

An exploration of the factors that
influence the physical activity
promotion practices of healthcare
professionals caring for adults
with chronic diseases

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Abstract

Background: Physical activity (PA) benefits physical and mental health and is effective in the prevention and treatment of non-communicable diseases. Globally, one in four adults are insufficiently active to benefit health and levels of physical activity are in decline. Brief behaviour change interventions by healthcare professionals (HCPs) effectively increase patients' PA, yet levels of promotion by HCPs remain low. Therefore, research in this thesis aims to explore the factors that influence the promotion of physical activity practices by HCPs.

Methods: The research is comprised of three phases – 1) A systematic review of 65 studies, representing 11,236 HCPs from 17 countries, that examines HCPs' perceptions about what influences promotion of physical activity for adults. 2) A qualitative study using semi-structured interviews that explores the perspectives of 14 HCPs who regularly refer patients to a PA referral scheme about what influences their promotion practices. 3) An explanatory mixed methods study that examines the engagement of pre-registration nursing and physiotherapy students (n=39) with an online physical activity promotion education programme, the resultant change in self-perceived motivational interviewing skills, and programme acceptability.

Results: The systematic review and qualitative study show that HCPs believe that physical activity is beneficial to health and consider promotion of physical activity to be important, but it can be limited due to patient health issues and low motivation. HCPs reported mixed levels of knowledge, education and confidence to promote physical activity. The practice of physical activity promotion was influenced by knowledge about the health benefits of exercise, role-specific perceptions, personal physical activity levels, patient factors, and knowledge and feedback from the referral scheme. In the mixed methods study, 35.7% of those starting the online course completed it, with no significant change in self-perceived motivational interviewing skills. Physiotherapists were significantly more likely to complete the course than nurses ($p=0.006$). Personal

factors, difficulties with the online platform and the Covid-19 pandemic led to dropout.

Conclusion: HCPs consider promotion of physical activity to be important, but there are notable challenges in engaging patients in discussions of physical activity. More HCP education is required to enable effective patient behaviour change.

Declaration of Authorship

I hereby declare that:

- a) This work has not been submitted for any other degree or professional qualification.
- b) That this thesis is the result of my own independent work and is not part of a collaboration.

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List of abbreviations

COREQ	Consolidated criteria for reporting qualitative research
GDP	Gross domestic product
GDPR	General Data Protection Regulation
GP	General practitioner
HCP	Healthcare professional
HCPC	Health and Care Professions Council
MI	Motivational interviewing
MITI	Motivational interviewing treatment integrity code
MSc	Master of Science
NCD	Non-communicable disease
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NMC	Nursing and Midwifery Council
PA	Physical activity
PARS	Physical activity referral scheme
PhD	Doctor of Philosophy
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RQ	Research question
UK	United Kingdom

USA	United States of America
WHA	World Health Assembly
WHO	World Health Organisation

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1.1 Introduction

Physical activity (PA) benefits physical and mental health and is effective in the prevention and treatment of non-communicable diseases (World Health Organisation, 2018a). Globally, one in four adults are insufficiently active to benefit health and levels of physical activity are falling (Guthold, Stevens, Riley & Bull, 2018). Brief interventions by healthcare professionals (HCPs) effectively increase patients' physical activity (Lamming et al., 2017), yet levels of PA promotion by HCPs remain low. Therefore, research in this thesis aims to explore the factors that influence the promotion of physical activity practices by HCPs.

1.2 Physical activity

Physical activity in humans is defined as “bodily movement produced by skeletal muscles that result in energy expenditure” (Caspersen, Powell & Christenson, 1985). The term ‘exercise’ is often used to refer to physical activity, that is planned, structured and repetitive with the purpose of improving or maintaining fitness (Caspersen et al., 1985).

Physical activity is essential in the development and maintenance of good physical function (Spiegelman, 2017). When placed under mechanical stress, bone tissue and muscle fibres become stronger. Bone strength and density improve through increased deposits of mineral salts and collagen fibres, while muscles increase in mass and size (Tortora & Derrickson, 2011). The main source of mechanical stresses on bone is physical activity that causes the pull of skeletal muscles, and the opposing pull of gravity creates stresses on both muscle and bone. This means that regular weight bearing exercise, including walking and lifting weights, helps to build and strengthen muscles and to build and retain bone mass and strength (Kohrt et al., 2004).

In addition to the effects on the musculo-skeletal structures of the body, physical activity contributes to improving and maintaining cardiovascular fitness (Blair & Morris, 2009). Sustained exercise increases muscle oxygen demand and this is met by both cardiac output and the function of the respiratory system (Tortora & Derrickson, 2009). Regular physical activity builds the functional mass of the myocardium (heart muscle) and improves gas transfer in the lungs, consequently improving oxygen delivery and cardiovascular fitness (Betts, 2013). Longer term engagement in physical activity promotes increased peripheral capillarisation and greater capacity for red blood cells to carry oxygen molecules. Physical activity also promotes increased levels of mitochondria, the organelles that generate cellular chemical energy, thereby promoting efficient energy transfer and improving aerobic metabolism (Xiao, 2017).

1.3 Physical activity and health

Regular physical activity is a well-established protective factor for the prevention and treatment of the leading non-communicable diseases (NCDs) that occur with age, including heart disease, stroke, diabetes and breast and colon cancer (World Health Organisation, 2010). It is associated with a reduction of 35% in cardiovascular mortality and a reduction of 33% in all-cause mortality (Nocon et al., 2008). It also contributes to the prevention of other important NCD risk factors such as hypertension, being overweight and obesity; is associated with improved mental health (Schuch et al., 2016); is effective in preventing subsequent depressive episodes (Mammen & Faulkner, 2013); is associated with a delay in the onset of dementia (Livingston et al., 2017); and improved quality of life and well-being (Das & Horton, 2012).

In addition to aiding the primary prevention of numerous NCDs, there is a significant body of evidence that supports the contribution of physical activity in the secondary prevention of illness. Physical activity is associated with reducing the risk of recurrence and mortality in people who have had a myocardial infarction (Lawler, Filion & Eisenberg, 2011); reducing blood pressure in people

who have been diagnosed with hypertension (Cornelissen & Smart, 2013); improving quality of life and reducing hospital admissions for people with heart failure (Taylor et al., 2014); improving mobility and reducing the risk of falls in older adults (Martínez-Velilla et al., 2016); and reduced symptoms and improved health-related quality of life in people with asthma (Eichenberger, Diener, Kofmehl & Spengler, 2013).

Despite the widely documented benefits of physical activity to health, and the associated risks of physical inactivity, levels of physical activity globally are in decline. In 2018 it was reported that, worldwide, only one in four people engaged in sufficient physical activity to benefit their health (Guthold et al., 2018). In 2019 in Scotland, where the research in this thesis was carried out, 30% of males and 40% of females were insufficiently active to benefit their health, while 21% of adults engaged in less than 30 minutes of physical activity per week (The Scottish Public Health Observatory, 2020). The recommended level of activity for adults at that time was a minimum of 150 minutes of moderate intensity physical activity per week, or 75 minutes of vigorous intensity PA, or a combination of both (World Health Organisation, 2010).

In contrast to the health benefits of physical activity, declining levels of PA have serious wider societal implications. Increased levels of physical inactivity have negative impacts on healthcare systems, the environment, economic development, community wellbeing and quality of life (Andersen, Mota & Di Pietro, 2016; Lippi & Sanchis-Gomar, 2020). The decline in levels of physical activity has been described as a pandemic (Kohl et al., 2012) and in 2012 was estimated to have been responsible for more than 5 million deaths worldwide (Lee et al., 2012). The annual global direct health cost of physical inactivity in 2013 was estimated to be at least (international) \$53.8 billion and in the UK alone, the cost was estimated to be (international) \$2.4 billion (Ding et al., 2016).

Although global efforts have been made to address the trend towards a less active population through widespread adoption and promotion of the

recommendations of the World Health Organisation (WHO) (World Health Organisation, 2010), there has been no improvement in global levels of physical activity since 2001 (World Health Organisation, 2020b). Levels of inactivity are twice as high in high-income countries compared to low-income countries, and levels of insufficient activity increased by 5% (from 31.6% to 36.8%) in high-income countries between 2001 and 2016 (World Health Organisation, 2020b). The reduction in levels of physical activity is partly attributed to inactive pursuits during leisure time and increasingly sedentary occupation profiles. Similarly, an increase in the use of passive modes of travel also contributes to insufficient physical activity (World Health Organisation, 2018c).

1.4 Physical activity guidelines

In recognition of the developing problem of declining levels of physical activity, in 2010 the WHO updated its recommendations for the levels of physical activity necessary to benefit health (World Health Organisation, 2010). The WHO recommendations categorised the population into three age groups – 5-17 years old; 18-64 years old; and 65 years and above. The research presented in this thesis focuses on HCPs who care for adult patients – consequently only the recommendations for individuals aged 18 years and older will be discussed. In 2019 the UK Government produced guidelines that reflected the 2010 WHO recommendations (Department of Health and Social Care, 2019).

- For good physical and mental health, adults should aim to be physically active every day. Any activity is better than none, and more is better still
- Adults should do activities to develop or maintain strength in the major muscle groups. These could include heavy gardening, carrying heavy shopping, or resistance exercise. Muscle strengthening activities should be done at least two days a week, but any strengthening activity is better than none
- Each week, adults should accumulate at least 150 minutes (2.5 hours) of moderate intensity activity (such as brisk walking or cycling); or 75

minutes of vigorous intensity activity (such as running); or even shorter durations of very vigorous intensity activity (such as sprinting or stair climbing); or a combination of moderate, vigorous and very vigorous intensity activity

- Adults should aim to minimise the amount of time spent being sedentary and when physically possible should break up long periods of inactivity with at least light physical activity

The WHO published revised guidelines for physical activity and sedentary behaviour in 2020 (World Health Organisation, 2020c) (**Table 1-1**). The new guidelines were developed in response to a request from the World Health Assembly (WHA) in 2018, when member states approved a new global action plan on physical activity and adopted a new voluntary target to reduce global levels of physical inactivity in adults and adolescents by 15% by 2030 (World Health Organisation, 2018a).

The 2020 WHO guidelines updated the previous recommendations released in 2010. They reaffirmed messages that some physical activity is better than none, more physical activity is better for optimal health outcomes, and provided a new recommendation on reducing sedentary behaviours (World Health Organisation, 2020c). These guidelines highlighted the importance of regularly undertaking both aerobic and muscle strengthening activities and, for the first time, there were recommendations for specific populations, including for pregnant and postpartum women and people living with chronic conditions or disability. The new guidelines are intended to inform national health policies aligned with the Global Action Plan on Physical Activity 2018-2030 (World Health Organisation, 2018a) and to strengthen surveillance systems that track progress towards national and global physical activity targets (Bull et al., 2020).

Table 1-1: *Guidelines on physical activity and sedentary behaviour (World Health Organisation, 2020c)*

Adults (aged 18-64 years)

Physical activity recommendation

For adults, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), transportation (wheeling, walking and cycling), work or household chores, in the context of daily occupational, educational, home and community settings.

In adults, physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, hypertension, cancers, type-2 diabetes, mental health (reduced symptoms of anxiety and depression); cognitive health, and sleep; measures of adiposity may also improve.

- All adults should undertake regular physical activity.
- Adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.
- Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.
- Adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.
- Doing some physical activity is better than doing none. If adults are not meeting these recommendations, doing some physical activity will benefit their health. Adults should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.

Sedentary behaviour recommendation (adults 18-64 years & older adults 65 years and older)

For adults, sedentary behaviour is defined as time spent sitting or lying with low energy expenditure, while awake, in the context of occupational, educational, home and community settings, and transportation. In adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality and incidence of cardiovascular disease, cancer and type-2 diabetes.

-
- Adults should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.
 - To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults should aim to do more than the recommended levels of moderate- to vigorous intensity physical activity.

