/S0140-6736\(12\)61031-9](https://doi.org/10.1016/S0140-6736(12)61031-9).
- Leyden, K.M. (2003) 'Social capital and the built environment: the importance of walkable neighborhoods', *American Journal of Public Health*, 93(9), 1546–1551, available: <https://doi.org/10.2105/AJPH.93.9.1546>.
- Lim, S.S., Vos, T., Flaxman, A.D., Danaei, G., Shibuya, K., Adair-Rohani, H., AlMazroa, M.A., Amann, M., Anderson, H.R., Andrews, K.G. (2012) 'A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010', *The Lancet*, 380(9859), 2224–2260, available: [https://doi.org/10.1016/S0140-6736\(12\)61766-8](https://doi.org/10.1016/S0140-6736(12)61766-8).

- Lindsey, I., Bacon, D. (2016) 'In pursuit of evidence-based policy and practice: A realist synthesis-inspired examination of youth sport and physical activity initiatives in England (2002–2010)', *International Journal of Sport Policy and Politics*, 8(1), 67–90, available: <https://doi.org/10.1080/19406940.2015.1063528>.
- Link, B.G., Phelan, J. (1995) 'Social conditions as fundamental causes of disease', *Journal of Health and Social Behavior*, 80–94, available: <https://doi.org/10.2307/2626958>.
- Mahesh, R., Vandevijvere, S., Dominick, C., Swinburn, B. (2018) 'Relative contributions of recommended food environment policies to improve population nutrition: results from a Delphi study with international food policy experts', *Public Health Nutrition*, 21(11), 2142–2148, available: <https://doi.org/10.1017/S1368980018001076>.
- Makinen, J.K., Aarresola, O., Lamsa, J., Lehtonen, K., Nieminen, M. (2016) 'Managing civic activities by performance: impacts of the government's performance-based funding system and the domain structure in Finnish sports policy', *International Journal of Sport Policy and Politics*, 8(2), 265–285, available: <https://doi.org/10.1080/19406940.2016.1164742>.
- Mansfield, L., Piggan, J. (2016) 'Sport, physical activity and public health', *International Journal of Sport Policy and Politics*, 8(4), 533–537, available: <http://dx.doi.org/10.1080/19406940.2016.1254666>.
- McDermid, D. (1998) 'Pragmatism and Truth: The Comparison Objection to Correspondence', *The Review of Metaphysics*, 51(4), 775–811, available: <http://www.jstor.org/stable/20130296> [accessed 6 Apr 2024].
- McDowell, C.P., Dishman, R.K., Gordon, B.R., Herring, M.P. (2019) 'Physical activity and anxiety: a systematic review and meta-analysis of prospective cohort studies', *American Journal of Preventive Medicine*, 57(4), 545–556, available: <https://doi.org/10.1016/j.amepre.2019.05.012>.
- McDowell, C.P., Dishman, R.K., Vancampfort, D., Hallgren, M., Stubbs, B., MacDonncha, C., Herring, M.P. (2018) 'Physical activity and generalized anxiety disorder: results from The Irish Longitudinal Study on Ageing (TILDA)', *International Journal of Epidemiology*,

47(5), 1443–1453, available: <https://doi.org/10.1093/ije/dyy141>.

McMahon, N.E. (2022) ‘Framing action to reduce health inequalities: what is argued for through use of the ‘upstream–downstream’ metaphor?’, *Journal of Public Health*, 44(3), 671–678, available: <https://doi.org/10.1093/pubmed/fdab157>.

Messing, S., Rütten, A., Abu-Omar, K., Ungerer-Röhrich, U., Goodwin, L., Burlacu, I., Gediga, G. (2019) ‘How Can Physical Activity Be Promoted Among Children and Adolescents? A Systematic Review of Reviews Across Settings’, *Frontiers in Public Health*, available: <https://www.frontiersin.org/articles/10.3389/fpubh.2019.00055> [accessed 6 Apr 2024].

Messing, S., Tcymbal, A., Abu-Omar, K., Gelius, P. (2023) ‘Research- vs. government-driven physical activity policy monitoring: a systematic review across different levels of government’, *Health Research Policy and Systems*, 21(1), 124, available: <https://doi.org/10.1186/s12961-023-01068-5>.

Milio, N. (1976) ‘A framework for prevention: changing health-damaging to health-generating life patterns.’, *American Journal of Public Health*, 66(5), 435–439, available: <https://doi.org/10.2105/AJPH.66.5.435>.

Mittelmark, M.B. (2014) ‘Unintended effects in settings-based health promotion’, *Scandinavian Journal of Public Health*, 42(July), 17–24, available: <https://doi.org/10.1177/1403494814545108>.

Misener, L., Misener, K.E. (2016) ‘Examining the integration of sport and health promotion: partnership or paradox?’, *International Journal of Sport Policy and Politics*, 8(4), 695–712, available: <https://doi.org/10.1080/19406940.2016.1220405>.

Mizdrak, A., Ding, D., Cleghorn, C., Blakely, T., Richards, J. (2021) ‘Hitting the target but missing the point? Modelling health and economic impacts of different approaches to meeting the global action plan for physical activity target’, *Sports Medicine*, 51, 815–823, available: <https://doi.org/10.1007/s40279-020-01398-2>.

Moher, D., Stewart, L., Shekelle, P. (2016) ‘Implementing PRISMA-P: recommendations for prospective authors’, *Systematic Reviews*, 5(1), 15, available:

<https://doi.org/10.1186/s13643-016-0191-y>.

Morris, J.N., Heady, J.A., Raffle, P.A.B., Roberts, C.G., Parks, J.W. (1953) ‘Coronary heart-disease and physical activity of work’, *The Lancet*, 262(6796), 1111–1120, available: [https://doi.org/10.1016/S0140-6736\(53\)91495-0](https://doi.org/10.1016/S0140-6736(53)91495-0).

Murphy, J., Milton, K., Mclaughlin, M., Shilton, T., McLoughlin, G.M., Reece, L.J., Mair, J.L., Direito, A., Kariippanon, K.E., Mackenzie, K.J., Mavilidi, M.F., Shellington, E.M., Kamada, M., Heron, L., Jauregui, E., Abdeta, C., Pina, I., Pinto, R., Sutherland, R. (2023) ‘Advocating for Implementation of the Global Action Plan on Physical Activity: Challenges and Support Requirements’, *Journal of Physical Activity and Health*, 20(1), 10–19, available: <https://journals.humankinetics.com/view/journals/jpah/20/1/article-p10.xml> [accessed 6 Apr 2024].

Murphy, J.J., Mansergh, F., Murphy, M.H., Murphy, N., Cullen, B., O’Brien, S., Finn, S., O’Donoghue, G., Barry, N., O’Shea, S. (2021) “‘Getting Ireland Active’—Application of a Systems Approach to Increase Physical Activity in Ireland Using the GAPP Framework’, *Journal of Physical Activity and Health*, 18(11), 1427–1436, available: <https://doi.org/10.1123/jpah.2020-0864>.

Murray, C.J.L., Chen, L.C. (1992) ‘Understanding Morbidity Change’, *Population and Development Review*, 18(3), 481–503, available: <http://www.jstor.org/stable/1973655> [accessed 6 Apr 2024].

Nau, T., Bauman, A., Smith, B.J., Bellew, W. (2022) ‘A scoping review of systems approaches for increasing physical activity in populations’, *Health Research Policy and Systems*, 20(1), 104, available: <https://doi.org/10.1186/s12961-022-00906-2>.

de Nazelle, A., Morton, B.J., Jerrett, M., Crawford-Brown, D. (2010) ‘Short trips: An opportunity for reducing mobile-source emissions?’, *Transportation Research Part D: Transport and Environment*, 15(8), 451–457, available: <https://doi.org/10.1016/j.trd.2010.04.012>.

Noël Racine, A., Van Hoyer, A., Boyd, A., Jackson, F., Garbarino, J.-M., Massiera, B.,

- Kahlmeier, S., Sandu, P., Vuillemin, A. (2020) ‘A scoping review of published research on local government policies promoting health-enhancing physical activity’, *International Journal of Sport Policy and Politics*, 12(4), 747–763, available: <https://doi.org/10.1080/19406940.2020.1816561>.
- Nutley, S., Walter, I., Davies, H.T.O. (2009) ‘Promoting evidence-based practice: Models and mechanisms from cross-sector review’, *Research on Social Work Practice*, 19(5), 552–559, available: <https://doi.org/10.1177/1049731509335496>.
- O’Reilly, M., Wiltshire, G., Kiyimba, N., Harrington, D. (2023) ‘“Is Everybody Comfortable?”#
xd; Thinking Through Co-design Approaches to Better Support Girls’ Physical Activity in Schools’, *Qualitative Research in Sport, Exercise and Health*, 15(2), 248–263, available: <https://doi.org/10.1080/2159676X.2022.2083663>.
- Ogilvie, D., Egan, M., Hamilton, V., Petticrew, M. (2005) ‘Systematic reviews of health effects of social interventions: 2. Best available evidence: how low should you go?’, *Journal of Epidemiology and Community Health*, 59(10), 886 LP – 892, available: <http://jech.bmj.com/content/59/10/886.abstract> [accessed 6 Apr 2024].
- Oliveira, J.S., Pinheiro, M.B., Fairhall, N., Walsh, S., Franks, T.C., Kwok, W., Bauman, A., Sherrington, C. (2020) ‘Evidence on physical activity and the prevention of frailty and sarcopenia among older people: a systematic review to inform the World Health Organization physical activity guidelines’, *Journal of Physical Activity and Health*, 17(12), 1247–1258, available: <https://doi.org/10.1123/jpah.2020-0323>.
- Oliver, K., de Vocht, F. (2017) ‘Defining “evidence” in public health: a survey of policymakers’ uses and preferences’, *European Journal of Public Health*, 27(suppl_2), 112–117, available: <https://doi.org/10.1093/eurpub/ckv082>.
- Oliver, K., Hopkins, A., Boaz, A., Guillot-Wright, S., Cairney, P. (2022) ‘What works to promote research-policy engagement?’, *Evidence & Policy*, 18(4), 691–713, available: <https://bristoluniversitypressdigital.com/view/journals/evp/18/4/article-p691.xml> [accessed 6 Apr 2024].

- Oliver, K., Innvar, S., Lorenc, T., Woodman, J., Thomas, J. (2014) ‘A systematic review of barriers to and facilitators of the use of evidence by policymakers’, *BioMed Central Health Services Research*, 14(1), 2, available: <https://doi.org/10.1186/1472-6963-14-2>.
- Oliver, K., Lorenc, T., Tinkler, J., Bonell, C. (2019a) ‘Understanding the unintended consequences of public health policies: the views of policymakers and evaluators’, *BioMed Central Public Health*, 19(1), 1057, available: <https://doi.org/10.1186/s12889-019-7389-6>.
- Oliver, K., Kothari, A. and Mays, N., (2019b) ‘The dark side of coproduction: do the costs outweigh the benefits for health research?’, *Health Research Policy and Systems*, 17, 1-10, available: <https://doi.org/10.1186/s12961-019-0432-3>.
- Ottesen, L., Jeppesen, R.S., Krustup, B.R. (2010) ‘The development of social capital through football and running: studying an intervention program for inactive women’, *Scandinavian Journal of Medicine & Science in Sports*, 20, 118–131, available: <https://doi.org/10.1111/j.1600-0838.2010.01123.x>.
- Ouzzani, M., Hammady, H., Fedorowicz, Z., Elmagarmid, A. (2016) ‘Rayyan-a web and mobile app for systematic reviews’, *Systematic Reviews*, 5(1), 1–10, available: <http://dx.doi.org/10.1186/s13643-016-0384-4>.
- Oxman, A.D., Lavis, J.N., Lewin, S., Fretheim, A. (2009) ‘SUPPORT Tools for evidence-informed health Policymaking (STP) 1: What is evidence-informed policymaking?’, *Health Research Policy and Systems*, 7(1), S1, available: <https://doi.org/10.1186/1478-4505-7-S1-S1>.
- Paffenbarger Jr, R.S., Blair, S.N., Lee, I.-M. (2001) ‘A history of physical activity, cardiovascular health and longevity: the scientific contributions of Jeremy N Morris, DSc, DPH, FRCP’, *International Journal of Epidemiology*, 30(5), 1184–1192, available: <https://doi.org/10.1093/ije/30.5.1184>.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S.,

- McGuinness, L.A., Stewart, L.A., Thomas, J., Tricco, A.C., Welch, V.A., Whiting, P., Moher, D. (2021) 'The PRISMA 2020 statement: An updated guideline for reporting systematic reviews', *International Journal of Surgery*, 88, 105906, available: <https://www.sciencedirect.com/science/article/pii/S1743919121000406> [accessed 6 Apr 2024].
- Panter, J., Guell, C., Humphreys, D., Ogilvie, D. (2019) 'Can changing the physical environment promote walking and cycling? A systematic review of what works and how', *Health & Place*, 58, 102161, available: <https://doi.org/10.1016/j.healthplace.2019.102161>.
- Parkhurst, J.O., Abeysinghe, S. (2016) 'What constitutes "good" evidence for public health and social policy-making? From hierarchies to appropriateness', *Social Epistemology*, 30(5–6), 665–679, available: <https://doi.org/10.1080/02691728.2016.1172365>.
- Pate, R.R. (2007) 'Historical perspectives on physical activity, fitness, and health', *Physical Activity and Health*, Champaign, USA: Human Kinetics, 22–35.
- Pawson, R. (2006) *Evidence-Based Policy: A Realist Perspective*, London, UK: SAGE.
- Pearce, M., Garcia, L., Abbas, A., Strain, T., Schuch, F.B., Golubic, R., Kelly, P., Khan, S., Utukuri, M., Laird, Y. (2022) 'Association between physical activity and risk of depression: a systematic review and meta-analysis', *Journal of the American Medical Association Psychiatry*, 79(6), 550-559, available: <https://doi.org/10.1001/jamapsychiatry.2022.0609>.
- Peirce, C.S. (1877) 'The Fixation of Belief', in Ruse, M., ed., *Philosophy after Darwin. Classic and Contemporary Readings*, Princeton, New Jersey: Princeton university press.
- Peirce, C.S. (1878) 'How to make our ideas clear', *Popular Science Monthly*, 12(Jan.), 286-302, available: <https://archive.org/details/popularsciencemo12newy/page/286/mode/2up> [accessed 10 Apr 2024].
- Pfadenhauer, L.M., Gerhardus, A., Mozygemba, K., Lysdahl, K.B., Booth, A., Hofmann, B., Wahlster, P., Polus, S., Burns, J., Brereton, L. (2017) 'Making sense of complexity in context and implementation: the Context and Implementation of Complex Interventions (CICI) framework', *Implementation Science*, 12(1), 21, available:

<https://doi.org/10.1186/s13012-017-0552-5>.

