

The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise

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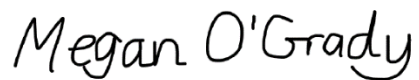
May 2025

Declaration

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Megan O'Grady

28 May 2025

Summary

Over half of the Irish population fails to meet the physical activity guidelines, with potentially detrimental effects on physical, mental, and societal health and wellbeing. Due to a lack of time and lack of knowledge of local resources, healthcare professionals face challenges facilitating engagement in physical activity and exercise resources in the community (local physical activity and exercise), despite the fact this is a ‘best investment’ in terms of physical activity promotion. Interventions delivered by ‘intermediaries’, such as social prescribing link workers, sports connectors, and health promotion workers, may be able to address these challenges. Intermediaries enable health and wellbeing by supporting individuals to connect to community and voluntary services, including local physical activity and exercise. However, much of the published literature has focused on social prescribing link workers, and little evidence exists describing intermediary interventions when facilitating connections to local physical activity and exercise. Therefore, the aim of this thesis was to investigate the role of intermediaries (social prescribing link workers, sports connectors, and health promotion workers) in connecting community-dwelling adults to local physical activity and exercise. Specific objectives were to examine international evidence regarding the processes and practices of intermediaries, to explore the processes of Irish intermediaries specifically, to identify who engages in intermediary interventions, and to test the feasibility of intermediary interventions to improve physical activity and health-related outcomes. To address these objectives, three studies were conducted: a scoping review (study I), a qualitative descriptive study (study II), and a mixed methods pilot feasibility study (study III).

Study I (Chapter 2) reviewed international evidence describing the processes of intermediaries, such as coaches, link workers, navigators, and co-ordinators. Intermediaries tended to receive referrals for older women living with or at risk of poorer health. Intermediary interventions consisted of four main steps: referral (or self-referral) to the intermediary, assessment by the intermediary, connection to local physical activity and exercise, and a period of follow-up to promote sustained engagement. However, information regarding the specific processes of intermediaries throughout these four

steps was heterogeneous across included studies or under-reported. While critical appraisal was not performed, many included studies reported positive physical activity outcomes in the short- and long-term. In study II (Chapter 3), semi-structured interviews with Irish intermediaries were conducted to explore processes used by intermediaries to connect individuals to local physical activity and exercise. This study found that intermediaries received few referrals from referring agents, such as healthcare professionals, specifically to improve physical activity. Additionally, it was identified that only local sports partnership community sports development officers and social prescribing link workers facilitated connections to local physical activity and exercise. However, the intensity of support provided varied between the two types of intermediaries, with local sports partnership community sports development officers conducting shorter, less intensive interventions. Their service users had at times complex physical, mental, and social health needs which intermediaries attempted to accommodate throughout their interventions. Finally, study III (Chapter 4) investigated the feasibility of interventions provided by local sports partnership community sports development officers and social prescribing link workers to impact on physical activity and health-related outcomes of community-dwelling adults. This study found that those accessing social prescribing services reported poorer health at baseline, but that intermediary interventions were acceptable. Intervention participants praised the physical, emotional, motivational, and social health benefits of intermediary interventions and engaging in local physical activity and exercise. While retention to the study was high, and the study outcome measures were found to be suitable, there were significant challenges associated with the recruitment strategies used in this study.

The findings of this thesis have described the processes and demonstrated the role of intermediary interventions in connecting community-dwelling adults to local physical activity and exercise, through acceptable interventions. Currently, unique cohorts with distinctive health needs access local sports partnership community sports development officer and social prescribing link worker services in Ireland, which would need to be considered for future studies and potential referral pathways. Further research using appropriate study designs is needed to investigate the effectiveness of intermediary interventions on physical, mental, and social health outcomes.

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Dissemination of Research

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- O’Grady, M., E. Barrett, and D. Connolly, *Understanding how intermediaries connect adults to community-based physical activity: A qualitative study*. PLOS One, 2025. **20**(1): p. e0318687. <https://doi.org/10.1371/journal.pone.0318687>
- O’Grady, M., D. Connolly, M. Kennedy, D. Mockler, J. Broderick, and E. Barrett, *The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: a scoping review*. International Journal of Integrated Care, 2024. **24**(12): p. 1 – 15. <https://doi.org/10.5334/ijic.7731>
- O’Grady, M., D. Connolly, and E. Barrett, *The role of intermediaries in connecting individuals to local physical activity — protocol for a pilot feasibility trial*. Contemporary Clinical Trials Communications, 2024. **41**(101332): p. 1 – 9. <https://doi.org/10.1016/j.conctc.2024.101332>
- O’Grady, M., E. Barrett, J. Broderick, and D. Connolly, *The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: A scoping review protocol [version 2; peer review: 2 approved]*. HRB Open Research, 2022. **5**(29). <https://doi.org/10.12688/hrbopenres.13523.2>

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- O’Grady, M., D. Connolly, M. Kennedy, D. Mockler, J. Broderick, and E. Barrett, *P43 Connecting people to community-based physical activity and exercise: what are the processes of intermediaries? A scoping review*. Journal of Epidemiology and Community Health, 2024. **78**(Suppl 1): p. A66 – A67. <https://doi.org/10.1136/jech-2024-SSMabstracts.138>
- O’Grady, M., E. Barrett, and D. Connolly, *136 Link workers promoting physical activity — who are they linking?* European Journal of Public Health, 2024. **34**(Supplement_2): p. ii7 – ii8. <https://doi.org/10.1093/eurpub/ckae114.016>
- O’Grady, M., D. Connolly, and E. Barrett, *137 The role of link workers in ‘bridging the gap’ to community-based physical activity*. European Journal of Public Health, 2024. **34**(Supplement_2): p. ii12. <https://doi.org/10.1093/eurpub/ckae114.027>

- O'Grady, M., E. Barrett, and D. Connolly, *The processes and practices of intermediaries in connecting individuals to local physical activity*. European Journal of Public Health, 2023. **33**(Supplement_2): p. ii455 – ii456. <https://doi.org/10.1093/eurpub/ckad160.1142>

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Poster Presentations:

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- O’Grady, M., F. Kennedy, D. Connolly, and E. Barrett, Feasibility and acceptability of ‘intermediaries’ connecting individuals to local physical activity: a pilot feasibility study.

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Finalist: 2024, 2025

- **O’Grady, M.** The role of intermediaries in 'bridging the gap' to physical activity.

Trinity College Dublin Faculty of Health Sciences Research Blitz

Winner: 2025

- **O’Grady, M.** The role of intermediaries in 'bridging the gap' to physical activity.

Other Relevant Publications (*collaborated on these research projects through my involvement in research in this area*):

- Connolly, H., N. Delimata, K. Galway, B. Kiely, M. Lawler, J. Mulholland, **M. O’Grady**, and D. Connolly, *Exploration of Evaluation Practices in Social Prescribing Services in Ireland: A Cross-Sectional Observational Study*. Healthcare, 2024. **12**(219): p. 1 – 16. <https://doi.org/10.3390/healthcare12020219>
- Connolly, H., N. Delimata, K. Galway, J. Mulholland, **M. O’Grady**, and D. Connolly, *Measuring Successes of Social Prescribing: Workshop Report*. 2024, All-Ireland Social Prescribing Network: Dublin. Available at: <https://www.allirelandsocialprescribing.ie/resources>

Abbreviations

BCT	Behaviour change technique
BMI	Body mass index
CADTH	Canadian Agency for Drugs and Technologies in Health
CDM	Structured chronic disease management
CI	Confidence interval
CSDO	Community sports development officer
CHO	Community healthcare organisation
CONSORT	Consolidated Standards of Reporting Trials
COPD	Chronic obstructive pulmonary disease
COREQ	Consolidated criteria for reporting qualitative research
CVD	Cardiovascular disease
DM	David Mockler
DPO	Data protection officer
EB	Emer Barrett
EU	European Union
GDP	Gross domestic product
GDPR	General Data Protection Regulation
GP	General practitioner
GPPAQ	General Practice Physical Activity Questionnaire
HCP	Healthcare professional
HPO	Health promotion and improvement officer(s)
HR	Heart rate
HRR	Heart rate reserve
HSE	Health Service Executive
ICTRP	International Clinical Trials Registry Platform
ID	Identification
IPAQ	International Physical Activity Questionnaire
IPAQ-SF	International Physical Activity Questionnaire — Short Form
IQR	Interquartile range
ISM	Irish Sports Monitor

JB	Joanna Briggs Institute
LSO	Local sports partnership community sports development officer(s)
LSP	Local sports partnership
M1	Single Item Measure
MECC	Making Every Contact Count
MET	Metabolic equivalent
mHealth	Mobile health
MI	Motivational interviewing
MK	Megan Kennedy
MO'G	Megan O'Grady
MYCaW	Measure Yourself Concerns and Wellbeing
N/A	Not applicable
NHS	National Health Service
NPAP	National Physical Activity Plan
NR	Not reported
NRS	Numerical rating scale
O₂	Oxygen
OM	Outcome measure
PA	Physical activity
PAGER	Patterns, Advances, Gaps, Evidence for practice, and Research recommendations
PAPHM	Physical Activity Pathway in Healthcare Model
PCC	Population, Concept, and Context
PI	Principal Investigator
PIL	Participant information leaflet
PPI	Public and patient involvement
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
PRISMA-ScR	Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews
RCT	Randomised controlled trial
RPE	Rate of perceived exertion

SD	Standard deviation
SEE	Self-Efficacy for Exercise Scale
SES	Socioeconomic status
SP	Social prescribing link worker(s)
SPIRIT	Standard Protocol Items: Recommendations for Interventional Trials
SWEMWBS	Short Warwick-Edinburgh Mental Wellbeing Scale
TILDA	The Irish Longitudinal Study on Ageing
UK	United Kingdom
USA	United States of America
VO₂	Maximal oxygen uptake
WHO	World Health Organisation

Chapter 1 Introduction

1.1 Definition of physical activity

Physical activity (PA) is an encompassing term for incidental and deliberate human movement produced by skeletal muscle, undertaken at home, at work, during school/education, for travel, or for leisure [1-5]. PA can be described as aerobic, muscle-strengthening, or multicomponent [3]. Aerobic PA is activity where the body's large muscles move in a rhythmic manner for a sustained period, resulting in substantial increases in heart rate and energy expenditure [3]. Regular participation leads to improved cardiovascular fitness, aerobic endurance, and skeletal muscle function [3, 4]. Muscle-strengthening involves activity performed against resistance, through body weight or external resistance such as weights or bands etc. This type of PA not only strengthens skeletal muscle but also increases power and muscular endurance [4, 6]. Multicomponent PA combines all types of exercise (aerobic, muscle-strengthening, and balance training) into a session [3]. Multicomponent PA can help to improve physical function, especially in older adults [7-9]. All PA results in energy expenditure above the energy expended during quiet sitting (generally referred to as 1 – 1.5 metabolic equivalent/s (MET) which is equal to 3.5 ml O₂/kilogram/minute) [10, 11]. PA is categorised by intensity, which reflects the levels of relative physiological stress on the person undertaking the activity, the metabolic and neurohormonal responses by the body during the activity, and the metabolic energy demand [10, 12]. PA can be categorised as light, moderate, or vigorous intensity, and this can be measured objectively, subjectively, or using descriptive measures. A description of each PA category is given in Table 1-1.

Table 1-1: PA intensity categories

Category	METs	RPE	%HRR	%HRmax	VO _{2max}	Description	Examples
Light	>1.5 – <3	2 – 4	20 – <40	40 – <55	20 – <40%	Incidental activities that do not result in substantial increase in heart or breathing rate	Slow walking Bathing
Moderate	≥3 – <6	5 – 6	≥40 – <60	≥55 – <70	≥40 – <60%	Aerobic activities that can be conducted while maintaining a conversation uninterrupted	Walking briskly Dancing Doubles tennis Swimming
Vigorous	≥6	7 – 8	≥60 – 84	≥70 – 90	≥60 – <85%	Aerobic activities in which a conversation generally cannot be maintained uninterrupted	Jogging Running Carrying loads upstairs Fast swimming

Abbreviations: MET — metabolic equivalent, RPE — rate of perceived exertion (a subjective measure rated out of ten, with higher RPE indicating increased intensity), HRR — heart rate reserve (maximal heart rate - resting heart rate), HRmax — maximal heart rate, VO_{2max} — maximal oxygen uptake. Adapted from [3, 10, 12].

1.2 Recommendations for sufficient physical activity

PA guidelines provide recommendations on the amount of PA (measured by frequency i.e., how many days, intensity i.e., how difficult, and duration i.e., for how long) required to offer significant health benefits and to reduce health risks [13]. The purpose of these guidelines is to impact on population levels of PA, with recommendations based on best published evidence [3, 13]. Ireland's most recent PA guidelines 'Every Move Counts', published in 2024 [14], recommend that all adults:

- Should do at least two hours and 30 minutes (150 minutes) to five hours (300 minutes) of moderate intensity aerobic PA; or at least one hour and 15 minutes (75 minutes) to two hours and 30 minutes (150 minutes) of vigorous intensity aerobic PA; or an equivalent combination of moderate and vigorous intensity activity throughout the week, for substantial health benefits.
- Should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on two or more days a week, as these provide additional health benefits.
- Should limit the amount of time spent being sedentary; replacing sedentary time with PA of any intensity (including light intensity) provides health benefits.

In addition to the above, and as part of their weekly PA, older adults (aged ≥ 65 years) and adults living with disability should do multicomponent PA that emphasises functional balance and strength training at moderate or greater intensity, on three or more days a week, to enhance functional capacity and to prevent falls.

1.3 Current levels of physical inactivity

Physical inactivity is defined as engaging in insufficient PA to meet PA guidelines [3, 15, 16]. According to the World Health Organisation (WHO), 1.4 billion adults (over a quarter of the world population) are failing to meet PA guidelines, a figure that has remained largely unchanged since 2018 [11, 15, 17] leading to a call for a 15% relative reduction in physical inactivity levels by 2030 [11, 18, 19]. Positively, as of 2024 Ireland was estimated to be on track to achieve this 15% reduction, based on national survey data (Eurobarometer (2002 – 2022), Healthy Ireland surveys (2014 – 2015, 2018 – 2019), and The Irish Longitudinal Study on Ageing (TILDA) data (2010)) [20]. While achieving this

reduction should be celebrated, other more recent surveys report that large proportions of the Irish population are not physically active. Data from the Healthy Ireland survey conducted in 2023 – 2024 indicates that only 41% of Irish adults met the PA guidelines [21], in comparison to 46% in the 2019 – 2020 survey [22]. This declined steadily across the life course to only 19% of those aged 75 or older [21]. PA levels of community-dwelling older Irish adults were examined using data from TILDA in 2015 [23] which found that the proportion of Irish older adults meeting the PA guidelines decreased significantly with advancing age, with 37% of those aged 60 – 64 meeting the guidelines compared to 17.1% of those aged 75 or older.

The Irish Sports Monitor (ISM) is a biennial longitudinal survey of sports and PA participation conducted by Sport Ireland, which has been operating since 2007 [24, 25]. According to the 2022 survey, only 37% of Irish adults met PA guidelines [26], increasing to 39% in the 2023 survey [27]. The proportion of the population undertaking no PA at all was 12%, a figure that has remained consistent for several iterations of the survey from 2017 to 2023. PA participation was also lowest amongst women, people from lower socioeconomic groups, and amongst Black, Asian, or other ethnic backgrounds [27]. The findings from these surveys appear to conflict with those of Strain et al., who suggested Ireland will achieve a 15% relative reduction in physical inactivity levels by 2030 [20]. However, the aim of the study by Strain and colleagues (2024) was to update estimates of physical inactivity, and to predict the probability of achieving the reduction based on pooled data. While the more recent surveys all used different measures of PA participation and different definitions of meeting the PA guidelines, limiting comparability, it appears large proportions of the Irish population are physically inactive (ranging from 54 – 61% for adults and 18 – 27% for adults aged 75 years or older) [21, 27]. This far exceeds the global average of over 25%. It also appears that there are significant gender and socioeconomic disparities, with physical inactivity particularly prevalent amongst the elderly, women, and people from lower socioeconomic groups.

1.4 The burden of physical inactivity

Engaging in PA has long been established as a means of maintaining health throughout the lifespan, and regular, sufficient PA contributes to both primary and secondary

prevention of non-communicable morbidities [3, 11, 15, 28-30]. These effects are dose-dependent, i.e., more PA leads to reduced risk of negative health outcomes [31]. Being physically inactive is associated with worse health outcomes, even in the absence of other lifestyle risk behaviours [32]. Physical inactivity is a major risk factor for heart disease, diabetes, colon and breast cancers, and musculoskeletal disorders [29, 30, 33]. Approximately 7 – 8% of all cases worldwide of cardiovascular disease, depression, and dementia, and 5% of type 2 diabetes cases, could be prevented if people were more active [15]. The proportions of non-communicable diseases attributable to physical inactivity range from 1.6% for hypertension to 8.1% for dementia [34]. Physical inactivity has also been linked to premature mortality [35, 36]. Globally, 7.2% and 7.6% of all-cause and cardiovascular disease deaths, respectively, are directly attributable to physical inactivity [34].

In addition to poorer physical health, physical inactivity has also been associated with poorer mental health [28, 37-39], and an increased risk of cognitive decline and dementia in older adults [40]. Societies that are more active can also achieve better climate outcomes such as reduced use of fossil fuels, cleaner air, and less congested, safer roads [11, 41]. The far-reaching consequences of physical inactivity even have a negative impact on societal health; for example, increased workplace absenteeism and decreased productivity, and reduced social capital and community spirit [15, 42, 43]. Physical inactivity also results in significant direct and indirect healthcare costs [36, 44]. Each year, approximately 2.1% of global disability-adjusted life years (a total of 32.1 million) are attributable to insufficient PA [36]. Direct healthcare costs of treating illnesses resulting from physical inactivity in high-income countries are predicted to account for 70% of healthcare expenditure by 2030, according to the WHO [15]. In Ireland, general healthcare costs in 2023 were €33.1 billion, accounting for approximately 7% of GDP [45], with the additional healthcare costs predicted by the WHO potentially placing an unsustainable burden on the economy. Physical inactivity therefore has major implications for health, the economy, and society at large, creating significant disease burden and healthcare/non-healthcare costs [46]. Because of this, and the continuing failure of large proportions of the population to meet PA guidelines,

there is an urgent need to scale and intensify efforts to promote engagement in sufficient PA to improve health and wellbeing outcomes for all.

1.5 Promoting sufficient physical activity

Promoting engagement in sufficient PA is a key target of many Irish health policies, frameworks, and national plans. For example, the Healthy Ireland framework states that the percentage of adults meeting the PA guidelines is one indicator of the overall picture of health and wellbeing in Ireland, and over time, of the effectiveness and impact of current health policies [47, 48]. The National Physical Activity Plan (NPAP) was implemented in 2016 [16], the aim of which was to achieve a 1% increase in PA levels across the whole population per year over the duration of the initiative [49]. Sláintecare is a government initiative involving reorientation of the healthcare service towards primary and community care settings [50]. One of the main focuses of Sláintecare is ‘prevention’ and decreasing the prevalence of unhealthy behaviours that contribute to chronic disease, such as physical inactivity [51]. The National Framework for the Integrated Prevention and Management of Chronic Disease describes a continuum of health promotion, disease prevention, and management for four major chronic diseases that affect over 1 million people in Ireland: cardiovascular disease, type 2 diabetes, chronic obstructive pulmonary disease, and asthma [52, 53]. Physical inactivity is named as a modifiable behavioural risk factor within this framework [53].

Promoting sufficient PA at a population level is a complex task with no single solution, therefore a comprehensive approach incorporating multiple concurrent strategies at both macro- and micro-level are recommended, involving stakeholders across a variety of contexts [5, 42, 54-57]. Eight ‘best investments’ for PA promotion have been identified: whole-of-school programmes, active transport, active urban design, healthcare, public education, sport and recreation for all, workplace, and community-wide programmes [5, 58]. These eight ‘best investments’ are consensus summaries of best evidence on how to get more people more active across multiple sectors and settings, and are used to encourage increased investment and action [58]. For the purposes of this thesis, discussion will focus on community-wide programmes and

healthcare, as the other investments represent distinct research areas beyond the scope of this project.

1.5.1 Community-wide programmes

The physical, social, and mental health benefits of engaging in community-based activities generally have been well-established [59-61]. In relation to PA, exercising in one's own community can enhance health and wellbeing [62, 63], and community-based approaches can reach large numbers of people in the communities where they live, work and play [64]. In addition, support from people and services within the community are potential resources that can be used to promote healthy PA behaviours and positively influence engagement [61, 64-69]. 'Community-wide' programmes can include top-level approaches such as systems-based or policy-based interventions, mass media campaigns, settings-based programmes, or altering the physical environment within the community. They can also encompass individual-level interventions, such as referral to local PA and exercise services [5].

1.5.1.1 Local physical activity and exercise services

Local PA and exercise services provide opportunities to participate in community-based PA, sport, and exercise resources. These are usually provided by voluntary, government, and sporting organisations in the local area or community (hereafter referred to as local PA). Local PA can include structured community-based programmes and classes, spaces to participate in PA, or organised community-based PA events such as parkrun [70, 71]. A major benefit of local PA is variety, in terms of the activities offered, the availability, and the location of these activities [67]. Ireland's PA Facilities Database is the official directory of all indoor/outdoor recreation, sports, and PA amenities in Ireland [72], and there is a wide variety of options available throughout the country for all ages, abilities, and interests. The availability and accessibility of facilities for local PA such as cycleways, footpaths, health clubs, and swimming pools are associated with PA behaviours and may contribute to continued engagement and adherence to PA [67, 73, 74]. Similarly, people who perceive their local area to offer many opportunities for PA are more likely to meet the PA guidelines, and to do more PA in comparison to those that feel there are fewer PA opportunities [75, 76]. Being able to access and engage in local PA at a place of

convenience increases accessibility and reduces barriers to participation [16, 49, 71, 77, 78]. As mentioned previously, exercising in a group or community-based setting could significantly influence PA engagement and adherence [79-81]. Engaging in local PA may also be cost-effective. Utilising pre-existing resources rather than developing new programmes and initiatives reduces costs [67], with estimates of cost-effectiveness ratios for local PA as low as £400 per quality-adjusted life year gained compared to costs of over £3,600 for more resource intensive PA interventions [82, 83].

However, having available and nearby local PA does not always result in participation [68, 84, 85], with many studies finding that proximity to walking trails, PA facilities, and urban parks had no effect on PA participation or achievement of PA guidelines [86-88]. There has been a lack of studies to date investigating the relationship between the availability of, and access to, local PA and PA engagement in Ireland. However, it would appear from the high levels of physical inactivity that many people are not accessing these services. There is a need therefore for interventions that assist individuals in accessing and engaging in local PA. Healthcare professionals (HCPs) are in theory well-placed to provide this intervention [89-92], thus combining two 'best investments': healthcare and community-wide programmes. HCPs have a clear role in promoting PA, and local PA is an appealing option of continuing care after a healthcare contact, as well as being a sustainable way of maintaining health and wellbeing outside of healthcare settings. Many Irish health policies and frameworks, such as the National Framework for the Integrated Prevention and Management of Chronic Disease [52, 53, 93], the NPAP [16], and the mental health service and promotion plans [94, 95], all encourage and promote this collaborative approach between healthcare and community sectors, and the prioritisation of community-based programmes. However, there are significant challenges and limitations to this in practice, which are discussed in the following section.

1.5.2 Healthcare professionals promoting sufficient physical activity

One of the central roles and responsibilities of HCPs is to support their patients to live healthy lives and support them to achieve health behaviour change. HCPs are often the first point of contact for healthcare advice, have an in-depth knowledge of the person's

health, are trusted sources of health information, and have the capacity to reach the least active people, and those living with (or at risk of) chronic disease and/or disability [5, 15, 96-98]. As part of the WHO's Global Action Plan on PA 2018 – 2030, the integration of screening and promotion of PA in primary healthcare services was identified as a key policy action [11]. In the Irish context, the Department of Health declared that the healthcare service has an essential role to “promote, educate, support and encourage physical activity generally” [99, p.7]. In addition, HCPs and the healthcare sector are named as key implementers in Ireland's NPAP and PA guidelines [14, 16]. HCPs are therefore key stakeholders and drivers of PA promotion.

HCPs have many opportunities to promote PA through regular contact with their patients. People most commonly access healthcare at the primary level. Primary healthcare includes all health or social care services in the community, outside of hospital. At the commencement of this Ph.D. in 2021, Ireland's public healthcare system the Health Service Executive (HSE), operated through four administrative areas divided into 32 local health offices through which free community-based health and personal social services were delivered. This included primary care, community welfare, and psychiatric services [100]. In 2024, the HSE was reorganised into six health regions, divided into 96 community healthcare networks, each delivering primary healthcare services across a population of approximately 50,000. This reorientation aimed to better align regional community healthcare services to local populations and their local needs, thus delivering on the Sláintecare vision of an integrated health and social care service and enhanced community care [51, 101]. Each community healthcare network consists of between four to six primary care teams, including general practitioners (GPs), public health nurses, health and social care professionals, and health care assistants alongside wider community network services including dentistry, audiology, psychology, and administrative staff [102, 103]. The Irish population reports an average of 4.4 GP visits per person per year [21], with visits to GPs increasing with advancing age [104-106], and as many as seven visits per year for a chronic disease population [107]. Data on utilisation of other primary care services such as nursing or allied health are unavailable, but it is estimated that there are 30 million contacts with Irish healthcare services annually [49]. Methods used by Irish HCPs in primary care to promote, support, and

encourage physically inactive individuals to engage in sufficient PA include PA referral pathways and brief interventions [108-111]. Each of these methods are discussed in the following sections, to provide context and an overview of the PA promotion landscape in Irish healthcare.

1.5.2.1 Physical activity referral pathways in Ireland

ExWell Medical and the Physical Activity Pathways in Healthcare Model are examples of two initiatives used by HCPs involving a formal PA referral or pathway. Both involve individuals participating in a programme of PA offered in community settings. ExWell Medical is a not-for-profit social enterprise, founded in 2019, which offers exercise programmes and classes with medical oversight to patients with diverse chronic conditions [112]. These classes are offered across 52 different urban and rural centres in the Republic of Ireland [113] on a rolling basis and are delivered by staff from sports and exercise science, physiotherapy, and other allied health professional backgrounds trained in delivering exercise to chronically ill patients. In a quasi-experimental study carried out in 2015/2016, ExWell was shown to be an effective programme, with significant improvements found in light intensity PA levels, time spent in sedentary behaviour, physical function, body composition, and psychological health; all of which were maintained at 12 months post-intervention [112, 114]. However, this was a before-after study (with no control group) of individuals retained in the programme, and overall, there was poor adherence over the 12-month period (estimated at 26%). Another major limitation of ExWell is that it is not offered as a primary prevention or primary treatment programme [112, 115, 116], and is therefore not an option for those with poor lifestyle behaviours, or who are at risk of developing chronic disease. ExWell Medical also mainly provide services for older persons, meaning younger persons may not be as comfortable or willing to engage. Classes also have a fee, and while some HSE-subsidised classes are available in certain areas this is usually time-limited funding, with the usual cost being reinstated after funding has ceased [117].

Work to develop a national exercise referral framework for Ireland has been ongoing over the last decade. A proposed framework published in 2016 laid out the potential development, delivery, and implementation of a national exercise referral scheme

[118]. However, a review of organisational readiness conducted in 2017 concluded that essential structures and resources in the healthcare service were not in place to move to the design phase for an operating model [119]. Since 2019 there has been renewed interest in the development of a physical activity referral pathway [49], and The Physical Activity Pathways in Healthcare model (PAPHM) (a collaboration between the HSE and Sport Ireland) is currently under development and due to be implemented in 2029 [120, 121]. The PAPHM consists of a range of enablers to build capacity for HCPs to implement a PA referral pathway in healthcare settings [121]. The PAPHM will support patients to connect to structured and self-directed PA opportunities, through screening, intervention, and review by HCPs, and participation in supports to become more active [121]. In parallel to the healthcare arm of the PAPHM, Sport Ireland is developing initiatives to increase capacity and access to appropriate PA opportunities in the community. As of 2025, there have been numerous achievements through the PAPHM such as development of a national PA Facilities database (See Section 1.5.1.1) [72], the implementation of a PA for Health Officer pilot project in seven locations throughout the country [122], and development of an exercise professional qualification package in collaboration with higher education institutes [123]. While the PAPHM is a positive development within the sphere of HCPs promoting sufficient PA, it has not yet been rolled out nationally. Therefore, at present, PA referral pathways are only suitable or available for a proportion of individuals presenting to healthcare settings or receiving PA promotion from HCPs. Brief interventions are the only PA promotion method that have been fully implemented and rolled out at a national level for all people attending healthcare services.

1.5.2.2 Brief interventions

‘Making Every Contact Count’ (MECC) is a health behaviour change framework which focuses on modifiable risk factors for chronic disease (physical inactivity, tobacco use, harmful alcohol consumption, and unhealthy eating) [53]. Roll out and full implementation of MECC within the healthcare services has been identified as necessary for the successful implementation of the Healthy Ireland Framework [101], the National Framework for the Integrated Prevention and Management of Chronic Disease [53, 93], and the NPAP [16]. The aim of MECC is for HCPs to use their daily interactions with

patients to deliver brief advice and brief interventions [107]. Brief interventions are defined as “intervention[s] that aims to equip people with tools to change attitudes and explore underlying problems. It involves discussion, negotiation and encouragement” [107, p.22]. In brief interventions, HCPs are encouraged to use their daily interactions with patients to opportunistically support them in making positive health behaviour changes, and brief interventions may be structured using the ‘five A’s’: Ask; Advise; Assess; Assist; Arrange [107, 124, 125]. A brief intervention for PA therefore would involve the HCP asking about the individual’s current levels of PA, advising on the current PA recommendations and the need for behaviour change, assessing readiness to change, collaborating with and assisting the individual to develop a behavioural change plan, and arranging follow-up. Irish and international guidelines recommend that in healthcare settings, all physically inactive people should be provided with brief advice and/or brief interventions, including signposting or referral to local PA opportunities as part of the arrangement step [126, 127].

1.5.2.3 Evidence for brief interventions

Brief interventions have been found to be most effective when physically inactive individuals ready to change their behaviour are identified, given simple and realistic advice, and behavioural and cognitive approaches are used to facilitate the adoption and maintenance of PA [5, 110]. However, the evidence suggests that while effective in the short-term on subjective PA levels, brief advice or brief interventions alone may not be sufficient to maintain improvements in PA. Systematic reviews have often failed to show convincing evidence of the effectiveness of brief interventions on PA levels in the long-term [128, 129]. Other reviews have found that brief interventions that are carried out over multiple sessions and over longer periods of time may be more effective [97, 98, 130]. While the limitations of the studies included in these reviews must be considered (delivery and fidelity of brief interventions, the nature of the control arm of the study, the different nomenclature and definitions of brief interventions, definitions of short- and long-term in relation to follow-up [131, 132]), these results appear to suggest that brief interventions for PA are not as successful as interventions that are more intensive and delivered over a long time. More comprehensive approaches may need to be

considered, “rather than a single point of encouragement for behaviour change in primary care” [98, p.e404].

1.5.2.4 Barriers to delivering brief interventions

In addition to the limitations of the evidence base, the barriers to implementing brief interventions for PA have been well-documented in the literature; lack of time, lack of incentive, HCPs’ perception of patients’ beliefs around PA and the barriers they face affecting participation in PA, lack of expertise, medico-legal concerns, and lack of responsibility [71]. Many of these barriers have been identified in an Irish context, in particular lack of expertise or training in both PA guidelines or counselling, poor knowledge of local services, lack of time, and negative perceptions of patient’s beliefs and attitudes around PA [65, 133-135]. These studies suggest that if Irish HCPs had better methods and guidance regarding PA promotion, improved referral pathways, and/or better knowledge of local services, brief interventions may be more effective. The context in which brief interventions for PA are being delivered also warrants consideration, with HCPs reporting increasingly large and complex caseloads, managing patients with multimorbidity and polypharmacy [136], with these issues usually worse in socially deprived areas [137].

1.5.2.5 Poor implementation of brief interventions

In addition to the presence of these barriers, it is also unclear whether brief interventions are being delivered in a systematic and rigorous fashion by HCPs in Ireland. The NPAP identified the need for education, training, and support mechanisms to assist HCPs to promote PA, and as such training in the MECC programme is now included in HCP undergraduate curricula [49]. However, despite large numbers of Irish HCPs receiving training in brief interventions, these interventions have been reported to be delivered to just over half of eligible patients [138, 139]. In both the Irish and international literature, patients rarely report receiving PA advice or brief interventions from HCPs (including GPs, nurses, and health and social care professionals), and often must initiate the conversation themselves [140-143]. Work conducted by Meade et al. (2022) aimed to explore the implementation of brief interventions in Ireland [138], and investigated the use of brief interventions by HCPs in practice. Encouragingly, over 80%

of HCPs reported having delivered brief interventions in relation to PA at least once, but this survey did not explore whether these interventions were performed regularly [144].

To try and encourage Irish HCPs to deliver and record brief interventions, various monitoring systems have been implemented in GP offices and hospital information technology systems across the country [107, 145]. However, currently these data are not collated centrally, so it is unclear how many patients are receiving brief interventions [135], and even more challenging to then estimate how many patients are receiving brief interventions for PA. One exception to this is the Structured Chronic Disease Management (CDM) programme in Ireland, for patients aged 18 years or over with one or more chronic disease(s). These patients are offered two free review appointments, one with their GP and one with the practice nurse, and these HCPs are encouraged to refer the patient to support services as needed, which could potentially include local PA [146-148]. Data collected on PA levels and PA interventions are recorded through GP desktop systems. In the first report of the CDM, published in 2022, there were 382,084 consultations [149]. Most patients (162,014 out of 166,147, (97.5%)) were asked about their PA levels, with over 44% reporting inadequate activity, and a further 10% unable to be physically active. Just over 150,000 PA interventions were documented for these 162,014 patients, with brief advice and/or brief interventions given in 57.5% of cases, and patients signposted to a website in 4.1% of cases. Patients declined in 18.9% of cases, and no action was documented in 19.5% of cases. No formal PA referrals or signposting to local PA were recorded. While the high volume of brief interventions conducted and recorded is a positive, there still remains a large number of people who did not receive any PA intervention, referral, or signposting to local PA, despite the known benefits of a prescribed approach to PA by HCPs for those living with a chronic disease [49].

To conclude, all HCPs have the capability to promote PA amongst their patients, and HCPs can be a key motivator for PA behaviour change. For example, how the topic of PA is raised and how it is linked to a person's health condition is central to their acceptance of the advice [71], and the encouragement provided by the HCP is a key factor in whether a patient accepts a referral or signposting to PA [150]. Despite being key stakeholders in

PA promotion efforts, Irish HCPs face significant barriers to implementing effective PA promotion strategies [49]. Brief interventions are currently the only fully implemented method to promote PA in Irish healthcare settings. However, there are numerous limitations to using brief interventions in isolation, and it appears these are neither appropriately implemented nor effective for all community-dwelling individuals. Many structured PA programmes and interventions such as ExWell and CDM focus on chronic disease populations, with no referral pathways in place for people who are at risk of developing chronic disease due to physical inactivity.

Without adequate data and reporting, it is impossible to conclude whether patients are receiving regular or effective PA brief interventions to achieve behaviour change and/or a sustainable increase in PA levels. In addition, despite signposting to local resources being identified as a component of a brief intervention, and the benefits of local PA and exercise services, there is very little evidence that this is occurring in practice or in any kind of systematic way in Ireland. Further supports and capacity are therefore needed for HCPs to effectively support their patients to improve PA in community settings [57, 65, 151, 152], including alternative methods of helping individuals to connect to local PA. Another method of connection which has received attention in recent years is referral to an 'intermediary' [74, 153, 154] and their role in PA promotion is beginning to be recognised [71, 152, 155-166].

1.6 Referral to an intermediary

1.6.1 Definition of an intermediary

There is no universal definition of an intermediary. Over 100 terms for this role were identified in a preliminary literature review, with the most common terms including: 'advisor', 'coach', 'connector', 'co-ordinator', 'health (trainer/worker)', 'link worker', 'navigator', and 'social prescribing' (Appendix I). Despite the differences in title, the preliminary literature review was used to develop a broad definition of an 'intermediary' for the purposes of this research project. Intermediaries were defined as non-medical professionals (or medical professionals working in a non-medical capacity) who have a role in enabling physical and mental health and wellbeing, by supporting individuals to

connect from healthcare services to community and voluntary services, including local PA, offering follow-up and support to connect the referred person to resources in line with their needs. This section will provide a brief overview of the main types of intermediaries identified in the preliminary literature review that are relevant to this research.

1.6.1.1 Social prescribing link workers

Social prescribing was developed in the UK, and since 2016 rolled out nationally as part of the NHS Long-Term Plan (which sets out priorities for healthcare over the next ten years and how funding will be allocated) [167-172]. Social prescribing aims to address the social determinants of health, reduce health inequalities, reduce healthcare usage, and promote health and wellbeing through engagement in community-based activities [167, 170, 173-175]. Social prescribing interventions in Ireland are delivered by social prescribing link workers (SP), and their interventions follow a similar pattern and structure to those delivered in the UK [74, 155, 168, 176-182]. However, in Ireland SP are usually recruited, employed, and hosted by community and voluntary organisations [183, 184], whereas in the UK SP are usually based in primary care [177, 178]. SP assess the individual's needs, strengths, and interests and connect them with available and appropriate non-medical community and voluntary sector resources (community activities). In addition to local PA, the literature also describes SP helping link individuals to activities such as arts and culture, education and employment support, hobby clubs, nutrition and weight management, benefits and housing advice, and social groups. SP also perform follow-up with the person to check they are attending the activity and to find out if they need further support to continue attending community activities. The HSE Social Prescribing Framework and Evaluability Assessment, published in 2021 and 2020 respectively, is aimed at supporting the development of Irish social prescribing services and together these documents outline a common approach for the delivery and evaluation of social prescribing across the HSE [181, 183].

In addition, there is growing policy support in Ireland for SP, and many of these documents also provide a supportive climate for their role facilitating connections to local PA. The Sláintecare strategy includes the Sláintecare Healthy Communities

programme, a geographical population profiling approach to improve the long-term health and wellbeing of the most disadvantaged communities in Ireland [51]. SP are part of the core group of services available in each Healthy Community, to support people's wellbeing and to provide better access to the range of services needed to help improve and promote healthier lifestyle behaviours [185]. SP are specifically named in the 'Stronger Together' mental health promotion plan as "an effective means of engaging people in non-clinical activities and services in their communities in order to promote social connectedness, [and] improve health and wellbeing" [95, p.29]. Social prescribing has been linked to MECC programmes and principles, and social prescribing is recommended for those "who may not have the confidence and skills at a particular time in their life to follow signposting advice after a MECC intervention" [183, p.28]. The HSE Social Prescribing Framework includes PA as an onward referral (examples named in the framework are "parkrun or walking groups" [183, p.22]). It also mentions that social prescribing services "can expand and develop the range of options available to HCPs to support people with chronic conditions to manage their condition" [183, p.29], such as local PA.

1.6.1.2 Sport connectors

Sport connectors support the development of opportunities to increase sport and PA participation. They are usually employed by, or work on behalf of a national governing sport and/or PA body, and some have been identified in the literature as having additional responsibilities to promote PA amongst individuals living in the community [186, 187]. For example, in the Netherlands, care sport connectors have a specific role to connect the primary care sector to local PA as 'brokers' [188, 189]. These care sport connectors are reported to accept referrals from primary care, guide referred individuals to local PA, and organise local PA groups [77]. While many other countries across the world have national governing bodies for sport and PA [190-199], it is unclear whether sport connector roles have been implemented within these agencies. In Ireland, local sports partnership community sports development officers (LSO) are an equivalent role.

Sport Ireland is the authority tasked with the development of sport in Ireland and operates through its network of 29 local sports partnerships [200]. The first eight local

sports partnerships were launched in May 2001 [201], and the LSO programme was established in 2016. Like SP, the work of LSO is also aligned with several health policies and national plans. Local sports partnerships have an important role in the delivery of the NPAP in local communities [16]. Local sports partnerships and LSO not only support the development of opportunities for PA but also foster and encourage a culture of active participation, address barriers to PA participation for those who experience disadvantage for any reason, and provide information about sport and PA to create awareness and access [202, 203]. As such, they are a key implementation partner of the National Sports Policy 2018 – 2027 [204], the goal of which is to see every citizen in Ireland engaging regularly in some form of sport and PA, irrespective of their age, socioeconomic circumstances, or physical capabilities.

1.6.1.3 Health promotion workers

Health promotion is defined as the process of enabling people, at the individual and societal level, to increase control over and improve their health [205]. It encompasses actions directed at strengthening the capabilities of individuals, as well as influencing social, environmental, and economic determinants of health [206]. As may be expected based on the wide remit, health promotion workers have different roles and responsibilities across the world, with some having a responsibility to connect service users with community activities [207-209]. For example, in Canada [210, 211] and the USA [212] health promotion workers have been reported to facilitate connections to local PA, financial assistance, food banks, arts and cultural activities, hobby clubs, nutrition and weight management, and support and social groups. In Ireland, health promotion and improvement officers act as enablers, negotiators, and advocates to build capacity within the healthcare service to improve the health and wellbeing of the population through targeting modifiable risk factors such as physical inactivity, smoking, alcohol consumption, and obesity [213]. Significant investment has been made into the development and embedding of the health promotion service as part of the Healthy Ireland Strategic Action Plan 2021 – 2025 (developed to facilitate the implementation of the Healthy Ireland framework) [47] and the Sláintecare Healthy Communities initiative [214]. The mental health service plan also calls for health promotion and improvement officers working across HSE areas to focus on both mental and physical health promotion

efforts [94]. Health promotion workers are also part of the core group of services available in Sláintecare Healthy Communities [185].

1.6.2 Evidence for intermediaries

This is a novel and unique role, and the need for evaluation of intermediaries and intermediary interventions has been recognised, in particular the impact and the effectiveness on links between primary healthcare and local PA [158, 215]. It must be acknowledged that while this thesis will consider all types of intermediaries, most of the published evidence arises from the social prescribing literature (See Section 1.6.1.1), with few studies involving other types of intermediaries such as sport connectors or health promotion workers. Because of this preponderance of literature in relation to SP, the following section will discuss the current evidence base in relation to SP interventions firstly, then interventions delivered by other types of intermediaries. The qualitative evidence in relation to interventions delivered by all types of intermediaries is then outlined, followed by a discussion of the limitations of the SP approach and the need to consider all types of intermediaries in the context of PA.

1.6.2.1 Effect of social prescribing link worker interventions on health and wellbeing

Systematic reviews which investigated effectiveness of SP interventions when connecting to community activities suggest some improvements in quality of life [216] and psychological outcomes such as wellbeing [217-219], but the majority found limited evidence of effectiveness [172, 180, 220-222]. Much of the published evidence was criticised within these reviews for low methodological quality, a consistent finding and conclusion of evidence syntheses over the last decade [180, 223-226]. Research focusing on SP interventions has found large variability in models of delivery and interventions [174], and this variety and heterogeneity is acknowledged to be a contributing factor [227, 228]. Studies have been criticised for being small-scale, lacking theoretical underpinnings, relying on qualitative methods or weak designs, lacking suitable control groups, being of short duration, little or no consideration of confounding factors, and significant loss to follow-up [61, 173, 217, 222, 227, 229, 230].

1.6.2.2 Effect of social prescribing link worker interventions on physical activity

Individuals referred to SP can be connected to a wide variety of community activities (See Section 1.6.1.1). While PA is heavily referenced in social prescribing literature as one potential resource that can be accessed through a social prescription [60, 74, 167, 173, 176, 178, 181, 207, 228, 231-233], a limitation of the social prescribing literature is that often no information is given regarding the specific community activities to which individuals were referred [234-238]. Often it is not clear whether local PA was accessed, available, or offered to individuals in studies or specific interventions [239-247]. PA is also rarely formally measured by social prescribing services [184] or in evaluations of these services, with primary and secondary outcome measures often focused on psychosocial health and wellbeing.

Only three studies investigating SP interventions and measuring PA outcomes were identified published within the last ten years [248-250], with preliminary evidence from these individual studies that SP interventions could be effective in increasing PA levels. The first study by Polley et al. (2021), was a service evaluation report of a pre-existing social prescribing service in Surrey, England [249]. Routinely collected service data were analysed, and PA was measured using the General Practice PA Questionnaire (GPPAQ). Complete data were available for n=228 service users, and a statistically significant mean improvement of GPPAQ score (0.5) from baseline to follow-up was observed, with 38% of the sample observed to have a clinically significant improvement in PA levels. However, this was a non-peer reviewed retrospective before-after study, with no control group and significant loss to follow-up (complete PA data were only available for 8% of individuals referred to the service). The authors did not report on how many individuals were connected to local PA, only reporting that a third of the social prescriptions issued were in relation to 'lifestyle and modifiable risk factors' which included increasing PA levels. The follow-up period was also unclear, with the report stating that data were collected at 'review appointments' but not specifying when these took place.

The second study was conducted by Mercer et al. (2019) and was a quasi-experimental cluster randomised controlled trial (RCT) conducted in Glasgow, Scotland [250]. The

purpose of the study was to assess the effect of a primary care-based SP intervention on patients' quality of life and wellbeing. The control group were randomly selected patients registered with a comparator practice, who had no access to SP. PA was a secondary outcome measure assessed by self-report and reported as the percentage who 'never exercise'. In comparison to Polley et al. [249], there was a 74.3% retention rate of participants to the study. There was no significant effect on PA levels in comparison to the control group at nine-month follow-up. However, there was evidence that participants attending the SP more frequently (>3 visits) showed small but significant within-group improvements in self-reported PA levels over time (adjusted effect estimate 0.339 (95% CI, 0.071 to 0.607); $p = 0.013$). However, an unvalidated measure of PA was used, where participants were asked to self-report their lifestyle activities, and the authors did not report on how many individuals were connected to any of the community activities available, including local PA.

The final study by Pescheny et al. (2019) was also an uncontrolled before-after study of a pre-existing social prescribing service in Luton, England [248]. The authors also analysed routinely collected service data. PA was measured using the International Physical Activity Questionnaire — Short Form (IPAQ-SF). There was a 30.1% retention rate to the study, and follow-up measures were completed immediately post-intermediary intervention. The number of sessions with SP and intensity of support provided were dependent on the individual's needs. PA levels, measured by mean moderate, vigorous, and walking MET-minutes per week, increased post-intervention compared to baseline. However, this study has many of the limitations associated with the other studies such as a lack of control group and significant loss to follow-up.

1.6.2.3 Effect of other intermediary interventions on health, wellbeing, and physical activity

There is limited quantitative evidence regarding the effectiveness of other intermediary interventions, and a lack of published evidence about these intermediaries generally. For example, a minority of evidence syntheses have included other types of intermediaries [153, 251], and only one investigated the effects of these interventions on health and wellbeing. This was a scoping review, conducted by Cunningham and colleagues in 2021,

which investigated effectiveness of intermediary interventions when connecting primary care patients to local PA [153]. Intermediaries in this review included exercise referral scheme workers, exercise professionals, and facilitators of the NHS Let's Get Moving Pathway [252]. The authors reported positive findings when examining the percentage of patients connected with and enrolling in local PA. However, no information regarding PA-specific outcomes beyond attendance at the first session of PA were reported.

Other studies have evaluated the implementation of sport connectors in the Netherlands [77, 186-188, 253] and the role was found to be particularly impactful when sport connectors were structurally embedded within primary care, for example, through structured referral schemes and through attending meetings with primary care teams [253]. There has been one published evaluation of LSO to date, conducted by Sport Ireland [202], also focusing on implementation. The report concluded that the LSO programme was satisfactorily implemented. However, no other published evaluations of the effectiveness of the sport connector role were identified in this preliminary literature review, as studies mainly investigated the effects of participating in local PA programmes offered through these connectors [254-256]. The evidence regarding health promotion workers, both in Ireland and further afield, is even more limited, with many sources only naming the role, with no further description of the intervention or its effect on health and wellbeing [208-210].

1.6.2.4 Qualitative evidence

Clearly, there is an absence of high-quality quantitative evidence regarding the effectiveness of intermediary interventions [153, 180, 223]. However, the qualitative evidence regarding intermediaries (again largely describing social prescribing interventions) has overwhelmingly positive findings which warrant consideration despite the absence of strong quantitative data. Both HCPs and referred individuals found both SP interventions [210, 257, 258] and other intermediary interventions (Healthy Living Centre mentors) [259] highly acceptable. All types of intermediaries were universally praised. The collaborative approach, personalised advice [235, 258, 260-263], motivational support [238, 257, 260, 263, 264], and gradual and holistic approach to health behaviour change [258] undertaken by SP intermediaries were particularly

praised. These approaches were also described and praised for other intermediaries such as exercise professionals [265, 266], community navigators [267], wellness coaches [268], community connectors [269], and Healthy Living Centre mentors [259], when connecting to local PA and other community activities. Study participants who received SP interventions reported improvements in quality of life, psychological outcomes [210, 257, 258], social connections [210, 261, 262], and achieving personal health goals like weight loss, reduced alcohol consumption, or reduction in blood pressure [235]. Those who received other intermediary interventions also reported improvements in psychosocial outcomes [259, 268], social connections [259, 265, 267-269], mobility and function [265], and better adherence to healthy lifestyle behaviours such as better sleep and reduced alcohol consumption [259, 268]. Importantly, for all types of intermediary interventions, improvements to PA levels and improved participation in local PA were also reported [257-261, 265, 268].

1.6.2.5 The limitations of social prescribing link worker interventions in the context of PA

Despite the fact that much of the evidence for intermediaries in the context of PA arises from the social prescribing literature, SP interventions can be used to access a broad range of community activities, not just to connect to local PA. Social prescribing services adopt a holistic view of health and wellbeing, beyond physical health alone, and physical health needs are infrequently referenced as the primary reason for referral to these services [171, 173, 184, 207, 270, 271]. Some social prescribing services appear to be under strain, with large caseloads, service users with complex health needs, issues with service continuity, and reduced capacity for ongoing support or caps on how many sessions are available to service users [78, 258, 272, 273]. There is a potential therefore for inappropriate referrals to these services if, for example, an individual is referred to social prescribing but has already begun to implement health behaviour changes in relation to PA. These individuals are likely not in need of intensive instrumental and personalised support, hindering delivery of services to the target group and leading to inappropriate use of high intensity resources, reducing cost-effectiveness [273, 274].

SP report barriers related to their (at times) complex caseload and their ability to manage this. For example, SP have reported working with service users with complex health

needs, often in communities with high levels of deprivation [236, 237, 275]. This may further add to the challenges encountered when motivating people to engage in both the service and community activities [78, 235, 238], potentially leading to the high drop-out rates observed in the literature. There has been no research conducted to date regarding SP experience and training in relation to PA specifically, and whether they feel they are able to offer these interventions. Strong relationships would be needed between HCPs and SP to facilitate referrals and trust between the two sectors. Investigations into the views of HCPs actively referring their patients to SP to connect to local PA are currently lacking [71, 140]. However, when asked for their opinions on the feasibility of referring to such interventions, HCPs expressed concerns about referral pathways, differences between medical and social models of care, and quality assurance [276]. Lack of trust in intermediaries and scepticism about their patients effectively attending activities in the community and voluntary sector have been identified as barriers to HCPs referring to SP services [273]. Therefore, there is a need to investigate the feasibility and effectiveness of all types of intermediaries, including sport connectors and health promotion workers, to both investigate their interventions and address the limitations of SP and social prescribing services when trying to establish connections to local PA.

1.6.3 Rationale for intermediaries in the context of physical activity

Stakeholders involved in intermediary interventions value the role of the intermediary, and there is preliminary evidence of changes in PA and health-related outcomes because of these interventions, albeit from poor quality evidence. However, intermediary interventions address several limitations of current PA promotion methods used in healthcare settings. Firstly, there are growing calls for intermediary roles within PA referral/promotion pathways, to address the barriers faced by HCPs such as lack of time and lack of knowledge of local PA and other community activities [49, 142, 276-280]. HCPs have identified that having individuals who have knowledge of local community activities would greatly enhance their ability to perform brief interventions [92], and to signpost individuals to appropriate community activities [210, 240, 281-283]. Secondly, it is unlikely that all physically inactive individuals who are simply given information about local PA using brief interventions are going to take up such opportunities without

further supports or ‘handholding’ [150, 284]. Intermediaries could therefore also act as an ‘introductory point’ to bridge the gap between physical inactivity and PA [285, 286]. Thirdly, the structure and delivery of brief interventions does not always account for differences in patient motivation, self-efficacy, and PA beliefs [74, 287]. For example, someone with a high degree of health motivation will need little support, but those with lower levels of self-efficacy, motivation, or activation may need more intensive personal motivational support in order to access and attend community-based activities and to foster change in their health behaviours [179, 258, 288, 289]. The intervention delivered by intermediaries goes beyond simple signposting or advice on PA, and this support is likely to be a more successful model of PA promotion within this cohort [162, 257, 258, 284, 290-292]. Some of the potential mechanisms of impact of intermediary interventions are discussed. As previously acknowledged, much of the evidence in the following section arises from the social prescribing literature, due to the lack of reporting regarding other intermediary interventions.

1.6.3.1 Ongoing support

PA behaviour change can be achieved through values and skills conveyed by those perceived by the individual as “important others” [150, p.9], such as HCPs or other external influencers. When these needs are not met, motivation is lost and individuals are less likely to maintain these behaviours [150, 293]. Ongoing support therefore appears crucial to successful PA behaviour change [150]. In SP and other intermediary (exercise referral scheme workers, exercise professionals, and Let’s Get Moving Pathway facilitators) interventions, the support and time invested from the intermediary was noted as key to achieving positive health behaviour changes [74, 78, 153, 248, 249, 257, 260, 290]. PA intervention studies are often criticised for short follow-up periods and a lack of follow-up after the intervention had concluded [98, 294]. Follow-up times as long as 12 – 24 months have been recommended to assess maintenance of behaviour change and maintain effectiveness of interventions [98, 274], particularly for the least physically active groups [295]. In HSE and NHS social prescribing guidelines, six to eight contacts with an SP are recommended over a three-month period [183, 296]. Therefore, intermediaries may have the capacity and potential to offer longer PA interventions than those currently available in the Irish healthcare service.

1.6.3.2 Instrumental support

In addition to prolonged follow-up, intermediaries potentially have capacity to provide different types of support as required by the referred individual, from signposting to more 'hands-on' instrumental support [153]. Higher intensity of contact has been shown to increase effectiveness of PA interventions [297]. A key feature of SP interventions appears to be the capacity to accompany service users to activities [233, 298], something that would be impractical or even impossible within healthcare settings [74]. There is evidence that SP and other intermediaries (Active Lifestyles advisors) apply cognitive behavioural strategies when trying to promote participation in and adherence to community-based activities [233, 258, 298-300]. PA interventions that combine tailored advice and/or prescription with increased support and behavioural change strategies, such as goal-setting, self-monitoring, motivational support, problem solving, and planning have shown the most promising results for long-term changes in health behaviours [64, 96, 158, 222, 256, 301-307]. Therefore, if intermediaries combined health coaching approaches along with higher intensity behavioural support, this could be an effective approach to increasing PA.

1.6.3.3 Emotional and social support

In addition to behavioural support, SP have been reported to provide emotional support to referred individuals [162, 227], taking time to build rapport and strong relationships [233, 262]. This leads to trusting relationships [177, 207, 227, 260], which appear to be a key driver of the intervention [85, 164]. This has also been reported in studies involving other types of intermediaries (activity coaches, health mentors) [308, 309]. Building trusting relationships with intermediaries may create a sense of responsibility, loyalty, and accountability, therefore influencing engagement in local PA [309-311], potentially further driving motivation and behaviour change. Intermediaries' ability to impact on social connectedness (See Section 1.6.2.4) may also be a potential mechanism of impact [310]. Throughout the intervention, intermediaries could provide friendly, meaningful, and supportive relationships to their service users [258, 310]. By facilitating participation in community activities, the social support offered through these groups could be another important aspect of this intervention.

1.6.3.4 Personalised support from a trusted source

Personalised support is utilised in SP interventions, as the SP conducts a needs assessment, offers a choice of community-based activities, actively involves the person in the decision on the resource, and supports the individual to access these personalised community activities [168, 207, 222]. The SP and the meetings they have with referred individuals at assessment and follow-up have been noted as having psychosocial or therapeutic attributes in themselves [181]. This person-centred approach applied to SP interventions may be a unique motivator and add legitimacy to starting a new activity [78]. Personalised support is consistently highlighted in the literature as a key feature of successful PA interventions [57], and is hypothesised to be a contributing factor to increased and sustained PA levels [251] and uptake of PA activities [273, 284, 312], particularly amongst the hardest to reach groups [85]. This phenomenon has also been observed in the clinical literature, when clinicians maintain relationships with patients which then becomes an active ingredient of clinical interventions [313, 314]. Similarly, rather than generic advice or referral to a community activity that may not match the preferences of the referred individual, intermediaries (SP, exercise professionals) identify and choose community-based activities tailored to the individuals' needs and interests [162, 251, 315, 316]. Personalised interventions such as these are more likely to lead to tangible changes in engagement and uptake of PA [158, 251, 309].

1.7 Complex interventions

The intervention delivered by an intermediary has been identified in the literature as a complex intervention [60, 74, 158, 165, 173, 222, 289, 317-319]. Interventions can be considered complex due to the properties of the intervention itself, in that they comprise multiple interacting components, the range of behaviours targeted, expertise and skills required to deliver the intervention, difficulty of implementation, the number of groups and settings targeted, or the level of flexibility of the intervention [317, 320]. Complex interventions, instead of being rigidly standardised, can be tailored to the local cultural, social, and environmental context [321]. Complexity can also arise through the interactions between the intervention and its context, which can influence the mechanisms of change [64, 317].

The UK Medical Research Council has developed a useful framework to develop and evaluate complex interventions, to help identify key questions about complex interventions, and to design and conduct research with an appropriate choice of methods [317]. Rather than being a single intervention, intermediary interventions involve pathways with interacting elements and relationships between referring agent, referred individual, intermediary, and community-based activity, all of which take place within the local context and the context of the referred individual's health needs [74, 222]. This makes it particularly difficult to isolate the effects of one component compared to another [181], and leads to large heterogeneity and variability in intervention delivery and mechanisms of action, further increasing the difficulty of researching this topic [60, 222, 322]. The challenges and complexity of not only quantifying and evaluating the components of the intermediary intervention, but the exposure, dosage, and quality of community-based activities further increases this dilemma [207, 323]. This makes RCTs difficult to conduct [173, 230], and may have contributed to why other observational studies have often failed to show effectiveness of intermediary interventions (See Section 1.6.2). Complex intervention research that focuses solely on effectiveness is unlikely to be successful, with calls that trials should focus more on acceptability, implementation factors, cost-effectiveness, scalability, and transferability [74, 317].

1.8 Rationale for this study

Many Irish people are physically inactive, with major repercussions for health and wellbeing. Local PA offers an accessible, sustainable, and low cost solution to address the problem of physical inactivity. However, current methods used in Irish healthcare settings to promote engagement in local PA rely heavily on brief interventions. The degree of implementation and delivery of these brief interventions by HCPs is unclear. Additionally, these interventions may not account for differences in individual motivation, behavioural change support needs, and health needs. Intermediaries offer a promising alternative or additional intervention to 'bridge' the gap between healthcare and local PA, and to promote and encourage participation in PA, and may help to address the limitations of brief interventions. However, this is a new and unique role, and there is currently a lack of evidence regarding intermediary interventions specifically in

relation to PA. There is also a lack of research which considers intermediaries other than SP. As this is a complex intervention, more research is needed to better understand the potential of this intervention for increasing participation in PA before high-quality trials of effectiveness can be carried out, and there remains significant gaps in our understanding of contextual factors, implementation factors, potential mechanisms of impact, and potential outcomes.

1.9 Aims and objectives

The overall aim of this thesis, therefore, was to investigate the role of intermediaries in connecting community-dwelling adults to local PA and exercise in both the Irish and international setting. Thesis-specific objectives were:

- i. To examine the available international evidence regarding the current processes of an intermediary, when connecting community-dwelling adults to local PA.
- ii. To explore the processes, practices, and procedures of intermediaries across different sectors in Ireland, when connecting community-dwelling adults to local PA.
- iii. To identify the characteristics of people who engage in intermediary interventions in Ireland, and are connected to local PA.
- iv. To test the feasibility of intermediary interventions to improve PA and health-related outcomes.

1.10 Study design

A mixed methods approach was applied to this thesis. Study I was a scoping review, and study II a qualitative descriptive study. Study III was a mixed methods pilot feasibility study, and the quantitative phase employed a quasi-experimental before-after design, and the qualitative phase a qualitative descriptive design. A detailed description of these methods is included in each relevant chapter.

Knowledge user engagement directly informed the design of each study in this thesis. 'Knowledge users' include anyone invested in the production of research or those likely to use research findings to make decisions about health systems and practices [324-326].

The goal of knowledge user engagement is to co-produce knowledge that is relevant and useful, leading to informed real-world health decisions [327]. Not only does this increase the policy relevance of the research questions, but it also fosters integration, implementation, and dissemination of findings into policy and practice [328, 329]. A key difference therefore between knowledge users and public and patient involvement (PPI) is a ‘higher level’ involvement, as knowledge users can directly influence health systems and practices through involvement with research. The goals of involving knowledge users in this research project were:

- To improve planning, development, quality, design, delivery, co-ordination, relevance, and impact of the research.
- To inform the research questions and make them more relevant.
- To build relationships and connections with relevant knowledge users.
- To increase the likelihood that other stakeholders will be interested in and support the research and its outcomes.
- To help in the dissemination and knowledge translation process and help inform the choice of knowledge translation methods.
- To exchange ideas, share examples of good practice, and to provide and share skills and networks.
- To inform the direction and priorities of future research arising from the findings of the studies in this thesis [330, 331].

As such, several intermediaries from across the country, working in social prescribing, local sports partnerships, and health promotion were consulted from October 2021 – December 2021 when conducting the scoping review, as engaging with knowledge users is an optional step when conducting such reviews [326, 332-334] (See Section 2.2.5). These intermediaries were then formally invited to join an advisory panel created for the purposes of this research project in March 2022. The Ph.D. candidate (MO’G) has maintained both the active involvement of the panel throughout this research project, and representation of each sector (social prescribing, local sports partnerships, and health promotion). Numerous steps were taken to embed knowledge user engagement within this research project [335]. Formal training in these approaches is critical for doctoral students [335], and therefore, advice and guidance was sought from a PPI

expert within this University prior to the first formal meeting of the advisory panel. MO'G also regularly attended a PPI shared learning group for postgraduate students, which was an informal opportunity to keep up to date with the latest PPI and knowledge user engagement research and best practice approaches.

Throughout the research project, an 'impact log' was kept by MO'G to record advisory panel activities, both formal and informal [335]. This log also served to record critical reflections on the involvement of the panel and the impact this had on the research [326, 331, 335]. Time and appropriate resources were dedicated to conducting advisory panel activities [326], and additional bursary funding was obtained to financially reimburse advisory panel members, as per best practice guidelines [326, 330]. Knowledge user engagement can occur when setting the research agenda, developing methodologies, conducting analysis, and when disseminating results [325, 336]. Therefore, the panel were involved and engaged actively in many of these activities as part of this research project. Specific details regarding their involvement are detailed in the Methods sections of the relevant studies (See Sections 2.2.5, 3.2.7, and 4.2.8), and the impact of their involvement is outlined in the relevant Discussion sections (See Sections 2.4.1.1, 3.5.1.1, and 4.4.6.1) [336].

1.11 Overview of thesis

Chapter 2 describes study I, a scoping review which identified and described available international evidence regarding processes of intermediaries when connecting individuals to local PA. Chapter 3 describes study II, where the role of intermediaries in Ireland specifically was explored. Chapter 4 describes study III, which investigated the feasibility and acceptability of Irish intermediary interventions and of the evaluation design. Chapter 5 discusses the main findings of this thesis, as well as the implications of these findings within the context of the current international literature. An outline of the strengths and limitations of the thesis, as well as suggestions for future research priorities are made.

1.12 Conclusion

This chapter has outlined the current evidence that physical inactivity is a major public health concern, and that while healthcare services have a critical role in supporting patients to become more physically active and connecting them to local PA, current methods may not be effective in the long-term. This chapter has demonstrated that an intermediary may be a promising alternative strategy when promoting engagement in local PA, because of the enhanced supports they can provide throughout their interventions. However, quantitative evidence is limited and there is a need for further research regarding all types of intermediaries, not just social prescribing link workers. This thesis will contribute to our understanding of the role of all intermediaries, including social prescribing link workers, sport connectors, and health promotion workers, when connecting community-dwelling adults to local PA.

Chapter 2 The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: a scoping review

The protocol for this scoping review is published in HRB Open Research.

Citation: **O'Grady, M.**, E. Barrett, J. Broderick, and D. Connolly, *The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: A scoping review protocol [version 2; peer review: 2 approved]*. HRB Open Research, 2022. **5**(29). <https://doi.org/10.12688/hrbopenres.13523.2> (Appendix II)

The scoping review is published in the International Journal of Integrated Care.

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2.1 Introduction

As discussed in the introduction of this thesis, physical inactivity is a major modifiable risk factor for non-communicable morbidity and mortality, resulting in significant direct and indirect healthcare costs [11, 36]. Despite this, the number of adults failing to meet PA guidelines is increasing globally [11, 20]. There is no single solution to increasing PA at a population and individual level, therefore a comprehensive approach requiring multiple concurrent strategies is needed [5, 54]. Healthcare services and community-wide programmes are recommended as two evidence-based 'best investments' for PA promotion [58]. Healthcare services have a critical role in PA promotion, education, and encouragement [151, 337]. This is particularly important in primary and community care services; often the first point of contact with healthcare services for individuals and where the majority of healthcare contacts take place [102, 103]. Community-based PA, exercise, and sport programmes (i.e., local PA) may therefore be an appealing option when HCPs recommend PA to their patients. These programmes may facilitate PA participation in a sustainable, accessible, affordable way, by making use of available environmental resources and social support [77, 99, 338, 339]. There are three main

methods of connecting physically inactive, community-dwelling adults from healthcare services to local PA: brief interventions, exercise referral schemes, or referral to an intermediary [153, 337, 340].

Brief interventions have already been discussed in-depth in the introduction of this thesis (See Sections 1.5.2.2 – 1.5.2.5), and there is a lack of evidence of long-term effectiveness of these interventions [128, 129]. Irish HCPs also face significant barriers to implementing brief interventions in practice [65, 133-135], and there is little evidence that signposting to local PA is being carried out as part of these brief interventions (See Section 1.5.2.5). Formal PA referral pathways in Ireland are limited (See Section 1.5.2.1). Exercise referral schemes involve HCPs identifying patients who are sedentary or inactive and referring them to a third party qualified exercise professional, who then conducts an assessment and develops and delivers a tailored programme of PA lasting from 10 – 14 weeks [118, 338, 340-342]. While these schemes have been rolled out in the UK, Sweden, Belgium, Canada, Australia, New Zealand, and the USA [304, 307, 343] no formal exercise referral schemes exist in Ireland. Additionally, exercise referral schemes were found to have limited effectiveness on self-reported PA, but poor uptake and adherence may have affected these results [129, 338, 340, 344, 345]. If people could therefore be given appropriate support to attend community-based PA, outcomes in relation to PA could potentially be improved.

Intermediaries are clinical or non-clinical professionals, based in primary care or the community. They facilitate connections to non-medical community and voluntary services and supports (community activities), with the overall goal of improving health and wellbeing [74, 156, 289, 346]. Other titles for intermediaries include ‘care navigator’, ‘sign poster’, ‘social prescribing link worker’, ‘sport connector’, and ‘health promotion worker’ [347]. There are limited conclusions regarding effectiveness of intermediary interventions in relation to PA, and much of the published literature focuses on social prescribing (See Section 1.6.2). A lack of understanding of the processes used by all types of intermediaries during their interventions, and how these bring about change and therefore influence outcomes for different target groups, has been highlighted as a limitation of the evidence to date [223, 289, 319, 348-350]. Calls

have been made for proper definitions of intermediary interventions to further define good practice [74], and to measure ‘active ingredients’ and mechanisms of impact [173, 180] to inform and improve future research.

Studies often fail to describe the processes used during intermediary interventions, or these ‘active ingredients’ [74, 173, 222]. This lack of reporting is even more common for intermediary interventions where the individual is connected to local PA [223], with little information available regarding the processes of referral and connection to local PA services, and PA-specific outcomes. ‘Active ingredients’ could include the mode of delivery, duration, intensity, underpinning model of behavioural change, and behaviour change techniques [173, 222] as well as the ongoing, personalised, and enhanced supports provided by intermediaries (See Section 1.6.3). However, even simple information regarding the processes and reasons for referral to an intermediary, the processes undertaken by intermediaries once the referral is received, and how onward connections to local PA are achieved are difficult to determine, as this information is often omitted [212, 226, 228, 351, 352]. Many reviews and studies of intermediary interventions fail to provide information regarding specific community activities to which patients were referred [78, 156, 159, 180, 353, 354]. Because the focus of much of the published literature is on social prescribing, local PA groups and services were often available in addition to other supports, such as arts or education on prescription, bibliotherapy, and signposting/information referral.

Wider health-related data and accurate demographic information are variables often poorly captured in studies involving intermediaries. In some studies, even the number of people who participated in the study is not reported [217, 352]. Studies often rely on routinely collected service data, which are often limited and have large amounts of missing data. For example, three studies were identified which investigated social prescribing link worker (SP) interventions and PA outcomes [248-250] (See Section 1.6.2.2). In the study by Pescheny et al. (2019) only age, gender, and working status (a binary variable of working or not working) was reported, with working status data missing for over 20% of participants [248]. Polley et al. (2021) reported data on gender, ethnicity, age, living situation, employment status, and self-reported long-term

conditions [249]. Again, there were significant amounts of missing data across the variables, and both studies collected no other health-related data. Mercer et al. (2019) did report more in-depth demographic data, reporting age, gender, those living in the top quintile of deprivation, whether the sample was employed, and living situation [250]. Health-related data however were lacking, despite the fact participants were recruited from GP practices, with the authors reporting rates/percentages of current smoking, those who never exercise, those who had self-reported multimorbidity, and social problems. There is a need therefore for both improved reporting of health characteristics and demographic information, but also a better understanding of who is accessing intermediary interventions to connect to local PA.

Because of the lack of published evidence describing the specific processes of all types of intermediaries when conducting interventions to connect individuals to local PA, and of the population accessing intermediary services, a decision was made to conduct a scoping review. Scoping reviews are a useful methodology when trying to identify and map the available evidence in the field [355, 356]. Scoping reviews are particularly helpful to summarise the volume, nature, and characteristics of published research and are useful when a topic is complex or heterogeneous [357]. Scoping reviews differ from a traditional literature review as they are informed by a protocol and therefore are reproducible, involve exhaustive searching for information, and take measures to reduce error and increase reliability e.g., multiple reviewers, structured data extraction [357]. As per best practice guidelines, prior to commencing the review a preliminary search for existing scoping reviews was conducted [356]. Two reviews were identified which investigated intermediaries connecting community-dwelling adults to local PA.

One review, conducted by Cunningham and colleagues in 2021 [153], investigated methods of connecting primary care patients to local PA. The review aimed to explore what was known about the effectiveness of three different methods; exercise referral schemes, signposting, and intermediaries [153]. Ten documents were identified describing 15 unique PA promotion processes. According to the authors' definition, PA promotion processes had three stages: 1) identification of eligible and willing patients at primary care level, 2) delivery of behaviour change strategies to enhance the

likelihood of these patients increasing their PA levels, and 3) connection of patients to local PA. The authors reported that referral to an intermediary took place during the third stage. However, the review was limited to studies carried out in the UK, and all processes involving referral to an intermediary described either exercise referral schemes, consultations with exercise professionals, and/or evaluations of the NHS Let's Get Moving Pathway [252]. While similar PA referral pathways exist in Ireland, such as ExWell Medical, the PAPHM, or through HCPs referring patients to a physiotherapist or community-based trainer (See Section 1.5.2.1), these specific formal referral pathways do not currently exist in Ireland, making comparisons difficult. The authors also reported challenges defining and reporting on the specific methods of connection, as these were often embedded within the overall process of PA promotion.

The review by Polley and Sabey aimed to 'map the territory' and inform researchers as to how social prescribing may influence the uptake of PA [78]. They also aimed to report on the barriers and facilitators associated with successful referrals to SP. The authors conducted a "rapid scoping review" [78, p.2] of academic and grey literature published in the previous five years. In total, 26 studies were identified with the majority conducted in the UK (two studies were conducted in Denmark and Spain). However, this review has significant limitations. The authors focused only on one type of intermediary (SP), largely based in the UK, limiting generalisability of results. The report was not peer reviewed and was conducted by the authors on behalf of the National Academy for Social Prescribing Academic Collaborative. The National Academy for Social Prescribing is an organisation that champions advancement of social prescribing [100] and therefore could be biased towards reporting evidence in favour of social prescribing. Only five included studies measured PA outcomes [154, 249, 250, 261, 358], which were varied and included leisure centre membership, self-reported PA, and validated outcome measures.

The aim of this scoping review, therefore, was to identify and describe the available international evidence regarding processes of referral to an intermediary, the characteristics of referred community-dwelling adults, and the processes and outcomes of connecting referred individuals to local PA. Specific objectives were:

- i. To identify and summarise the scope of the literature describing connection to intermediaries (in the context of onward connection to local PA).
- ii. To identify and summarise the health characteristics and demographic information of individuals connected to local PA by intermediaries.
- iii. To identify, map, and summarise the available literature regarding the practices of intermediaries in connecting individuals to local PA.
- iv. To identify the available literature describing and defining outcomes of intermediaries connecting community-dwelling adults to local PA, and map outcomes to processes.

2.2 Methods

2.2.1 Protocol and registration

This review was carried out according to guidelines published by the JBI (formerly Joanna Briggs Institute) [356, 359], following frameworks proposed by Arksey and O'Malley, Levac, and Daudt [333, 334, 355]. This review was registered on the Open Science Framework and a protocol was published *a priori* [347]. This study was reported using the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) checklist [360].

2.2.2 Eligibility criteria

Study eligibility criteria were selected based on the Population, Concept, and Context (PCC) approach. Full-text peer and non-peer reviewed studies in the English language were considered for inclusion, which included original empirical data and reported on community-dwelling adults (population), and the processes of intermediaries (concept) after receiving a referral for a community-dwelling adult, in connecting them to local PA (context). Reports without sufficient primary data, or sufficient data to answer review objectives (such as study protocols, policy briefs, or review papers), were excluded. Detailed PCC inclusion and exclusion criteria are summarised in Table 2-1.

Table 2-1: Detailed inclusion and exclusion criteria

PCC	Inclusion criteria	Exclusion criteria
Population	- Community-dwelling adults - Aged ≥ 18 years old	- Study participants are not community-dwelling e.g., current in-patients, living in residential care facilities, prisoners - Participants are aged < 18 years old - Family interventions i.e., targeting parents and children with the goal of improving health and wellbeing of children
Concept	- Study refers to referral (of any description) to an intermediary with onward referral to local PA	- Study does not describe and/or use an intermediary to establish connection to local PA - Study describes the intermediary delivering local PA, or other methods of healthy lifestyle support without onward referral - Intermediary does not meet the review criteria: 1) clinical or non-clinical staff 2) employed as an intermediary 3) based in primary care, community, or voluntary sector 4) receive self-referrals, referrals through the study team, or referrals from HCPs 5) provide some degree of assessment and follow-up to the individual who has been referred with the aim of improving and enabling physical and mental health and wellbeing 6) support the referred individual in establishing a connection to community and voluntary services offering PA opportunities

Context	- Study refers to an intermediary connecting referred individuals to local PA, including but not limited to • walking and jogging groups • sports and leisure clubs • gym-based classes • exercise referral schemes (where the intermediary independently connects the referred individual to a programme and is not involved in delivery of the programme) • adapted and chair-based exercise • outdoor activities (including gardening and other nature-based activities) • yoga • Pilates • Multimodal interventions/lifestyle interventions/weight loss interventions/chronic disease management/older adult day programmes (where the main focus is connection to local PA)	- Study involves PA exclusively delivered in a healthcare setting or exclusively delivered by HCPs e.g., condition-specific classes, medically supervised exercise programmes such as cardiac or pulmonary rehabilitation, exercise-based rehabilitation programmes (where referred individuals had the choice between PA located in healthcare settings in addition to community-based PA and exercise, these studies were eligible for inclusion) - Study describes other interventions such as • where the intermediary solely/exclusively delivers general health advice or education, coaching, motivational interviewing, brief interventions without follow-up or further signposting • exercise prescription or intermediary delivers the exercise programme • PA counselling (with no support in accessing services) • mHealth, eHealth, or app-based interventions

Abbreviations: HCP — healthcare professional, mHealth — mobile health, PA — physical activity, PCC — Population, Concept, and Context.

2.2.3 Search and study selection

As recommended by the JBI, a three-step search strategy was utilised for this review [356]. The first step involved an initial limited search of the databases Embase and PubMed to identify studies relevant to the topic area. The second step was an analysis of the keywords and index terms of these relevant studies, to create a comprehensive search strategy developed in consultation with a medical librarian (DM). Over 50 terms for the intermediary role were included in the search strategy to identify all literature describing health-related community-based staff who facilitate connections to local PA, and search terms included “Communit* NEAR/2 (‘link worker’ OR connector* OR navigator* OR broker* OR ‘support worker*’ OR ‘Link worker*’ OR ‘health worker*’), “Social NEAR/2 (prescribing OR prescription)”, “(exercise OR health OR community) NEAR/3 facilitator*”, “(Health OR wellbeing OR ‘well being’ OR community) NEAR/2 (coach OR coordinator OR ‘co ordinator’), and “(‘Case worker*’ OR ‘life coach*’ OR ‘engagement worker’ OR ‘lifestyle counsel*’)”. Because of the broad inclusion criteria in relation to the population, the fact that intermediaries can be based in primary care and receive referrals from primary care, and the large volume of community-dwelling adults attending primary care services, terms related to “primary care” were used in the search strategy to capture the population of interest.

The full search strategy is available in the appendices (Appendix IV). Searches were undertaken across four electronic databases (Embase, Medline, Web of Science, and CINAHL) in April 2022, and databases were searched from inception. The third step was an extensive grey literature search carried out from March 2022 – June 2022. Grey literature is literature produced by government, academics, business, and industry in print and electronic formats, but not formally published in academic sources (i.e., books or journals) [361]. Grey literature can provide a more comprehensive synthesis, reduce bias due to publication bias and often lengthy times between research and publication, and is frequently included in scoping reviews [333, 361]. Searches were conducted of databases that specialise in grey literature i.e., the Canadian Agency for Drugs and Technologies in Health (CADTH) Grey Matters Tool and Google Scholar. In addition, a search of controlled trial registers, academic dissertations and theses, websites of

international government organisations, agencies, scientific research groups and networks, and relevant conference proceedings were carried out (Appendix IV) [362]. These websites were either hand-searched, or the first 100 hits (as sorted by relevance) were screened, as further screening was deemed unlikely to result in additional relevant literature [363, 364]. Citations were imported into Covidence for screening.

A title screen was completed initially by MO'G to remove irrelevant titles, and titles which clearly did not meet the PCC eligibility criteria were excluded. The study eligibility criteria were then independently pilot tested with a random sample of 25 titles/abstracts by two reviewers (MO'G and MK). No modifications or refinements were needed at this stage. Titles and abstracts were screened independently by two reviewers (MO'G and MK). The reviewers met several times formally and informally throughout the screening process to resolve conflicts, refine the eligibility criteria, and discuss any challenges. Where inclusion or exclusion could not be determined based on title and abstract, the paper was included for full-text screening. Articles that were eligible for full-text screening were screened against the study inclusion/exclusion criteria by the same two reviewers. Disagreements were resolved by discussion, with a third reviewer available to act as an arbitrator if an agreement was not reached (EB). Authors were contacted a maximum of three times for additional information where required. Where investigators published several articles based on the same study population, data were collated and reported as a single item. The screening process took place from August 2022 – December 2022, and the final list of included articles were agreed amongst the review team. As part of the third and final step of the search strategy, the reference lists of articles that were selected from full-text screening were searched for additional references.

2.2.4 Data charting and summarising results

Data charting commenced in October 2022, and a data charting form was developed *a priori* using Microsoft Excel (Microsoft Corporation) by MO'G and tested with a random sample of ten articles by two reviewers (MO'G and MK). The form was refined to ensure consistency and suitability, and data extraction, charting, and summarising was carried

out by a single reviewer (MO'G) and verified by a second (MK). Data were extracted regarding:

1. Author(s)
2. Title
3. Year of publication
4. Evidence source details (database searches or grey literature)
5. Location of research (country of origin)
6. Study aim(s)
7. Research design
8. Inclusion/exclusion criteria
9. Population of interest (e.g., health characteristics, if applicable)
10. Demographic details of participants (age, gender, ethnicity, marital status, education, socioeconomic status (SES), health characteristics i.e., presence/absence of chronic disease, etc.) and sample size (total n, number of referrals to intermediary (intermediary n))
11. Details and features of the intermediary process and practice (method and nature of referrals, source of referrals, reason referred, number of referrals, intermediary service delivery (process of assessment, length of follow-up, content and features of follow-up, and discharge from the service))
12. Intermediary service description, nature, and approach (location, profile of the intermediaries, including background, training etc.), whether the service existed prior to the study
13. Characteristics and details of local PA (location, extent, and nature of local PA services utilised, how these services are identified, duration and content)
14. Presence or absence of a control/comparator group
15. PA-specific outcomes (outcomes measured, methods of measurement)

An overall findings effect indicator approach was used for each reported result in relation to PA outcomes: i) positive, ii) negative, or iii) mixed [365]. This was carried out by MO'G and verified by the review team. A positive result was recorded where authors reported outcomes in favour of the intervention (not necessarily achieving statistical significance), and vice versa for negative results, in line with methods used in previous

reviews [294]. A mixed result was when positive and negative results were recorded for outcomes at different timepoints. A logic model was created to map processes to outcomes based on Sport England logic model guidance [366], as it is specific to PA interventions. A logic model is a useful tool for visually illustrating assumed relationships between inputs, activities, outputs, and outcomes. The structure and organisation of logic models enable the results from scoping reviews to delineate complex interventions, thus enabling greater insight into the interactions between the intervention and the multiple outcomes [367]. The 'PAGER' framework was then used to identify evidence gaps; this tool was developed to provide a consistent approach to analysing, reporting, and translating scoping review findings and consists of 'patterns', 'advances', 'gaps', 'evidence for practice', and 'research recommendations' [368].

2.2.5 Knowledge user engagement

Knowledge user engagement in scoping reviews is an optional final step after data charting and summarising [333, 334]. Consultation with key stakeholders may provide additional sources of information and offer different perspectives on the data collected [355], aid research recommendation development [359], and reduce research waste [329]. However, only 14% of published scoping reviews report their processes for including knowledge users [369]. The goal of involving knowledge users in this review therefore was to improve the development, design, relevance, and dissemination of this work, and to identify priority areas for future research. Prior to commencing the review, informal discussions took place with intermediaries, as part of protocol and search strategy development. After formation of the advisory panel (See Section 1.10), panel members were invited to review the Knowledge User Engagement document from the JBI [332] and select tasks that they felt comfortable doing and that corresponded to their individual strengths and professional experience. As such, the preliminary results, tables, figures, and PAGER framework were shared with the advisory panel for comment and 'sense-checking', for suggestions regarding presentation of the results, and to review the implications of the findings to ensure that they were meaningful to the community [326].

2.2.6 Protocol amendments

Study eligibility criteria and the definition of an intermediary were further refined throughout the screening process. Additional sources were added to the grey literature search, and other sources not searched. The majority of grey literature sources were searched using keywords and individual website databases or search bars. Where this function was not available, sources were hand-searched for relevant reports rather than screening the first 100 references as described in the protocol. A title screen was carried out before screening abstracts, which was necessary due to the large volume of potentially eligible studies identified by the search strategy. Additional changes were also made to the data charting form:

- Individual study objectives were not charted, only the aims.
- The following health characteristics and demographic information were collected: total n, intervention n, age, gender, ethnicity, marital status, education, SES, health characteristics (presence/absence of chronic disease etc.).
- An item was added to describe the content and features of follow-up.
- An item was added to indicate if the intermediary service existed prior to the study.
- Instead of charting all outcomes and methods of measurement, only PA-specific outcomes and methods of measurement were recorded, due to the large number of heterogeneous health-related outcomes collected by included studies.

Finally, an overall findings effect indicator was used to provide additional context to reporting of the results of included studies.

2.3 Results

The search identified 10,257 records. After deduplication and title screening, 2,890 records were screened by title and abstract. 263 full-text reports were assessed for eligibility. Reasons for exclusion are shown in the PRISMA flow diagram (Figure 2-1). A total of 35 reports, reporting on data from n=28 individual studies, were included. The findings in relation to each of the objectives are detailed in the proceeding sections.

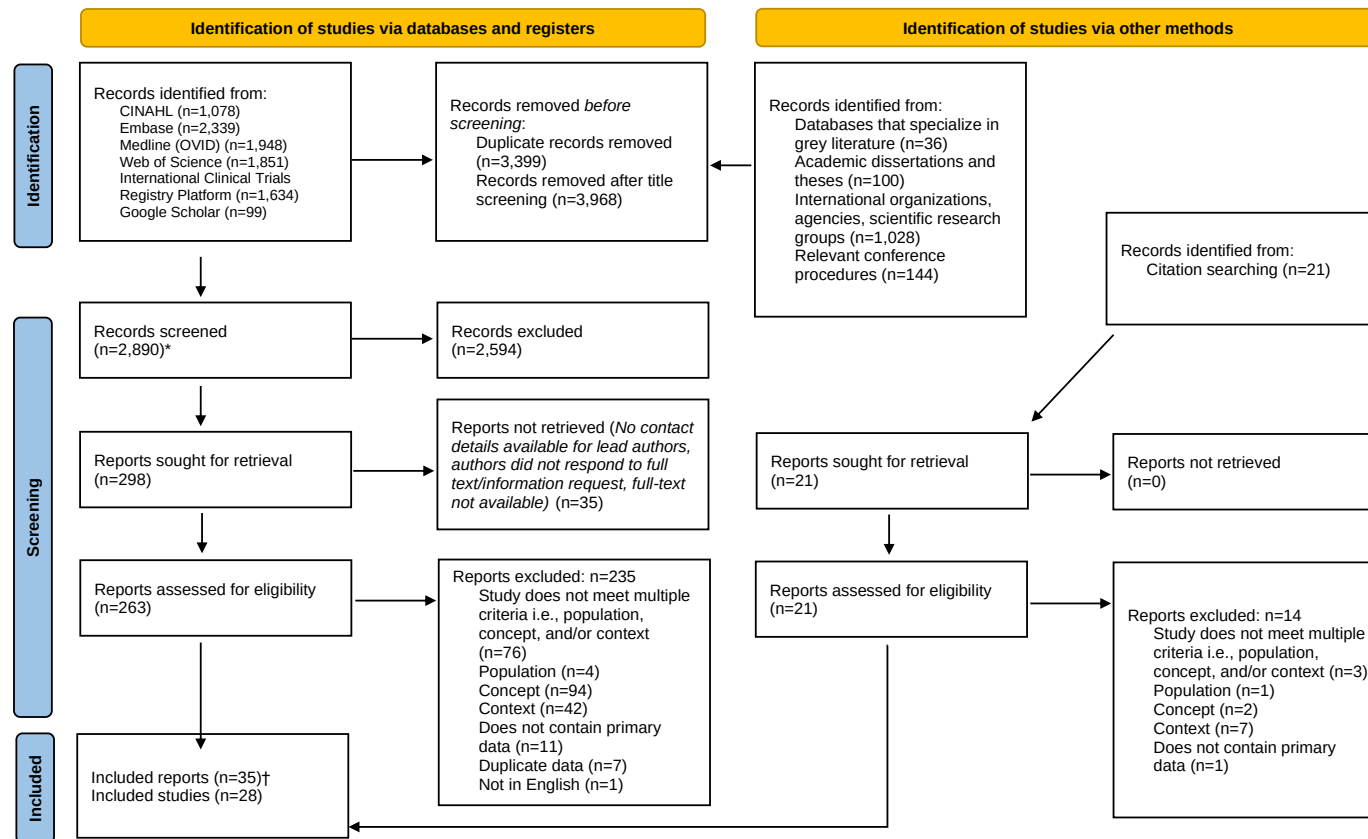


Figure 2-1: PRISMA flow diagram

*One record was identified from the International Clinical Trials Registry Platform. When screening the record for eligibility, three reports were associated with this record, all of which met the review inclusion criteria. Therefore, all three reports were sought for retrieval, assessed for eligibility, collated, and reported as The Men on the Move study [370-372]. †A total of 35 reports describing n=28 individual studies were included. Two reports were collated and reported as The CalPERS Health Matters study [373, 374]. Two reports were collated and reported as The RAPID study [375, 376]. Figure reproduced from [377].