Older adults (aged 65 years and older)

Physical activity recommendation

In addition to the recommendations for adults aged 18-64 years, it is recommended that:

- As part of their weekly physical activity, older adults should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.
 - Older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness.
-

1.5 Physical activity policy

The poor uptake of physical activity and the potential that this has for adverse economic and health implications has prompted policy level responses. It is estimated that even if working age populations worldwide adopt the lower limit of physical activity suggested in the new WHO PA guidelines (World Health Organisation, 2020c), there would be global health and economic benefits – an increase in gross domestic product (GDP) of 0.15%-0.24% per year and a reduction in premature mortality and morbidity (Hafner et al., 2020).

However, guidelines alone are unlikely to result in increased population levels of physical activity. It is essential that awareness and knowledge of the guidelines is supported by policies and opportunities for physical activity that support individuals in becoming more active (Milton et al., 2020). The WHO suggested that there should be a global population level emphasis upon a strong

commitment for physical activity promotion supported by healthcare policy makers and providers (World Health Organisation, 2017). Subsequently, in 2018, the WHO published a Global Action Plan for Physical Activity 2018-2030 (World Health Organisation, 2018a). The plan outlined the importance of policies to promote physical activity in the achievement of global PA targets. The current membership of the WHO exceeds 150 countries and, as a result, this represents a significant international commitment to policies that could increase physical activity levels (World Health Organisation, 2021). This translates into national policy development.

In response to the World Health Organisation (2018a) Global Action Plan on Physical Activity 2018-2030, the Scottish Government published A More Active Scotland: Scotland's Physical Activity Delivery Plan (Scottish Government, 2018b). It set out key areas of commitment to action designed to increase population-wide levels of physical activity. These, by necessity, are not limited only to healthcare and include making social recreational physical activity available and free where possible; promoting inclusivity so that everybody is able to participate in physical activity; increasing opportunities for active travel by cycling or walking; addressing barriers faced by groups who are at the greatest risk of inactivity; and supporting interventions promoting physical activity through the NHS. It is clear that efforts to promote physical activity require a collaborative societal approach in order to succeed, and the contribution of HCPs could be valuable in supporting efforts to achieve increased levels of physical activity. Indeed, Scottish Government policy outlines a commitment that physical activity promotion will be integral to the national healthcare system, with the aim of more people being active more often (Scottish Government, 2015a).

The multi-sectoral nature of physical activity does however present challenges in translating research to policy (Pratt et al., 2016). Milton and Bauman (2015) suggest that, in many cases, policy decisions that influence physical activity are made independently of research and these decisions are influenced by factors outside of healthcare. This means that physical activity research from

healthcare perspectives may not always resonate with policy makers who are external to healthcare (Pratt et al., 2016). There is, however, evidence that interventions by HCPs can be effective in increasing their patients' levels of physical activity, particularly in the form of brief interventions (National Institute for Health and Care Excellence, 2013). This means that HCPs may have a key role to play in the promotion of physical activity.

1.6 The role of healthcare professionals

Healthcare professionals (HCPs) have regular access to diverse population groups through their clinical practice and are viewed as trusted sources of information for health (Coulter, 2002; Ozaras & Abaan, 2018; Williams et al., 2018). Consequently, HCPs can play an important role in promoting physical activity in their communities in an effort to contribute to the achievement of global targets for increasing PA. Indeed, regulatory bodies for HCPs include the promotion of physical activity within requirements for health improvement interventions that constitute fundamental standards of practice (Health and Care Professions Council, 2020; Nursing and Midwifery Council, 2015). For example, registered nurses should be able to identify opportunities to counsel their patients about health-related lifestyle choices including, “the impact of smoking, substance and alcohol use, sexual behaviours, diet and exercise on mental, physical and behavioural health and wellbeing, in the context of people’s individual circumstances” (Nursing and Midwifery Council, 2018b).

There is some evidence to suggest that HCPs consider the promotion of physical activity to be an integral component of their clinical roles (Carstairs et al., 2020; Van der Ploeg et al., 2007). The concept of HCPs promoting physical activity is further supported by policy recommendations such as the UK National Institute for Health and Care Excellence (NICE), that recommends that HCPs should offer counselling on increasing levels of physical activity to inactive individuals, even when they are otherwise well (National Institute for Health and Care Excellence, 2013). Despite this, levels of physical activity promotion by

HCPs remain low – indeed it has been suggested in a systematic review of publications representing the views of 7371 physicians, that fewer than 40% of American medical doctors regularly discuss physical activity with their patients (Van Wormer, Pronk & Kroeninger, 2009). Although patients perceive physiotherapists and other HCPs to be closely associated with PA, its active promotion has been identified as being largely absent from physiotherapy practice in the United Kingdom (Williams, Smith & Papathomas, 2018). Furthermore, recent qualitative evidence suggests that while levels of PA promotion by UK general practitioners and practice nurses are low; this could still be instrumental in helping to effect changes in PA behaviour (Carstairs et al., 2020).

The reasons for low levels of physical activity promotion to patients among HCPs are complex and varied. There are multiple influential factors, including a lack of time, low levels of expertise and competing clinical priorities that act as barriers (Al-Ghamdi et al., 2018; Buchholz & Purath, 2007). Another factor may be variation between different HCP clinical disciplines (Deans, Kirk, McGarry & Rowe, 2020). Although levels of physical activity promotion by HCPs are low, research suggests that HCPs having conversations with their patients about physical activity may be effective in improving engagement with it. Studies have found that brief or very brief interventions are effective in increasing short term engagement with physical activity, particularly in primary care settings. Pears et al. (2016) report that, in a randomised controlled trial, a very brief intervention that involved HCPs motivating their patients to engage in physical activity using behaviour change techniques was effective. They established that there is a 73% probability of a very brief motivational intervention positively influencing physical activity. Similarly, in a pilot randomised controlled trial, Freene, Davey and McPhail (2019) suggested that very brief interventions by HCPs – in this case physiotherapists – may be effective in increasing levels of physical activity among patients. This trial involved forty participants who were randomly allocated to numerically equal intervention and control groups.

Caution must be applied in interpreting the evidence however – some brief interventions tested have been too long (up to 30 minutes) for effective use in healthcare settings and evidence of long term efficacy is limited (Lamming et al., 2017). However, growing evidence points towards HCPs' conversations with patients having real potential for increasing physical activity levels. Further research is required to establish effective, sustainable strategies for this.

1.7 The socio-ecological model

Social ecology posits the theory that behaviour is a product of five behavioural domains (intrapersonal, interpersonal, institutional, community and policy) that interact with and influence each other (Collins, Tapp & Pressley, 2010). The socio-ecological model was considered an appropriate theoretical framework for the research in this thesis because it can be used to examine the multiple influences on behaviour and the environmental interactions in which a behaviour occurs (Simons-Morton, McLeroy & Wendel, 2012). The model can be used to highlight factors at micro, meso and macro levels that contribute to a behaviour (Melius, 2015) and provide an understanding of what actions are required, in what areas, to facilitate behaviour change. Applying the socio-ecological model to the analysis of the evidence in the extant literature about the multiple and complex influences on HCPs' physical activity promotion behaviour can increase understanding of the relationships and potential for synergy between the elements. Continued consideration of the interactions between identified relationships throughout the empirical studies in this thesis can potentially maximise the potential for the practical application of results to create an environment in which HCPs are able to effectively promote physical activity.

1.8 Background to research programme

This PhD project is supported by a research grant from the Burdett Trust for Nursing (Burdett Trust for Nursing, 2016). The research grant was developed to identify challenges with access to a physical activity referral scheme (PARS) in Scotland and examine barriers and facilitators for successful engagement. Participants in the scheme were those with long term conditions who had been referred by HCPs, with some HCPs referring much more frequently than others. The work contained within this PhD focuses on one element of the access to PARS, which is referral of patients by HCPs.

There are few studies that focus exclusively on HCP referral to PARS. Those that do suggest that HCPs lack the skills and knowledge to effectively promote physical activity through PARS and have limited time to do so (Din et al., 2014). This study was undertaken using qualitative methodology with focus groups involving 46 HCPs. The majority of the participants were GPs (n=31) resulting in limited collection of data from nurses and allied health professionals. The use of focus groups in the study may have resulted in a hierarchical pattern of contribution in groups, with the perceptions of non-medical or junior staff being less well expressed due to a sense of inhibition. It is suggested that provision of education for HCPs in physical activity promotion could improve this and should be prioritised (Buckley, Finnie, Murphy & Watson, 2020). Existing evidence also points to a lack of training in physical activity promotion via PARS and poor knowledge of the evidence for its benefits, presenting barriers to promotion as suggested in a mixed methods study by Graham et al. (2005). Their study recruited 71 HCPs to the quantitative component, and 11 HCPs to the qualitative component. While descriptive statistics were reported, there was no direct link to the findings of the qualitative analysis. Results should be interpreted with consideration for the fact that all of the participants were physically active. This may be a limitation because, as reported in the systematic review in chapter 2 of this thesis, physically active HCPs are more

inclined to promote PA. Physically active HCPs may also be more likely to participate in PA research.

Other studies have included information about PARS in more general examinations of physical activity promotion by HCPs. These studies report that HCPs cite numerous barriers to physical activity promotion and referral, including competing clinical priorities and lack of time (Puig Ribera, McKenna & Riddoch, 2005). HCPs demonstrated poor knowledge of the evidence for physical activity promotion (Bélanger et al., 2015) and a lack of knowledge of physical activity guidelines (Douglas et al., 2006; Florindo et al., 2015). The general attitudes and beliefs of practising HCPs who promote physical activity through referrals to PARS could be important in understanding what contributes to successful promotion activities. This may be useful in identifying what factors influence who is successfully referred to PARS and why. A better understanding of the factors that influence the promotion of physical activity by HCPs has the potential to reveal whether HCPs influence uptake, and may elucidate an understanding of the challenges and opportunities that HCPs encounter in all physical activity promotion efforts.

1.9 Thesis aims and research questions

The aim of this work is twofold – firstly, to explore HCPs' personally-held beliefs and attitudes to, and knowledge of, physical activity and how these factors influence their promotion of it in clinical practice and, secondly, to explore the effect of an education programme on HCPs' perceptions of their competence in promoting physical activity. To address these aims the research questions were:

1. What knowledge, attitudes and beliefs do HCPs have relating to physical activity?
2. What factors influence the physical activity referral and promotion practices of healthcare professionals caring for adults with chronic diseases?

3. How does engagement with an online physical activity promotion education programme affect student healthcare professionals' self-reported skills in motivating patients to be more active?

To address these research questions, a sequential mixed methods approach was used:

RQ1: A systematic review and metasynthesis of factors influencing the promotion of physical activity by primary and secondary healthcare professionals (Chapter Two).

Chapter Two critically examines the evidence of factors that influence HCPs' promotion of physical activity to their patient populations. Evidence from primary and secondary care, involving all HCP disciplines, is synthesised and presented within the socio-ecological model. Finally, the chapter examines the synthesised evidence and identifies gaps in knowledge where further research is needed.

RQ2: A qualitative study to explore the factors that influence the physical activity promotion practices of healthcare professionals caring for adults with chronic diseases (Chapter Four).

Chapter Four presents the design and results of a qualitative study that examined the perspectives and opinions of 14 HCPs who referred patients to a PARS in their community. The findings are presented within a thematic framework, with detailed discussion of themes that developed from data that were collected in semi-structured interviews with individual HCPs.

RQ3: How does engagement with an online education programme affect student healthcare professionals' self-reported skills in motivating patients to be more active? (Chapter Five).

Chapter Five presents a mixed methods study that examined the feasibility and acceptability of an online education programme that was delivered to pre-registration nurses and physiotherapists, that aims to encourage HCPs to discuss physical activity with patients. The effect of engagement with the programme was subjected to statistical analysis and a qualitative component examined the experiences of non-completing participants.

Chapter 2. A systematic review and metasynthesis of factors influencing the promotion of physical activity by primary and secondary healthcare professionals.