Piggin, J. (2020) ‘What is physical activity? A holistic definition for teachers, researchers and policy makers’, *Frontiers in Sports and Active Living*, 2, 72, available:

<https://doi.org/10.3389/fspor.2020.00072>.

Pinheiro, M.B., Oliveira, J., Bauman, A., Fairhall, N., Kwok, W., Sherrington, C. (2020)

‘Evidence on physical activity and osteoporosis prevention for people aged 65+ years: a systematic review to inform the WHO guidelines on physical activity and sedentary behaviour’, *International Journal of Behavioral Nutrition and Physical Activity*, 17(1), 1–53, available: <https://doi.org/10.1186/s12966-020-01040-4>.

Powell, K.E., Paluch, A.E., Blair, S.N. (2011) ‘Physical activity for health: What kind? How much? How intense? On top of what?’, *Annual Review of Public Health*, 32, 349–365, available: <https://doi.org/10.1146/annurev-publhealth-031210-101151>.

Pratt, M., Varela, A.R., Bauman, A. (2023) ‘The Physical Activity Policy to Practice Disconnect’, *Journal of Physical Activity and Health*, 1–4, available:

<https://journals.humankinetics.com/view/journals/jpah/aop/article-10.1123-jpah.2023-0071/article-10.1123-jpah.2023-0071.xml> [accessed 6 Apr 2024].

Pratt, M., Varela, A.R., Salvo, D., III, H.W.K., Ding, D. (2019) ‘Attacking the pandemic of physical inactivity: what is holding us back?’, *British Journal of Sports Medicine*, bjsports-2019-101392, available: <http://bjsm.bmj.com/content/early/2019/11/08/bjsports-2019-101392.abstract> [accessed 6 Apr 2024].

Priest, N., Armstrong, R., Doyle, J., Waters, E. (2008) ‘Interventions implemented through sporting organisations for increasing participation in sport’, *Cochrane Database of Systematic Reviews*, 16(3), available: <https://doi.org/10.1002/14651858.CD004812.pub3>.

Putnam, R.D., Leonardi, R., Nanetti, R.Y. (1993) *Making Democracy Work: Civic Traditions in Modern Italy*, USA: Princeton university press.

Ramirez Varela, A., Hallal, P.C., Pratt, M., Bauman, A.E., Borges, C., Lee, I.-M., Heath, G.W., Powell, K.E., Pedisic, Z., Klepac Pogrmlovic, B., Milton, K., Nguyen, A., Foster, C.,

- Cozzensa, M., McLaughlin, M., Nino, G.I., Ferreira, P., Ekelund, U., Salvo, D., Ding, D., Kohl, H.W. (2021) Global Observatory for Physical Activity (GoPA!): 2nd Physical Activity Almanac, Global Observatory for Physical Activity (GoPA!). [online], available: <https://new.globalphysicalactivityobservatory.com/> [accessed 11 Nov 2022].
- Ramirez Varela, A., Pratt, M., Borges, C., Hallal, P.C. (2016) 1st Physical Activity Almanac: The Global Observator for Physical Activity - GoPA! [online], available: <https://indd.adobe.com/view/f8d2c921-4daf-4c96-9eaf-b8fb2c4de615> [accessed 31 Jan 2023].
- Rawls, J. (1971) *A Theory of Justice*, USA: Belknap Press.
- Rigby, B.P., Dodd-Reynolds, C.J., Oliver, E.J. (2022) ‘The understanding, application and influence of complexity in national physical activity policy-making’, *Health Research Policy and Systems*, 20(1), 1–14, available: <https://doi.org/10.1186/s12961-022-00864-9>.
- Rojas-Rueda, D., De Nazelle, A., Tainio, M., Nieuwenhuijsen, M.J. (2011) ‘The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study’, *British Medical Journal*, 343, available: <https://doi.org/10.1136/bmj.d4521>.
- Rorty, R. (1995) ‘Is Truth A Goal of Enquiry? Davidson Vs. Wright’, *The Philosophical Quarterly* (1950-), 45(180), 281–300, available: <http://www.jstor.org/stable/2219651> [accessed 6 Apr 2024].
- Rose, G. (2001) ‘Sick individuals and sick populations’, *International Journal of Epidemiology*, 30(3), 427–432, available: <https://doi.org/10.1093/ije/30.3.427>.
- Rütten, A., Abu-Omar, K., Gelius, P., Schow, D. (2013) ‘Physical inactivity as a policy problem: Applying a concept from policy analysis to a public health issue’, *Health Research Policy and Systems*, 11(1), 1–9, available: <https://doi.org/10.1186/1478-4505-11-9>.
- Rütten, A., Schow, D., Breda, J., Galea, G., Kahlmeier, S., Oppert, J.M., van der Ploeg, H., van Mechelen, W., Rutten, A., Schow, D., Breda, J., Galea, G., Kahlmeier, S., Oppert, J.M., van der Ploeg, H., van Mechelen, W. (2016) ‘Three types of scientific evidence to inform physical activity policy: results from a comparative scoping review’, *International Journal*

of *Public Health*, 61(5), 553–563, available:

<https://www.ncbi.nlm.nih.gov/pubmed/27113707> [accessed 6 Apr 2024].

Rutter, H., Savona, N., Glonti, K., Bibby, J., Cummins, S., Finegood, D.T., Greaves, F., Harper, L., Hawe, P., Moore, L., Petticrew, M., Rehfuess, E., Shiell, A., Thomas, J., White, M. (2017) ‘The need for a complex systems model of evidence for public health’, *The Lancet*, 390(10112), 2602–2604, available: [http://dx.doi.org/10.1016/S0140-6736\(17\)31267-9](http://dx.doi.org/10.1016/S0140-6736(17)31267-9).

Sabatier, P., (1988) ‘An advocacy coalition framework of policy change and the role of policy-oriented learning therein.’ *Policy Sciences*, 21(2), 129-168, available: <https://doi.org/10.1007/BF00136406>

Sacks, G., Kwon, J., Vandevijvere, S. and Swinburn, B., (2021) Benchmarking as a public health strategy for creating healthy food environments: an evaluation of the INFORMAS initiative (2012–2020). *Annual Review of Public Health*, 42, 345-362, available: <https://doi.org/10.1146/annurev-publhealth-100919-114442>.

Sallis, J., Bauman, A., Pratt, M. (1998) ‘Environmental and policy interventions to promote physical activity’, *American Journal of Preventive Medicine*, 15(4), 379–397, available: [https://doi.org/10.1016/S0749-3797\(98\)00076-2](https://doi.org/10.1016/S0749-3797(98)00076-2).

Sallis, J., Owen, N. Fisher, E.B. (1997) ‘*Ecological models of health behavior*’, ‘In Glanz, K, Lewis, F., & Rimmer B.(eds.). *Health Behaviour and Health Education*’.

Sallis, J.F., Bull, F., Guthold, R., Heath, G.W., Inoue, S., Kelly, P., Oyeyemi, A.L., Perez, L.G., Richards, J., Hallal, P.C. (2016) ‘Progress in physical activity over the Olympic quadrennium’, *The Lancet*, 388(10051), 1325–1336, available: [http://dx.doi.org/10.1016/S0140-6736\(16\)30581-5](http://dx.doi.org/10.1016/S0140-6736(16)30581-5).

Sallis, J.F., Cervero, R.B., Ascher, W., Henderson, K.A., Kraft, M.K., Kerr, J. (2006) ‘An ecological approach to creating active living communities’, *Annual Review of Public Health*, 27, 297–322, available: <https://doi.org/10.1146/annurev.publhealth.27.021405.102100>.

Sallis, R., Young, D.R., Tartof, S.Y., Sallis, J.F., Sall, J., Li, Q., Smith, G.N., Cohen, D.A.

- (2021) 'Physical inactivity is associated with a higher risk for severe COVID-19 outcomes: A study in 48 440 adult patients', *British Journal of Sports Medicine*, 55(19), 1099–1105, available: <https://doi.org/10.1136/bjsports-2021-104080>.
- Santos, A.C., Willumsen, J., Meheus, F., Ilbawi, A. and Bull, F.C., (2023). The cost of inaction on physical inactivity to public health-care systems: a population-attributable fraction analysis. *The Lancet Global Health*, 11(1), e32-e39, available: [https://doi.org/10.1016/S2214-109X\(22\)00464-8](https://doi.org/10.1016/S2214-109X(22)00464-8).
- Scheerder, J., Vos, S. (2011) 'Social stratification in adults' sports participation from a time-trend perspective Results from a 40-year household study', *European Journal for Sport and Society*, 8(1–2), 31–44, available: <https://doi.org/10.1080/16138171.2011.11687868>.
- Schoeller, D.A., Van Santen, E. (1982) 'Measurement of energy expenditure in humans by doubly labeled water method', *Journal of Applied Physiology*, 53(4), 955–959, available: <https://doi.org/10.1152/jappl.1982.53.4.955>.
- Sen, A. (2002) 'Why health equity', *Health Economics*, 11, 659–666, available: <https://doi.org/10.1002/hec.762>.
- Sharma, G. (2017) 'Pros and cons of different sampling techniques', *International Journal of Applied Research*, 3(7), 749–752, available: <https://www.allresearchjournal.com/archives/?year=2017&vol=3&issue=7&part=K&ArticleId=4130> [accessed 10 Apr 2024].
- Shea, B.J., Grimshaw, J.M., Wells, G.A., Boers, M., Andersson, N., Hamel, C., Porter, A.C., Tugwell, P., Moher, D., Bouter, L.M. (2007) 'Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews', *BioMed Central Medical Research Methodology*, 7(1), 10, available: <https://doi.org/10.1186/1471-2288-7-10>.
- Shiffman, J. (2009) 'A social explanation for the rise and fall of global health issues', *Bulletin of the World Health Organization*, 87(8), 608–613, available: <https://doi.org/10.2471%2FBLT.08.060749>.
- Slater, S., Chriqui, J., Chaloupka, F.J., Johnston, L. (2014) 'Joint use policies: are they related to

adolescent behavior?’, *Preventive Medicine*, 69 Suppl 1, S37–S43, available:
<https://doi.org/10.1016%2Fj.ypmed.2014.08.032>.

Spaaij, R., Farquharson, K., Marjoribanks, T. (2015) ‘Sport and Social Inequalities’, *Sociology Compass*, 9(5), 400–411, available: <https://doi.org/10.1111/soc4.12254>.

Sport Ireland and Sheffield Hallam University’s Sport Industry Research Centre (2021) *Researching the Value of Sport in Ireland* [online], available:
<https://www.sportireland.ie/research/value-of-sport> [accessed 20 May 2024]

Ståhl, T., Rütten, A., Nutbeam, D., Kannas, L. (2002) ‘The importance of policy orientation and environment on physical activity participation - A comparative analysis between Eastern Germany, Western Germany and Finland’, *Health Promotion International*, 17(3), 235–246, available: <https://doi.org/10.1093/heapro/17.3.235>.

Stamatakis, E., Ding, D., Ekelund, U., Bauman, A.E. (2021) ‘Sliding down the risk factor rankings: reasons for and consequences of the dramatic downgrading of physical activity in the Global Burden of Disease 2019’, *British Journal of Sports Medicine*, 55(21), 1222 LP – 1223, available: <http://bjsm.bmj.com/content/55/21/1222.abstract>.