2.3.1 Objective (i): To identify and summarise the scope of the literature describing connection to intermediaries

Study design and population of interest are summarised in Table 2-2. In total, n=14/35 quantitative reports [248, 308, 370, 373, 375, 378-386], n=7/35 qualitative reports [71, 166, 257, 260, 372, 387, 388] and n=14/35 mixed/other methods reports (consisting of service development descriptions, process evaluations, mixed methods case studies, real-world trials, impact reports [77, 253, 281, 371, 374, 376, 389-393], or methods not reported (n=3/35) [394-396]) were included. Of the quantitative reports, five were RCTs [373, 375, 378, 383, 386], five were controlled and uncontrolled before-after studies [248, 370, 382, 384, 385], and four were pilot/feasibility trials [308, 379-381]. Reports were published between 2001 and 2021, with half (n=18/35) published in the last five years. N=14/35 were identified through database searches, n=14/35 were identified through grey literature searches, and n=7/35 were identified through hand-searching bibliographies of included studies. Of the n=35 included reports, six reports were not peer reviewed [370, 379, 392, 393, 395, 396].

Table 2-2: Summary of included studies

Study design (n=35)*	
<i>Quantitative</i>	n[†]
RCT	5
Non-RCT	9
<i>Before-after trial</i>	3‡
<i>Pragmatic trial</i>	2
<i>Pilot or feasibility trial</i>	4‡
<i>Mixed/Other methods</i>	n[†]
Development process	3
Other	8‡
<i>Not reported</i>	n[†]
	3‡
<i>Qualitative</i>	n[†]
Interviews	5
Focus groups	2‡
Clinical features of study population (n=28)*	
<i>Quantitative/Mixed/Other methods/Not reported</i>	n[†]
Inactive or lifestyle risk	7
Chronic diseases (COPD, CVD etc.)	5
Prediabetes or diabetes	4
Psychosocial needs	4
Issues affecting health and wellbeing	1
<i>Qualitative</i>	n[†]
CVD or risk of CVD	1
Inactive	1

This table details included studies' design and study population. *Difference in values as n=35 reports were identified reporting data from n=28 individual studies. †Represents a frequency count. ‡Eight reports were considered "real-world" trials, i.e., examining routine delivery of a health intervention [397]; n=1 before-after trial [248], n=1 pilot or feasibility trial [380], n=3 other methods (mixed methods case study, mixed methods impact report, mixed methods evaluation) [215, 392, 393], n=2 design not reported [395, 396], and n=1 qualitative [372]. Abbreviations: COPD — chronic obstructive pulmonary disease, CVD — cardiovascular disease, RCT — randomised controlled trial. Table reproduced from [377].

Research was carried out in several high-income countries including the UK (England (n=5/28 studies), Scotland (n=4/28), Wales (n=1/28)), the USA (n=9/28), Canada (n=2/28), the Netherlands (n=2/28), Ireland, Spain, Denmark, Australia (all n=1/28), and one upper middle-income country (Brazil, (n=1/28)). The population of interest for each study were varied. Quantitative and mixed methods studies included carers, low-income populations, women, older adults, men, patients, local residents, and veterans. In two of these studies, the authors included intermediaries and other key stakeholders [215, 393]. Qualitative studies included individuals who had engaged with an intermediary [257, 260, 388], individuals who had been referred to medically supervised exercise instead of an intermediary [388], individuals registered with a general practice who were able to increase their PA [71], key stakeholders [372, 387], HCPs [71, 166, 260], and intermediaries [260, 372].

2.3.2 Objective (ii): To identify and summarise the health characteristics and demographic information of individuals connected to local PA by intermediaries

The total number of referrals to an intermediary across the included studies was n=10,104. Demographic information was available for n=8,049/10,104 and is shown in Table 2-3. The mean (SD) age was 58.1 (9.9), and the sample was 57% female (gender was not reported in n=1 study [385]). Two studies focused exclusively on men [308, 372] and one exclusively on women [394]. Due to the heterogeneity of reporting, summary statistics were unable to be calculated for other demographic information. Ethnicity, percentage married/co-habiting, education levels, and SES are also detailed in Table 2-3. These demographic variables were not reported in n=7 (25%), n=12 (43%), n=10 (36%), and n=7 (25%) studies, respectively. As the populations of interest were often individuals with clinical or pre-clinical diagnoses, health characteristics such as increased body mass index, being an active smoker, presence of chronic disease(s), mental ill-health, falls history, pain, and high medication use were common (health characteristics were not reported in n=4 (14%) of studies). Five studies (18%) also reported participant PA levels, with many classified as inactive or not meeting PA guidelines [308, 372, 374, 384, 386].

Table 2-3: Demographic information of individuals referred to an intermediary

Basic demographics					
	Total n	Intermediary intervention n	Age*	Gender	Marital status
	Range	Range	Mean (SD) Range	% Female Range	% Married/co-habiting Range
RCTs [374, 375, 378, 383, 386]	164 – 509	81 – 257	50.8 (12.2) – 74.3 (5.9)	16 – 73	44 – 60 NR= 2
Before-after trials [248, 372, 382, 384, 385]	186 – 966	208 – 1,355†	51.2 (15.7) – 76.8 (9.1)	0 – 83 NR= 1	28 – 78 NR= 2
Pilot or feasibility trials [308, 379-381]	20 – 446	20 – 797†	48.4 (NR) – 71.8 (6.5)	0 – 73	69 NR= 3
Mixed or other methods [391, 392, 394, 395]	159 – 1,749	104 – 1,749	*	65 – 100	i) 66 ii) 53‡ NR= 3
Qualitative [257, 260, 388]	15 – 84	10 – 1,603†	47.5 (NR) – 69.9 (10.4)	47 – 90	70 NR= 2
Socioeconomic characteristics					
Ethnicity§	n	Reference			
- Majority Black	2	[375, 381]			
- Majority European	1	[308]			
- Majority Hispanic/Latino	2	[385, 394]			
- Majority minority populations	1	[386]			
- <i>Majority White</i>	8	[257, 260, 372, 374, 380, 382, 384, 395]			
- NR	7	[248, 378, 379, 383, 388, 391, 392]			

SES§	n	Reference
- Employment status	7	[248, 257, 260, 308, 378, 384, 386]
- Food insufficiency	1	[394]
- Health insurance status	2	[380, 381]
- <i>Income levels</i>	9	[308, 375, 380, 382-386, 394]
- Social class	2	[257, 378]
- NR	7	[372, 374, 379, 388, 391, 392, 395]
Education§	n	Reference
- Level of educational attainment	11	[308, 372, 374, 380-384, 386, 391, 394]
- Years of education	1	[374]
- NR	10	[248, 257, 260, 375, 378, 379, 385, 388, 392, 395]
PA and health-related characteristics		
Health characteristics	n	Reference
- <i>Cardiovascular</i>	7	[372, 378, 379, 384-386, 388]
- Functional limitations, mobility, and falls	3	[308, 374, 382]
- Lifestyle risk factors	4	[378, 381, 384, 385]
- Mental health	3	[257, 260, 380]
- Metabolic	11	[308, 372, 374, 375, 378, 379, 381, 384-386, 394]
- <i>Multimorbidity</i>	6	[257, 308, 374, 380, 382, 383]
- Musculoskeletal	3	[378, 379, 386]
- NR	4	[248, 391, 392, 395]
- <i>Other¶</i>	6	[257, 260, 374, 380, 382, 383]
- Poor health status	4	[374, 382, 384, 386]
- Respiratory	3	[378, 379, 386]

PA levels	n	Reference
- % inactive	5	[308, 372, 374, 384, 386]
- % participating in self-directed PA	1	[374]
- Measure of physical fitness	1	[372]
- Minutes of PA per week	1	[374]
- NR	16	[248, 257, 260, 375, 378-383, 385, 388, 391, 392, 394, 395]

Demographic details are reported for the sample referred to an intermediary (intermediary intervention n), unless in italics which indicates the total sample of the study (including individuals in the control arm, or those referred to alternative interventions in the case of qualitative studies). Data presented from 21/28 studies; n=7 did not report on any demographic information of people referred to an intermediary, of which three were qualitative studies involving healthcare professionals, intermediaries, or key stakeholders [71, 166, 387], three were mixed methods evaluations of services [215, 389, 393], and one study which reported that n=1,249 referrals were made to an intermediary, but did report demographic information for these individuals [396]. *Five studies did not report the mean (SD) age of the sample, instead reporting the % of the sample in a given age range [372, 383, 391], or reporting that the 'majority' were in a given age range [392, 395]. Age range unable to be calculated for mixed or other methods studies as three studies reported age using these methods. †This figure is larger as these studies only included/reported demographic information on a subset of total individuals referred to an intermediary. ‡This study recruited mother and daughter pairs and reported demographic information separately for i) mothers and ii) daughters [394]. Marital status was not reported by any other mixed or other methods studies. §Reported largest proportion of sample, and/or reported as per author's reporting style. ¶Other health characteristics include taking medications, pain, recent emergency department visit, acting as caregivers, low confidence, social isolation, and non-medical/psychosocial needs. Abbreviations: NR — not reported, PA — physical activity, SES — socioeconomic status, RCT — randomised controlled trial.

2.3.3 Objective (iii): To identify, map, and summarise the available literature regarding the practices of intermediaries in connecting individuals to local PA

There was a wide variety of intermediaries identified within the included studies, with the most common terms for the role including ‘coaches’ (n=7, 25%) [308, 374, 382, 384, 388, 392, 394], ‘link workers’ (n=5, 18%) [71, 166, 257, 387, 393], ‘navigators’ (n=4, 14%) [248, 260, 381, 385], and ‘co-ordinators’ (n=3, 11%) [372, 375, 391]. The intermediaries had diverse backgrounds in healthcare, sports and fitness, health education, peer counselling, community care, and research. They were educated from community college to master’s degree level. Intermediaries were skilled professionals, with additional training in research, health, behaviour change, and community development. Additional information regarding the profile of intermediaries is summarised in Table 2-4. Processes of referral to the intermediary are summarised in Table 2-5. The most common nature of referral was referring directly to an intermediary (n=6, 21%). Methods of referral were poorly reported, but were via referral forms [248, 392], fax/email [380, 381], or online referrals [382, 395]. Half of the studies reported that referrals came from primary care practice staff or the GP (n=14, 50%). Self-referral to an intermediary was also common (reported in n=7 studies, 25%). Only two studies (7%) reported that individuals were referred to an intermediary specifically to become more physically active [215, 372].

Table 2-4: Summary of intermediaries in included studies

Profile of intermediaries (n=28)*

The following word cloud was generated using the terms for 'intermediaries' identified in the included studies.



		Research study-specific [260, 308, 380, 381, 383, 385]
		Behavioural change techniques [257, 378, 380]
		Motivational interviewing [381, 389, 396]
		Delivering health messages and services [372, 392]
		Personal outcomes approaches [396]
		n (%)
	Yes	15 (54)
	No‡	11 (39)
	Unclear	2 (7)
		n (%)
	Clinical settings	7 (25)
	Community and voluntary sector	4 (14)
	PA sector	2 (7)
	All of the above settings	5 (18)
	Research settings	1 (4)
	NR	9 (32)
<i>Additional training†</i>		
<i>Pre-existing service</i>		
<i>Location of the intermediary</i>		

*This table includes data from n=28 individual studies. †Additional training undertaken by intermediaries was not reported in over half of included studies (n=15, 54%). ‡i.e., the role was created for the study. Abbreviations: NR — not reported, PA — physical activity. Table reproduced from [377].

Table 2-5: Processes of referral to the intermediary

Nature of referral (n=28 studies)	n	%	Method of referral (frequency count)	
Referrals direct to intermediary	6	21%	Form	2
Assessed as eligible by HCP	5	18%	Fax/email	2
Assessed as eligible by study team	5	18%	Online	2
Participants responded to study invitation	4	14%	NR	22
Other*	4	14%		
NR	4	14%		
		<u>100%</u>		
Source of referral (n=28 studies)				
Primary care practice staff†			7	25%
GP			7	25%
Study team/research cohort			5	18%
Mixed‡			4	14%
Self-referral only			3	11%
<i>Self-referral (reported along with other sources of referral)§</i>			4	
NR			2	7%
				<u>100%</u>
Reason for referral (n=28 studies)				
As part of study intervention			15	54%
Lifestyle factors/health and wellbeing			4	14%
Non-medical needs/psychosocial symptoms			3	11%
Interested in becoming more physically active			2	7%
Interested in green health/gardening			2	7%
NR			2	7%
				<u>100%</u>

One study did not report on any processes of referral, as this was a qualitative study which aimed to explore the opinions and viewpoints amongst GPs regarding the advantages and disadvantages of applying social prescribing to promote PA [166]. *Examples of other referrals include “sporadic, structured, regular” [215], “drop-ins, targeted groups (clinical and non-clinical)” [393], “passive/active signposting or formal referral” [71], “green health referral, physical activity referral, green prescription” [387]. †Primary care practice staff includes GPs, nursing, HCPs, and office/reception staff. ‡Other sources of referrals reported when sources were mixed included “welfare sector, schools and representatives of municipalities” [215], “hospital health centres” [378], “voluntary sector, housing providers, and locality navigators” [395], “charities and local authorities” [393]. §i.e., the intermediary service accepted self-referrals alongside referrals from referring agents. Abbreviations: GP — general practitioner, HCP — healthcare professional, NR — not reported, PA — physical activity. Table reproduced from [377].

Processes of assessment are summarised graphically in Figure 2-2. Assessment processes included research study-specific components, assessment in relation to local PA (e.g., collecting information in relation to current PA behaviour, planning how and where to be physically active, explaining/suggesting local PA groups and services), behaviour change-related assessment techniques, and assessment of individual factors. Assessments most commonly took place in-person and where reported were lengthy in nature. Three studies reported that assessments were up to 60 minutes long [308, 378, 385], and length of assessment was not reported by any other studies. The most commonly reported features of assessment were assessing participant issues, needs, preferences and interests, explaining/suggesting a local PA group/service, and individual goal setting (reported by n=5 (18%), n=4 (14%), and n=4 (14%) studies respectively).

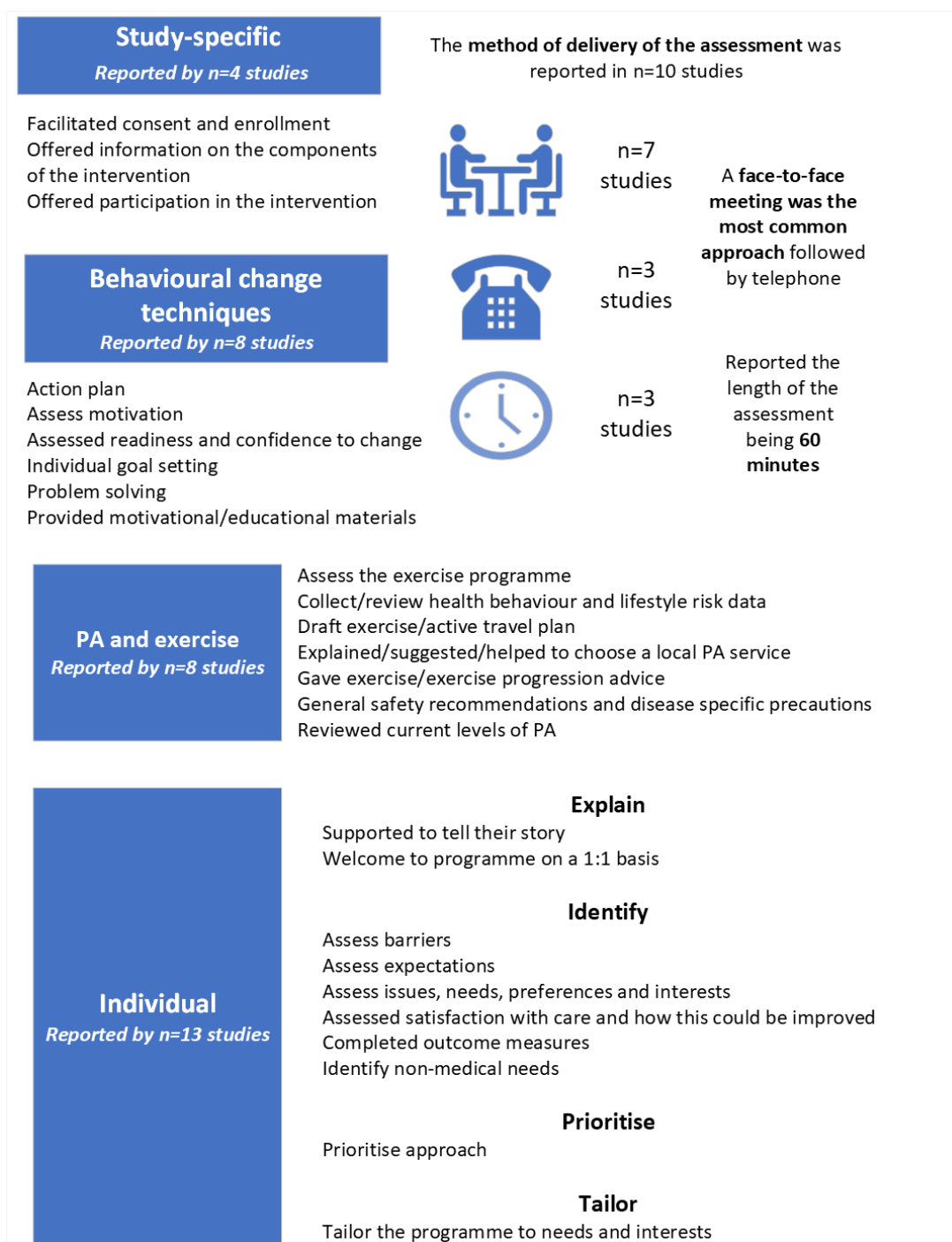


Figure 2-2: Processes of assessment by an intermediary

This figure shows the various processes of assessment used by an intermediary during the initial meeting/consultation with the referred individual. Individual factors are further categorised by explaining, identifying, prioritising, and tailoring. Many studies reported more than one assessment process; therefore, each process is reported as a frequency count. The process of assessment was either not described or was carried out by the research team in n=9 studies (32%) [71, 166, 215, 379, 383, 387, 388, 391, 394]. Abbreviations: PA — physical activity. Figure reproduced from [377].

Features of follow-up are summarised in Table 2-6. Data regarding the number and frequency of sessions with the intermediary, time allocated per session, method of delivery, length of follow-up, and discharge processes were often poorly reported. These data were missing from n=12 (43%), 14 (50%), 24 (86%), 16 (57%), 11 (39%), and 20 (71%) included studies, respectively. The most common approach was a number of sessions (ranging from two to 21) conducted weekly or fortnightly, with contact being more frequent and intense at the start (e.g., [257, 389]). These sessions were conducted over telephone, face-to-face meetings, email, and/or text message, most commonly within a six-month period (n=10, 36%). The sessions ranged from 10 – 60 minutes in length, reported by n=4 (14%) studies. Strategies used by intermediaries to facilitate uptake of local PA during follow-up sessions are summarised graphically in Figure 2-3. Strategies were categorised as health and exercise-specific strategies, behavioural strategies/underpinning theory, individual strategies, the personal skills of the intermediary, and community-specific strategies. The most commonly reported strategies were person-centred/individualised approaches, providing initial/ongoing support, and motivational interviewing (reported by n=15 (54%), n=13 (46%), and n=11 (39%) studies respectively).

The characteristics of local PA groups and services are summarised in Table 2-7. These services were most commonly identified by staying up to date with pre-existing community resources (n=7, 28%). Participants were most commonly connected to exercise and fitness classes (n=14 studies, (50%)) or walking, jogging, and running groups (n=13 studies, (46%)). Local PA groups/services were mostly located in community settings and centres (n=14 studies, (50%)). Duration of individual engagement with the local PA service was poorly reported (not reported in n=19 studies, 68%). Where studies did report this information, it was reported by time spent engaging with the service [308, 372, 374, 375, 378, 393], number of sessions attended [248], or that the service was available on an ongoing basis [257, 395]. Participants were discharged from the intermediary service usually after a pre-determined length of time, or after attending a number of sessions. Discharge processes were rarely described, although some studies did indicate that feedback was sent to the individual's doctor or the original referrer [374, 380, 392, 395].

Table 2-6: Processes and features of follow-up by the intermediary

Number of sessions		Time per session	
NR	12	NR	24
Reported	16	Reported	4
Range	2 – 21	Range	10 – 60 mins
Mode	4	Mode	15 mins
Frequency of sessions		<i>n</i>	%
NR		14	50%
At one week and one or more further session(s)		4	14%
Decreased over time		4	14%
Depending on service user		2	7%
Every three months		1	4%
Monthly		1	4%
Quarterly		1	4%
Weekly		1	4%
		28	100%
Method of delivery			
NR		16	57%
Telephone		6	21%
Face-to-face, telephone, email, and/or text message		2	7%
Face-to-face		2	7%
Email or telephone		1	4%
Other		1	4%
		28	100%
Length of follow-up			
NR		11	39%
≤6/12		10	25%
>6/12		7	25%
		28	100%
Discharge processes			
NR		20	71%
After attending a number of sessions		4	14%
After a pre-determined length of time		2	7%
Depending on service user or unlimited		2	7%
		28	100%

The processes of follow-up were not reported in n=6 studies (21%) [71, 166, 215, 372, 387, 393].

Abbreviations: NR — not reported. Table reproduced from [377].

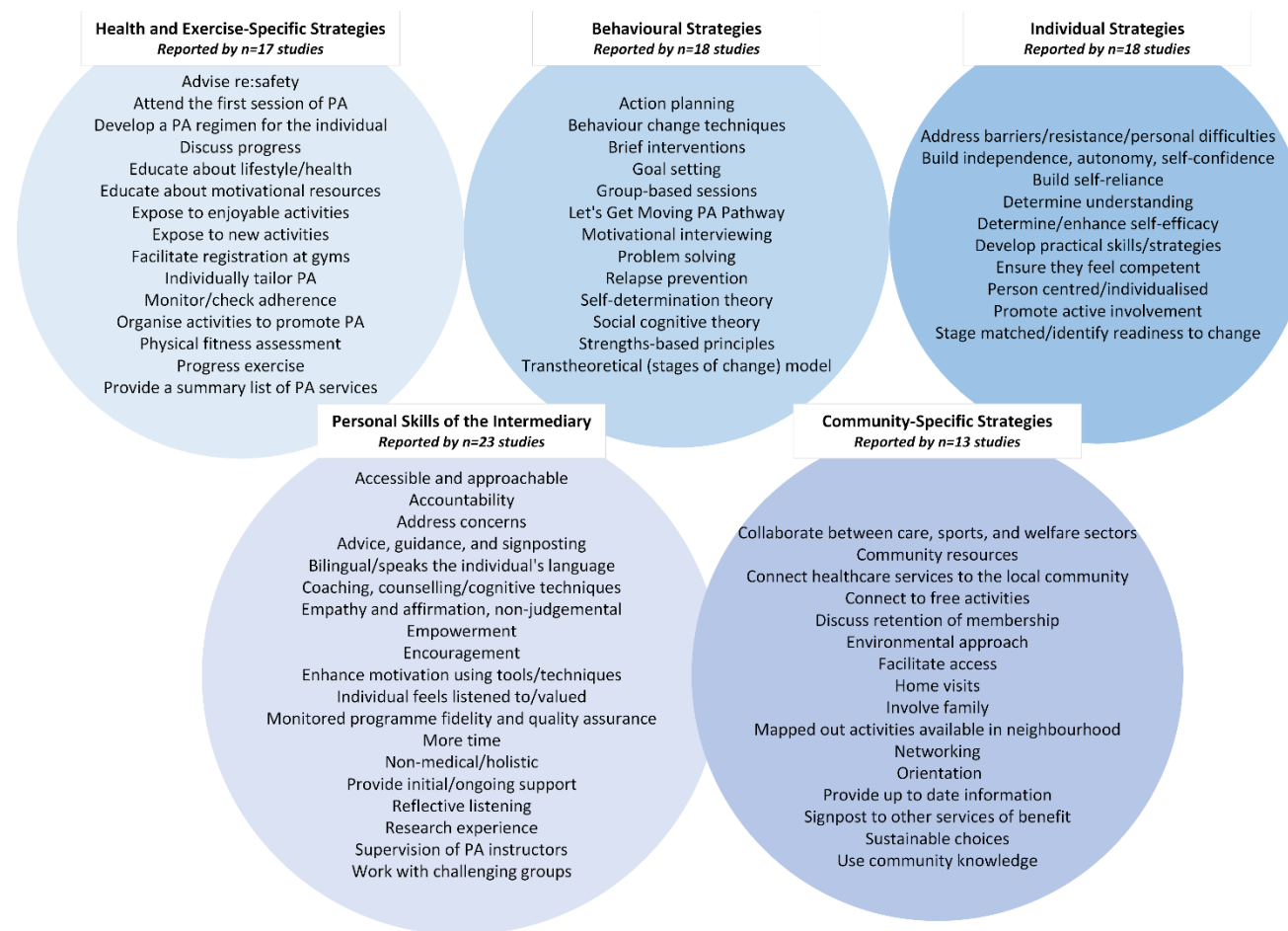


Figure 2-3: Strategies used by the intermediaries to facilitate uptake of local PA

Many studies reported more than one strategy category; therefore, each category is reported as a frequency count. Strategies and skills were not reported in n=3 (11%) studies [71, 387, 393]. Abbreviations: PA — physical activity. Figure reproduced from [377].

Table 2-7: Summary of local PA groups and services and PA outcomes

Most commonly reported local PA groups and services (n=28)				
		<i>n</i> *		
	Exercise and fitness classes	14		
	Walking, jogging, and running	13		
	Self-directed (including provision of equipment, e.g., pedometers)	12		
	Lifestyle programmes	8		
	Gardening and outdoor activities	7		
	Other	26		
Outcomes related to PA (n=17)[†]				
<i>Methods</i>	<i>Outcome</i>		<i>Short term</i> [‡]	<i>Long-term</i> [‡]
	Active travel [308]		-	-
	Change in behaviour change stage [385]		NR	+
	Decrease in sedentary behaviour [391]		+	NR
<i>Quantitative (n=14)</i>	Increased attendance and participation in local PA [373, 375, 378, 381, 382, 384, 385]		+	+
<i>Mixed/Other methods (n=1)</i>	Increased energy and caloric expenditure [248, 308, 386, 391]		+	+
<i>Not reported (n=1)</i>	Increase in steps per day [308, 378]		+	+/-
	Increased PA [308, 373, 379, 380, 383, 391, 394]		+	+/-
	Increased physical fitness [370]		+	NR
	Meeting PA guidelines [308, 370, 385]		+	-
	Positive PA experience [378]		NR	+
<i>Qualitative (n=1)</i>	Increased attendance and participation in local PA [257]			+\$

*Represents a frequency count. [†]The remainder of the studies were omitted as they were i) qualitative studies that did not report on outcomes of a PA intervention [71, 166, 215, 260, 387, 393] or ii) due to the lack of PA outcome measures [388, 389, 392, 395, 396]. [‡]An overall findings effect indicator approach was used for each reported result: i) positive (+), ii) negative (-), or iii) mixed (+/-). \$Length of follow-up not reported. Abbreviations: NR — not reported, PA — physical activity. Table reproduced from [377].

2.3.4 Objective (iv): To identify the available literature describing and defining outcomes of intermediaries connecting community-dwelling adults to local PA, and map outcomes to processes

Seventeen studies (61%) included outcomes related to PA, which are summarised briefly in Table 2-7. PA was measured subjectively e.g., questionnaires, and objectively e.g., accelerometry. Authors also examined PA experience and self-efficacy, participation/attendance, social support for exercise, sedentary behaviour, and physical fitness. There was a comparison group in n=11 (39%) studies; comparison in-waiting (n=5, 18%), usual care (n=3, 11%), education materials (n=1), matched cohort (n=1), or minimal intervention (n=1). Participants were followed up in the short-term (minimum six weeks) and long-term (maximum one year). The modal length of follow-up was one year. All studies reported some degree of positive outcome when assessing a variety of PA parameters and outcomes. To summarise the findings of this scoping review, the logic model of the processes of referral, assessment, follow-up, and outcomes in relation to PA is presented in Figure 2-4.

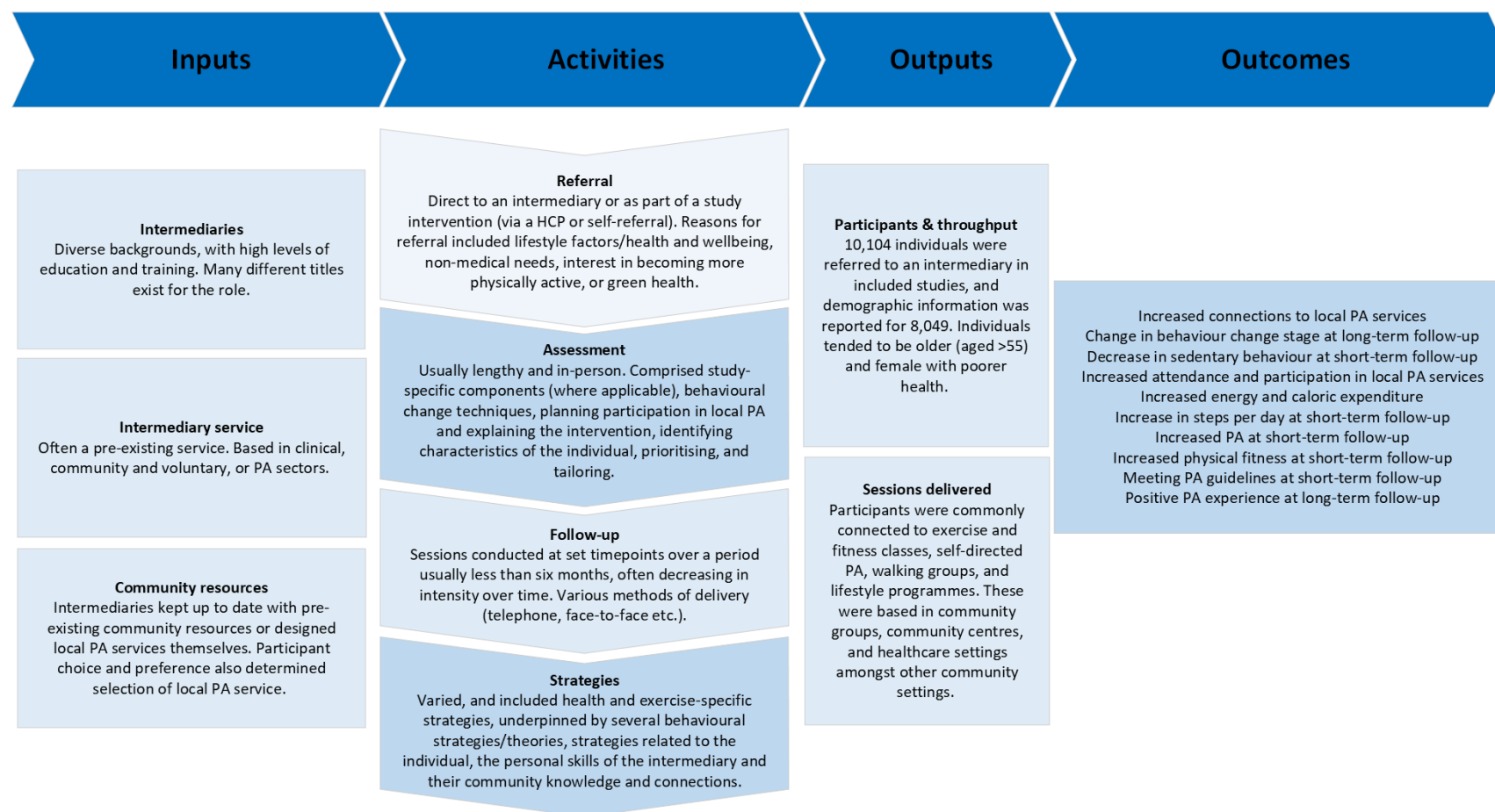


Figure 2-4: Logic model of the processes of referral, intermediary service delivery (assessment, follow-up, strategies, and discharge) and outcomes in relation to PA

This logic model has been developed by summarising the included studies. Abbreviations: HCP — healthcare professional, PA — physical activity. Figure reproduced from [377].

2.4 Discussion

The purpose of this scoping review was to gain a greater understanding of the role of intermediaries in connecting community-dwelling adults to local PA, to describe the core elements and common components of this process, and to map the available evidence to outcomes. The PAGER framework was used to identify patterns, advances, gaps, evidence for practice, and research recommendations from the results of the review. The PAGER framework is also recommended as a method of analysing and reporting scoping review findings [368]. As such, the framework was used to structure this Discussion section and interpret the findings of the review. The PAGER framework is shown in Table 2-8.

Included studies were mainly conducted in the UK and USA, involving a variety of methodologies. Research on social prescribing and other linking schemes involving intermediaries tends to be UK-centric, as this reflects their current policy and clinical pathways [298, 398]. It has been reported that social prescribing and linking schemes in the USA focus largely on connecting individuals to resources for basic needs such as food banks, housing, and legal needs [167], but this review indicates these schemes may also have a role in improving PA. Additionally, only one identified study was conducted in Ireland, which was a pragmatic controlled trial of a 12-week gender-sensitised PA programme for men delivered by local sports partnerships (LSP), with LSP co-ordinators acting as intermediaries [372]. Literature from low- and middle-income countries was underrepresented, with only one included study conducted in Brazil [383]. It is unclear whether this indicates that intermediary services in these countries are under-reported, intermediaries do not connect service users to local PA, or the service simply does not exist due to limited community and voluntary resources [159, 399]. Study designs tended to be less robust, with only five RCTs included, and almost half of the included reports identified from the grey literature. This likely reflects the difficulty of measuring and evaluating complex interventions, such as connecting individuals to local PA via intermediaries, when numerous individual, interpersonal, and organisational factors can affect outcomes [400, 401]. The novelty of the intermediary role within the context of

local PA, as identified in the literature review (See Section 1.6.2), meant that the lack of high-quality evidence may be an unsurprising finding.

Over 10,000 individuals were included in the studies and tended to be older and female. Many of these individuals were at risk of, or had, complex health needs. People with chronic diseases or poorer lifestyle would stand to benefit the most from increasing PA as both a primary and secondary prevention method, but some studies emphasise the need for more support to maintain this behaviour change [78, 180]. More detailed demographic information was often under-reported or contained large variability in reporting methods. Socioeconomic factors account for over half of the determinants of health and wellbeing [159]. People with a lower SES or living in deprived areas can have weaker social infrastructure [398], and therefore may need more motivation and support to enable behaviour change [78, 402]. Similarly, level of education and marital status have both been shown to affect PA levels [403-405]. Because of these missing data, it was difficult to determine how these demographic factors affected or influenced the process, or whether processes were different for those with complex biopsychosocial health needs compared to healthy individuals. This adds another level of complexity to an already complex intervention, due to the number of potential service user groups targeted and the level of flexibility that may be needed when delivering the intervention [317]. This review provides evidence that people who may need more support to become more physically active are being referred to intermediaries, but the optimum processes and strategies to connect people with more complex health and psychosocial needs remain unclear.

This review also identified and summarised some of the professional characteristics of intermediaries themselves. While these characteristics were under-reported in some studies, this review shows that the intermediary is a professional role, with links to communities, who has undertaken significant education and training prior to accepting referrals. This may reassure HCPs and individuals self-referring to these services, as a lack of understanding of the role [273, 275] and scepticism about patients effectively attending activities in the community and voluntary sector [273] have been previously identified as barriers to referral in reviews of social prescribing. This review also

identified the strategies used to connect individuals to local PA during follow-up. While this review did not specifically examine the effectiveness of these strategies, the support given by the intermediary during assessment and follow-up meetings appears to provide the increased support needed to elicit behaviour change. Intermediaries provided ongoing person-centred and motivational support and appear to provide a tangible benefit by acting as an organiser, health promoter, motivator, educator, and counsellor. This finding is discussed in further detail in the overall discussion chapter of this thesis (See Section 5.2.1.4). However, the processes and specific characteristics of the follow-up period were poorly described, and again the optimum processes and strategies needed to achieve positive outcomes in relation to PA remain unclear. Similarly, whether the background of an intermediary (e.g., in PA), impacts on referral patterns and outcomes warrants further exploration.

The processes of referral, assessment, and discharge were varied, and often poorly reported in included studies. Only eight studies could be considered “real-world” trials, i.e., examining routine delivery of a health intervention [397], based in pre-existing intermediary services [215, 248, 372, 380, 392, 393, 395, 396]. In the remaining studies, the intermediary role was implemented as part of research trial. Therefore, referral processes were often the methods of recruitment for the study rather than real-world processes of referral. Assessments were carried out by the research team and follow-up/discharge was pre-determined by the trial length. The results of this review therefore may not accurately reflect real-world processes of intermediaries, which warrants further exploration. Despite self-referrals being common, the reasons and motivations for self-referrals were not explored. This is important to explore in future studies, as it is likely that strategies used to support individuals that are more motivated will differ compared to those less motivated to engage in PA. Previous research has shown that individuals who self-refer for other health-related interventions are more motivated to engage [406, 407].

Community-based exercise and fitness classes, walking, jogging, and running groups and self-directed PA were the most commonly used local PA group and services. Often intermediaries offered a ‘menu’ of both indoor and outdoor local PA for individuals to

choose from, reflecting the person-centred, individualised approach highlighted in many of the included studies. Engaging in local PA reduces barriers to participation (such as availability and transport) and may be less stigmatising than exercise delivered in healthcare settings [71, 77, 78, 99, 260, 338, 354]. Addressing these barriers and facilitating connections to local PA may have accounted for the positive PA outcomes observed in this review. However, how the services were identified, and their duration, was poorly described. While not an objective of the review, it was observed that no information was available in the included studies as regards evaluation or quality assurance of the local PA groups. As discharge processes were poorly described, it is unclear whether engagement with local PA was maintained after attending an intermediary, or the reasons for disengaging. All of these may impact on the individual's long-term engagement in PA. This review also found that referrals to improve/increase PA specifically were uncommon, with the most common referral reason being as part of the study intervention, again reflecting the lack of real-world trials. The role of intermediaries in PA may be less understood by HCPs, or they could be simply unaware of the service. Increased training and education for HCPs may lead to increased buy-in and increased referrals for PA. This finding is discussed in further detail in the overall discussion chapter of this thesis.

Using an overall findings effect indicator approach, all studies that reported PA outcomes (n=17) reported some degree of positive outcome, particularly when measured in the short-term (up to 12 weeks). Previous scoping reviews of intermediaries connecting individuals to local PA also found positive outcomes when examining the percentage of individuals connected with, enrolling in, and attending a PA opportunity [153] and self-reported PA levels [78]. However, caution is advised when interpreting the results of this review. While the overall findings effect indicator approach was deemed appropriate to address the review objective to describe, define, and map outcomes to processes, these results do not necessarily mean statistical significance in meta-analysis or at the level of each individual study. Baseline PA levels were poorly reported, making comparisons pre- and post-intervention difficult. There was significant heterogeneity in outcome measures used, and studies tended to rely on self-reported measures. One RCT [378] and one pilot/feasibility trial [308] used objective

measures (accelerometry), but evidence was mixed at 12 months post-intervention. Longer-term outcomes in all studies were mixed in relation to PA. While n=11/17 studies had a control group only five included studies were RCTs, and the remaining studies used less robust designs risking bias, and quality of evidence was not rated. Finally, while this review examined outcomes in relation to the processes, it was not intended to examine effectiveness of the intervention. More research is needed using robust methodologies and suitable objective measures of PA, to allow more feasible comparison across studies. A better understanding of processes used by intermediaries when connecting individuals to local PA improves operationalisation of intermediary interventions, thus further improving evaluation efforts. This could also potentially improve awareness of the service and subsequent referrals from HCPs [60, 74, 223, 408, 409].

2.4.1 Strengths

The strengths of this review include a published protocol [347] and following guidelines by international experts [356]. The extensive grey literature search was also a strength considering the high volume of literature identified and included in the review from these searches. The detailed reporting of all information sources in the search, and the search strategies used, increase the replicability of the review methods and may inform future reviews on this topic [361]. To the best of our knowledge, this review is the first to describe how interventions are delivered by intermediaries in international settings when connecting to local PA, and to describe these processes in relation to outcomes. As there is limited evidence to guide implementation for intermediary roles [180], this review is timely and may provide guidance on what components of intermediary interventions should be evaluated or reported in future studies (e.g., processes of referral, assessment, follow-up, and discharge, the community resources used, and the outcomes in relation to PA).

2.4.1.1 Impact of knowledge user engagement

An additional strength was the inclusion of knowledge users to improve the development, design, relevance, and dissemination of the research. The panel advised the use of more visual representations of the data, and the use of a logic model. They also advised on ways to make the tables clearer to the reader, and additional outcomes

to report in the narrative summary to improve the logic and flow. The evidence gaps were also discussed, and suggestions were made by the panel as regards research priorities going forward. As such, knowledge users were involved from conceptualisation to dissemination in line with best practice [326], both influencing and contributing to the results of this review [326, 410, 411].

2.4.2 Limitations

This review has some limitations. Firstly, the search strategy identified over 10,000 articles, many of which were excluded at the title and abstract screening stage. This raises the possibility that the search strategy could have been refined further. However, the aim of this scoping review was to identify and describe all available international literature, therefore casting a wide net was deemed appropriate. The search terms were developed after literature review, in conjunction with a medical librarian and after consultation with knowledge users and aimed to include the wide variety of terms and titles to describe the intermediary role. Secondly, the inclusion of 'primary care' as a search term may have biased the results to studies only involving intermediaries based in primary care or receiving referrals from primary care. The search strategy therefore may not have identified studies where intermediaries were based in other settings such as acute care and health promotion. It was assumed that this would be a common source of referral due to the well-established links between intermediary services and primary care, particularly in relation to social prescribing. For example, the UK model of social prescribing delivery has embedded a social prescribing link worker model in primary care [169, 170] and the HSE Social Prescribing Framework also recommends that link workers have a physical presence in a local GP or primary care practice one to two days a week [183]. However, without this parameter the results from searches would have been unmanageable. It was also deemed appropriate given the focus of this research project on how to improve connections from healthcare settings to local PA. Additionally, the inclusion criteria chosen in relation to population were kept deliberately broad to ensure all studies, not just those involving primary care patients, were captured. Thirdly, following JBI guidance, quality of the evidence was not rated, therefore applications of this research for policy or practice cannot be definitively stated. Nevertheless, this review has identified potential areas for future research,

practice, and policy which are detailed in Table 2-8. Finally, an inherent limitation of the scoping review methodology means that no conclusions regarding causation or correlation of the work of an intermediary and PA outcomes can be made, or the optimum processes in relation to the outcomes examined.

2.4.3 Conclusions

This scoping review has described the key processes of intermediary interventions, and a number of evidence patterns and gaps were identified (Table 2-8). It remains unclear which individuals are most likely to benefit from working with an intermediary, but it appears people who need more support to become physically active are being connected to local PA with positive effects on PA outcomes. The optimum level of support in relation to referral, assessment, follow-up, and onward connection to local PA is also unclear. Further exploration of the positive effects on PA outcomes in both the short- and long-term are warranted. Further studies are also needed using real-world settings, optimum processes tailored to different types of contexts and groups of individuals, and more robust methodologies. Future studies could then help to inform training and education programmes to promote the role of intermediaries to HCPs and develop clinical pathways.

Table 2-8: PAGER framework

Pattern	Advances	Gaps	Evidence	Research Recommendations
Over 10,000 participants from the UK, USA, Canada, the Netherlands, Ireland, Spain, Denmark, Australia, and Brazil were reported in included studies.	• A large number of people are already accessing the services of an intermediary or accessed them through intervention studies. • The majority of included studies were carried out in the UK. • This review builds on the findings of the reviews by Cunningham and colleagues (2021) [153] and Polley and Sabey (2022) [78] by including the international literature.	• All bar one of the included studies were carried out in high-income countries. • It is unclear whether data are therefore missing for low- and middle-income countries, or these services do not exist.	There is growing evidence from research trials and real-world settings that people are being referred to an intermediary in high income countries.	More evaluations are needed in low- and middle-income countries to determine if the services of an intermediary are being utilised, or if these services exist.
Intermediaries work with a diverse range of people, most with chronic health conditions or at risk for chronic health conditions. Participants tend to be	• This review demonstrates that intermediaries work with people with a diverse mix of mental and physical health conditions and co-morbidities, ages,	• More detailed demographic information was often missing e.g., marital status, level of education, and PA level at baseline, all	There is growing evidence that intermediaries can connect people with complex health needs to local PA and improve their PA levels. This	The results of this review could inform future training and education programmes for HCPs regarding the role of intermediaries in connecting people to local PA. A pathway could be

older (aged >55 years) and female.	genders, SES, and ethnicities. • People at risk of chronic disease e.g., diabetes or cardiovascular disease were also referred to an intermediary.	of which may impact on engagement in PA. • The processes of connecting people at risk of or with more complex health needs, compared to people with less complex health needs, to appropriate PA were not clear.	review adds to the evidence base that referral to an intermediary may be a promising method of connection to local PA, that could be used by HCPs.	developed if this method was found to be successful for people at risk of or with complex health needs.
Intermediaries often have backgrounds in healthcare or sports/fitness, and they were reported to receive substantial amounts of training as part of their role or in preparation for the study.	• This review described the professional backgrounds and qualifications of intermediaries.	• Qualifications, background, and training were under-reported in studies.	The professional background and training requirements of an intermediary warrant further investigation.	Qualitative or quantitative investigations of the profile of intermediaries, and whether this impacts on referral patterns/outcomes.
Intermediaries were most commonly based in the clinical setting (such as primary care), followed by community and	• Intermediaries are ideally located in primary care and community settings to maximise their reach	• Location of the intermediaries was not reported in over a third of studies.	Knowing where intermediaries are based, and identifying all possible locations, could help to inform targeted	Qualitative or quantitative investigations could use the results of this review to assist in targeted recruitment strategies. It

voluntary sector, and PA settings.	and connections with community networks.		recruitment strategies in future studies.	could also be used to determine if setting influences processes and/or outcomes of an intermediary.
Intermediaries use a variety of strategies to facilitate connections to PA.	- Strategies can be broadly categorised as health and exercise-specific (e.g., attending the first session of a PA group), behavioural strategies, related to the individual (e.g., person-centred/individualised approach), skills of the intermediary (e.g., providing initial and ongoing support), and community-specific (e.g., providing up to date information). - Some studies also reported on a theoretical background, with the most common being the transtheoretical model.	- These strategies have not been examined to date to compare effectiveness. - Due to the methodological restrictions of a scoping review, no conclusions could be made regarding which of these strategies are more or less effective.	It is important to understand what processes and strategies lead to improvements in PA.	Longitudinal follow-up of cohorts referred to an intermediary and connected to local PA could be carried out, exploring the impact of the intervention by an intermediary. In addition, RCTs and concurrent process evaluations could also determine which strategies best support connections to PA.

The most common source of referral was primary care, followed by self-referral.	• Primary care professionals are the most common source of referral to an intermediary. • Self-referral is also common, in line with other reviews of SP and other intermediaries.	• Many of these studies were controlled interventions, therefore real-world numbers are not clear. • Similarly, research recruitment methods rather than referral processes were described in the majority of studies. • The reasons for self-referrals were poorly described.	Evidence is mostly gathered from controlled research trials. The real-world source of referral may not reflect the findings of this review and warrants further investigation.	Real-world sources of referral should be explored. An exploration to determine if those self-referring have different characteristics (increased motivation, less complex health needs etc.) to those referred from primary care (who may need more support to be physically active, have more complex health needs), and if outcomes differ, could also be warranted.
Participants were most often referred as part of the study intervention, to improve their health and wellbeing generally, or for non-medical/psychosocial needs and symptoms.	• The role of an intermediary in improving health and wellbeing is recognised. • However, their role in PA may not be as recognised, as people were not often referred for PA specifically.	• The role of an intermediary in connecting persons to PA may be less understood, or not promoted to referrers.	HCPs and intermediaries themselves may benefit from ongoing and bespoke training or education about the role of an intermediary in connecting people to local PA.	The results of this review could inform future training and education programmes for HCPs and intermediaries regarding the role of intermediaries in connecting people to local PA. In addition, an exploration of whether increased training of HCPs leads to increased

				number of referrals and improved PA outcomes could be carried out. An exploration to determine if those referred specifically for PA compared to those referred for general health reasons, and if outcomes differ, could also be warranted.
The processes of assessment by an intermediary focus on the individual primarily but can also include assessment of PA levels and PA preferences, as well as behavioural change and study-specific assessment techniques.	• This review demonstrates that an assessment involves study-specific components, behavioural change techniques, local PA-related assessment, and assessment of individual factors (explaining, identifying, prioritising, and tailoring). • Assessments took place face-to-face or over telephone.	• The processes of assessment were not described in almost a third of included studies. • Some studies reported that the assessments were carried out by the research team in relation to the study outcomes. • Many of these studies were controlled interventions, therefore real-world	While there is growing evidence regarding the processes of assessment, these may not reflect real-world processes due to the nature of the study designs.	Real-world processes of assessment should be explored. There is also a need to establish recommendations about which measures of PA are best for this process and would allow comparison across studies.

		processes may be different.		
The processes of follow-up (number of sessions, frequency, time, method of delivery, length of follow-up) were variable, and often not reported.	• This review described the process of follow-up by intermediaries. • Most commonly people were offered four sessions with an intermediary, with more frequent sessions at the start which decreased over time. • Sessions were up to 60 minutes and most commonly took place over telephone. • The intermediary had many different roles during follow-up; that of an organiser, health promoter, motivator, educator, counsellor, and a link between the person and the referrers using the strategies identified in Figure 2-3.	• The processes of follow-up were poorly described; over 40% of studies were missing data regarding number of sessions, 50% of studies were missing data regarding frequency of sessions, over 80% of studies were missing data regarding length of sessions, over 50% of studies were missing data regarding method of delivery, and over 35% of studies did not describe the length of follow-up. • Due to methodological limitations of a	It is important that intermediaries know the ideal length of follow-up and amount of support required to facilitate connections to local PA, and whether this differs depending on the person's individual needs and preferences.	Real-world processes of follow-up should be explored. Pilot studies could help to determine the ideal number of sessions, duration of intervention, and method of delivery to facilitate successful connections to PA before further RCTs are carried out. In addition, pilot studies could measure retention and drop-out rates. Strategies used by intermediaries to promote engagement and changes to PA levels specifically, and which of these are most effective, could also be explored.

	Follow-up length was most commonly less than six months.	scoping review, and as these outcomes were not examined in the included studies, it was unclear the minimum/optimum number of sessions, frequency, time, method of delivery, length of follow-up and content to achieve positive outcomes in relation to PA. The role of an intermediary is likely to be more multifaceted than only providing a link to community activities, and their role as a motivator or health promoter/educator warrants further investigation.		

Processes of discharge from an intermediary were poorly described.	- Over 70% of studies did not report when the person was discharged from the intermediary service. - Time of discharge, similar to length of follow-up, was variable and could take place after attending a set number of sessions, after a pre-determined length of time, to unlimited sessions with an intermediary. - The processes of discharge were very poorly described; some studies indicated that feedback was sent to the original referrer in line with other reviews of SP and other intermediaries.	- Where discharge was described, it relates to the completion of a study rather than real-world settings. - It is unclear whether participants continued participating in PA after engaging with an intermediary.	The process of discharge requires further exploration.	Real-world processes of discharge should be explored, as well as real-world duration of the intervention. A qualitative or quantitative exploration of what happens after the individual is connected, and whether they continue to engage in PA, could also be carried out.
A wide variety and choice of local PA were utilised and offered by intermediaries.	This review described the identification and details of local PA groups/services used by intermediaries.	The processes of how these resources were identified was unclear in several studies (over 30%),	It is important that intermediaries and HCPs know how local PA groups/services are identified to ensure	A qualitative or quantitative exploration of processes of identification/evaluation of local PA groups/services with intermediaries and local PA

	• Community-based exercise and fitness classes, walking, jogging, and running groups and self-directed PA were the most commonly used resources. • Lifestyle programmes and gardening/outdoor activities were also common. • These were most commonly provided by local community sites, healthcare settings, and community and voluntary sector organisations.	or simply reported that they were identified by staying up to date with pre-existing community resources (25%). • There were no reports on evaluation or quality assurance of local PA groups/services. • The duration of programmes, as well as the sustainability and ability to engage in these groups long-term, was also poorly described. • The wide variety and variation in local PA groups/services utilised by intermediaries will need to be considered in any future trials.	quality and sustainability. It is also important to know what interventions and/or programmes community PA partners provide.	partners could be carried out. A qualitative or quantitative exploration of what happens when the individual is connected from the perspective of the organisation delivering the activity to which the person is referred could also be carried out.

PA outcomes were most commonly assessed using self-report (including questionnaires), accelerometry, or programme attendance.	- PA was measured in some studies using validated subjective and objective measures of PA, such as questionnaires and accelerometry. - Measurement of PA was variable in included studies.	- PA outcomes were only reported in n=17 included trials. Only n=5 of these trials reported baseline PA levels. - The optimum method for measuring PA levels after engaging with an intermediary is unclear. - Baseline PA data were often not reported making it difficult to make comparisons.	The outcomes in relation to the processes need to be explored further.	A quantitative exploration of the processes of an intermediary, and outcomes in relation to engagement in local PA, using appropriate outcome measures could be carried out. Identifying an appropriate PA outcome measure for use by intermediaries, given the range of people they see, and the range of different PA services accessed, would be an important precursor to this.
Outcomes appeared to be positive in relation to PA when measured in the short-term.	This review found evidence of increased connections to and participation in local PA, a decrease in sedentary behaviour (at short-term follow-up) increased energy and caloric expenditure, increased PA and physical fitness (at	- Caution is advised when interpreting these results, as this scoping review was not designed to examine effectiveness of the intervention. - Due to the methodological	The emergent positive trends in PA outcomes warrant further investigation, considering the optimum methods of measuring PA levels pre- and post-engaging with an intermediary. Whether long-term engagement in	A quantitative exploration of connections to local PA via an intermediary using robust methodologies, examining outcomes in relation to PA could be carried out. This would add to the emerging evidence regarding PA outcomes.

	short-term follow-up), increased number of participants meeting the PA guidelines (at short-term follow-up), and positive PA experience (at long-term follow-up). • This review supports existing evidence that PA outcomes are successful when connection to local PA is via an intermediary, and adds international evidence identified using a rigorous scoping review process. • This review has mapped the processes of referral, assessment, and follow-up of an intermediary when establishing connections to local PA.	limitations of a scoping review, we cannot determine causality, and the quality of evidence was not rated. • Similarly, study designs at high risk of bias were included in this review. • Evidence regarding long-term effects of the intervention were less clear, with mixed results on PA and fitness levels, steps per day, decrease in sedentary behaviour, and meeting the PA guidelines.	PA is maintained after discharge from intermediary could also be explored, as well as the reasons for disengaging.	

Based on the results of the scoping review. Abbreviations: HCP — healthcare professional, PA — physical activity, SES — socioeconomic status, SP — social prescribing link workers.

2.5 Summary of main findings from the scoping review

Scoping Review

Described the **core elements of intermediary interventions** i.e., referral, assessment, follow-up, and onward connection to a variety of local PAs but with **significant amounts of missing information**.

All core elements **were heterogenous**, highlighting the flexibility of the intervention but also the challenges in synthesising evidence.

Few referrals to intermediaries specifically to increase PA levels and **large amounts of missing demographic information** for study samples, even for characteristics which could impact on PA levels and participation.

All studies reported **some degree of positive outcome in relation to PA**, but quality of evidence was not rated and no risk of bias assessment was conducted.

Chapter 3 The processes of intermediaries when connecting community-dwelling adults to local physical activity — a qualitative descriptive study

This study is published in PLOS One.

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3.1 Introduction

The scoping review carried out as part of this research project [377] (Chapter 2) identified international evidence describing core elements and common components of processes used by intermediaries when connecting community-dwelling adults to local PA. Many different types of intermediaries were identified in the scoping review, including coaches, link workers, navigators, and co-ordinators. They received referrals most commonly from primary care staff or through self-referral. Individuals referred tended to be older, female, and living with poorer health. The intermediary met with the individual to perform a lengthy assessment, assessing their needs and interests, explaining/suggesting local PA opportunities, and setting goals. They worked with the individual over a period of up to six months, providing a person-centred approach and ongoing motivational support to connect to local PA groups such as fitness classes or walking groups. These are complex interventions, consisting of pathways and links between referring agents, intermediaries, service users, and local PA opportunities, all of which are informed by the local context and the health needs of service users [74, 222, 289, 317].

Therefore, it is perhaps unsurprising that the scoping review identified significant gaps and heterogeneity in the descriptions of the processes undertaken by intermediaries when facilitating connections to local PA. This limits synthesis of evidence, and conclusions regarding potential effectiveness and efficacy of the various approaches. For example, the professional background and expertise of the intermediary was reported

in only half of included studies. Professional background of the intermediary, their level of experience with PA, and where they work from could all potentially impact on referral patterns, prioritisation of PA in relation to wellbeing, and PA outcomes [412]. In addition, more detailed demographic information in relation to study participants was often heterogeneously reported or missing; for example, ethnicity, marital status, education levels, and SES, all of which can impact on engagement in PA [27, 402-405].

Many included studies did not report on 'real-world' intermediary services and evaluations, and instead described research evaluations, or a service that was designed and implemented specifically for a research trial. Therefore, information regarding referral, assessment, and follow-up processes may not reflect current practice. Only two studies reported that participants were referred specifically to improve PA levels [215, 372]. This could suggest that an intermediary is an under-utilised resource when trying to promote participation in PA, but equally may reflect the lack of real-world trials. How local PA was identified and chosen for the individual was unclear in many studies, and no studies reported on any evaluation or quality assurance of these groups. Only five studies measured PA levels at baseline and there were a large variety of heterogeneous PA outcome measures reported, limiting conclusions as to how intermediaries evaluated impact of their interventions. There was a need therefore to further explore and define real-world intermediary interventions and address the evidence gaps identified in relation to the professional background of intermediaries, the profile of individuals referred to these services, reason/s for referral, intermediary work practices when connecting individuals to local PA, and how these interventions are evaluated.

Qualitative research can be used to investigate important questions and explore complex phenomena [413-415] and enables us to understand human behaviour by investigating people's beliefs, motivations, experiences, as well as the actions and interactions of people, organisations, and institutions [413]. Therefore, qualitative methods were considered an appropriate methodology for this study. Over half of the reports included in the scoping review utilised qualitative or mixed methods, with these studies exploring the experiences and perspectives of intermediary service users, intermediaries, HCPs, and other key stakeholders such as local PA service providers. However, only one study

was conducted in Ireland [372], involving one type of intermediary (LSP co-ordinators). No other studies involving other Irish intermediaries, such as social prescribing link workers (See Section 1.6.1.1) and health promotion and improvement officers (See Section 1.6.1.3), were identified. Therefore, there was an additional need to describe and define interventions delivered by other Irish intermediaries.

The aim of this study, therefore, was to explore the role of intermediaries in Ireland, in connecting adults to local PA, and to further define the processes, practices, and procedures in the Irish context. Specific objectives were:

- i) To describe the pathways of connections from the referring agent to the intermediary.
- ii) To explore the profile of people referred to an intermediary who are then connected to community-based PA services.
- iii) To explore how intermediaries choose a suitable and appropriate community-based PA service for the person referred, and pathways of connections onwards from the intermediary to these services.
- iv) To identify how intermediary services are established and embedded within the community.

3.2 Methods

3.2.1 Ethical approval

Ethical approval for this study was granted from the Trinity College Dublin School of Medicine Research Ethics Committee in July 2022 (Application Number: 20220601) (Appendix VI).

3.2.2 Study design

This study used a qualitative descriptive design to provide a rich, straight description of the experiences of study participants close to their own language [416, 417].

Qualitative descriptive designs have been identified as a useful approach when research questions are focused on discovering the who, what, and where of events or experiences and gaining insights from informants regarding a poorly understood

phenomenon [416-418]. This study was reported using the COnsolidated criteria for REporting Qualitative research (COREQ) checklist [419].

3.2.3 Participants

Participants were intermediaries, defined for this study as i) clinical or non-clinical staff, ii) based in primary care, community, or voluntary sectors, iii) who receive self-referrals or referrals from HCPs, and iv) support the referred individual in establishing a connection to non-clinical services in the community to improve health and wellbeing. Participants were aged >18 years old, employed in their role for ≥6 months, and able to give informed consent. Exclusion criteria were retired staff or staff on extended or maternity leave. Based on the literature review conducted as part of the introduction of this thesis (Chapter 1), the scoping review, discussions between the research team, and consultations with the project advisory panel, three types of intermediaries were identified in Ireland — social prescribing link workers (SP), local sports partnership community sports development officers (LSO), and health promotion and improvement officers (HPO). A full description of these roles has already been given in the introduction of this thesis (See Section 1.6.1.1 – 1.6.1.3), and a brief description of each intermediary is provided in the following sections.

3.2.3.1 Social prescribing link workers

A full description of the SP role is given in Section 1.6.1.1. SP design and co-produce personalised solutions so that people with social, emotional, or practical needs are empowered to find solutions which will improve their health and wellbeing, often using services provided by the community and voluntary sector. Social prescribing services had existed for years in Ireland in counties Mayo and Donegal [183], prior to the more recent investment and roll out of social prescribing services across the country. This was ongoing during this research project. At the time of this study, n=61 SP were working across the country (personal communication with Irish Social Prescribing Peer Network via Zoom, May 2022).

3.2.3.2 Local sports partnership community sports development officers

A full description of the LSO role is given in Section 1.6.1.2. LSO support the development of opportunities to increase sport participation, and work to address barriers to PA

participation. They also work to develop sustainable local leadership for sport within communities. The LSO programme was first established in 2016, to strengthen local delivery and capacity of local sports partnerships, through which Sport Ireland develop opportunities for people to be more physically active. A nationwide roll out of the LSO programme was carried out in 2019, after which one LSO was in situ in all 29 local sport partnerships across the country [202]. At the time of this study, all 29 LSO posts were filled (personal communication via email with Sport Ireland, June 2022).

3.2.3.3 Health promotion and improvement officers

A full description of the HPO role is given in Section 1.6.1.3. HPO act as advocates, both to build capacity within the Irish healthcare system and to ensure that available resources are used optimally to improve the health and wellbeing of the population. HPO work to target modifiable lifestyle risk factors such as smoking, alcohol consumption, obesity, and physical inactivity. As a result of the significant investment into health promotion services in Ireland at the commencement of this research project (2021), many new posts had been created to support health promotion, and these were being recruited at time of this study. It was estimated that n=246 health promotion officers were working across the country at the time of the study (personal communication via email with community healthcare organisation (CHO) Health and Wellbeing managers, October 2022 – November 2022).

3.2.4 Participant selection

Recruitment for this study took place from September 2022 – December 2022. Gatekeepers and professional organisations (HSE Health and Wellbeing, Association for Health Promotion Ireland, Irish Social Prescribing Peer Network, and Sport Ireland) were identified by the research team or by members of the project advisory panel, through either personal/professional networks, or through publicly available information such as websites. Where contact details or a suitable person could not be found using publicly available information, the organisations were contacted for the details of a suitable person. Participants were invited to take part in the study via an invitation circulated through gatekeepers in the relevant professional organisations and via the research

team's social media accounts to maximise reach. Three rounds of invitations were sent over the recruitment period.

Purposeful sampling was employed to include 'typical cases' and ensure representation from all three types of intermediaries, wide geographical spread, and different levels of professional experience [420]. Purposeful sampling involves the deliberate choice of a participant due to the qualities they possess [421]. It is typically used in qualitative research and qualitative descriptive studies to identify and select information-rich cases [416, 421]. 'Typical case' purposeful sampling involves selection of participants based on their likelihood of behaving like everyone else within the population [420, 421]. The research team planned to continue recruitment until ten of each intermediary type were recruited, or until no new analytical insights were emerging from interviews, whichever came first. This was determined by discussion between the research team. The sample size was in line with previous qualitative research involving intermediaries [166, 260] and chosen based on the research team's previous experience conducting qualitative studies [422].

Intermediaries were recruited from a variety of sectors, and those recruited to this study were based in primary care, community healthcare networks, local health offices (where community health and personal social services are delivered), GP offices, health promotion settings, community centres, local development companies (multi-sectoral partnerships that deliver community and rural development, social inclusion, and social enterprise services), local authorities, and local councils (local authorities operate within specific geographic areas called local government areas, each of which has a council, and are responsible for the provision of public services). Participants gave written informed consent to participate (Appendices VII and VIII).

3.2.5 Data collection

Interviews took place from September 2022 – January 2023 using a semi-structured approach that combined contextual, explanatory, and evaluative approaches [423]. Semi-structured interviews allowed for both structure and flexibility within the interview process, and an interactive approach to generate new knowledge [423]. Semi-structured

interviews were conducted according to the participant's personal preference — in-person, online (hosted via Zoom (Zoom Communications)), or over telephone. All interviews were conducted using an interview schedule designed by the research team, which was informed by previous qualitative studies carried out with intermediaries [77, 315, 424], and the findings of the scoping review carried out as part of the research project [377] (Appendix IX). Topics included the professional background of the intermediary, the profile of individuals referred to the intermediary, the processes of referral and assessment, the characteristics of onward connections to local PA, and how these services were monitored. This guide was designed to be iterative, with additional questions added as necessary in response to earlier interviews.

3.2.6 Data analysis

Interviews were recorded and transcribed verbatim by a professional stenographer, or by using the auto-transcription feature on Zoom. All transcripts were checked for accuracy. Pseudonymised transcripts were analysed using an inductive qualitative content analysis approach [425], from January 2023 – August 2023. The goal of qualitative content analysis is “to provide knowledge and understanding of the phenomenon under study” [426, p.314]. This methodology was chosen as it is a flexible but systematic coding and categorisation approach suitable for exploring large amounts of textual information [427-430], and for examining manifest or latent meanings and patterns in the data [430]. It is also the analysis strategy of choice for qualitative descriptive studies [417]. In addition, qualitative content analysis is well-suited for qualitative health-based research, analysing complex interventions, and for exploratory work in areas where not much is known about a topic [425, 427, 431]. This approach broadly involves three steps: 1) preparation, 2) organising, and 3) reporting [425]. Themes were developed in line with the qualitative content analysis approach described by Vaismoradi and colleagues [428]. This involves four steps: initialisation, construction, rectification, and finalisation. Initialisation takes place during the preparation step, and construction, rectification, and finalisation occur during the organising and reporting steps [425].

3.2.6.1 Initialisation

All interviews were conducted by MO'G, who is a female Ph.D. candidate and physiotherapist. Reflexivity tends to be under-reported in qualitative research [432], leading to difficulties evaluating, comparing, and synthesising findings [433]. As such, field notes were taken during the interviews and formed the basis of 'initial impressions' which were used during update meetings between the research team. These 'initial impressions' were updated approximately every six to ten interviews. Additional preparation and familiarisation also occurred while listening to the audio recordings and cleaning the transcripts. A personal research diary was kept by MO'G throughout the process of analysis. The purpose of this diary was to record any shifts in perspectives, establish credibility, record reflections on subjectivity and reflexivity, and to improve rigour.

Transcripts were read several times by MO'G to ensure familiarisation. The first round of coding was done line-by-line, by hand, and analytical notes and open codes were made on the transcripts to describe all aspects of the content [434]. Seventeen transcripts were coded during this first round with a random selection of four LSO transcripts, six HPO transcripts, and seven SP transcripts, proportional to the sample of each intermediary type. A sample of three transcripts, one from each intermediary type, were then reviewed at a 'pause' in this process. At this stage, code names and code descriptions were reviewed and refined where possible (Appendix X) using Microsoft Excel (Microsoft Corporation). This allowed for recognition of emerging patterns of meaning both within and across the intermediary types. These 17 transcripts and their associated codes were transferred to NVivo 12 (QSR International), and analytical notes and open codes were made on the remaining 12 transcripts using NVivo to complete the first round of coding. For the second round of coding, a random sample of ten transcripts were again coded line-by-line in NVivo to ensure consistency and accuracy of the codes and code descriptions. Finally, each code, code name, and associated data extract in the remaining 19 transcripts were checked and refined as needed. At the end of this stage, there were 686 codes identified (Appendix X).

3.2.6.2 Construction

A decision was made to focus at this stage on the manifest, more descriptive content of the data [428, 435] based on the aims and objectives of the study. All codes were organised into clusters (groups of codes that share similarities [428]) using Microsoft Excel and NVivo. Clusters were then grouped under generic categories following the logical flow of an intermediary intervention (referral and initial contact, the assessment, which people were referred to which local PA, what support was provided, discharge processes), as well as categories describing the background of the intermediary, the intermediaries' working relationships, promotion of the role, and monitoring/evaluation. Categories in qualitative content analysis describe the manifest content of the data and are used at the beginning of the data analysis process to enter the abstraction process [428]. Categories relevant to the research objectives and the 'steps' of the key processes of intermediaries were selected and organised into themes by the research team (Appendix X).

3.2.6.3 Rectification and Finalisation

The final two steps in developing themes were completed concurrently; while the stages as described by Vaismoradi et al. (2016) were designed to be iterative, the authors do allow for flexibility and creativity throughout the process [428]. Rectification consists of immersion in the data, relating themes to established knowledge, and stabilisation of themes [428]. In the finalisation phase, or the last phase of theme development, a narration developed by researchers as a written commentary describes and connects various themes, and answers the study question [428]. The findings of this study were generated by describing content of the clusters within the identified themes [425]. The appendices were also developed to show the process of rectification and finalisation of categories from codes, themes from categories (stabilisation), and to act as audit trails (Appendix X). Transcripts were checked against the developing 'story line' in the report draft, and themes were contextualised in relation to qualitative and other relevant literature published during the time of the research project [160, 232, 233, 309, 318, 319, 436-438].

3.2.7 Knowledge user engagement

The goal of knowledge user engagement is to co-produce knowledge that is relevant and useful to those making real-world health decisions [327], fostering integration, implementation, and dissemination of findings into policy and practice [328, 329]. Specifically, knowledge user engagement was used to improve the quality, design, relevance, and impact of this study [330, 331]. The study advisory panel was consulted to determine the types of intermediaries to include in this study, to assist with recruitment for this study, and to review the proposed interview schedule. In addition, knowledge users served to ensure credibility and confirmability of the findings of the qualitative analysis [439, 440] through peer debriefing. Peer debriefing involves a peer who is external to the research project reviewing the final themes or findings of a given study [440]. A two-page infographic summarising the key findings and good practice points was created by the research team and reviewed by the panel (Appendix XI). The panel were also consulted when planning dissemination of the results.

3.2.8 Presentation of results

Several themes were identified in relation to the *processes* of intermediaries, and in relation to the *population* referred to intermediaries. As such, the results of study II are presented in two sections. The section Findings (a) will report the results in relation to the *processes* of intermediaries, and Findings (b) will report the results in relation to the *population* referred to intermediaries. This is followed by a general discussion of the results of study II.

3.3 Findings (a)

This section reports the results in relation to the processes of intermediaries, which specifically address objectives i), iii), and iv):

- i) To describe the pathways of connections from the referring agent to the intermediary.
- iii) To explore how intermediaries choose a suitable and appropriate community-based PA service for the person referred, and pathways of connections onwards from the intermediary to these services.

- iv) To identify how intermediary services are established and embedded within the community.

Interviews were carried out with 29 intermediaries (11 SP, 10 HPO, 8 LSO), representing all but one CHO in Ireland (CHO Area 8: Laois/Offaly, Longford/Westmeath, and Louth/Meath). Interviews lasted 37 minutes on average (range 24 – 57 minutes). Fifteen interviews were conducted over Zoom, 12 over telephone, and two were conducted face-to-face at the intermediary's place of work. Demographic information of participants is shown in Table 3-1. Two participants were excluded at the analysis stage, as it transpired during their interviews that they were working as volunteers rather than employees in their current role. The decision was made to exclude these participants, as they would not be considered professionals and may lack the skills and resources required to deliver complex intermediary interventions [180, 441]. This left 27 interviews included in the final analysis.

Four themes were identified: the processes of connecting to an intermediary, connecting individuals to PA, exiting from the intermediary service, and working in the local context. Together, these themes discuss the processes of referral, assessment, and follow-up when intermediaries connected individuals to local PA. They describe how intermediaries selected appropriate local PA groups based on the referred individual's needs, and how individuals left intermediary services after being connected to an activity. Finally, the broader contextual factors that influenced the work of intermediaries are presented. Themes and sub-themes are shown in Figure 3-1 and a detailed description of each theme is given under the relevant heading.

Table 3-1: Demographic information of participants (n=27)

Type	Demographic	Result	
SP (n=10)	Gender	Female	10 (100%)
	Urban or rural	Urban	6 (60%)
		Urban/rural	2 (20%)
		Rural	1 (10%)
		Rural/urban	1 (10%)
	Setting of intermediary service*	Local development company	6
		Family resource centre	2
		Community centre	1
		GP practice	1
		Primary care	1
		Resource centre	1
LSO (n=8)	Professional background*	Health and social care	8
		Education	3
		Private sector	1
	Time in role (years)	Range	<1 – 8
	Gender	Female	6 (75%)
		Male	2 (25%)
	Urban or rural	Urban	2 (25%)
		Urban/rural	2 (25%)
		Rural	1 (13%)
		Rural/urban	3 (37%)
	Setting of intermediary service*	County council offices	3
		Community centre	2
		Local authority	2
		Sports partnership offices	1
	Professional background*	Physical activity and exercise	8
		Education	1
	Time in role (years)	Range	1 – 15

HPO (n=9)	Gender	Female	6 (67%)
		Male	3 (33%)
	Urban or rural	Urban	4 (44%)
		Urban/rural	2 (22%)
		Rural	2 (22%)
		Rural/urban	1 (11%)
	Setting of intermediary service*	Primary care	5
		Health promotion office	2
		HSE local health office	2
		Community healthcare network	1
		Freelance work in the community	1
		Local authority	1
	Professional background*	Health and social care	6
		Physical activity and exercise	4
		Education	1
	Time in role (years)	Range	1 – 18

*Some intermediaries were based in more than one setting or had backgrounds in multiple sectors. Urban/rural indicates the intermediary worked in a mostly urban setting. Rural/urban indicates the intermediary worked in a mostly rural setting. Physical activity and exercise professional background includes any work in the PA sector, including sport and private fitness sectors. Health and social care professional background includes healthcare, social care, youth work, mental health, community development, health promotion, and disability/inclusion roles. Education professional background includes any teaching, coaching, or guidance role. Abbreviations: GP — general practitioner, HPO — health promotion and improvement officers, HSE — Health Service Executive, LSO — local sports partnership community sports development officers, PA — physical activity, SP — social prescribing link workers. Table reproduced from [442].

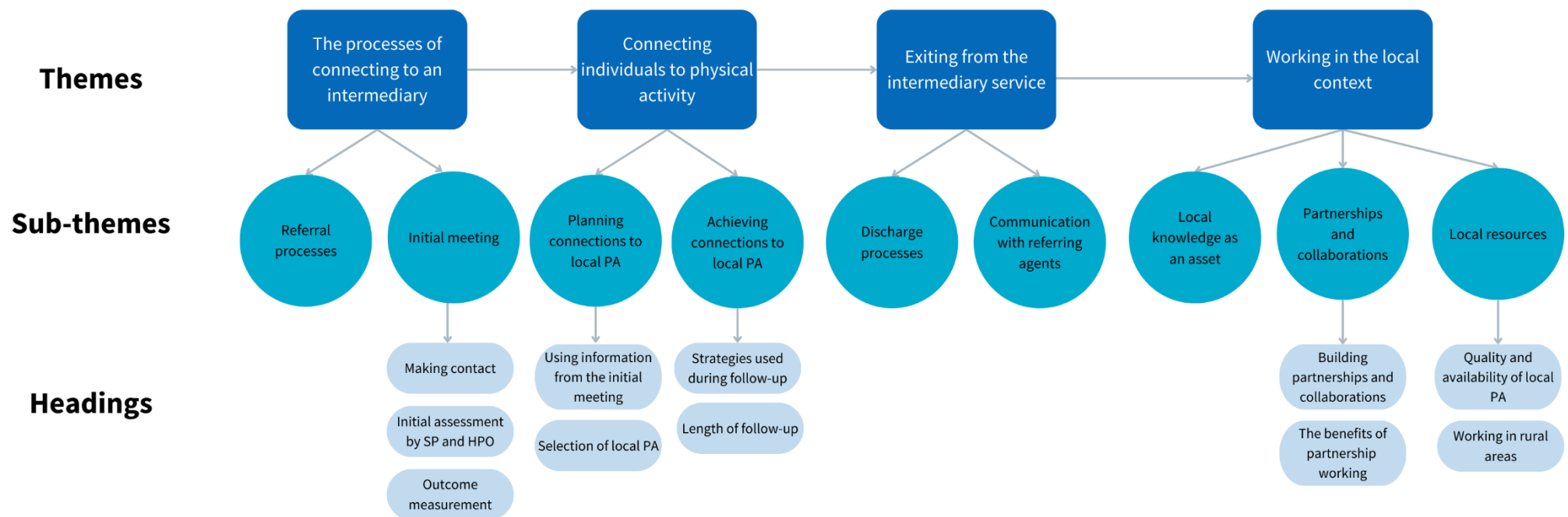


Figure 3-1: Themes and sub-themes identified in relation to the processes of intermediaries

Abbreviations: HPO — health promotion and improvement officers, PA — physical activity, SP — social prescribing link workers. Figure reproduced in part from [442].

3.3.1 Theme 1: The processes of connecting to an intermediary

This theme describes how and why individuals were referred to an intermediary and describes the initial meeting between intermediaries and service users, and the processes of an intermediary assessment. Two sub-themes were identified: 'referral processes' and 'initial meeting'.

3.3.1.1 Sub-theme 1: Referral processes

Referrals came from several routes. These included online forms or through websites, emails, paper-based referral forms, or by a telephone call from a referring agent.

"I'd have referral forms but very few people will actually use them, usually they just pick up the phone and they ring me, and we will talk over the person's situation." P21, SP

Referring agents were wide-ranging both within and between the intermediary types. All types of intermediaries worked closely with healthcare services, and they were a major source of referrals to SP, HPO, and to a lesser extent LSO, with well-established referral pathways and partnership working. Referrals from allied health professionals (such as occupational therapists, physiotherapists, social workers, and dieticians) and primary care professionals were the most common. However, referrals from acute care, addiction or recovery services, mental health services, health promotion teams, and maternity services were also reported.

"They are referred from mental health services, the local hospitals, particularly the physio department... some of the local GPs, other agencies like primary care, social work... I get a good few from recovery services as well like people who are on methadone." P07, SP

Some services received no referrals from healthcare services, despite being located near to each other.

"We would keep in contact... [with] next door here the local primary care centre. If we had a contact there we would let them know... but we wouldn't get a huge amount of referrals through so I don't know why that is." P22, LSO

Aside from healthcare services, referring agents could also be practically anyone in the community, coming from local community, voluntary, and charitable sector groups or even through friends and family members of the referred individual.

“They will come from a whole variety of different referring bodies, all sorts of different reasons. We accept self-referrals.” P09, SP

Self-referrals were also reported by all intermediary types, particularly by more well-established services (newer services reported lower numbers of self-referrals). While referral routes and pathways did exist in some areas to LSO (usually from healthcare services, e.g., physiotherapy departments, primary care), these were not common approaches nationally, and self-referral was the most common route of referral to LSO.

“They’re not referred... it’s self-referral in the sense where they possibly see the advertisement and see the promotion and go, okay, I think I’ll go for that.” P02, LSO

Reasons for referral (to SP and some HPO) could be categorised broadly as after a change in life circumstances or to address a pre-existing health issue. These were not mutually exclusive. HPO explained that they mainly received referrals related to their primary role as smoking cessation officers. These officers were often located in primary care services related to chronic disease management.

“In terms of me meeting the public the closest access I would have is in our stop smoking clinic... That’s the closest and most tangible time I’ll meet people.” P04, HPO

Individuals could be referred to SP because they were experiencing social isolation, financial difficulties, a bereavement, a relationship breakdown or other major life event, a fall, injury, or new diagnosis, or to address substance abuse issues.

“To be social, rural isolation, it could be bereavement, it could be mental health, it could be drugs, it could be alcohol, it could be people new to the area, people estranged from family, anything really.” P23,

SP

For the majority of LSO, individuals self-referred to participate in one of the various local PA groups being run by the local sports partnership, usually based on word of mouth.

“They just know that the [local PA] programme is on, and it's something that they might be interested in. So, they come along.”

P29, LSO

A minority of intermediaries across the three types reported that individuals were referred by a referring agent to specifically improve fitness, PA levels, or to connect to a PA group that was running in the community.

“They would be referred to us to improve their balance, their flexibility, and their range of movement.” P11, LSO

3.3.1.2 Sub-theme 2: Initial meeting

3.3.1.2.1 Making contact

After receiving a referral, intermediaries acknowledged the referral through an initial contact with the referred individual (service user). For LSO, the initial contact took place over telephone, email, or at the first session of a local PA group, which the LSO usually attended in-person. This was an opportunity to give the service user information about other local PA groups that were currently available, and to develop a rapport.

“They get to know you, you know, so you strike up a relationship with them and stuff like that. So, you know, the trust is there.” P22, LSO

LSO also occasionally performed physical health screens as part of this initial contact, which would take place at the start of selected local PA programmes (See Section 3.4.2.3 for further details).

“When we do our [name of programme], we do an assessment. So, we do a height, weight, BMI [body mass index], we do blood pressure, and if we're seeing high blood pressures, we do recommend that they get a doctor's note to say that it's okay for them to continue to exercise.” P29, LSO

For SP and HPO, this initial contact with the service user took place over telephone or by email. The purpose of this initial contact was to arrange a more in-depth initial assessment. This initial assessment could take place in a variety of locations and was

chosen based on the service user's preference and/or by the preference and capacity of the intermediary and their service.

"We arrange a face-to-face meeting in a location that's handy for them, so we have locations all around the city and county, we've some clinical style locations, we've some community style locations, depending on what the person is most comfortable with. We can also meet somebody in a totally neutral location, like going for a walk in their local park, if that's what's going to get them through the door."

P09, SP

3.3.1.2.2 Initial assessment by SP and HPO

As these were newer, less well-established roles, some intermediaries started by introducing or explaining the service and their role, and what the service could provide for the service user. Several SP also reported highlighting the limitations of their service.

"We'd have that initial conversation with them and tease out... what's their understanding of it? And what is it that they think they might get out of linking in with us?... we have to be careful not to become a counselling kind of support service... we're not in a position to be able to provide that sort of support." P16, SP

The discussion would then shift to the service user, to discuss their needs in relation to their health and wellbeing. Assessments could involve discussing PA but tended to be a more general discussion of lifestyle, including smoking, diet, sleep, and other physical health issues.

"I'll talk about any issue and guide people to any service [PA, weight management, bereavement support] and I'd have no problem about that." P25, HPO

General wellbeing, including mental health, social and community connectedness, and other psychosocial needs were also discussed, but only by SP. Some SP reported that discussing lifestyle and wellbeing could cause the assessment to become a more difficult and emotional process for the service user.

“During that first meeting I guess it’s really just to chat, it’s a lot for people, especially who might be a little bit more vulnerable or who might be in need of additional support, it can be a lot for people to meet with a stranger.” P19, SP

Assessments by SP were reported as lengthy, up to 90 minutes in some cases.

“It’s not a ten-minute tick box job, we really do pride ourselves on giving someone the time.” P09, SP

Creating a welcoming, informal, and comfortable environment was an important aspect of the assessment. This allowed the service user to discuss more difficult and sensitive topics.

“The most important bit that first day is actually building that rapport... because often people come in and they’re nervous and they’re shy, and it’s kind of yes and no answers.” P17, HPO

The ethos of assessment was very much person-centred and holistic, even if the processes varied between intermediaries and from service to service.

“It’s a complete holistic approach. You know we’re looking at everything from their emotional wellness through mental health, through diet, through physical health, everything... we will try and take a holistic look at that.” P16, SP

Some SP used the assessment as an opportunity to perform goal setting with the service user, so that service users had a clear picture of the planned intervention and their active role in generating this.

“We usually kind of finish with a general plan on what our work together will look like and what our goals are or what their goals are and how we can collaborate to achieve those.” P19, SP

3.3.1.2.3 Outcome measurement

Some services aimed to complete standardised outcome measures during the initial contact or assessment, and again at the time of exit from the service (See Section 3.3.3). SP tended to use formal outcome measures that examined changes in personal

wellbeing e.g., the Short Warwick-Edinburgh Mental Wellbeing Scale [443], WHO Five Wellbeing Index [444], Measure Yourself Concerns and Wellbeing [445], Wheel of Life [446], Pillars of Positive Health [447], and mood ratings.

“We use a tool called MYCaW [Measure Yourself Concerns and Wellbeing] and it asks for example what concerns, two concerns that you’d like us to help you with... so we use that, and another tool called SWEMWBS [Short Warwick-Edinburgh Mental Wellbeing Scale] which is the mental wellbeing.” P07, SP

Outcome measures were used to guide the conversation and highlight areas of the service user’s life where they may have needed assistance in making a change.

“These questions open up an awful lot of dialogue as well.” P27, SP

Only one formal outcome measure was used by LSO, the Single Item Measure (M1), a self-report measure of participation in sport and PA over time [202]. This was the only formal measure of PA used by any of the intermediary types.

“We use an M1 measurement, so we’d be reporting on that to Sport Ireland all the time.” P11, LSO

This was usually completed by LSO when completing more in-depth evaluations of local sports partnership programme delivery.

“Then there’s certain programmes... that I know will be a good programme so I would use the template that we have with a little bit more detail and a bit more of a personalised question... You select those programmes that you know are going to have a big impact in the community and get as much feedback from those as possible.”

P08, LSO

HPO did not use formal outcome measures and tended to collect basic demographic and attendance data for their service.

“The minimum dataset would be things like their name... their date of birth... who their GP is, level of education, whether or not they're

employed... we do a past medical history as well... how many people have engaged [with the service]". P17, HPO

3.3.2 Theme 2: Connecting individuals to physical activity

This theme describes the processes undertaken by intermediaries following the initial meeting with a service user. It describes how intermediaries identified PA as a need, and how a local PA was selected based on the service user's needs. This theme also describes the practices of intermediaries during the 'follow-up' period after the initial meeting, when establishing and maintaining connections to local PA. Two sub-themes were identified: 'planning connections to local PA' and 'achieving connections to local PA'.

3.3.2.1 Sub-theme 1: Planning connections to local PA

3.3.2.1.1 Using information from the initial meeting

HPO did not actively connect service users onwards to PA. As part of their smoking cessation work, they may have carried out brief interventions around physical inactivity, or signposted service users to further information.

"But in my current role we have a statute called Making Every Contact Count... So instead of closing the door, it's your responsibility to refer on to the appropriate services." P10, HPO

Additionally, some HPO had a remit to work with community stakeholders and partners to fund and develop PA groups, but they were not directly involved in the referral/connection of service users to these programmes.

"The HSE are involved in a lot of grant aid agreements, so we fund a lot of [PA] partners... more around finding out the nuts and bolts of their operational procedures and really just getting a good feel on... what's actually being delivered in the community and what the ask is moving forward." P13, HPO

The rest of this section will therefore focus on SP and LSO. While physical inactivity was often not the primary reason why they were referred, during the initial meeting service users could reveal physical inactivity as an issue that they wished to address. The

intermediary and the service user would then plan where and how the service user could connect to a local PA group.

“If they highlight it as a goal. . . But for a lot of people, it would be that they highlight physical activity. . . “Oh, I want to lose some weight”, or “I want to do some exercise to feel better”, or “my doctor told me because of my condition I need to do exercise and I’ve never gone to a gym, and I don’t know what to do”.” P09, SP

3.3.2.1.2 Selection of local PA

All intermediaries discussed how service users’ preferences and interests were used to guide selection of a suitable local PA group that they would enjoy.

“I’m not sure if I agree with that question about me deciding on a group, because again it very much depends on the person themselves.” P19, SP

“It’s really just finding what the individual wants.” P22, LSO

For SP it was also important to assess barriers to engaging in PA, with some choosing to address these before suggesting participation in PA. Section 3.4.2 provides more detail of how intermediaries addressed barriers when connecting service users to local PA.

“If they’ve got this major practical problem like they’re going to be thrown out of the house in two weeks or they can’t get out of the house because their parents have needs, I would know that there’s no point in me going forward to the fun stuff as I call it if they’re not going to be free to do it.” P07, SP

Some intermediaries gathered and presented information for their service users to give an overview of what was available. In addition to local PA, many SP connected service users to other community activities, like mental health supports, volunteering opportunities, information and advice services, or creative or educational groups in line with their needs and interests.

“We’ll explore everything. We search out under every rock to find something that might suit any individual.” P16, SP

In addition to personal preference, the choice of local PA was sometimes practical, and based on demographics, location, cost, and timetabling. For example, a group specifically for older adults or women only, or a group that was running during the month/season that the service user wanted to connect to it.

“So, we run our programmes in blocks of eight-, ten-, and twelve-week terms and we usually have three terms throughout the year, so we have one in January, one around April... and then the last one in September.” P11, LSO

Another factor was whether the service user would be made feel welcome and comfortable in the local PA group and the group environment.

“Because people are... coming for the first time or they’ve never ran before... we try to be at the first session and if we can’t then the tutors are well-versed in how to meet and greet people as well and bring them through the programme.” P24, LSO

Many intermediaries spoke of their service users experiencing fear or anxiety around starting to engage in PA or attending alone. To help assuage some of these fears, the chosen local PA group was tailored to the service users’ preferences and abilities, especially if they were new to exercise and PA.

“I have three men who would love to be part of physical activity but they’re very obese, you know. So, it has to be like a tailored physical activity for them, and in a small group as well.” P28, SP

3.3.2.2 Sub-theme 2: Achieving connections to local PA

3.3.2.2.1 Strategies used during follow-up

Sometimes, follow-up solely consisted of signposting to groups and/or providing additional information about specific local PA groups. Signposting alone was more commonly practiced by LSO, and was less common for SP.