2.1 Introduction

Globally, one in four adults are insufficiently active to maintain good health (World Health Organisation, 2017). Physical inactivity is particularly prevalent in high-income countries, with 32.4% of adults in the USA and 37.3% of adults in the UK estimated to be insufficiently active (World Health Organisation, 2018c). This is despite strong evidence that regular physical activity reduces the risk of cardiovascular disease, diabetes and some cancers (Lee et al., 2012).

Additionally, regular physical activity positively affects mental health (Josefsson, Lindwall & Archer, 2014), particularly depression and anxiety (Saxena, Van Ommeren, Tang & Armstrong, 2005). Physical inactivity has been estimated to cause 6% of coronary heart disease, 7% of type 2 diabetes and 10% of breast and colon cancers worldwide (Lee et al., 2012). This has adverse economic implications. Indeed, in 2013, the direct health cost of physical inactivity globally was estimated to be (international) \$67.5 billion (Ding et al., 2016) and it accounted for >11% of USA aggregated healthcare costs in 2014 (Lobelo et al., 2018). Such costs create a compelling case for physical activity promotion at a population level, supported by healthcare and policy makers worldwide (World Health Organisation, 2010).

Healthcare professionals are potentially important in physical activity promotion. They have access to diverse populations and are perceived by their patients to have credible professional knowledge and expertise in supporting individuals to find appropriate activities (Douglas et al., 2006). Consequently, health policy guidance recommends that HCPs provide physical activity advice to healthy people and those with non-communicable diseases. For instance, the UK National Institute for Health and Care Excellence recommends that HCPs offer

brief advice about increasing physical activity to inactive individuals who are otherwise well (National Institute for Health & Care Excellence, 2013). Additionally they should refer inactive individuals with NCDs to locally available physical activity interventions (National Institute for Health & Care Excellence, 2014). In the USA, the American Heart Association recommends that physical activity assessment and promotion is integral to every patient visit (Lobelo et al., 2018).

Policy recommendations, however, do not necessarily translate into practice. Physical activity remains less likely to be discussed by HCPs than smoking, diet and alcohol. Indeed, it is discussed 60% less often than other health promotion behaviours (Wheeler, Mitchell, Ghaly & Buxton, 2017). Many studies have investigated HCPs' perceptions of physical activity promotion in a healthcare environment. While two previous systematic reviews have examined primary care providers' attitudes and perceptions of physical activity counselling (Hébert, Caughy & Shuval, 2012; Huijg et al., 2015), no review has considered influences on the effective promotion of physical activity within both primary and secondary healthcare.

Influences on physical activity promotion within healthcare are multi-factorial. They include personal perceptions of physical activity (Karvinen, McGourty, Parent & Walker, 2012), perceptions of patients (Buchholz & Purath, 2007), organisational (Aldossary, Barriball & While, 2013), community (Buchholz & Purath, 2007), and policy issues (Bull, Schipper, Jamrozik & Blanksby, 1995). Therefore, there is a need to consider interactions between these factors.

Social ecology is the study of the effects of interrelationships between social levels, behaviour and health (Simons-Morton, 2012). The socio-ecological model illustrates the relationship between five domains that influence behaviour; intrapersonal, interpersonal, institutional, community and policy (Collins et al., 2010). Thus, the primary aim of this review is to systematically summarise and evaluate primary and secondary HCPs' perceptions about what influences physical activity promotion for healthy adults and those with NCDs. The review

will evaluate providers' perceptions about the importance of physical activity promotion through the lens of the socio-ecological model.

2.2 Methods

2.2.1 Study design

The protocol for this systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO; registration number CRD42018084790), available at

https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=84790.

It is a meta-synthesis of quantitative and qualitative data and was conducted using the Guidance on the Conduct of Narrative Synthesis in Systematic Reviews (Popay et al., 2006). The review was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff & Altman, 2009).

2.2.2 Search methods

Studies were identified through electronic searches conducted between September 2017 and January 2021 of Medline, CINAHL and PsycINFO for quantitative cross-sectional studies, mixed methods and qualitative studies examining factors influencing physical activity promotion by primary and secondary care providers (Appendix 1). Additionally, a search of Google Scholar and hand search of reference lists of included studies was conducted.

2.2.3 Study selection

Studies were eligible for selection if they: 1) included HCPs providing care to adults aged 18 years or over; 2) examined HCPs' personal perceptions of physical activity and its promotion; 3) were published in English; and 4) were

published between January 1995 and December 2020. Studies were excluded if they reported the implementation/effectiveness of a physical activity promotion intervention but did not consider the influence of HCPs' perceptions of the intervention. There were no restrictions on the sample size or quality of the studies. Two reviewers (BF and RG) independently screened titles and/or abstracts of all studies identified, using the search strategy to identify those that potentially met the inclusion criteria. A further reviewer (CH) randomly screened 50% of titles and/or abstracts to ensure consistency. Two reviewers (BF and CH) independently assessed the full texts for inclusion or exclusion. Disagreements about eligibility of studies were resolved through discussion between reviewers or by a third reviewer (LN) until consensus was reached.

2.2.4 Data extraction and analysis

Data were extracted using two customised Microsoft Excel spreadsheets (Microsoft Corporation, St. Redmond, WA, USA) (one quantitative and one qualitative) to allow for assessment of study quality and evidence synthesis. One reviewer (BF) extracted author, publication year, title, research aim, location and setting, methodology, participant characteristics and main outcome data. Quantitative studies and quantitative elements of mixed methods studies were critically appraised by one researcher (BF) for quality and the risk of bias using the appropriate Critical Appraisal Skills Programme (CASP) tool (Critical Appraisal Skills Programme, 2019). Qualitative studies and qualitative elements of mixed methods studies were critically appraised using the consolidated criteria for reporting qualitative research (COREQ) guidelines (Tong, Sainsbury & Craig, 2007).

Meta-analysis was not possible due to the variation in quantitative study designs, the descriptive nature of the qualitative data and the widely varying methods of measurement and analysis employed by the analytical studies, and/or insufficient data reported. Consequently, a narrative synthesis was undertaken because it can be used in systematic reviews focusing on a wide

range of questions, not only those relating to the effectiveness of a particular intervention (Popay et al., 2006). The review followed an iterative four stage analysis; 1) the development of a theory about how the intervention works, why and for whom; 2) a preliminary synthesis of findings of included studies; 3) an exploration of relationships in the data and 4) an assessment of the robustness of the synthesis (Popay et al., 2006).

During initial theory development, consideration was given to how the promotion of physical activity by HCPs works and how this fits with the socio-ecological model. The intervention was theorised to work via HCPs giving patients brief advice/counselling about physical activity or referring them to supervised PA programmes. In theory this works because HCPs are convinced of the benefits of physical activity for health and from a patient perspective are regarded as knowledgeable, credible providers of health advice. The result of the intervention was theorised to be that patients would receive physical activity advice and become active at levels beneficial to their health (**Figure 2-1**).

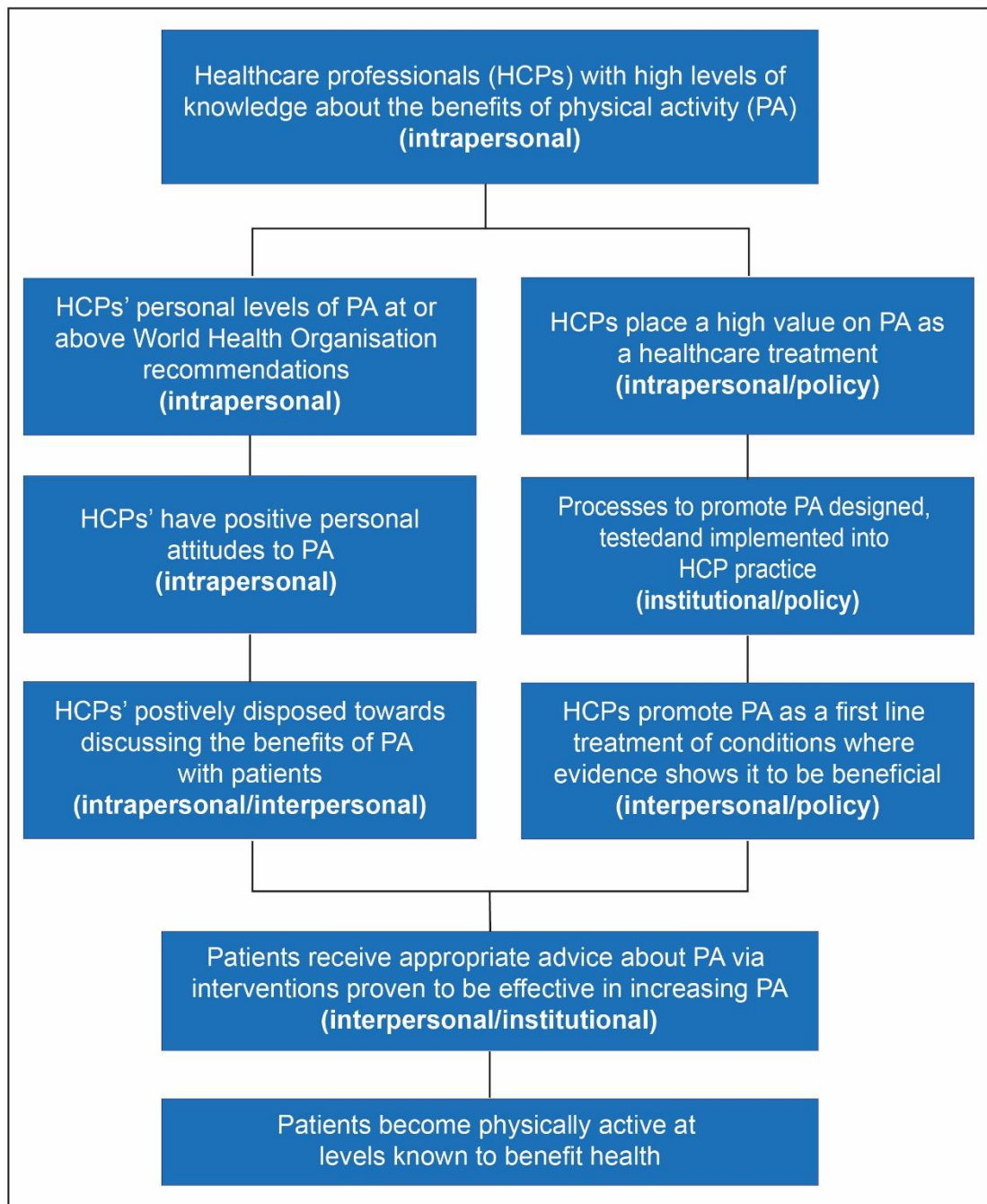


Figure 2-1: Initial theory development

Preliminary synthesis of study findings indicated that the factors included in the initial theory were consistently reported in studies, although not always in the positive manner theorised. Thorough explorations and assessment of

relationships between data allowed for the development of a robust synthesis of the factors influencing the promotion of physical activity by HCPs. The socio-ecological model was used to provide a framework for synthesising and understanding the role of multiple influences on the promotion of physical activity by HCPs, by examining the synergetic environmental interactions that influence behaviour (Melius, 2015). Applying this model to physical activity promotion behaviours highlights factors at the micro, meso and macro levels that may contribute to HCPs' PA promotion behaviour (Simons-Morton et al., 2012). The conceptual framework offered by the model was used during analysis to map the multiple levels of influence that contribute to the promotion of physical activity by HCPs.

2.3 Results

2.3.1 *Study selection and characteristics*

A total of 1364 records were screened for possible inclusion and 197 full-text papers were reviewed for eligibility. The final analysis included 65 papers representing studies from 17 countries (**Figure 2-2**).