Stamm, H., Lamprecht, M. (2005) ‘Structural and cultural factors influencing physical activity in Switzerland’, *Journal of Public Health*, 13(4), 203–211, available:
<https://doi.org/10.1007/s10389-005-0117-y>.

Strain, T., Brage, S., Sharp, S.J., Richards, J., Tainio, M., Ding, D., Benichou, J., Kelly, P. (2020) ‘Use of the prevented fraction for the population to determine deaths averted by existing prevalence of physical activity: a descriptive study’, *The Lancet Global Health*, 8(7), e920–e930, available: [http://dx.doi.org/10.1016/S2214-109X\(20\)30211-4](http://dx.doi.org/10.1016/S2214-109X(20)30211-4).

Strandbu, Å., Bakken, A., Sletten, M.A. (2019) ‘Exploring the minority–majority gap in sport participation: different patterns for boys and girls?’, *Sport in Society*, 22(4), 606–624, available: <https://doi.org/10.1080/17430437.2017.1389056>.

Swinburn, B., Egger, G., Raza, F. (1999) ‘Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions

for obesity’, *Preventive Medicine*, 29(6), 563–570, available:
<https://doi.org/10.1006/pmed.1999.0585>.

Swinburn, B., Sacks, G., Vandevijvere, S., Kumanyika, S., Lobstein, T., Neal, B., Barquera, S., Friel, S., Hawkes, C., Kelly, B., L’Abbé, M., Lee, A., Ma, J., Macmullan, J., Mohan, S., Monteiro, C., Rayner, M., Sanders, D., Snowdon, W., Walker, C. (2013) ‘INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support): Overview and key principles’, *Obesity Reviews*, 14(S1), 1–12, available: <https://doi.org/10.1111/obr.12087>.

Swinburn, B., Vandevijvere, S., Kraak, V., Sacks, G., Snowdon, W., Hawkes, C., Barquera, S., Friel, S., Kelly, B., Kumanyika, S. (2013) ‘Monitoring and benchmarking government policies and actions to improve the healthiness of food environments: a proposed Government Healthy Food Environment Policy Index’, *Obesity reviews*, 14, 24–37, available: <https://doi.org/10.1111/obr.12073>.

Swinburn, B.A., Sacks, G., Hall, K.D., McPherson, K., Finegood, D.T., Moodie, M.L., Gortmaker, S.L. (2011) ‘The global obesity pandemic: shaped by global drivers and local environments’, *The Lancet*, 378(9793), 804–814, available: [https://doi.org/10.1016/S0140-6736\(11\)60813-1](https://doi.org/10.1016/S0140-6736(11)60813-1).

Tcymbal, A., Gelius, P., Abu-Omar, K., Messing, S., Whiting, S., Wickramasinghe, K. (2022) ‘Cross-country collaboration for physical activity promotion: experiences from the European Union Physical Activity Focal Points Network’, *European Journal of Public Health*, 32(Supplement_1), i14–i21, available: <https://doi.org/10.1093/eurpub/ckac079>.

Theeboom, M., Haudenhuyse, R., De Knop, P. (2010) ‘Community sports development for socially deprived groups: a wider role for the commercial sports sector? A look at the Flemish situation’, *Sport in Society*, 13(9), 1392–1410, available:
<https://doi.org/10.1080/17430437.2010.510677>.

Trinity College Dublin (2022) *The Irish Longitudinal Study on Ageing* [online], available:
<https://tilda.tcd.ie/> [accessed 9 Oct 2022].

- Vanderlee, L., Goorang, S., Karbasy, K., Vandevijvere, S., L'Abbé, M.R. (2019) 'Policies to create healthier food environments in Canada: experts' evaluation and prioritized actions using the Healthy Food Environment Policy Index (Food-EPI)', *International Journal of Environmental Research and Public Health*, 16(22), 4473, available: <https://doi.org/10.3390/ijerph16224473>.
- Vandevijvere, S., Barquera, S., Caceres, G., Corvalan, C., Karupaiah, T., Kroker-Lobos, M.F., L'Abbé, M., Ng, S.H., Phulkerd, S., Ramirez-Zea, M. (2019) 'An 11-country study to benchmark the implementation of recommended nutrition policies by national governments using the Healthy Food Environment Policy Index, 2015-2018', *Obesity Reviews*, 20, 57–66, available: <https://doi.org/10.1111/obr.12819>.
- Vandevijvere, S., Swinburn, B. (2017) 'INFORMAS Protocol Public Sector Module: Healthy Food Environment Policy Index Extent of implementation of food environment policies by governments compared to international best practice & priority recommendations', *International Network for Food and Obesity / Non-communicable Diseases (NCDs) Research, Monitoring and Action Support*, (June), 1–35, available: <https://doi.org/10.17608/k6.auckland.5673439.v1>.
- Varela, A.R., Pratt, M., Harris, J., Lecy, J., Salvo, D., Brownson, R.C., Hallal, P.C. (2018) 'Mapping the historical development of physical activity and health research: a structured literature review and citation network analysis', *Preventive Medicine*, 111, 466–472, available: <https://doi.org/10.1016/j.ypmed.2017.10.020>.
- Varela, A.R., Pratt, M., Powell, K., Lee, I.-M., Bauman, A., Heath, G., Martins, R.C., Kohl, H., Hallal, P.C. (2017) 'Worldwide surveillance, policy, and research on physical activity and health: The global observatory for physical activity', *Journal of Physical Activity and Health*, 14(9), 701–709, available: <https://journals.humankinetics.com/view/journals/jpah/14/9/article-p701.xml> [accessed 6 Apr 2024].
- Verhoef, T.I., Trend, V., Kelly, B., Robinson, N., Fox, P., Morris, S. (2016) 'Cost-effectiveness analysis of offering free leisure centre memberships to physically inactive members of the

public receiving state benefits: a case study’, *BioMed Central Public Health*, 16(1), 616, available: <https://doi.org/10.1186/s12889-016-3300-x>.

Vickers, J.M. (1980) ‘Truth, consensus, and probability; On Peirce’s definition of scientific truth’, *Pacific Philosophical Quarterly*, 61(3), 183–203, available: <https://doi.org/10.1111/j.1468-0114.1980.tb00013.x>.

Volf, K., Kelly, L., García Bengoechea, E., Casey, B., Gobis, A., Lakerveld, J., Żukowska, J., Gelius, P., Messing, S., Forberger, S., Woods, C.B. (2022) ‘Policy Evaluation Network (PEN): Protocol for systematic literature reviews examining the evidence for impact of policies on physical activity across seven different policy domains [version 4; peer review: 3 approved]’, *HRB Open Research*, 3(62), available: <https://hrbopenresearch.org/articles/3-62/v4> [accessed 6 Apr 2024].

Wahid, A., Manek, N., Nichols, M., Kelly, P., Foster, C., Webster, P., Kaur, A., Friedemann Smith, C., Wilkins, E., Rayner, M. (2016) ‘Quantifying the association between physical activity and cardiovascular disease and diabetes: a systematic review and meta-analysis’, *Journal of the American Heart Association*, 5(9), e002495, available: <https://doi.org/10.1161/JAHA.115.002495>.

Wang, W., Theodoraki, E. (2007) ‘Mass sport policy development in the Olympic City: the case of Qingdao--host to the 2008 sailing regatta’, *Journal of the Royal Society for the Promotion of Health*, 127(3), 125–132, available: <https://doi.org/10.1177/1466424007077345>.

Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Beagley, J., Belesova, K., Boykoff, M., Byass, P., Cai, W., Campbell-Lendrum, D. (2021) ‘The 2020 report of the Lancet Countdown on health and climate change: responding to converging crises’, *The Lancet*, 397(10269), 129–170, available: [https://doi.org/10.1016/S0140-6736\(20\)32290-X](https://doi.org/10.1016/S0140-6736(20)32290-X).

Weed, M. (2016) ‘Should we privilege sport for health? The comparative effectiveness of UK government investment in sport as a public health intervention’, *International Journal of Sport Policy and Politics*, 8(4), 559–576, available: <https://doi.org/10.1080/19406940.2016.1235600>.

- Weed, M., Coren, E., Fiore, J., Wellard, I., Chatziefstathiou, D., Mansfield, L., Dowse, S. (2015) 'The Olympic Games and raising sport participation: a systematic review of evidence and an interrogation of policy for a demonstration effect', *European Sport Management Quarterly*, 15(2), 195–226, available: <https://doi.org/10.1080/16184742.2014.998695>.
- Weed, M., Coren, E., Fiore, J., Wellard, I., Mansfield, L., Chatziefstathiou, D., Dowse, S., Weed, M., Coren, E., Fiore, J., Wellard, I., Mansfield, L., Chatziefstathiou, D., Dowse, S. (2012) 'Developing a physical activity legacy from the London 2012 Olympic and Paralympic Games: a policy-led systematic review', *Perspectives in Public Health*, 132(2), 75–80, available: <https://doi.org/10.1177/1757913911435758>.
- Weiss, C.H. (1979) 'The Many Meanings of Research Utilization', *Public Administration Review*, 39(5), 426–431, available: <http://www.jstor.org/stable/3109916> [accessed 6 Apr 2024].
- Welch, A. (2014) 'Evidence-based policy: Epistemologically specious, ideologically unsound', in *Controversies in Education: Orthodoxy and Heresy in Policy and Practice*, Springer, 63–79.
- Whitehead, M. (1992) 'The concepts and principles of equity and health', *International journal of Health Services*, 22(3), 429–445, available: <https://doi.org/10.2190/986L-LHQ6-2VTE-YRRN>.
- Whiting, S., Mendes, R., Morais, S.T., Gelius, P., Abu-Omar, K., Nash, L., Rakovac, I., Breda, J. (2021) 'Promoting health-enhancing physical activity in Europe: Surveillance, policy development and implementation 2015-2018', *Health Policy*, 125(8), 1023-1030, available: <https://doi.org/10.1016/j.healthpol.2021.05.011>.
- Wiltshire, G., Lee, J., Williams, O. (2019) 'Understanding the reproduction of health inequalities: physical activity, social class and Bourdieu's habitus', *Sport, Education and Society*, 24(3), 226–240, available: <https://doi.org/10.1080/13573322.2017.1367657>.
- Wiltshire, G., Stevinson, C. (2018) 'Exploring the role of social capital in community-based physical activity: qualitative insights from parkrun', *Qualitative Research in Sport, Exercise*

and Health, 10(1), 47–62, available: <https://doi.org/10.1080/2159676X.2017.1376347>.

Woods, C.B., Kelly, L., Volf, K., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., den Braver, N.R., Żukowska, J., García Bengoechea, E. (2022) ‘The Physical Activity Environment Policy Index for monitoring government policies and actions to improve physical activity’, *European Journal of Public Health*, 32(Issue Supplement_4), available: https://academic.oup.com/eurpub/article/32/Supplement_4/iv50/6849913 [accessed 10 Apr 2024].

Woods, C.B., Mutrie, N. (2012) ‘Putting physical activity on the policy agenda’, *Quest*, 64(2), 92–104, available: <https://doi.org/10.1080/00336297.2012.669318>.

Woods, C.B., Powell, C., Saunders, J.A., O’Brien, W., Murphy, M.H., Duff, C., Farmer, O., Johnston, A., Connolly, S., Belton, S. (2018) *The Children’s Sport Participation and Physical Activity Study 2018 (CSPPA 2018)* [online] available: <https://www.sportireland.ie/research/csppa-2018> [accessed 6 April 2024].

Woods, C.B., Volf, K., Kelly, L., Casey, B., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Żukowska, J., Bengoechea, E.G. (2021) ‘The evidence for the impact of policy on physical activity outcomes within the school setting: A systematic review’, *Journal of Sport and Health Science*, 10(3), 263–276, available: <https://www.sciencedirect.com/science/article/pii/S2095254621000065> [accessed 6 April 2024].

World Cancer Research Fund International (2020) *NOURISHING and MOVING Policy Databases* [online], available: <https://policydatabase.wcrf.org> [accessed 20 Aug 2021].

World Health Organisation (2018) *Global Action Plan on Physical Activity 2018-2030: More Active People for a Healthier World*, [online], available <https://www.who.int/publications/i/item/9789241514187> [accessed 6 Apr 2024].

World Health Organisation, (2009) *Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks* [online], World Health Organisation: Geneva, available: <https://www.who.int/publications/i/item/978924156387> [accessed 6 Apr 2024].

World Health Organisation Regional Office for Europe (2016) ‘Physical Activity Strategy for the WHO European Region 2016 - 2025’, available:

<https://www.who.int/europe/publications/i/item/9789289051477> [accessed 6 Apr 2024].

World Health Organisation Regional Office for Europe (2018) *Promoting Physical Activity in the Education Sector: Current Status and Success Stories from the European Union Member States of the WHO European Region* [online], available:

<https://apps.who.int/iris/handle/10665/345134> [accessed 14 May 2023].

World Health Organisation Regional Office for Europe (2021) *Physical Activity Factsheets* [online], available: <https://www.euro.who.int/en/health-topics/disease-prevention/physical-activity/data-and-statistics/physical-activity-fact-sheets> [accessed 21 Dec 2021].