“So, we do have that guiding role as well, signposting people to programs.” P01, LSO

The level of support required to connect to a local PA group was person-centred which dictated the intensity of the intervention.

“We have another meeting with the person or a phone call to establish is there anything there that piques your interest? And if so, what support do you need to access it?” P09, SP

Sometimes the intermediary needed to give advice and reassurance around participating in a local PA group, to increase the service user’s confidence in taking part.

“I would still get a phone call or an email, “am I suitable for this programme?”, “would I be able for it?” ... More often than not once they know that they are physically well, then you’d encourage them to sign up and to get involved. . . The reassurance piece I suppose is a big thing in our space here, I think.” P24, LSO

At other times their role was to give encouragement and motivational support, to empower the service user to take part. Sometimes the service user required a combination of approaches to achieve their goals.

“It is about their own self-esteem and their own confidence and confidence in themselves, the rest will [then] happen.” P21, SP

Sometimes practical assistance was provided, either alone or in combination with these behavioural approaches, like helping the service user to complete a referral form or reminding them about an upcoming group. More instrumental assistance or ‘hand holding’ was common, particularly for SP. In practice, this involved being supportive, actively communicating, and being available to the service user as needed throughout the process of connection.

“Just keep holding their hand through that process.” P09, SP

One of the most commonly reported instrumental supports to service users was attending a session of the local PA group with them, in particular the first session. This was reported by both SP and LSO.

“That could mean... arranging to meet with the client on the day of the activity say ten minutes before.” P19, SP

“Especially when groups start, I will be at every single start of a program, and I’ll attend it for a couple of weeks, and then it might be just a drop in and out to the group.” P29, LSO

The PA instructor was another important feature of the process to continue to encourage and support the service user to take part in the PA group, especially as the intermediary began to step back and the frequency of contact began to decrease. This was particularly the case for LSO whose follow-up was limited with the service user.

“I suppose in terms of my contact with them it would probably finish once I connect them to a programme. It would be then the community tutor that would take over.” P11, LSO

Many LSO highlighted the PA instructor as also having an important role in providing ongoing motivational support for service users.

“After the six weeks [programme] then the instructor and the group usually bond and build up a rapport... it would be the instructor that would be in a better position week to week to measure the progress.”

P08, LSO

Both SP and LSO believed that PA instructors should be knowledgeable about PA and exercise and be skilled in adapting and delivering exercise suitable to the service user’s needs.

“I can’t have what I would call a ‘gym bunny’ physical trainer in there and killing the blimming life out of them... They have to have an empathy with the group.” P01, LSO

3.3.2.2.2 Length of follow-up

For LSO, usually the contact ceased once the service user had attended a local PA group. Their capacity to meet the service user again was limited due to their busy service.

“Over the last three weeks I have thirteen or fourteen programmes running with maybe twenty people at each one so you know you wouldn’t have the resources say to interact with each individual on that basis.” P08, LSO

For SP it depended very much on the service user and their needs and ranged from one session to multiple sessions over a longer period. The number of sessions could fluctuate over time in accordance with the service user's needs.

"Once somebody is linked in with us, they stay... We may not be providing constant support... they may be attending a group that we pop in on every week or every other week, or once a month." P16, SP

SP also pointed out that the service user may not engage in the first suggested local PA group, and they may then have facilitated connections to other local PA groups. This was not reported by LSO.

"And then from then on, there's no exact science, its trial and error. It's saying... you can try this for one session, and if you never want to go back again nobody is going to be biting the head off you." P09, SP

SP highly regarded having this flexibility, and this extra time to give to service users.

"It's just organic, and it just moves along at a nice pace, and there's no pushing... and there's no having to be... Coming to me is voluntary." P21, SP

3.3.3 Theme 3: Exiting from the intermediary service

This theme describes how service users were 'discharged' or exited from intermediary services, as well as processes used by intermediaries to communicate back to referring agents. Two sub-themes were identified: 'discharge processes' and 'communication with referring agents'.

3.3.3.1 Sub-theme 1: Discharge processes

How service users were 'discharged' varied from service to service and across intermediary types, but the person-centred ethos to assessment and follow-up carried through to this final step of the process. Generally, the exit process began once a service user had been connected successfully to a local PA group or was deemed to be more socially connected (in the case of SP).

"I suppose in a broad sense once the client feels that they have reached their goal, and they are meaningfully connected and

*supported in their community... it's natural they often feel that they
no longer need our support?" P19, SP*

In some SP services, there was a set number of sessions/weeks that the service user could avail of, with the intensity of the support offered decreasing over time. Other SP spoke of a more flexible approach, where they could decide if the service user needed more time or more sessions over and above what they were originally allocated.

*"There's no sort of right, that's it now, and you can't come back
here... you've had your so many sessions." P21, SP*

Several SP had no formal exit process, with some intermediaries reporting that they had service users who had remained in contact with the intermediary to some extent over months or even years in some cases.

*"We have people who have been referred to us, and we're still
supporting them two, three, four years later." P16, SP*

Formal 'discharge' was also not part of the processes of LSO, and many of these intermediaries spoke about service users returning and participating in the same local PA groups.

*"We get a lot of return participants... I'd say we'd probably get sixty
to seventy percent return participants and then twenty to thirty
percent are new participants each term." P11, LSO*

Some services operated an 'open door policy' where service users were free to contact the intermediary at any time for information or to link back in with local PA groups, even after they may have been formally discharged.

*"And we'll always leave the door open. Give us a buzz at any time."
P16, SP*

Sometimes this was through mailing and email lists.

*"If you have them on a mailing list it's great because I send out a list
of all those programmes and how you sign up, so it keeps them in the
loop all the time, that it's not a case of six weeks and then they're*

gone, you're trying to keep them within the cycle of activity." P08,

LSO

Outcome measures may have been completed at the time of exit to measure the effectiveness of the intervention and to show progress over the time spent engaging with the intermediary.

"It's nice to do a summary, because also again, social prescribing is so abstract. I find it quite important to me... this is what we said I had to do, this is how it went, and now this is where we are. This is what you've done. Go you. You're great. This is what social prescribing is."

P18, SP

Some SP would also collect some informal measures in addition to the outcome measures, such as the number of community activities accessed by the service user.

"The other outcome would be in terms of personal success and how many things we managed to link them with and how many of those they actually pursued." P07, SP

Many LSO reported anecdotal improvement in PA levels amongst their service users, often reported by the service users directly to them or observed when they attended groups.

"I can't tell you the value of what I heard, and what I saw with the improvements of these people." P01, LSO

Both SP and LSO spoke about service users continuing to engage in local PA groups after the connection was made, which appeared to be taken by many intermediaries as a proxy measure of having improved PA levels.

"But in terms of the return and the feedback and the benefit and the impact it's having, you couldn't put a cost on it because you know, the staff in the services, the participants themselves, the feedback, it's massive." P24, LSO

3.3.3.2 Sub-theme 2: Communication with referring agents

The final step in the process was feeding back to the original referring agent, if any. Feedback was usually limited to whether the service user had engaged with the intermediary service and what community activities they had been connected to. No information was provided as regards the other steps in the process.

“So, if they're referred... in the realms of confidentiality we would refer on numbers. So, this many turned up.” P01, LSO

However, in other services providing feedback was not common practice. Some intermediaries found it to be too time-consuming a process in the context of already limited resources, and often relied on their service users to feedback to the referring agent.

“Because so many of our participants are coming from the health services and being referred in from there, they would be in touch with a health professional on an ongoing basis. So, I suppose the health professional... would find out that way anyway. But we wouldn't be feeding that back to the referrer.” P11, LSO

3.3.4 Theme 4: Working in the local context

This theme describes the availability and types of local PA groups within the intermediaries' local community, and the contextual factors that facilitated their knowledge of these services. Three sub-themes were identified: 'local knowledge as an asset', 'partnerships and collaborations', and 'local resources'.

3.3.4.1 Sub-theme 1: Local knowledge as an asset

Having knowledge of currently available, local, community-based resources, services, and groups (local knowledge) was of significant benefit and a key component of the process.

“Some of us that are here a long time like myself, I'd know, I'd have a pretty good idea as to what might be available elsewhere that isn't directly run by us or the parkruns or those kind of things.” P24, LSO

Intermediaries spoke about both service users and referring agents valuing the intermediary's local knowledge. Intermediaries who participated in this study tended to be based in prominent community locations, which may also have influenced their capacity to build and improve local knowledge.

"Especially because it's local, they know that you are working in that area, they know that it's local to them, it's not somebody ringing from [area] or [area] or outside, you know they're ringing because they're looking for a local programme and when they know that's the area you're working in, they're happy about that." P22, LSO

While building local knowledge was considered very much a day-to-day part of the role, this was often labour intensive. It was conducted and driven by the intermediary themselves, and many intermediaries spoke of the difficulties and challenges of keeping their local knowledge up to date.

"It's just very, very difficult... I wouldn't write any of this stuff down... I wouldn't necessarily be compiling a resource list." P18, SP

Services and resources developed and changed rapidly in the community meaning intermediaries needed to be constantly updating, searching for, and retrieving up to date information.

"My former co-ordinator here... she used to say there's an awful lot of Nancy Drew work in being a CSDO [community sports development officer], and that's a really accurate description." P12, LSO

3.3.4.2 Sub-theme 2: Partnerships and collaborations

3.3.4.2.1 Building partnerships and collaborations

Intermediaries also spoke of an ongoing process of utilising and building networks of partnerships and collaborations within their community and local context. Both intermediary types spoke about a multitude of partners within these networks, across the community (such as local voluntary groups), local authority (such as local county councils), healthcare services, and PA and exercise sectors (both providers and sport organisations).

“So, you are now linking in with the HSE, Sláintecare, [local council], other departments, so we’re all kind of starting to work together or meet or share details or network.” P22, LSO

Often these partnerships developed naturally over time and constituted a ‘coming together’ of partners working in the same area.

“A lot of the work in the initial months was around networking, with local services, local sports partnerships, group supports, just everything that was available.” P19, SP

3.3.4.2.2 The benefits of partnership working

Many intermediaries spoke of cross-referrals between their services and their partners’ services, bringing new service users to intermediaries and facilitating onward referrals to community partners.

“They [partners] would know a lot of the people in the area... they would probably know who were... the people that were the most actually in need of the activities.” P29, LSO

All intermediaries perceived themselves to be working in collaboration with their partners, to identify and respond to the specific needs both of their local community and their service users.

“We will review that now and look at what opportunities could we make available to people, is there anything we need, could we get a grant for that, or get our heads together and have a chat about need and I suppose filling the gap.” P03, SP

Many LSO spoke about being approached by community partners to organise specific local PA groups for their members. LSO explained that because of this, local needs were met, and members were then introduced to LSO and other local PA available through the local sports partnership.

“So, we would identify the need within the community... I would send out an expression of interest form to those groups and they would come back to me with the activity they want to do and when they

want to do it... there could be a group in [location] that want to do Pilates on a Tuesday night after their meeting so I would try and facilitate that.” P8, LSO

Similarly, SP intermediaries also spoke about arranging and facilitating local PA groups such as walking groups for their service users.

“I’m [based] in the community centre, and the health project manager is a colleague of mine. So, if I’ve got five women who want to do activator poles walking, she’ll be like, okay, let me think. I can probably try and put that on in January... I have a bit of leverage to advocate for people, if they want to do something physical and it doesn’t exist, and I know that we can get that going.” P18, SP

Partners provided important resources such as equipment, funding, and venues for local PA groups. Partners could advertise or promote the intermediary service and local PA groups, assist with delivery of the local PA group, or provide PA instructors who would lead the group.

“We work with [sport] national governing bodies as well. So, they’re a really good resource for us because they have expertise and coaches. They understand the clubs that might be in a specific area, particularly if it’s rural [county], and we’re not really quite familiar with that place.” P12, LSO

3.3.4.3 Sub-theme 3: Local resources

3.3.4.3.1 Quality and availability of local PA

There was a large variety of local PA groups available in the intermediaries’ local contexts. Some of the more popular choices were dancing, chair-based exercise, local gyms and leisure centres, yoga and Tai Chi in addition to sports, gardening, and water-based activities.

“We’d do different things like sticks [pole walking] and cycling for older adults, leisure cycling, golf, pitch and putt, walks, outdoor Activator [pole walking]... then come September you’re back at your

indoor stuff, the likes of your yoga, Pilates, Tai Chi, Zumba Gold, line dancing, football, badminton, pickle ball.” P08, LSO

Walking groups were by far the most reported activity. Intermediaries highlighted both the popularity of walking groups amongst their service users, as well as the informal social nature of these groups.

“Especially those that have been very, very isolated for a very long time, things like walking groups and stuff like that are great because they're not formal. You're not being asked to sit in the class and say your name and who you are, and it's just turn up. If you want to talk to someone, you can talk to someone. But if you don't, you don't.”

P28, SP

While some intermediaries considered themselves to have access to many local PA groups in their area, others were not as positive. This appeared to be due to a general lack of human and community resources, or a lack of groups appropriate for their service users.

“To be honest with you I feel that if it wasn't for [the] sports partnership in [county] there'd be very little there that's successful for people.” P03, SP

Only one intermediary (P12, LSO) explicitly said that they would choose a local PA group for their service users based on the quality of the group. However, there was some evidence that intermediaries performed quality assurance on the local PA groups they connected their service users to. For example, intermediaries would try and ensure that both the venue and group content was suitable and accessible.

“You can pick up straight away on when things are not quite right, whether it's venue, whether it's the tutor, whether it's the group of people you brought together, whether it's the exercise that's been delivered.” P12, LSO

Feedback, both positive and negative, from service users who had attended the groups was another quality assurance measure used very frequently to make sure that the group was suitable and of an appropriate standard.

“When you link in, I will review you in six weeks’ time, you will come back and talk to me about the art class or the physical programme. I want your feedback because your information will help another person.” P27, SP

Some intermediaries admitted that in the past they had experiences of referring service users to poor quality groups, and the negative experience that service users had may have affected their participation and engagement.

“There was a group that I was referring into... for a number of weeks... and the feedback I was getting from participants... was that it kept getting cancelled. Or they weren't being informed that it was cancelled, and people were turning up, and then there was no one there.” P28, SP

3.3.4.3.2 Working in rural areas

Intermediaries working in rural areas also reported significant, unique challenges to their work, with scattered hubs of community resources and activities. Word of mouth and local contacts were of particular importance to rurally based intermediaries in developing their networks.

“Especially in the rural community... It's all different halls, and centres, and small places. It's word of mouth... it's about knowing a person. So, I'll contact or email somebody in the different centres and keep up to speed with them.” P21, SP

Being sensitive to the needs of small communities was an additional skill needed by these intermediaries.

“It's just a kind of a sense of the nature of the geographical area and the people living in the village and you kind of get a sense of that just working for years.” P23, SP

Rural isolation was also highlighted as a potential reason for referral. Issues that likely were contributing factors to rural isolation also made it difficult to access PA groups and intermediary services generally, such as lack of transport.

*“Transport is always a problem... when they can't access it, because
it's too far away.” P01, LSO*

3.3.5 Summary of main findings

Study 2 The Processes of Intermediaries

SP received referrals after a change in life circumstances or to address a pre-existing health issue, and facilitated connections to local PA groups. Their interventions were the most intensive, consisting of an in-depth, holistic assessment of interests and potential barriers and a person-led, flexible approach to follow-up.

LSO mainly received self-referrals to connect to local PA groups. Follow-up was short, consisting mainly of practical assistance and encouragement, and concluded once a successful connection to a local PA group had been made.

The main role of **HPO** was that of smoking cessation officers; only brief interventions and signposting to PA were performed but this was not considered to be routine practice.

Intermediaries in this study described how knowledge of **local services**, a broad array of community partners as well as a diverse variety of local PA groups (such as walking groups, dancing, and chair-based exercise) all **facilitated their interventions**.

3.4 Findings (b)

This section reports the results in relation to the population referred to intermediaries, which specifically addresses objectives ii) and iii):

- ii) To explore the profile of people referred to an intermediary who are then connected to community-based PA services.
- iii) To explore how intermediaries choose a suitable and appropriate community-based PA service for the person referred, and pathways of connections onwards from the intermediary to these services.

Two themes were identified: profile of individuals referred to an intermediary and accommodating complex needs. Together, these themes describe the at times complex physical, mental, and social health needs of intermediary service users and how intermediaries adapted their processes when connecting these individuals to local PA. The findings in this chapter are presented in relation to SP and LSO intermediaries only, due to the finding that HPO did not facilitate connections to local PA. Themes and sub-themes are shown in Figure 3-2 and a detailed description of each theme is given under the relevant heading.

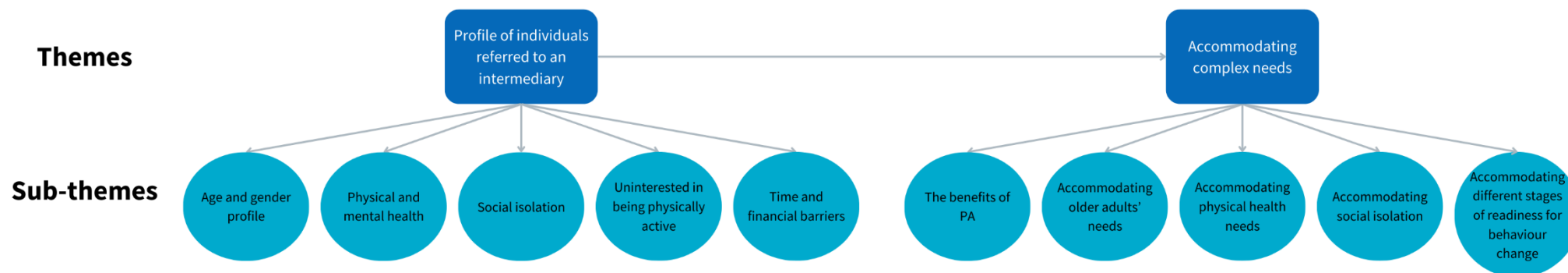


Figure 3-2: Themes and sub-themes identified in relation to the population referred or self-referred to social prescribing link workers and local sports partnership community sports development officers

Abbreviations: PA — physical activity. Figure reproduced in part from [442].

3.4.1 Theme 1: Profile of individuals referred to an intermediary

This theme describes how intermediary service users were reported to have complex presentations of their physical health, mental wellbeing, and/or social circumstances. It also describes some of the barriers that intermediary service users faced in the context of being physically active. This theme is divided into five sub-themes: 'age and gender profile', 'physical and mental health', 'social isolation', 'uninterested in being physically active', and 'time and financial barriers'.

3.4.1.1 Sub-theme 1: Age and gender profile

No intermediary service had one standard target service user in the community. As such, intermediaries worked with people of all ages. LSO reported working with children, adults, and often with older adults.

"I'd have primary schools and secondary schools as part of my remit in terms of youth programs...primarily my target group would be to provide physical activity to people with disabilities and older adults."

P02, LSO

SP worked primarily with adults aged 40 – 80+. Therefore, health issues more associated with older people, for example, poor mobility, balance issues, and falls were frequently reported by both SP and LSO. The different levels of function amongst older adults, and even the variation amongst older adults of similar ages, was also highlighted by intermediaries.

"And it's such a broad spectrum... from you know, your ninety-seven-year-old woman who's still living independently... And you could have the seventy-year-old person who, you know, to all intents and purposes, is far more vulnerable than that ninety-year-old. It's such a broad, broad area." P16, SP

Mobility issues would also influence the choice of PA programme and may have limited the options available to the service user.

“The programme we run would really only be suitable for people that walk unaided at the moment and people that wouldn’t have had multiple falls recently.” P11, LSO

Some intermediaries reported significantly less men accessed their services and engaged in local PA groups. Intermediaries felt that this was because men did not enjoy the social aspect of the groups, or it was not as much of a driver to participate.

“From my experience women definitely look for the social aspect of the exercise programme whereas men are more focused on getting fitter.” P03, SP

“Now I’d say off hand the majority of those would be female, I’d say if you had fifty males [out of >500 participants] out of that you’d be doing well.” P08, LSO

3.4.1.2 Sub-theme 2: Physical and mental health

Both types of intermediaries reported that they commonly worked with service users with chronic disease or a disability; examples of chronic diseases included COPD, diabetes, obesity, osteoporosis, CVD, neurological disease, cancer, asthma, drug and alcohol misuse, arthritis, chronic pain, and frailty.

“They’d have a wide range of health conditions... diabetes, obesity, osteoporosis, osteopenia, people with high blood pressure, high cholesterol.” P11, LSO

However, some LSO felt that working with service users with chronic disease was not currently part of their remit, but that this was an evolving target group.

“We’re slowly trying to work towards that or align some of those [local PA] programmes to chronic diseases.” P24, LSO

In contrast, service users could be referred to SP services because they had a chronic disease.

“At least 60% of the clients [that] have been referred report at least one chronic health condition.” P19, SP

Mental health issues (such as depression, anxiety, and more severe mental illness) and dementia were also commonly seen conditions amongst intermediaries. The presence of an undiagnosed mental health issue could have also arisen during the in-depth assessment carried out by SP (See Section 3.3.1.2.2) and may not have been mentioned at the time of referral.

“So, a typical case would be Mary goes to see her doctor... the doctor writes and says can you see Mary, Mary likes knitting, art, painting, and so forth. Mary comes in to the social prescriber and it’s nothing to do with that. It’s to do with loneliness, it’s to do with mental health, depression, low mood.” P27, SP

Both physical and mental health issues were identified by both types of intermediaries as barriers to engaging with their service and engaging in PA. For example, the service user’s physical health issues or physical ability, or their own perceived limitations, may have meant they were uninterested in engaging in local PA.

“Particularly because I work with an older cohort who might have mobility issues and they might have chronic pain, a lot of the time they mightn’t be willing to engage in physical activity or it just mightn’t be something that they feel they need or want... even the thoughts of chair yoga would be daunting for people.” P19, SP

Experiencing low mood and anxiety were also reported to cause significant distress or difficulty around joining a group.

“Mental health would be the barrier, the challenge, it would prevent them in the sense that they would have anxiety, and they’d have that fear of oh god, how could I go in here and do it.” P27, SP

3.4.1.3 Sub-theme 3: Social isolation

All intermediaries also highlighted that they worked with people who would be considered ‘vulnerable’, and this could be on foot of their social or socioeconomic circumstances.

“My role is social prescribing link worker for the... [Sláintecare] Healthy Communities areas, so that covers the most disadvantaged communities... so that will be our target group.” P28, SP

“So, we have a very specific five target groups... women and girls, older adults, people with disability, ethnic minorities, and people from disadvantaged areas as well.” P12, LSO

One particularly vulnerable group were the socially isolated. SP overwhelmingly received referrals for people experiencing social isolation or loneliness (See Section 3.3.1.1). Experiencing social isolation was reported to negatively impact motivation to continue attending the intermediary service or local PA group.

“Typically, people who I see are vulnerable. They are isolated in the community. They mightn’t be leaving their house very often. They don’t have many connections in the community.” P18, SP

3.4.1.4 Sub-theme 4: Uninterested in being physically active

The majority of LSO reported working with and targeting inactive individuals in the community.

“The people who get in touch with us are generally people who aren't physically active... if they've gotten in touch, it's sort of like they're reaching out to look for a little bit of help.” P12, LSO

During the initial contact or assessment, SP reported that they discussed with the service user if addressing physical inactivity was something that they were interested in doing, or how much of a priority it was for the service user at the time. A finding of note was that some SP reported only a small proportion of their service users were connected to local PA.

“So, in terms of physical activity, I'd say at the moment about 25%, maybe even 30% of people we'd refer on to [physical activity].” P28,

SP

There were two reasons for this. SP reported that service users were seeking connections to other community activities, or they felt that they were already doing sufficient PA.

“They don't want to [engage in physical activity]. A lot of people actually do a lot of walking themselves, so they're like “I already have that down, I want to do something relaxing”.” P18, SP

Other service users had been referred to the service (or it transpired during the assessment) to address more basic needs such as housing, food poverty, or welfare concerns. These service users received onward referrals to other services as a priority, for example to access relevant supports or befriending services.

“Food poverty is a big issue.” P16, SP

“Then there can be support classes... there's a couple of resource centres running Coping with Christmas, or coping with stress, and lots of different parental courses... Mother and toddler groups.” P21, SP

For service users that were very impacted by a chronic disease, social isolation, or loneliness, SP felt they did not perceive PA as a high priority or solution to these issues.

“Say you had somebody with diabetes or some chronic health condition, they are so focused on their day-to-day and managing it from a very basic level that they don't maybe see themselves as somebody that would benefit from movement.” P03, SP

3.4.1.5 Sub-theme 5: Time and financial barriers

Intermediary service users experienced other intra- and extra-personal barriers to engaging in PA, or indeed with the intermediary service. Family, work, and life commitments were a significant barrier. Trying to schedule appointments with the service user or choose an appropriate group around these commitments could be difficult.

“I do get referrals in for people who are still working and would like to access some sort of exercise group, and then it tends to be only mainstream gym classes that are available in the evenings, and that might be a source of anxiety for the person.” P09, SP

Service users may not have been in a financial position to engage in PA or may have lived in an area with little access to suitable public and/or accessible transport. Transport was

a key barrier reported by all types of intermediaries, regardless of whether they were based in a rural or urban area.

“We quickly identified with adults with disability, the parents don’t still value it if the son or daughter is in their thirties or forties, they’re not going to be driving them over the roads to do sports activities.”

P08, LSO

3.4.2 Theme 2: Accommodating complex needs

This theme discusses intermediaries’ attitudes towards PA and being physically active, and how intermediaries catered to the health needs of their service users throughout their interventions when connecting people to local PA. This theme is divided into five sub-themes: ‘the benefits of PA’, ‘accommodating older adults’ needs’, ‘accommodating physical health needs’, ‘accommodating social isolation’, and ‘accommodating different stages of readiness for behaviour change’.

3.4.2.1 Sub-theme 1: The benefits of PA

Despite the challenges posed by the health issues discussed above, all intermediaries recognised the value of PA and its ability to improve all aspects of health; physical, mental, and social.

“I think that you know getting people out, getting people active... it’s that holistic approach of getting people out into the community and having that link.” P22, LSO

“You know as a social prescriber often I feel my role and my responsibility... [is] just kind of an educational piece around the importance of looking after your body.” P19, SP

There were several reasons as to why intermediaries connected service users to local PA groups, and what they perceived as benefits of engaging in PA in such a setting. Some service users were motivated and activated to engage in PA, through their own goals to attend a specific group, to improve their health and fitness, to help manage a pre-existing condition, or by external motivators such as recommendations from HCPs. They may also

have been physically active in the past and wished to return to their previous activity level.

“I would have had young men, and they might have played five a side, and been very into their fitness... and I would say, well, why don’t you come back and start?” P21, SP

Local PA was viewed as an enjoyable activity.

“You want them to go away feeling that they enjoyed it, and that it was comfortable, that they could manage it, so that they will come back.” P02, LSO

It was hoped that service users could then progress on from the local PA group to exercising more independently.

“But it’s always very much focused on the beginner, or getting that person off the couch, so that they have the toolkit, go one foot in front of the other, and then, when you have them started, that they can move on to the next one.” P02, LSO

Intermediaries reported that PA could help in the management of certain diseases and improve recovery after injury or illness.

“Other ones that I know will have something to do with exercise could be... Any of the chronic health stuff. Then I’d kind of be like, okay. Exercise. Like in the back of my head.” P18, SP

PA had the ability to improve mood and wellbeing.

“A balanced body, a balanced mind.” P07, SP

However, all intermediaries recognised that some service users needed more support to become more physically active, and that for some people it was not a simple process to connect, attend, and continue to engage in PA.

“But people just don’t know where to go [after discharge from healthcare settings] ... I think you need to physically hand them something before they walk out the door. Maybe it’s me, with my number... she will be able to help you and tell you where in your area

there is a group, or a person, or a tutor or something... otherwise they're walking out the door and they're probably going to be back with a reoccurrence [of health issues] in a couple of months." P02,

LSO

As such, several strategies were identified by intermediaries to address barriers faced by their service users.

3.4.2.2 Sub-theme 2: Accommodating older adults' needs

Some intermediaries reported that older adults could need more support when connecting to local PA. This was reported particularly for those who struggled with digital literacy. Many LSO (and some SP) reported that information about local PA groups had moved online to websites, social media, or email mailing lists and that registration for their groups had also moved online.

"Somebody'd be running an activity programme or whatever, and they'd book on Eventbrite, but fifty percent of my clients wouldn't be able to use Eventbrite." P07, SP

All intermediaries were aware of this potential need in older people and offered support to those that were less confident with their digital literacy.

"A lot of older people are struggling with the online, so we still facilitate that in terms of the walk-ins or posting out the registration forms as well." P08, LSO

While older adults were considered to need more assistance and support, many LSO considered them to be open to taking part in local PA and particularly interested in local PA designed specifically for older adults, or groups that focused on falls prevention and balance.

"We do chair-based exercise classes, but it's very functional... it's focused on falls prevention, a lot as well." P29, LSO

3.4.2.3 Sub-theme 3: Accommodating physical health needs

Chronic diseases were perceived by many SP intermediaries to impact on the mental health, physical health, and social engagement of service users. These aspects of health were considered interconnected, and all could potentially impact on the other.

“We would get a lot of mental health conditions... that would often go hand in hand with other conditions, somebody might develop a mental health condition such as depression or anxiety on foot of a physical chronic condition or diagnosis, or on foot of recovery from a long-term physical illness like cancer.” P09, SP

To identify an appropriate local PA group for people with chronic disease or disability, intermediaries highlighted that it was important that the service user was medically cleared for whatever local PA was suggested. The reason for this was slightly different depending on the type of intermediary. LSO required medical clearance for some of their programmes as part of their in-house physical health screening process (See Section 3.3.1.2.1). These physical health screens were also seen to provide useful information to pass on to the PA instructor, or to help choose an appropriate local PA group as per the service user's health needs.

“There's a health screen where we find out any information in advance and then we can let the instructor know if there's back issues or if they're on medication.” P08, LSO

SP reported that they often sought medical clearance for service users with more complex health needs, or with multiple health conditions. Some SP reported that they did not feel confident in their health knowledge or their ability to provide tailored supports for these service users. In this case, they referred service users back to HCPs for clearance.

“I just had a lady in recently who had fibromyalgia and she... had about twelve different things and she was referred by a physio... [I would] tell her what's available but I will be saying to her you need to check back in with the physio before you would participate with any of these activities.” P23, SP

Only one SP (P03) identified additional training needs required around PA.

“Maybe there is something there that I could be doing differently around my own conversations and how I lead the conversations around exercise as well... maybe there’s training there available down the line that I should be doing to hone in on that.” P03, SP

The local PA group selected also had to be able to accommodate all levels of fitness, from the complete beginner to people who may have been physically active in the past and were re-starting PA. In addition to assuaging fears around starting PA (See Section 3.3.2.1.2), this was also to ensure that the service user felt safe engaging in the specific activity.

“We had a lot of people who saw us as a complete and utter safety net, that they knew if they were going to [a] sports partnership program, that it wasn't going to be the elite.” P02, LSO

The local PA group also had to be able to accommodate the service user’s additional needs and abilities in relation to their physical health. This could be through an all-level group delivered in the community, such as those run by the local sports partnership.

“Nine times out of ten we can generally always facilitate a group or an individual if they have extra needs... We will generally try and run a programme for them if it’s feasible.” P22, LSO

At other times, the service user’s needs and abilities could be accommodated through a condition-specific group (examples given included local PA groups for people with disabilities, frailty, COPD, Parkinson’s disease, and cancer survivors). ExWell Medical was another popular choice amongst SP intermediaries (See Section 1.5.2.1 for more information on ExWell) and was particularly promoted to their older service users, or those who had a chronic disease.

“There’s an ExWell programme in [location] that is medically supervised... so often the ones that wouldn’t do it [physical activity] or didn’t think they could can often [be] accommodated through that and that’s been hugely successful.” P07, SP

Both SP and LSO spoke of their ability to refer back to healthcare services; either to refer the person to their GP for follow-up of results from physical health screens, or in some cases to refer the person onwards to an appropriate healthcare service (such as physiotherapy) if they felt that the person's needs could not be accommodated by their service.

"Somebody might have a chronic illness or injury that we might not be able to provide them with something that we're doing, but again we might be able to link them back to the HSE and a health professional might have something more clinical that they could advise or provide." P11, LSO

Some intermediaries spoke about the need to ensure PA instructors were sufficiently educated about managing chronic disease, injury, or disability. That way, both referring agents and intermediaries could be confident that the service user would be engaging in safe and appropriate PA.

"For somebody who say is post stroke... just referring somebody into a mainstream gym where there might not be the understanding amongst the staff about how far to push the person, and what might aggravate an injury." P09, SP

3.4.2.4 Sub-theme 4: Accommodating social isolation

Participating in a local PA group according to intermediaries could facilitate new social connections and provide an opportunity for social engagement.

"A lot of the time we would kind of have a discussion around being sociable while also being physical." P19, SP

"Getting them back into socialising again and exercising with other people where it's more motivating and enjoyable than doing it in silo." P08, LSO

This was particularly relevant for service users experiencing social isolation, as local PA allowed the service user to connect socially.

"I try and suggest something physical... Usually the physical thing is part of a group and that... gives them that regularity of contact with a bunch of people." P07, SP

Connecting to other people within the community allowed for peer networks to develop, which was seen to facilitate engagement in PA.

"It's not just about the activity, it's very much about the people that are there, the welcome they get, the friendly face, the banter." P22, LSO

Intermediaries would try to foster social support for PA throughout the intervention. For example, intermediaries would encourage people to exercise in a group setting, rather than alone.

"I've had people who do yoga at home so while they're happy doing that they might want to get out and socially enjoy being part of a group." P23, SP

The local PA group would be carefully selected based on the level of social interaction within the group. This was particularly relevant at the time of this study when many local PA groups were beginning to be rolled out in-person after moving online during Covid-19 associated lockdowns.

"We did a lot of Zoom stuff as well, and people were so, so fed up of that... we've people that came on to Zoom [classes]... but they'd never been to a class in-person. So, they were delighted to get back out and meet people, and I do think it's a fear of missing out, and taking, grabbing everything, grabbing life, and doing everything they can rather than being stuck at home." P29, LSO

In addition to them attending the first session of the group for social support (See Section 3.3.2.2.1), intermediaries also spoke about arranging an introduction to the group if needed.

"Arranging to meet with the client... to introduce them to the group and to ensure that they are comfortable." P19, SP

3.4.2.5 Sub-theme 5: Accommodating different stages of readiness for behaviour change

SP intermediaries recognised that while the service user might not be mentally, physically, or psychologically ready at the time of their contact with them to make a behaviour change, this had the potential to change over time.

“But I suppose it's having an awareness that sometimes people aren't at the place to engage, and sometimes it is planting that seed.” P09,

SP

There were several different strategies used by SP to address this. Sometimes, extenuating life circumstances precluded the service user from engaging with the service.

“Life is complex as well, and the demographic that we have, people have a lot of challenges, so they could be doing really well, and then week five, something... in their life could go awry.” P28, SP

Some services were open to these service users re-referring when they felt they were more ready to engage with the service.

“Sometimes it is a matter of establishing a very good therapeutic rapport, closing the case because it's not the time, and being open to the person re-referring in.” P09, SP

If they did engage with the service, and faced barriers to engaging in PA, SP may have suggested another community activity to address a barrier, for example, an obese service user attending a healthy eating programme.

“Their first step... some of them have said that [what] they want to do is a healthy eating program, and we've referred them into that, and then hopefully, the exercise then will come further down the road.”

P28, SP

Sometimes, PA was incorporated into other community activities to introduce it slowly to the service user.

"Sometimes... the only thing that might work is beach clean ups because then they're walking as well so getting them to volunteer to something like that." P07, SP

Sometimes the intermediaries recognised that the service user may simply have been reluctant to take part in a local PA group and adjusted the level of support they provided in line with this.

"I think a lot of the time when people are reluctant, when there is something that they want to engage with but there's this bit of a barrier there, that offer of that support can be really, really helpful for people to actually take that first step and become more engaged."

P19, SP

SP explained that they used experience from previous professional roles particularly when working with service users who may have needed additional supports to achieve behaviour change.

"I bring in plenty of things from my [profession] training... motivational interviewing, little techniques like that, just to keep the person's morale up in checking in with them." P09, SP

3.4.3 Summary of main findings

Study 2 The Profile of Intermediary Service Users

SP and LSO intermediaries reported their service users tended to be **older women**, and in the case of SP, may have presented at **different stages of readiness for behaviour change** in relation to PA.

Both types of intermediaries also reported their service users experienced a **complex mix of physical, mental, and social health needs**, as well as other **barriers to PA** such as lack of time, lack of transport, and cost.

Both types of intermediaries recognised the **benefits of engaging in PA** on health and wellbeing.

SP and LSO described the **strategies they used** throughout their interventions to attempt to accommodate older people, physical and social health needs, and readiness for behaviour change, and connect service users to PA.

3.5 Discussion

This study aimed to gain insight into the processes, practices, and procedures of intermediaries in Ireland, when connecting people to local PA. This study described the steps involved in these processes for three types of intermediaries: social prescribing link workers (SP), local sports partnership community sports development officers (LSO), and health promotion and improvement officers (HPO). While a number of commonalities were identified across the three types of intermediaries, processes were varied and heterogeneous. This study also aimed to gain insight into the profile of intermediary service users in Ireland, and how suitable and appropriate community-based PA services were selected. The findings highlight that the population currently being referred to SP and LSO intermediaries tend to be experiencing poorer physical, mental, and social health and face barriers to being physically active. Despite this, intermediaries recognised the potential benefits of engaging in local PA and described using several strategies and accommodations to tailor their interventions to meet these additional health needs. This section discusses the findings in relation to both the processes of intermediaries and the population accessing intermediary services.

The first objective of this study was to describe the pathways of connections from the referring agent to the intermediary. Processes and patterns of referrals were heterogeneous between types of intermediaries, as may be expected based on the differences in job remit. The scoping review found the most common sources of referral were from primary care staff, GPs, or by members of the research team (See Section 2.3.3). However, intermediaries in this study reported that referrals were accepted from almost every source in the community, with few restrictions on who could refer and how. This highlights the accessible and open nature of these services, especially the acceptance of self-referrals. The fact that many intermediaries were based in non-healthcare settings may have also contributed to the accessibility of their services. Intermediaries who participated in this study were based in community centres, local councils and local development companies. Intermediaries therefore have the potential to reach many population groups living within the community to help improve their PA

levels, including those who may be experiencing increased barriers and inequalities in accessing healthcare services.

A major finding was that while HPO received referrals for community-dwelling adults, they did not typically connect these service users onwards to local PA, instead conducting brief interventions or signposting. Previous professional roles and experience with PA likely influenced whether HPO performed these interventions [349], as the HPO who took part in this study did not consider PA brief interventions to be routine practice, or a task that should be performed by all HPO. However, the remit of a HPO in Ireland is very broad. They are expected to deliver health and wellbeing training programmes to healthcare service staff, provide knowledge and expertise, and support different models of care within the healthcare service to deliver health and wellbeing gains for the population [213]. This is in addition to their work providing one-to-one smoking cessation services. The current focus of the role on smoking cessation may reflect a key implementation or policy area at the time of this study [448]. While PA promotion may simply not be a priority at present, priorities could shift and change over the coming years.

This study also found diverse reasons for referral to intermediary services, such as social isolation, social exclusion, socioeconomic difficulties, alcohol and drug issues, and acute or chronic health conditions. However, both SP and LSO reported receiving low numbers of referrals from a referring agent specifically to increase or improve PA (formal referrals). SP in this study tended to receive referrals for social reasons, similar to many social prescribing services across the world [167, 438]. This was not a wholly unexpected finding for SP, as studies from the UK found that referrals to SP tend to be for lifestyle or general physical health improvement, rather than PA alone [178, 248, 392, 396]. Conversely, while individuals were referred to or attended LSO exclusively to participate in their PA groups, this was mainly through self-referral. The lack of formal referrals is perhaps less obvious for LSO, given how well-established both the role and remit are in relation to PA [16, 202]. Despite low numbers of formal referrals to both SP and LSO, many intermediaries spoke about discussing the service user's PA levels and their interest in PA, and then connecting service users to and supporting them to engage in

local PA. This appears to represent a disconnect between the reason for referral and what the service user reports they want to address [354]. It also highlights intermediaries' awareness of the potential benefits of PA in addressing and improving multiple aspects of health. Overall, this study suggests that formal referrals to both LSO and SP to engage in PA could potentially be improved. This finding is discussed in further detail in the overall discussion chapter of this thesis.

The second objective of this study was to explore the profile of people referred to an intermediary who are then connected to community-based PA services. This study found that individuals accessing intermediary services appear to be experiencing poorer physical, mental, and social health and that intermediaries tried to accommodate these needs when connecting service users to suitable local PA. Intermediary service users tended to be older, with age ranges from middle age to oldest old. This finding has two implications. The first is that intermediaries tend to work with older people, who are known to experience higher rates of physical inactivity compared to younger adults [11, 23, 294, 449]. The second is that younger adults, who also may be physically inactive or sedentary, appear not to be accessing intermediary services. This is a finding of note considering that in Ireland, PA participation declines from early adulthood to middle age [449]. Some intermediaries also reported that less men accessed their services, and the decline in those achieving the PA guidelines is even starker if gender is considered, falling from 71% of males aged 15 – 24 to 53% of males aged 45 – 54 [449, 450].

Intermediary service users had diverse physical and mental health needs and co-morbidities, which may have been the reason a referral was prompted to the intermediary or was an incidental finding during follow-up. Given the older age profile of intermediary service users, this was an unsurprising finding. Chronic disease such as arthritis, coronary heart disease, cancer, diabetes, COPD, and asthma are all more common in older people and geriatric syndromes such as frailty and mild cognitive impairment exclusively affect older people [451-454]. Many intermediary service users were also reported to experience social isolation or loneliness. Studies have also shown that greater levels of social isolation and loneliness in older people are associated with lower objective and subjective PA levels and greater levels of sedentary behaviour [455-

458]. Social isolation and loneliness are common reasons for referral to SP services across the world [181, 257, 459, 460], and to SP intermediaries in this study. Data collection for this study was carried out in 2022, when many intermediary and local PA groups/services were resuming or reopening after periods of Covid-19 associated lockdowns. Lockdowns had detrimental effects on the ability and opportunity for individuals to engage socially, with many experiencing social isolation [457, 461, 462].

Engaging in local PA can be a social event, and engagement is influenced by those who take part in the group and the social support and social capital they provide [285, 457, 463]. Intermediaries in this study recognised that engaging in their services and participating in PA was an effective way to negate or improve social isolation. This is likely a bi-directional effect; participating in a local PA group creates new social connections, and these new social connections foster increased mental wellbeing, social support, and motivation to engage in PA. As a result, the person may also be more likely to engage in social events that are inherently active e.g., attending exercise groups in the future, attending other community activities generally [227], or simply travelling outside of the home [455, 464, 465]. The ability of SP interventions to impact on loneliness and social isolation has been observed in the literature [227, 466] but to date have not been reported in the literature for LSO or other sport connector interventions.

The third objective of this study was to explore how intermediaries choose a suitable and appropriate community-based PA service for service users, and pathways of connections onwards from the intermediary to community-based PA. A person-centred approach was evident across all intermediary types in terms of assessment, follow-up, and in choosing a local PA group/service for the service user, regardless of the length of their intervention. This was true even for LSO who reported more limited time with the service user, in contrast to SP who may remain in contact with a service user over a period of months or even years. In the Let's Get Moving PA pathway, designed for the UK NHS, follow-up is recommended at three and six months after a PA intervention [252]. Longer periods of follow-up or more intensive follow-up have been identified as potentially successful components of PA interventions [97, 172]. There is also evidence that more sessions with SP or other intermediaries (health educators or counsellors,

exercise specialists) lead to greater increases in self-reported PA and uptake of community resources [97, 180, 257].

However, it is unclear whether different referral patterns, assessment, and follow-up practices influenced the interventions delivered by SP and LSO intermediaries. For example, the optimum number and duration of contacts to initiate and maintain participation in PA remains unclear [285], particularly for service users with low agency or more complex health needs or issues. These service users may require more support and more intense interventions [107, 180, 220, 235]. This study identified that SP not only work with service users with complex needs but provide ongoing support to service users who were at different stages of readiness in relation to PA behaviour change. Unfortunately, the interview schedule was not designed to explore how intermediaries may have handled resistance or built motivation over time. Future studies could take into consideration the findings of this study regarding the length of follow-up provided by each type of intermediary, as this may be an area of further research i.e., does more support throughout this process, over a longer time, equal more successful connections to local PA, and who would benefit from this more intensive support?

Positively, all intermediaries in this study appeared to support those living with physical health needs to connect to and participate in PA, through strategies such as tailoring and personalisation of their interventions. For people living with a chronic disease, PA and exercise programmes that are tailored to their individual needs can provide substantial benefits in relation to physical functioning, health, and wellbeing [161, 467, 468]. PA interventions that include personalised advice, behavioural supports, and follow-up may improve clinical outcomes for people with chronic disease [96]. All of these elements were performed to some degree by both LSO and SP intermediaries. This finding is discussed in further detail in the overall discussion chapter of this thesis (See Section 5.2.1.4). In addition to this tailored approach, often the process of selection of a local PA group was practical and person-centred. However, bar one participant, no intermediary interviewed for this study mentioned quality of the PA service as a factor in their decision to recommend a service. This may be in part due to an already demanding schedule working with service users for sometimes months or years, but also the fact that

outcomes in relation to onward connections to local PA were poorly captured. Additionally, objective data on PA levels were infrequently collected by intermediaries.

Evaluating outcomes using appropriate measures would allow intermediaries to appraise the success of their onward referrals and/or quality of the PA service. PA is not included as a core outcome in the HSE Social Prescribing Evaluability Assessment [181], and PA levels were rarely measured by Irish SP in a survey of their evaluation practices [184]. The M1 questionnaire described by LSO asks respondents to recall how many days they were active for 30 minutes or more in the last seven days [469]. This measure was used as per Sport Ireland guidance, which recommends use of the tool in addition to qualitative evaluation for purposefully selected local PA groups to understand what factors contributed most to their success [469]. However, it may be unreasonable to expect evaluation at that level without further support and resources and highlights a potential area for further evaluation and research collaboration. Having more robust pathways and procedures in place for the evaluation of PA outcomes, and of the local PA groups being accessed by service users, may help to improve service user outcomes. This may also help to reassure potential referring agents as to the safety and quality of the PA being delivered, thus helping to improve formal referrals.

The final objective of this study was to identify how intermediary services were established and embedded within the community, and several important contextual factors were identified which influenced the processes of intermediaries. Intermediaries were generally positive about the breadth of local PA groups available in their communities or took steps to develop these in collaboration with their partners. A wide range of good quality and thriving community and voluntary sector services and activities is an important facilitator of any work done by an intermediary [167, 273, 292, 398], and a lack of appropriate or available services can hinder their work, or disproportionately affect individuals who have additional needs [85, 160]. A commonality across all types of intermediaries was building knowledge of local PA groups and services, which was found to be a key input in the intermediary intervention. Other studies have also noted the importance of this local knowledge, and the importance of the intermediary's own personal skills in developing and maintaining this

knowledge [238, 275, 438, 470]. Intermediaries in this study were based in a variety of central community locations and this, alongside dedicated time and resources to build their local knowledge, means they are likely best placed to recommend individualised PA and wider health and wellbeing resources specific to their local context. However, the time-consuming nature of maintaining this knowledge was highlighted by many intermediaries in this study. Another limitation of the reliance on intermediaries to gather and update this information individually is services being missed due to limitations of their awareness, or local knowledge being inconsistent or outdated [471].

Another commonality for all types of intermediaries was their commitment to building and maintaining partnerships and networks of collaborators. Intermediaries reported that partnerships allowed them to connect service users to appropriate and properly resourced PA services. Development of effective partnerships and referral pathways relies on careful selection of partners who will complement each other, who will strengthen the partnership's goals, and provide effective and efficient services to meet the needs of service users [273, 472, 473]. This study found intermediaries used a 'bottom up' approach to building partnerships and collaborations, with active 'seeking out' of local community partners. This is particularly relevant in the context of the Sláintecare roll out, as a key focus is partnering with local agencies in order to target specific health and wellbeing needs in the local community [50, 51].

3.5.1 Strengths

To the best of our knowledge, this study is the first to describe in detail how interventions are delivered by three types of intermediaries in Ireland (social prescribing link workers, local sports partnership community sports development officers, and health promotion and improvement officers) when supporting service users to connect to and take part in local PA. While social prescribing link worker processes, models of delivery, and intervention components have been described in the literature [160, 318, 438], no studies have described their interventions specifically when supporting service users to connect to and take part in local PA. This study identified that many components of SP interventions, such as building local knowledge [318, 438], and providing holistic and flexible support, motivation, and empowerment to service users [160, 233, 319] to

achieve connections to community activities [232] are also applied when SP support service users to connect to and take part in local PA. This study has also provided an overview from intermediaries of the profile of intermediary service users in Ireland, and their physical, mental, and social health needs. These health needs have also been identified in relation to SP [160, 438] and other intermediary (health mentor) [309] service users, but this study is the first to describe Irish intermediary service users undergoing interventions specifically to connect to local PA. A particular strength of this study was the robust qualitative analysis undertaken. This study generated over 17 hours of interview data, and qualitative content analysis was a useful methodology to explore these large amounts of data, and to delineate and describe the complex interventions delivered by the three types of intermediaries. In addition, extensive reflexive records and notes were kept throughout, ensuring rigour, and providing an audit trail.

3.5.1.1 Impact of knowledge user engagement

An additional strength was the inclusion of knowledge users to improve the development, design, relevance, and dissemination of the research as well as provide credibility and confirmability of the qualitative findings. The study advisory panel advised on the types of intermediaries to include in this study and were able to provide contact details for potential gatekeepers. Members also suggested using social media to aid recruitment of potential participants and assisted with recruitment where possible by circulating the publicly available study invitation. Members also advised no changes to the proposed interview schedule. When planning dissemination of the results, panel members advised that these should serve to focus on key findings and highlight good practice. They suggested disseminating the results of the study in an infographic, suitable for sharing through mailing lists and social media. While the panel members suggested changes to the language and format of the infographic, they were satisfied with the content. The infographics were circulated through the panel member's personal networks, reaching an audience of social prescribing link workers, local sports partnership staff and service users, HSE staff, and the Sláintecare Healthy Communities network. Overall, the contributions of knowledge users to this study informed important research decision making, verified the trustworthiness of the findings of this study [474,

475], and ensured the findings of this study were disseminated beyond traditional academic publishing to a wide variety of stakeholders.

3.5.2 Limitations

This study has several limitations. The sample was self-selected, and intermediaries who participated in this study tended to have professional backgrounds in health and social care and/or PA. Our sample could therefore represent those with a professional interest in PA promotion and not be representative of the processes of intermediaries generally. We aimed to recruit participants from the entire Republic of Ireland, but certain areas of the country were underrepresented, for example, counties in the midlands and south of the country where intermediaries may report different processes for connecting individuals to PA services. SP and HPO participants tended to have limited experience in their role, with the modal length of time in the role being one year. However, this is likely a reflection of new investment by the national healthcare service in intermediary services, with many of these roles being created within the last few years. For example, at the time of publication of the HSE Social Prescribing Framework (2021), there were 30 social prescribing services implemented across the country [183]. From 2021 to 2023, this increased to almost 50 services (personal communication via email with HSE Mental Health and Wellbeing programme, August 2023). An investment of €10 million to the HSE was approved over a two-year period from 2021 – 2022 as part of the Sláintecare Healthy Communities initiative, and represents the largest investment in health promotion and prevention in Ireland for 20 years [214]. As many of these new roles are still in development, their full scope and remit will continue to evolve over time. Therefore, this study represents an overview of the processes and practices relevant to the intermediaries who participated in this study at this specific point in time, which is likely to grow and progress in response to local needs, funding, and policy directives. A further limitation was not including referring agents which limits insights into their experiences of engaging with this intervention. This finding is discussed in further detail in the overall discussion chapter of this thesis.

Intermediaries were not asked to provide objective service data regarding the profile of people referred to their services, rather we relied on their personal account. In addition,

service users were not interviewed, so we were unable to confirm or verify information regarding their profile. Therefore, the profile of service users was based mainly on self-report and recollection and may have been subject to the intermediaries' own cognitive biases and assumptions regarding their service users. The interview schedule was also not designed to differentiate intermediaries' practices and strategies when working with service users with needs of varying complexity, therefore there are some limitations to the analysis in this study. For example, we were unable to conduct a more in-depth exploration with participants of their processes, strategies, and perceptions of working specifically with service users with additional needs. While some intermediaries who took part in this study had previous experience or further training to support them working with these service users, this was not the case for every participant. Therefore, it is unclear whether intermediaries feel comfortable and competent delivering interventions for these service users, and the optimum processes needed to facilitate connections to local PA when working with service users with complex health needs.

3.5.3 Conclusions

Social prescribing link workers (SP) and local sports partnership community sports development officers (LSO) are two types of intermediaries in Ireland that facilitate connections to local PA, by providing different levels of support. Health promotion and improvement officers (HPO), the third intermediary type studied, did not actively connect service users onwards to PA. Service users of SP and LSO had complex physical, mental, and social health needs, and experienced barriers to being physically active. This study described the additional steps taken during SP and LSO interventions to assist older people, people experiencing social isolation, or those living with a chronic disease to connect to and take part in PA. Many of these were novel findings, as there has been little published literature describing SP and LSO interventions when connecting individuals to local PA, and a dearth of literature describing these interventions in the Irish context. Despite this, referrals from healthcare and other professionals to SP and LSO to specifically improve PA are low. Considering the high levels of physical inactivity in Ireland, and the challenges associated with connecting physically inactive people to local PA, intermediaries may be an under-utilised resource to increase PA.

This study helped to address the evidence gaps and key uncertainties identified in the scoping review (Chapter 2) in relation to the processes of intermediaries; particularly referral patterns, onward connections to local PA, and 'real-world' evidence regarding the assessment, follow-up, and discharge processes of Irish intermediaries. This study identified and described the steps involved in the processes of establishing and embedding intermediary services within the context of their local community, and pathways of connecting individuals to intermediaries and onwards to local PA. This is an important step to improve evaluation efforts, synthesis of evidence, and the planning of future trials. Future trials can now focus on other key phases of complex intervention evaluation, such as feasibility and evaluation [317]. Further studies are also needed to investigate the impact of interventions provided by intermediaries, across the continuum of support provided, and using appropriate outcome measures, to capture PA levels and other health-related outcomes of service users.

Chapter 4 The role of intermediaries in connecting individuals to local physical activity — a mixed methods pilot feasibility study

The protocol for this study is published in Contemporary Clinical Trials Communications. Citation: **O'Grady, M.**, D. Connolly, and E. Barrett, *The role of intermediaries in connecting individuals to local physical activity — protocol for a pilot feasibility trial*. Contemporary Clinical Trials Communications, 2024. **41**(101332): p. 1 – 9. <https://doi.org/10.1016/j.conctc.2024.101332> (Appendix XII)

4.1 Introduction

In the literature, there is preliminary, low-quality evidence showing the effectiveness of intermediary (SP) interventions on PA outcomes [248-250] (See Section 1.6.2.2). While all studies included in the scoping review reported positive outcomes in relation to PA (See Section 2.3.4), there were few RCTs identified and quality of evidence was not rated, limiting the conclusions that could be drawn [377]. The dearth of high-quality literature, in relation to intermediary interventions generally, and specifically interventions to connect to local PA, has been recognised and is discussed in the introduction of this thesis (See Section 1.6.2). There is a need therefore to better research the impact of intermediary interventions on PA and other health outcomes, using appropriate measures and study designs [173, 184, 460, 476]. However, interventions delivered by intermediaries have been identified as complex interventions [74, 289] (See Section 1.7). The UK Medical Research Council has identified four phases of complex intervention research: identification of the intervention, feasibility, evaluation, and implementation [317].

The scoping review and study II have addressed the first step of identifying and defining intermediary interventions when connecting to local PA. Study II specifically explored the processes of Irish SP and LSO intermediaries when connecting community-dwelling adults to local PA and described how they delivered and adapted interventions based on service user health needs (See Sections 3.3 and 3.4). Feasibility trials are an important next step when evaluating complex interventions. They can be used to test various

aspects, such as evaluation design (recruitment, data collection and analysis procedures, retention, outcome measures) and the intervention itself (optimal content and delivery, acceptability, and adherence) [317]. Feasibility studies can then be used to determine the suitability of progressing to the next steps of research, including evaluation [218, 317, 320, 400]. Only four feasibility studies were identified in the scoping review [308, 379-381] and were conducted in Australia [379], Canada [308], and the USA [380, 381]. The intermediaries in these studies were members of the research team [379], community health educator referral liaisons [380], patient navigators [381], and activity coaches [308].

Dunn [379] investigated the feasibility of an intermediary intervention to improve cardiorespiratory fitness in stroke survivors. Feasibility was assessed through retention to the study and changes in participation in PA. All participants in both intervention and control groups (n=20) completed the study assessments, and intervention participants were found to be more physically active than the control group at follow-up based on qualitative self-report. Holtrop et al. [380] investigated the feasibility of implementing an intermediary intervention in primary care practices for patients with lifestyle risk factors. Feasibility was assessed through the number of eligible patients who were referred to three community health educator referral liaisons over an eight-month period from nine primary care practices. A total of 797 referrals were made, a referral rate of 0 – 2% based on the number of eligible patients attending each practice. The authors deemed this a positive finding as referrals were intentionally constrained due to the limited resources of the intermediary.

Loskutova et al. [381] investigated the feasibility and acceptability of an intermediary intervention for people living with diabetes or at risk of diabetes. Approximately 70% of referred patients engaged with the two patient navigators, who conducted an average of 6.1 sessions per patient over 120.4 days ($\pm$ 50.5). The authors concluded that the intervention was feasible and acceptable, based on interviews conducted with patients and HCPs referring to the service. Finally, Mackey et al. investigated the feasibility of an intermediary intervention for community-dwelling older men [308]. Feasibility was determined through achievement of recruitment (enrolling 50% of individuals

screened), retention (80% of participants completing the 24-week follow-up assessment), and adherence (60% of participants attending all sessions of the intervention) targets, pre-determined before study commencement. All these targets were exceeded, with 62% of screened individuals enrolled to the study, 88% returning for follow-up assessments, and adherence to the intervention ranging from 83 – 97%.

While all studies reported their evaluation designs and interventions to be feasible, none of these studies were carried out in Europe limiting the transferability of the evaluation designs to the Irish context. None of the studies focused on SP or LSO, or their equivalents, limiting the conclusions that can be drawn regarding the feasibility of these specific intermediary interventions. Most of these studies focused on clinical populations, meaning results may not be applicable to a community-dwelling population. Finally, a wide variety of outcome measures were used to assess PA and health-related outcomes, with no consensus on a core outcome set. Therefore, there was a need to investigate: i) recruitment strategies and PA and health-related outcome measures relevant and suitable for the Irish context and a community-dwelling population, ii) the experiences of those who undergo an intervention delivered by SP and LSO, and iii) appropriate methodologies and suitable progression criteria for future feasibility studies of these complex interventions being delivered across multiple contexts (if appropriate) [477-479]. As such, it was decided to perform a feasibility study, but to 'pilot' certain trial components on a smaller scale to see if suitable for future trials [477, 480].

This chapter describes study III, a pilot feasibility study examining the feasibility and acceptability of an intervention delivered by an intermediary to improve PA levels and wider health-related outcomes, as well as the feasibility of the evaluation design. This study was registered with ClinicalTrials.gov (NCT06260995) and a study protocol was published in Contemporary Clinical Trials Communications [481]. Any deviations from the published protocol are detailed in the Methods section. The aim of this study was to investigate the feasibility of an intervention delivered by an intermediary to improve PA and health-related outcomes of community-dwelling adults. Specific objectives were:

- i) To determine the rate of recruitment and enrolment of individuals (intervention participants) who undergo an intervention delivered by an intermediary, which includes participation in local PA.
- ii) To examine the suitability and acceptability of recruitment methods to the study.
- iii) To determine retention to the study.
- iv) To describe the demographics, health characteristics, and PA levels of intervention participants.
- v) To determine participation in, and adherence to, local PA by intervention participants.
- vi) To explore the acceptability of the intermediary intervention.
- vii) To explore suitability, acceptability, and completion rates of the measurement tools by intervention participants.
- viii) To assess if change occurs in PA and health-related outcomes following participation in the intervention.

4.2 Methods

4.2.1 Intervention

The intervention delivered by Irish intermediaries has been described in detail in previous chapters (See Sections 3.3 and 3.4) and comprises four main steps; referral to an intermediary, assessment/initial meeting with the individual by the intermediary, connection to a local PA, and a follow-up period, entailing any work done by the intermediary after the assessment to facilitate and maintain a connection to local PA. How the intervention is delivered depends on the type of intermediary, the individual who is referred, and local contextual factors. The logic model created from the findings of the scoping review (Figure 2-4) [377] was updated with the findings of the qualitative study [442], to describe the steps in the interventions delivered by SP and LSO intermediaries (Figure 4-1), and these are summarised briefly in the following section. Despite including HPO in the qualitative descriptive study, it was found that they did not facilitate connections to local PA and as a result, it was not appropriate to include them in a feasibility study investigating intermediary interventions for connecting community-dwelling adults to local PA.

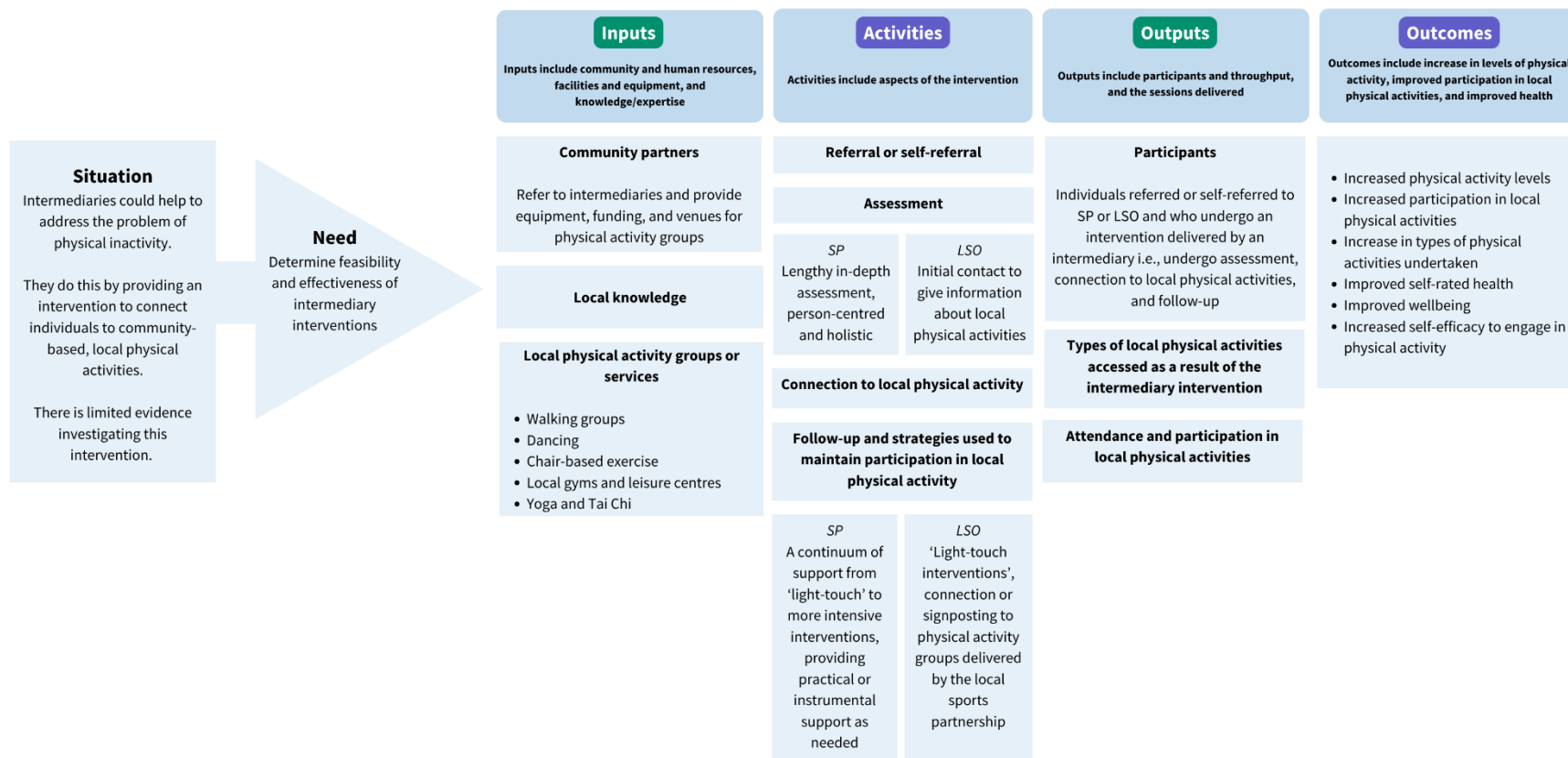


Figure 4-1: Logic model describing interventions delivered by social prescribing link workers and local sports partnership community sports development officers in Ireland when connecting individuals to local physical activity

Data in this logic model are based on the results of the scoping review and qualitative descriptive study, as per Sport England logic model guidance [366]. Abbreviations: LSO — local sports partnership community sports development officers, SP — social prescribing link workers. Figure reproduced from [481].

4.2.1.1 Social prescribing link workers (SP)

SP receive referrals from HCPs, community services, or through self-referral. Individuals are referred for social isolation, complex social needs, or to address a pre-existing mental or physical health issue. SP carry out a lengthy in-depth assessment of the individual's needs in relation to their health and wellbeing, and then work with the individual over several weeks and/or months to connect them to a range of community activities, which can include local PA. Strategies used during this follow-up period are characterised by ongoing instrumental support, or doing things for the individual [482], empowerment and motivation techniques, and/or attending activities with the individual. A full description of interventions delivered by SP is given in Chapter 3.

4.2.1.2 Local sports partnership community sports development officers (LSO)

LSO receive referrals mainly through self-referral, to improve the PA levels of individuals through participation in groups delivered by the local sports partnership. LSO do not carry out an in-depth assessment but after the referral is received, they may carry out screening and explain/signpost to local PA. They use several strategies to connect the individual to a local PA, such as attending the first session of the local PA, providing reassurance and practical support to the individual, as well as keeping them updated and informed as to upcoming local PA. A full description of interventions delivered by LSO is given in Chapter 3. After the intermediary establishes a connection to a local PA, the individual enrolls, attends, and takes part in the chosen activity/activities. The intermediary continues to support this engagement during the follow-up period, with SP providing longer periods of follow-up compared to LSO.

The intervention examined in this study therefore consists of two components. The first is the intervention delivered by the intermediary, and the second is attendance and participation in local PA facilitated by the intermediary. Local PA can include walking groups, local gyms and leisure centres, chair-based exercise, outdoor activities (including gardening), yoga and Tai Chi amongst others. The results of the scoping review and qualitative descriptive study identified that intermediaries provide motivation and support to the individual to maintain participation in, and adherence to, local PA, thereby

increasing PA levels, self-efficacy, self-rated health, and wellbeing. It is also known that it is challenging to isolate the effects of the two components, and that there is large variability in both the delivery of the intermediary intervention and the types of local PA accessed (See Section 1.7). Therefore, it was decided that the two components of the intervention could not be considered separately.

4.2.2 Ethical approval

Ethical approval for this study was granted from the Trinity College Dublin Faculty of Health Sciences Research Ethics Committee in August 2023 (Ref: 230603) (Appendices XIII and XIV).

4.2.3 Study design

This was a mixed methods pilot feasibility study, using a sequential explanatory approach [483-485]. Mixed methods are recommended for quasi-experimental studies [486, 487], feasibility studies [479, 488], and when evaluating complex interventions [61, 317, 479, 483, 485, 488]. In addition, mixed methods have been recommended for and used in research investigating intermediaries [173, 179, 215, 379, 381, 391, 393]. Sequential explanatory studies involve collecting and analysing quantitative data, followed by collection of qualitative data to help explain findings [483-485]. In this way, the qualitative and quantitative components in this study enable a gradual accumulation of knowledge of how the intermediary intervention is delivered, how it works, and the feasible aspects of the evaluation design [320].

The quantitative phase was a quasi-experimental before-after study. Before-after studies measure the outcome(s) of interest both before and after the intervention [489]. Quasi-experimental studies evaluate interventions but without randomisation of study participants [490] and introduce experimental designs into natural social settings, where the researcher does not have full control over scheduling of external stimuli [491]. This study was performed in real-world intermediary services across Ireland, where intermediary interventions are delivered routinely [397]. The qualitative phase employed a qualitative descriptive approach, to provide a rich, straight description of the experiences of study participants close to their own language [416, 417]. Qualitative

descriptive designs encompass sampling, data collection, analysis, and representational techniques [417]. It has been identified as a useful approach when research questions are focused on discovering the who, what, and where of events or experiences and gaining insights from informants regarding a poorly understood phenomenon [417, 418]. Qualitative methods are also recommended to explore how and to what extent the intervention delivered by the intermediary and the community activities contribute to changes observed in health and wellbeing [181].

Findings were then integrated after analysis of the quantitative and qualitative components to provide a comprehensive analysis [483, 487, 492]. The purpose of integrating the data in this study was four-fold. Firstly, quantitative approaches alone are unlikely to be sufficiently sensitive to complexity [317]. Secondly, the aim of this study was to investigate feasibility of both the intervention and the evaluation design. Qualitative data have particular value at this stage in addition to quantitative data, when trying to define and understand an intervention as well as when adapting evaluation designs [488]. Thirdly, mixed methods can be used to explore feasibility and acceptability in-depth from the perspectives of multiple key stakeholders [485]. Finally, a more nuanced and insightful analysis of the data can be achieved with mixed methods approaches, rather than quantitative or qualitative methods alone [483, 485-487, 493, 494]. This study was reported using the Consolidated Standards of Reporting Trials (CONSORT) extension to pilot and feasibility trials, and the Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) guidelines for protocols of interventional trials [495-497].

4.2.4 Study participants

There were four groups of study participants in this study: SP intervention participants, SP intermediaries, LSO intervention participants, and LSO intermediaries.

4.2.4.1 Intervention participants

‘Intervention participants’ were community-dwelling individuals referred or self-referred to SP or LSO who received an intervention delivered by an intermediary i.e., underwent assessment, onward connection to local PA, and follow-up. Eligibility criteria were

- age >18 years old
- referred or self-referred to an intermediary service for any reason
- met the eligibility criteria of the intermediary service
- able to give explicit informed consent.

Exclusion criteria were non-community-dwelling (e.g., hospital in-patients, living in residential care), diagnosis of dementia, inappropriate for health and social reasons (e.g., terminal illness, family, or other social crisis), or refusal to engage with the intermediary service.

Intervention participants were recruited from ten intermediary services (six social prescribing and four local sports partnership services) from across Ireland. In a deviation from protocol, eleven services originally agreed to participate in the study, however, one service was unable to be contacted upon commencement of the study. As many of these services have minimal staff and no administrative support, service users were invited to participate in the study directly by the SP and LSO who they were attending. Once the intermediary had identified that the individual was going to be connected to a local PA, the potential participant was invited to participate in the study and offered a participant information leaflet and informed consent form (Appendices XV and XVI). This could have been at any stage of the process, i.e., at the time of referral, the assessment or initial meeting, or when a connection to a local PA was achieved. Study posters were also sent to each service for display in offices, when introducing the study to their service users, or to share through mailing lists. Intermediaries also asked potential participants for their consent to share their contact details with the research team. Following a seven-day period to consider the study information, the research team then contacted these individuals to screen for eligibility and obtain verbal and written consent to participate. Contact information for the research team was also made available for individuals to contact the team directly.

4.2.4.2 Intermediaries

Intermediaries delivered interventions within their local service and were responsible for inviting service users to participate in the study. All intermediaries from local sports partnership and social prescribing services who had capacity to assist with the study

were considered eligible, and no specific exclusion criteria were applied. Intermediaries were recruited through three methods:

- Intermediaries who participated in the qualitative descriptive study and consented to being contacted about future projects were contacted in May 2023 to assess interest in participating in this study as gatekeepers.
- Some of these intermediaries also provided contact information for colleagues in their service.
- An invitation was also circulated via email through contacts in the Irish Social Prescribing Peer Network and Sport Ireland from October 2023 – November 2023, requesting assistance with this study.

All intermediaries who agreed to take part in the study met with the research team prior to starting recruitment to identify an appropriate recruitment strategy for their service. This was also an opportunity for the research team to explain the study and recruitment procedures and provide all relevant research materials. Intermediaries were encouraged to read these materials and use them to introduce the study to their service users. After completing recruitment for this study, intermediaries were provided with a participant information leaflet and informed consent form (Appendices XVII and XVIII) and asked to complete an interview about the acceptability and suitability of the recruitment methods. Following a seven-day period to consider the study information, the research team then contacted the intermediaries to obtain verbal and written consent to participate in an interview.

4.2.5 Outcomes

There were two main areas of enquiry within this study: feasibility of the evaluation design and feasibility of the intermediary intervention. Tables 4-1 and 4-2 show the study data sources, quantitative and qualitative data used to address the study objectives, and the timepoints for data collection for intermediaries and intervention participants respectively. A detailed description of each measure is then given in this section.

Table 4-1: Data sources for intermediaries

The quantitative and qualitative data collected to address the study's aims and objectives. Timepoints for data collection are also shown.

Arm	Objective	Domain	Quantitative Data	Timepoint	Qualitative Data	Timepoint
Feasibility of evaluation design	i. ii.	Recruitment	<i>Recruitment record log:</i> • Number eligible • Reach rate • Number recruited • Recruitment rate • Length of recruitment period • Reasons given for not taking part	Throughout recruitment period	<i>Intermediary semi-structured interviews:</i> • Explore intermediaries' perceptions of how willing service users were to take part in the research, their experience of recruitment, and the acceptability of the recruitment methods	Post-recruitment period
N/A	N/A	N/A	<i>Demographic characteristics:</i> • Gender • Job setting • Working in urban/rural setting • Length of time in role	Post-recruitment period	N/A	N/A

Abbreviations: N/A — not applicable. Table reproduced in part from [481].

Table 4-2: Data sources for intervention participants

The quantitative and qualitative data collected to address the study's aims and objectives. Timepoints and mode of data collection are also shown.

Arm	Objective	Domain	Quantitative Data	Timepoint	Qualitative Data	Timepoint
Feasibility of evaluation design	iii.	Retention	Number returning for T1 assessment	T1 (12 weeks)	N/A	N/A
	iv. v.	Demographic information and health characteristics	<i>Data collection form:</i> • Age • Gender • Marital status • Urban/rural location • Level of education • Ethnicity • Employment status • Self-reported chronic conditions • Self-reported rating of health	T0 T1 (12 weeks)*	<i>Data collection form:</i> • Free-text responses to “types of exercise currently undertaken” • Free-text responses to “do you have any chronic conditions”	T0 T1 (12 weeks)*
	vii.	Outcome measures	<i>Data collection form:</i> • Demographic information and health characteristics completion rates • IPAQ-SF, SEE, and SWEMWBS completion rates	T0 T1 (12 weeks)	<i>Intervention participant semi-structured interviews:</i> • Explore the acceptability of the study measures	T1 (12 weeks)

Feasibility of intermediary intervention	v. viii.	Changes in local PA participation	N/A	N/A	<i>Data collection form:</i> - Free-text responses to “types of exercise currently undertaken” <i>Intervention participant semi-structured interviews:</i> - Explore the local PA accessed because of the intervention and adherence to these	T0 T1 (12 weeks) T1 (12 weeks)
	vi.	Acceptability	<i>Intervention participant semi-structured interviews:</i> Overall acceptability NRS	T1 (12 weeks)	<i>Intervention participant semi-structured interviews:</i> Explore the content and delivery of the intervention by the intermediary, the level of support provided by the intermediary and the impact of this, and acceptability of the intervention by an intermediary	T1 (12 weeks)

	viii.	Outcomes	<i>IPAQ-SF:</i> • Total MET-minutes per week • Vigorous MET-minutes per week • Moderate MET-minutes per week • Walking MET-minutes per week • PA category • Hours spent sitting • Sedentary behaviour category <i>SEE:</i> • Total score <i>SWEMWBS:</i> • Total score • Wellbeing category	T0 T1 (12 weeks)	<i>Intervention participant semi-structured interviews:</i> • Explore the experience of engaging in local PA facilitated by the intermediary	T1 (12 weeks)

*Self-rated health and types of exercise currently undertaken were the only demographic and health variables collected at T1. Abbreviations: IPAQ-SF — International Physical Activity Questionnaire — Short Form, MET — metabolic equivalent of task, N/A — not applicable, NRS — numerical rating scale, PA — physical activity, SEE — Self-Efficacy Scale, SWEMWBS — Short Warwick-Edinburgh Mental Wellbeing Scale. Table reproduced in part from [481].

4.2.5.1 Demographics and health status

A data collection form (Appendix XIX) was completed by intervention participants upon enrolment to the study as a baseline assessment (T0). The form was either self-administered or administered by the researcher, depending on intervention participant preference. The script used for the data collection form when administered by the researchers was similar to self-administration, apart from some conversational inserts and insertion of response categories into the questions. These are unlikely to affect responses [498]. This form included demographic information, health characteristics, and several outcome measures. Demographic and health information included age, gender, marital status, area in which they lived (urban/rural), level of education, ethnicity, employment status, self-reported presence/absence of chronic condition(s), and a self-reported rating of health. Self-rated health is a reliable measure of overall health status, and positive associations between self-rated health and PA have been observed [23, 499]. In addition, the types of exercise currently undertaken were collected. A follow-up assessment was completed 12 weeks from the time of the baseline assessment (T1), and intervention participants were contacted a maximum of five times before being deemed lost to follow-up. This was not reported in the protocol but was determined during the study. At T1, self-reported rating of health and types of exercise undertaken were collected. Intervention participants were pseudonymised in this study using study ID numbers. This occurred after the baseline assessment was completed (using the study code 'FEAS'), and study ID numbers were assigned sequentially as the assessments were completed. Brief demographic information was also collected for intermediaries in relation to gender, job setting, whether they worked in an urban or rural location, and length of time in their role.

4.2.5.2 Outcome measures

Outcome measures (Appendix XIX) were completed at baseline (T0) and at follow-up 12 weeks later (T1). Changes in scores from baseline to T1 and suitability of the measures were examined, to assess their utility for future studies investigating the effect of intermediary interventions on PA and health-related outcomes. A description of each measure is given below.

4.2.5.2.1 International Physical Activity Questionnaire — Short Form

Self-reported measures of PA are commonly used to collect information on PA levels, and include methods such as questionnaires, interviews, or activity diaries [500]. While these methods are subject to sources of error and bias [501], they have numerous advantages over other objective or observational methods. For example, data can be captured using a single instrument, are unobtrusive, relatively easy to administer and score, and are inexpensive [500]. The International Physical Activity Questionnaire (IPAQ) was developed in 1997 to facilitate population surveillance of multiple domains of PA [502, 503] and is a well-validated questionnaire for research and clinical practice [504]. The short form of the IPAQ (IPAQ-SF) was chosen as a measure of PA for this study for several reasons. It has been shown to be a reliable and valid instrument, with intra-class correlations ranging from 0.7 – 0.8, inter-method validity median $\rho = 0.67$, and criterion validity $\rho = 0.3$ based on comparisons with accelerometer data [503, 505]. The original authors of the questionnaire recommend the IPAQ-SF over the long form IPAQ, as it decreases research burden for respondents when completing the measure and when being administered by researchers [502].

The IPAQ-SF assesses PA behaviour over the last seven days and includes measures of frequency and duration of vigorous PA, moderate PA, walking, and sedentary behaviour (time spent sitting on weekdays over the last seven days). These include PA undertaken for leisure, work, transport, and/or domestic activities e.g., housework, gardening, etc. [503]. The IPAQ-SF is scored using a standardised scoring protocol, and total days of activity, total activity (minutes/week), and total MET-minutes per week can be calculated [506]. A summary indicator then categorises respondents into three levels of PA: “high”, “moderate”, or “low”.

- **High**

Meets either of two criteria: i) vigorous intensity activity on >3 days/week and accumulating at least 1,500 MET-minutes/week, or ii) >5 days of any combination of walking, moderate intensity, or vigorous intensity activities achieving at least 3,000 MET-minutes/week. For the purposes of this study, only intervention participants who were categorised as achieving “high” levels of PA were considered to achieve PA guidelines, as

recommended in the literature [503, 507]. This is also in line with larger population-based surveys carried out in Ireland [508, 509].

- **Moderate**

Meets any of the following three criteria: i) three days of vigorous activity of at least 20 minutes/day, ii) five days of moderate intensity activity or walking of >30 minutes/day for >10 minutes at a time, or iii) five days of any combination of walking, moderate intensity, or vigorous intensity activities achieving at least 600 MET-minutes/week.

- **Low**

Meets neither 'moderate' nor 'high' criteria.

As there are no well-accepted thresholds to categorise time spent sitting [507], data in relation to sitting were categorised and analysed as per previous research carried out using the IPAQ-SF in an Irish cohort [21, 22, 510]. Total hours of sitting were calculated, and time spent sitting in minutes was categorised in terms of five, two hourly sitting categories (0 – 120 minutes= 0 – 2 hrs, 121 – 240 minutes= 2 – 4 hrs etc.). Intervention participants were then categorised as achieving <4 hours of sitting per day or >4 hours of sitting per day, as sitting for more than four hours per day has been associated with poorer health outcomes [510-512].

4.2.5.2.2 Self-Efficacy for Exercise Scale

Self-efficacy is defined as the belief in one's capabilities to organise and execute courses of action required to produce given attainments [513]. Activation is defined as when the person has the motivation, confidence, and skills necessary to enact behavioural changes and make health-related decisions [288]. Self-efficacy and activation are crucial factors in explaining adherence to health behaviours, including PA. Self-efficacy has been shown to be a predictor of both adoption and maintenance of PA behaviour [514-517] and is a target and mediator of PA interventions [305]. Self-efficacy has a mediating effect on activation by reinforcing the person's belief that they can accomplish the behaviour [517, 518]. The Self-Efficacy for Exercise Scale (SEE) [519] is a self-report measure developed for older adults based on qualitative and quantitative research of the factors that influence motivation and self-efficacy for exercise in this cohort, e.g., pain, weather, exercising alone [520]. Improvement in self-efficacy has been identified as a potential

outcome of engaging in intermediary interventions, through engagement with the intermediary and the community [267, 298, 460, 521, 522]. The support offered by intermediaries such as the holistic nature of the intervention, the ongoing personalised support, emphasis on participation in PA to improve all aspects of health and wellbeing (physical, mental, and social), and the consideration of other social and economic barriers (See Sections 3.3.2.2 and 3.4.2) could all positively influence self-efficacy.

The SEE was found to be reliable and valid in middle aged to oldest old adults, from a variety of diverse ethnic backgrounds [519, 523, 524], in keeping with the findings regarding the profile of intermediary service users in the qualitative descriptive study. This measure was also chosen as it measures beliefs about a *current* capability rather than a future capability and therefore more accurately reflects the timepoints chosen for this study i.e., pre- and post-intervention by an intermediary. The SEE is also concordant with the PA measure used in this study (IPAQ-SF), as both measures ask questions in relation to frequency and duration of PA [525]. The SEE consists of nine items, and respondents are asked to rate their current confidence in their ability to exercise three times per week for 20 minutes under different scenarios. Responses are rated on a numerical rating scale of 0 – 10, with zero indicating ‘not confident’ and ten indicating ‘very confident’. The overall score is calculated by summing the responses to each scenario, and a higher score indicates higher self-efficacy for exercise.

4.2.5.2.3 Short Warwick-Edinburgh Mental Wellbeing Scale

Mental wellbeing encompasses mood and psychological functioning, as well as hedonic and eudemonic wellbeing. Hedonic wellbeing consists of subjective happiness, and concerns the experience of pleasure [526]. Eudemonic wellbeing occurs when a person is holistically or fully engaged in activities that are congruent to their values [526]. The Warwick-Edinburgh Mental Wellbeing Scale was developed to evaluate interventions, programmes, and approaches promoting mental health and wellbeing, particularly in non-clinical populations [443]. A seven-item version of the original 14-item scale, the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS), was developed as an interval scale measure of mental wellbeing [527]. The short version is recommended by the original authors over the 14-item scale where respondent burden is a potential issue

[527]. PA has the potential to improve mental wellbeing for clinical and non-clinical populations [528-530] by improving subjective mood, self-esteem, self-perception, cognitive function, and sleep quality [531]. Improvements in mental wellbeing have also been attributed to intermediary (SP) services [154, 262]. As identified in the scoping review, individuals were often referred to intermediaries to improve general health and wellbeing or to address non-medical needs and/or psychosocial symptoms. This has two implications: i) that people referred to intermediaries may be experiencing mental health difficulties or have poorer mental wellbeing, and ii) that intermediaries facilitate connections for these people to local PA to help address these issues.

This was echoed in the qualitative descriptive study where intermediaries reported that their service users frequently experienced mental health issues (such as depression, anxiety, and more severe mental illness) and social isolation. Personal wellbeing was named as a critical outcome of social prescribing in the HSE Social Prescribing Framework [183]. The SWEMWBS is a recommended tool in the HSE Social Prescribing Evaluability Assessment to measure change in personal wellbeing and is widely used in services in Ireland and the UK [154, 164, 181, 184, 222, 532]. It has also been used in other community-based PA intervention trials in Ireland [114, 256, 533]. Items in the SWEMWBS cover different aspects of eudemonic and hedonic wellbeing, and each item is answered on a 1 – 5 Likert scale, ranging from “none of the time” to “all the time” [527]. The overall score is calculated using a standardised scoring protocol [534], and a higher score indicates a higher level of wellbeing. Additionally, wellbeing can be categorised into three levels based on scores: low (scores <20), moderate (scores <28), and high (scores >28).

4.2.5.3 Interviews — intervention participants

A structured interview was completed at the time of the T1 assessment with intervention participants. The purpose of this interview was to explore the experiences of those who received an intermediary intervention, and as such a structured approach to interviews was deemed to be appropriate [423]. An interview schedule was designed by the research team and was informed by previous feasibility studies carried out with intermediaries [308, 379-381] and the findings of the qualitative descriptive study

(Appendix XX). Topics included the content and delivery of the intervention by the intermediary, the local PA opportunities accessed because of the intervention and adherence to these, any changes in their engagement in local PA throughout the study period, the experience of engaging in local PA facilitated by the intermediary, the level of support provided by the intermediary and the impact of this, and acceptability of the study measures and intervention delivered by an intermediary. Questions focused on content mining and probes, i.e., questions that identified details within the various dimensions and generated understanding from the interviewee's point of view [423].

4.2.5.4 Overall acceptability of the intervention

As part of the interview, intervention participants were asked to rate the overall acceptability of the intervention delivered by an intermediary on a numerical rating scale of 1 – 10, with one indicating 'completely unacceptable' and ten indicating 'completely acceptable'. Assessing acceptability qualitatively and quantitatively is recommended for complex interventions [320], and allows researchers to explore what drives respondents' general acceptability judgment [535].

4.2.5.5 Recruitment record logs

Intermediaries were asked to keep a record of how many service users they had contact with during the recruitment period (including new referrals and service users returning for follow-up) and the number of these service users they planned to or had connected to local PA (number eligible). They were also asked to record how many eligible people were approached about the study (reach rate, or the proportion of those eligible to participate who are affected by a programme or receive an intervention [536, 537]), the reasons for refusal to take part in the study or accept study information (reasons given for not taking part), and the numbers recruited to the study. This recruitment record was kept from the date that recruitment commenced until the recruitment target had been reached (See Section 4.2.6) and all intervention participants had enrolled onto the study. For each intervention participant recruited to the study, intermediaries were also asked to keep a record of their contacts with this person (date, length of each contact, and mode of contact) for the length of time they participated in the study. This was used to

verify the data collected from intervention participants in their interview, and to report the amount of contact intervention participants had with intermediaries.

4.2.5.6 Interviews — intermediaries

Interviews were completed with intermediaries once the recruitment record log had been completed in full and returned to the research team. The purpose of this interview was to explore the acceptability of the recruitment methods. The decision to conduct interviews with intermediaries was made after recruitment commenced due to emerging insights about the challenges faced while recruiting for this study (Appendix XIV). As no other relevant feasibility study conducted interviews with stakeholders regarding recruitment suitability [308, 379-381], the interview schedule was designed by the research team. The schedule was developed iteratively based on correspondence with intermediaries approached to take part in this study, researcher reflexive notes and diaries, findings from intervention participant interviews, and knowledge of the contextual factors affecting each individual service (Appendix XXI). In comparison to the more structured approach taken with the intervention participant interviews, interviews with intermediaries followed a semi-structured approach. This was deemed to be appropriate as this was a more exploratory enquiry [423]. Topics included how willing service users were to take part in research and reasons given as to why they did not take part, the intermediaries' experience of discussing the research project with service users and reasons they chose not to invite eligible people to participate, and timing of recruitment. Questions focused on content mapping and probes, i.e., questions that opened up the research territory and generated understanding from the interviewee's point of view [423]. Intermediaries were pseudonymised in this study using study ID numbers. This occurred after the semi-structured interview had taken place and been transcribed (using the study code 'GK'). Study ID numbers were assigned sequentially as the interviews were completed.