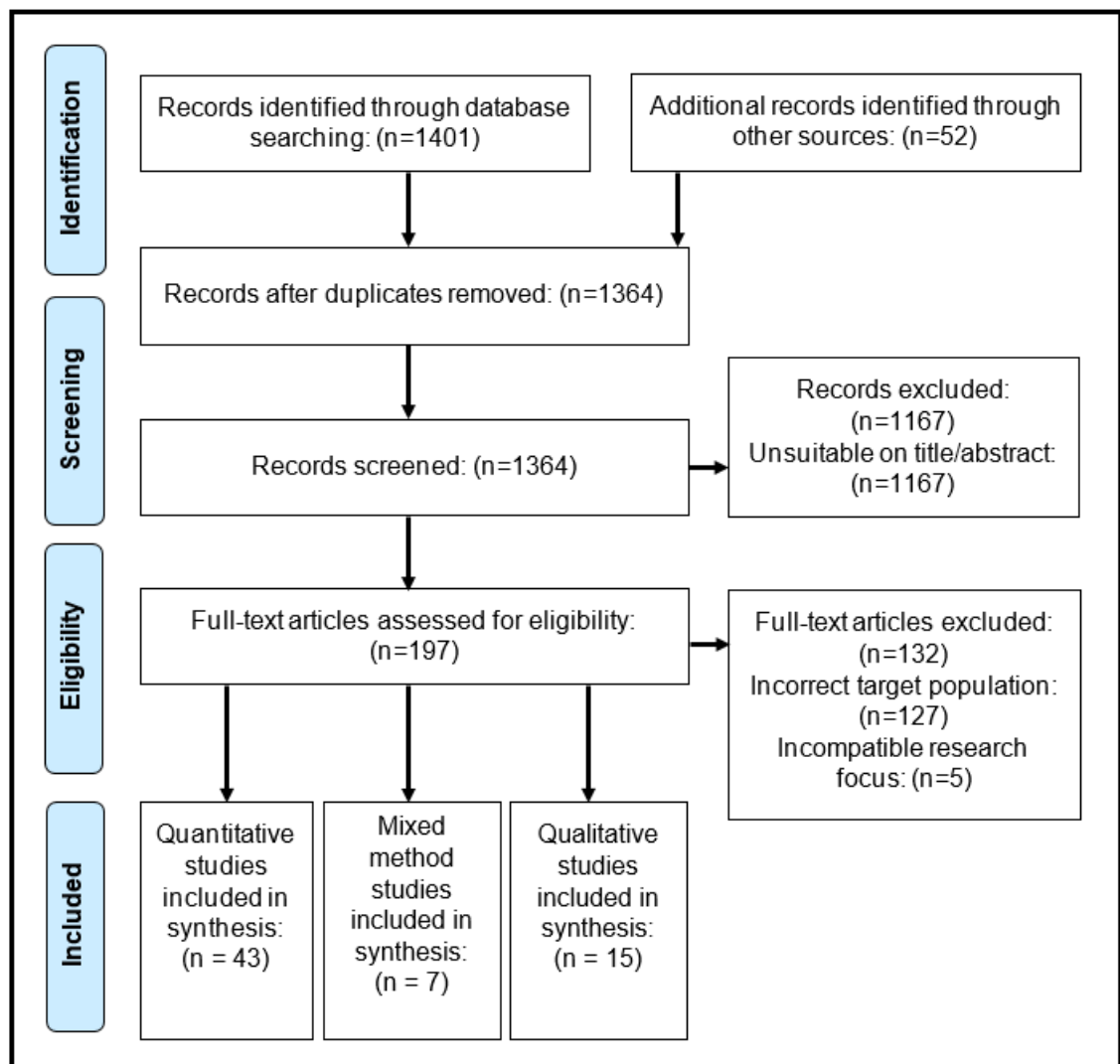


Figure 2-2: Flow diagram of included studies

Of the 65 included studies, 43 were cross-sectional quantitative studies (Al-Ghamdi et al., 2018; Aldossary et al., 2013; Bakhshi et al., 2015; Bartlem et al., 2016; Bleich et al., 2012; Bock, Diehm & Schneider, 2012; Buchholz & Purath, 2007; Buckley et al., 2020; Buffart et al., 2009; Bull et al., 1997; Burton, Pakenham & Brown, 2010; Cantwell et al., 2017; Cho, Sunwoo & Song, 2003; Dillman et al., 2010; Douglas et al., 2006a, 2006b; Florindo et al., 2015; Freene, Cools et al., 2019; Freene et al., 2017; Graham et al., 2005; Hardcastle et al., 2018; Jones et al., 2005; Jørgensen, Nordentoft & Krogh, 2012; Kable et al.,

2015; Karvinen et al., 2012; Kennedy & Meeuwisse, 2003; Keogh et al., 2017; Lanhers et al., 2015; Lawlor, Keen & Neal, 1999; Leemrijse et al., 2015; McDowell, McKenna & Naylor, 1997; McKenna, Naylor & McDowell, 1998; Morishita et al., 2014; Nadler et al., 2017; O'Hanlon & Kennedy, 2014; O'Brien et al., 2017; Park et al., 2015; Patra et al., 2015; Puig Ribera et al., 2005; Regolisti et al., 2018; Sheill et al. 2018; Shirley, van der Ploeg & Bauman, 2010; Soegtrop et al., 2018; Spellman, Craike & Livingston, 2014; Stanton, Happell & Reaburn, 2015; Steptoe et al., 1999; Suija et al., 2010; Van der Ploeg et al., 2007; Walsh et al., 1999; Williams, K. et al., 2015).

Seven employed mixed methods, including questionnaires and semi-structured interviews (Bélanger et al., 2015; Buckley et al., 2020; Cho et al., 2003; Douglas, Torrance et al., 2006b; Graham et al., 2005; Puig Ribera et al., 2005; Sheill et al., 2018) and 15 used only qualitative methods (Bohman, Mattsson & Borglin, 2015; Booth et al., 2013; Carstairs et al., 2020; De Vivo & Mills, 2019; Din et al., 2014; Haussmann et al., 2018; Jansink et al., 2010; Learmonth et al., 2018; Leyland et al., 2018; Patel, Schofield & Keogh, 2018; Roberts et al., 2019; Sabiston et al., 2018; Smith-Turchyn et al., 2016; Stuij, 2018; Williams et al., 2018) (**Table 2-1**).

In total, the included studies represent an examination of the perceptions of 11,236 HCPs: doctors (n=6,718), nurses (n=3,139) and allied health professionals or unspecified (n=1,379). Gender was reported in 56 studies. Participants were predominantly female: mean 64.4%. Studies were conducted in a variety of healthcare settings; primary care 60.0% (n=39), secondary healthcare 27.7% (n=18) and both primary and secondary healthcare 12.3% (n=8).

Table 2-1: Study Characteristics

Author, year and country	Design Data collection	Sample	Sample size (n)	Gender (% female)	Age (years) (Mean SD) or % by age group
Aldossary et al. (2013), Saudi Arabia	Cross-sectional postal questionnaire developed for the study	Nurses and doctors from military, government and private healthcare	Doctors (129) Nurses (605)	NR	NR
Al-Ghamdi et al. (2017), Saudi Arabia	Cross-sectional postal questionnaire used in previous studies	Nurses, doctors, nurse assistants, dieticians and health educators practising in the city of Riyadh	Doctors (309) Nurses (424) Nurse assistants (26) Dieticians (31) Health educators (13)	60%	Mean 33.06 (SD 8.45)
Bakhshi et al. (2015), UK	Cross-sectional postal questionnaire developed for the study	Registered nurses attending a London university	623	89.5%	NR
Bartlem et al. (2016), Australia	Cross-sectional computer assisted telephone interview developed for the study	Clinicians providing community mental health services	AHPs (54) Nurses (64) Psychiatrists (33)	58.9%	20-49: 56.7% ≥ 50: 43.3%
Belanger et al. (2015), Canada	Mixed methods Web-based survey	Family doctors listed in a provincial training programme mailing list	29	55.2%	Mean 41 (SD - NR)

	Face-to-face semi-structured interviews				
Bleich et al. (2011), USA	Cross-sectional postal survey developed for the study.	GPs, family doctors and interns from the Epocrates Honors Panel	498	32.8%	<40: 28% 40-54: 41% ≥55: 31%
Bock et al. (2012), Germany	Cross-sectional postal questionnaire developed for the study	Random sample of physicians identified from state records	260	35.4%	<50: 31.5% ≥50: 66.9%
Bohman et al. (2015), Sweden	Qualitative, descriptive. Face-to-face semi-structured interviews	Purposive sample of nurses from primary healthcare centres	12	100%	Mean 49.2 (SD 16.1)
Booth et al. (2013), UK	Qualitative cross-sectional, Semi-structured interviews	Purposive sample of HCPs working in a Regional Endocrinology Centre	Academic (1) Dietitian (2) Doctors (2) GPs (1) Nurse specialist (1)	NR	NR
Buchholz et al. (2007), USA	Cross-sectional exploratory, Web based questionnaire	Random sample of advanced nurse practitioners selected from the American Academy of Advanced Nurse Practitioners	148	95.5%	Mean 50 (SD 7.1)
Buckley et al. (2020), UK	Mixed methods, cross-sectional online survey, semi-structured interviews in person and by phone.	GPs practising in Liverpool, UK	56	50%	45.5 (SD 11.3)

Buffart et al. (2008), Australia	Cross-sectional, postal questionnaire	Purposive sample of GPs registered in New South Wales	646	42%	Not reported
Bull et al. (1997), Australia	Cross-sectional, 2 postal questionnaires developed for the study	Random sample of GPs in Perth	789	31.1%	≤35: 25% 36-45: 35% 46-55: 22% ≥56: 19%
Burton et al. (2010), Australia	Descriptive cross-sectional postal questionnaire.	Purposive sample of psychologists resident in Queensland who were registered with the Australian Psychological Society	236	84.7%	Mean 42.1 (SD11)
Cantwell et al. (2017), Ireland	Cross-sectional web-based survey developed for the study	Purposive sample of HCPs based in hospitals and GP surgeries	43	65%	<30: 2% 31-40: 28% 41-50: 51% 51-60: 14% >60: 5%
Carstairs et al. (2020), UK	Qualitative study, semi-structured interviews	Purposive sample of HCPs in primary care in Scotland	GPs (9) Nurses (5)	50%	35-44: 28.6% 45-54: 57.1% 55-64: 14.3%
Cho et al. (2003), South Korea	Mixed methods Postal questionnaire semi-structured interviews	Random sample of doctors identified by Korean National Health Insurance corporation	335	15.0%	Mean 46.7% (SD11.6)
De Vivo and Mills (2019), UK	Qualitative, semi-structured interviews	Random sample of midwives practising in England, UK	10	NR	Mean 50.8 (SD 8.44)

Dillman et al. (2010), Canada	Cross sectional unvalidated postal survey	Purposive sample of diabetes educators	119	97%	Mean 44
Din et al. (2015), UK	Qualitative, semi-structured group interviews	Purposive sample of GPs, practice nurses (PNs) and practice managers working in health practices who had referred to a national PA intervention	GPs (31) PNs (9) Practice managers (6)	56.5%	NR
Douglas et al. (2006), UK	Cross-sectional, Postal survey developed for the study.	Purposive sample of GPs, health visitors (HVs), and practice nurses from 4 health board regions	GPs (376) HVs (169) PNs (212)	NR	NR
Douglas et al. (2006), UK	Mixed methods, postal questionnaire followed by selective semi-structured interviews	Purposive sample of practice nurses and health visitors from 4 health board regions	HVs (169) PNs (212)	96.3%	NR
Florindo et al. (2015), Brazil	Descriptive, Telephone survey (IPAQ) developed for a previous project	Purposive sample community health workers	269	89.2%	18-29: 28.3% 30-49 61.3% ≥50 12.6%
Fong et al. (2018), Canada	Qualitative focus groups	Purposive sample of oncology clinicians practising in Ontario, Canada	Medical oncologists (10) Radiation oncologists (2) GP (1)	70.3%	NR