World Health Organization (1986) ‘Ottawa Charter for Health Promotion’, *Health Promotion International*, 4(1), 405 available: <https://doi.org/10.1093/heapro/1.4.405>.

World Health Organization (1988) *Adelaide Recommendations on Healthy Public Policy* [online], available: <https://www.who.int/teams/health-promotion/enhanced-wellbeing/second-conference> [accessed 21 Jul 2022].

World Health Organization (2003) ‘*WHO Tobacco Framework Convention on Tobacco Control*’, [online], available: <https://fctc.who.int/publications/i/item/9241591013> [accessed 6 Apr 2024].

World Health Organization (2007a) ‘*Everybody’s Business: Strengthening Health Systems to Improve Health Outcomes. WHO’s Framework for Action*’, [online], available: https://iris.who.int/bitstream/handle/10665/43918/9789241596077_eng.pdf [accessed 6 Apr 2024].

World Health Organization (2007b) *WHO Director-General Addresses Health Promotion Conference* [online], available: <https://www.who.int/director-general/speeches/detail/who-director-general-addresses-health-promotion-conference> [accessed 6 Dec 2021].

World Health Organization (2011) ‘*Promoting sport and enhancing health in European Union countries: a policy content analysis to support action*’ [online], available: <https://who->

sandbox.squiz.cloud/en/health-topics/disease-prevention/physical-activity/publications/2011/promoting-sport-and-enhancing-health-in-european-union-countries-a-policy-content-analysis-to-support-action [accessed 6 Apr 2024].

World Health Organization (2013) *Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020*, [online], available: <https://www.who.int/southeastasia/publications-detail/9789241506236#:~:text=The%20WHO%20Global%20NCD%20action,the%20challenge%20of%20NCDs%20and> [accessed 14 Apr 2024].

World Health Organization (2020a) *WHO Guidelines on Physical Activity and Sedentary Behaviour* [online], available: <https://www.who.int/publications/i/item/9789240015128> [accessed 8 Dec 2023].

World Health Organization (2020b) *Noncommunicable Diseases* [online], available: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases> [accessed 14 Dec 2021].

World Health Organization (2021) *Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases. A/RES/66/2*, available: <https://digitallibrary.un.org/record/710899?v=pdf> [accessed 6 Apr 2024].

World Health Organization (2022) *Global Status Report on Physical Activity 2022*, Geneva, Switzerland, available: <https://www.who.int/publications/i/item/9789240059153> [accessed 11 Nov 2022].

World Health Organization Regional Office for Europe (2010) *Review of Physical Activity Promotion Policy Development and Legislation in European Union Member States* [online], available: https://www.euro.who.int/__data/assets/pdf_file/0015/146220/e95150.pdf [accessed 31 Jan 2023].

Yamaguchi, M., Nomura, M., Arai, Y., Vandevijvere, S., Swinburn, B., Nishi, N. (2022) ‘An assessment of implementation gaps and priority recommendations on food environment

policies: the Healthy Food Environment Policy Index in Japan’, *Public Health Nutrition*, 25(6), 1720–1732, available: <https://doi.org/10.1017/S1368980021004900>.

Yancey, A.K. (Toni), Sallis, J.F. (2009) ‘Physical activity: Cinderella or Rodney Dangerfield?’, *Preventive Medicine*, 49(4), 277–279, available: <https://www.sciencedirect.com/science/article/pii/S0091743509004150> [accessed 6 Apr 2024].

Young, K., Ashby, D., Boaz, A., Grayson, L. (2002) ‘Social Science and the Evidence-based Policy Movement’, *Social Policy and Society*, 1(3), 215–224, available: <https://www.cambridge.org/core/product/33D115F3218BDA8A76B7A5B510099679> [accessed 6 Apr 2024].

Zola, I.K. (1972) ‘Medicine as an institution of social control’, *The sociological review*, 20(4), 487–504, available: <https://doi.org/10.1111/j.1467-954X.1972.tb00220.x>.

Żukowska, J., Gobis, A., Krajewski, P., Morawiak, A., Okraszewska, R., Woods, C.B., Volf, K., Kelly, L., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., García Bengoechea, E. (2022) ‘Which transport policies increase physical activity of the whole of society? A Systematic Review’, *Journal of Transport & Health*, 27(101488), available: <https://doi.org/10.1016/j.jth.2022.101488>.

Appendices

A1. Abstracts for reviews in three policy domains (Chapter four)

Education review

The 'Education' review which was published in the Journal of Sport and Health Sciences. Education settings were interpreted as schools providing education to children and adolescents between the ages of five and eighteen. The reference is given below.

Manuscript:

Woods, C.B., Volf, K., Kelly, L., Casey, B., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Żukowska, J. and Bengoechea, E.G., 2021. The evidence for the impact of policy on physical activity outcomes within the school setting: a systematic review. *Journal of sport and health science*, 10(3), pp.263-276.

Abstract:

Background: despite the well-established health benefits of physical activity (PA) for young people (aged 4–19 years), most do not meet PA guidelines. Policies that support PA in schools may be promising, but their impact on PA behaviour is poorly understood. The aim of this systematic review was to ascertain the level and type of evidence reported in the international scientific literature for policies within the school setting that contribute directly or indirectly to increasing PA.

Methods: this systematic review is compliant with Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines. Six databases were searched using key concepts of policy, school, evaluation, and PA. Following title and abstract screening of 2323 studies, 25 progressed to data synthesis. Methodological quality was assessed using standardized tools, and the strength of the evidence of policy impact was described based on pre-determined codes: positive, negative, inconclusive, or untested statistically.

Results: evidence emerged for 9 policy areas that had a direct or indirect effect on PA within the school setting. These were whole school PA policy, physical education, sport/extracurricular PA,

classroom-based PA, active breaks/recess, physical environment, shared use agreements, active school transport, and surveillance. The bulk of the evidence was significantly positive (54%), 27% was inconclusive, 9% was significantly negative, and 11% was untested (due to rounding, some numbers add to 99% or 101%). Frequency of evidence was highest in the primary setting (41%), 34% in the secondary setting, and 24% in primary/secondary combined school settings. By policy area, frequency of evidence was highest for sport/extracurricular PA (35%), 17% for physical education, and 12% for whole school PA policy, with evidence for shared use agreements between schools and local communities rarely reported (2%). Comparing relative strength of evidence, the evidence for shared use agreements, though sparse, was 100% positive, while 60% of the evidence for whole school PA policy, 59% of the evidence for sport/extracurricular PA, 57% of the evidence for physical education, 50% of the evidence for PA in classroom, and 50% of the evidence for active breaks/recess were positive.

Conclusion: the current evidence base supports the effectiveness of PA policy actions within the school setting but cautions against a “one-size-fits-all” approach and emphasizes the need to examine policy implementation to maximize translation into practice. Greater clarity regarding terminology, measurement, and methods for evaluation of policy interventions is needed.

Statement of contribution for the Education Review

I confirm that Kevin Volf contributed to the publication *The evidence for the impact of policy on physical activity outcomes within the school setting: a systematic review* by

- Developing the methods utilised in the review including the research question, the search strategy, data collection method and data synthesis method.
- Contributing to data collection by reviewing all titles and abstracts in the first round of screening and all full text documents in the second round.
- Contributing to data extraction and synthesis.
- Contributing to drafting and critical revision of the manuscript and response to peer review

Signature  _____

Prof Catherine Woods, lead author

28th January 2024

Transport review

This abstract summarises the ‘Transport’ review which was published in the Journal of Transport and Health. The reference is given below.

Manuscript:

Żukowska, J., Gobis, A., Krajewski, P., Morawiak, A., Okraszewska, R., Woods, C.B., Volf, K., Kelly, L., Gelius, P., Messing, S. and Forberger, S., 2022. Which transport policies increase physical activity of the whole of society? A systematic review. *Journal of Transport & Health*, 27, p.101488.

Abstract:

Purpose: there is strong evidence of the links between car-dependence and the physical inactivity pandemic. Physical inactivity accounts for 6–10% of major non-communicable diseases. Research consistently shows that unlike passive transport, active transport is associated with higher total daily physical activity (PA). While there are public policies that support PA in transport and, as a result, overall PA levels, the specific quantitative effect of such policies on PA behaviour has not been sufficiently investigated. The aim of this systematic review is to determine the level and type of evidence for policies in the area of transport that contribute to higher PA levels of the whole of society.

Methods: six databases (MEDLINE (Ebsco), SportDiscus, Cinahl, Cochrane library, Web of Science, and Scopus) were searched for key concepts of policy, transport, evaluation and PA. Methodological quality was assessed using standardized tools. The strength of the evidence of policy impact was described based on pre-determined categories of positive, negative, inconclusive or untested.

Results: 17 of 2549 studies were included in the data synthesis. The authors identified three main transport policy areas with 51 individual policy actions that had a direct or indirect effect on PA. These were: convenient transport infrastructure development, active travel promotion, and shift of transport mode. More than half of the policy actions identified had a positive effect on PA. Study quality ratings were moderate to good.

Conclusions: PA levels can be increased by implementing policies that provide convenient, safe, and connected walking and cycling infrastructures, promote active travel and give strong support to public transport. There is also clear evidence that active travel policies work best when implemented in a comprehensive way. This may include infrastructure and facility improvements as well as educational programmes to achieve substantial shifts towards active modes of travel.

Statement of contribution for the Transport Review

I confirm that Kevin Volf contributed to the publication *Which transport policies increase physical activity of the whole of society? A systematic review* by

- Contributing to the development of the study design including search strategy development, development of data extraction method and data synthesis method
- Performing preliminary searches for scientific literature
- Providing feedback on drafts of the manuscript

Signature  Dziekan
Dziiał Inżynierii i Ludoweli Śródowniska
(2)

Prof Joanna Zukowska

[Date] 30/03/2023, Gdańsk

Mass Media review

This abstract summarises the ‘Mass Media’ review which was published in the European Journal of Public Health. The reference is given below.

Manuscript:

den Braver, N.R., Garcia Bengoechea, E., Messing, S., Kelly, L., Schoonmade, L.J., Volf, K., Żukowska, J., Gelius, P., Forberger, S., Woods, C.B. and Lakerveld, J., 2022. The impact of mass-media campaigns on physical activity: a review of reviews through a policy lens. *European Journal of Public Health*, 32(Supplement_4), pp.iv71-iv83.

Abstract

Background: this review of reviews aimed to: (1) summarize the evidence from published reviews on the effectiveness of mass-media campaigns to promote physical activity (PA) or PA-related determinants (intermediate psychological and proximal outcomes) and (2) to identify policy-relevant recommendations related to successful PA campaigns.

Methods: an extensive literature search was performed on 1 March 2021. Reviews that evaluated the impact of campaigns on distal (e.g. PA) and/or proximal outcomes of PA (awareness, knowledge, etc.) and that targeted the general population or subsets were included. Quality of reviews was assessed using the AMSTAR-2 tool. Policy-relevant recommendations were systematically derived and synthesized and formulated as good practice statements. A protocol was registered beforehand (ID: CRD42021249184).

Results: a total of 1915 studies were identified, of which 22 reviews were included. The most consistent evidence was found for the effectiveness of mass-media campaigns on proximal outcomes, while the evidence for distal outcomes was mixed. Good practice statements were derived: (1) to achieve behaviour change, mass-media is an important component of larger, multilevel and multicomponent strategies; (2) mass-media strategies should be coordinated and aligned at local- and national-level and be sustained, monitored and resourced at these levels and (3) media should be tailored to reduce socioeconomic inequalities.

Conclusions: mass-media can play an important role in the promotion of PA. In general, evidence was more inconsistent for effectiveness on distal outcomes than for proximal outcomes. Policy-relevant recommendations include that mass-media strategies should be resourced, coordinated, aligned, sustained, monitored and evaluated on the local and national level.

Statement of contribution for the Mass Media Review

I confirm that Kevin Volf contributed to the publication *The impact of mass-media campaigns on physical activity: a review of reviews through a policy lens* by

- Contributing to the development of the study design including search strategy development and development of data extraction method.
- Performing preliminary searches for scientific literature
- Providing feedback on drafts of the manuscript.