4.2.6 Sample size

Convenience sampling was used, which involves selection of participants based on availability and accessibility [421]. The primary emphasis of convenience sampling is generalisability, i.e., that the knowledge gained is representative of the population under

study [421]. Convenience sampling was chosen as it is economical, accessible, and has been used in previous feasibility studies investigating intermediaries [380, 381]. Each service was given a recruitment target of three to four intervention participants, with a target sample size of 30, approximately 15 participants recruited by SP and 15 by LSO. Sample size in a pilot feasibility study must be congruent with the study objectives [496]. A sample size of 30 was considered adequate to examine the feasibility of recruitment, enrolment, and retention [308] and was in line with previous pilot and feasibility studies [308, 538].

4.2.7 Data Analysis

4.2.7.1 Quantitative

Quantitative data analysis was completed using SPSS Statistics, Version: 28.0.1 (IBM Statistics). Categorical variables were presented as counts and proportions [539]. Summary statistics for continuous variables were presented as frequency and percentage, mean and standard deviations for normally distributed data, and median and interquartile ranges for data which were not normally distributed [539]. Normality and presence of outliers were assessed by the Shapiro-Wilks test and visually inspecting boxplots. Data were classified as normally distributed when the significance value of the Shapiro-Wilks test was greater than 0.05, i.e., $p > 0.05$, and there were no values greater than 1.5 box-lengths from the edge of the boxplot [540]. As per the IPAQ data processing protocol, cases with missing data, or cases that were deemed outliers (where total walking, moderate, and vigorous time variables were >960 minutes), were excluded from analysis [507]. A protocol for managing data errors in the IPAQ-SF was devised iteratively by the research team:

- **Not giving a single value (e.g., “2 – 3 hours”)**

Answer was rounded down in relation to activity estimates and rounded up in relation to sitting time estimates, as self-reported PA values tend to be overestimated [505, 541] and self-reported sedentary behaviour tend to be underestimated [542, 543].

- **Giving time estimates for the past week**

If an intervention participant responded, “two hours per week”, two hours were divided by seven to give an average time per day.

- **Writing free-text responses instead of using the standardised answering format**

These responses were not included.

As per the SWEMWBS data processing protocol, cases with missing data were excluded from analysis [534]. No data processing protocol exists for the SEE. However, as the overall score is calculated by summing the responses to each scenario, and to ensure consistency with data processing across the three measures, cases with missing data were also excluded.

Within-group differences were assessed using paired t-tests for normally distributed data and Wilcoxon signed-rank tests for data which were not normally distributed (or related-sample sign tests when the distribution of differences between paired observations was not symmetrical [544]). In addition to the analyses specified in the study protocol, a McNemar’s test was performed as an exploratory analysis to assess differences in dichotomous categorical variables between related groups [545, 546]. Additional analyses were performed to examine between-group differences. This analysis was not pre-specified in the study protocol and should be considered exploratory. Differences in categorical variables were assessed using the chi-square test for association, or Fisher’s exact test where expected cell frequencies were <5 [547, 548]. Between-group differences were assessed using independent t-tests for normally distributed data and Mann-Whitney U tests for data which were not normally distributed. Equality of variances was assessed using Levene’s test. Data analysis in relation to recruitment, contacts between intermediaries and intervention participants, retention, and completion rates of the study measures was completed using Microsoft Excel (Microsoft Corporation). Recruitment metrics were calculated as follows:

- **Reach rate**= Number who received study information/Number eligible as recorded in the recruitment record log [549]
- **Recruitment rate**= Number enrolled on to the study/Number eligible as recorded in the recruitment record log [550]
- **Length of recruitment period**= Date last intervention participant enrolled - Date recruitment commenced as recorded in the recruitment record log [551]

- **Reasons given for not taking part=** Counts and proportions of the reasons recorded by intermediaries in the recruitment record log

The total number of contacts with intervention participants, total time in minutes spent engaging with intervention participants, and the frequency of different modes of contact (i.e., telephone, face-to-face etc.) were calculated. The average time spent engaging with intervention participants (total time in minutes/n) was also calculated. Retention to the study was calculated by dividing the number of intervention participants who completed a follow-up assessment by the number who completed a baseline assessment. Completion rates were calculated by dividing the number of items completed on the data collection form and three study outcome measures by the total number of items within each measure.

Intervention participants provided free-text responses to the questions ‘Do you have any chronic conditions?’ and ‘What types of exercise do you do currently? Please provide a list’ on the data collection form (Appendix XIX). For the chronic conditions question, if intervention participants selected ‘yes’, they were prompted to specify any chronic conditions they had as a free-text response. Free-text responses were transcribed to Microsoft Excel and coded under pre-determined categories of chronic diseases: heart conditions, lung conditions, musculoskeletal conditions, and other chronic conditions. These categories were used in other large longitudinal studies to classify chronic diseases [552]. For example, an intervention participant reporting that they had hypertension, high cholesterol, and arthritis were recorded as having three chronic diseases and were coded as having two categories of disease: heart and musculoskeletal. The median number of chronic diseases per intervention participant, and the counts and proportion of the sample reporting the different categories of disease, were calculated using SPSS Statistics.

For the types of exercise question, self-directed PA, local PA accessed independently, and local PA accessed through the intermediary intervention were all recorded by the intervention participant. Free-text responses at baseline and T1 were transcribed to a Microsoft Word (Microsoft Corporation) document, uploaded to NVivo 14 (Lumivero), and coded under pre-determined types of exercise: walking, exercise and fitness,

swimming, housework, exercise with medical oversight (e.g., ExWell (See Section 1.5.2.1), gardening, pole walking, sport, dancing, cycling, yoga and Tai Chi, and decreasing sedentary behaviour. The type of exercise accessed through the intermediary intervention was also coded. For example, an intervention participant reporting that they walked for leisure, attended a walking group, and were connected to a chair-based exercise class through an intermediary were recorded as reporting three local PAs, doing two types of exercise (walking and exercise and fitness), and connected to an exercise and fitness group through the intermediary. These data were then analysed further quantitatively, and the number of local PAs per intervention participant, and the counts and proportion of the sample reporting undertaking different types of exercise, were calculated at baseline and T1 using Microsoft Excel and SPSS Statistics. Counts and proportions were also calculated for the types of exercise accessed through the intermediary intervention.

4.2.7.2 Qualitative

4.2.7.2.1 Methods and Approaches

All interviews were conducted by one researcher (MO'G) and were recorded and transcribed verbatim by the same researcher, or by using the auto-transcription feature on Zoom (Zoom Communications). Auto-transcribed transcripts were checked for accuracy. Qualitative data were analysed in NVivo using an inductive qualitative content analysis approach as described by Elo and Kyngäs (2008) [425]. This approach broadly involves three steps: 1) preparation, 2) organising, and 3) reporting [425]. The goal of qualitative content analysis is “to provide knowledge and understanding of the phenomenon under study” [426, p.314]. It is a useful methodology when analysing the more manifest, descriptive content of the data [428, 435], meaning it is the analysis strategy of choice when conducting qualitative descriptive studies [417]. Qualitative content analysis may also combine qualitative and quantitative operations, making it a useful method for mixed methods studies [475].

4.2.7.2.2 Preparation

Preparation involves a period of immersion in the data [425]. To do this, field notes were taken during and after each interview and formed the basis of ‘initial impressions’ which

were used during update meetings between the research team. This allowed the generation of brief but systematic notes based on the dataset. The audio recordings of the interviews were listened to several times while transcribing and cleaning the transcripts. Transcripts and responses were then read several times. Meaningful, recurrent, and noteworthy comments were noted, highlighted, and updated on every iteration [428]. In addition, a reflexive diary was kept throughout the data collection and analysis phases (Appendix XXII). The reflexive diary served to improve rigour and provide an audit trail throughout the analysis process [428]. A 'lessons learned' log was also kept recording meaningful inferences and interpretations of the challenges experienced during the study, and the 'soft intelligence' gained through informal conversations with those involved in the study [477, 485]. This log was used to capture the challenges, any attempts made to resolve the issues, and reflections on whether these were successful or not, and helped inform the discussion and implications of the study results (Appendix XXII).

4.2.7.2.3 Organising

An inductive approach to organising was chosen for this study, and this approach involves open coding, creating categories, and abstraction [425]. Transcripts were coded separately by group; LSO intervention participants, LSO intermediaries, SP intervention participants, and SP intermediaries, reflecting the chronological order in which these data were collected. The recruitment period for LSO was shorter in comparison to SP, therefore data collection was completed for LSO intervention participants and LSO intermediaries several months before SP. As this was a time-limited project, analysis was conducted on these separate groups initially before combining results when data collection for every group was complete. Over 500 codes were identified (Appendix XXII). Codes were organised into clusters, representing a unifying idea or concept, and these clusters were given a descriptive label using quotes from study participants to reflect the main ideas developing from them [428]. The domains investigated qualitatively (Tables 4-1 and 4-2) (intermediary intervention acceptability, participation in and adherence to local PA, outcome measure suitability and acceptability, and recruitment suitability) were used as 'categories', a preliminary theme used to classify findings [428], thus completing abstraction, or formulation of a general description of the research topic

[425]. Clusters were organised into the most appropriate category, and longer descriptions of these clusters were written and used to draft early iterations of the research report.

4.2.7.2.4 Reporting

In the reporting phase a narration developed by researchers as a written commentary describes and connects various categories and answers the study question [428]. During the drafting of the research report, the 'story line' of the data was developed. Transcripts were checked against the developing 'story line' in the report draft. Codes, clusters, and categories were related to published literature or 'established knowledge' [428]. Recently published qualitative literature, as well as RCTs and feasibility studies included in the scoping review and other relevant reviews of intermediary interventions were used [157, 272, 289, 308, 373-375, 378-381, 383, 386, 553-558]. Finally, materials in the appendices were developed to show the process of rectification and finalisation of categories (Appendix XXII).

4.2.8 Knowledge user engagement

The goal of knowledge user engagement is to co-produce knowledge relevant and useful to making real-world health decisions [327], and to help foster integration, implementation, and dissemination of findings into policy and practice [328, 329]. Specifically, the aim of knowledge user engagement in this study was to improve planning, development, quality, design, and relevance of the research [330, 331]. Two meetings were held with the panel regarding this study, one prior to applying for ethical approval (May 2023) and another when recruitment had commenced for this study (September 2023). In the first meeting, the panel advised on potential gatekeepers for the study, appropriate sample sizes, appropriate recruitment targets and strategies for each service, the selection of suitable outcome measures, and methods of data collection. The second meeting with the panel was used to troubleshoot emerging issues with recruitment and data collection, and to discuss dissemination of the study.

4.3 Results

The findings in relation to each of the objectives are detailed in the proceeding sections, and outline recruitment, retention, and adherence to the study, the profile of study participants, acceptability of intermediary interventions, suitability of the study outcome measures, and changes in PA and health-related outcomes. The quantitative and qualitative data have been integrated and are presented together throughout this section. Recruitment of intermediaries took place from May 2023 – November 2023. Twenty-three intermediaries were identified and invited to participate in this study, representing seven local sports partnerships and 11 social prescribing services. In total, ten intermediaries agreed to participate (Figure 4-2). Demographic and professional information for intermediaries is shown in Table 4-3. Interviews were conducted with all ten intermediaries after the recruitment record log had been completed and returned to the research team. The mean interview length was 26 minutes (range 19 – 35 minutes). Recruitment of intervention participants took place from August 2023 – February 2024, and 390 intermediary service users were identified as eligible to participate (223 from local sports partnership services and 167 from social prescribing services). Thirty took part in the study, a recruitment rate of 7.7%. Recruitment rates were similar across the two groups (6.7% in LSO services vs. 9.0% for SP services) (Figure 4-3). The baseline demographic and health characteristics of intervention participants are shown in Table 4-4. In total, 29/30 intervention participants completed a baseline (T0) assessment, and 25 completed a follow-up (T1) assessment. Interviews were conducted at the follow-up assessment and lasted a mean of 11 minutes (range 6 – 22 minutes).

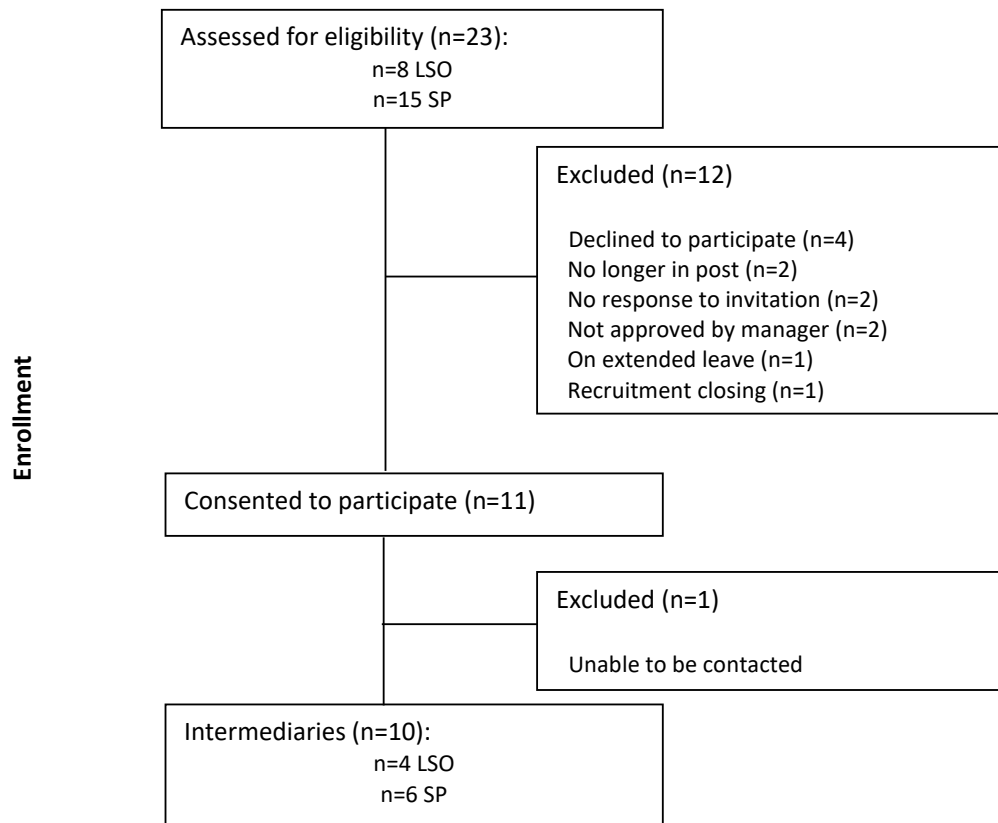


Figure 4-2: CONSORT diagram — intermediaries

CONSORT diagram of intermediaries approached to participate in this study. Abbreviations: LSO — local sports partnership community sports development officers, SP — social prescribing link workers.

Table 4-3: Demographic and professional information of intermediaries

	LSO (n=4)	SP (n=6)
How interview conducted <i>n (%)</i>		
Zoom	4 (100.0)	5 (83.3)
Telephone	0 (0.0)	1 (16.7)
Gender <i>n (%)</i>		
Female	3 (75.0)	6 (100.0)
Male	1 (25.0)	0 (0.0)
Urban vs. rural location* <i>n (%)</i>		
Urban	2 (50.0)	3 (50.0)
Urban/rural	2 (50.0)	2 (33.3)
Rural	0 (0.0)	1 (16.7)
Job setting† <i>n (%)</i>		
Community	3 (75.0)	4 (66.7)
Local government	1 (25.0)	0 (0.0)
Local partnership/development company	0 (0.0)	2 (33.3)
Length of time in role	Range 1 – 9 years	Range 2 – 9 years
Pobal HP deprivation index‡ (office location) <i>n (%)</i>		
Affluent	1 (25.0)	0 (0.0)
Marginally above average	2 (50.0)	3 (50.0)
Disadvantaged	1 (25.0)	2 (33.3)
Extremely disadvantaged	0 (0.0)	1 (16.7)
Pobal HP deprivation index‡ (county) <i>n (%)</i>		
Marginally above average	3 (75.0)	3 (50.0)
Marginally below average	1 (25.0)	3 (50.0)

*Urban/rural indicates the intermediary worked in a mostly urban setting. †‘Community’ incorporates intermediaries based in community halls, community centres, and (family) resource centres. ‘Local government’ means the intermediary was based in local council offices, which are specific geographic areas called local government areas, each of which has a council, and are responsible for the provision of public services. ‘Local partnership/development companies’ are multi-sectoral partnerships that deliver community and rural development, social inclusion, and social enterprise services. ‡The Pobal HP deprivation index is Ireland’s most widely used social gradient metric and scores each area in terms of affluence or deprivation using census information [559]. Abbreviations: LSO — local sports partnership community sports development officers, SP — social prescribing link workers.

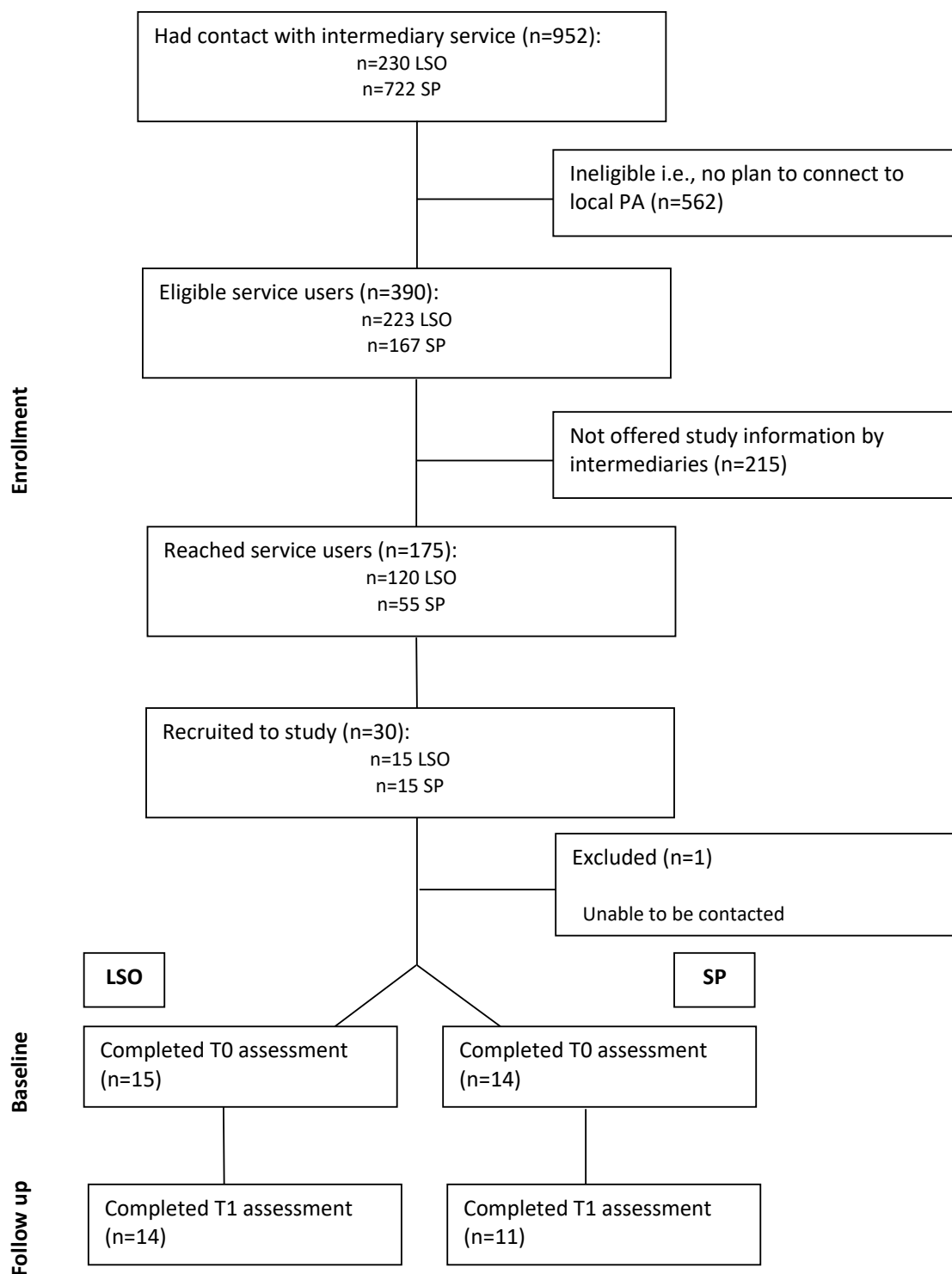


Figure 4-3: CONSORT diagram — intervention participants

CONSORT diagram of intermediary service users approached to participate in this study. Includes data from n=9/10 recruitment record logs, as n=1 SP intermediary was unable to retrieve this information due to migrating systems. Abbreviations: LSO — local sports partnership community sports development officers, SP — social prescribing link workers.

Table 4-4: Baseline (T0) demographic and health characteristics of intervention participants

	Whole Group (n=29)	LSO (n=15)	SP (n=14)	p-value
Age Median (IRQ)	68.0 (12.5)	68.0 (7.0)	70.0 (20.5)	0.813*
Gender n (%)				
Female	25 (86.2)	14 (93.3)	11 (78.6)	0.583†
Male	3 (10.3)	1 (6.7)	2 (14.3)	
Missing	1 (3.4)	0 (0)	1 (7.1)	
Marital status n (%)				
<i>Living with family</i>				0.196‡
Living with a spouse/partner	13 (44.8)	10 (66.7)	3 (21.4)	
Living with other family members	5 (17.2)	1 (6.7)	4 (28.6)	
<i>Living alone</i>				
Living as a single person	11 (37.9)	4 (26.7)	7 (50.0)	
Urban vs. rural location n (%)				
<i>Urban</i>				1.000†
City	10 (34.5)	5 (33.3)	5 (35.7)	
Satellite urban town§	9 (31.0)	5 (33.3)	4 (28.6)	
Independent urban town§	2 (6.9)	1 (6.7)	1 (7.1)	
<i>Rural</i>				
Rural area	6 (20.7)	3 (20.0)	3 (21.4)	
Highly rural/remote area	1 (3.4)	0 (0)	1 (7.1)	
Prefer not to answer	1 (3.4)	1 (6.7)	0 (0)	

Education level <i>n</i> (%)				
<i>Primary or secondary level</i>				
Some primary (not complete)	1 (3.4)	1 (6.7)	0 (0)	0.573¶
Primary or equivalent	4 (13.8)	2 (13.3)	2 (14.3)	
Junior Certificate or equivalent	3 (10.3)	0 (0)	3 (21.4)	
Leaving Certificate or equivalent	7 (24.1)	4 (26.7)	3 (21.4)	
<i>Tertiary level</i>				
Diploma/certificate	3 (10.3)	2 (13.3)	1 (7.1)	
Primary degree	7 (24.1)	3 (20.0)	4 (28.6)	
Postgraduate/higher degree	4 (13.8)	3 (20.0)	1 (7.1)	
Country born <i>n</i> (%)				
Republic of Ireland	26 (89.7)	14 (93.3)	12 (85.7)	0.598†
Other	3 (10.3)	1 (6.7)	2 (14.3)	
Ethnicity <i>n</i> (%)				
White Irish	29 (100.0)	15 (100.0)	14 (100.0)	N/A
Employment status <i>n</i> (%)				
<i>Retired</i>				
Retired	20 (69.0)	14 (93.3)	6 (42.9)	0.011†***
<i>Employed and/or unemployed</i>				
Part-time employed	2 (6.9)	1 (6.7)	1 (7.1)	
Full-time employed	1 (3.4)	0 (0)	1 (7.1)	
Unemployed	1 (3.4)	0 (0)	1 (7.1)	
Permanently sick or disabled	1 (3.4)	0 (0)	1 (7.1)	

Looking after home or family	1 (3.4)	0 (0)	1 (7.1)	
In education or training	1 (3.4)	0 (0)	1 (7.1)	
Other	1 (3.4)	0 (0)	1 (7.1)	
Missing	1 (3.4)	0 (0)	1 (7.1)	
Presence of chronic disease# n (%)				
Yes	16 (55.2)	6 (40.0)	10 (71.4)	0.072**
No	11 (37.9)	8 (53.3)	3 (21.4)	
Missing	2 (6.9)	1 (6.7)	1 (7.1)	
Number of chronic diseases†† Median (IRQ)	1.5 (2.5) Range 0 – 8	1.0 (3.0) Range 0 – 5	2.0 (1.0) Range 0 – 8	0.185‡‡
Number of participants reporting categories of chronic disease†† n (%)				
Heart conditions	10 (35.7)	7 (46.7)	3 (23.1)	N/A
Lung conditions	3 (10.7)	1 (6.7)	2 (15.4)	
Musculoskeletal conditions§§	9 (32.1)	3 (20.0)	6 (46.2)	
Other chronic conditions ¶¶	13 (46.4)	5 (33.3)	8 (61.6)	

***Statistically significant result. *Mann-Whitney U test, $U = 111.000$, $z = 0.263$. †Fisher's exact test. ‡Chi-square test, $\chi^2(1) = 1.675$. §Satellite urban town — where $\geq 20\%$ of residents work in the cities (as per the Irish Central Statistics Office definition), Independent urban town — where $\leq 20\%$ of residents work in the cities (as per the Irish Central Statistics Office definition). ¶Chi-square test, $\chi^2(1) = 0.318$. #Five intervention participants ($n=3$ LSO, $n=2$ SP, $n=4$ telephone-administered, $n=1$ self-administered) answered 'no' or did not complete the question 'Do you have any chronic conditions?' but filled in the free-text response reporting one to three chronic conditions. **Chi-square test, $\chi^2(1) = 3.240$. ††Data calculated from $n=27$, as two intervention participants ($n=1$ LSO, $n=1$ SP, $n=1$ telephone-administered, $n=1$ self-administered) did not complete this data item. ‡‡Mann-Whitney U test, $U = 127.000$, $z = 1.392$. §§e.g., osteoarthritis, osteoporosis, chronic pain. ¶¶e.g., cancer, mental health, other organ disease, sensory impairments. Abbreviations: LSO — local sports partnership community sports development officers, N/A — not applicable, SP — social prescribing link workers.

4.3.1 Objective (i) To determine the rate of recruitment and enrolment to the study of intervention participants

In total, 952 service users were recorded as having contact with intermediaries during the recruitment period. Less than half of these service users (390, 41.0%) were eligible to take part in this study but only 175/390 received study information, a reach rate of 44.9% (Figure 4-3). There were some notable differences between LSO and SP service users in relation to recruitment and enrolment. During the recruitment period, 230 LSO service users were recorded as having contact with four LSO intermediaries and 722 SP service users were recorded as having contact with six SP intermediaries. The majority (223, 97.0%) of LSO service users were eligible to take part in this study in comparison to only one-fifth (167, 23.1%) of SP service users. Reach rates in both groups were low; only 120/223 eligible LSO service users and 55/167 eligible SP service users received study information (53.8% and 32.9% respectively). For LSO service users, the most common reasons cited for not taking part were time burden and no interest in research and for SP service users, not planning on engaging in PA and other reasons (Table 4-5). When this was explored further in the intermediary interviews, additional reasons for refusal that were not captured in the log included recruitment efforts/research participation causing additional burden to service users and literacy issues (both general and digital).

“They did not want to give their personal information... and I got that from their reaction. It was a firm no... Or timewise was coming in late and wanted to get up and chat to the other ladies before the exercise class started... when you bring research up... it just feels like too much of an effort sometimes?” GK03, LSO

“If somebody hasn't got a background in that [research], or they feel like they have a bit of a confidence issue around their own literacy, or their own educational level... some people may not feel like they have what it takes to contribute to something like a research piece?” GK07,

SP

Table 4-5: Reasons given for not taking part in research

	LSO*		SP*	
Time burden	14	13.6%	8	7.1%
No interest in research	14	13.6%	8	7.1%
Other reasons†	6	5.8%	18	16.1%
Unable to fill in questionnaires	2	1.9%	1	0.9%
Not planning on engaging in physical activity‡	1	1.0%	18	16.1%
Not planning on engaging with intermediary	-	-	2	1.8%
No reason recorded	66	64.1%	57	50.9%
Total	103	100.0%	112	100.0%

*Includes data from n=8/10 recruitment record logs, as n=1 SP intermediary was unable to retrieve this information due to migrating systems and n=1 LSO intermediary was unable to complete the 'reasons for decline' section due to busy workload (the research team was informed of this in advance of starting recruitment). †Examples given were intermediary away from work and unable to recruit, intermediary believed from speaking to service users that there was too much information in the study materials, mental health issues, interested in other activities, transport, physical health issues, reluctance sharing personal details/information with third parties, did not understand, felt they had nothing to contribute. ‡Some service users were informed about the study and declined information because they did not plan on engaging in physical activity, or the service user discussed engaging in physical activity with the intermediary but did not pursue this. Abbreviations: LSO — local sports partnership community sports development officers, SP — social prescribing link workers.

4.3.2 Objective (ii) To examine the suitability and acceptability of recruitment methods to the study

The average length of the recruitment period was 105.8 days. For LSO intermediaries, recruitment took an average of 29.8 days (range 7 – 56) and for SP intermediaries 166.6 days (range 119 – 196, data missing for one intermediary). Thirty people enrolled onto the study; therefore, the recruitment rate was 7.7%. Fifteen people each from LSO and SP services were enrolled onto the study, meaning a recruitment rate of 6.7% for LSO services and 9.0% for SP services. During their interviews, intermediaries revealed aspects of the recruitment strategies that were feasible, but many aspects that were challenging.

4.3.2.1 Feasible aspects of recruitment

Intermediaries across the different services recruited slightly differently. The SP intermediaries shared study information at various timepoints along the social prescribing process, which is discussed in detail later in this section (See Section 4.3.2.2.2). Three LSO intermediaries shared study information while attending sessions of local PA groups and introduced the study at the start of the class. Reasons for selection of the specific groups varied; some picked well-established groups with high numbers of service users, others picked newly established groups. These intermediaries recruited service users from one to three local PA groups each. One LSO intermediary shared study information over telephone, when service users called seeking information on local PA groups.

"I generally do it at the end of the call. So, once I had booked them in for the programme or [had] given them the programme information, I then start on the research study piece." GK05, LSO

All intermediaries began their recruitment period in August/September, which coincided with the return of local PA groups after the summer break.

"I remember that I was lucky in the sense that it was the start of a programme... so it was new group of people coming, all starting out the same... when they first came in, I give the whole explanation [of the local PA group]... then I followed it up with the research, handed it [study information] out to everyone." GK03, LSO

When recruiting directly from local PA groups, LSO intermediaries had an opportunity to recruit while also doing their routine administrative work.

"I always have a desk and generally a sign in sheet, anyway. So, as they were coming in the door, I was explaining to them what we were doing." GK04, LSO

Similarly, three SP intermediaries reported that PA was an activity they would often recommend and promote to service users, suggesting that this was part of their routine work.

"It's always one I suggest, because... if somebody wants to get socially connected... physical activities are often a very easy way to do so... it's an easy way to interact, because the physical activity is the subject matter, so it makes it very easy." GK10, SP

Intermediaries met with large numbers of service users. As some LSO intermediaries attended the local PA groups they recruited from regularly, they also had a chance to speak with potential participants again and remind them about participation.

"It was easy for me to target those groups too... I was meeting them regularly. And I can touch base... and I can remind them... there was a case where some of them [were] saying... "Oh, thanks for reminding me"... there was a lot of that." GK02, LSO

Intermediaries felt that potential participants understood the requirements of the study and were generally able to understand the study information leaflet and materials.

"The answers were already on the leaflet as well, so they would have had that information, or if they didn't, I would have looked at it and told them about it. Generally, it was fairly clear for them." GK04, LSO

Service users generally reacted positively to the study and were often motivated to take information or take part from a sense of altruism, by wanting to 'give back' or share their experiences in appreciation for the benefits they had received from attending either SP services or local sports partnership PA groups.

"One or two people were saying to me, I'm happy to contribute to this, to give back for what I've received through the service as a kind of a thank you, which I thought was lovely as well." GK07, SP

Most (four) SP intermediaries found the recruitment workload manageable in terms of completing the data log and maintaining contact with the researcher.

"It was no bother that at all because you just keep the records yourself, so it's easy. If you weren't filling it in every week, you still have your sources to go back and fill it in." GK08, SP

There was no specific feedback in relation to the recruitment record log from LSO intermediaries, and most (three) LSO intermediaries completed this in full with minimal errors. Intermediaries also found regular contact with the research team through weekly emails were helpful when recruiting.

“The research side of things would probably slip your mind at times as well. And it might be only from you emailing me, or reminding me, that it might be a return [to] focus for me.” GK05, LSO

4.3.2.2 Challenging aspects of recruitment

Numerous and significant challenges during recruitment were reported by SP and LSO intermediaries. In addition, several observations were made by both LSO intermediaries and LSO intervention participants that calls into question the suitability of the recruitment strategies.

“It's great to be a gatekeeper, it's great to populate your Excel, it's great to recruit, it's great to talk to them through all of the study information. It's a great thing to engage. But it's a big body of work... on top of your own position.” GK01, SP

4.3.2.2.1 Extra work with minimal results

SP intermediaries recruited small numbers of intervention participants, ranging from one to four per intermediary, and services had lengthy recruitment periods (up to six months). Four SP intermediaries explicitly expressed that recruitment was a difficult process.

“The recruitment was a lot more difficult than what I had anticipated, because people weren't as willing to take part. I had imagined I would have been able to get more people quite quickly.” GK09, SP

While LSO intermediaries generally recruited more intervention participants in a shorter space of time compared to SP intermediaries, they too expressed difficulties while recruiting for this study. All intermediaries felt that their ability to recruit was impacted negatively by their busy workload and high service demand, and recruitment was seen as time-consuming.

“Co-ordinating programmes, and dealing with the admin in the background, fielding telephone calls for bookings and all that sort of stuff... I'm always very limited with time... adding another little kind of admin job into it — was tough for me.” GK05, LSO

“Definitely the time when the research happened for [area], it was probably not the best time... the service was extremely busy and in demand, and there was a big waiting list.” GK07, SP

Intermediaries often relied on the research team to fully explain the purpose and procedures of the study because of this lack of time.

“I suppose I'd be conscious of my time as well, so I'd probably be whizzing through it a bit, if I had more time [laughing] I could probably slow things down, and it might be easier for them [to understand].” GK05, LSO

This may have led to some misunderstanding of the purpose of the study amongst intervention participants, particularly LSO. Some appeared under the impression that this research study was being carried out on behalf of the local sports partnership, and therefore they had several suggestions as to how to improve the local sports partnership service, rather than the LSO intervention *per se*.

“I mean you're there to help the local sports partnerships in their future training and that... I'm sure there's a lot of information that both you and the sports partnership will gain from.” FEAS04, LSO

SP intermediaries expressed that working with their service users was always the priority, and sometimes reported that conducting research or recruitment could potentially negatively impact on relationship building or their work with service users.

“I think with the social prescribing workload... it's almost too much, and I think adding anything else into the mix of that, with the relationship with the client — for me, anyway, my professional role — is almost like it's not a priority, obviously.” GK06, SP

Additionally, there were significantly less eligible SP service users (23.1%) in comparison to the high numbers in LSO services (97.0%). Some SP intermediaries reported that the

profile of their service users was extremely complex, with multifaceted needs in relation to their mental and social health. This often meant that service users were supported to connect to other community activities focusing on mental health and addressing basic needs. These either took priority over PA, meant that intermediaries did not suggest PA as a community activity, or that service users declined the intermediary's suggestions of engaging in PA.

"Lot of people that maybe come our way have... either mental health, or social issues... you kind of felt well, if I throw exercise into the spanner [laughing], it's just gonna upset the whole cart." GK08, SP

4.3.2.2.2 Defining 'pre-intervention' timepoints

When to introduce the study to service users was also highlighted as a complex component of recruitment by SP intermediaries. The difficulty of measuring pre- and post-social prescribing interventions was noted, with no clear delineation of start and end points. This made deciding when a service user was eligible difficult for intermediaries.

"It would be very difficult, to say that this — you could start it, and it could be wrapped up in eight weeks, or twelve weeks." GK08, SP

All SP intermediaries reported slightly different approaches to recruitment, often dictated by the presentation of their service users at the time, meaning there was no consensus on the most appropriate time to introduce the study to service users. Half of the intermediaries assessed service users' interest in PA at the initial assessment, with half also reporting that they offered the study information at the first or second meeting.

"So, what I'd do is, I'd meet them, I'd do the wellbeing assessment, if they mentioned physical activity, I explained about the study then... it seemed to be with the timelines involved, I think the logical time to do it." GK10, SP

Other SP intermediaries were very reluctant to offer the study information at this stage, fearing that the introduction of a study at this early stage would not be appropriate. Some intermediaries even preferred to wait until after an intervention had been

completed, i.e., after a service user had been successfully connected to local PA, before they offered study information.

“I don't think it's useful having it [recruitment] at the very start, because quite often the service — how it works, the nature of it, establishing a relationship, building trust with somebody, and really trying to get into the nub of what they need and why they're there — I think that needs to be a piece of work that needs to be honoured, and left on its own.” GK07, SP

It also became clear during the follow-up interviews that not all LSO intervention participants were connected to the local PA group from which they were recruited from through the intermediary, and had self-referred directly to the group, particularly for groups that had been running for a longer period and were open to all in the community. They subsequently had met the intermediary, rather than self-referring to the intermediary in the first instance.

“There would be signs up in the hall, and a lot of it is through word of mouth as well. Their friends, or someone that's doing a class somewhere else... sometimes the teacher actually brings them along as well, tells them about it, so there are definitely various different ways for them to find out about it and to connect in with it [local PA group].” GK04, LSO

4.3.2.2.3 Selective approaches to recruitment

The reach rate amongst SP intervention participants was lower compared to LSO (32.9% vs. 53.8%). There was evidence of SP intermediaries being selective, and only offering study information to certain service users, rather than all eligible service users.

“I wasn't thinking I'm going to bring this up with everyone. I had already decided, okay, I'm going to be aware of the potential participants but I'm not going to push this on everyone.” GK06, SP

Intermediaries felt that having to explain research and the study was burdensome or confusing for some service users.

“A lot of people we work with will have chronic mental health issues, so stress is a big component. So, you don't want to overload them with too much information, you're trying to keep things really simple and clear.” GK07, SP

For some service users it was even thought to be not appropriate.

“I suppose the mere fact they're coming to social prescribing means that they're already taking a step back out, so they have taken this step for themselves. And maybe it's just a step too far then to be doing that, and doing something new, a study.” GK09, SP

Intermediaries appeared to select service users who were doing 'well' — service users who were less complex, physically active already, or perhaps more open to the idea of engaging in PA.

“I would say of the few people that I did recruit... they were people that were already engaging in some kind of exercise. So it wasn't that they were coming to it, you know, fresh and new, they were already doing a bit of walking themselves or actively looking for some sort of group activity... they were quite positive people?... It wasn't a hard sell for them.” GK08, SP

They also tended to offer study information to service users who were better educated or who had health backgrounds, or who were perceived to be able to better understand the goals of research.

“What worked really well was people who really had an understanding of why a study would be done like it, and people who were maybe passionate about academics or healthcare in general, and wellbeing.” GK07, SP

4.3.3 Objective (iii) To determine retention to the study

Retention rates for LSO intervention participants were high. Out of 15 participants, 14 returned for a T1 assessment (93.3%). One person was unable to be contacted after multiple attempts by the research team. Retention rates for SP intervention participants

were lower in comparison. Out of 15 participants, 14 completed a baseline assessment (one participant was enrolled onto the study after verbally consenting to take part but was unable to be contacted by the research team to complete the T0 assessment). Eleven out of the 14 participants returned for a T1 assessment (78.6%). Two participants dropped out from the study due to personal circumstances, and one was unable to be contacted after multiple attempts by the research team.

4.3.4 Objective (iv) To describe the demographic and health characteristics of intervention participants

Baseline (T0) demographic and health characteristics for LSO and SP intervention participants were statistically similar (Table 4-4). The only characteristic which was significantly different between groups was employment status; over 90% of LSO intervention participants were retired (93.3%) compared to 42.9% of SP intervention participants ($p=0.011$). Most SP intervention participants (56.8%) were in some form of employment or training, with the remainder unable to/not currently working. While no other demographic characteristics were significantly different between groups, there were notable trends. SP intervention participants tended to live alone (50.0%), whereas LSO intervention participants lived with partners or family members (73.4%). Slightly more LSO intervention participants achieved a third level qualification (53.3%) compared to SP intervention participants (42.8%). SP intervention participants also more commonly lived with chronic disease(s) compared to LSO intervention participants (71.6% vs. 40.0%). SP intervention participants reported a median of two chronic diseases and experienced complex diseases such as chronic pain, arthritis, orthopaedic surgeries, mental health issues, and cancer. In contrast, LSO intervention participants reported to have cardiovascular disease, such as hypertension, high cholesterol, or diabetes.

Most intervention participants in this study were female (86.2%). The lack of male service users taking part in local PA groups was also evident, with LSO intervention participants speaking of the support they had received from other women attending the local PA group (*"All the women talk, and we've become friendly"* (FEAS05, LSO), and the presence of *"token men"* (FEAS17, LSO)). When this was explored in the LSO

intermediary interviews, it was clear that very few men attended the local PA groups they selected for recruitment.

“In our older adult programme... we have over nine hundred participants, and I think it's 8.5% of those are men?” GK05, LSO

LSO intermediaries acknowledged this as a limitation of their services and spoke of ongoing work to try and address this gender inequality, often through running local PA groups exclusively for men. To recruit men for this study, intermediaries reported they would have had to recruit from these tailored local PA groups.

“But I run a men only class twice a week... I could have gone to them specifically, in a sense, if we did need more people.” GK04, LSO

Only one LSO intermediary did this, which accounted for the one male LSO intervention participant. The other LSO intermediaries who recruited through local PA groups reached their recruitment target quickly and were therefore unable to recruit from other groups. In contrast to LSO services, SP services generally had good engagement from men, but intermediaries spoke of male service users having a lack of interest in engaging in PA.

“I found that the uptake was far more receptive from women, and there was probably more of an openness with women around physical exercise that men didn't appear to have.” GK07, SP

Two reasons were suggested by SP intermediaries for this. Some reported that male service users tended to have more complex needs in comparison to female service users and needed supports around mental health and addiction, for example.

“Men who are widowed, or separated, or never married, who live alone... and maybe have had issues in the past with alcohol, so going to the pub isn't what they want to do anymore.” GK08, SP

Others reported a general lack of local PA suitable for men in their area, which negated them from offering it to their male service users.

“To the point that I was going oh my God, there's hardly anything for the men. In comparison to the women.” GK10, SP

4.3.5 Objective (v) To determine participation in, and adherence to, local physical activities by intervention participants

There were no significant differences at baseline in the number of local PAs per participant between groups, and intervention participants reported taking part in a median (IRQ) of 3.0 (2.75) local PAs (Table 4-6). Walking was the most popular type of exercise (reported by 23 participants, 82.1%). LSO intervention participants also reported taking part in exercise and fitness classes, pole walking, dancing, and sports. SP intervention participants also reported taking part in exercise with medical oversight, yoga and Tai Chi, and actively trying to decrease their sedentary behaviour. The number of local PAs per participant at T1, types of exercise undertaken at T1, as well as the types of exercise accessed through intermediary interventions are shown in Table 4-6. There was no difference in the median (IRQ) number of local PAs participated in at T1 (3.0 (2.5)) compared to baseline (3.0 (2.75)), and walking remained the most popular type of exercise (reported by 23 participants, 92.0%). Walking and exercise and fitness classes remained the most popular types of exercise amongst LSO intervention participants, and walking also remained the most popular type of exercise amongst SP intervention participants. Approximately half of intervention participants (10 LSO, 2 SP) reported no change in the types of exercise undertaken from baseline to T1 (unable to be calculated for one SP intervention participant due to missing data). This may be attributable to the recruitment strategies used by intermediaries, as LSO recruited from local PA groups that intervention participants had already started attending and engaging in, and SP intermediaries reported recruiting service users who were already taking part in the local PA facilitated by the intermediary at the time of enrolment to the study (See Section 4.3.2.2.2). One-fifth of intervention participants (2 LSO, 3 SP) reported undertaking fewer types of exercise at T1 compared to baseline. Three SP intervention participants reported that they had not started a local PA. Some had no intention of starting, others were planning on attending in the near future.

“She [intermediary] was encouraging me into the walking club, which never happened.” FEAS18, SP

“But the next walk they’re going to do I’m going to go with them as well, so.” FEAS21, SP

In addition, scheduled breaks in local PA service provision, illness, adverse weather, and preparing for Christmas and other holidays were all reported to negatively impact on participation in local PA which may also have accounted for the lack of change.

“Yeah, I’ve had a terrible time really over Christmas, and then the weather wasn’t too kind as well.” FEAS14, LSO

“We were meant to meet on the Thursday that I ended up in the hospital... he [PA instructor] offered me a slot today and I said to him, no. I’m just not right yet.” FEAS25, SP

However, almost 30.0% of intervention participants (2 LSO, 5 SP) were undertaking more types of exercise at T1, with more intervention participants reporting participating in additional walking, gardening, housework, dancing, exercise with medical oversight, and yoga and Tai Chi activities. In addition, six intervention participants (2 LSO, 4 SP) reported undertaking more local PAs of the same type (walking, exercise and fitness groups, exercise with medical oversight, and yoga and Tai Chi) at T1, i.e., doing one local PA of that type at baseline and two at T1. The most common types of exercise accessed through intermediary interventions were exercise and fitness classes (reported by 11 participants) and exercise with medical oversight (reported by four participants). Nine participants (5 LSO, 4 SP) were connected to more than one local PA group through an intermediary. Yoga and Tai Chi activities were the only type of local PA accessed through both LSO and SP intermediary interventions, but in comparison to LSO intermediaries, no SP intermediaries connected intervention participants to exercise and fitness, pole walking, sport, or dancing groups. Instead, SP intervention participants were connected to exercise with medical oversight, walking, swimming, and gardening.

“No matter what I talk about, whether it's chair yoga, swimming, or the local walking groups or meditation, everyone wants to be referred into ExWell.” GK06, SP

Table 4-6: Participation in local PA at baseline (T0) and T1, and local PA accessed through intermediary interventions

	Participation in local PA at T0				Participation in local PA at T1			
	Whole Group (n=28)*	LSO (n=15)	SP (n=13)*	p-value	Whole Group (n=25)†	LSO (n=14)	SP (n=11)	p-value
Number of local PAs per participant <i>Median (IRQ)</i>	3.0 (2.75) Range 1 – 6	3.0 (3.0) Range 2 – 5	3.0 (3.5) Range 1 – 6	p= 0.525‡	3.0 (2.0) Range 1 – 5	3.0 (2.25) Range 2 – 5	4.0 (2.0) Range 1 – 5	p= 0.647§
Number of participants reporting types of exercise n (%)								
Walking	23 (82.1)	13 (86.7)	10 (76.9)	N/A	23 (92.0)	13 (92.9)	10 (90.9)	N/A
Exercise and fitness	18 (64.3)	13 (86.7)	5 (38.5)		14 (56.0)	12 (85.7)	2 (18.2)	
Swimming	9 (32.2)	3 (20.0)	6 (46.2)		5 (20.0)	3 (21.4)	2 (18.2)	
Housework	8 (28.6)	4 (26.7)	4 (30.8)		8 (32.0)	3 (21.4)	5 (45.5)	
Exercise with medical oversight	5 (17.9)	1 (6.7)	4 (30.8)		5 (20.0)	1 (7.1)	4 (36.4)	
Gardening	4 (14.3)	2 (13.3)	2 (15.4)		4 (16.0)	0 (0.0)	4 (36.4)	
Pole walking	3 (10.7)	3 (20.0)	0 (0.0)		3 (12.0)	3 (21.4)	0 (0.0)	
Sport	2 (7.1)	2 (13.3)	0 (0.0)		2 (8.0)	2 (14.2)	0 (0.0)	
Dancing	2 (7.1)	2 (13.3)	0 (0.0)		3 (12.0)	3 (21.4)	0 (0.0)	
Cycling	2 (7.1)	1 (6.7)	1 (7.7)		0 (0.0)	0 (0.0)	0 (0.0)	
Yoga and Tai Chi	1 (3.6)	0 (0.0)	1 (7.7)		4 (16.0)	2 (14.2)	2 (18.2)	
Decreasing sedentary behaviour	1 (3.6)	0 (0.0)	1 (7.7)		1 (4.0)	0 (0.0)	1 (9.1)	

	T0 n=24¶		T1 n=24¶		p-value
Number of local PAs per participant <i>Median (IRQ)</i>	3 (2.75)		3.0 (2.5)		p= 0.689#
	Types of exercise accessed through intermediary interventions		Proportion of sample connected to type of exercise by intermediaries n (%)		
	LSO	SP	LSO (n=14)	SP (n=11)	
Walking		✓		3 (27.3)	
Exercise and fitness	✓		11 (78.5)		
Swimming		✓		2 (18.2)	
Exercise with medical oversight		✓		4 (36.4)	
Gardening		✓		1 (9.1)	
Pole walking	✓		3 (21.4)		
Sport	✓		1 (7.1)		
Dancing	✓		2 (14.3)		
Cycling					
Yoga and Tai Chi	✓	✓	1 (7.1)	2 (18.2)	

*Data calculated from n=28, as n=1 did not complete this data item (SP, self-administered). †Four participants lost to follow-up. ‡Mann-Whitney U test, U= 83.000, z= -0.681.

§Mann-Whitney U test, U= 86.000, z= 0.507. ¶Data calculated from n=24 due to missing data at baseline. #Wilcoxon signed-rank test, z= 0.401. Abbreviations: LSO — local sports partnership community sports development officers, N/A — not applicable, PA — physical activity, SP — social prescribing link workers.

Generally, attendance rates of local PA were high. LSO intervention participants self-reported their attendance as 75 – 100% of sessions, with half of participants reporting that they did not miss a session. If participants did report missing a session, it was due to extenuating circumstances such as health issues or travel.

“I don’t think I’ve ever missed a week... we didn’t take a holiday and consequently I didn’t need to bow out at any stage.” FEAS10, LSO

Approximately half of SP intervention participants also reported having high attendance rates, ranging from 75 – 90%.

“I try and get [to the walking group] at least once a week anyway but if I’m free on another week I’ll go twice.” FEAS28, SP

The other half had varying levels of attendance, ranging from only two sessions to two-thirds of the available sessions. Reasons for this poorer attendance were sometimes pragmatic, related to caring commitments, availability and scheduling of the local PA, holidays, and travel or work commitments.

“If I’m needed down at work, you know, I have to go to work... Because it’s all in the morning times they do the walks.” FEAS29, SP

A lack of intrinsic motivation may also have impacted on their attendance.

“Obviously I could have [attended] if I really wanted to.” FEAS12, SP

The factors that influenced and facilitated participation in, and adherence to, to local PA were explored qualitatively in interviews with intervention participants, who reported the health benefits they had achieved through engagement in the intermediary intervention and subsequently local PA; physical, emotional, motivational, and social, as well as the financial value of the local PA group.

4.3.5.1 Physical health benefits

Intervention participants spoke about the numerous health benefits they had enjoyed because of participating in local PA. Positive physical health outcomes included improvements in physical fitness (reported by two LSO intervention participants) and mobility (reported by one SP intervention participant).

“It meant that our physical fitness improved — dramatically.”

FEAS01, LSO

All intervention participants praised the local PA groups. For LSO intervention participants, particularly the local, accessible nature of the PA groups on offer and the level of difficulty of the classes were praised — they felt appropriately challenged but also well able to participate.

“And it was local as well, it was only out in [local club] which is only ten minutes away from me.” FEAS02, LSO

“It’s always at their own pace, nobody ever feels oh gosh, I’m really bad at this now and everybody else is really good.” FEAS04, LSO

LSO intervention participants also praised the local PA group instructors.

“The dance instructor... she is good fun and keeps everybody going and she challenges us with new moves... And the other lady who does the Chairobics is an absolute gem, she’s just so wonderful with people.” FEAS10, LSO

4.3.5.2 Emotional and motivational benefits

SP intervention participants also spoke of improvements in their mental health and overall wellbeing.

“From that point of view, I’m in a much better place... I’ve been meeting up with a lot of people over the last while as well, that I had worked with and things like that, and made contact with people.”

FEAS12, SP

LSO intervention participants reported an improvement in their participation in PA generally because of engaging in local PA, and an increased motivation to do other activities, and many spoke about how much they enjoyed the local PA they attended.

“That’s why going to this sports physical activity is fantastic for me, and it’s kind of keeping it on my mind. So, that I feel is very good you know, and it’s certainly keeping it... important for me, you know?”

FEAS17, LSO

SP intervention participants spoke about how the intermediary had facilitated connections to enjoyable and meaningful community activities, including and outside of local PA. For example, intervention participants also reported being connected to mindfulness classes, healthy eating courses, computer courses, and arts and culture-based activities.

“But it’s just having the avenues you see, to be able to get to that, and it’s only by connecting with one person that might lead you on to something else, you know, and then you start to realise you’re getting your life quite full of things, and you meet new people. That’s good for you, you know, for your mental wellbeing.” FEAS21, SP

SP intervention participants also highlighted how the local PA group itself had been a source of motivation. They spoke about how the facilitators within these groups created a supportive environment, motivating them to continue participating.

“These people are actually giving a lot of their time and it kind of falls back to you to actually pull up your socks a bit and make something of yourself with the group.” FEAS08, SP

4.3.5.3 Social benefits

Another positive outcome included increased social connections.

“As one of my daughters said to me, it’s changed your life. And I think it has really. Because I’ve met so many more people, and we go for coffee, and it’s just so nice.” FEAS10, LSO

Many intervention participants highly praised the social interaction within the PA group itself and identified the PA group as a social activity as well as a physical one.

“It’s a lovely group, you know, we’re all of much of a same age, some a little bit older, some a little bit younger, but they all gel well, we have a good laugh but it’s a social thing as well as much as anything else.” FEAS17, LSO

They spoke about making new friends and forging new social connections, which was a motivating factor to continue attending the local PA.

“The welcoming I got too, in all the different groups now I joined was absolutely brilliant, very encouraging.” FEAS08, SP

These social connections also carried on to outside of the groups as well to their local community.

“I drink my cup of coffee and sit down with three or four people [after the local PA group] that I never met before. And I do think that’s good for you.” FEAS10, LSO

SP intervention participants also valued connection to their peers and their local community. This in turn was reported to lead to increased participation in other community activities and was a bidirectional effect.

“I started with one wee thing and then somebody else would tell me something else... then that led to something else and something else, so it’s really if you’re in the middle of people then you get to know about things.” FEAS21, SP

An outcome also reported by SP intervention participants was the opportunity to meet peers with similar issues, and the opportunity to discuss their shared experiences together.

“We all enjoy it [local PA group]... you never know who you’re going to be sitting with, or who you’re going to be talking to, and most people when they’re at it, want to talk.” FEAS26, SP

4.3.5.4 Financial value

Attendance and participation were also likely influenced by the minimal cost of the local PA group itself. Intervention participants reported that the groups represented value for money and praised the low cost of the PA groups, with many of the groups free or charging a nominal fee to attend.

“And it’s a very good price as well... it’s very good value.” FEAS02, LSO

“With the one walking group there’s a two euro... suggested donation. Because they provide coffee, they bring thermoses and sandwiches and biscuits with them.” FEAS23, SP

4.3.6 Objective (vi) To explore the acceptability of the intervention delivered by the intermediary

Intermediaries recorded their contacts with intervention participants in the recruitment record log. LSO intermediaries recorded 19 contacts totalling 177 minutes of intervention time with 15 intervention participants, ranging from 0 – 8 contacts per participant. The average time spent engaging with intervention participants was 11.8 minutes. These contacts took place face-to-face, over telephone, or via text message/email. Most LSO intermediaries were unable to attend local PA groups regularly or for any length of time because of busy workloads. This likely accounted for some intervention participants recorded as having zero contacts with the intermediary during the study period.

“We will arrive for the first session of a program, and we try to arrive for the last session, but generally our tutors run the rest of the program... so that we as development officers are not getting caught up in the programme.” GK03, LSO

This was echoed by some intervention participants, who reported having or requiring minimal interactions with intermediaries at the local PA group. However, some intervention participants also reported seeing or interacting with the LSO intermediary at the local PA group, which was not recorded in the recruitment record logs.

“She does attend the group frequently, she’s there at opening and she’s there at closing. So, if I said I only met her twice last month it doesn’t mean that [intermediary] wasn’t there every time because if you left that before the chairs was all put away you would miss her, and equally so if you were late for class, you would miss her.” FEAS06, LSO

SP intermediaries recorded 34 contacts totalling 722 minutes of intervention time with 15 intervention participants, ranging from 0 – 11 contacts per participant. The average time spent engaging with intervention participants was 48.1 minutes. These contacts took place face-to-face, over telephone, or via text message/email. All participants who had zero contacts with the intermediary were recorded as having several contacts prior

to the study period, implying that these participants may have already been successfully connected to a local PA at time of recruitment.

“I haven’t seen her since or talked to her since [enrolling on the study]... I’m just doing the walking group now.” FEAS28, SP

Intervention participants found the intermediary intervention very acceptable, with a mean (SD) score of 9.8 (0.5)/10, praising the intermediary, local sports partnership, and social prescribing services generally. There were no negative impacts reported from engaging in the intervention. Most LSO intervention participants (13/14) gave a maximum acceptability score of 10, with one person declining to answer (See Sections 4.3.6.2 and 4.3.7).

“I don’t usually give things ten, but this is something that I really, really appreciate, and love it.” FEAS17, LSO

SP intervention participants gave the intervention a mean (SD) acceptability score of 9.5 (0.7)/10.

“I thought it [social prescribing] was a great idea, to try and get people out there, to do different things.” FEAS28, SP

Intervention participants’ perception and experiences of undergoing an intermediary intervention, and how this impacted their engagement in local PA, were also explored qualitatively. However, there were important differences between the groups in relation to how and why the intervention was accessed, and the value placed on the role of the intermediary.

4.3.6.1 Drivers of engagement with the intermediary intervention

Every LSO intervention participant self-referred directly to an intermediary, or more commonly, directly to a local sports partnership PA group (thus meeting the intermediary) and were mainly self-motivated to do so. They were driven to attend by wanting to be (more) physically active, by the sociability of the group, or after a change in life circumstances such as retirement or ill-health.

“I really felt I needed to do it [local PA group] and that I owed that to myself.” FEAS06, LSO

The high levels of internal motivation amongst LSO intervention participants were clear. Many spoke of self-directed PA they were participating in outside of local PA groups accessed through the intermediary intervention, and how they had maintained their participation in local PA over time despite attending other groups which did not work out — this may have been due to high cost, inappropriate level of difficulty, or not engaging with the other people involved with the group.

“It was a different teacher with a different style that I think... I mean, I’m not a total beginner if that makes sense? So, it might have been geared to people who were total beginners.” FEAS03, LSO

Like LSO intervention participants, SP intervention participants also reported being driven by wanting to do more PA (or to do a specific PA group), to be more sociable and connected, and to improve their physical and mental health. However, in contrast to LSO intervention participants, over half of SP intervention participants were referred to the intermediary by a HCP with a minority (two) self-referring to this service. SP intervention participants recognised that they needed these external sources of motivation, and that the intermediary provided this for them during the intervention.

“She’s opened doors for me that I certainly wouldn’t [have] done on my own. In the way I am at the moment. I would when I was flying, I’d be going here — but she facilitated that, you know, that’s a great service.” FEAS25, SP

4.3.6.2 Hands-off approach to LSO interventions

Many of the health benefits described by LSO intervention participants appeared to be attributed directly to the local sports partnership and/or the local PA, rather than the support provided by the intermediary.

“I suppose the one thing I would like to say is that it’s because of [local sports partnership] that I am as active as I am now.” FEAS05, LSO

LSO intervention participants mainly viewed the role of the intermediary as administrative. Intervention participants were well-informed about local PA service

provision, for example through mailing lists or WhatsApp groups managed by intermediaries.

“I would get emails from them now. I have an email already to say the activator poles are coming in January into the library again.”

FEAS05, LSO

“Because you don’t realise what’s out there. Until actually the likes of [intermediary] and that, they’ll tell you.” FEAS11, LSO

They also viewed intermediaries as having an important role in the day-to-day running of their PA group also, by providing resources such as instructors, equipment, and venues.

“If there was any issues, she’d [intermediary] be there, if we needed any extra gear or that.” FEAS20, LSO

They reported that the intermediaries assisted them in a timely fashion with any queries or questions in relation to PA or the PA group.

“If you rang his mobile, he’ll ring you back within very short time really. There was no such a thing as next day or two days later, it was picked up straight away.” FEAS02, LSO

Having the intermediary as a point of contact to deal with issues or concerns was valued and was observed as noteworthy in comparison to other PA providers and services.

“It’s very nice to have something that’s from the sports partnership that you feel that they’re interested in you, you know? As opposed to just somebody running a commercial business or an exercise class.”

FEAS14, LSO

Most LSO intervention participants were particularly complimentary of the intermediaries’ themselves. They found them to be pleasant, welcoming, motivating, approachable, and took interest in the individuals who attended local PA groups.

“Well, the main thing, that is her encouragement. She has that welcome or that people approach should I say that encourages people to come back, feel welcome.” FEAS06, LSO

While LSO intervention participants were positive about the amount of support they had received from the intermediary, they did acknowledge receiving minimal support. They explained that this was not a negative, rather the support was not expected or necessary; the intermediary did what was necessary to make them feel welcome to the group and ensure the PA group was operating.

*“There’s absolutely no need. She does what she needs to do.” FEAS07,
LSO*

One intervention participant declined to answer the acceptability score question because of this.

*“I had no expectations [of working with the intermediary], and
therefore I couldn’t say it was acceptable or otherwise, it was just
welcome.” FEAS10, LSO*

Other echoed this sentiment, feeling that they could manage their needs in relation to PA and participation in local PA independently. Some expected that support would be available to them if they needed it, but it was not necessary at present.

*“I would say yes, if you did need it, which I don’t thank God at the
moment, yeah I’d say help is there.” FEAS15, LSO*

4.3.6.3 Hands-on approach to SP interventions

Rather than praising the intermediary intervention as a whole for improving their health, SP intervention participants appeared to place more value on the hands-on approach taken by SP intermediaries themselves. They particularly valued the in-person meetings and maintenance of contact with the intermediary, with some reporting weekly follow-up at times.

*“She was very flexible about how to meet and so on, where to meet...
she was also I thought very well-structured... she had a Wheel of Life
diagram which she explained we could get to know me, or get to
know what my likes and dislikes [were]... she was employing a range
of ways of making sure that I was in touch, you know, and very
tailored.” FEAS23, SP*

SP intermediaries also informed intervention participants of current and upcoming local PA groups and were considered well-informed and knowledgeable about available services.

“Anything that she wanted to tell me she told me very clearly, and she was obviously very on top of her subject.” FEAS18, SP

Intervention participants also praised the fact that while the intermediary provided large amounts of information and support, there was no pressure or expectations to engage in any activities.

“She told me to give everything a try. Everything. And if you don’t like [it]... you don’t have to do it. We’ll find something else for you.”

FEAS09, SP

Some intervention participants also praised the flexible nature of the service, and how they were able to re-engage with the service after periods of ill-health for example.

“But I knew she’d be there if I needed her... I could have called on any of them [intermediaries in the service] when I had the [health problem necessitating surgery], because they would have come.”

FEAS21, SP

They described person-centred approaches, implemented throughout the intervention, and a high level of instrumental support to achieve connections to local PA.

“She connected [me] up with information leaflets and sent it out through the post... which was perfect for me... so I put in an email in to say that I was interested in it.” FEAS08, SP

“When I went down there [venue for local PA group] for to meet her [intermediary], she introduced me and I watched a class that was going on, and then I was assessed.” FEAS26, SP

The role of the intermediary was especially appreciated. Most were positive about the amount of support they had received from the intermediary. They were particularly complimentary of the intermediaries themselves, finding them to be pleasant, welcoming, helpful, good listeners, empathetic, and interested in their ‘story’.

"I was very impressed. Lovely young lady, very helpful, listened to everything that I had to tell her. I was really very happy with her."

FEAS24, SP

However, SP intervention participants tended to have a more emotive response to the support and assistance given by the intermediary compared to LSO intervention participants. Many SP intervention participants spoke positively about times when the intermediary had gone 'above and beyond' their expectations.

"She's actually the sort of person that would do more than she was probably supposed to do... if it was her time up, she wouldn't walk away, she would extend another half an hour, you know, helping, supporting, if need be, if that was the situation that warranted it."

FEAS21, SP

They also praised the holistic approach taken by the intermediary, and how this had helped some intervention participants to address the negative effects of loneliness and poor mental health on their lives.

"I found her a really good listener, she was very empathetic... there are so many people I think, like myself, who wouldn't be coming to health professionals... We do need mental and physical exercise and social connection, and this programme is really, really important, I think in achieving that." FEAS23, SP

Intervention participants also valued the 'non-medical' approach to the SP intervention.

"I was absolutely charmed [laughing], to have somebody, you know, looked at things in a different light, that wasn't as I say, 'pill-propped'. That, you know, were looking at the whole total person."

FEAS25, SP

The main critique was that not enough sessions were offered with the intermediary. Some intervention participants reported having little contact with the intermediary during the study period, and that they had wanted more sessions.

“I think there could be more of it... it was probably on a such a short period, just to get a small little window of what’s available you know.” FEAS08, SP

Some also critiqued the activities offered through the social prescribing service.

“Because they do have other... things other than walking groups, it’s just they didn’t really suit me, maybe for older people.” FEAS28, SP

4.3.7 Objective (vii) To explore suitability, acceptability, and completion rates of the measurement tools by intervention participants

The mode of completion, completion rates, and response errors for the data collection form and study outcome measures are summarised in Table 4-7. While there were extremely high completion rates at both baseline and T1, there were several data errors and response errors noted at baseline. Most of the errors in the data collection form were attributable to intervention participants who self-administered the form selecting multiple answers to data items. The IPAQ-SF was the study outcome measure with the highest number of data and/or response errors. Examples of these errors included participants not giving a single value (e.g., “2 – 3 hours”), giving time estimates for the past week instead of a typical day, or by writing free-text responses instead of the standardised answering format. All T1 assessments were telephone-administered to conduct the semi-structured interview concurrently and therefore reduce burden on the participant. This meant over 40.0% of intervention participants switched modes of administration (13/25, 44.8%), i.e., the study measures were self-administered at baseline and then telephone-administered at T1. More SP intervention participants switched modes (7/11, 63.6%) in comparison to LSO intervention participants (6/14, 42.9%). In total, one intervention participant (LSO) had an item non-response at T1, where they refused to answer the item regarding acceptability of the intervention. All other data items had completion rates of 100.0%. No response errors were recorded.

Table 4-7: Summary of completion rates for study measurement tools

T0				
<i>How completed</i>	<i>Self-administered n (%)</i>	<i>Telephone-administered n (%)</i>		
	13 (44.8)	16 (55.2)*		
<i>Outcome measure completion rates %</i>		<i>Data and/or response errors</i>	<i>Participant type</i>	<i>Mode of administration</i>
Data collection form	97.8	Yes	n=6 LSO	n=3 self-administered n=3 telephone-administered
			n=5 SP	n=4 self-administered n=1 telephone-administered
IPAQ-SF	99.0	Yes	n=5 LSO	n=3 self-administered n=2 telephone-administered
			n=3 SP	n=2 self-administered n=1 telephone-administered
SEE	99.6	Yes	n=1 LSO	Self-administered
SWEMWBS	100.0	No	N/A	N/A
T1				
<i>How completed</i>	<i>Self-administered n (%)</i>	<i>Telephone-administered n (%)</i>		
	0 (0.0)	25 (100.0)		
<i>Outcome measure completion rates %</i>		<i>Data and/or response errors</i>	<i>Participant type</i>	<i>Mode of administration</i>
Data collection form	100.0	Yes	n=1 LSO	Telephone-administered
IPAQ-SF	100.0	No	N/A	N/A
SEE	100.0	No	N/A	N/A
SWEMWBS	100.0	No	N/A	N/A

*Telephone support was available from the research team if needed for intervention participants who self-administered, but only n=1 availed of the support (SP). Abbreviations: IPAQ-SF — International Physical Activity Questionnaire — Short Form, LSO — local sports partnership community sports development officers, N/A — not applicable, SEE — Self-Efficacy Scale, SP — social prescribing link workers, SWEMWBS — Short Warwick-Edinburgh Mental Wellbeing Scale.

During their interviews, feedback from intervention participants was largely positive in relation to the measurement tools, and there were notable suggestions for additional measures to be included in future studies. In terms of acceptability of the measurement tools, most intervention participants found them to capture important information relevant to their experiences. They found the measures simple and easy to complete and did not feel any aspects or information were missing.

"I didn't see that it lacked anything. I wouldn't add anything to it either, no." FEAS06, LSO

"I liked the fact that they addressed, you know, mood and feeling as much as the physical side of things... I thought they were very well-formulated." FEAS23, SP

There was no clear preference for mode of completion. Intervention participants reported no difficulties completing the questionnaires over telephone. They reported that being able to speak to the researcher was a positive, for the opportunity to speak to a person, clarify questions or responses, and to mitigate potential literacy issues.

"If you're doing them over the phone, you're on the other end that if I'm not sure about something I can ask you exactly what it means... Because I'm not great at understanding some words, you know."
FEAS11, LSO

"It's very nice to communicate with a human being. I'm very much into that, even whenever I'm trying to get my Sky or my Vodafone sorted, I like to talk to somebody." FEAS21, SP

For intervention participants that preferred to self-administer the questionnaires, they explained that self-administration allowed appropriate time to think about their responses and could mitigate any communication or comprehension errors.

"Some of the questions ... I had to concentrate a bit more, I suppose, on them... I prefer to do them on my own." FEAS24, SP

However, some intervention participants appeared not to be confident in their ability to self-administer the questionnaires and were unsure if they completed them 'correctly'.

"You have to make it up yourself when you're filling in the form, you know? You have to depend on yourself really." FEAS02, LSO

While the majority reported no issues with the tools, some LSO intervention participants expressed potential challenges or issues with the IPAQ-SF. They highlighted particularly the potential for under- or mis-reporting the types and duration of physical activities.

"I had no problem because I like to exercise but perhaps if somebody who mightn't be as fond of exercise, they might have found it hard enough to admit it." FEAS04, LSO

Some intervention participants suggested that responses to the IPAQ-SF and the other tools could be adversely affected by circumstances beyond the study. For example, participants reported poor weather, seasonal illnesses, and lack of local PA groups impacting on their PA levels and wellbeing.

"Exercise I do is weather dependent, and it's very different winter and summer... And again, it's a different time of year, and I think everyone feels more down in the wintertime. Short days, and darkness, and long evenings." FEAS07, LSO

Only one SP intervention participant reported potential challenges with the measurement tools and suggested that there should be more options or choices for reporting self-rated health, feeling that the options presented in the study were limiting.

"Think there should have been maybe a few more choices... I felt there could have been a little bit more in there." FEAS12, SP

The main negative comment or critique of the suitability of the measurement tools was that they focused on PA outcomes, reported by two SP intervention participants. This critique was not reported by LSO intervention participants.

"I suppose as regards exercise and involvement, yes, but overall, I'd say they captured about 60% of it." FEAS08, SP

Intervention participants offered suggestions on measures that could be added in future studies, all of which could potentially add context and nuance to the findings. Three

participants suggested including a measure of social connectedness or social support, the most suggested measure.

“And whether or not for example, living with a partner, you know, a lifelong partner is associated in anyway with perceived mood or optimism or any of those other things that you’ve been checking.”

FEAS10, LSO

“I suppose I’m conscious of the fact that I don’t have any immediate family.” FEAS25, SP

Two LSO intervention participants suggested a measure of long-term changes in PA, and one a measure of the impacts of mental health on participation in PA (despite the inclusion of the SWEMWBS as a tool).

“I’d just say it [the measures] doesn’t capture improvements particularly... It’s more static, picture in time, rather than is this your normal mode, is it the same as it always has been or is it increased or decreased.” FEAS10, LSO

“Just maybe about mental health, you know, how that affected [participation].” FEAS20, LSO

Four SP intervention participants suggested measures related to participation, such as of uptake of other community activities, motivation to exercise, and a measure or question regarding how the intermediary was accessed.

“I think you know involvement, and you know, information... sometimes it’s hard to engage.” FEAS08, SP

“The questionnaires didn’t address how you had heard about it, or what were the mechanisms whereby you might come in touch with social prescribing.” FEAS23, SP

4.3.8 Objective (viii) To assess if change occurs in PA and health-related outcomes following participation in the intervention

Results from the four study measures in relation to PA and health (self-rated health, SEE, SWEMWBS, and IPAQ-SF) at baseline are shown in Table 4-8 and Table 4-9. Table 4-8

shows that again, while there were no significant differences between groups, there were notable trends. Over half of LSO intervention participants rated their health as excellent or very good (53.3%) compared to only 28.6% of SP intervention participants. More LSO intervention participants (33.3%) were categorised as having high levels of mental wellbeing compared to SP intervention participants (14.3%). LSO intervention participants were also observed to have higher median (IRQ) self-efficacy for exercise scores as measured by the SEE (58.5 (14.2) vs. 46.5 (37.5)) and total MET-minutes per week as measured by the IPAQ-SF (3,039.0 (4,893.0) vs. 2,485.0 (2,688.0)) in comparison to SP intervention participants.

Table 4-8: Physical activity and health-related outcomes at baseline (T0)

<i>Category</i>	<i>Result</i>	LSO	SP	
Self-rated health		T0 (n=15)	T0 (n=13)*	p-value
<i>Low-Moderate n (%)</i>	Fair	1 (6.7)	4 (28.6)	0.229†
	Good	6 (40.0)	5 (35.7)	
<i>High n (%)</i>	Very good	5 (33.3)	2 (14.3)	
	Excellent	3 (20.0)	2 (14.3)	
SEE		T0 (n=14)*	T0 (n=14)	p-value
	<i>Score Median (IRQ)</i>	58.5 (14.2)	46.5 (37.5)	0.137‡
SWEMWBS		T0 (n=15)	T0 (n=14)	p-value
	<i>Score Mean (SD)</i>	27.8 (4.0)	25.0 (3.8)	0.067§
<i>Low-Moderate n (%)</i>	Low wellbeing	1 (6.7)	3 (21.4)	0.390¶
	Moderate wellbeing	9 (60.0)	9 (64.3)	
<i>High n (%)</i>	High wellbeing	5 (33.3)	2 (14.3)	
IPAQ-SF		T0 (n=15)	T0 (n=12)*#	p-value
MET-minutes per week	Total	3,039.0 (4,893.0)	2,485.0 (2,688.0)	0.981**
<i>Median (IRQ)</i>	Walking	990.0 (1,419.0)	1,683.0 (2,277.0)	0.648††
		T0 (n=15)	T0 (n=13)*	
	Vigorous	0.0 (1,080.0)	80.0 (1,200.0)	0.751‡‡
	Moderate	720.0 (3,292.0)	160.0 (1,170.0)	0.098§§

		T0 (n=15)	T0 (n=12)*#	
PA category n (%)				
Not meeting PA guidelines	Low	1 (6.7)	2 (16.6)	0.547¶¶¶
	Moderate	6 (40.0)	5 (41.7)	
Meeting PA guidelines	High	8 (53.3)	5 (41.7)	
		T0 (n=15)	T0 (n=14)	
	Hours spent sitting <i>Median (IRQ)</i>	5.0 (4.6)	5.0 (3.2)	0.652##
Sitting category n (%)				
<4 hours	0 – 2 hrs	1 (6.7)	0 (0.0)	0.550***
	2 – 4 hrs	6 (40.0)	5 (35.7)	
	4 – 6 hrs	3 (20.0)	5 (35.7)	
	6 – 8 hrs	4 (26.67)	3 (21.4)	
>4 hours	>8 hrs	1 (6.7)	1 (7.1)	

*Due to data missing at baseline; *Self-rated health*: n=1 SP, self-administered, *SEE*: n=1 LSO, telephone-administered, *IPAQ-SF*: n=1 SP excluded as an outlier (self-administered).

†Chi-square test, $\chi^2(1) = 1.448$. ‡Mann-Whitney U test, $U = 65.500$, $z = -1.494$. §Independent t-test, $t(27) = 1.909$. ¶Fisher's exact test. #An additional n=1 SP excluded from analysis due to missing data (self-administered). **Mann-Whitney U test, $U = 89.000$, $z = -0.049$. ††Mann-Whitney U test, $U = 100.000$, $z = 0.489$. ‡‡Mann-Whitney U test, $U = 104.500$, $z = 0.345$. §§Mann-Whitney U test, $U = 61.000$, $z = -1.702$. ¶¶Chi-square test, $\chi^2(1) = 0.363$. ###Mann-Whitney U test, $U = 115.500$, $z = 0.463$. ***Chi-square test, $\chi^2(1) = 0.358$. Abbreviations: IPAQ-SF — International Physical Activity Questionnaire — Short Form, LSO — local sports partnership community sports development officers, MET — metabolic equivalent of task, PA — physical activity, SEE — Self-Efficacy for Exercise Scale, SP — social prescribing link workers, SWEMWBS — Short Warwick-Edinburgh Mental Wellbeing Scale.

Changes in PA and health-related outcomes from baseline to T1 are shown in Table 4-9. No change or improvements in self-rated health category, i.e., moving from 'low-moderate' to 'high' self-rated health, were observed for most intervention participants (83.3%, 11 LSO, 9 SP). A decrease in self-rated health category was observed for four intervention participants (3 LSO, 1 SP). These changes were non-significant ($p = 0.688$).

There was a mean (SD) decrease of 4.54 (16.2) in self-efficacy for exercise scores from baseline to T1 but this change was also non-significant ($p = 0.184$).

There was no median difference (0.0) from baseline to T1 in mental wellbeing scores and again this change was non-significant ($p = 0.922$). No change or improvements in wellbeing category, i.e., moving from 'low-moderate' to 'high' wellbeing, were observed for most intervention participants (80.0%, 9 LSO, 11 SP). A decrease in wellbeing category was observed for five intervention participants (all LSO). These changes were non-significant ($p = 0.727$).

In terms of PA levels, there was a non-significant median (IQR) decrease in total MET-minutes per week from baseline to T1 (476.0 (3,577.0), $p = 0.064$), with 15 intervention participants (8 LSO, 7 SP) observed to have a decrease. Eight intervention participants (6 LSO, 2 SP) were observed to have an increase in total MET-minutes per week. There were no significant differences between vigorous or moderate MET-minutes per week from baseline to T1, however, there was a significant median (IQR) decrease in walking MET-minutes from baseline to T1 (-396.0 (1,666.5), $p = 0.009$). Sixteen intervention participants (8 LSO, 8 SP) were observed to have a decrease in walking MET-minutes per week, and five intervention participants (all LSO) were observed to have an increase. Less than 40.0% of intervention participants met the PA guidelines at T1 (9/25, 36.0%) and five (21.7%) intervention participants no longer met the PA guidelines at T1 compared to baseline (3 LSO, 2 SP), but this difference was non-significant ($p = 0.063$).

There was no median difference (0.0) from baseline to T1 in hours spent sitting, however, nine intervention participants were observed to have an increase in hours spent sitting (5 LSO, 4 SP), with increases ranging from 0.5 to 3.6 hours. Nine intervention participants

(5 LSO, 4 SP) were observed to have a decrease in hours spent sitting, ranging from 0.5 hours to 5 hours. No change or improvements in hours spent sitting category, i.e., moving from '>4 hours' to '<4 hours', were observed for most intervention participants (92.0%, 14 LSO, 9 SP). An increase in hours spent sitting category was observed for two intervention participants (1 LSO, 1 SP). These changes were non-significant ($p=1.000$).

Table 4-9: Changes in PA and health-related outcomes

Category	Result				
Self-rated health		T0 (n=29)	T1 (n=25)	Difference (n=24)*	p-value
Low-Moderate n (%)	Poor	0 (0)	0 (0)	Increased 2 (8.3) Decreased 4 (16.7) No change 18 (75.0)	0.688†
	Fair	5 (17.2)	5 (20.0)		
	Good	11 (37.9)	10 (40.0)		
High n (%)	Very good	7 (24.1)	6 (24.0)		
	Excellent	5 (17.2)	4 (16.0)		
	Missing	1 (3.4)	0 (0.0)		
SEE		T0 (n=24)	T1 (n=24)	Difference (n=24)*	p-value
	Score Mean (SD)	54.7 (16.0)	50.2 (21.6)	-4.5 (16.2) (95% CI, -11.41 to 2.32)	0.184‡
SWEMWBS		T0 (n=25)	T1 (n=25)	Difference (n=25)	p-value
	Score Median (IRQ)	27.0 (5.0)	27.0 (4.5)	0.0	0.922§
		T0 (n=29)	T1 (n=25)	Difference (n=25)	p-value
Low-Moderate n (%)	Low wellbeing	4 (13.8)	2 (8.0)	Increased 3 (12.0)	0.727†
	Moderate wellbeing	18 (62.1)	19 (76.0)	Decreased 5 (20.0)	
High n (%)	High wellbeing	7 (24.1)	4 (16.0)	No change 17 (68.0)	
IPAQ-SF		T0 (n=23)	T1 (n=23)	Difference (n=23)¶	p-value
MET-minutes per week	Total	3,348.0 (3,912.0)	2,445.0 (2,533.0)	-476.0	0.064#
Median (IRQ)	Walking	1,237.5 (2,079.0)	693.0 (981.8)	-396.0	0.009** ***
		T0 (n=24)	T1 (n=24)	Difference (n=24)††	p-value
	Vigorous	320.0 (1,350.0)	80.0 (1,440.0)	0.0	0.804‡‡
	Moderate	510.0 (1,695.0)	300.0 (960.0)	0.0	0.741§§

PA category <i>n</i> (%)		T0 (n=27)¶	T1 (n=25)	Difference (n=23)¶	p-value
<i>Not meeting PA guidelines</i>	Low	3 (11.1)	4 (16.0)	Increased 0 (0.0)	0.063 [†]
	Moderate	11 (40.7)	12 (48.0)	Decreased 5 (21.7)	
<i>Meeting PA guidelines</i>	High	13 (48.1)	9 (36.0)	No change 18 (78.3)	
		T0 (n=29)	T1 (n=25)	Difference (n=25)	p-value
	Hours spent sitting <i>Median (IRQ)</i>	5.0 (3.5)	5.0 (2.6)	0.0	0.810¶¶
Sitting category <i>n</i> (%)		T0 (n=29)	T1 (n=25)	Difference (n=25)	p-value
<4 hours	0 – 2 hrs	1 (3.4)	1 (4.0)	Increased 2 (8.0) Decreased 2 (8.0) No change 21 (84.0)	1.000 [†]
	2 – 4 hrs	11 (37.9)	10 (40.0)		
	4 – 6 hrs	8 (27.6)	8 (32.0)		
	6 – 8 hrs	7 (24.1)	4 (16.0)		
	>8 hrs	2 (6.9)	2 (8.0)		

***Statistically significant result. *Due to data missing at baseline; *Self-rated health*: n=1 SP, self-administered, *SEE*: n=1 LSO, telephone-administered. [†]McNemar's test.

[‡]Paired t-test, $t(23) = -1.369$. [§]Wilcoxon signed-rank test, $z = -0.098$. [¶]Data missing for n=2 at baseline due to incomplete data and presence of outliers (SP, both self-administered). [#]Wilcoxon signed-rank test, $z = -1.855$. ^{**}Wilcoxon signed-rank test, $z = -2.608$. ^{††}Data missing for n=1 due to incomplete data at baseline (SP, self-administered).

^{‡‡}Related-sample sign test. ^{§§}Wilcoxon signed-rank test, $z = -0.330$. ^{¶¶}Wilcoxon signed-rank test, $z = -0.240$. Abbreviations: CI — confidence interval, IPAQ-SF — International Physical Activity Questionnaire — Short Form, LSO — local sports partnership community sports development officers, PA — physical activity, SEE — Self-Efficacy for Exercise Scale, SP — social prescribing link workers, SWEMWBS — Short Warwick-Edinburgh Mental Wellbeing Scale.

4.3.9 Summary of main findings — feasibility of intermediary interventions

Study 3 **Feasibility and Acceptability of Intermediary Interventions**

Service users engaging in SP or LSO interventions appeared to receive the **optimum level of support** in relation to their needs, judging from the **high levels of acceptability and the positive findings** of the qualitative interviews.

SP service users have poorer PA and health-related outcomes, and more complex physical and mental health needs, in comparison to LSO service users.

There were **different experiences of the interventions**. SP intervention participants described an intensive, almost therapeutic, relationship with the intermediary and LSO intervention participants viewed the intermediary as a facilitator of local PA.

Overall, there were **very little changes** in PA or health-related outcomes, but when groups were examined separately, SP intervention participants had slightly better outcomes.

4.3.10 Summary of main findings — feasibility of the evaluation design

Study 3 **Feasibility of the Evaluation Design**

While there were lower numbers of eligible service users in SP services overall, there were **poor reach and recruitment rates** to the study.

Intermediaries **had long recruitment periods for small numbers of participants**, and reported several challenges recruiting for the study.

There was evidence of **selection bias**. For example, few men were recruited to the study, and SP intermediaries tended to offer study information to service users doing 'well'.

The **outcome measures** (SEE, SWEMWBS, IPAQ-SF) **were suitable and acceptable**, especially when administered over the phone by a member of the research team.

4.4 Discussion

The aim of this mixed methods pilot feasibility study was to test the feasibility and acceptability of an intervention delivered by an intermediary to improve PA levels and wider health-related outcomes for community-dwelling adults. The main findings in relation to the objectives of this study will be discussed; recruitment, retention, and adherence to the study, the demographic characteristics and health profile of study participants, acceptability of LSO and SP intermediary interventions, changes in PA and health-related outcomes over time, and suitability of the study outcome measures.

4.4.1 *Recruitment, retention, and adherence to the study*

Even though most intermediaries found it was possible to recruit concurrently with their daily work, many felt that introducing and explaining the study was a time-consuming process. Both groups of intermediaries spoke about the challenges of an increasing workload, and how this impacted on their capacity to recruit even small numbers of intervention participants. The reach rate for this study, i.e., the number of eligible people who received study information, was poor for both SP and LSO services, with approximately half of eligible service users reached in LSO services (53.8%) and only a third in SP services (32.9%). The challenges of recruiting intermediary service users for research is beginning to be recognised [160, 460, 560, 561]. Research by Cooper et al., which was published in 2024 as data collection for this study was coming to an end, explored UK SP perceptions of facilitating recruitment of service users to research [561]. Many of their findings echo the findings of this current study; Cooper et al. (2024) reported SP selectively choosing potential participants to share study information with, busy workloads impacting on ability to recruit, complexity of service user needs reducing capacity to take part in research, and SP preferring to recruit people who had been engaging with the service for a longer time and who were therefore perceived as more motivated and confident to engage with research. If intermediary workloads continue to rise, expecting them to have time and capacity to assist with recruitment for a research study may be unreasonable. While service users may be more likely to participate in research if introductions are made via a link worker [561], this could potentially interfere

with their work. This finding is discussed in further detail in the overall discussion chapter of this thesis.

SP intermediaries reported unique challenges identifying eligible service users for research and raised concerns over when to introduce research participation. Some SP intermediaries were apprehensive that introducing research could negatively affect the flexibility of the intervention (for example, they reported challenges in knowing when a person was 'pre-' or 'post-' social prescribing intervention) and disrupt the rapport building that occurs between the intermediary and service user, two essential components of these interventions [349, 471]. Defining the start and end point of an intervention is a key component of intervention definition and essential for future evaluation [562]. The fluctuating nature of support needed by their service users and the need for ongoing support (in some cases even after connections to community activities had been made) added extra complexity when intermediaries were trying to decide if a service user was eligible or at a point where they could have received study information. This challenge needs to be considered for future studies, particularly if recruiting participants to a before-after trial or if conducting evaluations of real-world social prescribing services, where service delivery is guided by service users' needs.

An additional finding of note was the 'selective' approach taken by many of the SP intermediaries to recruitment, where only certain eligible participants were given information about the study. During their interviews, intermediaries rationalised this by not wanting to overburden service users they deemed as having complex needs or who were inappropriate for research. This may be a missed opportunity to assess the potential impact of intermediary interventions for these potentially underrepresented service users on PA and health-related outcomes. This may also have meant that intervention participants recruited from SP services for this study had engaged successfully in a social prescription, or potentially were more active or better educated in comparison to the general profile of service users. Unintentionally, the SP intermediaries may have introduced selection or recruitment bias. To address this in future studies, SP intermediaries may require further education or training regarding the importance of inviting all service users as agreed according to eligibility criteria.

Alternatively, recruitment strategies that do not rely on intermediaries to invite service users to participate in the study could also be considered. Suggestions of alternative strategies are detailed in the conclusion of this section.

Both LSO and SP intermediaries believed that several intervention participants took part in the study to share their positive experiences of engaging in intermediary interventions. This is also potentially a source of selection bias, and again needs to be considered when selecting recruitment strategies for future research. Most LSO intermediaries chose to recruit directly from their local PA groups, as this was feasible for them. However, it transpired that practically all intervention participants had self-referred directly to the local PA group in question rather than self-referring to the intermediary. While this wasn't an unexpected finding (See Section 3.3.1.1), it transpired during screening that many potential participants had no subsequent interactions with the intermediary. This calls into question whether this recruitment strategy was optimal, as it did not target individuals who LSO assisted to initially or subsequently connect to local PA. The study had poor recruitment rates for both LSO and SP intervention participants (6.7% for LSO services and 9.0% for SP services). It should be noted that while most intermediaries had no specific feedback regarding completion of recruitment record logs, often these were not completed in full and had large amounts of missing data, which may impact on the accuracy of these figures. Other studies have reported poor accuracy of recruitment logs, with completion rates as low as ~20% [62]. For example, 18/112 eligible SP intervention participants were recorded as having declined study information because they were not planning on engaging in PA (Table 4-5). However, when this finding was discussed with the intermediaries, it appears these service users never intended on engaging in PA from the outset and therefore would have been ineligible for the study. Again, it will be important for future studies to ensure gatekeepers are trained to identify eligible service users.