			Primary care physician (2) Nurses (8) Nurse practitioner (1) Surgical oncologist (2) Mammogram technician (1)		
Freene et al. (2017), Australia	Cross-sectional online survey	Voluntary sample of physiotherapists, nurses, exercise physiologists, occupational therapists, dietician and pharmacists	Physiotherapists (257) Exercise physiologists (57) Nurses (71) Occupational Therapists (26) Other (22)	78.5%	<35: 44.6% 35-44: 18.4% 45-54: 23.6% >54: 13.6%
Graham et al. (2005), UK	Mixed methods, postal survey, semi-structured interviews	Purposive sample of GPs and nurses from one UK health board	GPs (81) PNs (2)	NR	NR
Hardcastle et al. (2018), international	Cross-sectional online survey	Purposive sample of registered oncologists from seven oncology societies	123	51.3%	26-35: 12.7% 36-55: 61% 56-65: 22% ≥65: 4.3%

Hausman et al. (2018), Germany	Qualitative, semi-structured interviews and role play scenarios	Random sample of HCPs in a German region who specialise in cancer care	GPs (10) Specialised physicians (10) Nurses (10)	63%	Mean (SD) GPs 48.7 (9.3) Specialised physicians 24 (12.9) Nurses 41.6 (12.0)
Jansink et al. (2010), UK	Qualitative, Semi-structured interviews	Purposive sample of primary care nurses from practices that had participated in a diabetes-based RCT	13	100%	Mean 44 (SD NR)
Jones et al. (2005), Canada	Cross-sectional postal survey developed for the study	Purposive sample of oncologists identified via the Canadian Medical and Royal College of Surgeons directories	281	36.2%	Mean 44.6 (SD 8.9)
Jørgensen et al. (2012), Denmark	Quantitative postal questionnaire (ESCQ) adapted for the study	Purposive sample of GPs from two Danish municipalities	223	50.7%	Mean 53.4 (SD 8.0)
Kable et al. (2015), Australia	Cross-sectional, validated postal survey	Purposive sample of nurses practicing in the New England area	79	88.6%	NR
Karvinen et al. (2012), USA	Cross-sectional, Web-based survey	Random selection of oncology nurses throughout the USA, contacted by a data service	274	97.8%	Mean 43 (SD NR)
Kennedy et al. (2003), Canada	Cross-sectional postal survey designed for the study	Random sample of family physicians	330	36.2%	68.9%>40

Keogh et al. (2016), Australia	Cross-sectional web-based survey	Purposive sample of oncology nurses recruited via social media and email invitations	119	96%	26-35: 9% 36-45: 9% 46-55: 34% 56-65: 26% >65: 3%
Lanhers et al. (2015), France	Cross-sectional postal questionnaire adapted for the study	Purposive sample of all GPs in a region of France	48	39.6%	Mean 48.9 (SD 1.2)
Lawlor et al. (1999), UK	Descriptive cross-sectional postal survey	Purposive sample of GPs in Bradford, England	174	NR	NR
Learmonth et al. (2017), USA	Qualitative semi-structured interviews	Purposive sample of American doctors and nurses caring for multiple sclerosis patients	Doctor (13) OTs (10) PTs (11) Nurses (10)	68%	Mean 49.7 (SD 12.8)
Leemrijse et al. (2015), Netherlands	Cross-sectional postal questionnaire developed for the study	Purposive sample of general practitioners	340	41.2%	NR
Leyland et al. (2018), UK	Qualitative, focus groups.	Random sample of community mental health professionals	Nurse (13) Community support (10) Psychologists (4) Team leader (3) Psychiatrist (2)	NR	Mean 41.8 (SD 11.6)

McDowell et al. (1997), UK	Cross-sectional, postal questionnaire	Purposive sample of practice nurses in Avon, south-west England	220	100%	Mean 43.7
McKenna et al. (1998), UK	Cross-sectional descriptive, postal questionnaire adapted (ESCQ) for the study	Purposive sample of GPs and practice nurses in south-west England	Doctors (419) Nurses (196)	53.3%	Mean (GP) = 41.2r, (PN) = 43.6
Morishita et al. (2014), Japan	Cross-sectional, postal questionnaire designed for the study	Purposive sample of doctors caring for CKD patients	581	NR	24-30: 9.5% 30-40: 32.5% 40-50: 30.1% 50-59: 26.5% ≤60: 1.4%
Nadler et al. (2017), Canada	Cross-sectional web-based survey	Purposive sample of oncology care providers at a cancer centre in Ontario, Canada	120	73%	Median 48: (24-66)
O'Brien et al. (2016), Canada	Two questionnaires administered pre and post attendance at a training workshop	Doctors, allied health professionals and exercise professionals attending a training workshop	186	Doctors: 42.5% AHPs: 94.4% Exercise professionals: 73.9%	Doctors: 49 (SD11) AHPs: 43 (SD12) Exercise professionals: 38 (SD 10)
O'Hanlon et al. (2014), Ireland	Cross-sectional online survey	Purposive sample of Irish physiotherapists in oncology and oncology nurses	Physiotherapists 26 Nurses 58	Physiotherapists: 96.1% Nurses: 98.3%	NR
Park et al. (2015), South Korea	Cross-sectional survey distributed at a conference and by email.	Purposive sample of oncologists	167	33.5%	Mean 43 (SD8.6)

Patel et al. (2018), New Zealand	Qualitative semi-structured interviews	Purposive sample of HCPs caring for men with prostate cancer in Auckland, New Zealand	16	50%	28 – 72
Patra et al. (2013), India	Cross-sectional survey, postal questionnaire	Multi-stage random sampling of doctors in the city of Trivandrum	146	41.1%	<40: 41.8% 40-59: 46.6% >60: 11.6%
Puig Ribera et al. (2005), Spain	Mixed methods study' postal survey, focus group and semi- structured interviews	Purposive sample of physicians and nurses in General Practices	Doctors: 145 Nurses: 92	57%	NR
Regolisti et al. (2018), Italy	Cross-sectional postal survey developed for a previous study	Italian HCPs specialising in haemodialysis	Doctors (79) Nurses (251)	NR	Doctors: Mean47 (SD9) Nurses: 46 (SD8)
Roberts et al. (2019), UK	Qualitative, telephone semi- structured interviews	Purposive sample of cancer nurse specialists	19	95%	NR
Sheill et al. (2018), Ireland	Mixed methods, web-based survey with closed and open ended questions	Purposive sample of Irish oncologists	40	NR	NR
Shirley et al. (2010), Australia	Cross-sectional postal survey	Random sample of physical therapists in New South Wales	319	73%	<35: 42% 35-44: 29% 45-54: 22% ≥55: 7%

Smith-Turchyn et al. (2015)	Qualitative semi-structured interviews by telephone and in person	Purposive sample of HCPs working with women with breast cancer	24	66.7%	NR
Soegtrop et al. (2018), Canada	Cross-sectional online survey	Purposive sample of Canadian emergency department doctors	332	NR	NR
Spellman et al. (2014), Australia	Cross-sectional paper or online questionnaire	Purposive sample of oncology HCPs	Doctors 22 Nurses 8 AHPs 1	29%	30-40: 45.2% 41-50: 29% 51-60: 22.6% >60: 3.2%
Stanton et al. (2015), Australia	Cross-sectional descriptive study, postal survey using the Exercise in Mental Illness Questionnaire – Health Practitioner version	Purposive sample of mental health nurses practising in Queensland	34	NR	Mean 42.8 (SD13.5%)
Steptoe et al. (1999), UK	Cross-sectional study, postal questionnaire designed for the study	Purposive sample of GPs and practice nurses from 19 group practices	GPs: 107 Nurses: 58	70.4%	Mean GP 37.6 (SD 7.4) Mean PNs 42.3 (SD 9.9)
Stuij et al. (2018), Netherlands	Qualitative semi-structured interviews	Purposive sample of Dutch HCPs working with type 2 diabetes patients	PT 8 Nurses 8 GPs 2 AHPs 6	70.8%	25 - 64

Suija et al. (2010), Estonia	Cross-sectional survey, postal questionnaire (IPAQ) adapted for the study	Purposive sample of family doctors	198	100%	Mean 47.1 (SD 9.4)
Van der Ploeg et al. (2007), Australia	Longitudinal study of results from two postal questionnaires	Purposive sample of Australian GPs	1997: 325 2000: 397	1997: 28% 2000: 30%	NR
Walsh et al. (1996), USA	Cross-sectional survey, postal questionnaire adapted for the study	Purposive sample of doctors from four urban hospitals	175	44.6%	Mean 34.0 (SD 7.3)
Williams et al. (2015), UK	Cross-sectional online survey	Purposive sample of HCPs in oncology	Doctors: 79 Nurses: 126 AHPs: 26	81%	<25: 0.3% 26-36: 12% 46-55: 42% 56-65: 13% >66: 0.3%
Williams et al. (2017), UK & Ireland	Qualitative study, semi- structured interviews	Purposive sample of physiotherapists from Spinal Cord Injury centres	18	72.2%,	25 – 56

GP general practitioner, *AHP* allied health professional, *PN* practice nurse, *HV* health visitor, *NR* not reported, *IPAQ* international physical activity questionnaire *ESCQ* Exercise Stage of Change Questionnaire

2.3.2 Qualitative studies and qualitative elements of mixed methods study quality

The quality of qualitative studies and qualitative elements of mixed methods studies was generally good, with all of the studies at least partially fulfilling all three domains of the COREQ checklist (Tong et al., 2007) (**Table 2-2**). The domain of research team and reflexivity was least well fulfilled, with all studies failing to fully report the researchers' interest in the subject matter and five papers failed to even partially report the relationship with participants. The domain of study design was well fulfilled, with sufficient description of the study methods being given in all studies. The domain of analysis and reporting was partially fulfilled by all studies, with 16 studies fully reporting their findings while one paper did not fulfil the reporting criteria.

Table 2-2: Quality assessment of qualitative and mixed method studies using the consolidated criteria for reporting qualitative research quality

Study	Domain 1: Research team and reflexivity		Domain 2: Study design			Domain 3: Analysis and findings		
	Personal characteristics	Relationship with participants	Theoretical framework	Participant selection	Setting	Data collection	Data analysis	Reporting
Belanger et. al.(2015)	p	x	✓	p	p	p	p	✓
Bohman et. al. (2015)	p	p	✓	p	p	p	p	p
Booth et. al. (2013)	p	p	✓	p	p	p	p	✓
Buckley et. al. (2020)	p	x	✓	p	p	p	p	p

Carstairs et. al. (2020)	p	p	✓	✓	✓	p	✓	✓
Cho et. al. (2003)	p	p	p	✓	p	✓	p	✓
De Vivo et. al. (2019)	p	p	✓	✓	✓	p	✓	✓
Din et. al. (2015)	p	x	✓	p	p	p	p	✓
Douglas et. al. (2006)	p	p	✓	p	p	p	p	✓
Fong et al. (2018)	p	x	✓	✓	p	p	✓	✓
Graham et. al. (2005)	p	p	x	p	x	p	p	p
Hausmann et. al. (2018)	p	p	p	p	p	p	✓	✓
Jansink et. al. (2010)	p	x	✓	✓	x	p	p	x
Learmonth et. al. (2018)	p	p	p	p	p	p	✓	✓
Leyland et.al. (2018)	p	p	✓	✓	p	p	p	✓
Patel et.al. (2018)	p	p	p	p	p	p	p	p
Puig Ribera et.al. (2005)	p	p	✓	p	x	p	p	p
Roberts et al. (2019)	p	p	✓	✓	p	p	✓	✓
Sheill et. al. (2018)	p	p	p	✓	p	p	✓	✓
Smith-Turchyn et.al. (2016)	p	p	p	✓	p	p	✓	✓
Stuij et.al. (2018)	p	p	✓	✓	p	p	p	✓
Williams et.al. (2018)	p	p	✓	✓	p	p	p	✓

✓ = criteria fulfilled

p = criteria partly fulfilled

x = criteria not fulfilled.