Signature



Dr Nicolette Den Braver, lead author

16-03-2023

A2. Search Strategy (Chapter four)

Table 8.1 Search strategy

SportDISCUS, CINAHL, WoS, and Scopus:

1. TI: "Policy" OR "Public Policy" OR "Policy Making" OR "policy" OR "policies" OR "national policy" OR "national framework" OR "policy framework" OR "policy action" OR "legislation" OR "strategy" OR "policy making"
 2. TI: "Exercise" OR "Sedentary Behavior" OR "physical activit*" OR "physical inactivity" OR "physical education" OR "sedentar*" OR "sitting" OR "healthy lifestyle" OR "health initiative"
 3. TI: "evaluat*" OR "impact" OR "appraisal" OR "effect*" OR "assessment"
 4. TI: "health promoting clubs" OR sport* OR athletics
 5. 1 AND 2 AND 3
 6. AB: "Policy" OR "Public Policy" OR "Policy Making" OR "policy" OR "policies" OR "national policy" OR "national framework" OR "policy framework" OR "policy action" OR "legislation" OR "strategy"
 7. AB: "Exercise" OR "Sedentary Behavior" OR "physical activit*" OR "physical inactivity" OR "physical education" OR "sedentar*" OR "sitting" OR "healthy lifestyle" OR "health initiative"
 8. AB: "evaluat*" OR "impact" OR "appraisal" OR "effect*" OR "assessment"
 9. AB: "health promoting clubs" OR sport* OR athletics
 10. 5 AND 6 AND 7 AND 8 AND 9 AND 10
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A3. Data extraction tables (Chapter four)

Quantitative designs (Chapter four)

TABLE 10.2.1 PRE-POST DESIGNS

STUDY QR	COUNTRY	POLICY ACTION	POLICY ISSUER	SOURCE OF OUTCOME MEASURE	TIMESCALE
Weed <i>et al.</i> , 2016 ³² 56%	UK	Six national sport strategies with differing policies and priorities reflected in funding and programmes Sport in the seventies (1972) was focused on increasing the stock of sport facilities Sport in the community: The Next Ten Years (1982) focused on increasing access to those facilities	Sports Council and successive UK governments	Taking Part Survey, Active People Survey, Health Survey for England, General Household Survey	348 months approx.
Higgerson <i>et al.</i> , 2016 ³⁹ 75%	UK	The Re:refresh scheme Removal of user charges for council facilities [for people registered with a GP in Blackburn with Darwen]	Local government in Blackburn with Darwen	Swimming attendance data, Active People Survey 'in the last 4 weeks have you participated in Sport or Physical Activity' (Yes	120 months

		in combination with outreach and marketing activities		= 1; No = 0)	
Mutz and Van Munster 2020 ⁴⁰ 57%	Europe	23 Physical activity policy measures Including four measures in the domain of sport National Sport for All policy or action plan Sports Clubs for Health programme Framework to support offers in increasing access to exercise facilities for socially disadvantaged groups Target groups addressed by national HEPA policy	European Commission in collaboration with national governments		Eurobarometer 96 months
Ishkineeva <i>et al.</i> , 2017 ⁴¹ 27%	Russia	Russian sport policy emphasising the importance of sport infrastructure for increasing mass participation in sport	Russian Federal government and Federal Districts	Statistics provided by the Ministries of Sport and Health	72 months

Widdop <i>et al.</i> , 2017 ⁴² 83%	UK	Programme of austerity Cuts in local authority sport and leisure spending Reduced social benefits	Government of the UK	Active People Survey	60 months approx
Ikramullah <i>et al.</i> , 2014 ⁴³ 50%	UK	Sportivate provides grants to clubs that wish to hire coaches to target hard to reach groups	Sport England	Sport structures survey	48 months
White <i>et al.</i> , 2016 ⁴⁴ 64%	Canada	Sports day in Canada A day-long media celebration preceded by a week of sports activities	ParticipACTION, a national not-for-profit	Unspecified questionnaire survey	48 months
Kokolakakis <i>et al.</i> , 2015 ⁴⁵ 67%	UK	Free Swimming Programme (FSP) A policy to remove cost barriers - initially for everyone and subsequently for the age groups <16 yrs and >60	A Local Authority in Southeast England	Active People Survey, Swimming facility attendance data	45 months? Approx.
Bullough <i>et al.</i> , 2015 ⁴⁶ 33%	UK	Free swimming initiative	Implemented by an unnamed local authority	Facility attendance measured by cards	30 months

Foley <i>et al.</i> , Australia 2021 ³⁸ 89%	Voucher Programme subsidising structured physical activity for youths aged 4 to 18	State Government of New South Wales	Online Survey	6 months
Audrey <i>et al.</i> , 2002 ⁴⁷ 73%	UK Free swimming initiative Local Authorities provide free swimming for children under 16 and adults over 60	UK government, implemented by Bristol county council	Swimming attendance data	6 months
Verhoef <i>et al.</i> , 2017 ⁴⁸ 83%	UK Give it a Go project 4 months free membership of a leisure centre pending regular attendance to people on state benefits Incentives such as prize draws	Camden council	International Physical Activity Questionnaire	4 months
Frew <i>et al.</i> , 2015 ⁴⁹ 82%	UK Be Active Initiative free access to fitness gyms (including induction sessions), swimming pools and group fitness classes during off-peak hours (until	Birmingham city council	Godin Leisure-Time Exercise Questionnaire	3 – 4 months

17:00) on
weekdays and
limited hours
(after 13:00)
on weekends

TABLE 10.2.2 CROSS-SECTIONAL STUDIES

Slater <i>et al.</i> , USA 2014 ⁵⁰ 83%		Initiating agreements that let cities and private organisations share school facilities (JUPs)	Schools and city governments	Unnamed PA questionnaire	1 month
Humphreys <i>et al.</i> , 2007 ⁵¹ 75%	USA	Investing in parks and recreation	State governments in the USA.	Telephone survey. During the past month, did you participate in any physical activities or exercises such as running, callisthenics, golf, gardening, or walking for exercise?	Not reported
Limstrand 2008 ⁵² 50%	Norway	Building of sport and physical activity facilities	Government of Norway	Use of facilities survey	Not reported
Ståhl <i>et al.</i> , 2002 ⁵³ 67%	Finland, Germany	Policy Orientation: Sport for all, elite development or mixed	Governments of Finland and East Germany	Sport and PA behaviour measured by survey question	360 months
Spence <i>et al.</i> , 2010 ⁶⁷	Canada	Tax credits for Organised PA	Government of Canada	Internet survey	3 days

Kwon <i>et al.</i> , Korea 2019 ⁵⁴ 83%	Funds to support schools to deliver sport programmes by facilitating the hiring of instructors and expand low priced programmes. 40 000 USD/yr over 3 years	Government of the Republic of Korea	Unnamed survey of motivation	24 months
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Abbreviations: PA = Physical Activity, JUPs = Joint Use Partnerships, QR = Quality Rating, USD/yr – United States Dollars per years, USA = United States of America

Data extraction table – Qualitative Designs (Chapter four)

STUDY QR	COUNTRY	POLICY	ISSUER	THEMES
Eime <i>et al.</i> , 2009 ⁵⁵ 67%	Australia	Funding SSGOs to promote sport participation in the community by establishing links with schools	VicHealth, a government-funded health promotion agency	<ul style="list-style-type: none"> The SSGOS were found to be ineffective in establishing formal links with schools
Wang <i>et al.</i> 2007 ⁵⁶ 44%	China	Harnessing a sporting mega event to “build more sport venues, provide more sport facilities, holding sport events regularly, develop mass sport instructor’s projects and physical examination projects”	Qingdao municipal government	<ul style="list-style-type: none"> Preparing for hosting the mega event generated an immediate positive impact on mass sport and improved national health standards, however, negative effects were also generated such as urban/rural imbalance
Makinen <i>et al.</i> , 2016 ⁵⁷ 78%	Finland	Reorganisation of sport sector into 4 domains (youth sport, elite sport, adapted physical activity and adult sport) and Implementation of “performance-based funding” of sport organisations (moving away from “norm-based funding”)	Ministry of Education and Culture of Finnish	<ul style="list-style-type: none"> The legitimacy of the performance-based funding system broke down when the gulf between the theoretical world of the system and the real world experienced by the organisations grew too wide. The steering effect was negligible in the long run
Flintoff	UK	SSPP, a	DfES &	<ul style="list-style-type: none"> Competitive sports that

<p><i>et al.</i>, 2008⁵⁸ 44%</p>	<p>component of the PESSCL Strategy SSPP aims to create a more coherent structure of sporting opportunities by creating a network with the local authority</p>	<p>DCMS of the UK</p>	<p>were more appealing to males were hegemonic</p> <ul style="list-style-type: none"> • Implementers were hostile to a targeted approach
<p>Dashper <i>et al.</i>,⁵⁹ 78%</p>	<p>Sport policies aimed at targeting BME groups</p>	<p>Welsh Assembly</p>	<ul style="list-style-type: none"> • Increase supply is insufficient for BME groups • Different groups within the ‘BME’ designation face different barriers and treating policies need to be nuanced rather than treating BME as a homogenous group • Barriers can that are specific and non-specific to BME communities and include considerations like shift work affecting ability to take part in organised activity and ‘white gaze’ making attendance uncomfortable • Participation goals may conflict with accessibility goals if promoting accessibility for marginal groups is resource-intensive or if marginalised groups don’t feel confident participating

Abbreviations: BME = Black and minoritized ethnic, DCMS = Department for Culture, Media and Sport, DfES = Department for Education and Skills, HEPA= Health Enhancing Physical Activity, PESSCL = Physical Education and School Sports Club Links, SSGOs = State Sports Governing Organisations, SSPP = School Sport Partnership Programme, UK = United Kingdom

Data extraction table-- Studies with both Quantitative and Qualitative Elements (Chapter four)

Chen <i>et al.</i> , UK 2016 ⁶⁰ 53%		Leveraging the effect of sports megaevents (London Olympics) through a workplace programme called the Workplace Challenge Programme online competition run between businesses where participation can be logged for a prize of £4000	Leicester county council	12 months	Workplace challenge programmes promote increased participation in sport and PA. Awareness of PA benefits and motivation also increased
Bolton <i>et al.</i> , 2013 ⁶¹ 59%	UK	Free Swimming Initiative Free access to local authority swimming pools for children in the school holidays and older people Councils receive a subsidy from the Welsh government in return for guaranteeing a basic level of free access Over time emphasis was placed on encouraging unstructured sessions	Welsh Government	70 months	<ul style="list-style-type: none"> Free swimming coincided with a surge in participation by young people and it remained over the level of participation before the scheme. Most participants were new recruits <p>Adults with young children found the free sessions noisy and overcrowded</p>
Cummins <i>et al.</i> , 2018 ⁶² 86%	UK	Urban regeneration in East London related to the Olympic games aimed at improved facilities, housing, services and built infrastructure	UK Government	18 months	Access to facilities improved in the intervention borough but there was limited evidence of increased PA

Abbreviations: QR = Quality Rating; UK = United Kingdom,

Data extraction table— Reviews (Chapter four)

STUDY QR	RESEARCH QUESTION	DATA SOURCES	CONCLUSIONS
Lindsey and Bacon 2016 ⁶³ 58% Realist Review	Not specified	13 research reports on initiatives designed to stimulate youth sport	<ul style="list-style-type: none"> Evidence supports the importance of making decisions regarding the deployment of resources locally Provision of services is insufficient, and there is a noticeable absence of 'innovative' initiatives and initiatives that target recognised influences such as family Initiatives were uncritical of governments programme theory and outcomes evaluated appeared designed to provide assurance to supporters rather than illuminate effectiveness
Weed and colleagues 2015 ⁶⁴ 23%	“What evidence exists that previous Olympic Games, sports events or sport franchises have impacted sport participation? By what processes has sport participation been leveraged from previous Olympic Games, sports events or sport franchises?”	21 identified sources	<ul style="list-style-type: none"> Evidence suggests that Olympic events may increase participation frequency in sport, re-engage people formerly active in sport, increase switching between sports but there is no inherent effect that inspires inactive people to participate in sport The effect of increasing sportspeople of limited habitual activity can be leveraged by with supplementary sport participation investment
Weed and colleagues 2012 ⁶⁵ 54%	“What processes that have been shown to affect discretionary behaviours, in any field, through the Olympic Games, sports events and sport franchises, might inform strategies to increase physical activity (rather than formal sport) among the least active?”	24 identified sources	<ul style="list-style-type: none"> If policymakers do not actively engage with communities, those communities are unlikely to benefit from initiatives seeking to leverage the effects of the sport events A 'festival effect' can be generated and harnessed to support increased PA if major sports events are well promoted.
Priest and	Not specified	No identified	<ul style="list-style-type: none"> No evidence of well-

colleagues
2008⁶⁶
(100%)

randomised
studies

evaluated policy interventions
implemented through sports
organisations identified.

Abbreviations: PA = Physical Activity, QR = Quality Rating

A4.Contextual factors affecting policy according to CICI framework (Chapter four).