However, while recruitment rates were low, they are broadly comparable to recruitment rates in other feasibility studies of intermediaries. In studies involving direct referral from HCPs to an intermediary, recruitment rates vary widely from 0.0 – 19.6% [380, 559]. Inadequate recruitment reduces the power of studies, causes significant delays

(recruitment was extended by three months in the case of this study), and increases costs [563]. While the low reach rate likely contributed to the low recruitment rate, it is unclear why the level of uptake to the study was not higher. Investigations of service users who were not invited to take part in the study, or who declined to take part would have been desirable to evaluate reasons why [421]. Despite the challenges with the recruitment strategies, the retention rate to this study was high (86.2%), with most intervention participants completing baseline assessment, follow-up assessment, and interview. There was a slightly lower rate of retention amongst SP intervention participants, but this has been observed in the social prescribing literature and was broadly comparable [250, 482, 559] or higher [248] compared to other studies.

To address some of the limitations of the recruitment strategies used in this study, there are several suggestions. To reduce the additional time and resource burden placed on intermediaries during recruitment, future studies could consider using independent researchers to assist with recruitment and data collection [230]. Using these additional resources to ensure all eligible individuals attending LSO and SP services receive study information, therefore maximising reach rates, could also be considered. Data sharing agreements between research teams and intermediary services could be arranged to minimise duplication of effort and enhance accuracy of recruitment records. However, the ethical and resource implications of this would need to be considered. Future studies could consider recruiting potential participants at the point of referral to LSO and SP services, to better standardise 'pre-' intervention timepoints. To reduce the effects of selection bias, appropriate individual and/or site-level randomisation strategies or blinding of study participants [564] could be employed, which was not possible due to the quasi-experimental nature of this study. In addition, efforts should be made to gain trust amongst underrepresented populations, for example, by having members of the research team attend intermediary services in-person [565] or by targeting local PA groups for men [533].

4.4.2 Participant profile

Intervention participants in this study were predominantly white Irish women. Women appear to access intermediary interventions [186, 218], local PA [59, 256, 309, 315], and

engage in local PA research [186, 566] more than men. It is unclear whether women are more likely to seek help to address health and wellbeing issues, are more attracted to the intermediary approach, or are more willing to take part in research [227]. National level PA data suggests a significant and persistent gender gap in PA participation, with more men than women taking part in leisure-time PA and exercise in Ireland [567]. However, after the age of 45 women are more likely to take part in PA than men [567]. Men and women have different motivations to engage in PA, different PA preferences, and different PA behaviours [343, 568]. For example, women are more motivated to engage in exercise by the social aspect and the opportunity to engage with others compared to men [568-570]. Both groups of intermediaries spoke of the challenges of attracting and engaging men in local PA, raising wider issues around these challenges and the need for tailored, male only local PA groups [315], such as those implemented by the local sports partnership. It appears that SP intermediaries were not regularly connecting their male service users to these groups and may reflect an area where further training is needed.

Demographic and health characteristics differed between SP and LSO intervention participants. SP intervention participants more commonly lived alone, had slightly lower levels of education, more employment variability, lived with more complex chronic disease(s), and reported poorer self-rated health, mental wellbeing, and self-efficacy for exercise. While this is corroborated by the evidence for SP interventions generally (referrals to SP services in the UK are more frequent for people with chronic disease, mental health issues, and multimorbidity [164, 571]), it is notable that LSO intervention participants appear to be healthier than SP intervention participants. There were also notable differences between groups when comparing the data in relation to PA levels. SP intervention participants undertook less MET-minutes per week, were less likely to meet the PA guidelines, and spent more hours sitting in comparison to LSO intervention participants. They also more commonly reported taking part in swimming and exercise with medical oversight, and less commonly in exercise and fitness classes, in comparison to LSO intervention participants. The lower PA levels observed in SP intervention participants may in part be due to their overall health profile. For example, higher self-efficacy and increased social support are associated with long-term maintenance of PA

in older adults [533]. Being more socially isolated is related to reduced objective and subjective PA and increased sedentary behaviour [455-457]. For people living with a chronic disease, their physical function as well as attitudes towards PA can be barriers [78]. The qualitative data also suggested that motivation was another key difference between LSO and SP intervention participants, with LSO displaying characteristics of high intrinsic motivation i.e., high rates of self-referral and high levels of adherence to PA. In contrast, SP services are provided for people who may require a greater level of social and emotional support to improve health and wellbeing than is available in routine care [179]. SP interventions aim to empower people to utilise their intrapersonal resources such as confidence, self-esteem, and friends or community [163, 354].

4.4.3 Acceptability of the intermediary intervention

Despite the clear differences between LSO and SP intervention participants, and the interventions delivered by LSO and SP intermediaries, all intervention participants rated the acceptability of the intermediary intervention highly. The intermediaries themselves were highly praised. Other research has shown that where relationships with intermediaries were perceived as negative, resistance to ongoing engagement with the service was noted [227]. Equally, if the intermediary is perceived as over-enthusiastic and 'pushing' the service user into activities, this can also negatively impact engagement [267]. In this study, LSO intervention participants were positive about the support they had achieved through LSO intermediaries and felt that the support was appropriate and in line with their needs. However, their experience of the intervention was more akin to a signposting approach, where general resource lists are provided or where there is referral without ongoing follow-up [167, 292], with some reporting minimal to no interactions with the LSO intermediary. The core components associated with SP interventions of person-centredness, integration, and trackability [74, 167] were absent from LSO interventions. While some person-centred elements of the intervention were acknowledged by LSO intervention participants (addressing issues and barriers in a timely fashion, the intermediary being a motivating and encouraging presence), this was not a universal experience for all intervention participants.

In contrast to LSO intervention participants, SP intervention participants appeared to attribute much of the improvements in their health and wellbeing as a direct result of their interactions with the SP intermediary. The emotive way in which some participants spoke about the intermediary and the support they received, suggests a more reliant relationship. This reliance on the intermediary has been observed in the literature [61, 258, 262]. Some studies have also observed examples of intermediaries going above and beyond normal service provision and ultimately offering continuous support to patients who they believed needed it [349]. This raises questions regarding SP intermediary capacity and risk for burnout and compassion fatigue. Providing high intensity interventions over long periods of time further reduces capacity in services that are already under strain due to increasing caseloads and challenges maintaining service continuity [272, 273], but efforts are underway to prevent this by providing guidelines on the number of contacts between SP and service users [183, 296]. These service users could potentially take priority over service users who have more straightforward needs, for example, those who simply need information and assistance accessing different local PA groups, an important factor in continued engagement and adherence [285, 309]. Future studies would need to consider the importance of this therapeutic relationship between SP intermediary and service user, and the mediating role this relationship has on participation in local PA, but also the issues around capacity of the SP intermediary themselves. This finding is discussed in further detail in the overall discussion chapter of this thesis.

4.4.4 Suitability of study outcome measures

The data collection form and study outcome measures had very high rates of completion, but there were numerous errors in the data collected at baseline, when almost half of intervention participants self-administered the measures. The IPAQ-SF had the highest number of data errors of the three study outcome measures. A cognitive testing study of the IPAQ-SF [543] identified very similar issues to those encountered in this study when administering the IPAQ-SF to older persons. They reported challenges with comprehension of the wording and underlying concepts, where for example, participants described activities that were stressful or mentally taxing rather than physically taxing, difficulties recalling instances and activities (which led to item non-

response), and dissonance when the last seven days was not an accurate representation of their normal activities for reasons such as seasonality, weather, or illness. While the IPAQ-SF shows promise as a PA outcome measure, judging by the positive feedback on the study measures, some of the limitations of the IPAQ-SF as a standalone measure need to be acknowledged. It has been widely suggested that the IPAQ overestimates PA levels [505, 541], both in comparison to other subjective PA measurement tools [572, 573] and objective measures of PA [505, 573, 574]. Older adults also tend to overestimate their PA levels when using the IPAQ-SF [575] and data validity is also impacted when data are collected from participants when time has elapsed [576]. Intervention participants also recognised this potential for inaccurate reporting on the IPAQ-SF. This supports the argument for inclusion of more objective measures of PA to supplement self-reported data collected using the IPAQ-SF to improve accuracy and reduce potential for recall bias.

All T1 assessments were completed over telephone, meaning the study adopted a real-time 'switch mode', where intervention participants may have started in one mode of data collection i.e., self-administered, and then switched to another to complete the survey [577]. Mode switching allows the person to select the easiest mode for the specific circumstances of the interview, maximise participation over time, reduce attrition [578], and reduce non-response errors [579, 580]. In this study, mode switching at T1 was effective in eliminating data errors and missing data. This was not unexpected; the presence of an interviewer can increase response rates, allow for probing for responses or clarifications, help respondents with comprehension of questions, ensure questions are not missed, and control the order of questioning [581, 582]. However, switching modes of administration for study outcome measures potentially caused incomparability [323, 579] which may have contributed to the decreases in health and particularly PA levels observed from baseline to T1 (See Section 4.3.8). While other studies investigating intermediary interventions and measuring PA outcomes may have switched modes [250, 290], this is often unclear in written reports. However, care was taken when administering the study outcome measures to minimise the potential impacts on study responses and social desirability bias [581]. For example, participants were reminded at the start of the call that they were allowed not to answer, i.e., select

‘prefer not to answer’ [498]. Open response and closed response item structures were kept the same from telephone- to self-administered [498].

While there have been no studies comparing responses across different modes of administration for the SEE and SWEMWBS, ordinal scale items (such as the self-rated health item) have been shown to produce more extreme positive responses when interviewer-administered, especially over telephone [579, 583-585]. The mode of administration of the IPAQ-SF appears to affect responses, with up to a two-fold increase in PA reported by self-administration compared to telephone-administration [584]. However, while this study was under-powered to assess the effect of mode switching on outcomes, only half of intervention participants who reported a decrease in total MET-minutes and/or walking MET-minutes per week used mixed modes of administration. Therefore, while this is likely a contributing factor, it does not account fully for the differences in PA levels at follow-up. For example, it was observed that out of 15 intervention participants who reported a reduction in total MET-minutes per week, 13 also reported reductions in SEE scores and eight reported reductions in SWEMWBS scores from baseline to T1. The correlation between changes in other health measures and PA levels could be explored in future appropriately powered studies using a consistent mode of administration.

Aside from the issues identified with the IPAQ-SF, the self-rated health measure, SEE, and SWEMWBS had high completion rates, minimal errors, and high levels of acceptability amongst intervention participants. There was no clear preference for self-administration or telephone-administration amongst intervention participants, suggesting both are acceptable. However, a key finding of this study was that some of the SP intervention participants criticised the focus of the outcome measures on PA. Social prescribing is a holistic intervention, involving referral to any number or combination of community activities [167, 170, 173-175], whereas local sports partnerships have a sole focus on PA. This is likely the reason this criticism was not shared by LSO intervention participants. Relationships and social connections have been identified as key common outcomes measured in social prescribing interventions, as well as community engagement and belonging [78, 228, 319]. Intervention participants

suggested including some formal measure of the increased social connections and supports they had achieved through participating in intermediary interventions and local PA. This is an outcome not usually included in local PA research [586], despite research suggesting that participating in local PA can help to foster a sense of local community and new personal connections [309, 587] or indeed that increased social connections can foster engagement in PA. A variety of parameters could potentially be assessed. Studies investigating the impact of social prescribing on social isolation and loneliness have assessed social connectedness, social networks, social relationships, group memberships, belonging, social belonging, sense of community, community identification, and community connection [220, 228, 459]. A measure of ‘community connectedness’ is included as an optional outcome measure in the HSE Social Prescribing Evaluability Assessment [181], but recent work piloting this outcome measure in Irish social prescribing services concluded that further refinement and testing was needed before implementing in practice [588].

4.4.5 Changes in PA and health-related outcomes

Encouragingly, most intervention participants reported they were successfully connected to a local PA through an intermediary and had high levels of participation in, and adherence to, to this activity. The social benefits associated with participating in local PA received praise, as both a key outcome of engaging in these services, and a key factor in maintaining participation and adherence. In the case of some SP intermediaries, this was also a way of encouraging social connection amongst their service users. The support of friends and social groups has a major effect on PA and sedentary behaviour, through providing opportunities to be physically active [285, 307, 309, 382, 458, 533, 586, 589]. For LSO intervention participants, the social dynamics of the local PA and the PA instructors were important drivers of engagement and adherence. PA instructors have been noted in other studies to provide personal attention, encouragement, and advice which motivates group participants [74, 590, 591]. The ability of SP programmes to influence social connectedness [60, 280, 319, 348, 590, 592], foster peer support [60, 589], and improve sense of belonging [60, 348, 592] have also been identified as key components of these interventions. This finding is discussed in further detail in the overall discussion chapter of this thesis (See Section 5.2.2.2). Encouragingly, cost of the

local PA group was not identified as a barrier by intervention participants in this study, despite being identified in the literature as a major barrier to engagement in both SP and local PA [74, 218, 267, 307]. This is an encouraging finding in relation to feasibility, as free or low cost activities have less barriers to participation [78, 210].

While changes in motivation were likely not captured by the measures, and within the short timeframe of this study, the qualitative data suggested preliminary changes to both extrinsic and intrinsic motivation because of intermediary interventions and participation in local PA. Intervention participants in this study valued the health benefits they achieved through their participation in local PA, such as increased physical health and fitness, improved mental health and wellbeing, mobility, and improved motivation. Extrinsically motivated behaviours are those performed to achieve rewards and outcomes separate from the behaviour itself [593] and are a source of motivation to engage in PA. These extrinsically motivated behaviours can change, and can lead to greater intrinsic motivation, which is a critical factor in PA adherence [593, 594]. This is particularly relevant for SP intervention participants, who in comparison to LSO intervention participants appeared to lack this intrinsic motivation to be physically active. For example, a small number of SP intervention participants did not end up participating in a local PA, despite the support from the intermediary. This group described external support and encouragement from HCPs, intermediaries, and peers to facilitate their engagement in both the intermediary intervention and local PA. Therefore, if this intervention impacts on intrinsic motivation, participants may enjoy longer-term, measurable, and tangible benefits to their health and wellbeing.

However, on examining PA outcomes, almost a quarter of intervention participants no longer met the PA guidelines at T1. There was a non-significant median decrease in total MET-minutes per week of PA, no changes in moderate and vigorous MET-minutes per week, a significant median decrease in walking MET-minutes per week from baseline to T1, and one in five intervention participants were engaging in less types of local PA at T1. These findings appear to contradict studies showing positive effects of both SP interventions [248-250] and participation in local sports partnership PA groups [256, 595] on PA levels. However, the challenges of identifying when someone was pre-

intermediary intervention may have impacted on these results. While all LSO intervention participants reported being successfully connected to a local PA, it is likely that they had already begun engaging in this local PA group prior to being recruited for this study, hence the lack of change. Additionally, the reasons reported by intervention participants for poor adherence to local PA (ill-health, weather, holidays, work or caring commitments, scheduling conflicts) are not uncommon, and are regularly reported in the literature as barriers to PA participation and adherence [161, 241, 285, 307, 590, 596]. It highlights that future studies should consider seasonality of scheduled follow-up assessments or consider multiple follow-up assessments to determine whether this represents a true decline or a temporary decrease in PA levels in relation to the timing of the assessment.

Most intervention participants were recruited between September and December, and many local PA groups they attended took a break over the Christmas period, resuming in January. The timing of recruitment could also be considered, to allow appropriate time for service users to engage in a local PA group and build habits regarding attendance. SP intervention participants may be particularly susceptible to such external influences, particularly when support from the SP begins to be withdrawn. It also highlights that for many intervention participants in this study, their PA levels appear heavily dependent on whether local PA groups are running, with many reporting doing very little PA during scheduled breaks in local PA groups. Interestingly, more LSO intervention participants in comparison to SP intervention participants also reported decreases in self-rated health and mental wellbeing at T1. It is unclear whether this decline in health and wellbeing was attributable to the breaks in local PA service provision. This raises a larger question as to whether these service users maintain their PA levels outside of the structured PA programmes they attend. While beyond the scope of this study, these findings suggest that perhaps more work may be needed to encourage independent and self-directed PA outside of local PA groups for those attending LSO services, to improve sustainability and long-term adherence to PA.

SP intervention participants most commonly participated in and were most commonly connected to potentially lighter intensity activities, such as walking, swimming,

gardening, and yoga and Tai Chi [597]. However, the IPAQ-SF does not measure changes in light intensity activity. Even engaging in light intensity activity can have benefits for health, reducing chronic disease risk and mortality, and are safe for inactive people regardless of age or co-morbidities [14, 142, 598]. Both LSO and SP intervention participants may have improved their light intensity activity. The intermediary advisory panel when developing the protocol for this study stated that this is a common outcome of engaging with intermediaries — that the act of engaging with intermediary services and subsequently community activities reduces sedentary behaviour and increases light intensity activity. Use of the IPAQ-SF alone as a measure of PA levels may not have captured this potential improvement. Particularly when considering inactive participants, or those in the low category of PA, moving towards engagement in any type of PA should be encouraged [142, 598]. Capturing light intensity activity and/or replacement of sedentary behaviour with such activity, in conjunction with moderate – vigorous activity, warrants consideration for future studies. Inclusion of an objective measure of PA such as accelerometry could be considered, and this was an important finding in relation to the suitability of the study measurement tools.

There were small, non-significant changes in self-rated health, self-efficacy for exercise, mental wellbeing, and hours spent sitting from baseline to T1. In this study, over 60% of intervention participants reported a decrease in self-efficacy for exercise, with a slightly larger mean decrease for SP intervention participants (-5.82) in comparison to LSO intervention participants (-3.46). However, no data have been published regarding minimal clinically important difference for the SEE, therefore it is unclear whether this is a significant finding. Effective intervention techniques for changing PA self-efficacy and behaviour should include specific recommendations on when, where, and how one might become physically active, positive feedback and reinforcement, and action planning [305]. Intervention participants described that specific recommendations in relation to local PA were given, but it is unclear the extent to which positive feedback, action planning, and reinforcements of positive behaviour were performed. It is also unlikely that this was done during LSO interventions, due to the at times limited interactions intervention participants had with these intermediaries and the signposting approach used. The high levels of support provided by SP in theory should facilitate self-

efficacy but conversely, there is also evidence to suggest that exploring barriers to PA participation, such as during an SP assessment, may undermine PA self-efficacy because it provides further evidence of the individual's inability to perform the behaviour, directly impacting on PA behaviour [599]. Future studies could examine potential mediating effects of intermediary interventions on self-efficacy to further explain these findings. LSO intervention participants reported a slight median decrease of one point in SWEMWBS scores, whereas SP intervention participants reported a slight median increase of one point. A change of between one and three points has been suggested as a clinically significant change in SWEMWBS score [600]. This improvement in mental wellbeing has been reported in other studies investigating SP interventions [154, 263, 280, 348, 601].

4.4.6 Strengths

This study has several strengths. This study was to the best of our knowledge the first to show the acceptability of interventions delivered by Irish intermediaries in the context of local PA, with both LSO and SP intermediary interventions found to be highly acceptable. This study was conducted as per a peer reviewed published protocol [481]. A particular strength of this study was both the use of a mixed methods design, and the robust qualitative analysis undertaken, with extensive reflexive records and notes kept through interview field notes, reflexive diaries, and the 'lessons learned' log. While limited quantitative changes in PA and health-related outcomes were observed, the qualitative findings highlighted the nuance behind the seemingly low reach and recruitment rates, issues with the recruitment strategies, the factors that influenced participation in, and adherence to, local PA, and the potential mechanisms of impact of intermediary interventions. This study has highlighted the differences in overall health profile between LSO and SP intervention participants, which could be used to help inform recommendations for future PA referral pathways. This study highlighted an important consideration of intermediary interventions (social connection), which could be evaluated in future studies as a mediator for engagement in PA, and the most appropriate mode of administration of study outcome measures i.e., researcher-administered across timepoints.

4.4.6.1 Impact of knowledge user engagement

An additional strength was the inclusion of knowledge users to improve the development, design, relevance, and dissemination of the research. The panel were instrumental in the development of the protocol for this study. For example, they suggested the use of both the SWEMWBS and the IPAQ-SF as appropriate measures, and it was also their suggestion to capture the types of exercise that people engaged in. The panel were also able to brainstorm solutions to the arising issues in relation to recruitment and data collection, ensuring that the research team responded quickly and appropriately to these issues. The panel have also agreed to assist with future dissemination efforts and recommended that these should focus on key findings and highlight good practice. They have also suggested disseminating the results of the study in an infographic suitable for sharing through mailing lists and social media, which the research team is currently preparing. Overall, the contributions of knowledge users were invaluable during protocol development and during the early phases of the project.

4.4.7 Limitations

This study also has several limitations. It is subject to the biases associated with observational study designs (such as selection bias, information bias, and confounding) [164]. Future studies could consider trialling some degree of randomisation or identifying a suitable control group (such as brief interventions or brief advice) to reduce the potential for bias. Future studies could consider ways to recruit participants who did not engage with intermediary interventions, or who dropped out after several sessions. The reasons for this could then be explored, as well as the barriers to accessing this intervention, and how these may have impacted on their PA and health-related outcomes [160, 309]. The short follow-up time of this study may not have been sufficient to accurately measure changes in PA behaviour and PA levels. It has been suggested in the literature that follow-up data should be collected at six months post-PA intervention to assess maintenance of behaviour change and 12 – 24 months post-intervention to assess effectiveness [274]. While these timeframes were not suitable due to the time-limited nature of this project, a longer follow-up period would warrant consideration for future studies.

This study also relied on self-reported outcome measures. The limitations of self-reported PA questionnaires have been well-recognised which include difficulties recalling the duration and intensity of activities [505, 541, 602], social desirability bias (the tendency to respond to self-report questions with positive portrayals of the behaviour, rather than an accurate one [501, 581, 603]), and telescoping (where events have occurred prior to the assessment period in question, but are moved forward to that time period [604]). All these factors tend to lead to over-reporting of PA. While objective measures of PA would have been preferable, there were time and resource limitations for this study, and the IPAQ-SF was suggested as a suitable measure of both PA and sedentary behaviour by the intermediary advisory panel. Along with the limitations of self-reported PA measures, outcomes of intermediary interventions could also have been influenced by the personal relationship study participants had with the intermediary, rather than the quality of the local PA service to which individuals were connected [164]. Switching modes of administration from baseline to T1 may have negatively impacted scores calculated from outcome measures and should be taken into consideration when evaluating the findings of this study. However, when administering the IPAQ-SF, the researcher clarified responses and answered questions, but did not attempt to influence participant's responses or interpretation of their own PA levels.

In addition, a major limitation of this study was the lack of pre-specified progression criteria or delineation of a pathway to a definitive trial. Progression criteria were not developed for this study as guidance regarding the application and development of progression criteria for non-randomised feasibility trials is limited [477, 478]. In addition, progression criteria are generally used to decide whether to progress to a definitive controlled trial [605] and at the time of protocol development, it was not yet clear whether a controlled or experimental trial would be the most appropriate methodology for the next phase of this research project [481]. However, the findings of this study have highlighted that further optimisation of the evaluation design is warranted prior to progression to a definitive trial. This finding is discussed in further detail in the overall discussion chapter of this thesis (See Section 5.2.2.4), and further recommendations for future research are outlined in Section 5.6.

4.4.8 Conclusions

This pilot feasibility study found that Irish intermediary interventions are acceptable to those recruited to the study, a potentially biased sample due to recruitment, selection, and gender bias. Unique cohorts accessed LSO and SP intermediaries, and the distinct interventions offered by LSO and SP appeared to be suitable and acceptable for each cohort. However, LSO intermediary interventions are likely more suitable for a select cohort of individuals who are already motivated to engage in local PA. Considering the potentially more intensive interventions required to achieve PA behaviour change amongst inactive individuals, they may not be suitable as a potential referral pathway from healthcare settings to local PA. SP intermediary interventions may offer a suitable alternative because of the different levels of support offered by the SP intermediary, and the subsequent social contact and support through attending local PA. Further refinement of the recruitment strategies and study outcome measures is needed to show feasibility of the evaluation design and of an intervention delivered by an intermediary to improve PA levels and wider health-related outcomes. While PA and health-related outcomes remained static or disimproved over time, the qualitative evidence was largely positive, and this study helped us to understand in greater depth intermediary intervention components, and how these positively affected participation in, and adherence to, local PA amongst intervention participants. The reach and recruitment rates of this study, while low, are broadly comparable to the literature and add to the growing body of work regarding appropriate and ethical recruitment strategies for people accessing intermediary services. For future studies, it may not be appropriate to use intermediaries to invite service users to participate in the study due to the significant delays and challenges encountered when trying to recruit small numbers of participants. Alternative recruitment strategies, ideally identifying service users at the point of referral into intermediary services, need to be considered. The study outcome measures were acceptable to intervention participants, with high rates of completion especially when administered over telephone. Researchers could also consider inclusion of an objective measure of PA, and a measure of social connectedness or social connections, to enhance data accuracy and capture the full extent of PA and health-related outcomes associated with intermediary interventions.

Chapter 5 Discussion

5.1 Introduction

Large proportions of the Irish population remain physically inactive [27, 106], increasing their risk for detrimental health effects. This research project was conducted in the context of reorientation and refocus of Irish healthcare services towards community-based care, and a renewed focus on prevention and living well with chronic disease, with PA highlighted as a key strategy and effective method of maintaining and preserving health. Despite community-based PA and exercise services (local PA) being a ‘best investment’ when promoting engagement in PA [5, 58], many community-dwelling adults struggle to access and engage in these services [68, 85, 88]. Despite their key role in PA promotion, HCPs also face challenges when promoting participation in local PA, such as a lack of time during appointments, negative perceptions of patients’ beliefs around PA, lack of knowledge of local services, and lack of expertise or training [65, 71, 133-135]. Intermediaries have the potential to mitigate some of these challenges. Intermediary interventions involve supporting individuals to connect to community activities, such as local PA, to improve health and wellbeing (See Section 1.6.1). Intermediaries’ capacity to provide ongoing and instrumental support (if required), provision of supportive and trusting relationships, and their extensive knowledge of local, community-based services could positively influence PA and health-related outcomes (See Section 1.6.3). Therefore, the aim of this thesis was to investigate the role of intermediaries in connecting community-dwelling adults to local PA in both the Irish and international setting. The specific objectives were:

- i. To review international evidence regarding processes and practices of intermediaries when connecting community-dwelling adults to local PA.
- ii. To explore the processes and practices of Irish intermediaries when connecting people to local PA.
- iii. To identify the profile of people referred to intermediaries.
- iv. To examine the feasibility of intermediary interventions to improve PA and health-related outcomes.

Three studies were completed to address these aims and objectives. Firstly, a scoping review (Chapter 2) was conducted to identify and describe international evidence regarding processes of referral to an intermediary, characteristics of community-dwelling adults referred, and the processes and outcomes of connecting referred individuals to local PA. Secondly, a qualitative descriptive study (Chapter 3) was carried out to explore the roles of three types of intermediaries in Ireland (social prescribing link workers, local sports partnership community sports development officers, and health promotion and improvement officers), and to further define their processes, practices, and procedures when connecting people to local PA. Finally, a mixed methods pilot feasibility study (Chapter 4) was completed to investigate the feasibility of interventions delivered by local sports partnership community sports development officers (LSO) and social prescribing link workers (SP) to improve PA and health-related outcomes of community-dwelling adults. The main findings of each of these studies have been presented in Chapters 2 – 4 (See Sections 2.5, 3.3.5, 3.4.3, 4.3.9, and 4.3.10) and have been summarised in Figure 5-1. These findings are discussed and analysed in detail in this chapter, as well as the implications of these findings for future practice, policy, and research. Finally, the limitations of this thesis are discussed.

The role of intermediaries in connecting community-dwelling adults to local PA and exercise

Scoping Review	Study 2 The Processes of Intermediaries	Study 2 The Profile of Intermediary Service Users	Study 3 Feasibility and Acceptability of Intermediary Interventions	Study 3 Feasibility of the Evaluation Design
Described the core elements of intermediary interventions i.e., referral, assessment, follow-up, and onward connection to a variety of local PAs but with significant amounts of missing information .	SP received referrals after a change in life circumstances or to address a pre-existing health issue, and facilitated connections to local PA groups. Their interventions were the most intensive, consisting of an in-depth, holistic assessment of interests and potential barriers and a person-led, flexible approach to follow-up.	SP and LSO intermediaries reported their service users tended to be older women , and in the case of SP, may have presented at different stages of readiness for behaviour change in relation to PA.	Service users engaging in SP or LSO interventions appeared to receive the optimum level of support in relation to their needs, judging from the high levels of acceptability and the positive findings of the qualitative interviews.	While there were lower numbers of eligible service users in SP services overall, there were poor reach and recruitment rates to the study.
All core elements were heterogenous , highlighting the flexibility of the intervention but also the challenges in synthesising evidence.	LSO mainly received self-referrals to connect to local PA groups. Follow-up was short, consisting mainly of practical assistance and encouragement, and concluded once a successful connection to a local PA group had been made.	Both types of intermediaries also reported their service users experienced a complex mix of physical, mental, and social health needs , as well as other barriers to PA such as lack of time, lack of transport, and cost.	SP service users have poorer PA and health-related outcomes , and more complex physical and mental health needs, in comparison to LSO service users.	Intermediaries had long recruitment periods for small numbers of participants , and reported several challenges recruiting for the study.
Few referrals to intermediaries specifically to increase PA levels and large amounts of missing demographic information for study samples, even for characteristics which could impact on PA levels and participation.	The main role of HPO was that of smoking cessation officers; only brief interventions and signposting to PA were performed but this was not considered to be routine practice.	Both types of intermediaries recognised the benefits of engaging in PA on health and wellbeing.	There were different experiences of the interventions . SP intervention participants described an intensive, almost therapeutic, relationship with the intermediary and LSO intervention participants viewed the intermediary as a facilitator of local PA.	There was evidence of selection bias . For example, few men were recruited to the study, and SP intermediaries tended to offer study information to service users doing 'well'.
All studies reported some degree of positive outcome in relation to PA , based on evidence from RCTs (n=5), controlled (n=3) and uncontrolled (n=2) before-after trials, and other methods (n=7) trials. However, quality of evidence was not rated, and no risk of bias assessment was conducted.	Intermediaries in this study described how knowledge of local services , a broad array of community partners as well as a diverse variety of local PA groups (such as walking groups, dancing, and chair-based exercise) all facilitated their interventions .	SP and LSO described the strategies they used throughout their interventions to attempt to accommodate older people, physical and social health needs, and readiness for behaviour change, and connect service users to PA.	Overall, there were very little changes in PA or health-related outcomes, but when groups were examined separately, SP intervention participants had slightly better outcomes.	The outcome measures (SEE, SWEMWBS, IPAQ-SF) were suitable and acceptable , especially when administered over the phone by a member of the research team.

Figure 5-1: Summary of main findings of the thesis

Abbreviations: HPO — health promotion and improvement officers, IPAQ-SF — International Physical Activity Questionnaire — Short Form, LSO — local sports partnership community sports development officers, PA — physical activity, SEE — Self-Efficacy for Exercise Scale, SP — social prescribing link workers, SWEMWBS — Short Warwick-Edinburgh Mental Wellbeing Scale.

5.2 Analysis of key points

5.2.1 *Practices and processes of intermediaries*

Intermediary interventions were identified in this thesis as consisting of four steps: referral to an intermediary, assessment/initial meeting with the individual by the intermediary, connection to a local PA, and a follow-up period. This section will focus on the findings of this thesis in relation to the specific practices and processes used by intermediaries throughout their interventions. The lack of referrals from HCPs to intermediaries will be discussed, as well as the poorer health profile of individuals referred to intermediary services. The behavioural and motivational strategies used by intermediaries are discussed as a potential mechanism of impact of their interventions, followed by a discussion of the need for more clarity around optimum length of follow-up with intermediaries.

5.2.1.1 *Healthcare professionals do not tend to refer people to intermediaries to connect to local PA*

The findings of this thesis have highlighted the differences in sources of referral to the different intermediary types. Importantly, they have also highlighted a lack of referrals to intermediaries specifically to address physical inactivity. The scoping review found that the most common source of referral to intermediaries was HCPs working in primary care. In contrast, the qualitative descriptive study and feasibility study identified that in Ireland only SP regularly received referrals from HCPs, as LSO tended to receive self-referrals. Across the three studies, it was rare for intermediaries to receive referrals from HCPs to specifically increase PA levels, and instead these referrals were to address general health and psychosocial issues. Despite receiving few specific referrals to address physical inactivity, large numbers of individuals were connected successfully to a local PA (or were planning on taking up a local PA) through intermediary interventions. The findings of this thesis demonstrate that perhaps HCPs are not the main source of referrals to intermediaries specifically to achieve connections to local PA or improve PA levels in real-world practice, and that this is currently only conducted in the context of research trials. The findings of this thesis are corroborated by recent studies in which Irish, English, and Dutch GPs were surveyed about their PA promotion practices; few GPs

in these studies were aware of or referred their patients to intermediary interventions to connect to local PA [65, 152, 188]. However, in other studies GPs and primary care practitioners have expressed a need for a dedicated exercise professional to which they could refer patients, to connect to appropriate local PA [92, 111, 240, 281]. This may represent a missed opportunity in terms of HCP-led PA, health, and wellbeing promotion. Self-referrals to SP and LSO intermediary services were also commonly reported across all three studies. While self-referrals to SP services have been identified in the literature [178, 232, 309, 354], it is not commonly reported that these are for PA. This was a novel finding of the feasibility study, as two individuals self-referred to SP services to specifically connect to local PA, and little to no literature has been published regarding how individuals access LSO interventions. The lack of referrals from HCPs to specifically address physical inactivity, as well as the high numbers of self-referrals to Irish intermediaries observed across the three studies, likely influenced the findings in relation to the profile of service users in the qualitative descriptive and feasibility studies.

5.2.1.2 Demographic profile of intermediary service users

The findings from all three studies in this thesis suggest that individuals being referred or self-referred to intermediary interventions tend to be older. Older adults experience declines in PA levels with advancing age [15, 22, 23, 503]. Many PA intervention studies for older adults consist of more passive strategies, such as general health promotion, the use of activity trackers, or other eHealth interventions [294]. This is echoed in recent reviews of social prescribing interventions targeting older adults, which reported a lack of studies or trials focusing on this cohort [218, 319]. The findings of this thesis have not only shown intermediaries commonly work with older adults, but that these interventions are acceptable to older adults with a wide variety of underlying conditions, demographic characteristics, baseline levels of motivation for PA, and PA levels. They have also demonstrated that these individuals are supported by intermediaries to connect and engage successfully in local PA groups and services. The findings from all three studies in this thesis have also shown that women appeared to access intermediary services more commonly than men. Older women tend to have poorer PA levels generally [15, 23], facing significant challenges to PA such as cultural barriers and expectations, financial barriers, caring commitments, and life stage changes such as the

menopause [570, 606, 607]. Positively, almost all the women who participated in the feasibility study were successfully connected to a local PA suggesting that intermediary interventions could help address these barriers and be a successful mechanism through which older women can engage in appropriate local PA. However, it was observed by both SP and LSO intermediaries that men of all ages were a challenging group to engage in local PA.

SP intermediaries seemed to suggest that only men who were experiencing significant psychosocial health challenges engaged in their services, meaning that participation in local PA was not prioritised. There is evidence that more women are referred to social prescribing compared to men [608, 609], but men with poorer psychosocial health can benefit from this approach [262]. However currently, no centralised or collated data exists regarding gender differences in uptake of SP or LSO services in Ireland. Similarly, the sample in the feasibility study were all White Irish, and no data exists regarding the ethnicity of intermediary service users, meaning it is unclear whether the sample recruited in the feasibility study is representative. There were several challenges identified with the recruitment strategies in this study, which relied on the intermediaries inviting service users to participate in the study. These included service users being approached about the study selectively, for example, LSO intermediaries selecting specific local PA groups to recruit from and SP intermediaries 'cherry-picking' service users to inform about the study. These selective approaches to recruitment may also have influenced this gender and ethnicity bias. Individuals from ethnic minority groups are often underrepresented in social prescribing research [219], or ethnicity data are poorly reported [227, 319, 352]. Regardless of the representativeness of the sample, this thesis emphasises the need to ensure equitable and equal access to intermediary services and participation in research for all.

5.2.1.3 Poorer health profile of intermediary service users

Prevalence of chronic physical and mental health conditions was also high amongst intermediary service users across all three studies. Intermediary service users appear to be living with a wide variety of cardiovascular, respiratory, metabolic, and musculoskeletal conditions and/or multimorbidity. In addition, the findings of this thesis

suggest that those accessing intermediary services are a more physically inactive cohort, particularly SP services. The presence of chronic disease is linked to poorer PA levels and barriers to PA such as accessibility, poorer physical function, negative attitudes to PA, health concerns, and limited knowledge of health behaviours [78, 161, 285, 319, 606, 610-612]. It is likely therefore that individuals referred to intermediaries face barriers and challenges to being physically active. However, despite the high prevalence of chronic disease amongst their service users, intermediaries demonstrated the ability to recommend and support engagement in local PA amongst this cohort. For example, the results of the qualitative descriptive and feasibility studies demonstrated that intermediaries connected service users to exercise programmes with medical oversight where necessary, used screening tools prior to engaging in PA, and referred individuals back to HCPs where required for specific follow-up or guidance. Intervention participants in the feasibility study reported no negative impact from engaging in both intermediary interventions and local PA. This is also a finding of note, considering the lack of trust placed by HCPs in local PA services over their ability to manage patients living with chronic disease appropriately [133, 276, 279, 613], which could also have been a contributing factor to the lack of referrals from HCPs to address physical inactivity. The findings of this thesis suggest that for older adults living with chronic disease, who are referred to an intermediary and engage in the intervention, intermediary interventions to connect to local PA may be safe and acceptable. The potential role of intermediaries working with individuals living with chronic disease is discussed further in Section 5.3.3.

5.2.1.4 Strategies used by intermediaries during their interventions to support connection and engagement in local PA

This thesis has highlighted under-reporting of processes of intermediaries in the literature. However, the four main steps of an intermediary intervention (referral, assessment, follow-up, and onward connection to local PA) have now been delineated and described as a result of this work. While the scoping review revealed some of these key features of intermediary interventions, the qualitative descriptive study described in detail the processes used by three different types of intermediaries in Ireland when facilitating connections to local PA. This study also described how LSO and SP intermediaries identified a need for PA with individuals referred to their services, how

they chose a suitable local PA group, and how service user health and social needs were accommodated throughout. Interventions delivered by SP intermediaries to connect service users to general community activities, services, and supports have been well-documented in the literature from the perspectives of both link workers and service users [220, 222, 257, 258, 318, 438, 464]. However, this study was amongst the first to describe interventions delivered by SP specifically when connecting to local PA [162] and to describe interventions delivered by LSO [372]. As well as defining and describing the processes used by intermediaries during their interventions, there was also a need to identify potential mechanisms of impact of intermediary interventions. Potential mechanisms identified in the literature review and throughout this thesis included ongoing support, instrumental support, personalised support from a trusted source, and emotional support (See Sections 1.6.3.1 – 1.6.3.4). Additionally, it was identified that intermediaries applied behavioural strategies to their interventions, such as behavioural change techniques (BCTs) and motivational interviewing (MI), which could be another potential mechanism of impact. BCTs are planned, active components of an intervention designed to change behaviour and are observable and replicable [614, 615]. MI is a facilitative, client-centred counselling style approach to achieve behaviour change, helping those in receipt to explore and resolve ambivalence [616]. PA interventions that incorporate BCTs and MI approaches are recommended to achieve both initial behaviour change and behaviour change maintenance [98, 128, 130, 302, 617-620], and have been widely adopted and implemented in PA interventions and PA promotion [617, 621].

However, few intermediaries or service users who took part in this research project explicitly acknowledged or identified interventions to include these behavioural and/or motivational approaches. While behaviour change has been identified as a core component of social prescribing interventions [74], many reviews have identified a lack of strong behaviour change theory in evaluations of social prescribing services [218, 622]. Several potential behavioural and motivational strategies used by LSO and SP intermediaries during their interventions were observed informally in this thesis. Specific BCTs identified as per the BCT taxonomy included, for example, “social support” (provided by the intermediary and peers within the local PA group), “advising specific behaviour”, and “environmental restructuring” (when intermediaries give advice and

education regarding PA groups and resources available in the community) [623, 624]. Other behavioural and motivational principles were also employed by intermediaries, such as the identification of barriers to PA, goal setting, providing practical and instrumental support, and consideration of service user preferences, interests, and readiness for behaviour change. It was also observed in the feasibility study that changes in extrinsic and intrinsic motivation may have occurred as a result of intermediary interventions. However, application of these strategies was *ad hoc*, and appeared dependent on the intermediary and their professional background. Intermediaries in this research project had a diverse range of professional experience, with backgrounds in healthcare, health education, sports and fitness, counselling, community care, research, education, and the private sector.

Empowerment of individuals to independently engage in health behaviours is an important outcome of BCTs [625, 626], an important enabler of PA behaviour change [620], and reportedly a key feature of social prescribing interventions delivered by a link worker [78, 261, 627]. However, often SP intervention participants indicated a reliance or dependence on the intermediary despite being arguably most in need of this empowerment and autonomy compared to LSO intervention participants. Many SP service users were identified in this thesis as having chronic physical, mental, and social health issues, which led to connections to other community activities and supports being prioritised by both intermediaries and service users over PA. Many SP intermediaries in the qualitative descriptive and feasibility studies spoke of the challenges of trying to promote behaviour change in such cohorts, highlighting another key difference between SP and LSO service users; people access SP services for a range of reasons, meaning it may be challenging to introduce a focus on PA, whereas people access LSO services specifically to engage in PA. This prioritisation of basic needs is not a wholly unsurprising finding, given the insights from the wider social prescribing literature, which found that taking action to manage long-term health is challenging given other more immediate priorities such as precarious social circumstances [232, 233]. However, other evaluations of social prescribing services argue that social prescribing approaches are most beneficial for individuals who are motivated to participate and engage over time [628].

Despite these challenges, the findings of this thesis suggest that the empowerment and motivation of individuals to achieve behaviour change in relation to PA through behavioural strategies could be a mechanism of impact of intermediary interventions. The findings in relation to the profile of intermediary service users also suggest that this is a cohort that could benefit from this approach [78, 166, 180, 629], in particular SP service users (where appropriate and in line with their needs and goals in relation to health and wellbeing). It should be acknowledged that several other reasons for non-engagement and non-adherence to local PA were identified throughout this thesis such as caring and work commitments, availability and timing of local PA, seasonality, travel etc. that could not be addressed by behavioural strategies. However, where motivation is an issue affecting participation in PA, training in behavioural and/or motivational approaches may help intermediaries to support these individuals to engage in local PA. If intermediaries received further training in these approaches, and implemented these more consistently during their interventions, this could improve empowerment of service users and potentially PA and health-related outcomes.

5.2.1.5 Intensity of intermediary interventions

In the scoping review and qualitative descriptive studies, it was challenging to determine whether the processes of intermediaries were influenced by the demographic profile of their service users, as well as the optimum strategies when working with individuals with complex needs to achieve positive PA and health-related outcomes. In SP services, these intermediaries generally had more contact with service users, taking place over periods of months or years with service users engaging, exiting, and then re-engaging with the service as needed and 'discharge' poorly delineated. While LSO intermediaries offered far less contact with service users, some had long relationships with the LSO and had frequently engaged in the same local PA groups over months and years. The types of support offered also differed, with SP interventions characterised by more intensive instrumental support and LSO interventions consisting mainly of signposting and encouragement. Because of the additional support available through SP interventions, these interventions were considered in this thesis as 'hands-on'. Based on the overall poorer health profile of SP intervention participants, the higher frequency and intensity of interventions delivered by SP intermediaries, and the high rates of acceptability of this

intervention, this suggests that those with more complex health needs required this more intensive support from an intermediary to connect to local PA. This is supported by the wider social prescribing literature describing connections to other community activities [78, 231, 630]. However, expecting intensive, person-centred interventions to this degree for every physically inactive person would not be feasible or cost-effective.

Similarly, the lower intensity of the LSO intervention did not appear to impact on this intrinsically motivated groups' participation in local PA. The acceptability of these interventions was rated highly by intervention participants; however, LSO intermediaries were perceived as facilitators/administrators of local PA groups rather than a facilitator of connections. While LSO intermediaries in the qualitative descriptive study acknowledged this as part of their role, they also described more interpersonal roles, giving advice, encouragement, as well as signposting service users to relevant and appropriate local PA. While adequate support from an exercise professional can improve health outcomes [141], aside from their role in signposting to local PA, it is unclear how the role of an LSO intermediary differs significantly from other local PA service providers in PA groups outside of the local sports partnership. The 'hands-off' approach to LSO interventions will likely not be effective for many community-dwelling adults, who potentially need significant support and additional sessions with the intermediary (even after a connection has been achieved to local PA), and more time to build knowledge, confidence, and agency prior to engaging in PA [61, 74, 160, 460, 464].

While it does appear that these different interventions were acceptable to intervention participants regardless of the intensity, the optimum number of sessions needed for effective PA interventions remains unclear [130]. While guidelines have been published by the HSE and NHS in relation to a maximum number of sessions (8 – 12) during social prescribing interventions [183, 296], these are not specific to interventions to connect to local PA. Mercer et al. (2019) reported that those who attended an intermediary (SP) service in Glasgow more frequently (>3 visits) showed small but significant within-group improvements in self-reported PA levels over time [250]. Therefore, more exploration of the minimum and maximum number of sessions needed with an intermediary to achieve connections to local PA, for whom (considering that needs will differ from person to

person), and a clearer delineation of the start and end points of intermediary interventions are required, with a view to informing everyday practice, future work involving intermediaries in the context of PA, and future research trials. This has also been acknowledged in other studies of social prescribing generally; studies have called for better strategies and communication about the withdrawal of link worker support [631, 632].

5.2.2 Outcomes of intermediary interventions

This section will focus on the findings of this thesis in relation to the impact of intermediary interventions on PA engagement, social health, and wider health and wellbeing. The feasibility study findings in relation to the evaluation design are also discussed and how these may have impacted on the outcomes observed.

5.2.2.1 Intermediaries facilitate connections to and engagement in local PA

The findings of this thesis indicate that intermediaries may have a role to facilitate the initial engagement in local PA, potentially leading to a chain reaction of positive effects on wider health outcomes. This will in time increase PA levels [74, 189] if long-term engagement, participation, and adherence to local PA is facilitated. The concept of measuring participation in and adherence to local PA, a measure used in both the scoping review and qualitative descriptive studies, warrants consideration as an approach. Intermediaries utilised a wide variety of local PA throughout this research project such as dancing, chair-based exercise, local gyms and leisure centres, yoga and Tai Chi, sports, gardening, water-based activities, and walking groups. In the feasibility study, these local PA opportunities were highly regarded by intervention participants and were generally highly attended. However, while a community may have a wide variety of quality local PA opportunities, if people living in that community do not engage, these programmes do not achieve their purpose. 'Adherence' to an activity has already been identified as a marker of 'successful' social prescribing pathways [74]. Therefore, perhaps intermediary interventions and the enhanced support provided influence continued and sustained engagement in local PA. The modal length of follow-up for studies in the scoping review was one year [374, 375, 378, 385, 386], and studies which investigated outcomes in relation to participation in and adherence to local PA also reported positive

outcomes at this timepoint. Investigation of the long-term impact of intermediary interventions on participation in, and adherence to, local PA, rather than focusing on PA levels alone, warrants consideration with evaluation of the subsequent improvements in physical, mental, and social health over time.

5.2.2.2 Intermediary interventions may impact on social engagement and social connections

As discussed previously, older people with poorer health tended to access intermediary interventions investigated as part of this research project. Declining levels of PA in older adults are often associated with changing social circumstances and increased social isolation and loneliness [533, 633, 634]. In addition, social isolation along with a lack of social support are frequently reported by people living with chronic diseases [209, 465, 635-637]. It is perhaps then unsurprising that social isolation was commonly experienced by service users of Irish intermediary services, in particular SP services. SP intermediaries in the qualitative descriptive study reported largely receiving referrals for individuals experiencing social isolation. SP interventions are well-established as an intervention to address isolation and loneliness [227, 457, 638], a common reason for referral to SP services across the world [181, 257, 459, 460]. The levels of social isolation amongst SP and LSO service users was an important finding of the qualitative descriptive study, as only four studies included in the scoping review specifically reported on whether their sample was socially isolated [257, 374, 382, 395]. While a formal measure of loneliness or social isolation was not included in the feasibility study, it is known that Ireland has the highest prevalence rate of loneliness in the EU (20%, based on EU survey data) [639], with approximately one in ten older adults having a maximum of one social tie [640]. A novel finding of this thesis was how the opportunities for social connection afforded through interactions with the intermediary and engagement in local PA were reported to both positively influence both participation in, and adherence to, local PA. Thus, they were a key health benefit of intermediary interventions and a potential mechanism of impact.

Interventions that explicitly target loneliness can create unintentional barriers and stigma [641]. Therefore, interventions delivered by SP and LSO that achieve connections

to local PA but do not necessarily target loneliness as a primary goal could be beneficial. Social support interventions and active participation in groups are amongst the most effective interventions for alleviating loneliness [457, 642]. The findings of this thesis suggest that intermediary interventions allowed participants to achieve new social engagement and connections through regular activities, participation in a group or community, a sense of purpose, and peer support. Several intervention participants in the feasibility study strongly suggested the inclusion of a measure of social connectedness for future studies. These outcomes have been described in the context of interventions delivered by SP, where individuals were referred to other community activities [457], but were a novel finding of this thesis in relation to both SP and LSO intermediary interventions to connect to local PA. Often when HCPs are promoting PA, they do so to address physical health concerns [285], rather than promoting the benefits of PA for social health (which again may have contributed to the lack of referrals from HCPs to intermediary services). It is also known that lack of social support for PA is a frequently reported barrier to being physically active [143, 161, 533, 643]. The findings of this thesis demonstrate that the social benefits of intermediary interventions in the context of PA may be an unknown or under-appreciated outcome.

5.2.2.3 Limited conclusions regarding evidence of improvements to health outcomes through intermediary interventions

This thesis identified that intermediary interventions may have beneficial effects on engagement in local PA, social engagement, and social connections. While not an explicit aim of this thesis, all three studies suggested positive effects of intermediary interventions on PA and health-related outcomes, however, this conclusion is largely drawn from qualitative evidence from studies II and III and from the scoping review, where there was no consideration of study design, risk of bias, or certainty. In line with scoping review methodology and remit, examining effectiveness was not an objective of this review, therefore articles were not excluded based on quality criteria, quality of evidence was not rated, and no risk of bias assessment was conducted. While this must be taken into consideration, all studies reported some degree of positive outcome in relation to PA. However, this included results from controlled and uncontrolled before-after trials, pilot and feasibility trials, and qualitative studies. While the main aim of the

feasibility study was to test feasibility and acceptability of intermediary interventions, both LSO and SP intervention participants reported qualitative improvements in physical fitness and PA levels. SP intervention participants additionally reported improvements in mobility. As people age there are associated reductions in muscle strength, aerobic capacity, flexibility, and balance [644, 645]. These processes can negatively impact on the older person's ability to engage in PA, despite the ameliorating effects of PA on health and functional decline. The positive qualitative results in the feasibility study in relation to the health and wellbeing of older adults, suggests potential for intermediary interventions to have a positive impact on function, independence, and healthier ageing [11, 456, 646]. These were in addition to the emotional, motivational, and social benefits of intermediary interventions. However, these all warrant further quantitative investigation in appropriately designed trials.

In the feasibility study, quantitatively there were largely no improvements or reductions in PA and health-related outcomes. However, trends were observed that SP intervention participants had slightly better outcomes in comparison to LSO intervention participants, with small improvements in SWEMWBS scores, vigorous MET-minutes, and moderate MET-minutes per week. While the recruitment strategies may have influenced these findings (as intervention participants were recruited to the study at various timepoints during the intermediary intervention, including after connections to local PA had been made), it also raises the possibility that service users maintained similar levels of health and wellbeing from baseline to T1, which could be considered a positive outcome, particularly for SP service users. It is clear from the findings of this thesis, and the wider literature, that SP service users experience complex health and psychosocial needs and may struggle to engage in healthy behaviours [164, 236, 237, 275, 571]. In this case, avoidance of a decline in health and wellbeing as well as achieving successful connection(s) to local PA could be considered a successful outcome, considering these individuals may have had difficulties accessing these programmes and maintaining their health and wellbeing independently. However, demonstrating maintenance of health and wellbeing through intermediary interventions could be challenging to evaluate without an appropriate control group, as well as difficult to rationalise to service funders who may be primarily interested in improvements in health and wellbeing. It could also

be considered that intermediary interventions may not have a direct impact on PA levels. While the results of the scoping review suggested positive impacts of intermediary interventions on PA levels in the short-term (based on evidence from RCTs, before-after trials, and pilot and feasibility trials), in the feasibility study intervention participants had a decrease in their PA levels, although the sample was not powered to detect significant changes to health outcomes.

5.2.2.4 Further optimisation of the feasibility study evaluation design is warranted to explore health outcomes of intermediary interventions

Both intermediaries and intervention participants in the qualitative descriptive and feasibility studies described a broad array of positive outcomes in relation to health and wellbeing, beyond PA levels and PA outcomes alone, as a result of intermediary interventions. However, the quantitative findings of the feasibility study appeared at odds with these positive findings. These contradictory results are not wholly unexpected. Qualitative investigations of SP and other intermediary interventions tend to report more positive outcomes in comparison to quantitative investigations [172, 179, 220, 464, 560]. Qualitative methods are preferred in SP research to better capture the complex nature of these interventions, as well as nuance and interpersonal aspects [61, 532]. However, while qualitative research can be used to explore a concept or phenomenon and potential outcomes [483], it cannot be used to determine effectiveness. The small sample (n=30) may also have contributed to the contradictory qualitative and quantitative results. Seasonality of intervention delivery, conduct of research, and therefore the timing of follow-up assessments would also need to be considered for future studies as these also appeared to impact on PA and health-related outcomes. Seasonality has also been observed to impact on SP interventions, PA levels, and participation in outdoor activities [84, 543, 627]. The limitations of the quantitative measures used in the feasibility study have been discussed in detail (See Section 4.4.4), and further recommendations for future research are outlined in Section 5.6.

5.3 Implications for practice

Several implications for practice arose from the findings of this thesis in the context of intermediaries facilitating connections to local PA. These include the potential for

referral pathways between HCPs and intermediaries in Ireland, and the potential roles of intermediaries working with younger adults and in primary prevention and self-management of chronic disease. Potential training needs for intermediaries were identified, particularly when working with service users with chronic physical and mental health conditions. However, the findings in relation to the current capacity of intermediary services are also discussed, which could impact the implementation of these recommendations.

5.3.1 Referral pathways between HCPs and intermediaries

This thesis has successfully identified the processes used by intermediaries during their interventions, as well as indications of the potential outcomes, which are important steps towards the development of referral pathways between HCPs and intermediary services. While further research is needed to investigate the effectiveness of these interventions, it is hoped the findings of this thesis may be used to educate and inform HCPs regarding the role of intermediaries in facilitating connections to local PA. The findings of this thesis could allow HCPs who are considering referral or utilisation of these services to use clinical judgement regarding the profile of their patients and what intervention may be best suited to them. Development of a standardised approach to screen for patients who are physically inactive, identify who would benefit from intermediary interventions, and distinguish who would benefit from a 'hands-on' or 'hands-off' approach would also be beneficial. This would ensure that intermediary resources are used appropriately and reduce inappropriate referrals to these services, particularly in the context of increasingly busy intermediary services observed throughout this research project (See Section 5.3.4). This screening could be built into structured programmes in primary care, such as during the two free review appointments with GPs and practice nurses offered as part of the CDM, or during the screening phase of the PAPHM. The potential of intermediary interventions to improve social engagement and social connections through participation in local PA could also be promoted to HCPs. Intermediary interventions could therefore be a promising adjunct to brief interventions or PA referral provided by HCPs, especially during the final steps of assisting and arranging connections to local PA.

5.3.2 Intermediaries' potential role working with younger cohorts

This thesis identified a lack of referrals/self-referrals of younger adults to intermediary services, both worldwide and in Ireland, and it is unclear why these were not as common. This could be considered a missed opportunity to target PA interventions to adults in early middle age, to increase or promote continued engagement in PA and build lifelong healthy PA habits, thus helping contribute to primary prevention efforts. While by no means necessary for all younger adults, intermediary interventions could potentially be useful for those who need additional supports to engage in local PA, such as those living with or at risk of chronic disease. The potential roles of social prescribing and SP specifically in chronic disease prevention have been recognised in the literature [159, 571, 622], but discussion or evidence is limited for other types of intermediaries. The prevalence of chronic diseases is increasing in younger cohorts all over the world [647, 648]. In Ireland, it is estimated that one in seven adults aged 45 – 64 years are living with chronic disease, and one in 11 aged 18 – 44 years, as well as a high prevalence of unhealthy lifestyle behaviours amongst these groups such as tobacco smoking, alcohol consumption, unhealthy diet, and physical inactivity [53, 649]. This thesis has shown that intermediary interventions have the potential to address barriers to participation in PA, including those commonly experienced at younger ages, such as changes in home, school, or work environment and financial circumstances [650]. More research is needed to investigate reasons for the lack of referrals for younger adults to these services, particularly to address physical inactivity as a lifestyle risk factor for those more in need of intensive interventions.

5.3.3 Intermediaries' potential role in chronic disease self-management

The findings of this thesis suggest that some intermediary service users are struggling to manage their chronic disease and wider health independently, perhaps attributing to some of the poorer health-related outcomes observed throughout this thesis. The potential roles of social prescribing and SP in chronic disease management are also well-recognised in the literature [216, 257, 348, 651, 652]. Self-management is a vital component of chronic disease management, and involves the individual being an active participant and decision-maker regarding their health e.g., eating a healthy diet, medication compliance, and participating in PA [653-656]. Poor self-management of

chronic disease can greatly affect quality of life and health outcomes [657]. Both the HSE Social Prescribing Framework and National Framework for the Integrated Prevention and Management of Chronic Disease explicitly state that social prescribing can help to expand and develop the range of non-clinical options supporting patients living with chronic disease to maintain healthy lifestyle choices and self-management, particularly amongst those with lower SES and levels of education [53, 183]. The findings of this thesis have demonstrated that both SP and LSO intermediaries supported and facilitated community-dwelling adults living with chronic disease to engage in local PA through acceptable, tailored, and safe interventions. Through facilitating connections to local PA, intermediaries supported engagement in community-based social settings and PA interventions, essential components of self-management [655, 656, 658].

While intermediary interventions were considered acceptable by intervention participants with complex health needs, identifying the profile of intermediary service users has also highlighted the need for further guidance and clarity for intermediaries when facilitating connections to local PA for these individuals. For example, the results of the qualitative descriptive study intimated, and were confirmed in the feasibility study, that Irish SP services are receiving large volumes of referrals for service users with complex psychosocial needs, and significant mental health issues. Often, participation in PA was not suggested or encouraged amongst these service users, leading to low numbers of eligible service users for the feasibility study and subsequent low recruitment rates. This is another finding of note, particularly considering the substantive evidence for the beneficial effects of exercise and PA on mental health and wellbeing [116, 529, 530, 659], even for those living with severe mental illness [530]. This highlights potential training needs of intermediaries in relation to the role of PA in the management of mental health, and how best to educate, encourage, and support their service users to participate in local PA. Further training may also ensure that intermediaries can refer or signpost service users to the appropriate services with confidence.

The high prevalence of chronic disease amongst LSO service users was also an unexpected finding, as people living with chronic disease are not a priority target group

of Sport Ireland and local sports partnerships [660]. LSO have previously reported that they had limited knowledge of chronic diseases and are reluctant to lead any projects or PA programmes for people with chronic diseases [613]. There was also discussion and debate amongst LSO as to whether responsibility for PA service provision for this cohort fell under the remit of healthcare services or local sports partnerships [613]. This thesis has shown however that individuals living with chronic disease are actively accessing LSO and local sports partnership services, highlighting the need for appropriate management and PA service provision for these service users. Sport Ireland and local sports partnerships have since recognised this need during the years this research project was conducted and developed and launched the PA in Chronic Conditions project in 2021. A major output of the PA in Chronic Conditions project is the development of a Competency, Qualification and Accreditation Framework for exercise professionals, in collaboration with the Department of Sport and Exercise Science in South East Technological University. The framework sets out occupational competencies, qualification standards, and accreditation processes for the upskilling and certification of exercise professionals to become long-term conditions exercise instructors [661].

Complementary long-term condition awareness training, specifically developed with LSO in mind, was also developed to improve foundational knowledge in common chronic diseases and their impact on PA participation. It is envisioned this training will also increase confidence in suitable strategies and practices in the design and delivery of PA opportunities for people living with chronic diseases [662]. The findings of this thesis support the need for this training amongst LSO intermediaries, considering many intervention participants reported living with a chronic disease, with just under half of the sample reporting low-moderate self-rated health. The training could also be considered by SP intermediaries, to provide this foundational knowledge around chronic disease and PA. This would also help to reassure potential referring agents, such as HCPs, that intermediaries have the prerequisite knowledge to facilitate connections to local PA safely amongst this cohort. However, these potential training needs would need to be addressed before recommendations can be made to implement intermediary interventions into current chronic disease referral pathways or self-management supports and programmes in Ireland.

5.3.4 Large and complex intermediary caseloads

However, if considering potential referral pathways (or further research of intermediaries), the increasingly large and complex caseloads reported by intermediaries in the qualitative descriptive and feasibility studies must be considered. Both SP and LSO intermediaries who participated in the qualitative descriptive study spoke about working with service users, facilitating connections to local PA, and having capacity to do so. Many of these intermediaries also took part in the feasibility study, and in this study reported considerable difficulty in making these connections to local PA. They intimated this was due to the complex needs of their service users, which resulted in reduced service user capacity and low levels of interest in engaging in local PA. These findings potentially indicate services under strain. This is a finding of some concern, particularly considering the rapid rise in service users availing of intermediary services. Referrals to social prescribing services in Ireland and further afield are increasing, and those referred have increasingly complex needs [181, 275, 631]. The number of referrals to HSE associated social prescribing services in Ireland almost tripled from 2022 to 2023, from 2,000 to 5,589 referrals [663, 664]. While Irish data are limited in this regard, studies from the UK have indicated that retention of link workers is an increasing issue due to unmanageable workloads and expectations regarding the role [275, 409, 631].

Very little data exists regarding referral rates or caseloads of LSO intermediaries, however, the 2022 and 2023 Sport Ireland annual reports, published in 2024 and 2025 respectively, stated over 542,000 people participated in 1,434 initiatives delivered by local sports partnerships in 2022/23 [665, 666]. This figure has been steadily rising since the implementation of local sports partnerships in 2007 [469]. Sport Ireland's evaluation of the LSO programme recommends that after the LSO has established a presence locally, they revert to a co-ordination role and empower local leaders and partners to take ownership of programmes [202]. This approach is recommended as a more scalable and sustainable way to support the aims and goals of the local sports partnership. This recommendation, as well as the rising number of service users participating in local sports partnership initiatives, means that time for LSO to perform on the ground engagement and interventions with service users is likely reducing. This calls into

question whether LSO intermediaries are offering interventions regularly or systematically, and whether they have the capacity to do so. This may have accounted as to why contacts between LSO intermediaries and service users were reported to be minimal, and as to why intervention participants perceived the LSO role as administrative. If the trends in intermediary caseloads observed in this thesis continue, this could potentially impact on the intensity of interventions that are provided by intermediaries. Both the capacity of real-world intermediary services, and the intensity of support provided to service users, would warrant careful consideration if designing potential referral pathways or research trials. Based on the findings of this thesis, if an individual simply requires information on available local PA and has the means and motivation to engage in PA (perhaps with some minor motivational support and encouragement), an LSO intervention is acceptable. In contrast, those with low agency or more complex health needs or issues may benefit from the 'hands-on' SP approach, with the opportunity to identify and address barriers to engaging in PA as well as the opportunity to engage in other community activities to address other areas of health and wellbeing. However, local capacity of these services would need to be examined when considering how and why individuals are referred, and how the role is promoted to potential referring agents.

The issues regarding capacity of intermediaries raises the argument for a potentially specialised intermediary role focused on facilitating connections to local PA. Rather than a single intermediary type addressing all potential aspects of health and wellbeing, specialisations may be a logical next step whereby intermediaries can receive training and provide interventions specifically to connect individuals with physical, mental, or social health needs to local PA. Other roles that were developed and implemented during the time of this research project, such as PA for Health Officers, could also act in this intermediary role. The PA for Health Officer programme targets adults living with long-term health conditions, frailty and falls, mental health conditions, and/or obesity who are seeking to improve their PA levels, and who have additional needs when engaging in or returning to local PA [667, 668]. PA for Health Officers have been rolled out in seven locations across the country (Mayo, Laois, Limerick, Longford, Waterford, Wexford and Wicklow) [121, 122] and many sites appear to be offering adapted PA

programmes tailored to the needs and abilities of those with chronic diseases [669], with a focus on building skills and confidence to engage in and maintain recreational sport and PA participation independently [667, 670]. These elements appear to be missing from LSO interventions generally. With the remit of this role for chronic disease populations, these officers in theory could be well-placed to provide intermediary interventions as defined in this thesis. However, the pilot project has just been concluded (personal communication with Sport Ireland, March 2025) and results of evaluations are pending, meaning it is too early to conclude whether PA for Health Officers have potential roles as intermediaries.

5.4 Implications for policy

The findings of this thesis have greatly enhanced understanding of the potential role of intermediaries in connecting community-dwelling adults to local PA and have generated several implications for practice. As demonstrated in the introduction of this thesis, the role of intermediaries in improving health and wellbeing is recognised, with SP, LSO, and HPO currently named in many Irish health and PA policies as potential key stakeholders and implementers e.g., Healthy Ireland Strategic Action Plan, HSE Social Prescribing Framework, Making Every Contact Count, the national mental health promotion plan, National Physical Activity Plan, and the National Sports Policy (See Sections 1.6.1.1 – 1.6.1.3). Additionally, all intermediaries included in this research project (SP, LSO, and HPO) are named in the new PAPHM document (published in 2024) as stakeholders in this pathway [121]. One of the key recommendations arising from the PAPHM is that promotion and signposting to local PA should be integrated into social prescribing and health promotion services, and LSO are named as a support to facilitate connections to appropriate local PA. This is an important step towards the recognition of real-world intermediary roles in PA promotion, and their role specifically facilitating connections to local PA. It is hoped that the recognition of intermediaries in the new PAPHM, strengthened by the findings of this thesis, may lead to SP, LSO, and HPO intermediaries being considered as stakeholders and implementers of future National Physical Activity Plans. It appears an opportune time to highlight the role of intermediaries in connecting individuals to local PA in policy, as these roles continue to develop.

Formally incorporating PA promotion and signposting into health promotion services is a positive development, considering the large and growing HPO workforce (See Section 3.2.3.3). However, the findings of this thesis suggest that HPO are not actively connecting their service users onwards to PA and instead focus on providing smoking cessation services. It is unclear whether this role remit was influenced by policy at the time of the qualitative descriptive study [448], but further policy support may be needed to assist HPO and health promotion services to introduce PA promotion into service delivery. However, further investigation of the effectiveness of SP, LSO, and HPO intermediary interventions would be needed using appropriate research designs (Section 5.6) and consideration of their complex caseloads (Section 5.3.4) before full implementation and incorporation into policy. Similarly, this thesis also identified the broad professional backgrounds of intermediaries, with subsequent varied training needs, which differ across intermediary types (Section 5.3.3). This raises further questions regarding intervention costs and cost-effectiveness/cost-utility, which warrants further investigation and consideration before making policy recommendations regarding the intermediary role in connecting community-dwelling adults to local PA.

Another finding of this thesis that has implications for policy is that some intermediaries working in rural areas at times reported a lack of local PA services or resources. This is by no means a new finding. Irish social prescribing stakeholders identified that lack of local assets was a significant challenge to rural social prescribing, and also described difficulty in maximising the use of existing resources, due to issues with transport [671]. Diminishing community resources has also been reported by other rural social prescribing services in the UK and Canada [235, 628, 672]. While this finding suggests a general lack of investment and infrastructure for rural communities to access PA, it also has wider implications. Rural areas in Ireland face many health challenges and inequalities, including rural isolation, an older demographic profile, and a greater vulnerability to the effects of economic downturn [673, 674]. Rural intermediaries may therefore be delivering interventions for populations with increased needs, but with more limited resources. They may also need more time to deliver an intervention, due to reduced availability and capacity of services, and difficulties in accessing these services. It is also known that there is geographical variation in costs of delivering

intermediary services, and that the costs of delivering community activities are rarely considered in economic evaluations [675]. Policymakers should consider these findings and provide adequate resources to ensure continuity and well-resourced local PA services in rural communities in Ireland.

Additionally, some intermediaries who took part in this research project worked in areas of higher deprivation or with marginalised or underserved populations. This has several implications for their work when trying to facilitate connections to local PA. Prevalence of social isolation and chronic diseases is significantly higher in people in lower SES groups [137, 454, 633, 637]. A persistent social gradient in sports participation has been observed in Ireland, with those from deprived and less educated backgrounds less likely to participate in sport [27, 567]. Working in areas of high deprivation may also add to the challenge of motivating people to engage in social prescribing and onward activities [78, 235, 238], with more advantaged service users better able to engage in such interventions [233]. Cost of activities can also be a significant barrier amongst this cohort, with those in lower SES groups more likely to engage in free activities such as parkrun or outdoor exercise equipment [676]. However, people from lower socioeconomic groups in Ireland remain less likely to participate in PA in comparison to those in more affluent groups [27]. Again, policymakers need to be aware of the potential effects of the social determinants of health on the capacity of individuals to engage in intermediary interventions, and the capacity of intermediary services within these communities. They also need to ensure appropriate, affordable, and accessible local PA resources within the community to try and minimise barriers in this regard.

5.5 Critical analysis of this work

5.5.1 Strengths

The strengths of each individual study have been discussed in-depth in the relevant chapters (See Sections 2.4.1, 3.5.1, and 4.4.6). An overall strength of this thesis is the breadth of dissemination, through both formal and informal routes. The scoping review and study II have both been published in peer-reviewed international journals [377, 442], as well as the scoping review and study III protocols [347, 481]. Findings have been

disseminated widely through national, European, and international conferences and communicated to non-research stakeholders through infographics (See Sections 3.5.1.1, 4.4.6.1 and Appendix XI). An additional strength was the use of the UK Medical Research Council guidance as an overarching framework. The use of this framework allowed for identification of key questions regarding intermediary interventions, and the design and conduct of research using appropriate methods and diversity of perspectives to address these questions [317]. An additional strength was the involvement of the project advisory panel. When conducting knowledge user engagement in research, it is important to evaluate the impact of this on the project as a whole [336, 677]. Impact can be evaluated by how knowledge user engagement influenced the relevance of research questions and the transparency of the research process [336]. The project advisory panel, consisting of intermediaries working in social prescribing, local sports partnerships, and health promotion, had an opportunity to inform the development, design, relevance, and dissemination of findings from all three studies in this thesis (See Sections 2.4.1.1, 3.5.1.1, and 4.4.6.1). The panel assisted throughout the duration of this research project, and good working relationships have now been established with panel members.

5.5.2 Limitations

5.5.2.1 Study design and methods

The limitations of each individual study have been discussed in-depth in the relevant chapters (See Sections 2.4.2, 3.5.2, and 4.4.7). There is an absence of strong high-quality evidence regarding intermediaries generally, and much of the evidence describes interventions delivered by SP to connect to a range of community activities rather than local PA specifically. Because of this lack of evidence describing the role of intermediaries when supporting connection to and engagement in local PA, the aim of this thesis was to investigate the potential of the intermediary role rather than the effectiveness of this intervention. Therefore, any conclusions regarding the efficacy of intermediary interventions are limited. Both the support of the intermediary and connection to (and subsequent engagement in) local PA were considered as two components of one intervention in the feasibility study. There may be a need to investigate the contributions

of the support of the link worker versus the support of the local PA group on PA and health-related outcomes [227], and the relative contributions of each. Because of the ‘real-world’ nature of study III, and the feasibility study design, we were unable (and it would not have been appropriate) to manipulate content or delivery of the intermediary intervention, or measure or record fidelity. Because HCPs were not included throughout this thesis, their perspectives and experiences of engaging with intermediary services specifically to improve or increase patient PA levels or engagement are not known, and this is an area that warrants further enquiry. HCPs may not be aware of how to refer to intermediary services, how intermediaries facilitate connections to local PA, or indeed that this is a role intermediaries perform in Ireland, which may have contributed to the lack of referrals to intermediary services observed in this thesis.

5.5.2.2 Sampling and recruitment

The qualitative descriptive study utilised purposeful sampling, and the feasibility study utilised convenience sampling. These methods were chosen to ensure broad representation in the case of the qualitative descriptive study and representativeness of knowledge gained in the case of the feasibility study. However, both methods have the potential to introduce selection bias. For example, intermediaries who participated in the qualitative descriptive study may have had a professional interest in PA which could have influenced how they delivered interventions. There were also several limitations identified with the recruitment strategies used in the feasibility study, which may have introduced bias. Future studies would need to consider how best to minimise the effects of bias, for example, through rigorous inclusion and exclusion criteria and prospective study designs [678]. Additionally, conducting recruitment through intermediary services meant that intervention participants were recruited after they had been referred to the service, despite referral being the first step of an intermediary intervention. The sampling approach used in the feasibility study may also have influenced the results in relation to acceptability of the intermediary intervention, due to the inclusion of individuals who self-referred to intermediary services (all 15 LSO intervention participants self-referred, and 2/14 SP intervention participants). In the social prescribing literature, those who self-refer are considered a separate, more motivated cohort compared to those referred by HCPs [61, 220, 460]. The HSE Social Prescribing

Evaluability Assessment even cautions against the inclusion of self-referrals within evaluation, as this has the potential to “distort results because of a perceived pre-existing motivation for change” [181, p.8]. Including intervention participants who self-referred may therefore have positively skewed the results in relation to acceptability and feasibility of the intervention. However, intervention participants had the opportunity to qualitatively describe their experience of the intermediary intervention and the (at times) more limited interactions they had with their intermediary. This study also included individuals who did not end up engaging with local PA. A major limitation of much social prescribing literature is that only individuals who have successfully completed SP interventions are included, potentially biasing results.

5.5.2.3 Absence of key stakeholders

The project advisory panel only included intermediaries and therefore other relevant stakeholders such as referring agents and intermediary service users were not represented. This was due to the challenges of identifying these stakeholders early in the process of the research project, and the limited resources available to facilitate and reimburse their involvement. It would have been beneficial to include referring agents as participants in this research project or as members of the project advisory panel, as much of the evidence regarding HCPs referring to intermediaries is based on anecdotal reports from intermediaries and intermediary service users. PPI involves working in collaboration or partnership with patients, carers, service users, families, people with lived experience, or the public, in planning, designing, managing, conducting, dissemination, and translation of research [330]. PPI input has an important role in deciding research topics and providing experiential knowledge [677]. Involving intermediary service users as PPI participants may have significantly influenced this research project, as several intervention participants in the feasibility study suggested additional or alternative research topics of importance to them. One opportunity afforded by qualitative research within a mixed methods trial is to explore if the research questions proposed are the most meaningful to participants prior to progression to a full trial [486, 679]. Intervention participants in this study suggested investigating a number of topics: how better to communicate and advertise local sports partnership groups to the wider community, how better to provide local PA services in their locality, and the

potential impact of service users returning and participating in the same local PA groups on service provision and sustainability. To date, there has been a lack of PPI observed in reviews of social prescribing evaluation literature [230]. Future studies should include PPI input from intermediary service users, to ensure appropriate research questions are identified and prioritised, and receive input on the design, conduct, analysis, oversight, and dissemination of future trials.

5.6 Implications for future research

This thesis has identified the four main steps of intermediary interventions (referral, assessment, follow-up, and onward connection to local PA), as well as identifying some of the potential mechanisms of impact. The findings of this thesis therefore provide a useful framework for future researchers conducting work in this area, and intermediary services when defining or evaluating their interventions. As well as ongoing support, instrumental support, personalised support from a trusted source, and emotional support, the findings of this thesis also identified behavioural and motivational components of intermediary interventions and nuanced considerations of chronic physical and mental health needs as potential mechanisms of impact when intermediaries connect people to local PA. While Irish HCPs have the capacity to refer patients directly to local PA and exercise services through ExWell Medical (Section 1.5.2.1), as part of the ‘assist’ and ‘arrange’ steps of a brief intervention (Section 1.5.2.2), and through the CDM programme (Section 1.5.2.5), the advantages and disadvantages of these approaches have been discussed in detail in the introduction of this thesis. Future research could evaluate the additional benefit and/or impact of introducing intermediary interventions into these existing PA referral pathways after the initial encounter between HCP and patient. Despite the limited conclusions regarding effectiveness of intermediary interventions, this thesis has described many of the potential outcomes of intermediary interventions, such as facilitation of engagement in local PA, social connectedness, as well as improvements in physical fitness, PA levels, mental wellbeing, and motivation which could be investigated in future studies. There were several key learnings and recommendations identified in relation to the evaluation design of the feasibility study which could be considered for future studies aiming to test these variables. Optimisation of recruitment methods and strategies is an important

component of feasibility research [479], to recruit a truly representative, non-biased sample [587] particularly when trying to recruit vulnerable or hard to reach populations [186, 587]. For future studies, it may not be feasible for intermediaries to invite service users to participate in the study, as this caused undue burden on intermediaries and introduced bias. Supplying additional resources to intermediary services, such as independent researchers and centralised research data management systems, could be considered to reduce this burden. This was unfortunately beyond the scope of this study. It is also recommended that service users are recruited at a standardised timepoint, e.g., at time of referral to the intermediary service, to capture all steps of intermediary interventions, reduce selection bias and better operationalise pre-intermediary intervention timepoints.

Future studies should aim to include appropriate outcome measures capturing the PA and health-related domains identified in this thesis as potentially improved by intermediary interventions. Such studies should consider some degree of objective or quantitative measurement of these reported outcomes, to strengthen the preliminary findings of this thesis. While the IPAQ-SF was an acceptable and suitable outcome measure of PA levels, future studies would need to rectify the recall bias and inaccuracies identified in the feasibility study, such as mode switching, seasonality, and inaccurate reporting of time and intensity of activities. This could be done by using an objective measure of PA such as accelerometry, considered a core outcome of PA interventions [542, 680]. In addition to appropriate outcome domains and measures, consideration of alternative evaluation methodologies is also warranted. Few RCTs have been conducted of intermediary interventions [218], likely due to the challenges of conducting RCTs of complex interventions. While the before-after design of the feasibility study was shown to be feasible, studies with more robust designs, appropriate randomisation, longer follow-up times, and a suitable control group would strengthen the evidence base for intermediary interventions when connecting to local PA. Further feasibility testing with appropriate progression criteria [605] is also recommended to inform future RCTs, and to test the following feasibility domains of primary concern [485] identified in the feasibility study: recruitment capability (using alternative recruitment strategies to those used in the feasibility study), randomisation (and identification of suitable control groups

e.g., direct referral by HCPs to local PA and exercise services (See Sections 1.5.2.1, 1.5.2.2, and 1.5.2.5) and assessment procedures (including suitability and acceptability of any additional outcome measures).

5.7 Conclusions

Effective methods of promoting PA are needed to address high rates of physical inactivity and associated ill-health. The findings of this thesis have demonstrated that intermediaries have a potential role in PA promotion, by providing person-centred interventions and facilitating connections to local PA. It appears that people experiencing poorer health outcomes are being successfully and safely supported to attend local PA by intermediaries, in interventions that are acceptable to service users. Improvements in physical, mental, and social health were reported qualitatively by intermediaries and service users, but overall, the quantitative findings of this thesis were limited. There were also positive qualitative findings in relation to local PA accessed through intermediary interventions, and the experience of engaging in same. In Ireland, the LSO approach to interventions is light-touch, and LSO intermediary services may therefore only suit those who are motivated to change their PA behaviour and/or have the health capital to address barriers to PA. In contrast, SP provide more intensive follow-up over a longer period and appear to work with cohorts with more complex health needs. Encouragingly, some of these service users are supported to connect to local PA. However, SP intermediaries currently receive large volumes of referrals for individuals with complex mental health and psychosocial needs, and these findings would need to be considered if implementing referral pathways for PA. Referrals would also be highly dependent on local service capacity. The findings of this thesis have highlighted that intermediaries may benefit from additional training in behavioural approaches and working with cohorts living with chronic disease, to strengthen and improve an already acceptable intervention. There is also an argument for a potentially specialised intermediary role in PA promotion, but more research is needed using appropriate outcome measures, study designs, and sampling methods to further investigate the effectiveness of intermediary interventions in relation to PA and health-related outcomes.

5.8 Summary of key recommendations

The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise

Key recommendations for practice



Intermediaries could be a useful adjunct to brief interventions and PA referral provided by HCPs, particularly when arranging connections to local PA.



HCPs who are considering referral to or utilisation of intermediary services should use clinical judgement as to what intervention, and subsequently what intensity of intervention, may be best suited to their patients.



However, before formal referral pathways are implemented the training needs of intermediaries and their current large complex caseloads should be considered.

Key recommendations for policy



Intermediaries could be considered as stakeholders in future National Physical Activity Plans, pending further research and considering their current caseloads.



The scope of the HPO role appears limited at present in relation to PA promotion, but this could develop over time with appropriate policy support.



Policymakers should ensure intermediaries work in appropriately resourced areas, considering the needs of rural and more deprived communities.

Key recommendations for research



Further research is needed to determine the effectiveness of intermediary interventions on physical, mental, and social health outcomes.



However, further feasibility testing is recommended to determine appropriate recruitment strategies, ideally recruiting at the point of referral to intermediary services.



Future feasibility and effectiveness studies should consider subjective and objective assessment of the PA and health-related outcomes identified in this thesis as potentially impacted by intermediary interventions.



Future feasibility and effectiveness studies should also consider the inclusion of an appropriate control group, such as PA referral pathways and/or brief interventions.

Abbreviations: HCP — healthcare professional, HPO — health promotion and improvement officers, PA — physical activity.