2.3.3 Quantitative studies and quantitative elements of mixed methods studies quality

Quality and validity of the quantitative studies was generally good with all studies clearly stating their research aims and employing appropriate methodology (**Table 2-3**). All of the studies were, however, cross-sectional in design and recognition must be made of the limitations of this. This includes that both the outcome and exposure are assessed at the same time making causal association difficult to discern (Peat, 2002), exacerbated by the significant time period that the studies represent and the potential for variation over this time (Bowen & Wiersema, 1999).

Recruitment and data collection were described by all studies and all except one used appropriate methods for data collection and analysis. This study (Bakhshi et al., 2015) used the Physical Activity Scale for the Elderly (Washburn, Smith, Jette & Janney, 1993), that was developed to assess physical activity levels in older adults accessing healthcare in the community, rather than the sample population recruited for the study, and therefore may not be appropriate for the sample group. One study was notable in reporting a 100% response rate when recruiting participants (Steptoe et al., 1999), as the expected success rate for recruitment to clinical studies is less than 50% (Mapstone, Elbourne & Roberts, 2007). A further study reported excluding male participants' data from the results as there were few male participants, but a significant difference in the results between genders (Suija et al., 2010). Given that the ratio of male to female participants is representative of the study's sample population, omitting male participants introduces the risk of reporting bias with the results potentially not accurately reflecting all variables.

None of the studies described a relationship between the participants and the researchers, making it impossible to establish what relationship, if any, existed. Without understanding the relationship between researchers and participants, it

is difficult to establish if there may be a risk of bias introduced through professional association or common clinical focus.

Most studies fully described ethical issues and the approval process. One study stated that informed consent was waived, without explaining what this meant, or the potential effects on the sample group (Karvinen et al., 2012). Informed consent is considered an underpinning requirement of ethical research and it is essential to consider collected data to be valid. Occasions exist where informed consent may not be needed – however, circumstances need to be fully explained in order to maintain rigour and transparency (Ashcroft, Dawson, Draper & McMillan, 2007).

Table 2-3: Quality assessment of quantitative and mixed methods studies using the CASP tool

Study	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Was the data collected in a way that addressed the research issue?	Has the relationship between the researcher and participants been adequately considered?	Have ethical issues been taken into consideration?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?	How valuable is the research?
Aldossary et al. (2013)	Y	Y	Y	Y	Y	N	Y	Y	Y	Suggested further study/training.
Al-Ghamdi et al. (2018)	Y	Y	Y	Y	Y	N	Y	Y	Y	HCP education and training required, recommended intervention studies
Bakhshi et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Recommended PA promotion training for nurses
Bartlem et al. (2016)	Y	Y	Y	Y	Y	N	Y	Y	Y	Suggested further research, limited to mental health services
Belanger et al. (2015)	Y	Y	N	N	Y	N	Y	Y	Y	Suggested further research and training. Small sample – nine doctors.
Bleich et al. (2012)	Y	Y	Y	Y	Y	N	Y	Y	Y	Informed doctor training, relevant to other

										populations of HCPs.
Bock et al. (2012)	Y	Y	Y	Y	Y	N	N	Y	Y	Limited to doctors, suggested interventions but no specific suggestions.
Buchholz et al. (2007)	Y	Y	Y	Y	Y	N	Y	Y	Y	Recommended further exploration of nurse practitioners' PA promotion knowledge.
Buckley et al. (2020)	Y	Y	Y	Y	Y	N	Y	Y	Y	PA promotion limited by absence of education for HCPs, recommended further research.
Buffart et al. (2009)	Y	Y	Y	Y	Y	N	Y	Y	Y	Confirmed existing evidence and recommended further research.
Bull et al. (1997)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified barriers to PA promotion and suggested that interventions should be developed to overcome these barriers.
Burton et al. (2010)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified that psychologists are willing to promote PA and recommended further study.

Cantwell et al. (2018)	Y	Y	Y	Y	Y	N	Y	Y	Y	Recommended developing strategies to improve HCPs' PA promotion skills. Specific to cancer recovery.
Cho et al. (2003)	Y	Y	N	Y	N	N	N	Y	N	Suggested that Korean physicians place less value on lifestyle advice than western counterparts and that steps should be taken to change their perceptions. No suggestions for interventions.
Dillman et al. (2010)	Y	Y	Y	Y	Y	N	Y	Y	Y	Conclusions align with extant literature, recommended longitudinal research. Specific to diabetes.
Douglas et al. (2006)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified gaps in knowledge re PA promotion, suggested training/education.
Douglas et al. (2006)	Y	Y	Y	Y	Y	N	Y	Y	Y	Recommended further research and training.
Florindo et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted lack of knowledge of PA guidelines and promotion skills in HCP populations.

Freene et al. (2017)	Y	Y	Y	Y	Y	N	Y	Y	Y	Agreed with extant literature: poor knowledge of PA guidelines, positive attitude to PA promotion may not translate to practice. Recommended improving HCPs' PA knowledge
Graham et al. (2005)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted the importance of training HCPs in PA promotion skills. Identified that PA promotion does not share the profile of other health interventions such as smoking cessation.
Hardcastle et al. (2018)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted the need for education in PA promotion. Agreed with known barriers.
Jones et al. (2005)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted common barriers to PA promotion including limited skills among HCPs. Specific to oncology.
Jorgensen et al. (2012)	Y	Y	Y	Y	Y	N	N	Y	Y	Informed further research.

Kable et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified need to improve undergraduate education in PA promotion.
Karvinen et al. (2012)	Y	Y	Y	Y	Y	N	N	Y	Y	Suggested a need for nurse training and further research.
Kennedy et al. (2003)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified previously described barriers to PA promotion and highlighted low levels of PA guidance knowledge among HCPs. Recommended research on PA promotion education for HCPs.
Keogh et al. (2017)	Y	Y	Y	Y	Y	N	Y	Y	Y	Suggested that nurses should do more to promote PA. Recommended further research. Specific to oncology nursing.
Lanhers et al. (2015)	Y	Y	Y	Y	Y	N	N	Y	N	Supported known evidence relating to barriers to PA promotion and suggested that a network of PA promotion professionals may help in

										overcoming barriers. Specific to diabetes.
Lawlor et al. (1999)	Y	Y	Y	Y	Y	N	N	Y	Y	Indicated that GPs do not adequately influence health promotion
Leemrijse et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Stated that there is little co-operation between HCPs and exercise providers, makes national recommendations.
McDowell et al. (1997)	Y	Y	Y	Y	Y	N	Y	Y	Y	Recommended encouraging nurses to promote PA, possibly developing nurses with a specialism in PA promotion. Specific to practice nurses.
McKenna et al. (1998)	Y	Y	Y	Y	Y	N	Y	Y	Y	Supported existing evidence of barriers to PA. Suggested training GPs in PA promotion. Specific to GP surgeries.
Morishita et al. (2014)	Y	Y	Y	Y	Y	N	Y	Y	Y	Recommended the development of exercise promotion guidelines specifically for CKD patients.

Nadler et al. (2017)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified poor knowledge of PA guidelines among HCPs, specific to oncology.
O'Brien et al. (2017)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted low levels of PA promotion knowledge among HCPs. Recommended further research on referrals and collaborative interventions.
O'Hanlon et al. (2014)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted absence of undergraduate education in PA promotion. Agreed with existing knowledge of barriers to PA promotion. Specific to oncology clinicians.
Park et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Highlighted the favourable attitude of HCPs to PA promotion, and the low levels of knowledge. Suggested development of exercise guidelines. Specific to oncology.

Patra et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Suggested that HCPs' personal engagement with PA influenced practice.
Puig Ribera et al. (2005)	Y	Y	Y	Y	Y	N	N	Y	Y	Suggested development of protocols and care co-ordination. Identified key barriers in common with existing evidence.
Regolisti et al. (2018)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified a need to provide PA promotion training for HCPs. Agreed with existing literature on barriers to PA promotion. Specific to dialysis clinicians.
Sheill et al. (2018)	Y	Y	Y	Y	Y	N	Y	Y	Y	Agreed with extant literature that HCPs are positive towards PA promotion. Highlighted a need for education for PA promotion. Specific to palliative care doctors.
Shirley et al. (2010)	Y	Y	Y	Y	Y	N	Y	Y	Y	Agreed with previously documented belief that HCPs feel that PA promotion

										is part of their role. Recommended further research on integrated interventions.
Soegtrop et al. (2018)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified that knowledge of PA guidelines among HCPs is low. Suggested further research into how PA promotion competence may be improved.
Spellman et al. (2014)	Y	Y	Y	Y	Y	N	Y	Y	Y	Identified that few HCPs promote PA. More than half of participants felt that PA promotion was not part of their role. Specific to prostate cancer specialists.
Stanton et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Agreed with extant literature on barriers to PA promotion. Highlighted the need for professional training in PA promotion. Recommended further research with larger samples.
Steptoe et al. (1999)	Y	Y	Y	Y	Y	N	N	Y	Y	Identified that more active HCPs

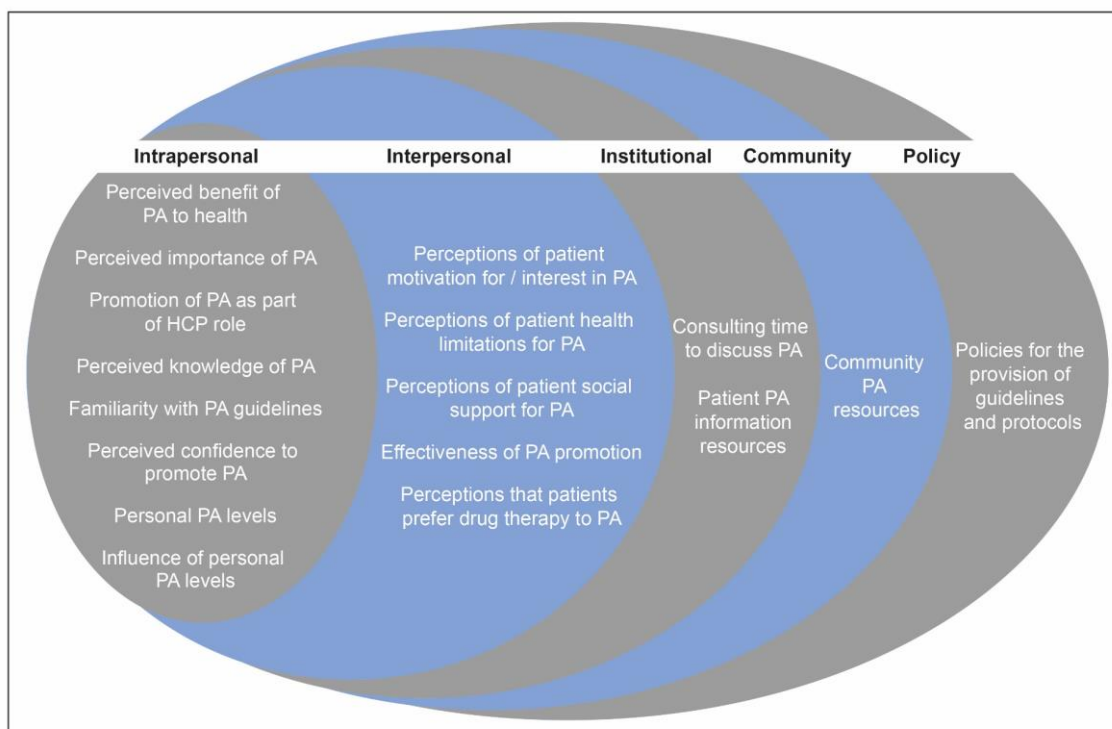
										are more likely to promote PA. Suggested that approach to PA promotion should change.
Suija et al. (2010)	Y	Y	Y	N	Y	N	Y	N	Y	Suggested that doctors are all physically active and that they all promote PA. Only recommendation refers to depressed patients.
Van der Ploeg et al. (2007)	Y	Y	Y	Y	Y	N	Y	Y	Y	Suggested that PA promotion is important to health promotion. Identified that there is an absence of PA promotion education for HCPs.
Walsh et al. (1999)	Y	Y	Y	Y	Y	N	N	Y	Y	Directed future research towards training.
Williams et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	Y	Reported low levels of knowledge of PA guidelines in HCP populations, and poor understanding of evidence for PA promotion. Recommended improving HCP

2.3.4 *Metasynthesis of study outcomes*

Metasynthesis of study outcomes revealed factors influencing the promotion of physical activity by HCPs within every domain of the socio-ecological model (

Figure 2-3). Quantitative studies were identified as having two distinct types of physical activity promotion (general PA promotion and disease-specific PA promotion) and qualitative studies were identified as reporting results from either primary or secondary care. Quantitative and qualitative studies reported on broadly similar outcomes and were thus synthesised within each domain. Where studies reported that <50% of participants were in agreement that identified factors were influential, this was classed as a positive finding. Where data are presented in tables, a numerical citation style has been used in order to aid readability. The related bibliography is provided in Appendix 2.