	Mechanism	Interactions
Build multipurpose sport infrastructure and facilities	<u>Geographical context</u> Increasing the stock of facilities in a particular location enables residents to use those facilities to participate in sport and PA satisfying a latent demand for activity which exists in the community	<u>Socio-cultural context</u> When latent demand becomes among those interested in sport is exhausted, further gains are not realised amongst people who are semi sporty or who dislike sport (Weed, 2016)
Provide free access for identified target groups (under 16s and over 60s or people on benefits)	<u>Socio-economic context</u> Removing financial barriers enables to participation benefits persons of lesser means. Increases in participation are reported to be greatest in most disadvantaged socioeconomic group by Higgeson and colleagues (2018).	<u>Socio-cultural context</u> Existing users of the facility may reduce their attendance at a setting or cease attending altogether (Kokolakakis <i>et al.</i> , 2015). More affluent shift from local authority facilities to private gyms after the introduction of free access (Higgeson <i>et al.</i> , 2018) <u>Political context</u> The movement of existing members away from the facilities following the introduction of free access may be partly explained by a lack of capacity to accommodate new members. The needs of minority ethnic groups may not be considered when developing policies to maximise accessibility for the general population. Hence, these groups may exhibit a below average rate of participation (Dashper <i>et al.</i> , 2019)
Provide a voucher programme subsidising structured PA and sports	<u>Socio-economic context</u> Removing financial barriers enables to participation benefits persons of lesser means.	<u>Socio-cultural context</u> Mass media interventions have not been investigated as part of a multicomponent intervention. This implies that awareness may continue to cause a barrier (Foley <i>et al.</i> , 2021). <u>Socio-economic context</u> Travel infrastructure interventions have not been investigated as part of a

		multicomponent intervention. This implies that transport related costs may continue to cause a barrier (Foley <i>et al.</i> , 2021)
Fund sport clubs to increase sport participation in hard-to-reach groups	<u>Epidemiological context</u> Sports clubs and sports federations are incentivised to promote sport and PA to target demographics. This includes young people who would otherwise become inactive in their late teens.	<u>Socio-cultural context</u> Males and females display preferences for different activities. Females often prefer non-competitive activities. Some women's participation in sport is conditional on family support (Flintoff, 2008) <u>Ethical context</u> The dominance of competitive sport opportunities may cause male preferences to be better catered for than female in collaborations between community stakeholders and clubs (Flintoff, 2008). <u>Political context</u> Providers may not have the capacity nor the will to promote sport beyond the traditional membership (Flintoff 2008; Eime and Payne 2009; Mäkinen <i>et al.</i> , 2016) The capacity of organisations needs to be expanded if they are to deliver sustainable participation increases (Ikramullah <i>et al.</i> , 2018)
Promote detailed shared use agreements	<u>Geographical context</u> Promoting shared use maximises the utility of existing facilities within the community increasing access to residents of the area	<u>Legal context</u> Liability laws may reduce the appetite of property owners to promote access (Slater <i>et al.</i> , 2014).
Combine free access with outreach measures	<u>Socio-cultural context</u> Increasing awareness of PA opportunities can stimulate uptake	<i>Limited information</i>
Leverage sporting mega-events to promote physical activity	<u>Socio-cultural context</u> Mega events such as the Olympics are reported to increase interest and demand for sport and PA through a so-called 'demonstration effect' (Weed <i>et al.</i> , 2012)	<u>Geographical context</u> Sport development investments were concentrated in the area of the hosting city exacerbating urban rural divides (Wang and Theodoraki 2007) <u>Political context</u> Investments in sport made without public

		<p>consultation in preparation the megaevent do not immediately benefit the general public (Wang and Theodoraki 2007)</p> <p><u>Socio-cultural context</u></p> <p>No evidence that mega events raise PA levels in those who did not previous participate in sport (Weed <i>et al.</i>, 2012)</p> <p>Reported increases in participation due, at least in part, to already active peoples switching to new novel activities (Weed <i>et al.</i>, 2015)</p>
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A5. Ethical approval letter for chapter five study

Ethical Approval Received; 22-04-2021

Dear Catherine, Liam

Thank you for your amended Research Ethics application which was recently reviewed by the Education and Health Sciences Research Ethics Committee. The recommendation of the Committee is outlined below:

Project Title: 2021_03_04_EHS Policy Evaluation Network (PEN) - Public policies addressing health-related behaviours in Europe
Principal Investigator: Catherine Woods
Other Investigators: Liam Kelly, Enriqe Garcia Bengoechea, Kevin Volf, Blathin Casey.
Recommendation: Approved until December 2022.

Please note that as Principal Investigator of this project you are required to submit a Research Completion Report Form (attached) on completion of this research study.

Yours Sincerely

Anne O'Brien

Anne O'Brien
Senior Administrator
Research Ethics Committee
Faculty of Education & Health Sciences
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A6. Examples of Documents reviewed for development of PA-EPI (Chapter five).

Supplementary Table A. Example of Policy Documents reviewed for development of PA-EPI. TITLE:	DATE:	ISSUING BODY:	SECTOR:	LINK:
Global Action Plan for Physical Activity	2018	WHO	Health	https://www.who.int/ncds/prevention/physical-activity/global-action-plan-2018-2030/en/
Health economic assessment tool (HEAT) for walking and for cycling	2017	WHO	Health and Transport	https://www.euro.who.int/__data/assets/pdf_file/0010/352963/Heat.pdf
Physical activity strategy for the WHO European Region 2016-2025	2016	WHO Regional office for Europe	Health	http://www.euro.who.int/en/publications/abstracts/physical-activity-strategy-for-the-who-european-region-20162025
Transforming our world: the 2030 Agenda for Sustainable Development	2015	UN	Crosscutting	https://sustainabledevelopment.un.org/post2015/transformingourworld
Global action plan for the prevention and control of noncommunicable diseases 2013–2020	2013	WHO	Health	https://apps.who.int/iris/bitstream/handle/10665/94384/9789241506236_eng.pdf;jsessionid=F9B05C65144DAC87848E935BE373F813?sequence=1
Council recommendation on promoting health-enhancing physical activity across sectors	2013	Council for the European Union	Health	https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=celex%3A32013H1204%2801%29
Global recommendations on physical activity for health	2010	WHO	Health	https://www.who.int/dietphysicalactivity/publications/9789241599979/en/
The Toronto Charter for physical activity: a global call for action	2010	Physical Activity and Health	Health	http://www.paha.org.uk/Resource/toronto-charter-for-physical-activity-a-global-call-for-action

A7. Good practice statements below the median in all three criteria (Chapter five)

Academic Experts						Policymakers					
Good Practice Statement	I	F	A	Overall Median	Rank	Good Practice Statement	I	F	A	Overall Median	Rank
<p>^b H03 - There are consistent policies for promoting and supporting physical activity in primary and secondary healthcare settings among at-risk groups, such as people with type 2 diabetes and older adults (e.g., protocols for the assessment of the physical activity capacity; accessible, affordable, and tailored physical activity programmes; and training for caregivers for delivering physical activity programmes within residential aged care).</p>	8.35	6.65	6.57	7.19	1	<p>^b MM02 – There are clear, consistent policies to ensure that multiple media modes/channels (e.g., via posters, social media, radio as well as TV) combined with complementary community initiatives are used to promote the benefits of physical activity and disseminate guidelines which align with the WHO physical activity recommendations.</p>	7.53	6.78	6.25	6.85	1
<p>^{a, b} PI03 – There are structures and mechanisms for regular, meaningful, and inclusive interactions between government and civil society (academia, professional organizations, public-interest, non-governmental organisations, and citizens) on physical activity policies and other strategies to improve population physical activity and health.</p>	8.25	6.32	6.64	7.07	2	<p>^b H01 – Guidelines and regulations in healthcare include routine screening for physical activity and, for all insufficiently active patients, brief advice, and referral to appropriately trained practitioners and/or physical activity opportunities.</p>	7.95	6.58	6.00	6.84	2
<p>^b C03 – There are public policies in place to foster partnerships for shared use of public spaces and facilities for community-based and community-led physical activity programmes.</p>	8.19	6.67	6.27	7.04	3	<p>^{a, b} W02 – There are concepts and regulations for buildings, plots and the environment in place that promote and support employers to create physically active workplace environments through building design and provision of adequate facilities (both indoor and outdoor).</p>	8.08	6.30	6.03	6.80	3

SP03 – There is government support for ‘sports clubs for health’ and ‘health promoting sports clubs’ policies.	7.69	6.65	6.71	7.01	4	UD03 – There are guidelines and/or regulations that improve universal and equitable access to safe outdoor and indoor spaces and facilities where people can be physically active.	7.55	6.65	6.18	6.79	4
a, b W02 – There are concepts and regulations for buildings, plots and the environment in place that promote and support employers to create physically active workplace environments through building design and provision of adequate facilities (both indoor and outdoor).	8.08	6.06	6.44	6.86	5	b WD02 – Opportunities for training and professional development are provided to relevant individuals across multiple sectors (e.g., the 8 ‘Policy’ domains) regarding the fundamentals of physical activity, its role in public health, and effective strategies for physical activity promotion.	7.90	6.21	6.18	6.76	5
* G05 – <i>There are procedures in place for ensuring transparency in the development of physical activity policies.</i>	8.18	6.36	5.93	6.82	6	*, a W03 – <i>The government supports companies (both private and public organizations) to promote and support sport participation, activity friendly work practices (e.g., walking phone calls, standing meetings) and physically active social activities in their workplace.</i>	7.70	6.65	5.90	6.75	6
*, a W03 – <i>The government supports companies (both private and public organizations) to promote and support sport participation, activity friendly work practices (e.g., walking phone calls, standing meetings) and physically active social activities in their workplace.</i>	7.67	6.33	6.31	6.77	7	*, a MM03 – <i>There are public policies in place to ensure mass media contain evidence informed focused physical activity messages, appropriate for and tailored to the target audience.</i>	7.38	6.68	6.13	6.73	7
b C02 - Public policies are in place to support the implementation of whole-of-community approaches to promote physical activity and networking to strengthen resources and exchange experiences (e.g., WHO Healthy Cities, Active Cities, Partnerships for Healthy Cities).	7.92	6.29	6.04	6.75	8	b HIAP02 - There are processes (e.g., health impact assessments) to assess and consider health impacts during the development of policies indirectly related to physical activity.	7.92	5.95	6.23	6.70	8
* C01 - <i>There are policies consistent with relevant recommendations to promote and support the</i>	7.71	6.38	6.04	6.71	9	a, b PI03 – There are structures and mechanisms for regular, meaningful, and inclusive interactions between	7.72	6.18	6.05	6.65	9

implementation of free, universally accessible, whole-of-community events as opportunities for being active in local public spaces.

* *SP04 – Inter-sectoral partnerships promoting physical activity through mass participation events are supported by government policy, and/or funding.* 7.06 6.67 6.40 6.71 10

* *a MM03 – There are public policies in place to ensure mass media contain evidence informed focused physical activity messages, appropriate for and tailored to the target audience.* 7.54 6.50 6.06 6.70 11

* *a PI02 – There are formal platforms (with clearly defined mandates, roles and structures) for regular interactions between national and/or subnational government and physical activity related sectors, and these adopt systematic and transparent accountability processes to identify and ethically manage conflicts of interests.* 8.29 5.96 5.79 6.68 12

* *a H02 – Policies promote and support the application of digital health technologies that facilitate physical activity promotion in healthcare settings.* 6.71 6.31 6.63 6.55 13

a G01 – There are reliable procedures to restrict commercial influences related to physical activity environments where there are conflicts of interest with improving population physical activity levels (e.g., restricting

government and civil society (academia, professional organizations, public-interest, non-governmental organisations, and citizens) on physical activity policies and other strategies to improve population physical activity and health.

MI03 – Physical activity monitoring is systematically linked to the regular monitoring of the prevalence of / risk factors for the main physical inactivity related non-communicable diseases and their related inequalities. 7.74 6.13 6.00 6.62 10

* *a H02 – Policies promote and support the application of digital health technologies that facilitate physical activity promotion in healthcare settings.* 6.93 6.60 5.98 6.50 11

a G01 – There are reliable procedures to restrict commercial influences related to physical activity environments where there are conflicts of interest with improving population physical activity levels (e.g., restricting lobbying influences). 7.97 5.77 5.62 6.45 12

a WD01 – The capacity (numbers and skills) of the government’s public health workforce is aligned with the scale of the physical inactivity problems of the population and the amount of government resources for health. 7.74 5.67 5.62 6.34 13

* *a PI02 – There are formal platforms (with clearly defined mandates, roles and structures) for regular interactions between national and/or subnational government and physical activity related sectors, and these adopt*

lobbying influences).

*systematic and transparent
accountability processes to identify and
ethically manage conflicts of interests.*

^aWD01 - The capacity (numbers and skills) of the government's public health workforce is aligned with the scale of the physical inactivity problems of the population and the amount of government resources for health.

8.07 5.32 5.86 6.42 15

Key:

I = Importance; F = Feasibility; A = Ease of Assessment; Rank = 'Good Practice Statements' below set criteria following consultation were ranked from highest to lowest.

* denotes 'Good Practice Statements' that were removed from PA-EPI following expert/policymaker consultation and WP1 partner consensus workshop (n=7; H02, MM03, C01, SP04, W03, G05, PI02).

^a = 'Good Practice Statements' considered for removal that were common to both Academic Expert and Policymaker Consultations (n=8)

^b = 'Good Practice Statements' that were exempt from consideration for removal to maintain the criterion of having a minimum of two 'statements' within each domain (n=9)

A8. Ethical approval for chapter six study

Dear Kevin,

Thank you for your amended Research Ethics application which was recently reviewed by the Education and Health Sciences Research Ethics Committee. The recommendation of the Committee is outlined below:

Project ID: 2022_02_01_EHS

Project Title: Benchmarking and Prioritizing Public Policies; Applying the PA-EPI to Promote a Healthy Physical Activity Environment

Principal Investigator: Catherine Woods

Other Investigators: Kevin Volf, Liam Kelly, Enrique Garcia Bengoechea, Aurelie Van Hoyer

Recommendation: Approved until July 2022

Please note that as Principal Investigator of this project you are required to submit a Research Completion Report Form (attached) on completion of this research study.