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Appendices

Appendix I: List of common terms for intermediary roles

Name	Iterations	References
Advisor	Voluntary, community, and social enterprise sector advisor Health and fitness advisors Health advisor Wellbeing advisor	(Dayson et al., 2016, Farenden et al., 2015, Gibbons et al., 2019, National Voices, 2016, Natural England, 2017, Polley et al., 2017, Thomson et al., 2015, Campbell et al., 2015, Duda et al., 2014, Jolly et al., 2009, Pavey et al., 2011, Polley et al., 2021, NHS England and NHS Improvement, 2020, North of England Care System Support and NHS, 2021, Jackson et al., 2014, Global Social Prescribing Alliance, 2021, Carter et al., 2018, DeBate et al., 2004, Plescia et al., 2008, Social Prescribing Network, 2016)
Case	Case worker Case manager	(Carter et al., 2018, Healthy London Partnership et al., 2018, Kimberlee, 2016, Anselmi et al., 2015, Bhuyan et al., 2015, Health Education England, 2016, Hassan et al., 2023)
Coach	Activity coach Health and wellbeing coaches Health coach Life coach Lifestyle coach Wellbeing coach Wellness coach	(McKay et al., 2019, The Scottish Parliament Health and Sport Committee, 2019, Healthy London Partnership, 2017, World Health Organization, 2021, World Health Organization, 2018, McKay et al., 2018, McKay et al., 2017, Sims-Gould et al., 2019, Gray et al., 2020, Franke et al., 2021, Social Prescribing Links Westminster Patients, nd, Personalised Care Group, nd-a, Bertotti et al., 2019, Chima et al., 2021, Cole et al., 2020, Gibbons et al., 2019, Grover et al., 2023, Hsiung et al., 2019, Leese et al., 2023,

		Mulligan et al., 2020, Huijg et al., 2015, Krops et al., 2020, Leenaars, 2017, Zurynski et al., nd, NHS England and NHS Improvement, 2020, NHS Health Scotland, 2016, Arie, 2015, Cheetham et al., 2018)
Community	Community builder Community broker Community development workers Community health agent Community workers Community physical activity organiser Community wellbeing advisor	(Naito et al., 2021, Kimberlee, 2015, Cole et al., 2020, Garside et al., 2020, Fullam et al., 2021, Polley et al., 2017, Friedli et al., 2007, Kimberlee, 2013, The Health and Social Care Alliance (the ALLIANCE), 2017, Carter et al., 2018, Chapman et al., 2013, Royal Australian College of General Practitioners and Consumers Health Forum of Australia, 2019b, NHS England and NHS Improvement, 2020, Zurynski et al., nd, Wellbeing Exeter and Wellbeng Cranbrook, 2022)
Connector	Care sport connector Community connector Health connector Connector Social prescribing connector schemes Social connector	(Dayson and Leather, 2020, Department of Health et al., 2017, Elliott et al., 2021, Garside et al., 2020, Health Education England, 2016, Hsiung et al., 2019, Cole et al., 2020, North of England Care System Support and NHS, 2021, Oster et al., 2023, Tierney et al., 2019, Tierney et al., 2020, Agarwal et al., 2019, Fullam et al., 2021, Leenaars, 2017, Muhl et al., 2023, Public Health England and NHS England, 2015, Roberts et al., 2021, NHS England and NHS Improvement, 2020, Royal Australian College of General Practitioners and Consumers Health Forum of Australia, 2019b, Polley et al., 2017, Polley et al., 2020, Wallace et al., 2021b, The Scottish Parliament

		Health and Sport Committee, 2019, Hassan et al., 2023)
Co-ordinator	Co-ordinator Care co-ordinators Community care co-ordinators Community co-ordinator Health co-ordinators Healthy Lifestyles co-ordinators Link co-ordinator Local area co-ordinators Recreation co-ordinators Social prescribing co-ordinator Wellbeing co-ordinators Physical activity co-ordinators	(Kimberlee, 2016, McKay et al., 2018, Care Forum, 2012, Gage, 2020, Fixsen et al., 2021, Health Education England, 2016, NHS England and NHS Improvement, 2020, NHS England and NHS Improvement, 2021, Polley et al., 2017, Department of Health et al., 2017, Wallace et al., 2021b, Bertotti et al., 2019, Browne, 1997, Rees et al., 2019, Brown, 2018, APS Group Scotland, 2012, Gray et al., 2020, McKay et al., 2017, Sims-Gould et al., 2019, Activate Social Prescribing for People and Communities, nd, City and Hackney Clinical Commissioning Group and University of East London, 2015, Garside et al., 2020, Healthy Dialogues, 2018, The Welsh NHS Confederation, 2019, Oster et al., 2023, Farenden et al., 2015, Kiely et al., 2021, Zurynski et al., nd, Global Social Prescribing Alliance, 2021, Department of Health and Children Health Promotion Unit, 2000, Carroll et al., 2019, Calderón-Larrañaga et al., 2021, Polley et al., 2020, Healthy London Partnership et al., 2018, Cunningham et al., 2021, Wildman et al., 2019, HSE, 2015, Elliott and Wallace, 2021a, Elliott et al., 2021, Elliott and Wallace, 2021b, Batik et al., 2008, Department of Health, 2016, Department of Health, 2021, Elley et al., 2008, Trinh et al., 2012, Llewellyn et al., 2020, Lamb et al., 2002, Beech et al., 2017)

Facilitator	Facilitator Health facilitator Social prescribing facilitator	(Moffatt et al., 2017, Kimberlee, 2015, Polley et al., 2017, Zurynski et al., nd, Kimberlee, 2013, Kiely et al., 2022, Payne et al., 2020, Natural England, 2017, Mossabir et al., 2015, Leenaars et al., 2016a, Bickerdike et al., 2017, Kumpunen et al., 2017, Kimberlee et al., 2013)
Health	Health promoters Health broker Healthy living initiatives Healthy lifestyles teams Healthy Living Centre mentors Health mentor Health educator Health counsellor	(Thomson et al., 2015, Mulligan et al., 2020, Kimberlee, 2016, Alliance for Healthier Communities, 2020, DeHaven et al., 2021, Hsiung et al., 2019, World Health Organization, 2022, Polley et al., 2017, Leenaars et al., 2016b, Leenaars et al., 2016a, Greaves and Farbus, 2006, Garner-Purkis et al., 2020, Kettle et al., 2020)
Health trainer	Health trainer Community health trainers	(NHS Health Education England, 2016, Bertotti et al., 2019, Polley et al., 2017, Bickerdike et al., 2017, Cunningham et al., 2021, Health Education England, 2016, London Sport, 2021, Natural England, 2017, Payne et al., 2020, Public Health England and NHS England, 2015, Hassan et al., 2023)
Health worker	Community health workers Health workers (with local knowledge)	(O'Donnell et al., 2018, Carter et al., 2018, Kimberlee, 2015, Naito et al., 2021, Kimberlee, 2013, Royal Australian College of General Practitioners and Consumers Health Forum of Australia, 2019b, NHS England and NHS Improvement, 2020, Kimberlee et al., 2013, Souza Neto et al., 2021, Mossabir et al., 2015, Kiely et al., 2022, Thomson et al., 2015)
Hub	Hub Hub and spoke Hub co-ordinator	(Speake et al., 2016, Moffatt et al., 2017, Kimberlee, 2016, Sport Ireland, 2019, Anselmi et al.,

	Social prescription hub co-ordinator	2015, Sandhu et al., 2022, Gibbons et al., 2019, Local Government Association, 2016, Cole et al., 2020, Department of Health, 2021, Kimberlee, 2013)
Liaison	Patient advice and liaison service Community health liaison	(Carter et al., 2018)
Link worker	Community link worker Holistic link worker Link worker Social prescribing link worker Single point of contact link worker National Association of Link Workers	(Alliance for Healthier Communities, 2020, Chatterjee et al., 2018, Elston et al., 2019, Ferguson and Hogarth, 2018, Fixsen et al., 2021, Gage, 2020, Husk et al., 2019, Kiely et al., 2021, Mental Health and Wellbeing Programme (HSE Health and Wellbeing), 2021, Moffatt et al., 2017, O'Donnell et al., 2018, Polley et al., 2020, Roberts et al., 2021, The Scottish Parliament Health and Sport Committee, 2019, Tierney et al., 2019, Tierney et al., 2020, Wallace et al., 2021b, Wildman et al., 2019, Zurynski et al., nd, Alejandre et al., 2023, APS Group Scotland, 2012, Bertotti et al., 2019, Bevan et al., 2023, Bhatti et al., 2021, Chapman et al., 2013, Chronic Conditions Working Group, 2017, Cole et al., 2020, Cunningham et al., 2022, Department of Health et al., 2017, Elliott et al., 2022, Friedli et al., 2012, Garside et al., 2020, Gibbons et al., 2019, Gibson et al., 2021, Gilbert et al., 2018, Global Social Prescribing Alliance, 2021, Golubinski et al., 2020, Grover et al., 2023, Health Education England, 2016, Healthy London Partnership, 2018, Hsiung et al., 2019, Htun et al., 2023, Husk et al., 2020, Juster-Horsfield and Bell, 2021, Kimberlee, 2016, Leese et al.,

		2023, Llewellyn et al., 2020, London Sport, 2021, Lovell et al., 2017, Malhotra, 2021, Muhl et al., 2023, Munoz et al., 2020, Natural England, 2017, North of England Care System Support and NHS, 2021, Oster et al., 2023, Personalised Care Group, nd-b, Pescheny et al., 2021, Pollard et al., 2023, Rothe and Heiss, 2022, Royal Australian College of General Practitioners and Consumers Health Forum of Australia, 2019a, Sandhu et al., 2022, The Health and Social Care Alliance (the ALLIANCE), 2017, Tierney et al., 2024, White et al., 2022, Wood et al., 2022, Wood et al., 2021, Hassan et al., 2023)
Navigator	Care navigator Healthcare navigator Health and social navigator Locality navigator Primary care navigator Navigator Community navigator Practice-based social prescribing navigators Social prescribing navigator Systems navigators	(Carter et al., 2018, Tierney et al., 2020, Alliance for Healthier Communities, 2020, Chatterjee et al., 2018, Social Prescribing Network, 2016, Fixsen et al., 2021, Mulligan et al., 2020, Polley et al., 2017, Wallace et al., 2021b, Royal Australian College of General Practitioners and Consumers Health Forum of Australia, 2019b, NHS England and NHS Improvement, 2020, Health Education England, 2016, Zurynski et al., nd, Juster-Horsfield and Bell, 2021, Agarwal et al., 2019, APS Group Scotland, 2012, Bertotti et al., 2019, Bhatti et al., 2021, Chronic Conditions Working Group, 2017, Cole et al., 2020, Cunningham and O'Sullivan, 2021, Department of Health et al., 2017, Elliott et al., 2022, Esmene et al., 2020, Gibbons et al., 2019, Grover et al., 2023, Healthy Dialogues, 2018, Hsiung et al., 2019, Local

		Government Association, 2016, London Sport, 2021, Munoz et al., 2020, Natural England, 2017, NECS and NHS, 2021, Thomson et al., 2015, Tierney et al., 2019)
Officer	Lead officer Exercise officer	(Friedli et al., 2012, Campbell et al., 2015, Cunningham et al., 2021, Harrison et al., 2005, Leenaars, 2017)
Practice based referral worker	Practice based generic referral worker Practice based specialist referral worker	(Oster et al., 2023, Pescheny et al., 2018)
Referral	Referral(s) facilitator Referral agent Community referral(s) Social referral Social referral facilitator	(Chatterjee et al., 2018, Local Government Association, 2016, Grant et al., 2000, Runacres, 2019, Zurynski et al., nd, Friedli et al., 2007, Activate Social Prescribing for People and Communities, nd, Gibbons et al., 2019, Thomson et al., 2015, APS Group Scotland, 2012, Bevan et al., 2023, Buck, 2016, Chronic Conditions Working Group, 2017, Cunningham et al., 2022, Department of Health, 2020, Farenden et al., 2015, Grover et al., 2023, HSE, 2020, Husk et al., 2020, Kimberlee, 2013, London Sport, 2021, Natural England, 2017, North of England Care System Support and NHS, 2021, NHS Health Scotland, 2016, Pescheny et al., 2021, Polley et al., 2017, Public Health England and NHS England, 2015, Royal Australian College of General Practitioners and Consumers Health Forum of Australia, 2019b, The Health and Social Care Alliance (the ALLIANCE), 2017, Rempel et al., 2017)
Signpost	Signposter Signposting	(Tierney et al., 2019, Zurynski et al., nd, NHS Health Scotland, 2016, Alexandre et al., 2023, APS

		Group Scotland, 2012, Cunningham et al., 2022, Friedli et al., 2007, Health Education England, 2016, Kimberlee, 2015, NHS England and NHS Improvement, 2020, Public Health England and NHS England, 2015, The Health and Social Care Alliance (the ALLIANCE), 2017, Thomson et al., 2015)
Social prescribing	Primary care referral direct to social prescribing National champion for social prescribing Social prescriber Social prescribing advisor Social prescribing co-ordinator Social prescribing commissioner Social prescribing provider Social prescribing link co-ordinator Social prescribing project co-ordinator Social prescribing project worker	(Ferguson and Hogarth, 2018, Polley et al., 2020, Wallace et al., 2021b, Roberts et al., 2021, Health Education England, 2016, Zurynski et al., nd, Oster et al., 2023, Sandhu et al., 2022, Natural England, 2017, Cole et al., 2020, Dayson et al., 2016, Garside et al., 2020, Local Government Association, 2016, Personalised Care Group, nd-b, Wallace et al., 2021a, All Ireland Social Prescribing Network, 2024, Elliott et al., 2021, Esmene et al., 2020, Fixsen et al., 2021, Fullam et al., 2021, Gibbons et al., 2019, Government of Ireland, 2022, Kimberlee, 2016, Kumpunen et al., 2017, Leese et al., 2023, Making Every Contact Programme, 2022, Muhl et al., 2023, Porter et al., 2023, Social Prescribing Links Westminster Patients, nd, Social Prescribing Network, 2016, The Scottish Parliament Health and Sport Committee, 2019, Tierney et al., 2019, Fixsen and Barrett, 2022, Polley et al., 2019, Polley et al., 2021, Kimberlee, 2013, Kimberlee et al., 2013, NHS Health Education England, 2016, Tierney et al., 2024, Wood et al., 2022, Mental Health and

		Wellbeing Programme (HSE Health and Wellbeing), 2021, Activate Social Prescribing for People and Communities, nd, Alderwick et al., 2018, Araki et al., 2022, Bertotti et al., 2018, Bevan et al., 2023, Brown, 2018, Carnes et al., 2017, City and Hackney Clinical Commissioning Group and University of East London, 2015, Gage, 2020, Healthy Dialogues, 2018, HSE, 2015, Kiely et al., 2021, Kiely et al., 2022, Polley et al., 2017)
Support	Family support worker Community support worker Support worker Support person Support broker Personal support	(Stirrat, 2014, Polley et al., 2017, Wallace et al., 2021b, Thomas et al., 2021, Farenden et al., 2015, National Nutrition Surveillance Centre and Health Service Executive, 2011, Tava'e and Nosa, 2012, Polley et al., 2021, Thomson et al., 2015, White et al., 2022, Friedli et al., 2007)
Third sector, i.e., community and voluntary	Community health partnerships Community planning partnerships Non-primary care based Third sector partners Exercise professionals Exercise specialists	(Kimberlee, 2016, Friedli et al., 2007, Leenaars, 2017, APS Group Scotland, 2012, Oster et al., 2023, Kimberlee, 2015, Kimberlee et al., 2013, Natural England, 2017, ukactive, 2015, Loughren et al., 2014, Kettle et al., 2022)
Worker	Generic worker Project worker Engagement worker Triage worker Wellbeing worker	(Wallace et al., 2021a, NHS Health Scotland, 2016, Garside et al., 2020, Kimberlee et al., 2013, NHS Health Education England, 2016, Kimberlee, 2016, Sandhu et al., 2022, Wood et al., 2021, Malhotra, 2021, Natural England, 2017, Payne et al., 2020)

Abbreviations: HSE — Health Service Executive, NHS —National Health Service.

Appendix II: Publication of scoping review protocol (“The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: A scoping review protocol [version 2; peer review: 2 approved]”)



STUDY PROTOCOL

REVISED **The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: A scoping review protocol**

[version 2; peer review: 2 approved]
Previously titled: The role of intermediaries in connecting community-dwelling adults to local physical activity and sport: A scoping review protocol

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Abstract

Introduction: Physical inactivity is a major global issue affecting health. Promoting, supporting and encouraging physical activity amongst community-dwelling adults is essential. An intermediary is a clinical or non-clinical professional based in primary care, community or voluntary settings. They support individuals referred to them to connect with appropriate community services with the goal of improving health and wellbeing. This may be a promising method to establish a connection to local physical activity and exercise; however the process has been poorly described to date.

Objective: The objectives of this scoping review will be to identify and summarise the literature describing the process of connecting community-dwelling adults to an intermediary, the characteristics of these adults, the processes (role, practice and procedure) of an intermediary in connecting these adults to local physical activity and exercise opportunities, and to map these processes of connection to outcomes.

Methods: This scoping review will be conducted in accordance with the scoping review methodology of the Joanna Briggs Institute. A comprehensive search strategy will identify relevant studies in Embase, Medline, Web of Science and CINAHL, along with a structured grey literature search. Studies which describe an intermediary connecting community-dwelling adults (aged ≥ 18 years) to local physical activity and exercise will be included. Data will be charted and narratively summarised. Intermediary processes will be mapped to outcomes related to physical activity, and the PAGER (patterns, advances, gaps, evidence for practice and research recommendations) framework will be used to identify evidence gaps and research

Open Peer Review

Approval Status ✓ ✓

	1	2
version 2 (revision) 07 Jul 2022		
version 1 08 Apr 2022	✓ view	✓ view
1. Joey Murphy , University of Bristol, Bristol, UK		
2. Caitriona Cunningham , University College Dublin, Dublin, Ireland		
Any reports and responses or comments on the article can be found at the end of the article.		

recommendations.

Conclusions: This scoping review will be the first to describe the process of an intermediary connecting community dwelling adults to local physical activity and exercise. This review will identify, map and summarise the existing research on the processes and outcomes. The results will also identify any evidence gaps and will guide future research.

Keywords

exercise, physical activity, health promotion, health services research, referral and consultation, scoping review, social prescribing, link workers

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REVISED Amendments from Version 1

Title: The title has been amended to 'local physical activity and exercise'. This has been updated through the manuscript (removing references to local physical activity and sport, and adding 'exercise' in the definition of local physical activity and exercise).

Abstract: The introduction has been updated with a definition of an intermediary, and the objectives section has also been updated to align more closely with the manuscript. The following sentences were removed in order to meet the word count – "... especially in primary care services where the majority of healthcare contacts take place" in the Introduction and "... for sport opportunity or other similar resource" in the Methods.

Introduction: Clarification has been added to the introduction section around the average number of GP visits per year, and brief interventions for people self-managing a chronic disease. A reference to the National Exercise Referral Framework has also been added.

Study design: A line has been added to indicate the review is registered on the Open Science Framework with appropriate reference.

Stage 1: Study objectives i) and ii) have been updated – objective i) now relates to the connection to the intermediary, and objective ii) relates to the person referred.

Eligibility criteria: Clarified that 'peer-reviewed and non-peer reviewed' studies will be included.

Population: 'Community-dwelling' has been defined. "... can receive referrals from primary care" has been added as a rationale to use 'primary care' as a search term. A line has been added to clarify that the review will include studies involving community-dwelling adults who may or may not attend primary care with appropriate references.

Concept: "Health and social care professional/s" has been changed to "healthcare professional/s".

Stage 4: Data fields 11 and 12 have been updated; data field 11 concerns intermediary process and practice, and data field 12 concerns intermediary service description.

Any further responses from the reviewers can be found at the end of the article

Introduction

According to the World Health Organisation, over a quarter of adults are not meeting physical activity recommendations and levels of physical inactivity are increasing globally (World Health Organization, 2019). Physical inactivity is a major modifiable risk factor for non-communicable morbidity, early mortality and results in significant direct and indirect healthcare costs (Ding *et al.*, 2016; Lee *et al.*, 2012). Ireland has implemented several policies, strategies and monitoring systems that directly and indirectly promote increased participation in physical activity (Bike to work, 2020; Department of Health, 2013; Department of Health, 2016; Department of Transport, 2018; Gelius *et al.*, 2021; Healthy Ireland, 2019b; Smarter Travel, 2009; Sport Ireland, 2020a; Woods *et al.*, 2010). Despite this, national data indicates that the proportion of Irish adults meeting the national physical activity guidelines remains low, with estimates ranging from 34–46% only (Healthy Ireland, 2019a; Sport Ireland, 2020b). This declines steadily

across the life course to only 18% of those aged 75 or older, falling far below the global average (Healthy Ireland, 2019a; World Health Organization, 2019).

The health service has an essential role to "promote, educate, support and encourage physical activity generally" (Department of Health, 2021, p. 7). At present for persons aged 15 years or older, the average number of general practitioner (GP) visits is four per year (Collins & Homeniuk, 2021; Healthy Ireland, 2019a). This can be as high as seven per year in a chronic disease population (Health Service Executive, 2016). Additionally, the Irish healthcare system is undergoing major reform, with significant developments underway to expand primary and community care services (Department of Health, 2018). Therefore, primary care professionals are and will continue to be at the forefront of supporting individuals living in the community to make healthy lifestyle choices, and to support them in increasing their physical activity.

Internationally, methods of connecting community-dwelling adults from primary care services to physical activity include exercise referral schemes, brief interventions or referral to a connector or intermediary (Albert *et al.*, 2020; Campbell *et al.*, 2015; Craike *et al.*, 2020; Cunningham *et al.*, 2021b; Leenaars *et al.*, 2018; National Institute for Health Care Excellence, 2014; Public Health England, 2021; Woods *et al.* (2016); World Health Organization, 2018). Exercise referral schemes involve referring a person from primary care services to a qualified exercise professional, to develop and deliver a tailored programme of physical activity lasting from 10–12 weeks. These schemes usually rely on partnerships between local authorities, primary care professionals and private community-based leisure service providers (Campbell *et al.*, 2015). Recent reviews found that while the individualised support was shown to increase initial adherence to physical activity, there was marginal additional benefit on self-reported physical activity or cardiorespiratory fitness after 12 months when compared to verbal/written advice alone or signposting to local facilities (Campbell *et al.*, 2015; National Institute for Health Care Excellence, 2014; Orrow *et al.*, 2012).

Due to the poor evidence base for exercise referral schemes, in Ireland priority has been given to health behaviour change models such as 'Make Every Contact Count' (MECC) instead. MECC is based on behavioural science approaches such as COM-B ('capability', 'opportunity', 'motivation' and 'behaviour') and other dual process models, which recognise the instinctive, reactive and conscious aspects of decision-making, and how internal and external cues can impact on an individual's decisions and behaviour (Houlihan, 2018; Michie *et al.*, 2011). The aim of MECC is to enable healthcare professionals to use their daily interactions with patients to support them in making positive health behaviour changes, including around physical activity. Interventions are opportunistic, and can range from brief advice and/or brief interventions (defined as "An intervention that aims to equip people with tools to change attitudes and explore underlying problems. It involves discussion, negotiation and encouragement" [(Health Service Executive, 2016, p22)]) with signposting to local resources, to planned,

high-intensity interventions that may take place over a number of sessions (Health Service Executive, 2016; Public Health England, 2016).

While effective in the short term, brief interventions alone may not be sufficient to maintain improvements in physical activity, with inconclusive evidence for effectiveness on objective physical activity levels four months post-intervention (Lamming *et al.*, 2017; Lion *et al.*, 2019; Orrow *et al.*, 2012). Lamming and colleagues (2017) reported that brief interventions may be more effective with increased follow-up and support, but evidence was mixed. Extended brief interventions of increased duration are already recommended for people requiring more intensive support for behaviour change, such as those self-managing a chronic disease (Health Service Executive, 2016). In a more recent review of delivering brief physical activity interventions, healthcare professionals identified a common barrier of a perceived lack of local services, opportunities or places to which patients could be referred (Hall *et al.*, 2022). If primary care professionals could therefore offer increased follow-up and support and be able to signpost their patients to appropriate services, the connection could potentially be more successful.

The final method of connection is referral to an intermediary. It has been identified as a useful way to connect people with local services and opportunities who may not benefit from brief interventions and active signposting alone (Brandling & House, 2009; Husk *et al.*, 2020; Tierney *et al.*, 2020). There is no universal definition of an intermediary, and many titles are used to describe the role; for example, 'care navigator', 'link worker', 'social prescriber' or 'sign poster'. Despite differences in title, the main attributes and work practices are similar: they are usually community-based, non-clinical staff who receive referrals for individuals with the goal of improving health and wellbeing. They connect these individuals with appropriate community and voluntary services and supports, and may follow up with the person over a number of sessions (All Ireland Social Prescribing Network, 2021; Health Education England, 2016; Husk *et al.*, 2020; Tierney *et al.*, 2019; Tierney *et al.*, 2020).

Intermediaries can link referred individuals to a wide variety of community-based services, including physical activity. Examples of physical activity opportunities and resources from the All Ireland Social Prescribing Network website include recreational jogging groups, walking groups, virtual exercise classes and community gardening (All Ireland Social Prescribing Network, 2021). Both primary care professionals and patients identified an intermediary as a potentially useful resource for connecting to physical activity opportunities (Brandborg *et al.*, 2021; Carstairs *et al.*, 2020). However, in a review examining social prescribing models, less than 10% of identified studies examining exercise used an intermediary; the majority involved connecting the individual from primary care directly to an activity (Husk *et al.*, 2020). A recent scoping review of methods of connection between primary care services and community-based physical activities found high success rates for processes that involved referral to an intermediary and/or subsequent referral to a physical activity opportunity

(Cunningham *et al.*, 2021b). However, the search was limited to evaluations undertaken in the UK, and only half of the included studies described processes which involved an intermediary. The intermediaries were poorly described, and very few studies included evaluations of effectiveness.

Current research appears to suggest that an intermediary may be a promising method of connecting community-dwelling adults to physical activity, sport, and exercise resources and opportunities in the community/local area/locality (hereafter described as local physical activity and exercise), and adults can successfully engage when referred to and supported by a link worker. However, this process has been poorly described to date. A preliminary search for existing scoping and systematic reviews of this topic was conducted using MEDLINE, the Cochrane Database of Systematic Reviews and Joanna Briggs Institute (JBI) Evidence Synthesis. Apart from the aforementioned review by Cunningham and colleagues, no other published or underway reviews were identified. The aim of this scoping review, therefore, is to identify and describe the available international evidence regarding processes and characteristics of referral to an intermediary, and the processes and outcomes of connecting referred community-dwelling adults to local physical activity and exercise via an intermediary.

Methods

Study design

A scoping review was deemed the most suitable methodological approach, due to the emerging and poorly delineated nature of the evidence for intermediaries and their role in physical activity promotion. A scoping review generally includes diverse sources of evidence, and can be used to clarify key concepts and knowledge gaps in a topic area (Grant & Booth, 2009; Munn *et al.*, 2018). This review will follow the Joanna Briggs Institute guidelines for scoping reviews (Peters *et al.*, 2020), and will be guided by the framework proposed by Arksey and O'Malley, as well as the enhancements proposed by Levac and Daudt (Arksey & O'Malley, 2005; Daudt *et al.*, 2013; Levac *et al.*, 2010). This protocol has been registered on the Open Science Framework (O'Grady *et al.*, 2022).

The scoping review framework proposed by Arksey and O'Malley was employed to structure this protocol, which suggests five main steps and optional sixth step for a rigorous scoping review (Arksey & O'Malley, 2005). These include: (1) identifying the research questions; (2) identifying relevant studies; (3) selecting studies; (4) charting the data; (5) collating, summarising, analysing and presenting the results; and (6) consulting with stakeholders to inform or validate study findings.

Stage 1: Identifying the research questions

The main research question, expressed using the Population-Concept-Context framework (Peters *et al.*, 2020), is: what is the available evidence regarding the current processes (role, practice and procedure) of an intermediary, in connecting community-dwelling adults to local physical activity and exercise? In this instance, population refers to community-dwelling adults, concept refers to the work of an intermediary in establishing

connections to physical activity and context refers to physical activity, sport and exercise resources and opportunities in the community/local area/locality (local physical activity and exercise).

The review objectives include the following:

- i) To identify and summarise the scope of the literature describing connection to an intermediary (method and nature of referrals, source of referrals, reason referred, number of referrals, profile of the intermediaries; including background, training and sector where they are based);
- ii) To identify and summarise the health characteristics and demographic information of individuals referred to an intermediary;
- iii) To identify, map and summarise the available literature regarding the work of the intermediary in connecting individuals to local physical activity and exercise (process of assessment, extent and nature of community-based physical activity services and other services utilised, how these services are identified, length of follow-up, discharge from the service);
- iv) To identify the available literature describing and defining outcomes of an intermediary connecting community-dwelling adults to local physical activity and exercise, and map these outcomes to processes.

The purpose of this scoping review is to gain a greater understanding of the role of an intermediary in connecting community-dwelling adults to local physical activity and exercise, to describe the core elements and common components of

this process in further detail and to map the available evidence to outcomes. By fulfilling the review objectives, it is expected that evidence gaps in this topic area will emerge and inform future research recommendations.

Eligibility criteria. Inclusion criteria will be limited to peer reviewed and non-peer reviewed studies that report on the process of an intermediary (concept), after receiving a referral for a community-dwelling adult (population), in connecting them to physical activity, sport and exercise resources and opportunities in the community/local area/locality (context). All full-text peer reviewed and non-peer reviewed studies which include empirical data will be considered for inclusion. Reports which do not provide primary data to answer review objectives will be excluded, such as study protocols and policy briefs. Abstracts may be included if relevant primary data is reported and study authors will be contacted to seek additional research data. Databases will be searched from inception to present. Non-English language studies will be excluded due to time and resources required for translation and interpretation. Inclusion and exclusion criteria are summarised in [Table 1](#).

Population. The included studies must involve community-dwelling adults aged ≥ 18 years. Community-dwelling is defined as not living in long-term care, other residential/institutional settings or in-patient settings. Inclusion for this review will not exclude any specific clinical or diagnostic group, as this is more representative of the community-dwelling population. Because of these broad inclusion criteria, the fact that intermediaries can be based in primary care, can receive referrals from primary care, and the large volume of community-dwelling adults attending primary care services, "primary care" will be used in the search strategy to capture the population of interest. This review will include studies involving community-dwelling

Table 1. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
- Original empirical data: qualitative studies, quantitative studies (may include both experimental and observational trials) mixed-methods studies, and published or unpublished reports from governments and other agencies which contain primary data relevant to research objectives - Study refers to referral (of any description) of community-dwelling adults (>18 years) to an intermediary with onward referral/connection to local physical activity and exercise - Full-text peer reviewed studies - Full-text non-peer reviewed studies - English language studies	- Studies which do not contain primary data relevant to review objectives such as study protocols, policy briefs or review papers - Study participants are not community-dwelling e.g. current in-patients, living in residential care facilities - Participants are aged <18 years old - Study does not describe and/or use an intermediary to establish connection to local physical activity and exercise - Intermediary does not meet the review criteria (See 'Concept' section for further details) - Study involves physical activity delivered in a healthcare setting - Study describes other interventions (See 'Context' section for further details) - Full-text publication is not available after contacting authors

adults who may or may not attend primary care services, which is in line with other studies involving the same population (Dugan *et al.*, 2001; Macmillan *et al.*, 2004; Ryan *et al.*, 2015). The terms “primary health care”, “primary care”, “general practice” and “family medicine” are often used interchangeably (Cunningham *et al.*, 2021a) and this will be reflected in the search strategy.

Concept. All studies eligible for inclusion must involve referral (of any description) of community-dwelling adults to an intermediary, with an onward referral to local physical activity and exercise. We are primarily interested in the extent (breadth), range (variety) and nature (characteristics, context and design) of the process of an intermediary in connecting referred individuals to local physical activity and exercise. Almost sixty different synonyms for the role were identified on preliminary literature search carried out by the review authors, and these will be utilised in the search strategy to ensure all relevant evidence is identified. An intermediary will be defined as follows based on current literature (All Ireland Social Prescribing Network, 2021; Health Education England, 2016; Husk *et al.*, 2020; Tierney *et al.*, 2019; Tierney *et al.*, 2020):

- Clinical or non-clinical staff, working exclusively in an intermediary role.

This can be a dedicated intermediary post such as a link worker or social prescriber, or a healthcare professional acting as an intermediary for the purpose of the study intervention. Staff may have additional upskilling in person-centred care, health coaching and motivational interviewing;

- Based in primary care, community or voluntary sector;
- Receive self-referrals from community-dwelling adults, referrals from healthcare professionals, or referrals as part of the study intervention;
- Provide some degree of assessment and follow-up to the individual who has been referred (referee) with the aim of improving and enabling physical and mental health and wellbeing;
- Support the referee in establishing a connection to community and voluntary services offering physical activity opportunities.

These can be pre-existing services, or developed specifically for the study intervention (see ‘Context’ section for further details). The intermediary can signpost or support the referee in attending, and/or follow up with them after the connection has been made, but does not deliver the physical activity intervention;

- Perform some degree of outcome measurement after connection to an activity.

An intermediary described in a study that does not meet the above criteria will not be eligible for inclusion. This working definition of an intermediary may be further refined iteratively during the review process, as we become increasingly familiar with the breadth and nature of the evidence.

Context. This review will include studies where the intermediary connects referred individuals to physical activity, sport and exercise resources and opportunities in the community/local area/locality (local physical activity and exercise). All types of local physical activity and exercise will be considered for inclusion, including but not limited to; walking and jogging groups (including pedometer-based walking), sports and leisure clubs, gym-based classes, exercise referral schemes (where the intermediary independently connects the referee to a programme and is not involved in delivery of the programme), adapted and chair-based exercise, outdoor activities (including gardening), yoga and Pilates. This will be reflected in the search strategy. Multimodal interventions will be included where the main focus is connection to local physical activity and exercise. Interventions where the intermediary solely/exclusively delivers general health advice or education, coaching, motivational interviewing, brief interventions (see *Introduction*) without follow-up or further signposting, exercise prescription or physical activity counselling (with no support in accessing services) will be excluded. Local physical activity and exercise that is delivered by healthcare workers or based exclusively in a healthcare setting will be excluded.

Stage 2: Identifying relevant studies

A comprehensive search strategy aiming to identify relevant literature from a broad range of sources including electronic databases, reference lists and grey literature will be developed in conjunction with a medical librarian. As recommended by the Joanna Briggs Institute, a three-step search strategy will be utilized (Peters *et al.*, 2020). The first step involved an initial limited search of the databases Embase and PubMed to identify studies relevant to the topic area. The second step was an analysis of the keywords and index terms of relevant studies, to create a final search strategy using all identified keywords and index terms, available as extended data (see *Extended data* (O’Grady *et al.*, 2022)). This strategy will be undertaken across the following electronic databases, with terms modified as appropriate for each database: Embase, Medline, Web of Science and CINAHL. The third and final step will be to search the reference lists of sources that have been selected from full-text screening and grey literature searching. For the grey literature search, a search of the Canadian Agency for Drugs and Technologies in Health (CADTH) Grey Matters Tool and Google Scholar will be carried out. In addition, a search of controlled trial registers, relevant conference proceedings, academic dissertations and theses, websites of international government organizations and agencies and relevant scientific research groups and networks will also be carried out (see *Extended data* (O’Grady *et al.*, 2022)) (Paez, 2017). Only the first 100 hits (as sorted by relevance) from grey literature searches will be screened, as further screening will unlikely result in additional relevant literature (Pham *et al.*, 2014; Stevinson & Lawlor, 2004). The definitive search strategy and results will be reported in detail in the published review.

Stage 3: Selecting studies

Once the searches have been completed, results will be collated and exported to Covidence for storage, removal of duplicates, and screening against eligibility criteria. Prior to commencing

the screening process, two independent reviewers will carry out pilot testing of the eligibility criteria. A random sample of 25 titles/abstracts will be selected and screened. The team will then meet to discuss any discrepancies and make modifications or refinements as needed to the eligibility criteria. Screening will commence when 75% (or greater) agreement is achieved (Peters *et al.*, 2020). Two reviewers will independently review titles and abstracts for eligibility, meeting at the beginning, midpoint and final stages of the screening process to discuss any challenges and uncertainties (Levac *et al.*, 2010). Disagreements will be resolved by discussion and where consensus is not achieved, a third review author will act as an arbitrator. Where inclusion or exclusion cannot be determined on the basis of title and abstract, the paper will be included for full-text screening. Included studies following review of title and abstract will be retrieved in full-text and independently reviewed by two reviewers to determine their inclusion based on the study inclusion criteria. A third author will again act as arbitrator in the case of disagreements. A final list of all included papers will be agreed amongst the research team. Reason for exclusion at all stages will be recorded and charted as part of the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram (Page *et al.*, 2021).

Stage 4: Charting the data

A data charting form will be developed *a priori* using Microsoft Excel. The tool will be designed using the JBI data extraction tool template and will include recommended charting elements, as well as other relevant data relating to the review aims and objectives (Daudt *et al.*, 2013; Levac *et al.*, 2010; Peters *et al.*, 2020). Two reviewers will independently extract data from the first 10 included studies to pilot the data charting form, and meet to determine whether their approach to data extraction is consistent with the research question and purpose, and the suitability of the data charting form (Daudt *et al.*, 2013; Levac *et al.*, 2010). The form may then be further refined, as familiarity with selected studies necessitates a need to capture further information (Peters *et al.*, 2020). Any differences will be resolved by consensus discussion, with a third author available as arbitrator.

The data extraction instrument will collect the following data relating to included studies:

1. Author(s)
2. Title
3. Year of publication
4. Evidence source details
5. Location of research (country of origin)
6. Study aims/objectives/purpose
7. Research design
8. Inclusion/exclusion criteria
9. Population of interest (health characteristics, if applicable)

10. Demographic details of participants and sample size
11. Details and features of the intermediary process and practice (method and nature of referrals, source of referrals, reason referred, number of referrals, process of assessment, length of follow-up, discharge from the service)
12. Intermediary service description, nature and approach (location, profile of the intermediaries, including background, training etc.)
13. Characteristics and details of the physical activity intervention (location, extent and nature of local physical activity and exercise services and other services utilised, how these services are identified, duration and content)
14. Presence or absence of a control/comparator group
15. Outcomes (outcomes measured, methods of measurement)
16. Other key findings that relate to the scoping review questions.

Data will be extracted by a single review author and verified by a second.

Critical assessment for level of evidence. As the purpose of this scoping review is to describe the current research comprehensively, papers will not be excluded based on quality criteria, therefore risk of bias assessment will not be conducted (Arksey & O'Malley, 2005; Peters *et al.*, 2020; Peters *et al.*, 2022).

Stage 5: Collating, summarising, analysing and presenting the results

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) checklist will be used to guide the reporting of this review (Tricco *et al.*, 2018). Results of the literature search and study screening process will be presented in a PRISMA flow diagram. Descriptive statistics will be used to summarise the general characteristics and data of the included studies. This will be presented in diagrammatic or tabular form based on the descriptive headings in the data extraction form, and accompanied by a narrative summary describing the results. This narrative summary will be grouped according to the research objectives and PCC framework (Peters *et al.*, 2020; Peters *et al.*, 2022). A mapping exercise will be carried out to understand the relationship between the characteristics of an intermediary process and outcomes for connection to local physical activity and exercise. The PAGER framework will then be used to identify any evidence gaps. This tool was developed to provide a consistent approach to analysing, reporting and translating scoping review findings and consists of 'patterns', 'advances', 'gaps', 'evidence for practice', and 'research recommendations' (Bradbury-Jones *et al.*, 2021). A patterning chart of key themes and descriptive characteristics will be produced using the data extraction form and mapping exercises, and evidence advances and gaps will be identified. Evidence for practice will identify current processes or new practices that are

emerging in this field, and research recommendations will be made that are relevant and contextual to the other elements of the scoping review findings (Bradbury-Jones *et al.*, 2021). Any deviation from the protocol will be made clear and explained in the complete scoping review report.

Stage 6: Consulting with stakeholders to inform or validate study findings

Informal discussions took place with intermediary representatives prior to commencing the review. This engagement helped to inform the focus of the review and was instrumental in the early stages of the protocol development. We will re-engage with the stakeholders during the write-up phase to share results and discuss the implications and interpretation of this work, which will help shape the final write-up of this review. Results of this consulting step will be included in the complete scoping review report.

Discussion

Physical inactivity is a major public health issue, and current methods aiming to increase physical activity levels have not been shown to have major long-term effects. The use of an intermediary is a promising method for establishing a successful connection to local physical activity and exercise, which in itself offers a variety of different indoor and outdoor activities, reduces barriers to participation and may improve adherence (Carstairs *et al.*, 2020; Department of Health, 2021; Leenaars *et al.*, 2018; National Institute for Health Care Excellence, 2014). The only other scoping review to date to examine this topic found high success rates when using an intermediary to connect adults from primary care services to local physical activity and exercise, but the processes were not described in detail (Cunningham *et al.*, 2021b).

This scoping review protocol will be the first, to the best of the author's knowledge, to focus on the concept of an intermediary in connecting community-dwelling adults to local physical activity and exercise. It will follow a systematic approach as outlined in this protocol with a comprehensive search strategy of both peer reviewed and grey literature. This review will identify, map and summarise the existing research describing the

role, process, procedure and outcomes of an intermediary in this context. The review will also identify any gaps in the research based on the review questions, and will guide future research recommendations in this topic area.

Dissemination

The findings of this scoping review will be published in a peer reviewed journal.

Study status

At time of publication of this protocol, electronic database searches are underway.

Data availability

Underlying data

No underlying data are associated with this study.

Extended data

Open Science Framework: The Role of Intermediaries in Connecting Community-Dwelling Adults to Local Physical Activity and Sport: A Scoping Review Protocol, <http://www.doi.org/10.17605/OSF.IO/V7RBD> (O'Grady *et al.*, 2022)

This project contains the following extended data:

- Embase Search Strategy
- Grey Literature Search Strategy

Data are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

Reporting guidelines

Open Science Framework: PRISMA-P checklist for "The Role of Intermediaries in Connecting Community-Dwelling Adults to Local Physical Activity and Sport: A Scoping Review Protocol", <http://www.doi.org/10.17605/OSF.IO/V7RBD> (O'Grady *et al.*, 2022)

Data are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

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Open Peer Review

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 **Caitriona Cunningham** 

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The proposed scoping review regarding the role of intermediaries in connecting adults with physical activity (PA) opportunities is timely and important, and the proposed methods, which are in line with Joanna Briggs Institute methodology, are robust. Overall, this protocol paper is clear and well written. The scoping review should make a valuable contribution in helping to prioritise related research and informing the implementation of physical activity pathways.

Some points for consideration in this protocol paper and when conducting the scoping review are given below.

- Sport is mentioned in the title but not much mention of sport elsewhere. What about connecting with exercise opportunities? Would it be better to refer to physical activity and exercise instead throughout?
- Recommend to expand the 'intermediary' definition/explanation in the abstract - it is explained in the methods of the paper.
- Context/Population - Need to clarify if referring to situations/adults where some link/engagement with the healthcare system is required for the paper to meet the inclusion criteria of scoping review.
- GP visits - 4 per year. Is this across all adult populations? Any explanator or even to say higher number likely in some cohorts, e.g. older/chronic disease pops?
- Currently, Stage 1 objective ii) process/pathway merged with the profile of the adult population - Recommend having two separate objectives: one for population and a separate review objective to identify process/pathway for accessing intermediary and directing

onwards to physical activity opportunity. Also, review and revise the stated objectives in the abstract to ensure they align well with the expanded review objectives in the Stage 1 section of the methods.

- Similarly, worth reviewing points on the data extraction tool (e.g. no. 11 - seems to be a mix of intermediary profile and actual process, should be two separate data fields).
- Some acknowledgment that brief intervention is unlikely to be sufficient to support those with more complex clinical needs/disabilities who need the support and supervision of a health care professional to adopt physical activity and exercise behaviours would be good to see.
- Given many readers from Ireland are likely, recommend to include some information on HSE's proposed physical activity pathway to demonstrate awareness of the same. Add citation: Woods C., McCaffrey N., Furlong B., Fitzsimons-D'Arcy L., Murphy M., Harrison M., Glynn L., O'Riordan J., O'Neill B., Jennings S. and Peppard C. (2016) The National Exercise Referral Framework. Health and Wellbeing Division, Health Service Executive. Dublin. Ireland.
- 'HSCP' in the Irish context does not include doctors or nurses. Perhaps better to say healthcare professionals in the following sentence in the concept section: "*or social prescriber, or a health and social care professional acting as an intermediary...*".
- Keywords - Should a term to represent intermediary be given?

Is the rationale for, and objectives of, the study clearly described?

Yes

Is the study design appropriate for the research question?

Yes

Are sufficient details of the methods provided to allow replication by others?

Yes

Are the datasets clearly presented in a useable and accessible format?

Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Physical Activity Promotion, Musculoskeletal Health and related Health Services

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 30 Jun 2022

Megan O'Grady

Response to Reviewer 2:

Thank you so much for taking the time to review our manuscript, and for your constructive comments. Responses and subsequent changes to the manuscript are detailed below.

Comment: Sport is mentioned in the title but not much mention of sport elsewhere. What about connecting with exercise opportunities? Would it be better to refer to physical activity and exercise instead throughout?

Response: We agree that sport is not referenced often in the manuscript, and agree with the reviewer's suggestion to use the term 'exercise' instead.

Action: References to 'sport' throughout the manuscript have been changed to 'exercise' where required/appropriate. In addition, references to 'local physical activity' throughout the manuscript have been changed to 'local physical activity and exercise' for consistency. 'Local physical activity and exercise' is defined as physical activity, sport, and exercise resources and opportunities in the community/local area/locality.

Comment: Recommend to expand the 'intermediary' definition/explanation in the abstract - it is explained in the methods of the paper.

Response: We agree with this suggestion.

Action: The explanation of an intermediary has been expanded in the abstract introduction - "An intermediary is a clinical or non-clinical professional based in primary care, community or voluntary settings. They support individuals referred to them to connect with appropriate community services with the goal of improving health and wellbeing. This may be a promising method to establish a connection to local physical activity and exercise...".

Comment: Context/Population - Need to clarify if referring to situations/adults where some link/engagement with the healthcare system is required for the paper to meet the inclusion criteria of scoping review.

Response: We agree with the reviewer that this section could be clearer. We plan to include studies involving community-dwelling adults, who have been referred from a healthcare system or self-refer to intermediaries.

Action: The population section has been updated to include a definition of "community-dwelling" adults - "Community-dwelling is defined as not living in long-term care, other residential/institutional settings or in-patient settings". The rationale for using "primary care" as a search term is explained, and has been updated to reflect that intermediaries receive referrals from primary care. A clarification has been added that we intend to include studies involving community-dwelling adults who may or may not attend primary care services, in keeping with other studies that involved community-dwelling adults. Additionally, in the abstract introduction, the line "... especially in primary care services where the majority of healthcare contacts take place" in relation to physical activity promotion amongst community-dwelling adults has been removed to avoid confusion.

Comment: GP visits - 4 per year. Is this across all adult populations? Any explanator or even to say higher number likely in some cohorts, e.g. older/chronic disease pops?

Response: Four GP visits per year is the average for the Irish population aged 15 years or older, and includes those who have not visited a GP. There is evidence that those with

chronic disease visit their GP up to seven times a year.

Action: The sentence referring to GP visits in the 'Introduction' has been updated to reflect this – "At present for persons aged 15 years or older, the average number of general practitioner (GP) visits is four per year (Collins & Homeniuk, 2021; Healthy Ireland, 2019a). This can be as high as seven per year in a chronic disease population (Health Service Executive, 2016)."

Comment: Currently, Stage 1 objective ii) process/pathway merged with the profile of the adult population - Recommend having two separate objectives: one for population and a separate review objective to identify process/pathway for accessing intermediary and directing onwards to physical activity opportunity. Also, review and revise the stated objectives in the abstract to ensure they align well with the expanded review objectives in the Stage 1 section of the methods.

Response: We agree with the reviewer that separating the population and the process objectives is more appropriate.

Action: Study objective (i) has been amended to, "To identify and summarise the scope of the literature describing connection to an intermediary (method and nature of referrals, source of referrals, reason referred, number of referrals, profile of the intermediaries; including background, training and sector where they are based)"; and study objective (ii) has been amended to, "To identify and summarise the health characteristics and demographic information of individuals referred to an intermediary". The abstract has been updated under the 'Objective' section to include study objective (ii).

Comment: Similarly, worth reviewing points on the data extraction tool (e.g. no. 11 - seems to be a mix of intermediary profile and actual process, should be two separate data fields).

Response: We have reviewed the data fields on the proposed data extraction instrument and updated them where necessary to reflect the study objectives.

Action: Data fields 11 and 12 have been updated as follows: "11. Details and features of the intermediary process and practice (method and nature of referrals, source of referrals, reason referred, number of referrals, process of assessment, length of follow-up, discharge from the service)" and "12. Intermediary service description, nature and approach (location, profile of the intermediaries, including background, training etc.)"

Comment: Some acknowledgment that brief intervention is unlikely to be sufficient to support those with more complex clinical needs/disabilities who need the support and supervision of a health care professional to adopt physical activity and exercise behaviours would be good to see.

Response: People living with chronic disease or who need more intensive healthcare support are recommended to have extended brief interventions in order to achieve health behaviour change. This is reflected in the Making Every Contact Count Framework and Implementation Plan for Health Professionals in the Irish Health Service.

Action: A line has been added to the 'Introduction' to reflect this – "Extended brief interventions of increased duration are already recommended for people requiring more intensive support for behaviour change, such as those self-managing a chronic disease (Health Service Executive, 2016).

Comment: Given many readers from Ireland are likely, recommend to include some

information on HSE's proposed physical activity pathway to demonstrate awareness of the same. Add citation: Woods C., McCaffrey N., Furlong B., Fitzsimons-D'Arcy L., Murphy M., Harrison M., Glynn L., O'Riordan J., O'Neill B., Jennings S. and Peppard C. (2016) The National Exercise Referral Framework. Health and Wellbeing Division, Health Service Executive. Dublin, Ireland.

Response: The reference has been included as a source of information for those readers requiring further detail on the National Exercise Referral Framework in Ireland.

Action: The reference has been added to the paragraph in the 'Introduction' explaining exercise referral schemes.

Comment: 'HSCP' in the Irish context does not include doctors or nurses. Perhaps better to say healthcare professionals in the following sentence in the concept section: "or social prescriber, or a health and social care professional acting as an intermediary...".

Response: We agree with the reviewer's suggestion.

Action: References to 'health and social care professional/s' in the 'Concept' section have been updated to 'healthcare professional/s'.

Comment: Keywords - Should a term to represent intermediary be given?

Response: 'Social prescribing' was chosen as a keyword to represent intermediaries, due to the variation in nomenclature internationally. In addition, 'link workers' has also been used in the literature.

Action: 'Link workers' has been added as a keyword.

Competing Interests: The authors declare no competing interests.

Reviewer Report 06 May 2022

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✓ **Joey Murphy** 

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This manuscript presents a scoping review protocol that aims to identify and summarise the literature describing the process of connecting community-dwelling adults to an intermediary, the processes (role, practice, and procedure) of an intermediary in connecting these adults to local physical activity and sports opportunities, and to map these processes of connection to outcomes.

First, I would like to thank the authors and editorial team for this opportunity to review this work.

Overall, the protocol is well-written with a clear justification and proposed methods presented. I have minor feedback that I feel will strengthen this work.

Introduction

The introduction is well-written with a clear justification for this scoping review provided. The authors clearly describe the current context in Ireland which will help translate this work for international readers. I have no revisions for this section.

Methods

Again, the methods present a clear overview of the steps that will be taken in order to complete this scoping review in a credible and rigorous way. It is great to see the authors using a combination of the JBI guidelines, Arksey and O'Malley framework, and enhancements from Levec and Daudt to guide this review.

I have three suggestions for this section:

1. I see from the end of the document that this scoping review is registered through the Open Science Framework. I think it would be useful to state this in-text so readers are aware.
2. When explaining the eligibility criteria you state: "Inclusion criteria will be limited to studies that report on...". I think it would be good to highlight that you mean both peer and non-peer reviewed studies. This would align with the criteria listed in Table 1.
3. You do a good job justifying the limitations of previous work and why this research is needed during the introduction. However, considering one difference between this review and Cunningham's is looking at community-dwelling versus primary care populations specifically, I think it would be a good idea to define "community-dwelling". The current "Population" section sounds like you are focusing on primary care, when in fact I think you are looking at a wider group. I think highlighting that community-dwelling populations are much wider and defining this would improve the section.

Is the rationale for, and objectives of, the study clearly described?

Yes

Is the study design appropriate for the research question?

Yes

Are sufficient details of the methods provided to allow replication by others?

Yes

Are the datasets clearly presented in a useable and accessible format?

Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Physical activity, public health, pragmatic evaluation, implementation, systems

thinking, knowledge translation

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 30 Jun 2022

Megan O'Grady

Response to Reviewer 1:

Thank you so much for taking the time to review our manuscript, and for your constructive comments. Responses and subsequent changes to the manuscript are detailed below.

Comment: The introduction is well-written with a clear justification for this scoping review provided. The authors clearly describe the current context in Ireland which will help translate this work for international readers. I have no revisions for this section.

Response: Thank you for your comments.

Action: None required.

Comment: I see from the end of the document that this scoping review is registered through the Open Science Framework. I think it would be useful to state this in-text so readers are aware.

Response: This is useful information for the reader.

Action: A line has been added to the 'Study design' section of the Methods to indicate the protocol is registered through the Open Science Framework.

Comment: When explaining the eligibility criteria you state: "Inclusion criteria will be limited to studies that report on...". I think it would be good to highlight that you mean both peer and non-peer reviewed studies. This would align with the criteria listed in Table 1.

Response: This will align the text with the inclusion/exclusion criteria listed in Table 1.

Action: Reference to "studies" in the eligibility criteria section changed to "peer reviewed and non-peer reviewed studies".

Comment: You do a good job justifying the limitations of previous work and why this research is needed during the introduction. However, considering one difference between this review and Cunningham's is looking at community-dwelling versus primary care populations specifically, I think it would be a good idea to define "community-dwelling". The current "Population" section sounds like you are focusing on primary care, when in fact I think you are looking at a wider group. I think highlighting that community-dwelling populations are much wider and defining this would improve the section.

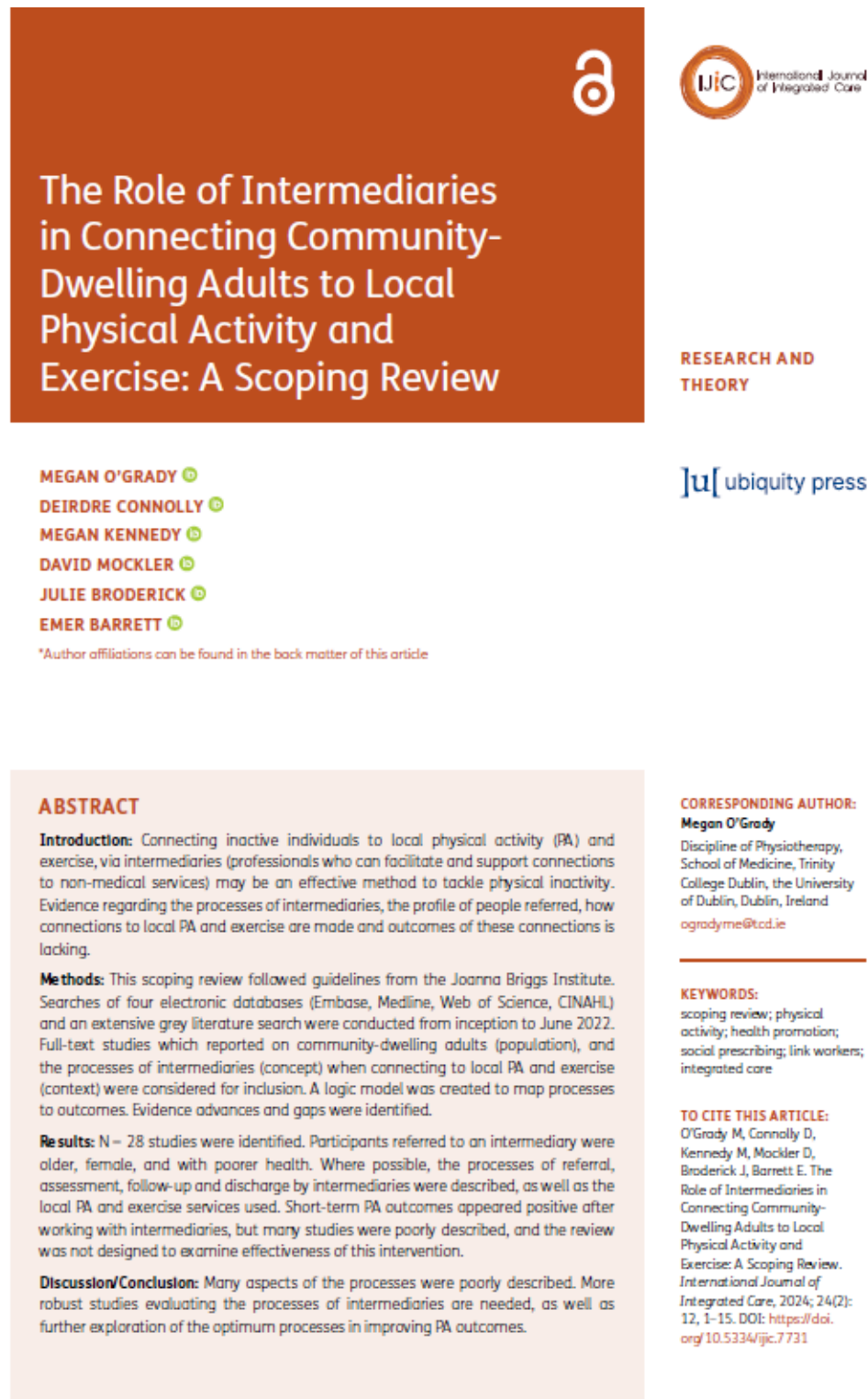
Response: We agree with the reviewer's comment that this section needs a clearer definition of "community-dwelling". We are intending to include studies involving a wider group, not just those who attend primary care services.

Action: The population section has been updated to include a definition of "community-dwelling" adults – "Community-dwelling is defined as not living in long-term care, other residential/institutional settings or in-patient settings". The rationale for using "primary care" as a search term is explained and has been updated to reflect that intermediaries receive referrals from primary care. A clarification has been added that we intend to include

studies involving community-dwelling adults who may or may not attend primary care services, in keeping with other studies that involved community-dwelling adults.

Competing Interests: The authors declare no competing interests.

Appendix III: Publication of scoping review (“The role of intermediaries in connecting community-dwelling adults to local physical activity and exercise: a scoping review”)



INTRODUCTION

Physical inactivity is a major modifiable risk factor for non-communicable morbidity and mortality, resulting in significant direct and indirect healthcare costs [1, 2]. Despite this, the number of adults failing to meet physical activity (PA) guidelines is increasing globally [2, 3]. There is no single solution to increasing PA at a population level, therefore a comprehensive approach requiring multiple concurrent strategies is needed [4]. The International Society for Physical Activity and Health recommend several evidence-based 'best investments' for PA: these include healthcare system and community-based PA promotion [4, 5].

Healthcare services have a critical role in PA promotion, education, and encouragement [6, 7]. This is particularly important in primary and community care services; often the first point of contact with healthcare services for individuals and where the majority of healthcare contacts take place [8, 9]. Community-based PA, exercise and sport programmes may therefore be an appealing option when healthcare professionals (HCPs) recommend PA to their patients. These programmes may facilitate PA participation in a sustainable, accessible, affordable way, by making use of available environmental resources and social support [10–13]. There are three main methods of connecting physically inactive, community-dwelling adults from healthcare services to PA: brief interventions, exercise referral schemes, or referral to an intermediary [7, 14, 15]. However, HCPs report challenges in implementing brief interventions in practice including lack of time, training, perceived lack of local services and concerns about patient responses [16, 17]. Exercise referral schemes were found to have limited effectiveness on self-reported PA, but poor uptake and adherence may have affected these results [12, 14, 18]. If people could therefore be given appropriate support to attend community-based PA, PA outcomes could potentially be improved.

Intermediaries are clinical or non-clinical professionals, based in primary care or the community. They facilitate connections to non-medical community and voluntary services and supports, with the overall goal of improving health and wellbeing [19–22]. Intermediaries are a promising integrated care approach for improving health outcomes, incorporating illness prevention and patient empowerment. Other titles for intermediaries include 'link worker', 'care navigator', 'social prescribing link worker' and 'sign poster' [23]. Several literature reviews investigating linking schemes (such as those provided by intermediaries) from primary care to community resources have been published in recent years [21, 24–28]. Many of the included studies did not provide information regarding specific community and voluntary services to which patients were referred. Where reported, PA services were available in addition to other supports,

such as arts or education on prescription, bibliotherapy, and signposting/information referral. Little information is available therefore regarding the processes of referral and connection to PA services, and PA-specific outcomes.

Two scoping reviews were identified which investigated intermediaries connecting community-dwelling adults to community-based PA. Cunningham and colleagues [15] found strong positive findings for processes that involved referral to an intermediary, when examining the percentage of patients connected with, and enrolling in, a PA opportunity. However, the review was limited to studies within the UK. Only half of the processes examined by the authors described an intermediary. No information regarding the processes undertaken by intermediaries or PA-specific outcomes (beyond attendance at the first session of PA) were reported. Polley and Sabey [26] focused on one type of intermediary (social prescribing link worker). The authors reported improvements in PA levels, and barriers and facilitators associated with successful referrals to intermediaries (such as appropriate training for referrers and link workers). However, this was a rapid review, with the majority of included studies carried out in the UK, limiting generalisability of results. The aim of this scoping review, therefore, was to identify and describe the available international evidence regarding processes of referral to an intermediary, the characteristics of referred community-dwelling adults, and the processes and outcomes of connecting referred individuals to local PA and exercise.

METHODS

PROTOCOL AND REGISTRATION

This review was carried out according to guidelines published by the Joanna Briggs Institute [29], following frameworks proposed by Arksey and O'Malley, Levac and Daudt [30–32]. This review was registered on the Open Science Framework [33] and a protocol was published *a priori* [23]. The protocol described the planned approach and methods of the review, which are described briefly in this paper.

OBJECTIVES

The objectives of this scoping review were:

- I. To identify and summarise the scope of the literature describing connection to intermediaries (in the context of onward connection to local PA and exercise);
- II. To identify and summarise the health characteristics and demographic information of individuals connected to local PA and exercise by intermediaries;
- III. To identify, map and summarise the available literature regarding the practices of intermediaries in connecting individuals to local PA and exercise;

- iv. To identify the available literature describing and defining outcomes of intermediaries connecting community-dwelling adults to local PA and exercise, and map outcomes to processes.

ELIGIBILITY CRITERIA

Study eligibility criteria were selected based on the Population-Concept-Context (PCC) approach. Full-text peer and non-peer reviewed studies in the English language were considered for inclusion, which included original empirical data and reported on community-dwelling adults (population), and the processes of intermediaries (concept) after receiving a referral for a community-dwelling adult, in connecting them to local PA and exercise (context). Reports without sufficient primary data, or sufficient data to answer review objectives (such as study protocols, policy briefs or review papers), were excluded. Databases were searched from inception to June 2022. Further details on PCC inclusion and exclusion criteria are summarized in Supplementary File 1.

SEARCH AND STUDY SELECTION

Studies were identified and selected as described in the protocol [23]. A comprehensive search strategy was developed in consultation with a medical librarian (Supplementary File 2) and undertaken across four electronic databases (Embase, Medline, Web of Science and CINAHL) in April 2022. Over fifty terms for the intermediary role were included in the search strategy e.g., 'community connector', 'link worker', 'social prescribing', and 'wellbeing coach' to identify all literature describing health-related community-based staff who facilitate connections to local PA and exercise (See [23] and Supplementary File 1 for a detailed description of the role). An extensive grey literature search was carried out from March – June 2022 (Supplementary File 3).

Citations were imported into Covidence for screening. A title screen was completed initially by the lead author to remove irrelevant titles. Titles which clearly did not meet the PCC eligibility criteria were excluded. Titles and abstracts were screened independently by two reviewers. Full texts were then screened by the same two reviewers. Throughout the screening process, conflicts were resolved by discussion, with a third author available for conflict resolution where necessary. Where investigators published several articles based on the same study population, data were collated and reported as a single item. Authors were contacted a maximum of three times for additional information where required. The screening process took place from August – December 2022, and the final included articles were agreed amongst the review team.

DATA CHARTING AND SUMMARISING RESULTS

A data charting form was developed *a priori* using Microsoft Excel, and data were extracted regarding

the study design, population, intermediary service, the process of connection to an intermediary, details of the PA intervention, PA outcomes and the methods of measurement. An overall findings effect indicator approach was used for each reported result: 1) positive or 2) negative [34]. This was carried out by one author and verified by the review team. A positive result was recorded where authors reported outcomes in favour of the intervention, in line with methods used in previous reviews [35].

A logic model was created to map processes to outcomes based on Sport England logic model guidance [36], as it is specific to PA interventions. A logic model is a useful tool for visually illustrating assumed relationships between inputs, activities, outputs, and outcomes. The structure and organisation of logic models enable the results from scoping reviews to delineate complex interventions, thus enabling greater insight into the interactions between the intervention, and the multiple outcomes [37]. The 'PAGER' framework was then used to identify evidence gaps; this tool was developed to provide a consistent approach to analysing, reporting and translating scoping review findings and consists of 'patterns', 'advances', 'gaps', 'evidence for practice', and 'research recommendations' [38].

KNOWLEDGE USER ENGAGEMENT

An advisory panel of three intermediaries was created for the purposes of this project. Intermediaries were considered 'knowledge users' i.e., those who may benefit or be impacted by the research [39]. The advisory panel were involved in developing the research question and search strategy, interpretation of the results, report writing and knowledge translation. Knowledge user engagement is reported in Supplementary File 4.

PROTOCOL AMENDMENTS

Study eligibility criteria and the definition of an intermediary were further refined throughout the screening process. Amendments are highlighted in Supplementary File 1. Additional sources were added to the grey literature search, and other sources not searched. The majority of grey literature sources were searched using keywords and individual website databases or search bars. Where this function was not available, sources were hand-searched for relevant reports rather than screening the first 100 references as described in the protocol (see Supplementary File 3). A title screen was carried out before screening abstracts. This was necessary due to the large volume of potentially eligible studies identified by the search strategy. Additional changes were also made to the data charting form:

- Individual study objectives were not charted, only the aims.

- The following health characteristics and demographic information were collected: total N, intervention N, age, gender, ethnicity, marital status, education, socioeconomic status, health characteristics (presence/absence of chronic disease, etc.).
- An item was added to describe the content and features of follow-up.
- An item was added to indicate if the intermediary service existed prior to the study.
- Only PA-specific outcomes and methods of measurement were recorded.

Finally, an overall findings effect indicator was used to provide additional context to reporting of the results of included studies.

RESULTS

The search identified 10257 records. After deduplication and title screening, 2890 records were screened by title and abstract. 261 full-text reports were assessed for eligibility. Reasons for exclusion are shown in the PRISMA flow diagram (Figure 1). A total of 35 reports, reporting on data from N = 28 individual studies, were included.

OBJECTIVE (I): TO IDENTIFY AND SUMMARISE THE SCOPE OF THE LITERATURE DESCRIBING CONNECTION TO INTERMEDIARIES

In total, N = 14/35 quantitative reports [40, 43, 45, 47–57], N = 7/35 qualitative reports [42, 58–63] and N = 14/35 mixed/other methods reports (consisting of service development descriptions, process evaluations, mixed methods case studies, real world trials, impact reports [11, 41, 44, 46, 64–70] or methods not reported (N = 3/35) [71–73]) were included. Of the quantitative reports, five were randomised controlled trials, five were controlled and uncontrolled before-after studies, and four were pilot/feasibility trials (Table 1). Reports were published between 2001 and 2021, with half (n = 18/35) published in the last five years. N = 14/35 were identified through database searches, N = 14/35 were identified through grey literature searches, and N = 7/35 were identified through hand-searching bibliographies of included studies. Of the N = 35 included reports, six reports were not peer-reviewed [40, 48, 69–71, 73]. Research was carried out in several high-income countries including the UK (England (N = 5/28 studies), Scotland (n = 4/28), Wales (N = 1/28)), the USA (N = 9/28), Canada (N = 2/28), the Netherlands (N = 2/28), Ireland, Spain, Denmark, Australia (all N = 1/28), and one upper middle income country (Brazil, (N = 1/28)).

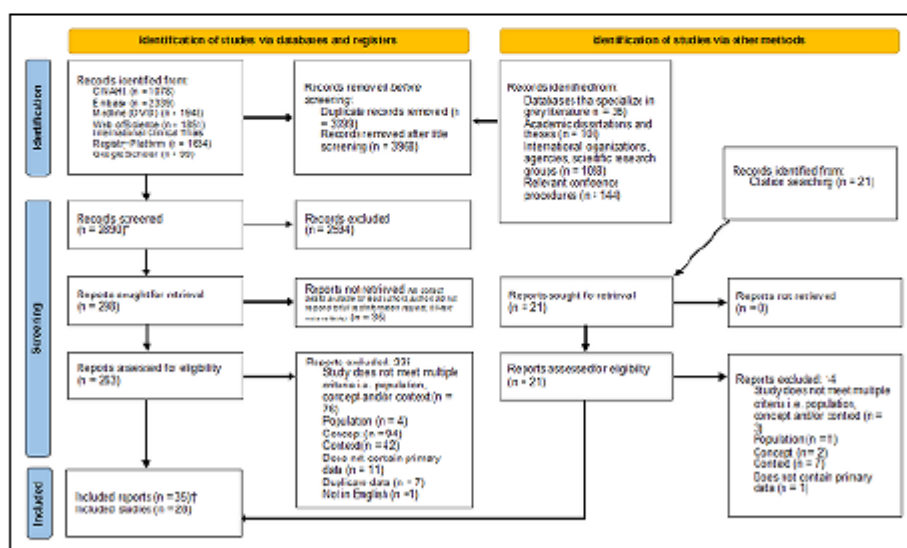


Figure 1 PRISMA flow diagram.

*One record was identified from the International Clinical Trials Registry Platform. When screening the record for eligibility, three reports were associated with this record, all of which met the review inclusion criteria. Therefore, all three reports were sought for retrieval, assessed for eligibility, collated and reported as The Men on the Move study [40–42]. †N = 35 reports of N = 28 individual studies were included. Two reports were collated and reported as The CalPERS Health Matters study [43, 44]. Two reports were collated and reported as The RAPID study [45, 46].

Study Design (N = 35)*		Clinical features of study population (N = 28)*	
Quantitative	N†	Quantitative/Mixed/Other methods/Not reported	N†
RCT	5		
Non-RCT	9		
Mixed/Other methods	N†	Inactive or lifestyle risk	7
Development process	3	Chronic conditions (COPD, CVD etc.)	5
Other	8	Prediabetes or diabetes	4
Not reported	N†	Psychosocial needs	4
	3	Issues affecting health and wellbeing	1
Qualitative	N†	Qualitative	N†
Interviews	5	CVD or risk of CVD	1
Focus groups	2	Inactive	1
Profile of intermediaries (N = 28)*			
Additional training‡	Research study-specific [49–51, 53, 56, 62]		
	Behavioural change techniques [47, 49, 61]		
	Motivational interviewing [50, 64, 73]		
	Delivering health messages and services [42, 69]		
	Personal outcomes approaches [73]		
		N (%)	
Pre-existing service	Yes	15 (54)	
	No§	11 (39)	
	Unclear	2 (7)	
		N (%)	
Location of the intermediary	Clinical settings	7 (25)	
	Community and voluntary sector	4 (14)	
	PA sector	2 (7)	
	All of the above settings	5 (18)	
	Research settings	1 (4)	
	Not reported	9 (32)	

Table 1 Summary of included studies.

This table details included studies' design, study population and the profile of intermediaries. *Difference in values as N = 35 reports were identified reporting data from N = 28 individual studies. †Represents a frequency count. ‡Additional training undertaken by intermediaries was not reported in over half of included studies (N = 15, 54%). §i.e., the role was created for the study. Abbreviations: COPD – chronic obstructive pulmonary disease, CVD – cardiovascular disease, PA – physical activity, RCT – randomised controlled trials.

The population of interest for each study were varied. Quantitative and mixed methods studies included carers, low-income populations, women, older adults, men, patients, local residents, and veterans. In two of these studies, the authors included intermediaries and other key stakeholders [70, 74]. Qualitative studies included individuals who had engaged with an intermediary [61–63], individuals who had been referred to medically supervised exercise instead of an intermediary [63], individuals registered with a general practice who were able to increase their PA [59], key stakeholders [42, 60], HCPs [58, 59, 62], and intermediaries [42, 62]. Study

design and population of interest are summarised in Table 1, and detailed information is available in Supplementary File 5.

OBJECTIVE (II): TO IDENTIFY AND SUMMARISE THE HEALTH CHARACTERISTICS AND DEMOGRAPHIC INFORMATION OF INDIVIDUALS CONNECTED TO LOCAL PA AND EXERCISE BY INTERMEDIARIES

The total number of referrals to an intermediary across the included studies was 10,104. Demographic information was available for N = 8,049/10,104 and is detailed in

Supplementary File 6. The mean (SD) age was 58.1 (9.9), and the sample was 43% male (gender not reported in $N = 1$ study [56]). Two studies focused exclusively on men [42, 51] and one exclusively on women [72]. Due to the heterogeneity of reporting, summary statistics were unable to be calculated for other demographic information. Ethnicity, percentage married/co-habiting, education levels and socioeconomic status, are also detailed in Supplementary File 6. These demographic variables were not reported in $N = 7$ (25%), $N = 12$ (43%), $N = 10$ (36%), and $N = 7$ (25%) studies, respectively. As the populations of interest were often individuals with clinical or pre-clinical diagnoses, health characteristics such as increased body mass index, being an active smoker, presence of chronic disease(s), mental ill-health, falls history, pain and high medication use were common (health characteristics were not reported in $N = 4$ (14%) of studies). Five studies also reported participant PA levels, with many classified as inactive or not meeting PA guidelines (Supplementary File 6).

OBJECTIVE (III): TO IDENTIFY, MAP AND SUMMARISE THE AVAILABLE LITERATURE REGARDING THE PRACTICES OF INTERMEDIARIES IN CONNECTING INDIVIDUALS TO LOCAL PA AND EXERCISE

Intermediaries had diverse backgrounds in healthcare, sports and fitness, health education, peer counselling, community care and research. They were educated from community college to master's degree level. Intermediaries were skilled professionals, with additional training in research, health, behaviour change, and community development. Additional information regarding the profile of intermediaries is summarised in Table 1. Processes of referral to the intermediary are summarised in Supplementary File 7. The most common nature of referral was referring directly to an intermediary ($N = 6$, 21%). Methods of referral were poorly reported, but were via referral forms [55, 69], fax/email [49, 50] or online referrals [52, 71]. Half of the studies' reported that referrals came from primary care practice staff or the GP ($N = 14$, 50%). Self-referral to an intermediary was also common (reported in $N = 7$ studies). Only two studies reported that individuals were referred to an intermediary specifically to become more physically active [42, 74].

Processes of assessment are summarised graphically in Supplementary File 8. Assessment processes included research study-specific components, local PA and exercise-related assessment, behavioural change-related assessment techniques, and assessment of individual factors. Assessments most commonly took place in-person and were lengthy in nature. Three studies reported that assessments were up to 60 minutes long [47, 51, 56], and length of assessment was not reported by any other studies. The most commonly reported features of assessment were assessing participant issues, needs, preferences and interests, explaining/suggesting

a local PA and exercise service and individual goal setting (reported by $N = 5$, $N = 4$ and $N = 4$ studies respectively).

Features of follow-up are summarised in Supplementary File 9. Data regarding the number and frequency of sessions with the intermediary, time allocated per session, method of delivery, length of follow-up and discharge processes were often poorly reported. This data was missing from $N = 12$ (43%), $N = 14$ (50%), $N = 24$ (86%), $N = 16$ (57%), $N = 11$ (39%) and $N = 20$ (71%) included studies, respectively. The most common approach was a number of sessions conducted weekly or fortnightly, with contact being more frequent and intense at the start (e.g., [61, 64]). These sessions were conducted via telephone, face-to-face meetings, email and/or text message, most commonly within a 6-month period ($N = 10$, 36%). The sessions ranged from 10–60 minutes in length. Strategies used by intermediaries to facilitate uptake of local PA and exercise during follow-up sessions are summarised graphically in Supplementary File 8. Strategies were categorised as health and exercise-specific strategies, individual strategies, behavioural strategies/underpinning theory, community strategies and the personal skills of the intermediary. The most commonly reported strategies were person centred/individualised approaches, providing initial/ongoing support and motivational interviewing (reported by $N = 15$, $N = 13$ and $N = 11$ studies respectively).

The characteristics of local PA and exercise services are summarised in Table 2 and in detail in Supplementary File 8. These services were most commonly identified by staying up to date with pre-existing community resources ($N = 7$, 28%). Participants were most commonly connected to fitness and exercise groups ($N = 14$ studies) or walking, jogging or running groups ($N = 13$ studies). Local PA and exercise services were mostly located in community settings and centres ($N = 14$ studies). Duration of individual engagement with the PA and exercise service was poorly reported (not reported in $N = 19$ studies, 68%). Where studies did report this information, it was reported by time spent engaging with the service [42, 44, 45, 47, 51, 70], number of sessions attended [55], or that the service was available on an ongoing basis [61, 71]. Participants were discharged from the intermediary service usually after a pre-determined length of time, or after attending a number of sessions. Discharge processes were rarely described, although some studies did indicate that feedback was sent to the individual's doctor or the original referrer [44, 49, 69, 71].

OBJECTIVE (IV): TO IDENTIFY THE AVAILABLE LITERATURE DESCRIBING AND DEFINING OUTCOMES OF INTERMEDIARIES CONNECTING COMMUNITY-DWELLING ADULTS TO LOCAL PA AND EXERCISE, AND MAP OUTCOMES TO PROCESSES

Seventeen studies (61%) included outcomes related to PA, which are summarised briefly in Table 2 and

Most commonly reported local PA and exercise services (N = 28)			
		N*	
Exercise and fitness classes		14	
Self-directed		14	
Walking, jogging and running		13	
Lifestyle programmes		8	
Gardening and outdoor activities		7	
Other		26	
Outcomes related to PA (N = 17)†			
Methods	Outcome	Short-term‡	Long-term‡
Quantitative Mixed/Other methods Not reported	Active travel	–	–
	Change in behaviour change stage	NR	+
	Decrease in sedentary behaviour	+	NR
	Increased attendance and participation in local PA and exercise	+	+
	Increased energy and caloric expenditure	+	+
	Increase in steps per day	+	+/-
	Increased PA	+	+/-
	Increased physical fitness	+	NR
	Meeting PA guidelines	+	–
	Positive PA experience	NR	+
Qualitative	Increased attendance and participation in local PA and exercise	+§	

Table 2 Summary of local PA and exercise services and PA outcomes.

*Represents a frequency count. †The remainder of the studies were omitted as they were i) qualitative studies that did not report on a PA intervention [58–60, 62, 70, 74] or ii) due to the lack of PA outcome measures [63, 64, 69, 71, 73]. ‡An overall findings effect indicator approach was used for each reported result: 1) positive (+), 2) negative (–), or 3) mixed (+/–). §Length of follow-up not reported. Abbreviations: NR – not reported, PA – physical activity.

in detail in Supplementary File 10. PA was measured subjectively e.g., questionnaires, and objectively, e.g., accelerometry. Authors also examined PA experience and self-efficacy, participation/attendance, social support for exercise, sedentary behaviour and physical fitness. There was a comparison group in N = 11 (39%) studies; comparison in-waiting (N = 5), usual care (N = 3), education materials (N = 1), matched cohort (N = 1) or minimal intervention (N = 1). Participants were followed up in the short-term (minimum six weeks) and long-term (maximum one year) (N = 17, 61%). The modal length of follow-up was one year. All studies reported positive PA outcomes. The logic model of the processes of referral, assessment, follow-up and outcomes in relation to PA is presented in Figure 2. Evidence advances and gaps are presented in Supplementary File 11. These are discussed in detail in the 'Discussion' section.

DISCUSSION

The purpose of this scoping review was to gain a greater understanding of the role of intermediaries in connecting community-dwelling adults to local PA and exercise, to describe the core elements and common components of this process, and to map the available evidence to outcomes. Included studies were mainly from the UK and US, involving a variety of methodologies. Research on social prescribing and other linking schemes involving intermediaries tends to be UK-centric, as this reflects their current policy and clinical pathways [75, 76]. It has been reported that social prescribing and linking schemes in the US focus largely on connecting individuals to resources for basic needs such as food banks, housing and legal needs [77], but this review indicates these schemes may also have a role in improving PA. Literature from low and middle income

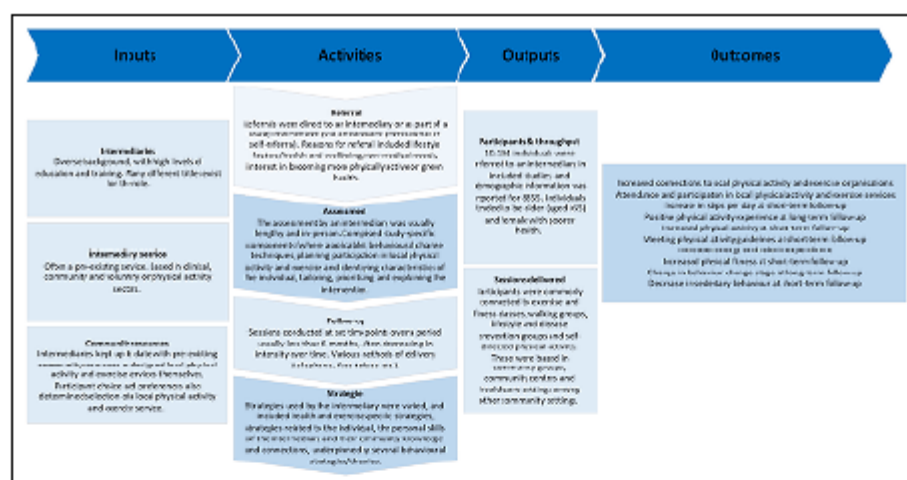


Figure 2 Logic model of the processes of referral, assessment, follow-up and outcomes in relation to PA and discharge. This logic model has been developed by summarising the included studies.

countries was under-represented, with only one included study conducted in Brazil [53]. It is unclear whether this indicates that intermediary services in these countries are under-reported, intermediaries do not connect to local PA and exercise, or the service simply does not exist due to limited community and voluntary resources [28, 78]. Study designs tended to be less robust, with only five RCTs included, and almost half of the included reports identified from the grey literature. This likely reflects the difficulty of measuring and evaluating complex interventions, such as connecting individuals to local PA and exercise via intermediaries, when numerous individual, interpersonal and organisational factors can affect outcomes [79, 80].

Over 10,000 individuals were included in the studies and tended to be older and female. Many of these individuals were at risk of or had complex health needs. People with chronic conditions or poorer lifestyle would stand to benefit the most from increasing PA, but some studies emphasise the need for more support in order to maintain this behaviour change [25, 26]. More detailed demographic information was often under-reported or contained large variability in reporting methods. Socioeconomic factors account for over half of the determinants of health and wellbeing [28]. People with a lower socioeconomic status or living in deprived areas can have weaker social infrastructure [76], and therefore may need more motivation and support to enable behaviour change [26, 81]. Similarly, level of education and marital status have both been shown to affect PA levels [82–84]. This review provides evidence that people who may need

more support to become more physically active are being referred to intermediaries, but the optimum processes and strategies to connect people with more complex health and psychosocial needs remain unclear.

This review also identified and summarised some of the professional characteristics of intermediaries themselves. While these characteristics were under-reported in some studies, this review shows that the intermediary is a professional role, with links to communities, who has undertaken significant education and training prior to accepting referrals. This may reassure HCPs and individuals self-referring to these services, as a lack of understanding of the role [85, 86] and scepticism about patients effectively attending activities in the third sector [85] have been previously identified as barriers to referral in reviews of social prescribing. This review also identified the strategies used to connect individuals to local PA and exercise during follow-up. Intermediaries appear able to provide the increased support needed to elicit behaviour change, and a tangible benefit by acting as an organiser, health promoter, motivator, educator and counsellor. However, the processes of follow-up were poorly described, and again the optimum processes and strategies needed to achieve positive outcomes in relation to PA remain unclear. Similarly, whether the background of an intermediary (e.g., in PA), impacts on referral patterns and outcomes warrants further exploration.

The processes of referral, assessment, and discharge were varied, and often poorly reported in included studies. Only eight studies could be considered “real-

world" trials, based in pre-existing intermediary services [42, 49, 55, 69–71, 73, 74]. In the remaining studies, referral processes were often the methods of recruitment for the study rather than "real-world" processes of referral. Assessments were carried out by the research team and follow-up/discharge was pre-determined by the trial length. The results of this review therefore may not accurately reflect "real-world" processes of intermediaries, which warrants further exploration. Despite self-referrals being common, the reasons and motivations for self-referrals were not explored. It is likely that strategies used to support individuals that are more motivated will differ compared to those less motivated to engage in PA. Previous research has shown that individuals who self-refer for other health-related interventions are more motivated to engage [87, 88]. As discharge processes were poorly described, it is unclear whether engagement with local PA and exercise was maintained after attending an intermediary, or the reasons for disengaging.

Community-based exercise and fitness classes and walking/jogging/running groups were the most commonly used local PA and exercise services. Often intermediaries offered a 'menu' of both indoor and outdoor local PA and exercise for individuals to choose from, reflecting the person-centred, individualised approach highlighted in many of the included studies. Engaging in local PA and exercise reduces barriers to participation (such as availability and transport) and may be less stigmatising than exercise delivered in healthcare settings [10–12, 26, 27, 59, 62]. Addressing these barriers and facilitating connections to local PA and exercise may have accounted for the positive PA outcomes observed in this review. However, how the services were identified and their duration was poorly described. No information was available on evaluation or quality assurance. All of these may impact on the individual's long-term engagement in PA. This review also found that referrals to improve/increase PA specifically were uncommon, with the most common referral reason being as part of the study intervention, again reflecting the lack of "real-world" trials i.e., examining routine delivery of a health intervention [89]. The role of intermediaries in PA may be less understood by HCPs, or they could be simply unaware of the service. Increased training and education for HCPs may lead to increased buy-in and increased referrals for PA.

All studies that reported PA outcomes ($N = 17$) reported some degree of positive outcome, particularly when measured in the short-term (up to 12 weeks). Previous reviews of intermediaries connecting individuals to local PA and exercise also found positive outcomes when examining the percentage of individuals connected with, enrolling in and attending a PA opportunity [15] and self-reported PA levels [26]. However, caution is advised

when interpreting the results of this review. Baseline PA levels were poorly reported, making comparisons pre- and post-intervention difficult. There was significant heterogeneity in outcome measures used, and studies tended to rely on self-report measures. One RCT [47] and one pilot/feasibility trial [51] used objective measures (accelerometry), but evidence was mixed at 12-months post-intervention. Longer-term outcomes in all studies were mixed in relation to PA. While $N = 11/17$ studies had a control group, only five included studies were RCTs, and the remaining studies used less robust designs risking bias. Finally, while this review examined outcomes in relation to the processes, it was not designed to examine effectiveness of the intervention. More research is needed using robust methodologies and suitable objective measures of PA, to allow more feasible comparison across studies.

STRENGTHS AND LIMITATIONS

This review has several limitations. The search strategy identified over 10,000 articles, many of which were excluded at the title and abstract screening stage. This raises the possibility that the search strategy could have been refined further. However, the aim of this scoping review was to identify and describe all available international literature and casting a 'wide net' is appropriate. The search terms were developed after literature review, in conjunction with a medical librarian and after consultation with a knowledge user panel and included over fifty terms. Following JBI guidance, quality of the evidence was not rated, therefore applications for policy or practice cannot be definitively stated. Finally, an inherent limitation of the scoping review methodology means that no conclusions regarding causation or correlation of the work of an intermediary and PA outcomes can be made, or the optimum processes in relation to the outcomes examined.

The strengths of this review include a published protocol [23] and following guidelines by international experts [29]. To the best of our knowledge, this review is the first to describe how interventions are delivered by intermediaries in international settings when connecting to local PA and exercise, and to describe these processes in relation to outcomes. As there is limited evidence to guide implementation for intermediary roles [25], this review is timely and may provide guidance on what should be evaluated or reported in future studies (e.g., processes of referral, assessment, follow-up and discharge, the community resources used, and the outcomes in relation to PA). An additional strength is the inclusion of knowledge users to improve the development, design, relevance, and dissemination of the research.

CONCLUSION

The concept of an intermediary combines several aspects of integrated care; person-centred integration aimed at empowerment and self-management [90], as well as supporting the long-term shifts envisaged for healthcare systems with focus on improving population health, tackling inequalities and supporting broader social development across communities [76]. However, a number of evidence patterns and gaps were identified (Supplementary File 11). It remains unclear which individuals are most likely to benefit from working with an intermediary, but it appears people who need more support to become physically active are being connected to local PA with positive effects on PA outcomes. The optimum level of support in relation to referral, assessment, follow-up and onward connection to local PA is also unclear. Further exploration of the positive effects on PA outcomes in both the short- and long-term are warranted. Further studies are also needed using "real-world" settings, optimum processes tailored to different types of contexts and groups of individuals, and more robust methodologies. Future studies could then help to inform training and education programmes to promote the role of intermediaries to HCPs and develop clinical pathways.

ADDITIONAL FILES

The additional files for this article can be found as follows:

- **Supplementary File 1.** Detailed inclusion and exclusion criteria. DOI: <https://doi.org/10.5334/ijic.7731.s1>
- **Supplementary File 2.** Search strategy. DOI: <https://doi.org/10.5334/ijic.7731.s2>
- **Supplementary File 3.** Grey literature search strategy. DOI: <https://doi.org/10.5334/ijic.7731.s3>
- **Supplementary File 4.** Knowledge user engagement. DOI: <https://doi.org/10.5334/ijic.7731.s4>
- **Supplementary File 5.** Study design, location, aims and population of interest. DOI: <https://doi.org/10.5334/ijic.7731.s5>
- **Supplementary File 6.** Demographic information of individuals referred to an intermediary. DOI: <https://doi.org/10.5334/ijic.7731.s6>
- **Supplementary File 7.** Processes of referral to the intermediary. DOI: <https://doi.org/10.5334/ijic.7731.s7>
- **Supplementary File 8.** Supplementary graphics. DOI: <https://doi.org/10.5334/ijic.7731.s8>
- **Supplementary File 9.** Processes and features of follow-up by the intermediary. DOI: <https://doi.org/10.5334/ijic.7731.s9>

- **Supplementary File 10.** Outcomes related to PA. DOI: <https://doi.org/10.5334/ijic.7731.s10>
- **Supplementary File 11.** PAGER framework. DOI: <https://doi.org/10.5334/ijic.7731.s11>

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COMPETING INTERESTS

The authors have no competing interests to declare.

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Appendix IV: Search strategy for scoping review

Searches run 06/04/22. Number in square brackets indicates results.

EMBASE [2373]

1. 'primary health care'/exp OR 'general practice'/exp OR 'general practitioner'/exp
2. (primary NEAR/3 (care OR 'health care')):ab,ti
3. (general NEAR/3 practi*):ab,ti
4. (general NEAR/3 physician*):ab,ti
5. (family NEAR/3 physician*):ab,ti
6. (family NEXT/1 practi*):ab,ti
7. #1 OR #2 OR #3 OR #4 OR #5 OR #6
8. 'health auxiliary'/exp OR 'community medicine'/exp OR 'community participation'/exp
9. ((communit* OR 'community based') NEAR/3 (volunteer* OR aide* OR support* OR care OR intervention* OR referral* OR 'health promotion')):ti,ab
10. (Communit* NEAR/2 ('link worker' OR connector* OR navigator* OR broker* OR 'support worker*' OR 'Link worker*' OR 'health worker*')):ti,ab
11. (Social NEAR/2 (prescribing OR prescription)):ti,ab
12. ((exercise OR health OR community) NEAR/3 facilitator*):ti,ab
13. ('accredited social health activist*' OR 'ASHA worker*' OR 'barefoot doctor*' OR 'medical auxil?iar*' OR Linkworker* OR link-worker*):ti,ab
14. ((lay OR voluntary OR volunteer OR volunteers) NEAR/3 (worker* OR attendant* OR aide* OR support* OR person* OR people OR helper* OR carer* OR assistant* OR staff OR provider* OR 'care giver*' OR practitioner*)):ti,ab
15. ((Health OR wellbeing OR 'well being' OR community) NEAR/2 (coach OR coordinator OR 'co ordinator')):ti,ab
16. ('Case worker*' OR 'life coach*' OR 'engagement worker' OR 'lifestyle counsel*'):ti,ab
17. #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16
18. 'exercise'/exp OR 'kinesiotherapy'/exp OR 'physical activity'/exp OR 'physical activity, capacity and performance'/de OR 'training'/de OR 'endurance'/de OR 'exercise tolerance'/de OR 'physical capacity'/de OR 'sport'/exp
19. (strength* or isometric* or isotonic* or isokinetic* OR exercis*):ti,ab

20. (resistance NEAR/3 train*):ti,ab
21. ((physical* or motion* or cardiopulmonary or cardiorespiratory) NEAR/3 (fit* or therap*)):ti,ab
22. (treadmill* or cross-train* or rowing or sport* OR exercise* OR 'physical activit*' OR aerobic* OR run or jog* or running OR walk or walks or walking OR gym* OR yoga or pilates OR 'recreation* activit*' OR zumba or salsa* OR cycling or bicycle or bike or swim* or dance or dancer* or dances or dancing):ti,ab
23. (circuit* NEAR/1 train*):ti,ab
24. (keep* NEAR/1 (active or fit)):ti,ab
25. ((active OR activity OR exercis*) NEAR/2 prescription*):ti,ab
26. #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25
27. #7 AND #17 AND #26

Medline [1948]

1. exp Primary Health Care/ OR exp General Practice/ OR General Practitioners/
2. (primary adj3 (care OR health care)).ti,ab.
3. (general adj3 practi*).ti,ab.
4. (general adj3 physician*).ti,ab.
5. (family adj3 physician*).ti,ab.
6. (family adj1 practi*).ti,ab.
7. or/1-6
8. Community Medicine/ OR exp community participation/
9. ((communit* OR community based) adj3 (volunteer* OR aide* OR support* OR care OR intervention* OR referral* OR health promotion)).ti,ab.
10. (Communit* adj2 (link worker OR connector* OR navigator* OR broker* OR support worker* OR Link worker* OR health worker*)).ti,ab.
11. (Social adj2 (prescribing OR prescription)).ti,ab.
12. ((exercise OR health OR community) adj3 facilitator*).ti,ab.
13. (accredited social health activist* OR ASHA worker* OR barefoot doctor* OR medical auxil*iar* OR Linkworker* OR link-worker*).ti,ab.