Figure 2-3: Influences on the promotion of physical activity by healthcare professionals



2.3.5 Intrapersonal domain

A total of 61 studies reported themes identified as being within the intrapersonal domain of the socio-ecological model. Of the quantitative studies (n=46) reporting factors within this domain, 26 were about general PA promotion and 20 were about PA promotion for those with specific conditions. Eight of the qualitative studies were based in primary care and seven in secondary care. The studies included 9747 HCPs.

Eight themes were identified. 1) Perceived benefit of PA to health – all studies (n=21) reporting this theme agreed that HCPs believed that physical activity is beneficial to health. 2) Perceived importance of physical activity – 20 of 21 studies reporting this theme agreed that PA promotion was important, with only one specific to kidney disease, suggesting it was unimportant compared to other health interventions (Regolisti et al., 2018). 3) Promotion of PA as part of the HCP role – 25 of the 27 studies reporting this theme agreed that HCPs considered physical activity promotion to be an integral component of their clinical role, with only two disease-specific studies reporting that <50% of respondents believed this (Jones, L. et al., 2005; Regolisti et al., 2018). 4) Perceived knowledge of PA – the majority (n=16) of 29 studies considering this theme reported that HCPs believed that they had an adequate level of knowledge to promote physical activity. One study reported a difference in perspectives between HCP populations, where fewer nurses than physiotherapists believed that their knowledge was adequate to promote PA (O'Hanlon & Kennedy, 2014). 5) Familiarity with PA guidelines – all eight studies reporting this theme agreed that the ability of HCPs to accurately describe PA guidelines was poor. 6) Perceived confidence to promote physical activity – 18 studies reported this theme. HCPs felt confident to give general advice on physical activity, but were less confident in giving specific and disease-specific advice. 7) Personal physical activity levels – 21 studies examined this factor and 14 reported that at least <50% of HCPs were

physically active. Studies used a range of validated and non-validated measurement instruments. 8) Influence of personal physical activity levels on the likelihood of PA promotion – four out of six quantitative studies reported a positive association between personal physical activity and the likelihood of PA promotion. Four of five qualitative studies reported that HCPs' personal physical activity influenced its promotion (**Table 2-4**).

Table 2-4: Intrapersonal themes

Theme	Total studies (n)	Quantitative studies (n)	Population studied	HCP (n)	Narrative quantitative results summary	Qualitative studies (n)	Population studied	HCP (n)	Qualitative Results
Intrapersonal Domain									
Perceived benefit of PA to health	21	15	5 (G)	1233	All five studies agreed that PA was beneficial to health ¹⁻⁵ . Three studies reported HCPs believed that PA was beneficial to health (range 64-73.4%) ^{2,3,5} , while two reported that few HCPs believed that lack of benefit to health was a barrier to PA promotion (range 1.3-1.6% of respondents) ^{1,4} . Two primary care studies reported that PA was beneficial to secondary prevention of chronic diseases, including CVD, depression and cancers (range 19.8% for cancer - 91.1% for chronic diseases) ^{3,5} .	7	4(P)	73	All (n=7) studies reported that HCPs believed PA is beneficial to physical and mental health ⁶⁻¹² .
			10 (DS)	1580			3(S)	74	

Perceived importance of PA promotion	20	11	7 (G)	3184	All studies reported that PA promotion was perceived to be an important part of health care (range 55.4 - 97.8% of respondents) ^{2 5 7 23-26} .	5(P)	139	Studies (n=9) reported that HCPs believed that PA promotion was less important than other interventions including smoking cessation and weight loss ^{6-8 26-31} .	
					Results of studies were mixed. Three studies (cancer n=2 ^{15 18} , diabetes n=1) ³² , reported that exercise/exercise counselling was considered important (range 55.8-70.2% of respondents). One study (chronic kidney disease n=1) reported that exercise was not considered important (61.2% of respondents) ²¹ .	9			
			4 (DS)	849		4(S)	108		
Promotion of PA as part of HCP role	27	19	9 (G)	4069	All (n=9) studies reported that PA promotion was perceived to be part of the primary care role (range 50.0%-98.0% of respondents) ^{1 4 7 23 33-37} .	6(P)	151	All (n=8) studies reported that PA promotion is perceived to be part of HCPs' role ^{6-8 10-12 28 38} , with one study in primary care finding that some HCPs feel that PA promotion is more appropriately carried out by other HCPs ³⁹ .	
			10 (DS)	1436	In the majority (n=8) of studies it was reported that HCPs believed that providing PA advice to patients with specific conditions (cancer n=6, mental illness n=1, obesity n=1) was part of their role (range 54.8-87.5%) ^{13 14 17-19 40-42} .	9	3(S)		34(S)
Perceived knowledge of PA	29	16	9 (G)	3473	All (n=9) studies reported that HCPs perceived that they had sufficient knowledge to advise patients about PA (range 50.0-89.1% of respondents) ^{2 5 7 23 24 33 43-45} .	13	8(P)	174(P)	Studies in primary and secondary care (n=13) reported that a lack of

				7 (DS)	963	Studies reported mixed results. One study reported that 33.3% of nurses, and 78.3% of physiotherapists believed that they had adequate knowledge to promote PA, and that 35.8% of nurses and 82.6% of physiotherapists believed that they were familiar with the evidence base ⁵⁰ . One study reported that 95.4% of HCPs (mental illness) believed that they had adequate knowledge to promote PA ⁴¹ , the majority of the remaining studies (n=3) reported that few HCPs believed that lack of knowledge was a barrier to PA promotion (range 20.2%-50.4%) ^{13 17 32} .	5(S)	143(S)	formal training was a barrier to PA promotion with knowledge and skills being largely self-acquired ^{6 7 10 11 26-29 31 46-49} . Studies in primary care (n=5) reported that some HCPs had little knowledge of the evidence base for the promotion of PA for health ^{10 29 31 47 48} .
Familiarity with PA guidelines	8	8		6 (G)	2063	Only four studies tested specific knowledge of PA guidelines ^{1 5 7 51} . Very few HCPs were able to correctly describe guidelines (range 2.4-15.9% of respondents). Three studies reported whether HCPs were aware/familiar with PA guidelines. Results were mixed (range 33.4-67.9% of respondents) ^{1 3 4} .	N/A		Qualitative studies did not report HCPs' familiarity with PA guidelines
				3 (DS)	703	Only one study (cancer, n=1) tested knowledge of general and disease-specific PA guidelines ⁴⁰ . 15% of respondents were able to correctly identify general PA guidelines from four choices. No HCPs were able to identify disease-specific guidelines from four choices. Two studies (cancer, n=2) reported awareness of			

				exercise guidelines for cancer patients (range 37.0-49.3% of respondents were aware of guidelines) ^{14 20} .		
Perceived confidence to promote PA	18	18	10 (G)	3293	All studies (n=10) reported that HCPs felt confident to provide general PA advice (range 52.0% - 100% of respondents) ^{1 4 5 33 34 41 43 45 52 53} . Those studies (n=5) that reported confidence in providing specific PA advice had varied results (range 40.0% - 100% of respondents reported being confident to provide specific PA advice). Doctors and allied health professionals reported lower confidence to give PA advice compared to physiotherapists and exercise therapists.	N/A
			8 (DS)	1850	The majority (n=6) of studies (cancer n=2, chronic kidney disease n=1, diabetes n=1, obesity n=1) reported that HCPs were not confident to give general PA advice to patients with specific conditions (range 30.3-49.7% of respondents) ^{15 18 21 32 42 54} . Only one study (mental health n=1) reported confidence to give specific PA advice (30.9% of respondents felt confident) ²² .	

Perceptions of confidence were only discussed in qualitative studies where it was influenced by other factors.

HCPs' personal PA levels	21	21	11 (G)	3508	10 out of 11 studies (HCP n=3532) reported that >50% engaged in regular PA (range 42.7-84.2% of respondents) ^{1 3-5 35 37 43 53 55 56} . Three studies used a validated PA self-report measure ^{51 55 56} , and three used an adapted Transtheoretical Model of Change Questionnaire ^{35 57 58} .	N/A			HCPs' personal PA levels were not examined by qualitative studies, their perceptions of their own activity levels are described only in relation to influence on PA promotion in practice.	
			10 (DS)	1083	Four (cancer n=3, mental illness n=1) of 10 studies (HCP n=1336) reported that >50% of HCPs engaged in regular PA ^{15-17 59} , while six (cancer n=3, chronic kidney disease n=1, diabetes n=1, mental illness n=1) reported that <50% engaged in regular PA, (range 11.4%-77.7% of respondents) ^{14 18 40} . Six studies used a validated PA self-report measure.					
Influence of personal PA levels on the likelihood of PA promotion	11	6	4 (G)	529	All general studies (n=4) reported HCPs' personal exercise is positively associated with increased promotion of PA ^{19 26 53 60} .	5		2(P)	79(P)	Studies from primary and secondary care (n=5) reported that HCPs' personal PA engagement influenced practice. Most studies (n=4) reported that HCPs believed that their personal PA was a positive influence ^{8 26 28 30} , while studies from primary care (n=2) reported that HCPs'
			2 (DS)	849	One study reported that less than half of HCPs (43.3%) felt that their own PA engagement influenced their PA promotion ¹⁶ , while the other reported that HCPs' PA engagement was positively associated with PA promotion (p<0.001) ⁶¹ .			3(S)	64(S)	

personal experience of PA
was a negative influence ²⁶
_{29.}

References are provided in Appendix 2

2.3.6 Interpersonal domain

Fifty studies reported themes identified as being within the interpersonal domain of the socio-ecological model. Of the quantitative studies (n=35) reporting factors within this domain, 20 were about general physical activity promotion and 15 were about physical activity promotion for those with specific conditions. Nine of the qualitative studies were based in primary care and six in secondary care. The studies included 8,213 HCPs.

Five themes were identified. 1) Perceptions of patient motivation for/interest in physical activity – studies (n=28) reported mixed results. Seventeen reported that a lack of patient motivation was a barrier to PA promotion, while 11 reported that it was not. 2) Perceptions of patient health limitations for physical activity – study (n=22) results were mixed. All qualitative studies (n=8) and two quantitative studies reported that poor health status limited physical activity promotion efforts, while the other 10 quantitative studies reported that this was not an issue. 3) Perceptions of patient social support for physical activity – all studies (n=8) reporting this theme suggested that social support was an important factor in patient decisions about PA and that when HCPs perceived that patients had little social support for physical activity, this adversely affected decisions about its promotion. 4) Effectiveness of physical activity promotion – evidence from 26 studies about HCPs' perceptions of whether their promotion of PA was effective was mixed. Eleven quantitative studies reported that physical activity promotion was effective (Bartlem et al., 2016; Burton et al., 2010), while seven quantitative and seven qualitative studies reported that it was not. 5) Perceptions that patients prefer drugs to physical activity as a treatment – four out of six studies examining this theme reported that patients preferred to be prescribed medication after consultation, rather than being advised to increase their levels of physical activity (**Table 2-5**).