Yours Sincerely

Annie

Annie Bossa

Administrator

Faculty of Education & Health Sciences

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A9. Search Strategies for Evidence Document (Chapter six)

Policy Domains

E01

Evidence informed, quality mandatory physical education that promotes and supports the ideals of equity, diversity and inclusion and adheres to defined standards is part of the curricula in all schools.

The documents *Get Ireland Active! National Physical Activity Plan for Ireland* (NPAP), *Healthy Ireland: A Framework for Improved Health and Wellbeing 2013 – 2025* (HIF) and *Healthy Ireland Strategic Action Plan 2021–2025* (HI SAP) were identified as important crosscutting policy documents from section three of the HEPA PAT. The internet was searched for these documents, using their titles as search terms, and the documents were downloaded. Several documents labelled as annual implementation reports for NPAP were also identified from this search and downloaded. The downloaded policy documents were checked for every indicator. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

The policy document *National Sport Policy 2018 – 2027* was identified from HEPA PAT. The internet was searched for this policy document, using its title as a search term, and the document was downloaded. Sections of NSP were identified as relevant evidence for this indicator and summarised in the evidence document.

Members of the research team had worked on the *Children’s Sport Participation and Physical Activity Study* (CSPPA) and were aware of the findings which were relevant to policy implementation. The internet was searched for the CSPPA website for use as a reference.

The document *Physical Education Curriculum Specification* was identified from section 3 of the HEPA PAT. The internet was searched for this policy document, using its title as a search term and the document was downloaded. The relevant sections of the policy document were summarised in the evidence document.

The research team accessed the websites of the Department of Education, the National Council for Curriculum Assessment and <https://www.curriculumonline.ie/> and the documents specifying the primary school and junior cycle PE curricula were identified and downloaded.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the document *Participation Plan 2021-2024 Increasing Participation in a Changing Ireland*, the non-examinable Physical Education curriculum at senior cycle level and the survey *Lifeskills Survey*. A search of the internet was undertaken using the titles of these documents and the survey.

E02

National and/or subnational initiatives are in place to promote and support school-related physical activity both at school and in other settings. These initiatives should employ an inter-sectoral approach and collaborative multi-agency partnerships (e.g., links with out-of-school sports clubs, active breaks/recess, walking clubs).

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document. The policy document “*Get Active! Physical Education, Physical Activity and Sport for Children and Young People. A Guiding Framework*” was identified from section three of the HEPA PAT as potentially relevant for this indicator and downloaded after an internet search for the title of that document. *Active School Flag* was identified from NPAP as a potentially relevant national initiative, based on the wording of the indicator. An internet search was conducted using “Active School Flag” as a search term and the Active School Flag website (<https://activeschoolflag.ie/>) was utilised as a reference.

The implementation reports for NPAP were also checked and *Youth Physical Activity Towards Health* (Y-PATH) was identified as another potentially relevant national initiative. Similar to Active School Flag an internet search was undertaken (using the search term “Y-PATH”) for the Y-PATH website (<https://irishheart.ie/courses/y-path/>).

The NSP was checked for information relevant to this indicator and information on the relevant passages were added to the evidence document.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the documents *Participation Plan 2021-2024 Increasing Participation in a Changing Ireland* and *Sports Action Plan 2021-2023*. A search of the internet was undertaken using the titles of these documents.

The validation by government officials also provided comments suggesting that several school-based initiatives that support the wellbeing agenda should be included in the evidence document. The names of these initiatives were searched and relevant initiatives were added to the evidence document “Initiatives supporting the school ‘Wellbeing’ Agenda”.

E03

There are shared use agreements that utilise school spaces. Community access is supported by initiatives to promote and support opportunities for physical activity for all persons outside of normal school hours.

The NSP was checked for information relevant to this indicator.

Community Sports and Physical Activity Hubs were identified as potentially relevant by snowballing from action 11 of NSP. A follow up internet search was undertaken using the search term “community sports hubs”.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the document *Participation Plan 2021-2024 Increasing Participation in a Changing Ireland*.

E04

National and/or sub-national policies are in place to promote and support safe active travel to and from school.

Smarter Travel: A Sustainable Transport Future. A New Transport Policy for Ireland 2009 –

2020 (STP) was identified from the HEPA PAT as a policy document that potentially contains important evidence for this indicator. The internet was searched for this document, using its title as a search term, and the document was downloaded. A related document, *Review of actions of Smarter Travel Policy*, was identified from this search. Both documents were checked for information relevant to this indicator.

The Green Schools initiative was identified through snowballing. The initiative was identified through STP, and a search of the internet was undertaken using the search term “green schools travel programme”.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the documents *Programme for Government: Our Shared Future* and *Participation Plan 2021-2024 Increasing Participation in a Changing Ireland*.

T01

Regulations are in place that provide a variety of infrastructures to support safe walking and/or cycling and/or wheeling, including measures to calm speed, reduce vehicle traffic and enhance active mobility.

STP was identified from the HEPA PAT as a policy document that potentially contains important evidence for this indicator. STP and *Review of actions of Smarter Travel Policy* were checked for information relevant to this indicator.

Similarly, the *National Cycle Policy Framework* (NCPF) was identified as a policy document that potentially contains important evidence for this indicator from the HEPA PAT. The internet was searched for this document using the documents title, identified from HEPA PAT, as a search term.

The internet was searched using the search terms “speed limits Ireland” and “speed limits legislation Ireland”.

T02

There is a funded implementation plan, led by the appropriate level/s of government, to achieve improvements in active travel and increased use of public transport.

STP was identified from the HEPA PAT as a policy document that potentially contains important evidence for this indicator. STP and *Review of actions of Smarter Travel Policy* were checked for information relevant to this indicator.

The HEPA PAT was checked for policy documents titles and the “national mitigation plan” was identified. An internet search was conducted using the search term “national mitigation plan”. It was found that the National Mitigation Plan was ruled to be unlawful by the Irish Supreme Court and new policies were required. More searches were conducted using the search terms “climate action plan” and “climate action plan 2019”.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the document *Programme for Government: Our Shared Future*.

T03

Guidelines and tools to support infrastructure for active mobility and/or transport plans and systems that encourage physical activity are promoted and disseminated.

National Cycle Manual was identified through snowballing. The resource was identified through STP (action 2), and a search of the internet was undertaken using the search term “national cycle manual”.

The HEPA.

Design Manual for Urban Roads and Streets (DMURS) was identified through snowballing. The resource was identified from the *Review of actions of Smarter Travel Policy* and a search of the internet was undertaken for this resource using the search term.

UD01

Policies or regulations that take a “health in all” approach are adopted to reallocate space from motorised transport to active travel and/or recreation purposes.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

STP and *Project Ireland 2040 National Planning Framework* were identified from the HEPA PAT as policy documents that potentially contain important evidence for this indicator. An internet search was conducted for the document *Project Ireland 2040 National Planning Framework* using its title as a search term and the document was downloaded. The relevant sections of both documents were summarised in the evidence document.

UD02

Governments adopt land use policies, and planning processes, consistent with principles of mixed land use, compact urban design, and/or provision of green open spaces to support physical activity and reduce motorised transport.

Project Ireland 2040 National Planning Framework was identified from the HEPA PAT as a policy document that potentially contains important evidence for this indicator. The relevant sections of the policy document were summarised in the evidence document.

UD03

There are guidelines and/or regulations that improve universal and equitable access to safe outdoor and indoor spaces and facilities where people can be physically active.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document. *Ready, Steady, Play! A National Play Policy* was identified as potentially relevant by snowballing from action 15 of

NPAP. An internet search was conducted to identify a downloadable copy of this policy document from its title.

Better Outcomes, Brighter Futures, the national policy framework for children & young people 2014 – 2020 and NCPF were identified as a policy documents that potentially contains important evidence for this indicator from the HEPA PAT. An internet search was conducted to identify downloadable copies of these policy document from their titles.

DMURS and *The Permeability Best Practice Guide* were identified by snowballing from the document *Review of actions of Smarter Travel Policy*.

H01

Guidelines and regulations in healthcare include routine screening for physical activity and, for all insufficiently active patients, brief advice, and referral to appropriately trained practitioners and/or physical activity opportunities.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

Researchers had access to physical copies of the National Exercise Referral Framework (NERF) document through their work on previous projects. An internet search was undertaken using the search terms “national exercise referral framework” and an online version of the document was downloaded. The document was consulted for both health indicators.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the documents *Self-Management Support Framework*, *Exercise Referral for the Health Services Briefing Document* and *Making Every Contact Count*. An internet search was conducted to identify downloadable copies of these policy document from their titles.

H02

There are consistent policies for promoting and supporting physical activity in primary and secondary healthcare settings among at-risk groups, such as people with type 2 diabetes and older adults (e.g., protocols for the assessment of the physical activity capacity; accessible, affordable, and tailored physical activity programmes; and training for caregivers for delivering physical activity programmes within residential aged care).

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

Snowballing from action 29 of NPAP identified *Let's Get Active!... to Improve Health and Wellbeing* as a policy document that potentially contains important evidence for this indicator. An internet search was conducted to identify a downloadable copy of this policy document from its title.

Snowballing from action 30 of NPAP's 2019 implementation report identified Age and Opportunity as a potentially relevant initiative for this indicator. An internet search was conducted using the search term "age and opportunity carepals".

Researchers had access to physical copies of the National Exercise Referral Framework (NERF) document through their work on previous projects. An internet search was undertaken using the search terms "national exercise referral framework" and an online version of the document was downloaded. The document was consulted for both health indicators.

The first draft of the evidence document was validated by government officials. Feedback from validation by Government officials directed researchers to the Sláintecare healthcare reform. An internet search was undertaken using the search term "slaintecare"

MM01

There are national and/or subnational public policies in place that ensure media and education campaigns that promote and support physical activity are sustained and monitored (e.g., by making them part of, or aligning them with, a national action plan on physical activity and the

physical activity guidelines).

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP and HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

The Start campaign was identified from snowballing from HI SAP.

Snowballing from action 1 of NPAPs 2018 implementation report identified the *Healthy Ireland Communication and Citizen Engagement* and *Feel Good Together* campaigns. Internet searches were undertaken using the search terms “healthy ireland communication and citizen engagement campaign” and “physical activity summer campaign”.

The *Let’s Get Set* campaign was identified by searching the internet using the search terms “healthy ireland active campaign” and the *Let’s Get Back* was identified by searching the internet using the search term “physical activity campaign Ireland”.

A search of the Sport Ireland website identified the *Women in Sport Policy* document and the *Keep Well* campaign as relevant. The *In This Together* campaign was identified as the predecessor to the *Keep Well* campaign. The website gov.ie was search with the search terms “in this together” and “#inthistogether”.

The internet was searched using the search term “covid-19 resilience and recovery plan”.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to action four of NSP and the documents *Participation Plan 2021-2024 Increasing Participation in a Changing Ireland* and *Sports Action Plan 2021-2023*.

MM02

There are clear, consistent policies to ensure that multiple media modes/channels (e.g., via posters, social media, radio as well as TV) combined with complementary community initiatives are used to promote the benefits of physical activity and disseminate guidelines

which align with the WHO physical activity recommendations.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP and HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

C01

Public policies are in place to support the implementation of whole-of-community approaches to promote physical activity and networking to strengthen resources and exchange experiences (e.g., WHO Healthy Cities, Active Cities, Partnerships for Healthy Cities).

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents and the NSP was checked for information relevant to this indicator.

The Healthy Cities and Counties of Ireland Network was identified by snowballing from HI SAP

Sport Ireland's Active Cities initiative was identified through an internet search using the search terms "active cities Ireland". The phrase 'active cities' was searched as it appears as an example in the wording of the indicator.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the *Bike Week*, *Community Sports Hubs* and *European Week of Sport initiatives*.

C02

There are public policies in place to foster partnerships for shared use of public spaces and facilities for community-based and community-led physical activity programmes.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents and the NSP was checked for information relevant to this indicator. Sections of NPAP were identified as relevant evidence for this indicator and

summarised in the evidence document.

The policy document *Ready, Steady, Play! A National Play Policy* was identified from snowballing from action 15 NPAP. An internet search using the search term “national play policy” was undertaken to identify a downloadable copy of this policy document from its title.

The policy documents NSP, *STP Action Plan for Rural Development and Better Outcomes, Brighter Futures, the national policy framework for children & young people 2014 – 2020* were identified as a policy documents that potentially contains important evidence for this indicator from the HEPA PAT.

The policies *Outdoor Recreation Plan (ORP) and Strategy for the Future Development of National and Regional Greenways* through snowballing. Both documents are cited in action 17 of Review of actions of Smarter Travel Policy. An internet search was conducted to identify downloadable copies of these policy document from their titles.