14. ((lay OR voluntary OR volunteer OR volunteers) adj3 (worker* OR attendant* OR aide* OR support* OR person* OR people OR helper* OR carer* OR assistant* OR staff OR provider* OR care giver* OR practitioner*)).ti,ab.
15. ((Health OR wellbeing OR well being OR community) adj2 (coach OR coordinator OR co ordinator)).ti,ab.
16. (Case worker* OR life coach* OR engagement worker OR lifestyle counsel*).ti,ab.
17. or/8-16
18. exp Exercise/ OR exp Exercise Therapy/ OR exp Physical Fitness/ OR exp "physical education and training"/ OR exp "Exercise Movement Techniques"/ or physical endurance/ or exercise tolerance/ OR Physical Exertion/ or exp Sports/ or Dancing/
19. (strength* or isometric* or isotonic* or isokinetic* or exercis*).ti,ab.
20. (resistance adj3 train*).ti,ab.
21. ((physical* or motion* or cardiopulmonary or cardiorespiratory) adj3 (fit* or therap* or activit*)).ti,ab.
22. (treadmill* or cross-train* or rowing or sport* or exercise* or physical* activit* or aerobic* or run or jog* or running or walk or walks or walking or gym* or yoga or pilates or "recreation* activit*" or zumba or salsa* or cycling or bicycle or bike or swim* or dance or dancer* or dances or dancing or physiotherap* or physical therap*).ti,ab.
23. (circuit* adj1 train*).ti,ab.
24. (keep* adj1 (active or fit)).ti,ab.
25. or/18-24
26. 7 AND 17 AND 25

Web of Science [1851]

1. (primary NEAR/3 (care OR "health care")) OR (general NEAR/3 practi*) OR (general NEAR/3 physician*) OR (family NEAR/3 physician*) OR (family NEAR/1 practi*)
2. ((communit* OR "community based") NEAR/3 (volunteer* OR aide* OR support* OR care OR intervention* OR referral* OR "health promotion")) OR (Communit*

- NEAR/2 ("link worker" OR connector* OR navigator* OR broker* OR "support worker*" OR "Link worker*" OR "health worker*")) OR (Social NEAR/2 (prescribing OR prescription)) OR ((exercise OR health OR community) NEAR/3 facilitator*) OR ("accredited social health activist*" OR "ASHA worker*" OR "barefoot doctor*" OR "medical auxil*iar*" OR Linkworker* OR link-worker*) OR ((lay OR voluntary OR volunteer OR volunteers) NEAR/3 (worker* OR attendant* OR aide* OR support* OR person* OR people OR helper* OR carer* OR assistant* OR staff OR provider* OR "care giver*" OR practitioner*)) OR ((Health OR wellbeing OR "well being" OR community) NEAR/2 (coach OR coordinator OR "co ordinator")) OR ("Case worker*" OR "life coach*" OR "engagement worker" OR "lifestyle counsel*")
3. (strength* OR isometric* OR isotonic* OR isokinetic* OR exercis*) OR (resistance NEAR/3 train*) OR ((physical* OR motion* OR cardiopulmonary OR cardiorespiratory) NEAR/3 (fit* OR therap*)) OR (treadmill* OR cross-train* OR rowing OR sport* OR exercise* OR "physical activit*" OR aerobic* OR run OR jog* OR running OR walk OR walks OR walking OR gym* OR yoga OR pilates OR "recreation* activit*" OR zumba OR salsa* OR cycling OR bicycle OR bike OR swim* OR dance OR dancer* OR dances OR dancing) OR (circuit* NEAR/1 train*) OR (keep* NEAR/1 (active OR fit)) OR ((active OR activity OR exercis*) NEAR/2 prescription*)
4. #1 AND #2 AND #3

CINAHL [1078]

1. (MH "Primary Health Care") OR (MH "Family Practice") OR (MH "Physicians, Family")
2. TI (primary N2 (care OR "health care")) OR AB (primary N2 (care OR "health care"))
3. TI (general NEAR3 practi*) OR AB (general NEAR3 practi*)
4. TI (general N3 physician*) OR AB (general N3 physician*)
5. TI (family N3 physician*) OR AB (family N3 physician*)
6. TI (family N1 practi*) OR AB (family N1 practi*)
7. S1 OR S2 OR S3 OR S4 OR S5 OR S6

8. (MH "Community Medicine") OR (MH "Community Networks") OR (MH "Community Role") OR (MH "Communities")
9. TI ((communit* OR "community based") N3 (volunteer* OR aide* OR support* OR care OR intervention* OR referral* OR "health promotion")) OR AB ((communit* OR "community based") N3 (volunteer* OR aide* OR support* OR care OR intervention* OR referral* OR "health promotion"))
10. TI (Communit* N2 ("link worker" OR connector* OR navigator* OR broker* OR "support worker*" OR "Link worker*" OR "health worker*")) OR AB (Communit* N2 ("link worker" OR connector* OR navigator* OR broker* OR "support worker*" OR "Link worker*" OR "health worker*"))
11. TI (Social N2 (prescribing OR prescription)) OR AB (Social N2 (prescribing OR prescription))
12. TI ((exercise OR health OR community) N3 facilitator*) OR AB ((exercise OR health OR community) N3 facilitator*)
13. TI ("accredited social health activist*" OR "ASHA worker*" OR "barefoot doctor*" OR "medical auxiliaries*" OR Linkworker* OR link-worker*) OR AB ("accredited social health activist*" OR "ASHA worker*" OR "barefoot doctor*" OR "medical auxiliaries*" OR Linkworker* OR link-worker*)
14. TI ((lay OR voluntary OR volunteer OR volunteers) N3 (worker* OR attendant* OR aide* OR support* OR person* OR people OR helper* OR carer* OR assistant* OR staff OR provider* OR "care giver*" OR practitioner*)) OR AB ((lay OR voluntary OR volunteer OR volunteers) N3 (worker* OR attendant* OR aide* OR support* OR person* OR people OR helper* OR carer* OR assistant* OR staff OR provider* OR "care giver*" OR practitioner*))
15. TI ((Health OR wellbeing OR "well being" OR community) N2 (coach OR coordinator OR "coordinator")) OR AB ((Health OR wellbeing OR "well being" OR community) N2 (coach OR coordinator OR "coordinator"))
16. TI ("Case worker*" OR "life coach*" OR "engagement worker" OR "lifestyle counsel*") OR AB ("Case worker*" OR "life coach*" OR "engagement worker" OR "lifestyle counsel*")
17. S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16

18. (MH "Exercise+") OR (MH "Physical Activity") OR (MH "Physical Fitness+") OR (MH "Physical Performance") OR (MH "Sports+") OR (MH "Resistance Training") OR (MH "Therapeutic Exercise+") OR (MH "Exercise Intensity")
19. TI (strength* or isometric* or isotonic* or isokinetic* OR exercis*) OR AB (strength* or isometric* or isotonic* or isokinetic* OR exercis*)
20. TI (resistance N3 train*) OR AB (resistance N3 train*)
21. TI ((physical* or motion* or cardiopulmonary or cardiorespiratory) N3 (fit* or therap*)) OR AB ((physical* or motion* or cardiopulmonary or cardiorespiratory) N3 (fit* or therap*))
22. TI (treadmill* or cross-train* or rowing or sport* OR exercise* OR "physical activit*" OR aerobic* OR run or jog* or running OR walk or walks or walking OR gym* OR yoga oR pilates OR "recreation* activit*" OR zumba or salsa* OR cycling or bicycle or bike or swim* or dance or dancer* or dances or dancing) OR AB (treadmill* or cross-train* or rowing or sport* OR exercise* OR "physical activit*" OR aerobic* OR run or jog* or running OR walk or walks or walking OR gym* OR yoga oR pilates OR "recreation* activit*" OR zumba or salsa* OR cycling or bicycle or bike or swim* or dance or dancer* or dances or dancing)
23. TI (circuit* N1 train*) OR AB (circuit* N1 train*)
24. TI (keep* N1 (active or fit)) OR AB (keep* N1 (active or fit))
25. S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25
26. S7 AND S17 AND S26

Google Scholar [99]

"Primary Health Care"| community|"social prescribing" "physical AROUND(3) exercise|activity|fitness"exercise|walking

Grey literature search strategy*

Source	Example	
	<i>Searched as per protocol (“only the first 100 hits (as sorted by relevance) from grey literature searches will be screened”)</i>	<i>Websites hand-searched (each of these websites were searched using the websites’ database or search bar using combinations of keywords. Websites that did not have a database or search bar were hand-searched. Potentially relevant records were downloaded, de-duplicated, and irrelevant documents (e.g., application forms) removed, and were screened as described in the text)</i>
Databases that specialise in grey literature	Google Scholar	Canadian Agency for Drugs and Technologies in Health Grey Matters Tool Checklist (CADTH)
Controlled trial registers		International Clinical Trials Registry Platform (ICTRP)
Academic dissertations and theses†	Proquest Digital Dissertations	
International organizations, agencies, scientific research groups†	UK National Institute for Health and Social Care Excellence Guidance Ireland Lenus	UK NHS Publications, National Institute for Health Research, National Association of Link Workers, The King’s Fund, Social Prescribing Network, Health and Social Care Alliance Scotland, NHS Confederation, Personalised Care Institute, <i>UK Health Security Agency and Office for Health Improvement and Disparities</i>‡, National Association of Primary Care, National Academy for Social Prescribing, Coalition for Personalised Care, Royal College of General Practitioners, British Medical Association, <i>GPs at the Deep End</i>, <i>Royal Voluntary Service</i>, <i>National Voices</i>, <i>Altogether Better</i> Ireland Irish College of General Practitioners, Irish Medical Organisation Australia Royal Australian College of General Practitioners, Consumers Health Forum of Australia Canada

		Alliance for Healthy Communities/ <i>Alliance pour des communautés en santé</i> , <i>Canadian Institute for Health Information</i> , <i>Canadian Association of Community Health Centres</i> , <i>Canadian Family Practice Nurses Association</i> , <i>Public Health Physicians of Canada</i> , <i>The College of Family Physicians of Canada</i> , <i>Canadian Nurses Association</i> , <i>British Columbia College of Family Physicians</i> , <i>Ontario Ministry of Health</i> Europe/International <i>Activate Social Prescribing for People and Communities</i> , <i>Global Social Prescribing Alliance Directory</i>
Relevant conference proceedings		Zetoc

*The grey literature search strategy included the following three groups of terms: (1) primary care, (2) intermediary, (3) physical activity. These were based on the Google Scholar search strategy developed in conjunction with the medical librarian ("Primary Health Care"| community|"social prescribing" "physical AROUND(3) exercise|activity|fitness"exercise|walking). These terms were used as keyword fields in all database searches. Information sources in italics indicate a new source identified during the search or by discussion with the research team. †The following sources were included in the protocol but were not included in the final report due to issues with exporting citations, paywalls, or duplication of information: DART-Europe, Mental Health Network, Irish Medical Council, and National Association for Patient Participation. ‡Public Health England was originally reported in the protocol, but this organisation was replaced by UK Health Security Agency and Office for Health Improvement and Disparities. Abbreviations: CADTH — Canadian Agency for Drugs and Technologies in Health Grey Matters Tool Checklist, GP — general practitioner, ICTRP — International Clinical Trials Registry Platform, NHS — National Health Service. Table reproduced from [377].

Appendix V: Publication of qualitative descriptive study (“Understanding how intermediaries connect adults to community-based physical activity: A qualitative study”)

PLOS ONE

RESEARCH ARTICLE

Understanding how intermediaries connect adults to community-based physical activity: A qualitative study

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Abstract

Intermediaries facilitate connections to community-based services and supports, including physical activity and exercise groups, and are an emerging method to promote physical activity participation. However, their processes when establishing connections to community-based physical activities are unclear. The aim of this study was to explore the processes, practices, and procedures of Irish intermediaries when connecting people to community-based physical activity. This was a qualitative descriptive design study. Semi-structured interviews were carried out with $n = 27$ intermediaries from a variety of sectors—Health Promotion and Improvement [HPO], Local Sports Partnerships [LSO] and Social Prescribing [SP]. Four themes were identified using qualitative content analysis; 1) the processes of connecting to an intermediary, 2) connecting individuals to physical activity, 3) exiting from the intermediary service and 4) working in the local context. Intermediaries reported that they received referrals for individuals with physical, mental, and social health needs, but that referrals to improve physical activity specifically were low. They used a person-centred approach throughout their process, often addressing barriers to physical activity. However, only LSO and SP facilitated connections to physical activity, as HPO mainly focused on delivering smoking cessation support and services. Levels of support given and length of follow-up varied between LSO and SP, with the latter providing more intensive support. To facilitate their work, they developed extensive local knowledge and networks of partners, which enabled connections to a variety of community-based physical activities. Intermediaries may be an under-utilized resource to promote physical activity. Understanding the processes used in their interventions can inform future research, which is needed to investigate the effectiveness of intermediaries in improving physical activity levels and to inform future referral pathways.

OPEN ACCESS

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Data Availability Statement: The data underlying this study contain potentially identifiable personal information, and therefore, cannot be shared publicly. Public availability would compromise participant privacy and is not in compliance with the protocol approved by the Trinity College Dublin School of Medicine Research Ethics Committee. For further inquiries, the Research Ethics Committee can be contacted at SOMREC@tcd.ie.

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Introduction

Physical inactivity is defined as insufficient physical activity to meet current physical activity recommendations, i.e., at least 2 hours and 30 minutes per week of moderate intensity activity

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[1, 2]. Over a quarter of adults globally are failing to meet physical activity recommendations, and in Ireland this figure is as high as 54–61% [3–5]. To address the issue of physical inactivity, a comprehensive approach requiring multiple concurrent strategies is recommended, such as healthcare systems promoting physical activity, and community-based approaches like individually adapted health behaviour change interventions, social support interventions, and the creation of places for physical activity [6–10]. However, supporting physically inactive individuals to 'bridge the gap' between healthcare services and community-based physical activity services remains challenging.

Ireland's publicly funded healthcare system is currently undergoing significant reorientation towards primary and community care settings, and towards chronic disease prevention and management in the community [11–13]. Examples of new services and programmes include primary healthcare community healthcare networks delivering services across populations of 50,000 people, chronic disease hubs providing specialist care services for individuals living with more complex chronic disease and multi-morbidity, and the Healthy Communities programme in areas across Ireland where health inequalities are most evident [12–14]. Engaging in physical activity is an essential component of chronic disease prevention and management, and community-based physical activity services align with the goal to 'shift' away from medical to community services.

Healthcare professionals have a responsibility to support their patients to be physically active, but health behaviour change can take time, ongoing follow-up, and appropriate resources. Healthcare professionals often report a lack of time to engage in meaningful and constructive dialogue around physical activity during appointments [15–17]. They can often work in less-than-favourable conditions, experiencing high work pressures, stress, and staff shortages [18–20], which may limit their capacity to offer ongoing follow-up and support [21]. In addition, healthcare professionals often perceive a lack of local physical activity services, opportunities or places to which individuals could be referred [20, 22, 23] or, they are unaware of existing community resources and services [24–26]. A 2013 survey of Irish healthcare professionals' physical activity promotion practices found this was mainly performed on ad hoc basis, with a perceived lack of local services [21]. Almost ten years later in 2021, lack of time and awareness of local services remain key barriers to physical activity promotion in the Irish context [27].

An intermediary is considered an emerging method to address these gaps. An intermediary's role is to act as a link person, or connector, to community-based physical activity, or other community resources, services and supports while offering increased time, follow-up, and personalised solutions to the needs of individuals referred to their services [28–33]. These are complex interventions, consisting of pathways with interacting elements and relationships between referring agents (often healthcare professionals), service users, intermediaries, and community-based physical activity, all of which take place within the local context and the context of the health needs of service users [28, 29, 31, 34]. Therefore, it is perhaps unsurprising that a scoping review carried out as part of this research identified significant gaps and heterogeneity in the descriptions of the processes undertaken by intermediaries when facilitating connections to community-based physical activity [35]. Many included studies did not report on 'real-world' intermediary services, and instead described a service that was designed and implemented specifically for a research trial. Therefore, information reported in these studies regarding referral, assessment and follow-up processes when connecting individuals to community-based physical activity, are unclear and may not reflect current practice.

Intervention identification and refinement are key phases of complex intervention development and evaluation [34]. Intermediaries could be a promising method to help address the problem of physical inactivity, particularly in Ireland where healthcare professionals find

physical activity promotion challenging in practice. If the processes involved in the intermediary intervention were better understood across multiple contexts, future evaluation studies could then explore potential mechanisms of impact and outcomes [34, 36]. Therefore, the aim of this study was to explore the role of intermediaries in Ireland, in connecting adults to community-based physical activity, and to further define the processes, practices and procedures in the Irish context. This paper will discuss the findings in relation to each of the study objectives, which were:

- i. To describe the pathways of connections from the referring agent to the intermediary;
- ii. To explore the profile of people referred to an intermediary who are then connected to community-based physical activity services;
- iii. To explore how intermediaries choose a suitable and appropriate community-based physical activity service for the person referred, and pathways of connections onwards from the intermediary to these services;
- iv. To identify how intermediary services are established and embedded within the community.

Methods

Study design

This study used a qualitative descriptive design, to provide a rich, straight description of the experiences of study participants close to their own language [37]. Qualitative descriptive designs have been identified as a useful approach when research questions are focused on discovering the who, what, and where of events or experiences and gaining insights from informants regarding a poorly understood phenomenon [37–39]. Ethical approval for this study was granted from the Trinity College Dublin School of Medicine Research Ethics Committee (Application Number: 20220601) in July 2022.

Participants

Based on discussions between the research team, literature review and consultations with the project advisory panel, three types of intermediaries were identified in Ireland—Health Promotion and Improvement Officers [HPO], Local Sports Partnership Officers [LSO] and Social Prescribing Link Workers [SP]. A brief description of each intermediary is provided, with detailed descriptions of these roles available in the supplementary material (S1 File). Participants were intermediaries aged >18 years old, employed in their role for ≥6 months and able to give informed consent. Exclusion criteria were retired workers or those on extended or maternity leave.

Health Promotion and Improvement Officers [HPO]. HPO act as advocates, both to build capacity within the Irish healthcare system and to ensure that available resources are used optimally to improve the health and wellbeing of the population. HPO work to target modifiable lifestyle risk factors such as smoking, alcohol consumption, obesity, and physical inactivity.

Local Sports Partnership Officers [LSO]. LSO support the development of opportunities to increase sport participation, and work to address barriers to physical activity participation. They also work to develop sustainable local leadership for sport within communities.

Social Prescribing Link Workers [SP]. SP design and co-produce personalised solutions so that people with social, emotional, or practical needs are empowered to find solutions which will improve their health and wellbeing, often using services provided by the community and voluntary sector.

Participant selection

Recruitment for this study took place from the 7th of September 2022 until the 13th of December 2022. Gatekeepers and professional organizations (Health Service Executive Health and Wellbeing, Association for Health Promotion Ireland, Irish Social Prescribing Peer Network and Sport Ireland) were identified by the research team or by members of the project advisory panel, through either personal/professional networks, or publicly available information such as websites. Where contact details or a suitable person could not be found using publicly available information, the organizations were contacted for the details of a suitable person. Participants were invited to take part in the study via an invitation circulated through gatekeepers in the relevant professional organisations and via the research team's social media accounts to maximise reach. Three rounds of invitations were sent over the recruitment period.

Purposeful sampling was employed to include 'typical cases' and ensure representation from all three types of intermediaries, wide geographical spread, and different levels of professional experience [40]. The research team planned to continue recruitment until ten of each intermediary type were recruited, or until no new analytical insights were emerging from interviews, whichever came first. This was determined by discussion between the research team. Intermediaries were recruited from a variety of sectors, and those recruited to this study were based in primary care, community healthcare networks, local health offices (where community health and personal social services are delivered), general practitioner offices, health promotion settings, community centres, local development companies (multi-sectoral partnerships that deliver community and rural development, social inclusion, and social enterprise services) local authorities and local councils (local authorities operate within specific geographic areas called local government areas, each of which has a council, and are responsible for the provision of public services). Participants gave written informed consent to participate.

Data collection

Interviews took place from September 2022 to January 2023. Semi-structured interviews were conducted according to the participant's personal preference—in-person, online (hosted via Zoom) or via telephone. All interviews were conducted using an interview schedule designed by the research team, which was informed by previous qualitative studies carried out with intermediaries [41–43], and the findings of the scoping review carried out as part of the research [35]. The schedule was also reviewed by the project advisory panel to establish credibility, with no changes suggested. Topics included the professional background of the intermediary, the profile of individuals referred to the intermediary, the processes of referral and assessment, the characteristics of onward connections to community-based physical activity, and how these services were monitored. This guide was designed to be iterative, with additional questions added as necessary in response to earlier interviews.

Data analysis

Interviews were recorded and transcribed verbatim by a professional stenographer, or by using the auto-transcription feature on Zoom. Pseudonymized transcripts were analysed using an inductive qualitative content analysis approach [44], from January 2023 to August 2023. This methodology was chosen as it is a flexible but systematic coding and categorizing

approach suitable for exploring large amounts of textual information [45–47]. In addition, it is well-suited for qualitative health-based research, analysing complex interventions, and for exploratory work in areas where not much is known about a topic [44, 45, 48]. This approach broadly involves three steps: 1) preparation, 2) organising, and 3) reporting [44]. Themes are developed by coding, development of preliminary themes or 'categories', relating categories/themes to published research and production of the written report [45].

Preparation. All interviews were conducted by the lead author, who is a female Ph.D. candidate, and this study formed part of her Ph.D. research. Field notes were taken during the interviews and formed the basis of 'initial impressions' which were used during update meetings between the research team. Additional preparation and familiarisation also occurred while listening to the audio recordings, transcribing interviews, and cleaning the transcripts. A personal research diary was kept by the lead author throughout the process of analysis. The purpose of this diary was to record any shifts in perspectives, establish credibility, record reflections on subjectivity and reflexivity, and to improve rigour.

Organising. Transcripts were read several times by the lead author to ensure familiarisation. Three rounds of coding were completed by the lead author. Analytical notes and open codes were made on the transcripts to describe all aspects of the content [49]. Over 650 codes were identified and coded using NVivo 12 and organised into clusters (groups of codes that share similarities [46]) using Microsoft Excel. Clusters were then grouped under generic categories, such as 'promotion of the role', 'assessment' and 'local physical activity'. Categories in qualitative content analysis describe the manifest content of the data and are used at the beginning of the data analysis process to enter the abstraction process [46]. Categories relevant to the research objectives and the 'steps' of the process of the intermediary were selected and organised into themes by the research team.

Reporting. The findings of this study were generated by describing contents of the clusters within the identified themes [44]. Audit trails were kept ensuring dependability, and a sample audit trail for a cluster is included in the supplementary material (S2 File). An advisory panel, consisting of professionals from health promotion, local sports partnerships, and social prescribing services, were involved throughout the study. The panel advised on the study population, reviewed and gave feedback on study materials, and assisted with recruitment. A summarised version of the study findings was also reviewed by the panel to ensure credibility and confirmability. This study was reported using the COnsolidated criteria for REporting Qualitative research (COREQ) checklist [50].

Findings

Interviews were carried out with $n = 29$ intermediaries ($n = 11$ SP, $n = 10$ HPO, $n = 8$ LSO). Interviews lasted 37 minutes on average (range 24–57 minutes). Fifteen interviews were conducted over Zoom, twelve over telephone, and two were conducted face-to-face at the intermediary's place of work. Demographic information of participants is shown in Table 1. Two participants were excluded at the analysis stage, as it transpired during their interviews that they were working as volunteers in their current role. The decision was made to exclude these participants, as they would not be considered professionals and may lack the skills and resources required to deliver complex intermediary interventions [51, 52]. This resulted in 27 interviews included in the final analysis.

Four themes were identified: the processes of connecting to an intermediary, connecting individuals to physical activity, exiting from the intermediary service, and working in the local context. Together, these themes discuss the processes of referral, assessment, and follow-up when intermediaries connected individuals to community-based physical activity. They

Table 1. Demographic information of participants (n = 27).

Type	Demographic	Result	
HPO (n = 9)	Gender	Female	6 (67%)
		Male	3 (33%)
	Urban or rural	Urban	4 (44%)
		Rural	2 (22%)
		Urban/rural	2 (22%)
		Rural/urban	1 (11%)
	Setting of intermediary service ^a	Primary care	5
		Health promotion office	2
		HSE local health office	2
		Community healthcare network	1
		Fredance work in the community	1
	Professional background ^b	Local authority	1
		Health and social care	6
		Physical activity and exercise	4
	Time in role (years)	Education	1
		Range	1–18
LSO (n = 8)	Gender	Female	6 (75%)
		Male	2 (25%)
	Urban or rural	Rural/urban	3 (37.5%)
		Urban	2 (25%)
		Urban/rural	2 (25%)
		Rural	1 (13%)
	Setting of intermediary service ^a	County council offices	3
		Community centre	2
		Local authority	2
		Sports partnership offices	1
	Professional background ^b	Physical activity and exercise	8
		Education	1
	Time in role (years)	Range	1–15
SP (n = 10)	Gender	Female	10 (100%)
		Urban	6
	Urban or rural	Urban/rural	2
		Rural	1
		Rural/urban	1
			10%
	Setting of intermediary service ^a	Local development company	6
		Family resource centre	2
		Community centre	1
		GP practice	1
		Primary care	1
		Resource centre	1
	Professional background ^b	Health and social care	8
		Education	3
		Private sector	1
	Time in role (years)	Range	< 1–15

^aSome intermediaries were based in more than one setting, or had backgrounds in multiple sectors. Urban/rural indicates the intermediary worked in a mostly urban setting. Rural/urban indicates the intermediary worked in a mostly rural setting. Physical activity and exercise professional background includes any work in the physical activity sector, including sport and private fitness sectors. Health and social care professional background includes healthcare, social care, youth work, mental health, community development, health promotion and disability/inclusion roles. Education professional background includes any teaching, coaching or guidance role. Abbreviations: GP—general practitioner, HPO—health promotion and improvement officer, HSE—Health Service Executive, LSO—local sports partnership community development officer, SP—social prescribing link worker.

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Fig 1. Themes and sub-themes.

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describe how intermediaries selected appropriate community-based physical activities based on the referred individual's needs, as well as how individuals left the intermediary service after being connecting to an activity. Finally, the broader contextual factors that influenced the work of intermediaries are presented. A detailed description of each theme and sub-theme is given under each theme heading, and themes and sub-themes are shown in Fig 1.

The processes of connecting to an intermediary

This theme describes how and why individuals were referred to an intermediary, as well as the demographic and health characteristics of these individuals. This theme also describes the initial meeting between intermediaries and service users. Three sub-themes were identified: 'referral processes', 'profile of individuals referred to an intermediary' and 'initial meeting'.

Sub-theme: Referral processes. Referring agents varied widely both within and between the three intermediary types. All types of intermediaries worked closely with health care services who were identified as a major source of referrals to HPO, SP and to a lesser extent LSO. In addition, referrals would often come directly from the community itself, through local community, voluntary and charitable sectors or through friends and family members of the person referred.

"Individuals can self-refer, it could be a GP, it could be community mental health, it could be private counsellors, physios, OTs [occupational therapists], public health nurses. . . I would get friends referred to me or you know a Granny might refer her grandson you know just word of mouth as well."

P23, SP

Reasons for referral could be categorized broadly as after a change in life circumstances or to address a pre-existing health issue.

"It would be people with loneliness, isolation, physical problems, mental health problems, emotional needs, practical needs. . . there's no one type of person that gets referred into us all the time because it just changes."

P27, SP

"Those who are excluded or marginalized. . . either by socioeconomic status, either by location of where they live."

P10, HPO

Self-referrals were also reported by all intermediary types, and this was the most common route of referral to LSO. A minority of intermediaries across the three types reported that individuals were referred by a referring agent specifically to improve fitness, physical activity levels or to connect to a community-based physical activity service.

"I've never actually had a referral where someone has outlined a person's physical inactivity."

P27, SP

Sub-theme: Profile of individuals referred to an intermediary. Referred individuals (service users) tended to be mid- to older-aged adults. According to intermediaries, less men accessed their services or engaged in physical activity groups.

"Now I'd say off hand the majority of those would be female, I'd say if you had 50 males [out of > 500 participants] out of that you'd be doing well."

P08, LSO

Intermediaries reported that service users commonly presented with co-morbidities, such as cardiovascular, respiratory, neurological, and musculoskeletal disease.

"I'd be getting general referrals from adults. . . they'd have a wide range of health conditions. . . diabetes, obesity, osteoporosis, osteopenia, people with high blood pressure, high cholesterol."

P11, LSO

Mental health issues were also frequently reported, alongside social isolation. These issues may have been reported at the time of referral but were often observed by intermediaries during the assessment or follow-up periods.

"Typically people who I see are vulnerable. They are isolated in the community. They mightn't be leaving their house very often. They don't have many connections in the community."

P18, SP

Intermediaries also reported that service users frequently had difficulty with mobility, impaired balance, and falls.

"People who are mobility challenged. . . You've older people who reach the stage where they can no longer drive, or they're physically not strong enough to take public transport."

P16, SP

Sub-theme: Initial meeting. For LSOs, the initial contact with service users took place over phone, email, or at the first session of a community-based physical activity. This was an opportunity to give them information about other physical activity services that were currently available, and to develop a rapport.

"They get to know you, you know, so you strike up a relationship with them and stuff like that. So you know the trust is there."

P22, LSO

No explicit assessments were carried out by LSO. A longer, more in-depth assessment was carried out by HPO and SP. Intermediaries started by introducing or explaining the service and their role. The discussion would then shift to the service user, to discuss lifestyle behaviours including physical activity, smoking, diet, sleep, and other physical health issues.

"I'll talk about any issue and guide people to any service [physical activity, weight management, bereavement support] and I'd have no problem about that."

P25, HPO

General wellbeing, including mental health, social and community connectedness, and other psychosocial needs were also discussed, but only by SP. The ethos of this first meeting was person-centred and holistic, even if processes varied from one SP to the next.

"Even the fact they've come, and you've listened to them. One of the best things we can do is sit, and we can give them time... a minimum of 45 minutes, mostly maybe the hour, or an hour and 15 minutes. And so that it's very powerful."

P28, SP

Some services aimed to complete standardised outcome measures during the initial meeting and again at the time of exit from the service.

"At that initial meeting we would run some basic outcome measures to establish a baseline. We'd use the Warwick [Edinburgh Mental Wellbeing Scale], and we'd use the WHO-5... just to get a sense of the person, what their hobbies have been in the past, what's brought them to this point, and to establish that rapport."

P09, SP

Connecting individuals to physical activity

This theme describes the processes undertaken by intermediaries following the initial meeting with a service user. It describes how intermediaries identified physical activity as a need, and how a community-based physical activity was selected based on the service user's needs. This theme also describes the practices of intermediaries during the 'follow-up' period after the initial meeting, when establishing and maintaining connections to community-based physical activity services. Three sub-themes were identified: 'identifying a need for physical activity', 'choosing an appropriate physical activity' and 'accommodating complex needs'.

Sub-theme: Identifying a need for physical activity. While physical inactivity was often not the primary reason why they were referred, during the assessment service users could reveal physical inactivity as an issue that they wished to address. The assessment could then also be used to identify barriers to physical activity and set goals in relation to engaging in physical activity.

"If they highlight it as a goal... But for a lot of people it would be that they highlight physical activity... "Oh, I want to lose some weight", or "I want to do some exercise to feel better", or "my doctor told me because of my condition I need to do exercise and I've never gone to a gym, and I don't know what to do".

P09, SP

All intermediaries identified that physical and mental co-morbidities often negatively impacted on service users' ability, readiness, or interest in engaging in physical activity. Intermediaries reported other barriers to engaging in both physical activity and the intermediary service generally, such as mobility and physical limitations, social isolation, family and employment commitments, socio-economic circumstances, and gender.

"Say you had somebody with diabetes or some chronic health condition, they are so focused on their day to day and managing it from a very I suppose basic level that they don't maybe see themselves as somebody that would benefit from movement."

P03, SP

Despite these barriers, all intermediaries recognised the potential benefits of physical activity for health, and that some service users needed additional supports to become more physically active.

"Other ones that I know will have something to do with exercise could be. . . Any of the chronic health stuff. Then I'd kind of be like, okay. Exercise. Like in the back of my head."

P18, SP

As such, intermediaries would provide behavioural support, such as reassurance and motivational support.

"So the odd time I would still get a phone call or an email, "am I suitable for this programme?" you know, "would I be able for it?" . . . More often than not once they know that they are physically well then you'd encourage them to sign up and to get involved. . . The reassurance piece I suppose is a big thing in our space here, I think."

P24, LSO

This could be in combination with practical support, like attending the first session of the group (LSO and SP) or being available as needed throughout the process of connection (SP only).

"Other people they're like, 'no, can you just meet me for a coffee before I go the next time, because it was really scary'. . . so they might need some continued support."

P18, SP

In terms of length of follow-up, for LSO contact generally ceased once service users had attended a community-based physical activity.

"You know generally 99% of people that contact us will generally turn up to our programmes and they generally will partake."

P22, LSO

HPO did not actively connect service users onwards to physical activity. They explained that they mainly received referrals related to their primary role as smoking cessation officers. These officers were often located in primary care services related to chronic disease management.

"In terms of me meeting the public the closest access I would have is in our stop smoking clinic... that's the closest and most tangible time I'll meet people."

P4, HPO

For SP it depended on the service user and their needs and ranged from one session to multiple sessions over a longer period of time.

"Some people who want to work on their physical health are just looking for information on what's available to them and that's a simple case of signposting and maybe a bit of motivational support in our chat."

P19, SP

Sub-theme: Choosing an appropriate physical activity. All intermediaries discussed how service users' preferences and interests were used to guide selection of a suitable community-based physical activity service.

"I'm not sure if I agree with that question about me deciding on a group, because again it very much depends on the person themselves."

P19, SP

Service users were connected to physical activities that would be enjoyable and suited to their needs, such as their physical health, physical fitness, or psychosocial needs.

"It would be kind of thinking about what's on, thinking about the person's ability, and what they're going to get the most enjoyment at, because it'll suit them."

P18, SP

Only one LSO intermediary explicitly said that they would choose a community-based physical activity service based on the quality of the service. The physical activity instructor was considered by intermediaries as an important feature in the process of encouraging service users to take part in a group, especially as the intermediary began to step back and the frequency of contact began to decrease.

"The social prescriber cannot become a befriending service to the point where we are accompanying somebody consistently, it would be too much. So I have to trust... the facilitator of that programme, is able to take up that hand-holding to a degree."

P27, SP

LSO and SP believed that physical activity instructors should be knowledgeable about physical activity and exercise and be skilled in adapting and delivering exercise suitable to the service user's needs.

"There's a health screen where we find out any information in advance. So the instructor's prepared and know[s] about the person coming in and can prepare... the class that they need."

P08, LSO

Sub-theme: Accommodating complex needs. To accommodate physical health needs, all intermediaries highlighted the importance of seeking medical clearance before the service user engaged in physical activity. SP reported they often sought medical clearance for service users with more complex health needs or suggested medically supervised or condition-specific physical activity groups.

"I just had a lady in recently who had fibromyalgia and she . . . had about 12 different things and she was referred by a physio. And what I would . . . tell her what's available but I will be saying to her you need to check back in with the physio before you would participate with any of these activities."

P23, SP

To support older adults to engage in physical activity, intermediaries recommended groups specifically designed for older adults or focused on falls prevention and balance.

"So we do chair-based exercise classes, but it's very functional. . . it's focused on falls prevention, a lot as well."

P29, LSO

All intermediaries recognised the potential digital literacy needs of older adults, and offered support to those that were less computer-literate.

"But still a lot of older people are struggling with the online [registration] so we still facilitate that in terms of the walk-ins or posting out the registration forms as well."

P08, LSO

Community-based physical activity services offered socially isolated service users the opportunity to connect and build wider peer support and community networks.

"I kind of approach it with a person like. . . a balanced body, a balanced mind. . . I try and suggest something physical. . . Usually the physical thing is part of a group. . . it gives them that regularity of contact with a bunch of people."

P07, SP

For service users of SP that were not ready or interested in engaging in physical activity, intermediaries recognised this had the potential to change over time.

"But I suppose it's having an awareness that sometimes people aren't at the place to engage, and sometimes it is planting that seed."

P09, SP

To assist service users in making this change, SP intermediaries reported several strategies. They may have suggested an alternative community service to address barriers to being physically active (for example, a service user with weight management difficulties attending a healthy eating programme), incorporated physical activity into other activities (for example, through volunteering) or adjusted their level of support accordingly.

"I think a lot of the time when people are reluctant, when there is something that they want to engage with but there's this bit of a barrier there, that offer of that support can be really, really helpful for people to actually take that first step and become more engaged."

P19, SP

Exiting from the intermediary service

This theme describes how service users were 'discharged' or exited from intermediary services, as well as processes used by intermediaries to communicate back to referring agents. Two sub-themes were identified: 'discharge processes' and 'communication with referring agents'.

Sub-theme: Discharge processes. Both LSO and SP spoke about service users continuing to engage in community-based physical activity services after the connection was made, which was taken by many intermediaries as a proxy measure of improved physical activity. However, this was rarely formally measured.

"So we're always trying to find a way for them to access physical activity... whether they stay with us or not... We don't evaluate everything, because one, we wouldn't have time otherwise, we'd spend most of our time evaluating."

P01, LSO

The 'discharge' process varied from service to service and across intermediary types, but the person-led ethos to assessment and follow-up carried through to the exit process. Generally, the exit process began once service users had been connected successfully to a group or were deemed to be more socially connected.

"Typically, when that happens you'll see other things in their life start going. So when you ring them for the follow up after they've been engaged in something, they'll be like, yeah, I've been going to that course. Yeah, I also went out to meet my sister for lunch, and I haven't seen her in 6 months."

P18, SP

Several SP had no formal 'discharge' or exit process, with some intermediaries reporting that they had service users who had never stopped engaging with the service.

"I'm six and a half years now in this post and there are some people that I am seeing, maybe every couple of months from the beginning."

P21, SP

LSO similarly spoke about service users returning to their service and participating in the same groups. This idea of 'repeat attenders' was identified by both SP and LSO.

"If they just feel comfortable at that level, and you know, they don't want to go on to anything else... they want to stay in that safety net of the Men on the Move group, and it's a social element for them... I think that's totally up to them."

P02, LSO

Sub-theme: Communication with referring agents. The final step in the process was feeding back to the original referring agent, if any. Only some referring agents requested feedback on service users' progress, but in other services providing feedback was not common practice.

"What I usually generally do is I don't divulge details but I just inform the referral agent of the person's engagement. So, a general email then to follow up and say that your referral engaged in the programme and they are engaging well or they're not."

P03, SP

Working in the local context

This theme describes the availability and types of community-based physical activity services within the intermediaries' local community, and the contextual factors that facilitated their knowledge of these services. Two sub-themes were identified: 'local knowledge as an asset' and 'partnerships and collaborations'.

Sub-theme: Local knowledge as an asset. Having a knowledge of currently available, local, community-based resources, services, and groups (local knowledge) was of significant benefit and a key component of the intermediary process. Intermediaries spoke about both service users and referring agents valuing the intermediary's local knowledge.

"Especially because it's local, they know that you are working in that area, they know that it's local to them, it's not somebody ringing from [areas] or outside. . . they're ringing because they're looking for a local programme. . . they're happy about that you know."

P22, LSO

However, building this local knowledge was often labour intensive. It was conducted and driven by the intermediaries themselves, and many spoke of the difficulties and challenges of keeping this up to date.

"I would say the most up to date resource is in my own head [laughing] because. . . if I was to have an up-to-date resource at my fingertips it would just be a 24–7 job."

P19, SP

There was a large variety of community-based physical activity services available in the intermediaries' local communities.

"But I have to say, when I look at [city] compared to other cities, I do think we are very well resourced in terms of options for physical exercise, especially for people who would be intimidated by the idea of exercise, and would never consider themselves athletes, there are so many non-intimidating beginner options, and welcoming options that people can access."

P09, SP

Some of the more popular choices were dancing, chair-based exercise, local gyms and leisure centres, yoga and tai chi in addition to sports, gardening and water-based activities.

Walking groups were by far the most reported activity by intermediaries and were a popular activity amongst service users.

"People love walking. A lot of people want to do walking, walking groups. . . There's a very well-established walking group in one of the [GP] practices, and lots of people from that practice want to join the walking group, so I get referrals to see them, and then part of that referral would be to introduce them to the walking group."

P18, SP

Sub-theme: Partnerships and collaborations. In addition to developing local knowledge, intermediaries spoke of an ongoing process of utilising and building networks of partnerships and collaborations within their community and local context. These partnerships often developed naturally over time and constituted a 'coming together' of partners working in the same area.

"There's no specific area where you say, oh, yeah, we have partnership, and this is where it started. It's built up over time. . . they know this local sports partnership is there, and we know that they're there in a sense."

P29, LSO

Intermediaries described partners becoming aware of the others' presence and specific attributes of the service, and learning how each partner could help to implement health and physical activity policy and strategy within the local context.

"So you are now linking in with the HSE [Health Service Executive], Sláintecare, [local council], other departments so we're all kind of starting to work together or meet or share details or network or things like that. It's kind of growing. . . it kinda wasn't there in the past. You may have felt you worked on your own."

P22, LSO

Intermediaries explained how partners brought specific skills and knowledge to the partnership, enabled cross-referrals where appropriate, and provided important resources such as equipment, funding and venues for community-based physical activity services.

"It's really about linking in with the likes of the development companies. . . family resource centres. . . local GAA [Gaelic Athletic Association] clubs, your community groups, your over 55s groups, because these people, they have people on the ground they linked in with. . . we might find it hard to infiltrate these rural settings, a little hamlet, or whatever, so it's important to build on what's already there."

P20, HPO

Intermediaries working in rural areas reported significant, unique challenges, with scattered hubs of community resources and services and service users often presenting with rural isolation. Issues that likely were contributing factors to rural isolation also made it difficult to access physical activity services, such as lack of transport.

"Travel is a big issue in the rural areas and we would see that in [county]. . . so it's great if you can go into the community whereas if you're doing a [exercise group in a] town over approach you're cutting off a lot of people that really need to be active."

P08, LSO

Discussion

This study aimed to gain insight into the processes, practices, and procedures of intermediaries in Ireland, in connecting people to community-based physical activity. This study described the steps of these processes of three types of intermediaries: Health Promotion and Improvement Officers [HPO], Local Sports Partnership Officers [LSO] and Social Prescribing Link Workers [SP]. While a number of commonalities were identified across the three types of intermediaries, processes were varied and heterogeneous.

Processes and patterns of referrals were heterogeneous between types of intermediaries, as may be expected based on the differences in job remit. Our scoping review found the most common sources of referral were from primary care staff, general practitioners or as part of a research study [35]. However, intermediaries in this study reported that referrals were accepted from almost every source in the community, with few restrictions on who could refer and how. This highlights the accessible and open nature of these services, especially the acceptance of self-referrals, and means that their services are available to individuals who may not present to healthcare services or settings. The fact that many intermediaries were based in non-healthcare settings may have also contributed to the accessibility of their services. Intermediaries who participated in this study were based in community centres, local development companies, local governments and councils. Intermediaries therefore have the potential to reach many population groups living within the community to help improve their physical activity levels, including those who may experience increased barriers and inequalities in accessing healthcare services.

A major finding was that while HPO received referrals for community-dwelling adults, they did not typically refer these service users onwards to community-based physical activity. However, the remit of a HPO in Ireland is very broad. They are expected to deliver health and wellbeing training programmes to health service staff, provide knowledge and expertise, and support different models of care within the health service to deliver health and wellbeing gains for the population [53]. This is in addition to their work providing one-to-one smoking cessation services. The current focus of the role on smoking cessation may reflect a key implementation or policy area at the time of this study [54]. While physical activity promotion may simply not be a priority at present, priorities could shift and change over the coming years.

Both SP and LSO reported receiving low numbers of referrals specifically to increase or improve physical activity. SP in this study tended to receive referrals for social reasons, similar to many social prescribing services across the world [55, 56]. Conversely, while individuals were referred or attended LSO exclusively to participate in their physical activity groups, this was mainly through self-referral. Despite low numbers of formal physical activity referrals to both SP and LSO, many intermediaries spoke about assessing the service user's physical activity levels, their interest in physical activity, and then connecting service users to and having them engage in community-based physical activity. This appears to represent a disconnect between the reason for referral and what the service user reports they want to address [57]. It also highlights intermediaries' awareness of the potential benefits of physical activity in addressing and improving multiple aspects of health. Overall, this study suggests that formal referrals to both LSO and SP to engage in physical activity could potentially be improved.

This study found that individuals accessing intermediary services appear to be experiencing poorer physical, mental, and social health and that intermediaries tried to accommodate these needs when connecting service users to suitable community-based physical activity. This is an important finding given the context of this study. Data collection for this study was carried out in 2022, when many intermediary and community-based physical activity services were resuming or reopening after periods of Covid-19 associated lockdowns. Lockdowns had detrimental effects on the ability and opportunity for individuals to engage socially, with many experiencing social isolation [58–60]. Greater social isolation in older men and women is related to reduced objective and subjective physical activity and greater sedentary behaviour [60–62].

A person-led approach was evident across all intermediary types in terms of assessment, follow-up and in choosing a community-based physical activity service for the service user, regardless of the length of their intervention. This was true even for LSO who reported more limited time with the service user, in contrast to SP who may remain in contact with a service user over a period of months or even years. In the Let's Get Moving physical activity pathway, designed for the UK national health service, follow-up is recommended at three and six months after a physical activity intervention [63]. Longer periods of follow-up or more intensive follow-up have been identified as potentially successful components of physical activity interventions [64, 65].

However, it is unclear whether different referral patterns, assessment and follow-up practices influenced the intervention. For example, the optimum number and duration of contacts to initiate and maintain participation in physical activity remains unclear [15], particularly for service users with low agency or more complex health needs or issues. These service users may require more support and more intense interventions [51, 66–68]. This study identified that SP not only work with service users with complex needs but provide ongoing support to service users who were not ready to change their PA behaviour. Unfortunately, the interview schedule was not designed to explore how intermediaries may have handled resistance or built motivation over time. Future studies could take into consideration the findings of this study regarding the length of follow-up provided by each type of intermediary, as this may be an area of further research i.e., does more support throughout this process, over a longer time, equal more successful connections to community-based physical activity, and who would benefit from this more intensive support?

This study identified that intermediaries initiated and maintained participation in physical activity for service users with poorer health. This finding is of note, given the recent move to enhance community-based chronic disease prevention services within the Irish healthcare system. The need for enhanced supports to improve self-management skills for people living with chronic disease had also been recognised at a national level, with roll-out in 2021 of integrated care teams, chronic disease hubs and chronic disease models of care [13, 69]. Self-management involves the individual being an active participant and decision-maker regarding their health e.g., eating a healthy diet, medication compliance and participating in physical activity [70, 71]. The Irish healthcare system was and is undergoing major reform as part of the Skintecare initiative, involving significant development and expansion of primary and community care services [11]. This echoes the call for community-based approaches to improving physical activity, where physical activity initiatives and programmes are offered where people live, work and engage in recreation [6]. This supports the need for community-based services, such as those provided by intermediaries, to support those living with social isolation, poor physical health, and the negative sequelae of these.

By facilitating and encouraging service users to participate in physical activity, there is potential for two distinct roles for intermediaries: one of primary prevention of ill-health, and

one for secondary prevention of complications resulting from ill-health. However, while some intermediaries who took part in this study had previous experience or further training to support them working with people with complex needs (Table 1) this was not the case for every participant. The interview schedule was not designed to explore intermediaries' perceptions of working with service users with more or less complex needs, so it is unclear whether all intermediaries felt comfortable and competent delivering interventions for these service users. Healthcare professionals often report a need for appropriate education and continuous training when promoting physical activity [17, 23, 27]. Intermediaries could perhaps therefore benefit from additional training to provide the optimal support to facilitate behaviour change for these service users, and to ensure selection of suitable physical activity services for these service users.

This study also explored how intermediaries chose a suitable and appropriate community-based physical activity service for service users. While this process was practical (e.g. medical pre-clearance, difficulties using online registration systems) and person-led (based on the individual's abilities and interests), local knowledge was a key factor in this decision. However, the time-consuming nature of maintaining this knowledge was highlighted by many intermediaries in this study. Bar one participant, no intermediary interviewed for this study mentioned quality of the physical activity service as a factor in their decision to recommend a service. This may be in part due to an already demanding schedule keeping up to date with local community resources and working with pre-existing service users (for long periods of time, as evidenced by the lack of formal exit processes), but also the fact that outcomes in relation to onward connections to community-based physical activity were poorly captured.

Evaluating outcomes using appropriate measures would allow intermediaries to appraise the success of their onward referrals, and/or quality of the physical activity service. It may be unreasonable to expect evaluation at that level without further support and resources and highlights a potential area for further evaluation and research collaboration. For example, community-based physical activity providers could evaluate and feedback to intermediaries. Having more robust pathways and procedures in place for the evaluation of physical activity outcomes and of the physical activity groups being accessed by service users, may help to improve service user outcomes as well as help to reassure potential referring agents as to the safety and quality of the physical activity being delivered, helping to improve formal referrals.

Several important contextual factors were identified which influenced the processes of intermediaries. A commonality across all categories of intermediaries was building knowledge of local physical activity services, which was found to be a key input in the intermediary intervention. Other studies have also noted the importance of this local knowledge, and the importance of the intermediary's own personal skills in developing and maintaining this knowledge [56, 72–74]. Intermediaries in this study were based in a variety of central community locations and this, alongside dedicated time and resources to build their local knowledge, means they are likely best placed to recommend individualised physical activity and wider health and wellbeing resources specific to their local context. However, one limitation of the reliance on intermediaries to gather and update this information individually is inconsistent or outdated resources, or services being missed due to limitations of their awareness [75].

Another commonality for all intermediary types was their commitment to building and maintaining partnerships and networks of collaborators. Intermediaries reported that partnerships allowed them to connect service users to appropriate and properly resourced physical activity services. Development of effective partnerships and referral pathways relies on careful selection of partners who will complement each other, who will strengthen the partnership's goals and provide effective and efficient services to meet the needs of service users [76–78]. This study found intermediaries used a 'bottom up' approach to building partnerships and

collaborations, with active 'seeking out' of local community partners. This is particularly relevant in the context of the Sláintecare roll-out, as a key focus is partnering with local agencies in order to target specific health and wellbeing needs in the local community [11, 12].

Limitations

This study has a number of limitations. The sample was self-selected, and intermediaries who participated in this study tended to have professional backgrounds in health and social care and/or physical activity. Our sample could therefore represent those with a professional interest in physical activity promotion and not be representative of the processes of intermediaries generally. We aimed to recruit participants from the entire Republic of Ireland, but certain areas of the country were underrepresented, for example, counties in the midlands and south of the country where intermediaries may report different processes for connecting individuals to physical activity services. SP and HPO participants tended to have limited experience in their role, with the modal length of time in the role being one year. However, this is likely a reflection of new investment by the national health service in intermediary services, with many of these roles being created within the last few years. As many of these new roles are still in development, their full scope and remit will continue to evolve over time. Therefore, this study represents an overview of the processes and procedures relevant to the intermediaries who participated in this study which is likely to grow and progress over time in response to local needs, funding, and policy directives. A further limitation was not including referring agents and/or service users which limits insights into their experiences of engaging with this intervention.

Conclusions

Local Sports Partnership Officers [LSO] and Social Prescribing Link Workers [SP] are two types of intermediaries in Ireland that facilitate connections to community-based physical activity, by providing different levels of support, whereas Health Promotion and Improvement Officers [HPO] did not actively connect service users onwards to physical activity. Despite this, referrals from healthcare and other professionals to LSO and SP to specifically improve physical activity are low. Considering the high levels of physical inactivity in Ireland, and the challenges associated with connecting physically inactive people to community-based physical activity, intermediaries may be an under-utilized resource to increase physical activity. This study identified and described the steps involved in the processes of establishing and embedding intermediary services within the context of their local community, and pathways of connecting individuals to intermediaries and onwards to community-based physical activity. This is an important step to improve evaluation efforts, synthesis of evidence and the planning of future trials. Further studies are needed to investigate the impact of interventions provided by intermediaries, across the continuum of support provided, and using appropriate outcome measures, to capture physical activity levels of service users. Future trials can now focus on other key phases of complex intervention evaluation, such as feasibility and evaluation [34], and a pilot feasibility trial is currently underway [29].

Supporting information

S1 File. Detailed descriptions of intermediary roles. A detailed description of the health promotion and improvement officer, local sports partnership officers and social prescribing link worker roles in Ireland.
(DOCX)

S2 File. Sample audit trail. A sample audit trail for the cluster 'mental health issues negatively impact engagement', part of the theme 'connecting individuals to physical activity'. (DOCX)

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Appendix VI: Ethical approval letter (study II)



Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

21 July 2022

Re: The processes and practices of an intermediary in connecting community dwelling adults to local physical activity and exercise services

Application No: 20220601

Dear Megan

Your application has been reviewed by the School of Medicine Research Ethics Committee (REC) and we are pleased to inform you that the above project has been approved.

Please note that documents submitted for GDPR purposes within your ethics application are approved by the REC from an ethical perspective only and this approval does not confirm GDPR compliance. Where a Data Protection Impact Assessment (DPIA) is required please submit the DPIA to the Data Protection Office (DPO) and seek comment from the DPO prior to commencing your study.

It is the responsibility of the researcher/research team to ensure all aspects of the study are executed in compliance with the General Data Protection Regulation (GDPR), Health Research Regulations and Data Protection Act 2018.

This Level 2 REC approval has been granted based on the information which you have outlined in your REC application and supporting documentation. You, and the named research team (if applicable), are responsible for conducting the research strictly in the manner outlined in your application and supporting documentation, and in compliance with it. Deviation from the study as outlined in the approved REC application will invalidate this REC approval. Any changes or amendments to the approved study must be re-submitted to the REC for approval in advance of any changes or amendments being implemented.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Ghaith'.

Dr. Ghaith Hussein,
Chairperson, School of Medicine, Level 2 Research Ethics Committee,
Trinity College Dublin.

Appendix VII: Participant information leaflet (study II)



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Name of Study: THE PROCESSES AND PRACTICES OF AN INTERMEDIARY IN CONNECTING COMMUNITY DWELLING ADULTS TO LOCAL PHYSICAL ACTIVITY AND EXERCISE SERVICES

Site	Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT
Principal Investigator and Co-Investigators	Megan O'Grady, Research Physiotherapist (Principal Investigator), email: ogradyme@tcd.ie Dr Emer Barrett, Assistant Professor, email: barrete@tcd.ie Dr Deirdre Connolly, Associate Professor, email: connoldm@tcd.ie
Study Organiser/ Sponsor	Trinity College Dublin
Data Controllers	Trinity College Dublin
Data Protection Officer	Data Protection Officer Secretary's Office Trinity College Dublin Dublin 2

You are being invited to take part in a research study that is being done by Trinity College Dublin by researchers from the Disciplines of Physiotherapy and Occupational Therapy. Before you decide whether or not you wish to take part, please read this information sheet carefully. Ask the research team any questions. Don't feel rushed or under pressure to make a quick decision. This leaflet has five main parts:

Part 1 – The Study

Part 2 – Data Protection

Part 3 – Costs, Funding and Approval

Part 4 – Future Research

Part 5 – Further Information

Part 1 – The Study

Why is this study being done?

- Physical inactivity is a major global issue affecting health. People often present to healthcare professionals with issues relating to their health and wellbeing, including being physically inactive. Community-based physical activity and exercise services offer a wide variety of choice and reduce barriers to participation in physical activity.
- An intermediary is a professional who facilitates connections from healthcare services (or through self-referral) to community services. However, the evidence describing an intermediary's role in connecting people specifically to physical activity is limited.
- We are doing this study to understand how an intermediary connects (or doesn't connect) people to local, community-based physical activity and exercise opportunities in order to improve their health and well-being. We want to learn about the processes and practices of intermediaries in establishing these connections.

Why have I been invited to take part?

- You have been invited to take part because you are aged ≥ 18 years, and have been working as an intermediary for longer than a year.
- We are interested in speaking to individuals from three categories of intermediaries in Ireland: social prescribing link workers, health promotion and improvement officers and Local Sports Partnerships community development officers.
- We want to interview approximately ten people from each of the categories.

Do I have to take part? Can I withdraw?

- You do not have to take part in this study. It is entirely voluntary, and all your responses will be kept confidential.
- You can change your mind about taking part in the study and opt out at any time even if the study has started, and you do not have to give a reason. If you decide not to participate you will not be penalized in any way.
- When the interview is over you can still choose to withdraw your data up to the point that analysis has taken place.
- After analysis has been completed you can choose to delete your individual data, view it or take it away with you, but at this stage we won't be able to remove your data from the overall results as they will have been combined.
- You will be assigned a study ID when we are transcribing your interview, therefore you won't be identifiable in any reports or outputs related to this study.
- If you wish to opt out, please contact Megan O'Grady on ogradyme@tcd.ie who will be able to organize this for you.

What will happen to me if I decide to take part?

- You will be provided with a consent form. You must read and complete this consent form and return it to the research team before taking part in the study.

- A date, time and location will be arranged for your interview according to your availability. The interview can take place in-person, over telephone, or online depending on your preference. The interview will be recorded to enable us to listen back to the conversation and ensure we understand the points made.
- We will also send you the interview questions in advance, so that you have some time to think about how you might like to answer.
- During the interview we will ask you about how your service was established; the profile of people who you work with; the process of connecting people to community-based physical activity and exercise services, and how you identify and assess the quality of community-based services.
- The study interview will last approximately 30-45 minutes.

What will happen to my Data?

- Data collected will be stored digitally in a Trinity College Dublin cloud server which is protected using a two-stage authentication process.
- All personal data will be pseudo anonymised (coded), and only the research team will have access to this data.
- If you choose to do your interview in-person or over the phone, audio recordings from the interviews will be transcribed (typed record of the interview) by a professional typist. Real names will then be removed from the transcripts and you will be assigned a study ID. If you reveal any potentially identifiable data during the interview this will also be removed from the transcripts by Megan O'Grady.
- If you choose to do your interview online, the interview will be automatically transcribed. We will record the interview also to check that the transcription is accurate.
- Transcripts will be analysed by looking for themes and similarities between participant's answers. Data analysis will be conducted to determine what processes, practices and procedures are used by intermediaries in Ireland when connecting people from healthcare services to community-based physical activity and exercise services.
- It is intended to publish the findings of the study in an academic journal and/or present them at a conference.

Are there any benefits to taking part in this research?

- Taking part in this study will not directly benefit you. However, your responses may help us to better understand the processes of intermediaries when connecting people to community-based physical activity and exercise services in greater detail. In this way you will help to describe current practice and help to inform future research in this area.

Are there any risks to me if I take part?

- There is no risk to participating in this study.

Part 2 – Data Protection

What information about me (personal data) will be used as part of this study?

- Information about your job will be collected (your title, where you work and time in your current role).
- The study interview will be digitally recorded. Therefore your voice will be recorded, and if you choose an online interview and opt to have your webcam on, your face will be recorded.
- Transcripts, which are used for analysis, will record what you say during the study. We will destroy the digital recording of your interview once the transcript has been made.
- Your responses (transcripts) will be stored securely for up to 7 years, after which they will be destroyed.

Who will access and use my personal data as part of this study?

- Only members of the research team as named above will have access to your data for the purposes of analysis.

Will my personal data be kept confidential? How will my data be kept safe?

Your privacy is important to us. We take many steps to make sure that we protect your confidentiality and keep your data safe. Here are some examples of how we do this:

- We will keep all data in secure files on a password-protected, encrypted Trinity College Dublin cloud server. Only members of the research team as named above will have access to the password.
- All of your details will be coded with a study ID to maintain your confidentiality. Your name will be changed on the transcript. If you reveal any potentially identifiable data during the interview, such as your place of work, this will also be removed from the transcripts.
- The results of the study may be published in an academic journal and/or presented at a conference, but you will not be identified in any way in these reports/output.
- All researchers working on the project have undergone training in data protection.

What is the lawful basis to use my personal data?

By law,¹ we can use your personal information for scientific research² in the public interest³. We will also ask for your explicit consent to use your data as a requirement of the Irish Health Research Regulations.

What are my rights?

You are entitled to:

- The right to access to your data and receive a copy of it
- The right to restrict or object to processing of your data
- The right to have inaccurate information about you corrected or deleted
- The right to receive your data in a portable format and to have it transferred to another data controller
- The right to request deletion of your data.

By law you can exercise the following rights in relation to your personal data, unless the request would make it impossible or very difficult to conduct the research. You can exercise these rights by contacting Megan O’Grady or the Trinity College Data Protection Officer, Secretary’s Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.tcd.ie/privacy.

Part 3 – Costs, Funding and Approval

Has this study been approved by a research ethics committee?

Yes, this study has been approved by Trinity College Dublin, School of Medicine, Research Ethics Committee. Approval was granted on 21/07/2022.

Who is organising and funding this study?

This research project is funded by the Discipline of Physiotherapy, Trinity College Dublin, as part of postgraduate research.

Is there any payment for taking part? Will it cost me anything if I agree to take part?

No, we are not paying participants to take part in the study. The study interview will take place at a location convenient for you so you will not incur any expense other than time.

¹The European General Data Protection Regulation (GDPR)

² Article 9(2) (j))

³ (Article 6(1)(e))

Part 4 – Future Research

Will my personal data be used in future studies?

No, your data will not be used in future studies.

Part 5 – Further Information

Who should I contact for information or complaints?

If you have any concerns or questions, you can contact:

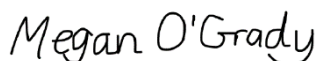
- Principal Investigator, Megan O’Grady: Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT. email: ogradyme@tcd.ie.
- Data Protection Officer, Trinity College Dublin: Data Protection Officer, Secretary’s Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.tcd.ie/privacy.

Under GDPR, if you are not satisfied with how your data is being processed, you have the right to lodge a complaint with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland. Website: www.dataprotection.ie.

Will I be contacted again?

The research team will not contact you again.

Signatures of investigators;



Megan O’Grady



Dr Emer Barrett



Dr Deirdre Connolly

Appendix VIII: Informed consent form (study II)

Study Name: THE PROCESSES AND PRACTICES OF AN INTERMEDIARY IN CONNECTING COMMUNITY DWELLING ADULTS TO LOCAL PHYSICAL ACTIVITY AND EXERCISE SERVICES

Centre ID: Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT

Identification Number for study: 20220601

Consent Form

There are two sections in this form. Each section has a statement and asks you to initial if you agree. The end of this form is for the researchers to complete.

Please ask any questions you may have when reading each of the statements.
Thank you for participating.

Please initial the box if you agree with the statement. Please feel free to ask questions if there is something you do not understand.

General	Initial
I confirm I have read and understood the Information Leaflet for the above study. The information has been fully explained to me and I have been able to ask questions, all of which have been answered to my satisfaction.	
I understand that this study is entirely voluntary , and if I decide that I do not want to take part, I can stop taking part in this study at any time without giving a reason.	
I understand that I will not be paid for taking part in this study .	
I know how to contact the research team if I need to.	
I agree to take part in this research study having been fully informed of the risks, benefits and alternatives which are set out in full in the information leaflet which I have been provided with.	

Data processing	
I understand that personal information about me, including the transfer of this personal information about me outside of the EU, will be protected in accordance with the General Data Protection Regulation.	
I understand that there are no direct benefits to me from participating in this study. I understand that results from analysis of my personal information will not be given to me.	
I understand that I can stop taking part in this study at any time without giving a reason and this will not negatively affect me in any way.	

To be completed by the lead investigator or nominee.

I, the undersigned, have taken the time to fully explain to the above participant the nature and purpose of this study in a way that they could understand. I have explained the risks and possible benefits involved. I have invited them to ask questions on any aspect of the study that concerned them. I have given a copy of the information leaflet and consent form to the participant with contacts of the study team.

Researcher name:

Title and qualifications:

Signature:

Date:

Appendix IX: Semi-structured interview guide (study II)

Section 1: The intermediary

- What is your professional background?
Example prompts: professional qualifications, additional training

Section 2: The people

- Who are the people that are referred to you?
Example prompts: age, gender, typical health conditions, number of referrals, why referred
- Can you tell me about how the initial contact and visit with the person happens?
Example prompts: method of referral, what happens when the person is referred, where do you meet the person, what do you talk about
- How many people do you refer to local physical activity services?
Example prompts: are all suitable, what services are they referred to instead

Section 3: The process

- How do you decide on a local physical activity service to connect the person with?
- How do you support the person in connecting to this physical activity service?
Example prompts: specific skills/techniques, length of follow-up
- How do you decide that the person no longer needs your services? Do you provide any feedback to the original referrer about the person and the services you have helped connect them with?

Section 4: The service

- How did you establish a working relationship between your service and local physical activity partners?
- How do you promote and 'get the word out' about your role?
Example prompts: primary care, local physical activity partners
- How do you monitor/evaluate the physical activity services that you use?
Example prompts: assessing quality, assessing permanence, assessing suitability, keeping up to date resources, are services effective
- Do you do any outcome measurement of your work?
Example prompts: general/ physical activity specific, is this fed back to the referrer

Appendix X: Qualitative theme development (study II)

1. Review and refinement of code names and code descriptions

[illegible]

Abbreviations: LSP — local sports partnership, PA — physical activity, SP — social prescribing link workers.

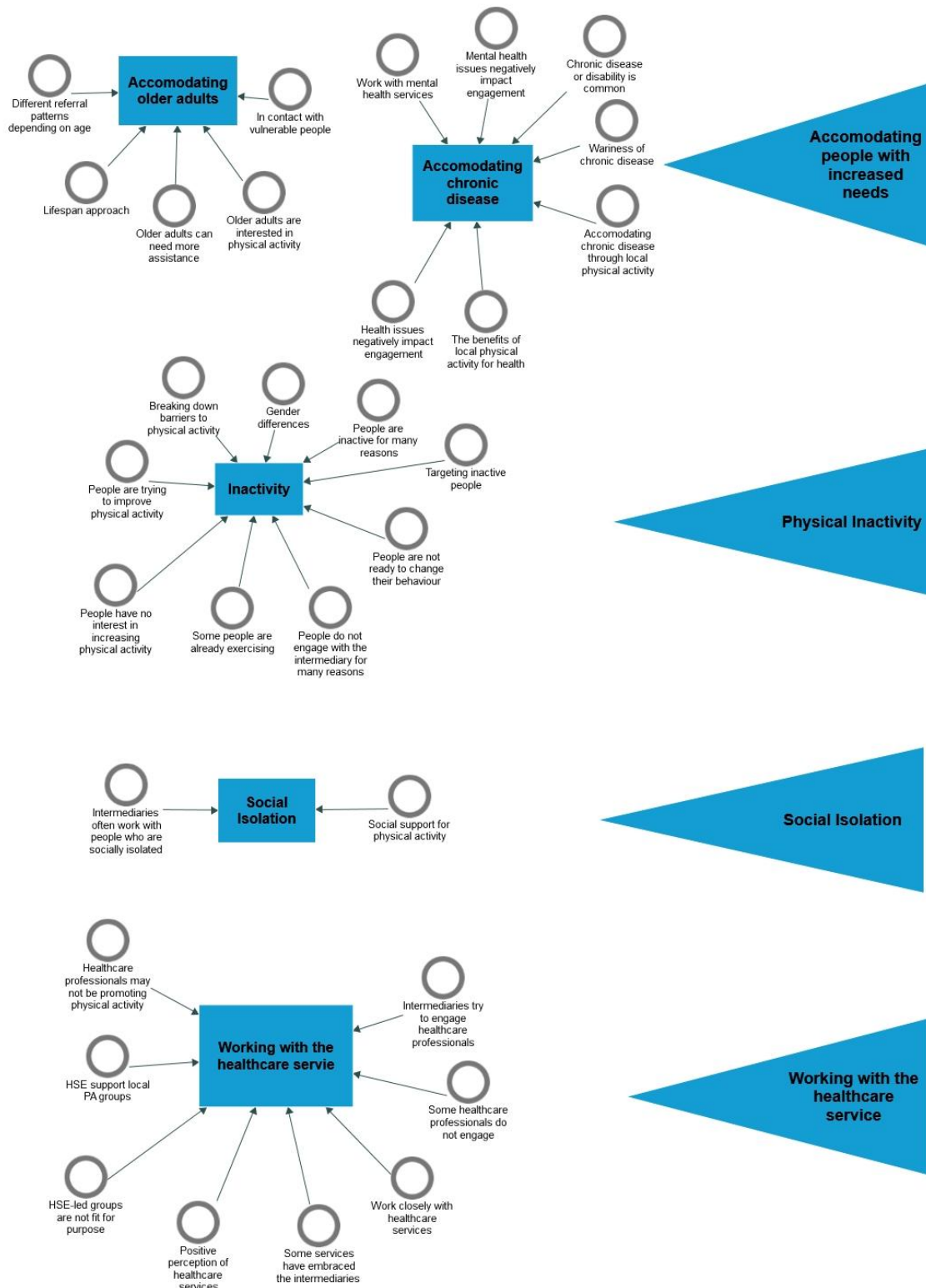
2. Sample of codes

Name	Files	References
a negative experience can impact physical activity engagement	5	5
accessibility of self-referrals	3	4
actively involved or interested in physical activity	11	13
approach to assessment and follow-up is holistic	11	13
assess barriers to physical activity	6	7
assessment at a place of convenience	9	11
assessment at GP practice	2	3
assessment at home	3	3
assessment can be an emotional process	3	4
assessment done remotely	1	1
assessment face to face	4	5
assessment highlights where the person needs assistance	4	6
assessment in community locations	7	10
assessment in office	5	6
assessment is a lengthy process	7	7
assessment over the phone	2	2
assessment process is person-led	5	7
attend other groups as a gateway to doing PA groups	5	5
attend PA groups as a holistic approach	7	10
attend PA groups for fun or pleasure	6	9
attend PA groups for peer support	10	10
attend PA groups to build confidence	5	8
attend PA groups to connect to community	9	10
attend PA groups to improve attitudes towards PA	2	4
attend PA groups to improve recovery	5	6
attend PA groups to promote independence	2	2
attend PA groups to share experiences and knowledge	2	2
attend PA groups to try new things	3	4
attend the first session	15	19
attend the last session	2	2
attend the PA group to ensure quality	4	7

Abbreviations: GP — general practitioner, PA — physical activity.

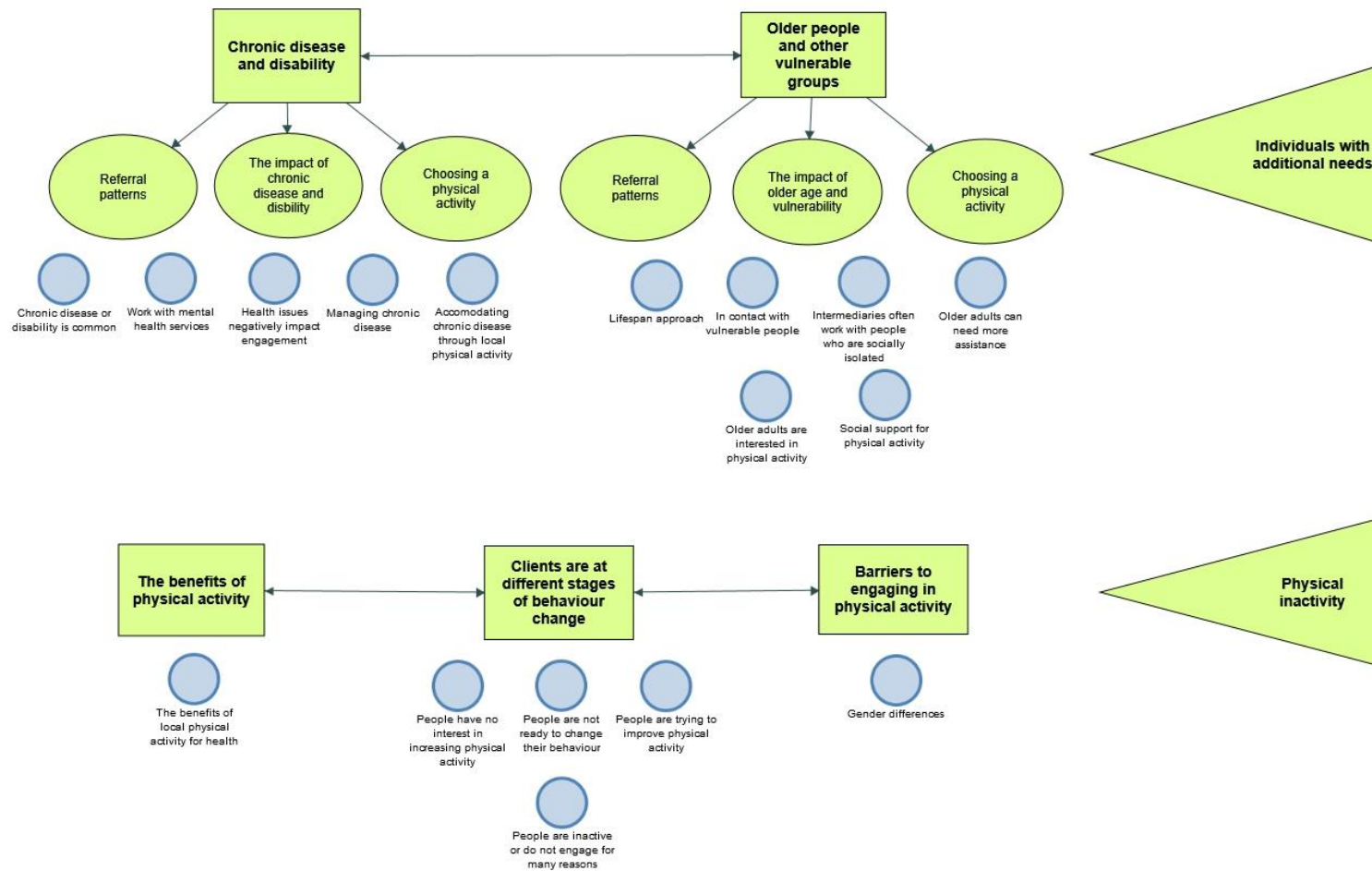
3. Development of themes from categories

Version 1: Concept Map (Population) 16/08/2023

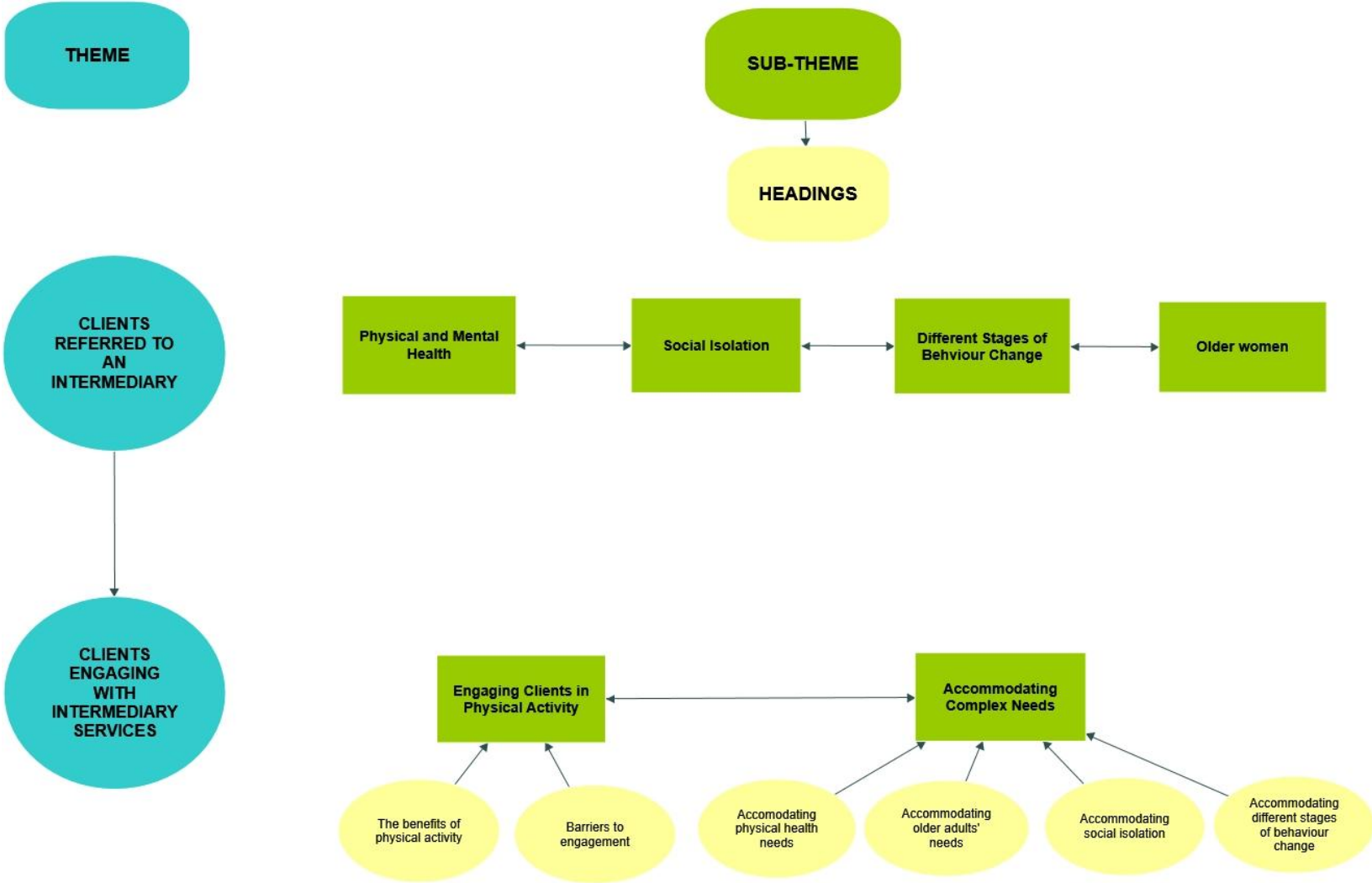


Abbreviations: HSE — Health Service Executive.

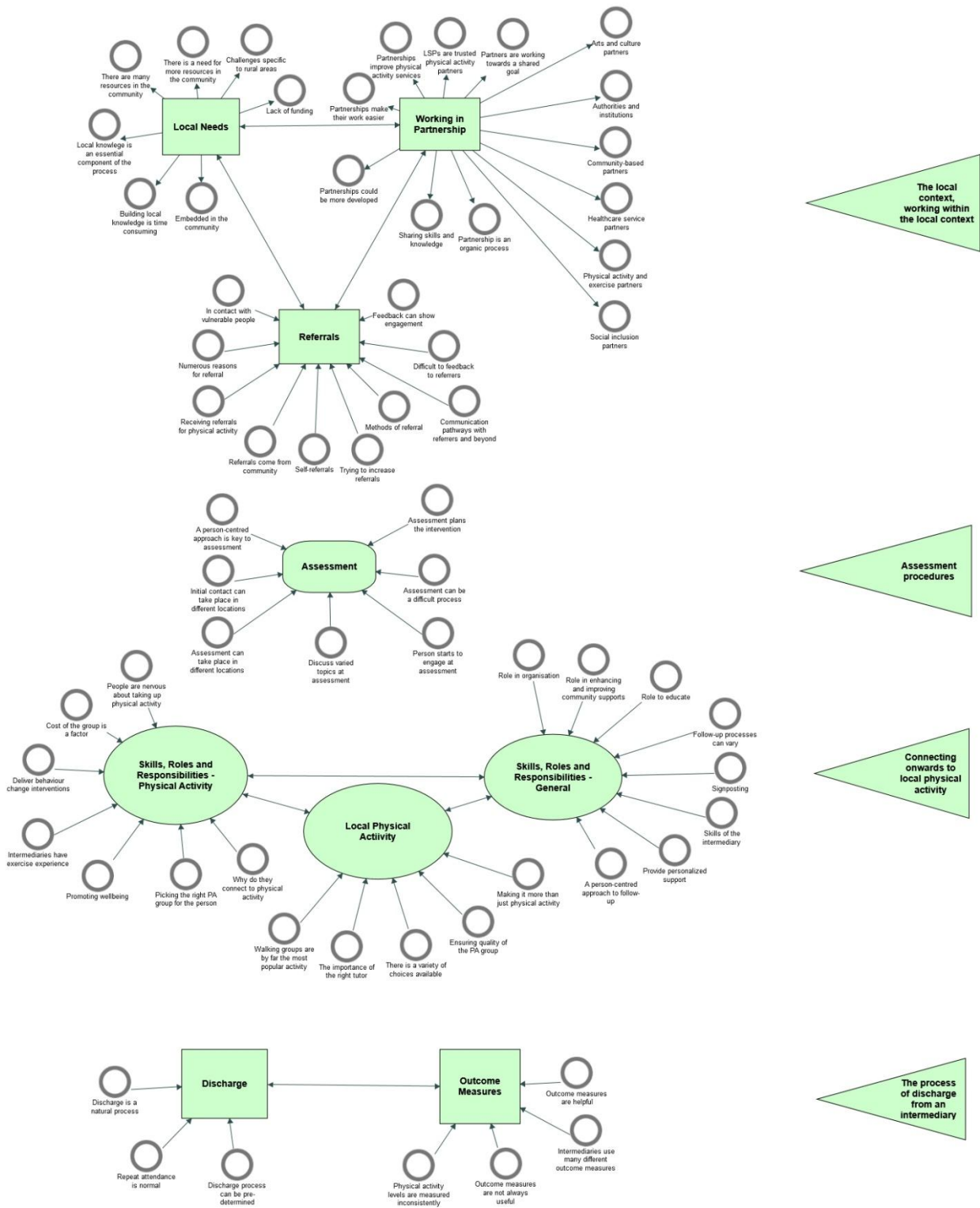
Version 3: Concept Map (Population) 19/10/2023



Version 4: Concept Map (Population) 30/11/2023

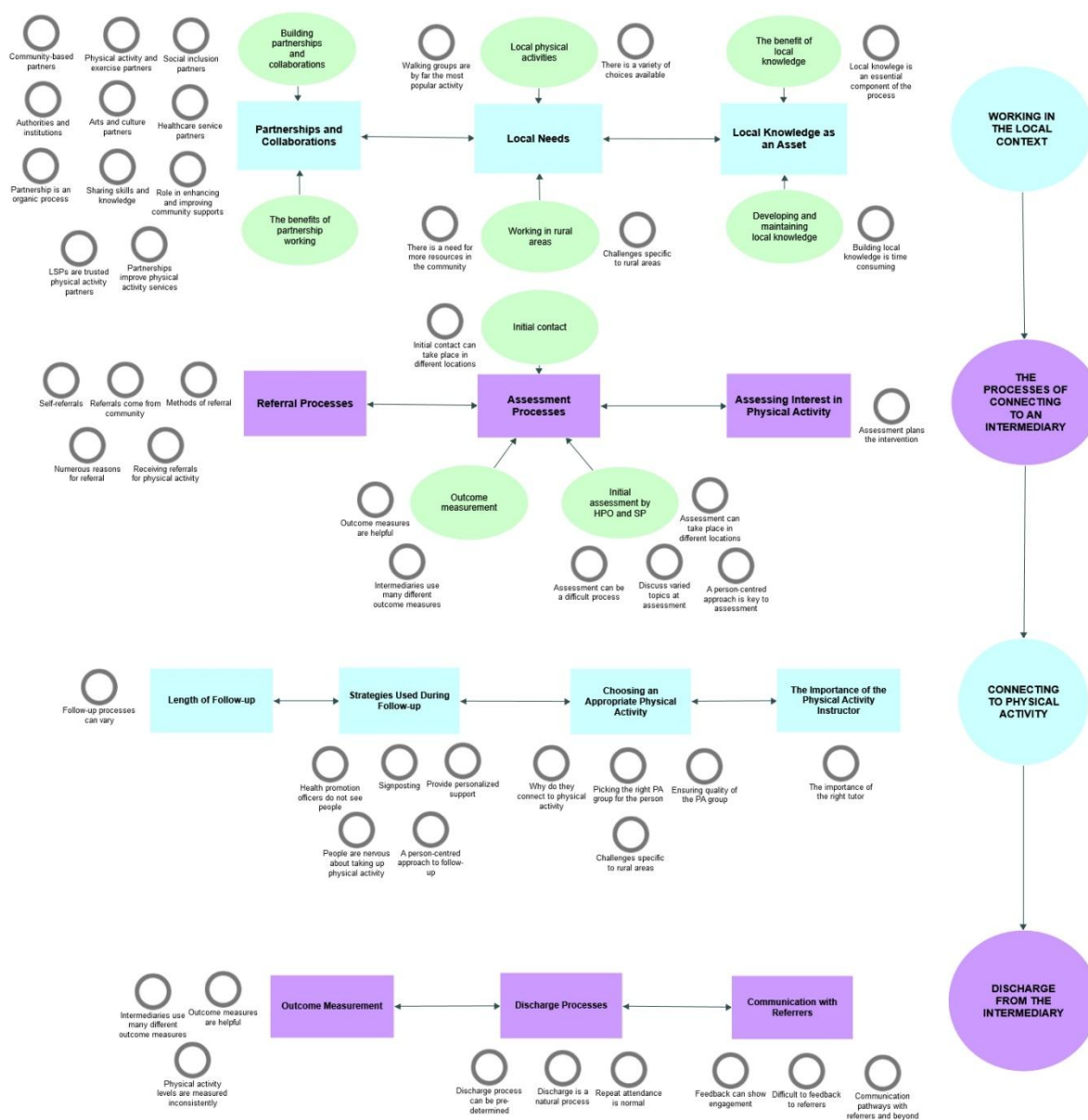


Version 1: Concept Map (Processes) 28/06/2023



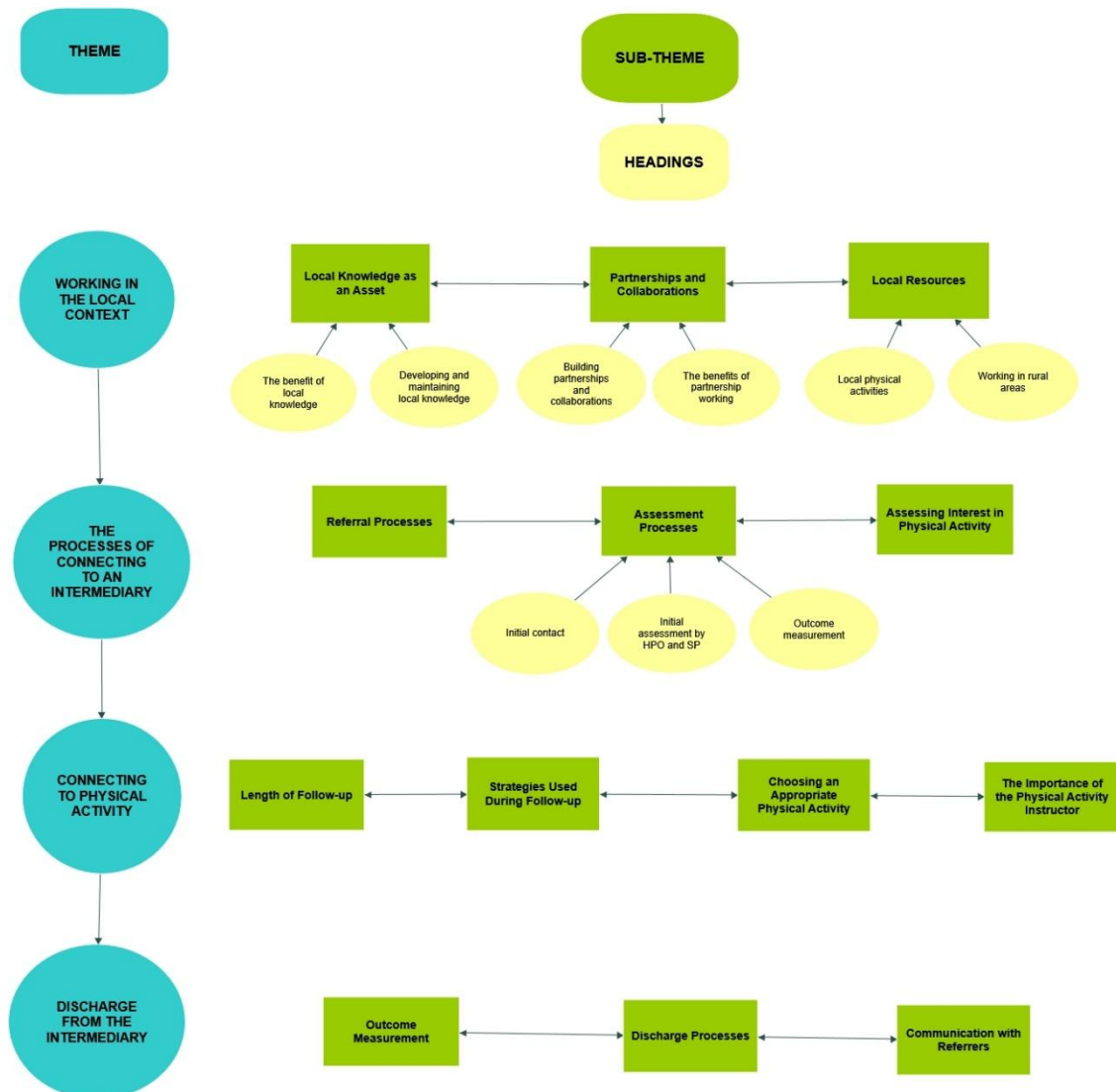
Abbreviations: LSP — local sports partnership, PA — physical activity.

Version 3: Concept Map (Processes) 01/09/2023



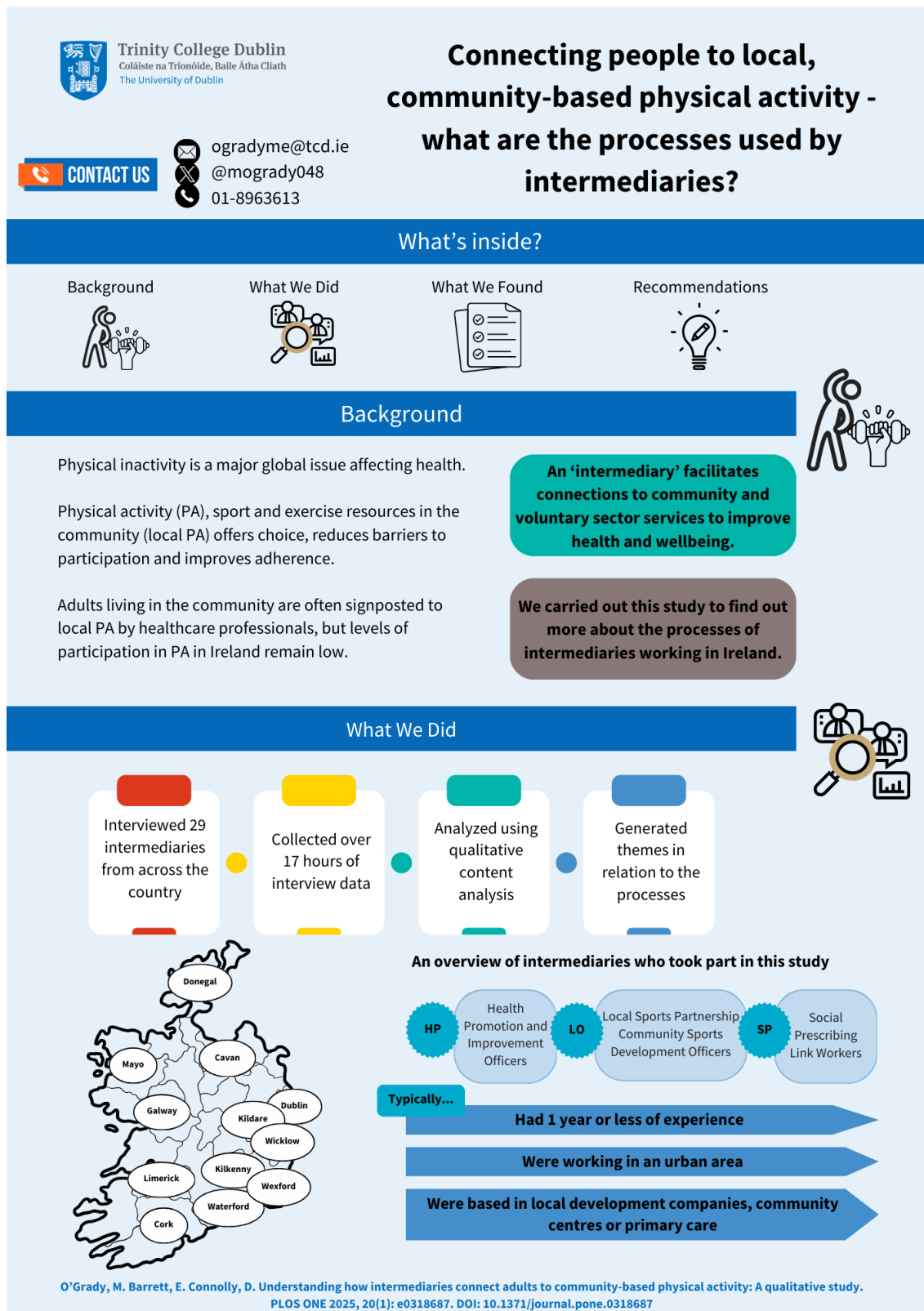
Abbreviations: HPO — health promotion and improvement officers, LSP — local sports partnership, PA — physical activity, SP — social prescribing link workers.

Version 4: Concept Map (Processes) 25/11/2023



Abbreviations: HPO — health promotion and improvement officers, SP — social prescribing link workers.

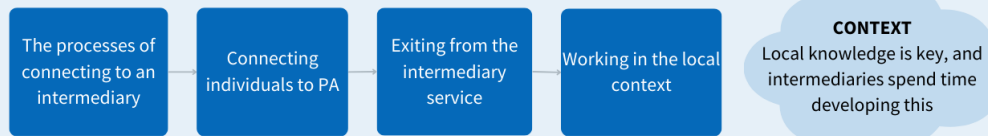
Appendix XI: Infographic summarising key findings (study II)



What We Found



We identified four themes in relation to the processes of intermediaries.



There were similarities and differences in the processes of the three types of intermediaries.

Connecting to intermediaries	Findings	HP	LO	SP
	Often connected through healthcare services, especially by allied health professionals and primary care professionals	x		x
	Received self-referrals	x	x	x
	Few people were connected to intermediaries to improve PA levels*	x	x	x
	People often had physical and mental health issues	x	x	x

*LO tended to receive self-referrals to improve PA levels

Findings	HP	LO	SP
Initial contact to give information about local PA		x	
Lengthy in-depth assessment, person-centred and holistic	x		x
Discuss likes, dislikes and interests	x	x	x
Assess barriers to PA e.g., physical fitness, mobility	x		x
Goal setting			x

Connecting to PA

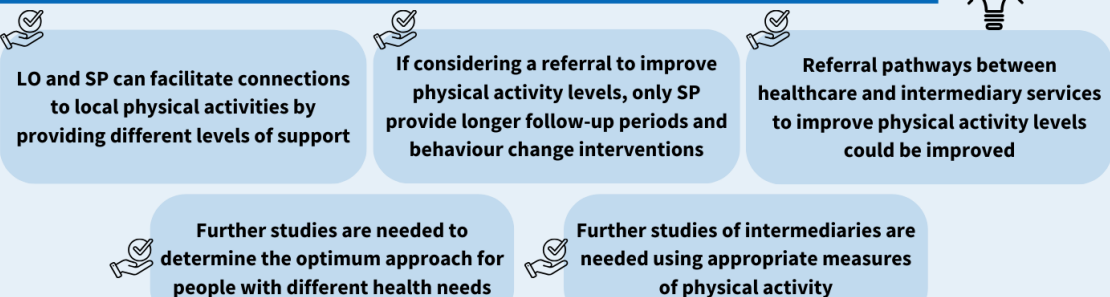
CONTEXT: Walking groups were by far the most popular local PA

Findings	LO	SP
Follow-up complete once connected to local PA	x	
Signposting	x	x
Level of support person-led	x	x
Advice, reassurance, encouragement, motivational support	x	x
Practical and instrumental support	x	x
Connect to other services and supports e.g., mental health, volunteering		x
Move clients to different stages of behaviour change		x
Brief interventions and signposting alone, no further follow-up or support		HP

Follow-up and strategies used

CONTEXT: The qualities of the PA instructor were important, as they 'took over' from the intermediary

Recommendations



O'Grady, M. Barrett, E. Connolly, D. Understanding how intermediaries connect adults to community-based physical activity: A qualitative study. PLOS ONE 2025, 20(1): e0318687. DOI: 10.1371/journal.pone.0318687

Appendix XII: Publication of pilot feasibility study protocol (“The role of intermediaries in connecting individuals to local physical activity – protocol for a pilot feasibility trial”)

Contemporary Clinical Trials Communications 41 (2024) 101332



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The role of intermediaries in connecting individuals to local physical activity – protocol for a pilot feasibility trial

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ABSTRACT

Background: Intermediaries are health-related workers who facilitate connections to local physical activities. Intermediaries deliver interventions by receiving referrals, conducting assessments, connecting referred individuals to activities and/or services in the community, and following up with them over time. However, it is unclear whether individuals who are referred to physical activities by an intermediary improve their physical activity levels, and what their perspectives and experiences are of participating in this intervention. To date there has been a lack of studies investigating the effect of this intervention on physical activity using appropriate outcome measures.

Methods: This will be a mixed methods pilot feasibility study. Participants will be individuals referred or self-referred to an intermediary and connected to local physical activities. Participants will be recruited through two types of intermediary services in Ireland; social prescribing and local sports partnerships. A total of 30 participants will be recruited (15 per service). Baseline demographic information will be taken upon enrolment to the study and three questionnaires will be completed: the International Physical Activity Questionnaire - Short Form, Self-Efficacy for Exercise Scale and Short Warwick Edinburgh Mental Well-being Scale. The questionnaires will be repeated after 12 weeks and in addition semi-structured interviews will be carried out to explore intervention content and delivery, as well as acceptability of the intervention and evaluation design.

Discussion: This overall aim of this proposed study is to investigate the feasibility of an intervention delivered by an intermediary to improve physical activity and health-related outcomes of community-dwelling individuals.

Registration: [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT06260995).

1. Introduction

Physical inactivity is a major global issue affecting health. Physical activity, sport and exercise resources in the community (local physical activities) offer choice, reduce barriers to participation and improve adherence [1–3]. An ‘intermediary’ is a health-related worker who supports individuals to improve their health and wellbeing. Intermediaries facilitate connections to community resources, services and supports (including local physical activities) to improve health and wellbeing [4–8]. A scoping review of methods used to connect individuals from primary care to local physical activities found strong positive findings for processes that involved referral to an intermediary,

when examining the percentage of patients connected with a physical activity opportunity, the percentage of connected patients enrolling in and attending the first session of the physical activity, and acceptability of the intermediary service for primary care professionals and patients [9]. Another rapid scoping review of social prescribing link workers (a type of intermediary) found improvements in physical activity levels and quality of life and/or wellbeing [3].

Intermediaries deliver complex interventions due to the number of components involved, the expertise and skills required by those delivering the intervention, the number of groups targeted and the level of flexibility of the intervention components [10]. When reporting and evaluating complex interventions, it is essential that the contextual

Abbreviations: IPAQ-SF, International Physical Activity Questionnaire - Short Form; LSPO, Local sports partnership community sports development officer; RCT, Randomised controlled trial; SEE, Self-Efficacy for Exercise Scale; SPLW, Social prescribing link worker; SWMWBS, Short Warwick-Edinburgh Mental Well-being Scale.

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factors and causal mechanisms are understood [11]. While interventions are being delivered by intermediaries to facilitate engagement in physical activity, the processes involved in the intermediary 'intervention' have been poorly described. For example, the processes of referral/connection to an intermediary, the characteristics of the intermediaries themselves, the profile of individuals referred to an intermediary, the mechanisms of actions/strategies used to connect individuals to local physical activities and the local physical activity opportunities accessed remained unclear [12,13].

To date, the research team have completed a scoping review of the published literature to describe the processes of an intermediary when connecting community-dwelling individuals to local physical activities [14]. This review found many different approaches to establishing this connection, and often the processes of referral, assessment, follow-up, and discharge were poorly described. In order to address these gaps, a qualitative descriptive study was carried out where intermediaries from three different professions across Ireland were interviewed; health promotion and improvement officers, local sports partnership community sports development officers and social prescribing link workers [15]. The aim of this study was to gain insight into the role of intermediaries in Ireland and to further define the processes, practices and procedures in the Irish context.

The two previous studies helped to determine the processes of the 'intervention' delivered by an intermediary, i.e., receive a referral or self-referral, conduct an assessment, connect to a local physical activity, followed by a period of follow-up and subsequent discharge from the intermediary service. Based on the results from the scoping review and the qualitative descriptive study, there remained three main evidence gaps: 1) after the individual connects to local physical activities, do they continue to engage in physical activity, 2) what are the perspectives and experiences of individuals referred to an intermediary, and 3) is an intervention delivered by an intermediary effective in improving physical activity and wider health-related outcomes? However, to date there has been a limited number of high-quality studies investigating the effectiveness of the intervention delivered by an intermediary, with only five RCTs identified in the scoping review [16–20].

Effective methods of physical activity promotion are needed, as evidenced by the low numbers of people engaging in sufficient physical activity. Globally, over a quarter of adults are physically inactive [21]. In Ireland, rates of physical inactivity are higher than the global average, with 54–66 % of the population failing to meet physical activity recommendations [22,23]. If the intervention delivered by an intermediary was shown to be effective, it could be a promising method of improving physical activity levels. When evaluating complex interventions, feasibility testing is recommended in order to make decisions about progression to the evaluation phase [10]. Having identified the core elements and contextual factors of interventions delivered by an intermediary in Ireland, the research team are now progressing to the next phase of the study which includes feasibility testing.

A feasibility study asks whether a research study can be done, should we proceed with it, and if so, how [24]. Four feasibility studies were identified in the scoping review, and while all studies found their evaluation designs and interventions to be feasible, none of these studies were carried out in Europe limiting their transferability to the Irish context. The majority focused on clinical populations, and a wide variety of outcome measures were used to assess physical activity and health-related outcomes [25–28]. There is a need therefore to determine appropriate physical activity and health-related outcome measures as well as appropriate evaluation designs relevant to the Irish context and a community-dwelling population, before full-scale evaluations can be carried out. There is also a need to investigate the experiences of those who undergo an intervention delivered by an intermediary. Therefore, the purpose of this proposed study is to examine the feasibility and acceptability of an intervention delivered by an intermediary to improve physical activity levels and wider health-related outcomes, as well as the feasibility of the evaluation design.

2. Materials and methods

2.1. Intervention

The intervention that will be examined in this proposed study consists of two phases. The first is the intervention delivered by the intermediary, and the second is attendance and participation in the local physical activity facilitated by the intermediary. The intervention delivered by an intermediary comprises four main steps; referral to an intermediary, assessment of the individual by the intermediary, connection to a local physical activity, and a follow-up period. How the intervention is delivered by the intermediary varies depending on the type of intermediary, the individual who is referred and their needs in relation to their health and wellbeing, the local context and the availability of community services and supports. Logic models were developed based on findings from the scoping review [14] and qualitative study [15] to describe the steps in the intervention delivered by intermediaries (Fig. 1), and are summarised briefly in the following section.

2.1.1. Social prescribing link workers (SPLW)

SPLW receive referrals from healthcare professionals, community services, or through self-referral. Individuals are referred for social isolation, for frequent healthcare attendance, complex social needs, or to address a pre-existing mental or physical health issue [30]. SPLW carry out a lengthy in-depth assessment of the individual's needs in relation to their health and wellbeing, and then work with the individual over a number of weeks and months to connect them to a range of community services and supports, which can include local physical activities. They use a number of strategies during this follow-up period, characterised by ongoing instrumental support (doing things for the individual [31]), empowerment and motivation techniques and/or attending activities with the individual [15].

2.1.2. Local sports partnership community sports development officers (LSPO)

LSPO mainly receive self-referrals, or can receive referrals, to improve the physical activity levels of individuals through participation in physical activity groups delivered by the local sports partnership [32]. LSPO do not carry out an in-depth assessment, but after the referral is received they may carry out screening and explain/signpost to local physical activities. They use a number of strategies to connect the individual to a local physical activity, such as attending the first session of the local physical activity, providing reassurance and practical support to the individual, as well as keeping them updated and informed as to upcoming local physical activities [15].

After the intermediary establishes a connection to a local physical activity, the individual enrolls, attends and takes part in the chosen local physical activity/activities. The intermediary continues to support this engagement during the follow-up period. Local physical activities can include walking groups, local gyms and leisure centres, chair-based exercise, outdoor activities (including gardening), yoga and tai chi amongst others.

2.2. Aims and objectives

Feasibility is defined as the extent to which a task or innovation can be successfully carried out within a given agency or setting and performed relatively easily or conveniently given existing resources and circumstances [33]. The aim of this proposed study will be to investigate the feasibility of an intervention delivered by an intermediary to improve physical activity and health-related outcomes of community-dwelling adults. Specific objectives include:

- i. To determine the rate of recruitment and enrolment to the proposed study of individuals who undergo an intervention

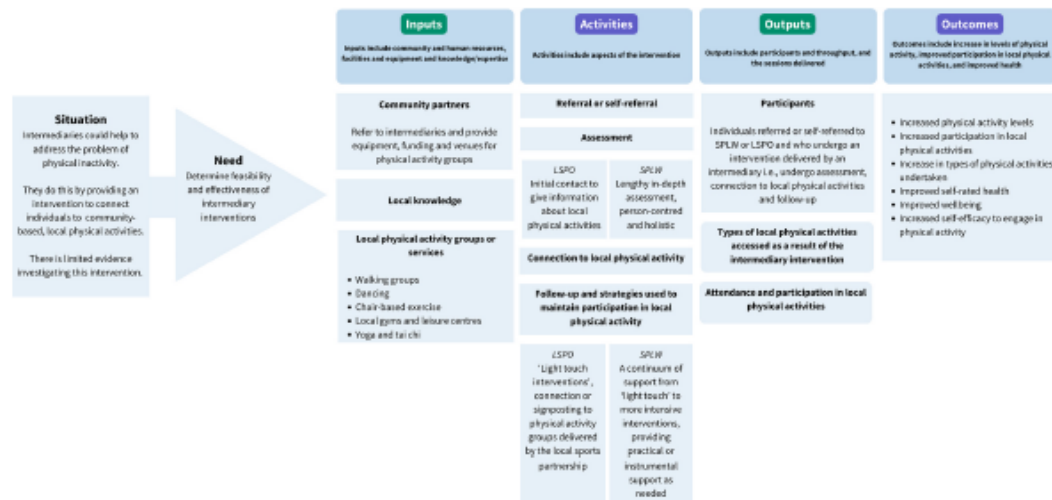


Fig. 1. Logic Model Describing an Intervention Delivered by Local Sports Partnership Community Sports Development Officers and Social Prescribing Link Workers in Ireland. Data in this logic model is based on the results of the scoping review and qualitative descriptive study conducted as part of this project [14,15], and is based on Sport England logic model guidance [29]. Abbreviations: LSPO – local sports partnership community sports development officers, PA – physical activity, SPLW – social prescribing link workers.

- delivered by an intermediary, which includes participation in local physical activities (intervention participants).
- To examine the suitability and acceptability of recruitment methods to the proposed study.
 - To determine retention to the proposed study.
 - To describe the demographic and health characteristics of intervention participants.
 - To determine participation in and adherence to local physical activities by intervention participants.
 - To explore the acceptability of the intervention delivered by the intermediary.
 - To explore suitability, acceptability, and completion rates of the measurement tools by intervention participants.
 - To assess if change occurs in physical activity and health-related outcomes following participation in the intervention.

The CONSORT extension to pilot and feasibility trials, and the SPIRIT guidelines for protocols of interventional trials have been used to guide the reporting of this protocol [34–36].

2.3. Research ethics approval

Ethical approval for this proposed study was granted from the Trinity College Dublin Faculty of Health Sciences Research Ethics Committee on August 3, 2023 (Ref: 230603).

2.4. Study design

This proposed pilot feasibility study (NCT06260995) will use a sequential explanatory mixed methods study design [37]. This design involves collecting and analysing quantitative data, followed by collection of qualitative data to help explain findings from the quantitative data [37,38]. Findings are then merged in the interpretation or discussion sections [37]. The quantitative phase of the study will be a quasi-experimental before-and-after design (without control) and the qualitative phase will employ a qualitative descriptive approach [39].

2.5. Sample

Participants will be those who are referred or self-referred to a social prescribing link worker or local sports partnership community sports development officer and who undergo an intervention delivered by an intermediary i.e., undergo assessment, onward connection to local physical activities and follow-up. A baseline assessment will be taken upon enrolment on to the study, and this assessment will be repeated after 12 weeks from time of enrolment.

2.6. Eligibility criteria

Participants will be adults aged >18 years old, able to give explicit informed consent, referred to an intermediary, and that the intermediary facilitates a connection to local physical activities. Inclusion and exclusion criteria are listed in Table 1.

2.7. Sample size

Convenience sampling will be used, which involves selection of participants based on availability and accessibility [40]. The limitations of non-probability sampling techniques are that it may not create a sample that is representative of the population referred to an

Table 1
Study inclusion and exclusion criteria.

Inclusion criteria	- Aged ≥18 years - Referred to intermediary service for any reason OR self-referred to intermediary service for any reason - Meets the eligibility criteria of the intermediary service - Intermediary facilitates a connection to local physical activity
Exclusion criteria	- Non-community-dwelling e.g., hospital in-patients, living in residential care facilities - Diagnosis of dementia - Inappropriate for health or social reasons (such as terminal illness, family or other social crisis) - Refused to engage with the intermediary service - Unable to give explicit informed consent

intermediary, and that it may introduce selection bias [41]. However, convenience sampling is economical, accessible, and has been used in previous feasibility studies investigating intermediaries [26,27]. Therefore, it was selected for this proposed study. The target sample size will be 30 participants, with approximately 15 participants recruited by SPLW and 15 by LSPO. As this proposed study will have three outcome measures (See Section 2.9 'Outcomes'), the sample size has been

calculated based on the 10 participants per candidate predictor (variable) rule [42,43]. This rule has been used for multivariable methods of analysis, to reduce the risk of unstable risk estimates and misleading associations that could occur with too few or too many events per variable [44].

Table 2

Data Methods and Schedule of Measures. Study objectives, descriptions of their associated measures, data measurement tools and the timeframe of data collection. Abbreviations: Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS), Self-Efficacy for Exercise Scale (SEE), International Physical Activity Questionnaire - Short Form (IPAQ-SF), Numerical Rating Scale (NRS).

Objectives	Measure Definition	Measurement Tool	Data Collection Timeframe		
			Time 0	Time 1 (12 Weeks)	Post-recruitment period
i To determine the rate of recruitment and enrolment to the proposed study of individuals who undergo an intervention delivered by an intermediary, which includes participation in local physical activities (intervention participants).	How many people are approached/receive information about the study from the gatekeeper - # (%) of total clients referred to an intermediary who will be connected to local physical activities i.e., eligible people - # (%) of eligible people who receive study information How many eligible people take part in the study - # (%) eligible people who receive study information who take part in the study	Gatekeeper recruitment log Gatekeeper recruitment log	Ongoing throughout recruitment period Ongoing throughout recruitment period		
ii To examine the suitability and acceptability of recruitment methods to the proposed study.	How long it takes to recruit 3–4 people from each service/gatekeeper - length of recruitment period per service (days) Reasons given for not taking part - frequency count of reasons given for not taking part in research Explore gatekeepers' perceptions of how open clients were to take part in the research, their experience of recruitment and the acceptability of the recruitment methods.	Gatekeeper recruitment log Gatekeeper recruitment log Gatekeeper semi-structured interview items #1–8	Ongoing throughout recruitment period Ongoing throughout recruitment period		✗
iii To determine retention to the proposed study.	How many people return for a follow-up assessment with the research team	# (%) of participants who return for 12-week follow-up assessment		✗	
iv To describe the demographic and health characteristics of intervention participants.	The age, gender, marital status, urban/rural, level of education, ethnicity, employment status, self-reported presence/absence of chronic condition, self-reported rating of health, and types of exercise currently undertaken of the study sample	Data collection form items #1–10	✗	✗ (Items #9–10 only)	
v To determine participation in and adherence to local physical activities by intervention participants.	Changes in types of exercise undertaken by participants from Week 0 to Week 12 - including self-directed physical activity and/or local physical activities accessed as a result of the intervention	Data collection form item #10 - "What types of exercise do you do currently? Please provide a list." Intervention participant semi-structured interview item #3 - Includes prompts about what local physical activities were accessed as a result of the intervention, and adherence to the local physical activity	✗	✗ ✗	
vi To explore the acceptability of the intervention delivered by the intermediary.	Explore intervention content and delivery by the intermediary, the impact of the support provided, and how acceptable the intervention was to the participant.	Intervention participant semi-structured interview items #1–6, 11 Intervention acceptability NRS (Intervention participant semi-structured interview item #10)		✗ ✗	
vii To explore suitability, acceptability and completion rates of the measurement tools by intervention participants.	Determine if the outcome measures used in this proposed study captured important information/improvements made by the participant, the rates of completion of each outcome measure, and explore experience of completing the outcome measures.	Intervention participant semi-structured interview items #7–9 # (%) items completed in data collection form items #1–10, SWEMWBS, SEE, IPAQ and intervention participant semi-structured interview items #1–11	✗	✗ ✗	
viii To assess if change occurs in physical activity and health-related outcomes following participation in the intervention.	Change in IPAQ-SF score from Week 0 to Week 12 Change in SEE score from Week 0 to Week 12 Change in SWEMWBS score from Week 0 to Week 12 Changes in self-rated rating of health from Week 0 to Week 12	IPAQ-SF SEE SWEMWBS Data collection form item #9	✗ ✗ ✗ ✗	✗ ✗ ✗ ✗	

2.8. Recruitment

Nineteen services ($N = 11$ social prescribing services and $N = 8$ local sports partnership services), who had taken part in an earlier study as part of this research project, were contacted to act as gatekeepers for this proposed study. Out of nineteen services, $N = 11$ agreed to act as gatekeepers. Therefore, participants will be recruited from eleven social prescribing ($N = 7$ services) and local sports partnership ($N = 4$ services) services from across Ireland, with the goal to recruit up to 3–4 participants from each service. Recruitment will take place over a six-month period, commencing in September 2023. As many of these services do not have access to administrative support, intermediaries usually make their own appointments and/or meet with individuals directly. Therefore, potential participants will be recruited by social prescribing link workers and local sports partnership community sports development officers, who will act as gatekeepers. Study posters will be sent to each service and can be used at the discretion of the gatekeeper e.g., for display in offices or when introducing the study to their clients or to share through mailing lists. Recruitment strategies will vary slightly depending on the category of intermediary, as detailed below.

2.8.1. Social prescribing link workers (SPLW)

If the SPLW plans or makes a connection to, and/or the individual referred expresses an interest in attending, a local physical activity, they are eligible for recruitment and they will be informed about the study. This can occur at the time of referral, the first appointment or subsequent appointments. If the potential participant is agreeable, the SPLW will give them a participant information leaflet and informed consent form (study information) and ask consent to share their contact details with the research team. Following a seven-day period, the research team will then contact those who agree to be contacted to screen for eligibility and obtain verbal and written consent to participate, or participants can contact the research team directly.

2.8.2. Local sports partnership community sports development officers (LSPO)

LSPO meet with individuals for the first time at the initial session of a local sports partnership physical activity programme, or during a screening phone call. Every person that the LSPO meets at these initial sessions or during phone calls during the recruitment period will be informed about the study. If the potential participant is agreeable, the LSPO will then give them the study information and ask consent to share their contact details with the research team. The research team will then contact those who agree to be contacted directly after seven days to screen for eligibility and obtain verbal and written consent to participate, or participants can contact the research team directly.

2.9. Outcomes

Definitions of outcomes, measurement tools, and time points for data collection are summarised in Table 2.

2.9.1. Demographics and health status

Participant age, gender, marital status, area in which they live (urban/rural), level of education, ethnicity, employment status, self-reported presence/absence of chronic condition(s), self-reported rating of health, and types of exercise currently undertaken will be collected at baseline. These data will be used to report demographic information and health-related behaviours of the study sample. A number of questionnaires will be completed at baseline (T0), and again after 12 weeks from the time of the baseline assessment (T1), and these are detailed below. Changes in these scores over time will be examined, and these questionnaires will be tested as suitable outcome measures for future studies investigating effectiveness of intermediaries in improving health- and physical-activity related outcomes over time.

2.9.2. International Physical Activity Questionnaire - Short Form

The International Physical Activity Questionnaire is a self-reported measure of multiple domains of physical activity, such as physical activity undertaken for leisure, work, transport and/or domestic activities [45]. There are two versions, the long form and short form (IPAQ-SF). The original authors of the questionnaire recommend the IPAQ-SF, as it is less burdensome for both participants to complete and researchers to administer. This was an important consideration due to the remote nature of this proposed study (See Section 2.10 'Data Collection'). The IPAQ-SF assesses physical activity behaviour over the last seven days and includes measures of frequency and duration of vigorous physical activity, moderate physical activity, walking and sedentary behaviour. Using a standardised scoring protocol, total days of activity, total activity (minutes/week), metabolic equivalent minutes per week and physical activity category (low, moderate or high levels of physical activity) can be calculated [46].

2.9.3. Self-Efficacy for Exercise Scale

The Self-Efficacy for Exercise Scale (SEE) is a self-report measure of self-efficacy for physical activity [47]. This measure was chosen as it measures beliefs about a current capability and is concordant with the physical activity measure used in this proposed study in relation to frequency and duration [48]. Participants are asked to rate their current confidence in their ability to exercise three times per week for 20 min under different scenarios. Responses are rated on a numerical rating scale of 0–10, with 0 indicating 'not confident' and 10 indicating 'very confident'. The overall score is calculated by summing the responses to each scenario, and a higher score indicates higher self-efficacy for exercise.

2.9.4. Short Warwick-Edinburgh Mental Well-being Scale

The Warwick-Edinburgh Mental Well-being Scale is used to evaluate interventions, programmes and approaches promoting mental health and wellbeing, particularly in non-clinical populations [49]. This measure was chosen as many individuals who are referred to intermediaries to address loneliness and mental health issues are connected to local physical activities to help address these issues [15]. Physical activity has the potential to improve subjective mood, improve self-esteem and self-perception, cognitive function and sleep quality, all of which may impact on well-being [50]. A seven-item version of the original 14-item scale, the Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS), was developed as an interval scale measure of mental well-being [51] and has the added benefit of being shorter and less burdensome to complete. Items cover different aspects of eudemonic and hedonic well-being, and each item is answered on a 1 to 5 Likert scale, ranging from "none of the time" to "all the time" [51]. The overall score is calculated by summing the scores for each item, and a higher score indicates a higher level of well-being.

2.9.5. Semi-structured interviews – intervention participants

A semi-structured interview will be completed at the time of the follow-up assessment at 12 weeks with intervention participants, to explore the experiences of those who underwent the intervention (which includes the intervention delivered by the intermediary and attendance and participation in the local physical activity facilitated by the intermediary). A semi-structured approach allows both structure and flexibility, an interactive approach to interviewing, and the use of generative probes, allowing the participant to explore avenues of thought that arise from the interview [52]. This interview will explore topics such as: the content and delivery of the intervention by the intermediary, the local physical activities accessed as a result of the intervention and adherence to these, the experience of engaging in these local physical activities facilitated by the intermediary, the level of support provided by the intermediary and the impact of this, and acceptability of the proposed study measures and intervention by an intermediary. A sample topic guide is outlined in Fig. 2.

Section 1: Intervention content and delivery 1. What were your initial impressions when you were referred to/when you met the intermediary? 2. Tell me about your interactions with the intermediary over the 12 weeks. How often did you work with/meet with the intermediary over the last 12 weeks? 3. How did the intermediary help you to connect to local physical activities or other services in the community? What local physical activities did you connect to? When did you start the local physical activity and if you didn't start, why not? How often did the group run? How often did you attend? 4. Do you think you received an appropriate amount of support from the intermediary? 5. How did working with the intermediary impact on you? 6. Did you experience any negative impacts from engaging with an intermediary? Section 2: Outcomes 7. Did the questionnaires that were used in this study capture important information/improvements? 8. Was there any information/improvements that were not captured by the questionnaires? Section 3: Measures 9. How did you find completing the questionnaires? 10. Overall, how acceptable did you find working with the intermediary? 11. Why did you choose this number?

Fig. 2. Sample semi-structured interview topic guide for intervention participants.

2.9.6. Overall acceptability of the intervention

As part of the semi-structured interview, participants will be asked to rate the overall acceptability of the intervention delivered by an intermediary on a numerical rating scale of 1–10, with 1 indicating 'completely unacceptable' and 10 indicating 'completely acceptable'. Assessing acceptability qualitatively and quantitatively is recommended for complex interventions [53]. Including a general acceptability item alongside a qualitative investigation allows researchers to explore what drives participants' general acceptability judgment [54].

2.9.7. Gatekeeper recruitment logs

Gatekeepers will be asked to keep a record of how many clients they had contact with during the recruitment period, how many people were approached about the study, and the reasons for refusal to take part in the study. This record will be kept until 3–4 participants have been recruited from each participating service. For participants recruited to the study, gatekeepers will also be asked to keep a record of their contacts with this person (date, length of each contact and mode of contact). This will help to verify the data collected from participants in their interview.

2.9.8. Semi-structured interviews – gatekeepers

In addition to the recruitment logs, semi-structured interviews will also be conducted with gatekeepers to explore the acceptability of the recruitment methods. These interviews will take place at the end of the

recruitment period. This interview will explore topics such as: how open individuals were to take part in research and reasons given as to why they did not take part, their experience of discussing the research project with potential participants, and timing of recruitment. A sample topic guide is outlined in Fig. 3.

2.10. Data collection

Data will be collected according to the person's preference; online (hosted via Zoom), over telephone, or data collection forms will be posted to participants to complete in their own time (with or without telephone support from the research team).

2.11. Data analysis

Quantitative data analysis will be performed using SPSS V28 (IBM, USA) and Microsoft Excel software (Microsoft Corporation, USA). Categorical variables (counts and proportions) and graphical representations e.g., bar charts will be used to present feasibility outcomes. Summary statistics for continuous variables will also be presented as (i) means and standard deviations for normally distributed data, and (ii) median and interquartile ranges for data which was not normally distributed. Within-group differences will be assessed using paired T-tests for normally distributed data and Wilcoxon signed rank tests for data which are not normally distributed.

1. Generally, how was your experience of recruiting for the study? What worked well? What didn't work well?
2. Did you have many clients who were eligible for the study? If not, why?
3. How did your clients react when you informed them of the study? If it was a positive/negative reaction, why?
4. Do you feel that your clients were generally well able to understand the study information?
5. Did your clients understand what would be required of them to participate in the study?
6. When did you introduce the study to your clients? What influenced your decision to introduce the study? For future studies when would be the most appropriate time to introduce the study?
7. Were there clients that met the eligibility criteria that you did not inform of the study? If so, what was the reason/s for not informing them of the study?
8. For those that declined to participate, can you explain why they chose not to participate?

Fig. 3. Sample semi-structured interview topic guide for gatekeepers.

A qualitative descriptive approach will be taken to the analysis of the exit interviews and free text responses, with the aim of providing a rich, straight description of an experience or an event close to the participant's language [39]. Interviews will be digitally recorded and transcribed verbatim. Transcripts will be analysed using an inductive qualitative content analysis as described by Elo & Kyngäs [55]. Themes will be developed in a four step approach; initialization, construction, rectification and finalization [56]. One researcher (MO'G) will analyse all transcripts using NVivo 14 (QSR International, Australia). The qualitative and quantitative data will then be integrated to provide a comprehensive analysis [37,57].

Progression criteria were not developed for this proposed study, as guidance regarding the application and development of progression criteria for non-randomized feasibility trials is limited [58,59]. In addition, progression criteria are generally used to decide whether to progress a feasibility trial to a definitive controlled trial [60]. It is not yet clear whether a controlled or experimental trial will be the most appropriate methodology for the next phase of this research. By examining feasibility and acceptability of the evaluation design in this proposed study, it is anticipated this will inform future research and trial design.

2.12. Data management

Only the research team will have access to data. Detailed descriptions of the plans for data entry, coding, security, confidentiality and storage, including any related processes to promote data quality, are detailed in the Data Protection Impact Assessment created for this proposed study. This has been reviewed and approved by the Trinity College Dublin Data Protection Officer for Research and is available from the authors upon request.

2.13. Dissemination

Results from this proposed study will be published as part of a Ph.D. thesis, and in peer-reviewed journals or scientific conferences. The advisory panel associated with this Ph.D. project, consisting of representatives from local sports partnerships, social prescribing link workers and health promotion and improvement officers will be consulted as regards the dissemination plan for this proposed study.

2.14. Protocol amendments

Any substantive protocol amendments will be reviewed by the Trinity College Dublin Faculty of Health Sciences Research Ethics Committee, and any deviation from the protocol will be made clear and explained in the final report.

3. Discussion

There is a need for community-based interventions to help address the burden of physical inactivity. The scoping review and qualitative descriptive study carried out by the research team identified the processes used by intermediaries to connect individuals to local physical activities. However, it remains unclear how these processes influence physical activity outcomes of clients, and what the experiences are of individuals receiving this intervention. This proposed pilot feasibility study will investigate the feasibility of the intervention delivered by an intermediary, and any indications of change in health- and physical-activity related outcomes. It will also investigate the feasibility and acceptability of the evaluation design, specifically recruitment, retention and choice of outcome measures. This proposed study is timely, as community care services in Ireland are expanded, new chronic disease prevention and management policies and programmes are implemented, and national physical activity guidelines and plans are updated [61–64]. Strengths of this proposed work include the mixed-method design, which we anticipate will generate a rich analysis describing the experiences of intervention participants. An additional strength is the wide variety of recruitment sites, incorporating urban and rural LSPO and SPLW services. This will provide comprehensive feasibility data for a variety of settings with a variety of existing resources. A limitation of the proposed study is its pilot nature, which limits the conclusions that can be drawn about the effectiveness of the intervention. However, understanding factors related to feasibility and acceptability can help to provide information on how an intervention might be replicated or outcomes reproduced in future evaluation trials.

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ORCID iD authorship contribution statement

Megan O'Grady: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Funding acquisition, Conceptualization. Deirdre Connolly: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization. Emer Barrett: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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- [64] *Healthy Ireland, in: Every Move Counts National Physical Activity and Sedentary Behaviour Guidelines for Ireland*, Department of Health, 2024 [cited 2024 April 2].

Appendix XIII: Ethical approval letter (study III)



Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

Megan O'Grady,
Discipline of Physiotherapy,
Trinity Centre for Health Sciences,
St James' Hospital
Dublin 8
D08 W9RT

3rd August 2023

Ref: 230603
Title of Study: The role of intermediaries in connecting individuals to local physical activity – a non-randomized pilot feasibility trial.

Dear Megan,

Further to a meeting of the Faculty of Health Sciences Ethics Committee held in August 2023. We are pleased to inform you that the above project has ethical approval to proceed.

This study has been ethically approved. We would advise you to seek review and comments on your DPIA from the DPO if required prior to study commencement.

As a researcher you must ensure that you comply with other relevant regulations, including DATA PROTECTION and HEALTH AND SAFETY.

We wish you every success with this study and should you require any assistance in the future please do not hesitate to contact us.

Yours sincerely,

A handwritten signature in dark ink, reading "Jacintha O'Sullivan", written over a light-colored rectangular background.

Prof. Jacintha O'Sullivan
Chairperson
Faculty Research Ethics Committee

Appendix XIV: Ethical amendment approval letter (study III)



Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

Megan O'Grady,
Discipline of Physiotherapy,
Trinity Centre for Health Sciences,
St James' Hospital,
Dublin 8,
D08 W9RT

11th March 2024

Ref: 230603

Title of Study: The role of intermediaries in connecting individuals to local physical activity – a non-randomized pilot feasibility trial.

Dear Megan,

Further to a meeting of the Faculty of Health Sciences Ethics Committee held in March 2024, we are pleased to inform you that the above project (as amended with the following changes) has Ethical & DPO approval.

An amendment was granted on the 15 January 2024 for this project to conduct interviews with study gatekeepers, which will take place once the gatekeeper logs are completed and returned. The purpose of these interviews will be to explore the acceptability and suitability of the recruitment methods of this study.

On request of the DPO, a PIL providing information regarding the interview has been created for gatekeepers (Appendix XI). This PIL provides information on what is involved for gatekeeper participants in this study. Gatekeepers will be given a copy of the PIL and the consent form when they return the data collection sheet (Section 3a.1). The wording and structure of the consent form for gatekeepers has also been amended on advice from the DPO (Appendix X).

As a researcher you must ensure that you comply with other relevant regulations, including DATA PROTECTION and HEALTH AND SAFETY.

Yours sincerely,

Prof. Jacintha O'Sullivan
Chairperson Faculty Research Ethics Committee

Dámh na nEalaíochtaí Stáinte
Foinsneamh na Ceimice,
Coláiste na Tríonóide,
Ollscoil Átha Cliath,
Baile Átha Cliath 2, Éire.

Faculty of Health Sciences
Chemistry Building,
Trinity College Dublin,
The University of Dublin,
Dublin 2, Ireland.

www.healthsciences.tcd.ie

Appendix XV: Participant information leaflets — intervention participants (study III)

Participant information leaflet — social prescribing intervention participants

Name of Study: The role of intermediaries in connecting individuals to local physical activity — a non-randomized pilot feasibility trial

Site	Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT
Principal Investigator(s) and Co-Investigator(s) (insert names, titles and contact details)	Megan O'Grady, Research Physiotherapist (Principal Investigator) email: ogradyme@tcd.ie phone: 01-8963613 Dr Emer Barrett, Assistant Professor, email: barrete@tcd.ie Prof Deirdre Connolly, email: connoldm@tcd.ie
Study Organiser	Trinity College Dublin
Data Controllers	Trinity College Dublin
Data Protection Officer	Data Protection Officer Secretary's Office Trinity College Dublin Dublin 2

You are being invited to take part in a research study that is being done by Trinity College Dublin by researchers from the Disciplines of Physiotherapy and Occupational Therapy. Before you decide whether or not you wish to take part, ask the research team any questions. Don't feel rushed or under pressure to make a quick decision. You should understand the risks and benefits of taking part in this study so that you can make a decision that is right for you. You may wish to discuss it with your family, friends or GP. This leaflet has five main parts:

Part 1 – The Study

Part 2 – Data Protection

Part 3 – Costs, Funding and Approval

Part 4 – Future Research

Part 5 – Further Information

Part 1 – The Study

Why is this study being done?

- Social prescribing link workers help people to connect to community-based physical activity and exercise services, by acting as a link person or intermediary.
- We are doing this study to understand if connecting to community-based physical activity and exercise services via an intermediary can improve health and wellbeing. We also want to learn about people's experiences of working with an intermediary.
- This is a pilot feasibility study, which means we are evaluating the measures we use to see if they are suitable for a larger study in the future.

Why have I been invited to take part?

- You have been invited to take part because you are aged 18 years or older, and were referred (or you referred yourself) to a social prescribing link worker.
- You have indicated you are interested in taking part in the research to the social prescribing link worker and they have forwarded your contact details to the research team.
- We intend to invite 30 people to participate in this study.

Do I have to take part?

- No, you don't have to take part in this study. It is entirely voluntary.
- If you decide not to take part, it won't affect your future contacts with the social prescribing link worker. You don't have to give a reason for not taking part.

Can I withdraw? What happens if I change my mind?

You can change your mind about taking part in the study and opt out even if the study has started.

- If you decide to opt out, it won't affect your future contacts with the social prescribing link worker. You don't have to give a reason for opting out. If you wish to opt out, please contact Megan O'Grady on ogradyme@tcd.ie who will be able to organize this for you.
- You can choose to withdraw your data up to the point that analysis has taken place. This will take place after recruitment has closed for the study. After analysis has been completed you can choose to delete your individual data, view it or take it away with you, but at this stage we won't be able to remove your data from the overall results as they will have been combined.

What does taking part in the study involve?

- If you decide to take part, a member of the research team will discuss this information leaflet and the consent form with you. It should take about half an hour to take you through the consent process and answer any questions you may have.

- You will be given a copy of your signed consent form and this leaflet to keep. If you consent to take part, we will agree a time for you to do your first study assessment.
- This assessment will take 15-20 minutes and can be done over the phone, over Zoom or the forms can be posted out to you to complete in your own time. A member of the research team can provide assistance while you do this over the phone if you wish.
- In this assessment, we will collect information about you and your health. You do not have to answer any question you do not want to answer.
- We will also complete three questionnaires; one about your wellbeing, one about your physical activity levels and one about your confidence to do physical activity.
- A member of the research team will then contact you 12 weeks after this first assessment to do a follow-up assessment. This follow-up assessment will again take place at a time that suits you and will take 30-40 minutes.
- This assessment is longer because we will also do an interview about your experience of working with the social prescribing link worker and how this impacted on your motivation and physical activity levels.
- You do not need any specialist knowledge to take part. A copy of the interview questions will be sent to you in advance if you would like to think about how you would like to answer. You do not have to answer any question you do not want to answer.
- With your permission, the interview will be recorded. We will then transcribe the interview or use the auto-transcription feature on Zoom.
- After the interview is transcribed, you will have an opportunity to check the transcript. The transcript will have any identifiable information (i.e. names and locations) removed to protect your identity.
- This will be the final part of the study.

Are there any benefits to taking part in this research?

Taking part in this study will not directly benefit you. However, your participation in this study will be used to explore the impact of working with an intermediary in improving health and physical activity related outcomes, and this will help to inform future research.

Are there any risks to me or others if I take part?

There are no known risks involved in this study. At all times the well-being of participants takes priority over research activities. There is a very small risk that a connection to your identity could be made. However, great care will be taken to ensure the confidentiality of your data.

Will I be told the outcome of the study?

The results of the study will be reported in academic journals and/or disclosed at scientific conferences. No information which reveals your identity will be disclosed.

Part 2 – Data Protection

What information about me (personal data) will be used as part of this study?

- We will need your name and contact details to arrange your interview, and to stay in contact with you about the study.
- Your age, gender, marital status, area where you live (urban/rural), education level, ethnic background and employment status (**demographic information**) will be collected as these may influence your questionnaire results.
- You will be asked about your health, to give a rating of your current health and give information about your physical activity levels (**health information**) as these may also influence your questionnaire results.
- You will be asked to complete three **questionnaires**; mental wellbeing, belief in your ability to keep exercising, and your current physical activity levels. These data are collected to examine any changes in these health outcomes over time.
- The **interview** will be digitally recorded. Therefore, your voice will be recorded, and if you choose an online interview and opt to have your webcam on, your face will be recorded.
- **Transcripts**, which are used for analysis, will record what you say during the study.

Who will access and use my personal data as part of this study?

Only members of the research team as named above will have access to your data for the purposes of analysis.

Will my personal data be kept confidential? How will my data be kept safe?

- All personal data will be kept confidential. We will replace your name with a study ID code on any research data (transcripts, questionnaires, demographic information, etc.)
- Audiotapes from the interview will be transcribed (typed record of the interview) or automatically transcribed (if you do your interview over Zoom) after which your name will be changed to a study ID to protect your identity. Real names will then be removed from the transcripts and any other potentially identifiable information.
- Recordings from the interview will be destroyed once the transcripts are completed and checked for accuracy.
- We will keep all data in secure files on a password-protected secure files, using Trinity's secure storage solutions provided by Microsoft.
- All researchers working on the project have undergone training in data protection

How long will my personal information used for this study be retained for?

- Your personal data will be retained for a period of 3 years after Megan O'Grady is awarded her Ph.D., in line with research best practice. After this period, the personal data will be securely deleted by Dr Emer Barrett.

- Consent forms will be retained for a period of 3 years after Megan O’Grady is awarded her Ph.D., and then deleted or shredded in line with research best practice.
- The audio recording of the interview will be retained until your interview has been transcribed and the content verified, after which it will be securely deleted.
- If you do your interview online and choose to have your webcam on, the video recording will be automatically deleted after 30 days.

What is the lawful basis to use my personal data?

By law,¹ we will only use your personal data for this research² study which is in the public interest³. We will also ask for your consent to use your data as a requirement of the Irish Health Research Regulations.

What are my rights?

You are entitled to the following until the information has been combined with other information for analysis:

- The right to access your personal data and transcript of your interview and receive a copy of these
- The right to restrict or object to processing of your personal data and transcript of your interview
- The right to have inaccurate personal data or the transcript of your interview corrected until data is pooled together for analysis (this is due to start after the last interview has been completed)
- The right to request deletion of your personal data and transcript of your interview

By law you can exercise the above rights in relation to your personal data, unless the request would make it impossible or very difficult to conduct the research (i.e., because the information has been pooled together for analysis, or the information has already been published). You can exercise these rights by contacting Megan O’Grady or Trinity College Dublin Data Protection Officer, Secretary’s Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.tcd.ie/privacy.

¹The European General Data Protection Regulation (GDPR)

² Article 9(2) (j))

Part 3 – Costs, Funding and Approval

Has this study been approved by a research ethics committee?

Yes, this study has been approved by Trinity College Dublin, Faculty of Health Sciences Research Ethics Committee. Approval was granted on 03/08/2023.

Who is organising and funding this study? Will the results be used for commercial purposes?

This research project is funded by the Discipline of Physiotherapy, Trinity College Dublin, as part of postgraduate research.

Is there any payment for taking part? Will it cost me anything if I agree to take part?

No, we are not paying participants to take part in the study. The study assessment will take place at a location convenient for you so you will not incur any expense other than time.

Part 4 – Future Research

Will my personal data be used in future studies?

No, your data will not be used in future studies.

Part 5 – Further Information

Who should I contact for information or concerns?

If you have any concerns or questions, you can contact the Principal Investigator, Megan O'Grady: Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT by email: ogradyme@tcd.ie or by phone: 01-8963613.

Under GDPR, if you are not satisfied with how your data is being processed, you have the right to raise a concern with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland. Website: www.dataprotection.ie.

Will I be contacted again?

The research team will not contact you again.

Name of Study: The role of intermediaries in connecting individuals to local physical activity — a non-randomized pilot feasibility trial

Site	Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT
Principal Investigator(s) and Co-Investigator(s) (insert names, titles and contact details)	Megan O'Grady, Research Physiotherapist (Principal Investigator) email: ogradyme@tcd.ie phone: 01-8963613 Dr Emer Barrett, Assistant Professor, email: barrete@tcd.ie Prof Deirdre Connolly, email: connoldm@tcd.ie
Study Organiser	Trinity College Dublin
Data Controller	Trinity College Dublin
Data Protection Officer	Data Protection Officer Secretary's Office Trinity College Dublin Dublin 2

You are being invited to take part in a research study that is being done by Trinity College Dublin by researchers from the Disciplines of Physiotherapy and Occupational Therapy. Before you decide whether or not you wish to take part, ask the research team any questions. Don't feel rushed or under pressure to make a quick decision. You should understand the risks and benefits of taking part in this study so that you can make a decision that is right for you. You may wish to discuss it with your family, friends or GP. This leaflet has five main parts:

Part 1 – The Study

Part 2 – Data Protection

Part 3 – Costs, Funding and Approval

Part 4 – Future Research

Part 5 – Further Information

Part 1 – The Study

Why is this study being done?

- Local sports partnership officers help people to connect to community-based physical activity and exercise services, by acting as a link person or intermediary.
- We are doing this study to understand if connecting to community-based physical activity and exercise services via an intermediary can improve health and wellbeing. We also want to learn about people's experiences of working with an intermediary.
- This is a pilot feasibility study, which means we are evaluating the measures we use to see if they are suitable for a larger study in the future.

Why have I been invited to take part?

- You have been invited to take part because you are aged 18 years or older and were referred (or you referred yourself) to a local sports partnership officer.
- You have indicated you are interested in taking part in the research to the local sports partnership officer and they have forwarded your contact details to the research team.
- We intend to invite 30 people to participate in this study.

Do I have to take part?

- No, you don't have to take part in this study. It is entirely voluntary.
- If you decide not to take part, it won't affect your future contacts with the local sports partnership officer. You don't have to give a reason for not taking part.

Can I withdraw? What happens if I change my mind?

You can change your mind about taking part in the study and opt out even if the study has started.

- If you decide to opt out, it won't affect your future contacts with the local sports partnership officer. You don't have to give a reason for opting out. If you wish to opt out, please contact Megan O'Grady on ogradyme@tcd.ie who will be able to organize this for you.
- You can choose to withdraw your data up to the point that analysis has taken place. This will take place after recruitment has closed for the study. After analysis has been completed you can choose to delete your individual data, view it or take it away with you, but at this stage we won't be able to remove your data from the overall results as they will have been combined.

What does taking part in the study involve?

- If you decide to take part, a member of the research team will discuss this information leaflet and the consent form with you. It should take about half an hour to take you

through the consent process and answer any questions you may have.

- You will be given a copy of your signed consent form and this leaflet to keep. If you consent to take part, we will agree a time for you to do your first study assessment.
- This assessment will take 15-20 minutes and can be done over the phone, over Zoom or the forms can be posted out to you to complete in your own time. A member of the research team can provide assistance while you do this over the phone if you wish.
- In this assessment, we will collect information about you and your health. You do not have to answer any question you do not want to answer.
- We will also complete three questionnaires; one about your wellbeing, one about your physical activity levels and one about your confidence to do physical activity.
- A member of the research team will then contact you 12 weeks after this first assessment to do a follow-up assessment. This follow-up assessment will again take place at a time that suits you and will take 30-40 minutes.
- This assessment is longer because we will also do an interview about your experience of working with the local sports partnership officer and how this impacted on your motivation and physical activity levels.
- You do not need any specialist knowledge to take part. A copy of the interview questions will be sent to you in advance if you would like to think about how you would like to answer. You do not have to answer any question you do not want to answer.
- With your permission, the interview will be recorded. We will then transcribe the interview or use the auto-transcription feature on Zoom.
- After the interview is transcribed, you will have an opportunity to check the transcript. The transcript will have any identifiable information (i.e. names and locations) removed to protect your identity.
- This will be the final part of the study.

Are there any benefits to taking part in this research?

Taking part in this study will not directly benefit you. However, your participation in this study will be used to explore the impact of working with an intermediary in improving health and physical activity related outcomes, and this will help to inform future research.

Are there any risks to me or others if I take part?

There are no known risks involved in this study. At all times the well-being of participants takes priority over research activities. There is a very small risk that a connection to your identity could be made. However, great care will be taken to ensure the confidentiality of your data.

Will I be told the outcome of the study?

The results of the study will be reported in academic journals and/or disclosed at scientific conferences. No information which reveals your identity will be disclosed.

Part 2 – Data Protection

What information about me (personal data) will be used as part of this study?

- We will need your name and contact details to arrange your interview, and to stay in contact you about the study.
- Your age, gender, marital status, area where you live (urban/rural), education level, ethnic background and employment status (**demographic information**) will be collected as these may influence your questionnaire results.
- You will be asked about your health, to give a rating of your current health and give information about your physical activity levels (**health information**) as these may also influence your questionnaire results.
- You will be asked to complete three **questionnaires**; mental wellbeing, belief in your ability to keep exercising, and your current physical activity levels. These data are collected to examine any changes in these health outcomes over time.
- The **interview** will be digitally recorded. Therefore, your voice will be recorded, and if you choose an online interview and opt to have your webcam on, your face will be recorded.
- **Transcripts**, which are used for analysis, will record what you say during the study.

Who will access and use my personal data as part of this study?

Only members of the research team as named above will have access to your data for the purposes of analysis.

Will my personal data be kept confidential? How will my data be kept safe?

- All personal data will be kept confidential. We will replace your name with a study ID code on any research data (transcripts, questionnaires, demographic information, etc.)
- Audiotapes from the interview will be transcribed (typed record of the interview) or automatically transcribed (if you do your interview over Zoom) after which your name will be changed to a study ID to protect your identity. Real names will then be removed from the transcripts and any other potentially identifiable information.
- Recordings from the interview will be destroyed once the transcripts are completed and checked for accuracy.
- We will keep all data on a password-protected secure files, using Trinity's secure storage solutions provided by Microsoft.
- All researchers working on the project have undergone training in data protection.

How long will my personal information used for this study be retained for?

- Your personal data will be retained for a period of 3 years after Megan O'Grady is awarded her Ph.D., in line with research best practice. After this period, the personal data will be securely deleted by Dr Emer Barrett.

- Consent forms will be retained for a period of 3 years after Megan O’Grady is awarded her Ph.D., and then deleted or shredded in line with research best practice.
- The audio recording of the interview will be retained until your interview has been transcribed and the content verified, after which it will be securely deleted.
- If you do your interview online and choose to have your webcam on, the video recording will be automatically deleted after 30 days.

What is the lawful basis to use my personal data?

By law,⁴ we will only use your personal data for this research⁵ study which is in the public interest⁶. We will also ask for your consent to use your data as a requirement of the Irish Health Research Regulations.

What are my rights?

You are entitled to the following until the information has been combined with other information for analysis:

- The right to access to your personal data and transcript of your interview and receive a copy of these
- The right to restrict or object to processing of your personal data and transcript of your interview
- The right to have inaccurate personal data or the transcript of your interview corrected until data is pooled together for analysis (this is due to start after the last interview has been completed)
- The right to request deletion of your personal data and transcript of your interview

By law you can exercise the above rights in relation to your personal data, unless the request would make it impossible or very difficult to conduct the research (i.e., because the information has been pooled together for analysis, or the information has already been published). You can exercise these rights by contacting Megan O’Grady or Trinity College Dublin Data Protection Officer, Secretary’s Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.tcd.ie/privacy.

Part 3 – Costs, Funding and Approval

Has this study been approved by a research ethics committee?

⁴ The European General Data Protection Regulation (GDPR)

⁵ Article 9(2) (j))

⁶ (Article 6(1)(e))

Yes, this study has been approved by Trinity College Dublin, Faculty of Health Sciences Research Ethics Committee. Approval was granted on 03/08/2023.

Who is organising and funding this study? Will the results be used for commercial purposes?

This research project is funded by the Discipline of Physiotherapy, Trinity College Dublin, as part of postgraduate research.

Is there any payment for taking part? Will it cost me anything if I agree to take part?

No, we are not paying participants to take part in the study. The study assessment will take place at a location convenient for you so you will not incur any expense other than time.

Part 4 – Future Research

Will my personal data be used in future studies?

No, your data will not be used in future studies.

Part 5 – Further Information

Who should I contact for information or concerns?

If you have any concerns or questions, you can contact the Principal Investigator, Megan O'Grady: Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT by email: ogradyme@tcd.ie or by phone: 01-8963613.

Under GDPR, if you are not satisfied with how your data is being processed, you have the right to raise a concern with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland. Website: www.dataprotection.ie.

Will I be contacted again?

The research team will not contact you again.

Appendix XVI: Informed consent form — intervention participants (study III)

STUDY: The role of intermediaries in connecting individuals to local physical activity — a non-randomized pilot feasibility trial Recruitment Site: <i>Name</i>	
There are two sections in this form. Section 1 contains statements of understanding and asks you to tick each if you understand. Please ask any questions you may have when reading each of the statements. Section 2 asks for your informed consent. Please select either 'yes' or 'no' to indicate your choice. Thank you for participating. The end of this form is for the researchers to complete.	
1. General Understanding	Tick
I confirm that I have read and understood the Information Leaflet for the above study. The information has been fully explained to me and I have been able to ask questions, all of which have been answered to my satisfaction.	
I understand that taking part in this study is entirely voluntary. I understand that not taking part will have no negative impact on me.	
I understand that I can leave this study at any time without giving a reason. I understand that leaving this study will not affect my future contacts with the local sports partnership officer.	
I understand that I will not be paid for taking part in this study.	
I know how to contact the research team if I need to.	
By ticking each box above and choosing my options below <u>and</u> signing this document I agree to participate in this study as described in the Participant Information Leaflet.	

2. Consent	
I agree to take part in this research study, having been fully informed of the risks and benefits in the participant information leaflet provided to me.	Yes No ☐ ☐
I agree to the use of information about me (personal data) including my name, contact details, demographic and health information and interview recordings being used by the research team for this research study as described in the participant information leaflet.	Yes No ☐ ☐

Participant Name (Block Capitals) Participant Signature Date

Witness Name (Block Capitals) Witness Signature Date

To be completed by the Principal Investigator or nominee.

I, the undersigned, have taken the time to fully explain to the above participant the nature and purpose of this study in a way that they could understand. I have explained the risks and possible benefits involved. I have invited them to ask questions on any aspect of the study that concerned them. I have given a copy of the participant information leaflet and consent form to the participant with contact details of the study team.

Researcher name

Title and qualifications

Signature

Date

Copies to be created and retained: 1 for Participant and 1 for PI.

Appendix XVII: Participant information leaflet — intermediaries (study III)

Name of Study: The role of intermediaries in connecting individuals to local physical activity — a non-randomized pilot feasibility trial

Site	Trinity Centre for Health Sciences, St James' Hospital, Dublin 8, D08 W9RT
Principal Investigator and Co-Investigators	Megan O'Grady, Research Physiotherapist (Principal Investigator), email: ogradyme@tcd.ie Dr Emer Barrett, Assistant Professor, email: barrete@tcd.ie Prof Deirdre Connolly, Associate Professor, email: connoldm@tcd.ie
Data Controller	Trinity College Dublin
Data Protection Officer	Data Protection Officer Secretary's Office Trinity College Dublin Dublin 2

You are being invited to take part in a research study that is being done by Trinity College Dublin by researchers from the Disciplines of Physiotherapy and Occupational Therapy. Before you decide whether or not you wish to take part, please read this information sheet carefully. Ask the research team any questions. Don't feel rushed or under pressure to make a quick decision. This leaflet has four main parts:

Part 1 – The Study

Part 2 – Data Protection

Part 3 – Costs, Funding and Approval

Part 4 – Further Information

Part 1 – The Study

Why is this study being done?

- We are doing this study to understand if connecting to community-based physical activity and exercise services via an intermediary can improve health and wellbeing. This is a pilot feasibility study, which means we are evaluating the way the trial is designed to see if it is suitable for a larger study in the future.
- As gatekeepers, you have been collecting information about the numbers of people who are eligible to take part in this study, as well as the numbers of people who did and did not receive study information (study gatekeeper record). This is to find out how suitable the recruitment methods are for this study.
- Understanding more in-depth what worked well and what didn't work well in terms of recruitment will be helpful when designing future studies.

Why have I been invited to take part in this study?

- We are inviting you to complete an interview as you acted as a gatekeeper in a previous study as part of this research project, called "The processes and practices of an intermediary in connecting community dwelling adults to local physical activity and exercise services" (Approved by the Trinity College Dublin School of Medicine Research Ethics Committee, 21 July 2022).
- You have been invited to take part in this current study as we want to interview all gatekeepers once recruitment has closed for your service, and you have completed and returned the study gatekeeper record.

Do I have to take part?

- You do not have to take part in this study. It is entirely voluntary, and all your responses will be kept confidential.
- You can change your mind about taking part in the study and opt out at any time even if the study has started, and you do not have to give a reason. If you decide not to participate you will not be penalized in any way.

What does taking part in the study involve?

- You will be provided with a consent form. You must read and complete this consent form and return it to the research team before taking part in the study. You will be given a copy of your signed consent form and this leaflet to keep.
- A date and time will be arranged for your interview according to your availability. The interview can take place over telephone or online depending on your preference. A copy of the interview questions will be sent to you in advance if you would like to think about how you would like to answer.
- With your permission, the interview will be recorded to enable us to listen back to the conversation and ensure we understand the points made.
- During the interview we will ask you about your experiences recruiting for this study; how open individuals were to take part in research, your experience of discussing the research project with potential participants, and the timing of recruitment.

- We will then transcribe the interview or use the auto-transcription feature on Zoom. The transcript will have any identifiable information (i.e., names and locations) removed to protect your identity.
- After the interview is transcribed, you will have an opportunity to check the transcript should you wish. This will be available for you to check for one month after your interview has been transcribed. The transcript will be used as is if you do not get back to the team within that window of time.
- The study interview will last approximately 20-30 minutes.

What are the possible benefits of taking part?

- Taking part in this study will not directly benefit you. However, your responses may help us to better understand if the recruitment methods for this study worked well or didn't work well. In this way you will help to inform future research in this area.

What happens if I change my mind and wish to withdraw from the study?

- Yes, you can stop taking part in the interview at any stage.
- You can also request withdrawal of any information collected about you (personal data) up to the point that all information has been combined for analysis.
- You will be assigned a study ID when we are transcribing your interview, therefore you won't be identifiable in any reports or outputs related to this study.
- If you wish to opt out, please contact Megan O'Grady on ogradyme@tcd.ie who will be able to organize this for you.

Are there any possible disadvantages or risks from taking part?

- There is no risk to taking part in this study.

What will happen to the results of the study?

- The results of this study are being used in part fulfilment of a Ph.D.
- The results of the study may be published in an academic journal and/or presented at a conference, but you will not be identified in any way in these reports/output.

Part 2 – Data Protection

What information about me (personal data) will be used as part of this study?

- We will need your name and contact details to arrange your interview, and to stay in contact you about the study.
- Information about you and your job (gender, job title, where you work and time in your current role) that was collected as part of the study "The processes and practices of an intermediary in connecting community dwelling adults to local physical activity and exercise services" will be used as part of this study.
- The study interview will be digitally recorded. Therefore, your voice will be recorded, and if you choose an online interview and opt to have your webcam on, your face will be recorded.

- If you choose to do your interview online, the interview will be automatically transcribed. We will use the recording of the interview also to check that the transcription is accurate.
- Transcripts will be analysed by looking for themes and similarities between your answers with those of other participants.

Who will access and use my personal data as part of this study?

- Only members of the research team as named above will have access to your data for the purposes of analysis.

How is the information kept confidential and secure?

Your privacy is important to us. We take many steps to make sure that we protect your confidentiality and keep your data safe. Here are some examples of how we do this:

- Audio recordings from the interviews will be transcribed (typed record of the interview). Real names will then be removed from the transcripts and any other potentially identifiable information.
- Recordings from the interview will be destroyed once the transcripts are completed and checked for accuracy.
- Data collected will be stored digitally in a Trinity College Dublin cloud server which is protected using a two-stage authentication process.
- The link between you and your transcript will be saved separately and securely by the researcher.
- All researchers working on the project have undergone training in data protection.

How long will my personal information used for this study be retained for?

- Your personal data will be retained for a period of 3 years after Megan O'Grady is awarded her Ph.D., in line with research best practice. After this period, the personal data will be securely deleted by Dr Emer Barrett.
- Consent forms will be retained for a period of 3 years after Megan O'Grady is awarded her Ph.D., and then shredded or deleted in line with research best practice.
- If you do your interview online and choose to have your webcam on, the video recording will be automatically deleted after 30 days.

What is the lawful basis to use my personal data?

By law,⁷ we will only use your personal data collected for this research study to determine the suitability of the recruitment methods for this study (in line with article 6(1)(e) of the GDPR). We will also ask for your explicit consent to use your data as a requirement of the Irish Health Research Regulations.

What are my rights?

⁷The European General Data Protection Regulation (GDPR)

You are entitled to:

- object to our use of your personal data or any further use
- request access to your personal data and to receive a copy of it
- request inaccurate personal data be corrected or deleted
- request restriction of our use of your personal data
- request deletion of your data.

By law you can exercise the above rights in relation to your personal data, unless the request would make it impossible or very difficult to conduct the research. For example, if the study results have been pooled for analysis or are about to be published then we may not be able to delete it. You can exercise these rights by contacting Megan O’Grady or the Trinity College Data Protection Officer, Secretary’s Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.tcd.ie/privacy.

Part 3 – Costs, Funding and Approval

Has this study been approved by a research ethics committee?

Yes, this study has been approved by Trinity College Dublin, Faculty of Health Sciences Ethics Committee. Approval was granted on 15/01/2024.

Who is organising and funding this study?

This research project is funded by the Discipline of Physiotherapy, Trinity College Dublin, as part of postgraduate research.

Is there any payment for taking part? Will it cost me anything if I agree to take part?

No, we are not paying participants to take part in the study. The study interview will take place over telephone or online so you will not incur any expense other than time.

Part 4 – Further Information

Who should I contact for information or complaints?

If you have any concerns or questions, you can contact:

- Principal Investigator, Megan O’Grady: Trinity Centre for Health Sciences, St James’ Hospital, Dublin 8, D08 W9RT. email: ogradyme@tcd.ie.

- Data Protection Officer, Trinity College Dublin: Data Protection Officer, Secretary's Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.tcd.ie/privacy.

Under GDPR, if you are not satisfied with how your data is being processed, you have the right to raise a concern with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland. Website: www.dataprotection.ie.

Will I be contacted again?

The research team will not contact you again.

Appendix XVIII: Informed consent form — intermediaries (study III)

Megan O'Grady, B.Sc. (Hons) Physiotherapy, Ph.D. Candidate
Discipline of Physiotherapy
Trinity Centre for Health Sciences
St James' Hospital
Dublin 8
D08 W9RT
Tel: 01-8963613

NAME OF STUDY: The role of intermediaries in connecting individuals to local physical activity — a non-randomized pilot feasibility trial

Identification Number for study: 230603

Dear _____,

The purpose of this trial is to follow-up with people after their first contact with a social prescribing link worker or local sports partnership officer (intermediary), and collect information regarding their health, wellbeing, and physical activity at baseline and at 12 weeks. You have agreed to act as a gatekeeper for this study, and **this form asks for your consent** to complete an interview regarding the acceptability and suitability of recruitment methods. **Please tick yes or no to indicate your choice.**

Please contact Megan O'Grady with any questions you may have when reading each of the statements.

Consent Please indicate your choice by ticking yes or no.					
When I return the study gatekeeper record to Megan O'Grady, I consent to take part in a short interview about recruitment for this study.	<table><tr><td>Yes</td><td>No</td></tr><tr><td>☐</td><td>☐</td></tr></table>	Yes	No	☐	☐
Yes	No				
☐	☐				
I consent to information about me (gender, job title, job location/setting, and length of time in current role), collected by the researcher for the study "The processes and practices of an intermediary in connecting community dwelling adults to local physical activity and exercise services" being re-used for this study.	<table><tr><td>Yes</td><td>No</td></tr><tr><td>☐</td><td>☐</td></tr></table>	Yes	No	☐	☐
Yes	No				
☐	☐				
I consent to the interview recording, and written transcript from that interview, being used for this study.	<table><tr><td>Yes</td><td>No</td></tr><tr><td>☐</td><td>☐</td></tr></table>	Yes	No	☐	☐
Yes	No				
☐	☐				

Gatekeeper Name (Block Capitals)

Gatekeeper Signature

Date

To be completed by the Principal Investigator or nominee.

I, the undersigned, have taken the time to fully explain to the above gatekeeper(s), the nature and purpose of this study in a way that they could understand. I have explained the risks and possible benefits involved. I have invited them to ask questions on any aspect of the study that concerned them.

Researcher Name and Qualifications (Block Capitals)

Researcher Signature

Date

2 copies to be made: 1 for gatekeeper, 1 for PI

Appendix XIX: Data collection form (study III)

Data Collection Sheet — T0

Participant ID: _____

How completed (please circle):

Telephone Zoom On my own With support from the researcher

Date/time of assessment: _____ @ _____: _____

Introduction

Explicit informed consent? Verbal ☐ Written ☐

If verbal only, has the written consent form been sent by email or post? ☐

Explanation of testing:

This study is interested in looking at the impact of working with a social prescribing link worker/local sports partnership officer to connect to physical activity and exercise groups and services in your community. We will be asking you questions about your health and wellbeing, mood, and physical activity today, and in 12 weeks. This is a pilot feasibility study, which means we are evaluating the trial itself and the measures we use to see if they are suitable for a larger study in the future. Participation in this study is completely voluntary and confidential. If you should come to any question you don't want to answer, you can tick 'prefer not to answer' and go on to the next question. The answers that you give will be kept confidential and will be used only for research purposes. In the data collection form, there are some free-text answers and we would request that you do not disclose any information that might identify any other person to protect their identity.

Demographic and Health Information

1.	What age are you in years?	Age: _____ Prefer not to answer ☐
2.	How do you self-identify in relation to gender?	_____ Prefer not to answer ☐
3.	Are you...	Living with a spouse/partner? ☐ Living with other family members? ☐ If so, who? _____ Living as a single person (including widows, separated etc.) ☐ Prefer not to answer ☐

4.	Do you live in an urban or rural area?	City ☐ Satellite urban town (≥20% of the residents work in the cities) ☐ Independent urban town (≤20% of the residents work in the cities) ☐ Rural area ☐ Highly rural/remote area ☐ Don't know ☐ Prefer not to answer ☐
5.	What is the highest school certificate or degree that you obtained?	Some primary (not complete) ☐ Primary or equivalent ☐ Intermediate/junior/group certificate or equivalent ☐ Leaving certificate or equivalent ☐ Diploma/certificate ☐ Primary degree ☐ Postgraduate/higher degree ☐ Don't know ☐ Prefer not to answer ☐
6a.	Were you born in the Republic of Ireland? Yes ☐ No ☐ Prefer not to answer ☐ If no: In which country were you born? _____	
6b.	What is your ethnic or cultural background?	<i>White</i> Irish ☐ Irish Traveller ☐ Any other White background ☐ <i>Black or Black Irish</i> African ☐ Any other Black background ☐ <i>Asian or Asian Irish</i> Chinese ☐ Any other Asian background ☐ <i>Other, including mixed background (please specify):</i> ☐ _____ Prefer not to answer ☐

7.	Which one of these would you say best describes your current situation?	Retired ☐ <i>Part-time</i> employed (including unpaid work in family business, temporarily away from work, or participating in apprenticeship or employment programme such as Community Employment) ☐ <i>Full-time</i> employed ☐ Self-employed (including farming) ☐ Unemployed ☐ Permanently sick or disabled ☐ Looking after home or family ☐ In education or training ☐ Other (specify): ☐ Don't know ☐ Prefer not to answer ☐
8.	Do you have any chronic conditions?	Yes ☐ No ☐ Don't know ☐ Prefer not to answer ☐ <i>If yes, please specify below:</i>
9.	Would you say your health is...	Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐ Don't know ☐ Prefer not to answer ☐
10.	What types of exercise do you do currently? Please provide a list.	

11. T0 The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS)¹

Below are some statements about feelings and thoughts.

**Please tick the box that best describes your experience of
each over the last 2 weeks**

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5

¹ Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS)

© NHS Health Scotland, University of Warwick and University of Edinburgh, 2008

12. T0 Self-efficacy For Exercise (SEE) Scale

How confident are you right now that you could exercise three times per week for 20 minutes if:

	Not confident					Very confident					
1. The weather was bothering you	0	1	2	3	4	5	6	7	8	9	10
2. You were bored by the program or activity	0	1	2	3	4	5	6	7	8	9	10
3. You felt pain when exercising	0	1	2	3	4	5	6	7	8	9	10
4. You had to exercise alone	0	1	2	3	4	5	6	7	8	9	10
5. You did not enjoy it	0	1	2	3	4	5	6	7	8	9	10
6. You were too busy with other activities	0	1	2	3	4	5	6	7	8	9	10
7. You felt tired	0	1	2	3	4	5	6	7	8	9	10
8. You felt stressed	0	1	2	3	4	5	6	7	8	9	10
9. You felt depressed	0	1	2	3	4	5	6	7	8	9	10

13. T0 INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

☐ No vigorous physical activities → **Skip to question 3**

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

☐ No moderate physical activities → **Skip to question 5**

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Data Collection Sheet — T1

Participant ID: _____

How completed (please circle):

Telephone Zoom On my own With support from the researcher

Date/time of assessment: _____ @ _____ : _____

Introduction

Explicit informed consent? Verbal ☐ Written ☐

Updates on consent: _____

Explanation of testing:

Thank you for attending for your follow-up assessment. We will be asking you questions about your health and wellbeing, mood, and physical activity today. We will also do an interview and some extra questions today about your experience of working with the social prescribing link worker/local sports partnership officer. Participation in this study is completely voluntary and confidential. If you should come to any question you don't want to answer, you can tick 'prefer not to answer' and go on to the next question. The answers that you give will be kept confidential and will be used only for research purposes. In the data collection form, there are some free-text answers and we would request that you do not disclose any information that might identify any other person to protect their identity.

Health Information

9.	Would you say your health is...	Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐ Don't know ☐ Prefer not to answer ☐
10.	What types of exercise do you do currently? Please provide a list.	<i>What group did you connect to through LSO/SP?</i>

11. T1 The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS)¹

Below are some statements about feelings and thoughts.

Please tick the box that best describes your experience of
each over the last 2 weeks

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5

¹ Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS)

© NHS Health Scotland, University of Warwick and University of Edinburgh, 2008

12. T1 Self-efficacy For Exercise (SEE) Scale

How confident are you right now that you could exercise three times per week for 20 minutes if:

	Not confident					Very confident						
1. The weather was bothering you	0	1	2	3	4	5	6	7	8	9	10	
2. You were bored by the program or activity	0	1	2	3	4	5	6	7	8	9	10	
3. You felt pain when exercising	0	1	2	3	4	5	6	7	8	9	10	
4. You had to exercise alone	0	1	2	3	4	5	6	7	8	9	10	
4. You did not enjoy it 5.	0	1	2	3	4	5	6	7	8	9	10	
6. You were too busy with other activities	0	1	2	3	4	5	6	7	8	9	10	
7. You felt tired	0	1	2	3	4	5	6	7	8	9	10	
8. You felt stressed	0	1	2	3	4	5	6	7	8	9	10	
9. You felt depressed	0	1	2	3	4	5	6	7	8	9	10	

13. T1 INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

Appendix XX: Structured interview guide — intervention participants (study III)

Section 1: Intervention content and delivery

What were your initial impressions when you were referred to/when you met the intermediary?

Additional prompts:

- *Why were you referred to the intermediary?*
- *What motivated you to go/self-refer to the intermediary?*

Tell me about your interactions with the intermediary over the 12 weeks.

Additional prompts:

- *How long did you work/have you been working with the intermediary?*
- *Were you working with the intermediary before the study?*
- *How often did you work with/meet with the intermediary over the last 12 weeks?*

How did the intermediary help you to connect to local physical activities or other services in the community?

Additional prompts:

- *What local physical activities did you connect to?*
- *When did you start the local physical activity? If you didn't start, why not?*
- *How often did the group run? How often did you attend? Would you say you attended 50%/75%/>90% of the sessions?*
- *Did you stay for the full session?*

Do you think you received an appropriate amount of support from the intermediary?

How did working with the intermediary impact on you?

Did you experience any negative impacts from engaging with an intermediary?

Section 2: Outcomes

Did the questionnaires that were used in this study capture important information/improvements?

Was there any information/improvements that were not captured by the questionnaires?

Section 3: Measures

How did you find completing the questionnaires?

Overall, how acceptable did you find working with the intermediary? Please circle one answer.

1	2	3	4	5	6	7	8	9	10
Completely unacceptable					Completely acceptable				

Why did you choose this number?

Appendix XXI: Semi-structured interview guide — intermediaries (study III)

1. Generally, how was your experience of recruiting for the study? What worked well? What didn't work well?
2. Did you have many clients/service users who were eligible for the study? If not, why?
3. How did your clients/service users react when you informed them of the study? If it was a positive/negative reaction, why?
4. Do you feel that your clients/service users were generally well able to understand the study information?
5. Did your clients/service users understand what would be required of them to participate in the study?
6. When did you introduce the study to your clients/service users? What influenced your decision to introduce the study? For future studies when would be the most appropriate time to introduce the study?
7. Were there clients/service users that met the eligibility criteria that you did not inform of the study? If so, what was the reason/s for not informing them of the study?
8. For those that declined to participate, can you explain why they chose not to participate?

Appendix XXII: Qualitative theme development (study III)

1. Sample of field notes, highlighting of noteworthy comments, and reflexive notes on a transcript

GK02

☐ Edit

☐ Code Panel

would have been men and women? And you know, age profile was kind of... I would say... 55 plus. So... yeah, and I would have done that for several weeks, and then we would have come to the point then where you weren't kind of getting any-nobody was calling you so.

Interviewer: Yeah. So, it-it seems to be like it was working well, kind of in what you were doing, and that, you know, going into the groups, explaining the study, there was lots of interest, you know, lots of engagement from people, but just not people following up then by contacting the research team?

Participant: Yeah, yeah, definitely, like I-on the ground? I got the impression that people were interested, and they were taking the information. But what they were doing after that, you know I-you know, I don't know what was happening after that - now, after us having a chat about it, and you not getting any con-you know, nobody was contacting you, I kind of went back. We sort of chatted about how we could maybe go about getting people to contact. So when I went back then, and chatted to the kind of people I was like, "look guys, me again [laughing] you know, chatting about this study again". and you know. people were nodding and all of that. and then people were like going "oh. yeah.

Annotations

Item	Content
3	Changed recruitment strategy slightly in Week 5 of recruitment - see notes from recruitment record log. Field note: Very few people followed up with the research team directly as per original plan.
4	Field note: Generally interest was high.
5	Changed recruitment strategy slightly in Week 5 of recruitment - see notes from recruitment record log. Field note: Intermediary then started to collect phone numbers from interested potential participants, leading to the first people recruited from this service.
6	Research team.

2. Sample of preparation for an interview with an intermediary, and the relevant entry in the 'lessons learned' log

GK02 Interview Prep

Edit

Code Panel

Notes made in preparation of interview (based on correspondence and observations in reflexive diary, lessons learned log and recruitment record log)

- Recruited 12
- n=5 enrolled
- Had to extend recruitment period: 11 weeks total to recruit men

What didn't work well - regular contacts from study team?
 Three people minimal interaction at the group (one signed up to mailing list but otherwise...)
 PIL "too long" and "putting people off". "People didn't express why they didn't want to take it... a lot of info on the sheet"
 Call October: Very few people followed up with team directly as per original plan. Then started collecting phone numbers (first participants)
 "Mental with sportsfest"

See lessons learned log 2(c) -Conversation with LSO intermediary regarding length of PIL and difficulty relying on people to sign up

COMMUNICATION WITH INTERMEDIARIES		
2 (c).	Conversation with LSO intermediary regarding length of PIL and difficulty relying on people to sign up	Issue: Had a telephone call with an LSO intermediary on the 4/10/2023 who gave feedback on their recruitment efforts ➔ Had handed out tens of leaflets and reminded people at follow-up sessions of the programme (as recommended by the research team) but none had followed up contacting the research team directly ➔ This intermediary felt that this may be due to the fact that the PIL is “too long” and “may be putting people off”. They felt that if the poster and consent form alone could be handed out this wouldn’t be as off-putting to people.

		Action: • I explained that due to requirements from both DPO and ethics committee the length of the PIL could not be changed and had to be handed out. • I suggested collecting contact numbers of persons interested in taking part in the study (as described in the protocol) and passing these on the research team. The intermediary agreed with this suggestion, and contact numbers were passed on the next day using this method of recruitment. Future actions: • Recruiting through local PA may be too labour intensive, as large numbers of PILs may need to be handed out in order to recruit appropriately large samples for future controlled trials. • The PIL may need to be simplified/reworked for clarity, possibly in conjunction with the advisory panel and/or a public/patient representative.

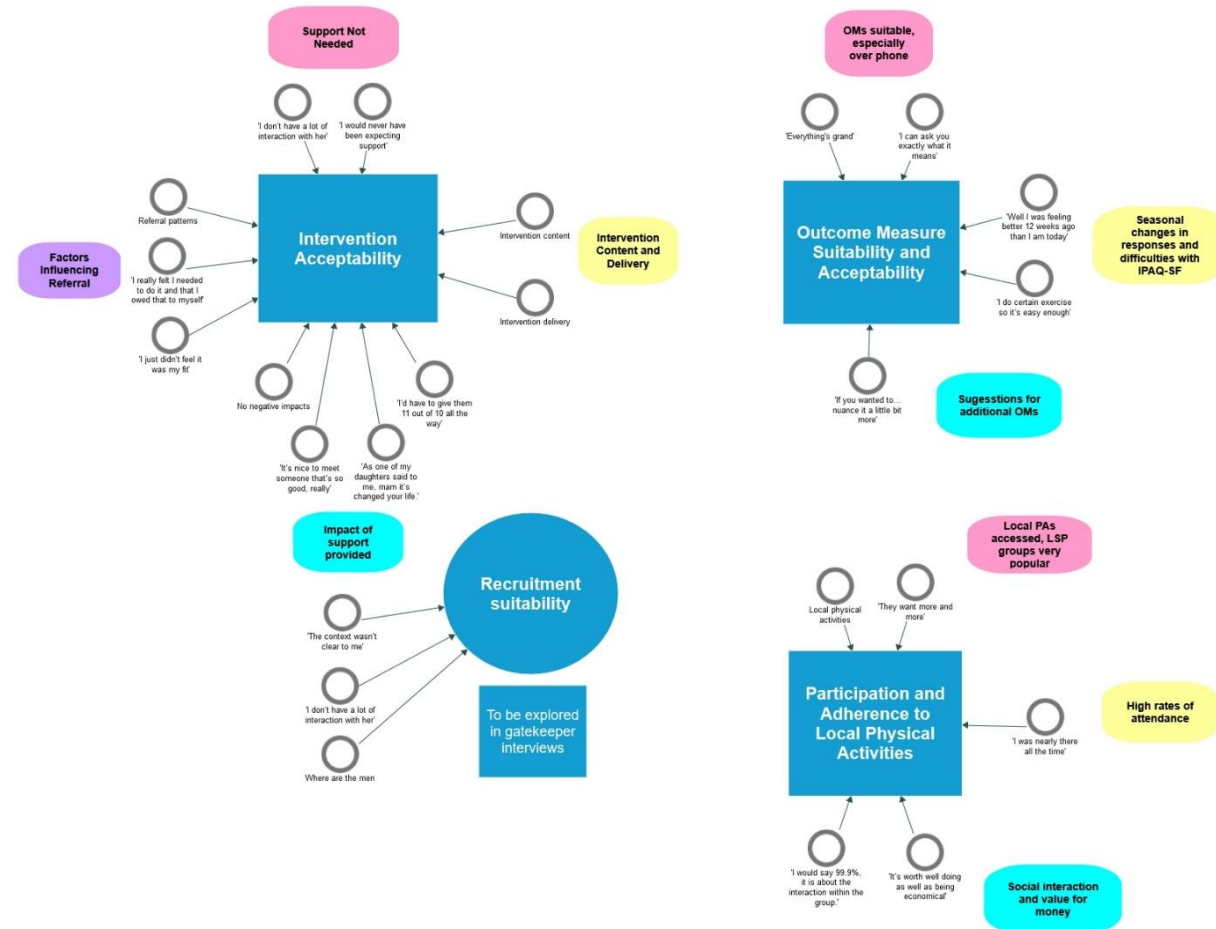
Abbreviations: DPO — data protection officer, LSO — local sport partnership community sports development officers, PA — physical activity, PIL — participant information leaflet.

3. Sample of codes

Name	Files	References
Not all eligible people received study information	2	2
Offer free programmes	2	2
People aren't active when groups aren't on	1	2
People connect to groups via other methods	1	1
People not reading PIL	1	1
People unwilling to contact research team directly	1	2
PIL misleading in terms of what was required	1	2
PIL was clear	2	2
Pointing out researcher's contact details not successful	1	1
Positive reaction to study	4	9
Reasons for not participating	3	10
Did not want to share personal information	1	2
Lack of interest	1	1
Not interested at the time of recruitment	1	1
Previously taken part in research	1	1
Recruitment interrupting exercise	1	2
Too much work or effort	1	2
Unable to read study material	1	1
Recruited at start of new group	1	1
Recruited from pre-existing groups	2	3
Recruited in September	3	3
Recruitment strategies that worked well	1	3
Did recruitment and screening together	1	2
Not interrupting exercise	1	1
Recruitment strategy as is is time consuming	2	4
Recruitment strategy as is isn't time consuming	1	1
Regular contact with groups a positive	2	7
Reminder emails from team were helpful	1	1
Remote nature a positive	1	1
September recruitment	3	3
Shorter or concise recruitment period preferred	3	7

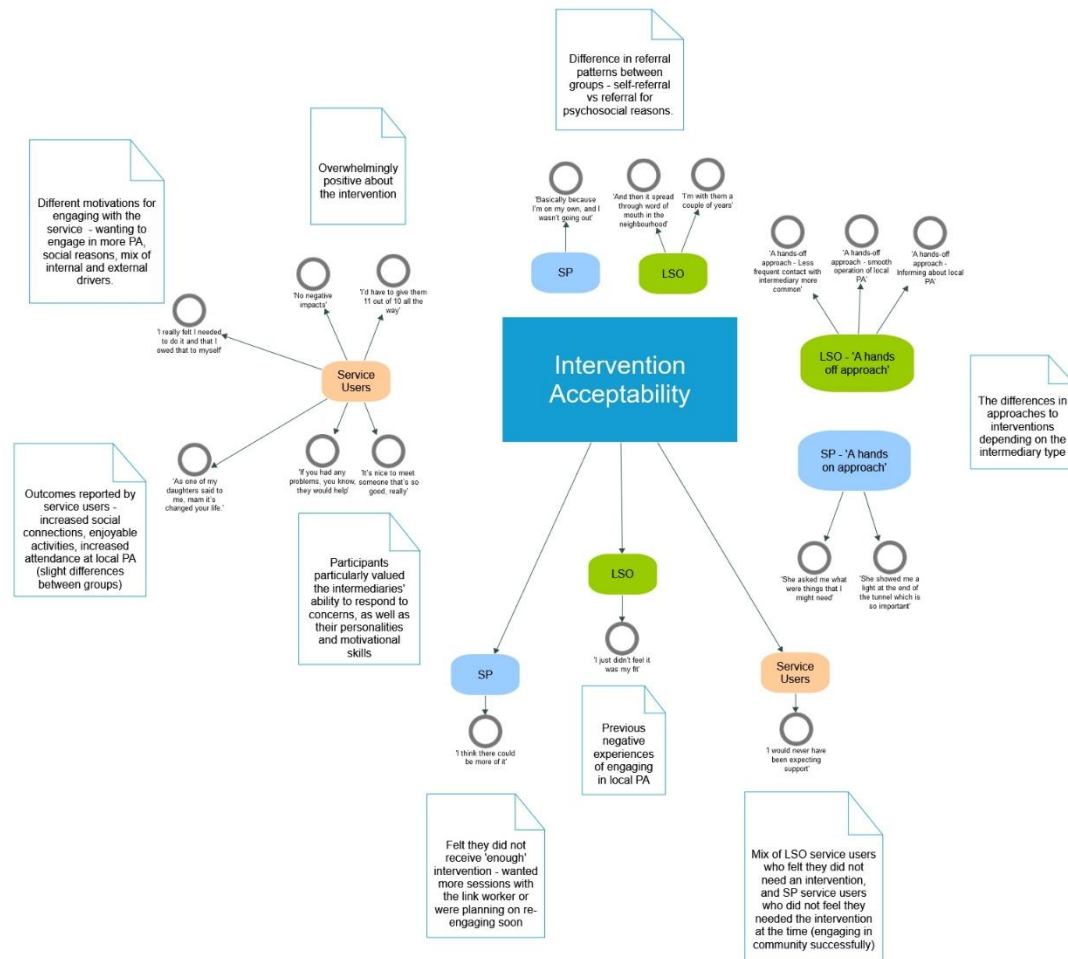
Abbreviations: PIL — participant information leaflet.

4. Development of categories. Version 1: Concept Map (Intervention Acceptability — LSO intervention participants) 26/03/2024



Abbreviations: IPAQ-SF — International Physical Activity Questionnaire — Short Form, LSO — local sports partnership community sports development officers, LSP — local sports partnership, OM — outcome measure, PA — physical activity.

Version 2: Concept Map (Intervention Acceptability— LSO and SP intervention participants) 04/07/2024



Abbreviations: LSO — local sports partnership community sports development officers, PA — physical activity, SP — social prescribing link workers.