The *Community Facilities Scheme* initiative was Identified from snowballing. The Action Plan for Rural Development implementation report 2018 action 64. An internet search using the search term “community facilities scheme” was undertaken to identify online resources related to the scheme.

SP01

There are national and/or subnational evidence informed 'Sport and Recreation for All' policies that prioritise investment in initiatives that target the least active, as well as disadvantaged groups.

The NSP was identified, from its title, as the primary policy document relevant for this indicator. The Sports Capital and Equipment Programme (SCEP) was identified from snowballing from the NSP. This was followed up by an internet search using the search term “sports capital programme”.

The Sport Ireland website was searched for relevant policy documents and *the Participation Plan 2021-2024 Increasing Participation in a Changing Ireland, Sport Inclusion Disability*

Charter, Sport Ireland Policy on Participation in Sport by People with Disabilities and Women in Sport Policy were all identified as relevant for this indicator.

The HEPA PAT for Ireland document was checked for policy document titles and an internet search was undertaken using the search term “migrant integration strategy”.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to *Diversity and Inclusion Plan*.

SP02

There are national and/or subnational evidence informed policies or action plans in place that ensure equitable access to sport and recreation spaces and places for all.

The SCEP and the Large Scale Sport Infrastructure Fund (LSSIF) were identified from snowballing from the NSP.

SP03

There is government support for programs designed to encourage sports clubs to promote health-enhancing physical activity and other health behaviours (e.g., 'sports clubs for health' and 'health promoting sport clubs').

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. The GAA National Healthy Club Project was identified by snowballing from HI SAP.

The first draft of the evidence document was validated by government officials. The research team were directed to chapter 3 of the NSP.

The Community Sports and Physical Activity Hubs were identified by snowballing from the NSP.

W01

There are national and/or sub-national policy initiatives and infrastructure development

programmes in place to promote and support safe active travel to and from the workplace.

STP was identified from the HEPA PAT as a policy document that potentially contains important evidence for this indicator. STP and *Review of actions of Smarter Travel Policy* were checked for information relevant to this indicator. Smarter Travel Workplace was identified by snowballing from action 8 of *Review of actions of Smarter Travel Policy* while the Cycle to Work Scheme was identified from action 11.

W02

There are concepts and regulations for buildings, plots and the environment in place that promote and support employers to create physically active workplace environments through building design and provision of adequate facilities (both indoor and outdoor).

The 2018 Finance Act was identified by Snowballing. The NSP suggests that changes to the tax code may be sought to incentive usage of gym equipment. The Finance Act amends the Taxes Consolidation Act 1997

Infrastructure Support Domains

L01

There is strong, visible, political support (at the head of state/cabinet level) for creating health-promoting policy environments to improve population levels of physical activity and reduce inactivity related non-communicable diseases and their related inequalities. Political responsibility for health-related physical activity is clearly allocated within the governmental structures.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents.

The *Healthy Ireland Fund* was identified by snowballing from HIF and *the National Healthy Cities and Counties of Ireland Network* was identified from HI SAP.

The first draft of the evidence document was validated by government officials. The research team received feedback directing them to the documents the NSP, *Programme for Government: Our Shared Future, A Healthy Weight for Ireland, Obesity Policy and Action Plan 2016-2025, Healthy Workplaces Framework, Healthy Campus* and the initiatives *Sláintecare Healthy Communities Programme* and *Healthy Ireland Campaign*

L02

There is a comprehensive up-to-date plan (including timeline, targets, funding, priority policy and programme strategies) linked to national needs and priorities to increase population physical activity.

The relevant policy documents for this indicator were selected from section 3 of the HEPA PAT document.

L03

Priorities are given to reduce inequalities in relation to inactivity related non-communicable

diseases in the comprehensive plan (above).

This indicator does not require a search as the content is based entirely on the previous indicator.

L04

There are clearly defined, evidenced informed population physical activity guidelines for all age groups and for people living with non-communicable diseases, pregnant women, and people with disabilities.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

The national guidelines were identified from the HEPA PAT. An internet search was undertaken using the title of the guidelines document.

G01

There are reliable procedures to restrict commercial influences related to physical activity environments where there are conflicts of interest with improving population physical activity levels (e.g., restricting lobbying influences that limit physical activity opportunities).

An internet search using the google search engine was undertaken using the search terms “lobbying regulations ireland”.

Feedback from validation by Government officials was received directing the research team to the 2018 Public Health Act. The website Irish Statute Book (<https://www.irishstatutebook.ie/>) was searched for the relevant legislation

G02

There are procedures in place for using evidence in the development of physical activity policies.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of HIF and NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

The two physical activity-relevant actions of document *Healthy Weight for Ireland* were read and linked to the appropriate indicators.

The first draft of the evidence document was validated by government officials. The research team received feedback suggesting that evidence from NSP was relevant to this indicator.

Feedback from validation by Government officials was received directing the research team to the NSP, *Participation Plan 2021-2024 Increasing Participation in a Changing Ireland*, *National Sports Policy 2018 – 2027 Sports Action Plan 2021 – 2023* and the *National Sports Policy 2018 – 2027 Research Strategy*.

G03

The government ensures access to and regular dissemination of physical activity guidelines and key documents to the public.

The Physical Activity Guidelines were read, and a dissemination section was identified which was used to populate this section.

G04

The government fosters the cooperation and coordination of all sectors to align with strategic plans to improve the physical activity environment, and where appropriate, promotes civil society participation to develop and implement these plans.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

Feedback from validation by Government officials was received and relevant elements from

NSP, the Sports Action Plan and the participation plan were added.

MI01

There is regular monitoring of physical activity levels across the life-course based on representative samples, against guidelines/standards/targets.

Surveillance instruments identified from section 6 of the HEPA PAT survey, follow up searches, using names of surveys as keywords were on google internet search engine conducted to identify the associated online resources. Members of the research team had previous been involved in these surveys notably CSPPA. Follow up searches on google internet search engine conducted to identify relevant online resources.

MI02

There is regular monitoring of physical activity environments across all 8 policy domains (e.g., walkability, built environment).

The Childhood Obesity Surveillance Initiative (COSI) population survey identified from HEPA PAT. The Lifeskills survey and Sport Ireland's National Trials Register were added following feedback from validation by Government Official.

MI03

Physical activity monitoring is systematically linked to the regular monitoring of non-communicable diseases and their related inequalities.

Healthy Ireland survey and Irish Sports Monitor identified from HEPA PAT document section 6.

MI04

There is regular research and evaluation of policies and major programmes to assess their effectiveness, process, and impact on achieving the goals of the physical activity and health plans.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

MI05

Progress towards reducing health inequalities related to social and economic determinants of physical activity is regularly monitored.

The Healthy Ireland survey was identified through snowballing from HI SAP.

The paragraph on demographics modules of surveys was added after validation by government officials.

FR01

The budget spent on physical activity promotion across all policy domains is clearly identified and periodically monitored.

The HEPA PAT itself and the budgetary information contained therein, was added as a paragraph following feedback from the validation by government officials.

Details of local government expenditure were included following a suggestion from validation by government officials. Government official feedback provided details of the online location of spending reports.

Feedback from validation by Government officials was received and descriptions of the relevant elements of NSP were added.

FR02

There is a sufficient proportion of total health spending assigned to population physical activity promotion.

The details of total government budget were identified by searches of the website of the Department of Finance and the Department of Public Expenditure and the website

<https://whereyourmoneygoes.gov.ie/en/>.

Government expenditure reports were identified from the website of the separate the Department of Public Expenditure.

Details of local government expenditure were included following a suggestion from validation by government officials. Government official feedback provided details of the online location of spending reports.

FR03

A sufficient proportion of total research spending is assigned to population physical activity promotion.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP and HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

The Health Research Board is responsible for funding health research in Ireland. The HRBs website was searched for budget information.

The Sport Ireland Research Funding Scheme was added following validation by government officials which directed the research team to the relevant passages of the Sports Action Plan.

FR04

A secure funding stream is available for at least one statutory health promotion agency with an objective to improve population physical activity

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

Details of the Health and Wellbeing division were identified from searches of the Health Service Executives website. The Health Service Executive is the state agency responsible for

health services in Ireland.

PI01

There are robust coordination mechanisms across departments and levels of government to ensure policy coherence, alignment and integration of physical activity, and inactivity related non-communicable disease prevention policies across governments.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP and HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

The two physical activity-relevant actions of document Healthy Weight for Ireland were read and linked to the appropriate indicators.

Feedback from validation by Government officials was received and relevant elements from the NSP and the Sports Action Plan were added.

PI02

There are structures and mechanisms for regular, meaningful, and inclusive interactions between government and civil society (academia, professional organizations, public-interest, non-governmental organisations, and citizens) on physical activity policies and other strategies to improve population physical activity and health.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP and HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

Members of the research team were involved with the I-PARC. Details of I-PARC were added after using the I-PARC website (<https://i-parc.ie/>) as a reference.

Feedback from validation by Government officials was received and descriptions of the relevant elements of the NSP were added.

WD01

To address the challenge of population physical inactivity, there are sufficient resources and people with necessary skills within the government's workforce (across all 8 policy domains).

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

A professional working in the Health Service Executive was contacted and directed the research team to CORU which regulate health and social professions in Ireland including physiotherapists.

A search of the internet was undertaken using the search term "teacher training in Ireland". The website of the Teaching Council of Ireland, the professional body for teaching in Ireland was accessed. From the website's homepage, the pages on becoming a post-primary teacher (which includes Physical Education teacher) and Continuous Professional Development were accessed.

Feedback from validation by Government officials was received and details of the NSP, details of the activities of the inspectorate of the Department of Education and details of the activities of the Professional Development Service for Teachers were added.

WD02

Opportunities for training and professional development are provided to relevant individuals across multiple sectors (e.g., the 8 'Policy' domains) regarding the fundamentals of physical activity, its role in public health, and effective strategies for physical activity promotion.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of NPAP were identified as relevant evidence for this indicator and summarised in the evidence document.

A professional working in the Health Service Executive was contacted and directed the

research team to CORU (website: <https://www.coru.ie/>) which regulates the health and social care professions in Ireland including physiotherapists. The research team was also directed to REPS Ireland - the register for exercise professionals in Ireland (website: <https://repsireland.ie/>).

Feedback from validation by Government officials was received and details of the relevant sections of the NSP were added.

WD03

Support and training systems are in place for relevant professionals (e.g., guidelines, toolkits, training workshops/modules/courses). To ensure uptake, accrediting agencies for professional education, and professional licensing entities should include minimum requirements for initial and continuing education in this domain

A professional working in the Health Service Executive was contacted and directed the research team to CORU (website: <https://www.coru.ie/>) which regulates the health and social care professions in Ireland including physiotherapists. The research team was also directed to REPS Ireland - the register for exercise professionals in Ireland (website: <https://repsireland.ie/>).

Feedback from validation by Government officials was received and details of the relevant sections of the NSP were added.

The website of Sport Ireland, the state agency responsible for the development of sport in Ireland, was searched using the search terms “coaching development”.

A search of the internet was undertaken using the search term “teacher training in Ireland”. The website of the Teaching Council of Ireland, the professional body for teaching in Ireland was accessed. From the website’s homepage, the pages on becoming a post-primary teacher (which includes Physical Education teacher) and Continuous Professional Development were accessed.

Feedback from validation by Government officials was received and details of the NSP, details

of the activities of the inspectorate of the Department of Education and details of the activities of the Professional Development Service for Teachers where added.

HIAP01

There are processes in place to ensure that population physical activity and related health outcomes are explicitly and transparently considered and prioritised in the development of all government policies.

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

Information on the Health Promotion Strategic Framework was identified by an internet search using the Google search engine using the search term “crosscutting health promotion policy ireland”

HIAP02

There are processes (e.g., health impact assessments) to assess and consider health impacts during the development of policies indirectly related to physical activity

The policy documents NPAP, HIF and HI SAP were checked for every indicator as they were identified as crosscutting policy documents. Sections of HIF were identified as relevant evidence for this indicator and summarised in the evidence document.

Information on the activities of the Institute of Public Health was identified by an internet search using the Google search engine using the search term “health impact assessment Ireland”.

A10. Ethical consent form (Chapter six)

Ethical Consent Form

I declare that I am willing to take part in research for the project titled **Benchmarking and Prioritizing Public Policies; Applying the PA-EPI to Promote a Healthy Physical Activity Environment**

I declare that I have been fully briefed on the nature of this study and my role in it and have been given the opportunity to ask questions before agreeing to participate.

The nature of my participation has been explained to me, and I have full knowledge of how the information collected will be used.

I am aware that such information may also be used in future academic presentations and publications about this study.

I fully understand that there is no obligation on me to participate in this study.

I fully understand that I am free to withdraw my participation without having to explain or give a reason, up to a period of two weeks after the data collection is completed.

I acknowledge that the research is based around the views of experts and unless requested my name may be acknowledged in publications to give credibility to the statements.

I declare that I have read and fully understand the contents of the Research Privacy Notice.

I explicitly consent to the University contacting me as part of current or similar future research and holding my contact details on its database for the purpose of contacting me.