Table 2-5: Interpersonal themes

Theme	Total studies (n)	Quantitative studies (n)	Population studied	HCP (n)	Narrative quantitative results summary	Qualitative studies (n)	Population studied	HCP (n)	Qualitative Results	
Interpersonal Domain										
Perceptions of patient motivation for/interest in PA	28	15	10(G)	3835	13	8(P)	178	5(S)	123	Studies in primary and secondary care (n=13) reported that HCPs' perceptions of poor patient motivation to exercise is a barrier to PA promotion ^{6 7 10 26-28 30 31 38 46 48 49 62} . Four of the studies in primary care suggested that HCPs only discussed PA when they believed that their patients were motivated to exercise ^{6 7 28 49} .
			7(DS)	1588						
Perceptions of patient health limitations for PA	22	14	3(G)	1459	8	3(P)	43		Studies (n=8) from primary and secondary care reported that HCPs' perceptions of their patients' poor health status inhibits the promotion of PA ^{7 11 29-31 46 48 62} .	

				11(DS)	2239	Most disease-specific studies (n=10) reported that HCPs' perceptions of their patients' health limitations did not affect their PA promotion activities ^{13 15-19 32 40 61 63} . One study ¹⁰ , reported that 70% of HCPs believed that their cancer patients were too unwell or frail to exercise ²⁰ .		5(S)	129	
Perceptions of patient social support for PA	8	3		1(G)	789	One general study reported that HCPs believed that lack of family support (56.3%) and lack of company (56.1%) limited patients' engagement with exercise ⁵² .		3(P)	62	All studies (n=5) agreed that a lack of social support is a barrier to PA promotion ^{7 11 12 30 48} . The studies (n=2) in primary care suggested that family and peer support networks are important ^{30 48} .
				2(DS)	127	One disease-specific study (cancer) reported that HCPs (physiotherapists 89%, nurses 78%) believed that patients' families advised them to avoid exercise ⁵⁰ , the remaining study reported that only 40% of HCPs believed this ¹³ .	5	2(S)	54	
Effectiveness of PA promotion	26	19		11(G)	3776	Most general studies (n=9) reported that most HCPs believed that their PA promotion activities were effective in increasing the patients' PA levels (range 56.7%-92.65) ^{1 2 4 23 25 33 43 44 53 58} . One study reported that only 24.0% of GPs and 34.5% of nurses agreed with this ⁶⁴ . The remaining study reported that only 7.5% of HCPs believed that more than 50% of their patients would engage in PA as a result of their counselling ⁵ .	7	5(P)	132	Studies from primary and secondary care (n=7) agreed that HCPs believed that their PA promotion activities were unlikely to result in long term change for their patients ^{6 26-28 30 46 62} .

					Most disease-specific studies (n=5) reported that HCPs felt that their PA promotion activities were ineffective ^{15 18 21 32 50} . Only two studies reported that 90.7% ⁴¹ and 55.0% of HCPs ²² , believed that patients increased PA as a result of their PA promotion.			2(P) 31
Perceptions that patients prefer drugs to PA as a treatment	6	4	4(G)	2039	Finding were mixed with two studies reporting that 59.5% and 82.6% of HCPs believed that patients expect or prefer to receive medication as a treatment ^{24 45} , while the remaining two studies reported that 37.1% and 39% of HCPS believed this ^{44 65} .	2	1(P) 14	Studies (n=2) in primary and secondary care reported that HCPs feel that patients expect to be prescribed medication and prefer this to being advised to increase PA levels ^{38 62} .
							1(S) 7	

References are provided in Appendix 2

2.3.7 Institutional, community and policy domains

A total of 48 studies reported themes identified as being within the institutional, community and policy domains of the socio-ecological model. Of the quantitative studies (n=33) reporting themes within these domains, 22 were about general promotion of physical activity and 11 were about PA promotion for those with specific conditions. Ten of the qualitative studies were based in primary care and seven in secondary care. The studies included 6,650 HCPs. Four themes were identified: 1) Consulting time available to promote physical activity – 38 studies examined this theme and reported mixed results. Eighteen studies (seven quantitative and 11 qualitative) reported that a lack of time was a barrier to promotion of physical activity, while 17 quantitative studies reported that it was not. One study reported a difference between HCP disciplines (McKenna et al., 1998). 2) Patient PA information resources – six studies examined this theme with mixed results. Two general studies reported that more than 50% of HCPs identified a lack of patient information resources as a barrier to promotion of physical activity, while two further studies (one general and one disease-specific) reported that fewer than 50% of participants agreed with this. One general study found a difference between HCP disciplines, with 93% of nurses and 47% of physiotherapists reporting that a lack of patient information was a barrier to promotion of physical activity. 3) Community PA resources – 25 studies examined this theme. The majority of quantitative studies (11 out of 12) reported that lack of community physical activity resources was not a barrier to PA promotion. One quantitative study and six qualitative studies reported that a lack of knowledge about community resources was a barrier. 4) Policies for provision of guidelines and protocols – all 19 studies examining this theme reported that a lack of guidelines and protocols were a barrier to promotion of physical activity (**Table 2-6**).

Table 2-6: Institutional, community and policy themes

Theme	Total studies (n)	Quantitative studies (n)	Population studied	HCP (n)	Narrative quantitative results summary	Qualitative studies (n)	Population studied	HCP (n)	Qualitative Results
Institutional									
Consulting time available to promote PA	38	27	17(G)	6599	Results were mixed. Seven general studies reported that the majority of HCPs (range 51.6%-99.7%) believed that a lack of time was an impediment to promoting PA ^{2 19 23 24 44 45 53} . In contrast, nine studies reported that <50% of HCPs (range 6.0%-48%) agreed that time was a barrier ^{1 4 5 35 36 43 52 61 65} . One study reported a difference in sampled populations, with 65% of GPs and 40% of nurses identifying lack of time as a barrier to PA promotion ⁵⁸ .	6(P)	151		All primary and secondary care studies (n=11) reported that HCPs believed that a shortage of consulting time was a barrier to PA promotion ^{6-8 26-30 47-49} .
			10(DS)	1491	Most disease-specific studies (n=8) reported that the majority of HCPs (range 24.0%-42.5%) did not believe that a lack of time was a barrier to PA promotion ^{13 14 16-18 20 40 50} . Only two studies reported that time was a barrier (range 54.6% - 65% of HCPs agreed that time was a barrier) ^{21 32} .	5(S)	121		

Patient PA information resources	6	6	3(G)	1166	Two studies reported that a lack of PA information sources for patients was a barrier to PA promotion (range 76.4% - 90.3% of HCPs agreed) ^{35 45} . In contrast, one study reported that only 48.6% of HCPs agreed that lack of PA information sources was a barrier ⁷ .	N/A	Absence of patient information resources was not reported as a theme in the qualitative evidence.
			3(DS)	250	One study reported a difference in HCP populations' views on patient information resources for PA promotion. 93.0% of nurses and 47.0% of physiotherapists felt that there were inadequate patient information resources ⁵⁰ . The remaining studies reported that 4% ¹⁴ , and 49% ¹³ , of HCPs agreed with this.		
Community							
Community PA resources	25	12	7(G)	2473	Most general studies (n=6) reported that a shortage of local PA resources was not a barrier to PA promotion (range 20% - 38.0% of HCPs agreed that lack of community PA resources was a barrier to PA promotion) ^{17 22 35 36 52 58} . Only one study reported that the majority of HCPs (80.1%) perceived a lack of community PA resources to be a barrier ⁴¹ .	13	Studies (n=13) in primary and secondary care identified community-based factors that influenced their PA promotion. Studies from both primary and secondary care reported that a lack of knowledge about available community exercise provision (n=6) ^{9 10 26 29 30 47} and cost (n= 4) were barriers to PA provision ^{28 29 47 49} . Studies in primary care reported that HCPs valued physical activity referral schemes where they were available (n=4) ^{11 39 48 49} , but that the absence of
			5(DS)	439	All studies (n=5) reported that few HCPs (range 11.0% - 48.0%) cited a lack of resources in their community as a barrier to PA promotion ^{13 14 32 40 59} .		

feedback from such schemes was a barrier to use (n=2) ^{27 28}.

Policy								
Policies for provision of guidelines and protocols	19	5	2(G)	567	Both general studies reported that the majority of HCPs (range 54.6 % and 55.0%) believed that a lack of guidelines or protocols for PA were a barrier to effective PA promotion ^{26 44} .	8(P)	194	The majority of studies in primary (n=7) ^{6 7 26 27 46 48 49} , and secondary care (n=5) ^{10 29-31 47} , reported that a lack of strategic resources and protocols were a barrier to PA promotion. Studies in primary (n=3) ^{27 28 48} and secondary care (n=2) ^{29 31} reported that HCPs believed that there is a lack of funding for PA promotion. Finally, some secondary care studies (n=3) suggested that PA promotion is inhibited by an absence of patient PA guidelines for specific conditions ^{31 47 48} .
			3(DS)	842	All three disease-specific studies reported that few HCPs considered an absence of protocols or guidelines for PA to be a limiting factor in theory PA promotion activities (range 20.0% - 34%) ^{20 42 58} .	6(S)	137	

References are provided in Appendix 2

2.4 Discussion

This study presents, to the author's knowledge, the first comprehensive review and synthesis of evidence of factors that influence the promotion of physical activity by HCPs practising in both primary and secondary care. Uniquely, this review examines the evidence within the framework of a socio-ecological model (Simons-Morton, 2012). The most prominent domains of the socio-ecological model examined by the literature in relation to promotion of physical activity are the intrapersonal and interpersonal domains. HCPs believed that physical activity was beneficial to health, considered its promotion important, and many considered that it was integral to their role. Mixed levels of knowledge and confidence to promote physical activity were reported, with lower levels of both observed in disease-specific studies compared with general physical activity promotion studies. Contributing factors included a lack of training for physical activity behaviour change in pre-registration education courses, low recall of physical activity guidelines and a perception that its promotion was ineffective, as many patients lack motivation and support to increase their physical activity levels, or are limited by health problems. Those HCPs reporting higher personal levels of physical activity were more likely to promote it. At an institutional level, lack of time and patient information resources were cited as barriers to promotion of physical activity. A lack of community PA resources was not considered a barrier to its promotion, although some studies reported a lack of knowledge about existing facilities. Physical activity referral schemes were valued where they existed. HCPs identified a lack of strategic resources, protocols and funding as policy barriers to promotion of physical activity. By using a socio-ecological lens (Simons-Morton, 2012), I have illustrated the interconnectivity of variables and highlighted potential areas for intervention to improve promotion of physical activity within healthcare settings.

The results confirm the findings of previous systematic reviews of physical activity promotion by HCPs in primary care, that the promotion of PA is sub-optimal (Hébert et al., 2012; Huijg et al., 2015) and that this is also the case in

secondary care. Studies mainly report findings from high-income countries in Europe, and in North America, New Zealand and Australia, with a smaller number from middle-income countries such as Brazil and India. It is unclear why studies have been conducted largely in higher income countries, but it is possible that this is due to a higher prevalence of physical inactivity in developed countries (World Health Organisation, 2018b) and healthcare systems that are more focused on healthy lifestyle promotion. It may also reflect greater availability of research funding. Little evidence exists about promotion of physical activity by HCPs in lower income countries, highlighting the need for studies to explore perceived importance, barriers and facilitators in this context.

Recent evidence shows that progress towards meeting the World Health Organisation's target of reducing global physical inactivity by 10% by 2025 (World Health Organisation, 2016) has been too slow and is not on track (Guthold et al., 2018). Prioritising promotion of physical activity as an essential healthcare intervention with an equal priority to other lifestyle factors, and effectively addressing the barriers facing HCPs, is key in achieving the desired levels of physical activity to benefit health (World Health Organisation, 2010).

2.4.1 Addressing intrapersonal and interpersonal barriers to physical activity promotion by healthcare professionals

In the review, HCPs believed that physical activity was beneficial to health and considered its promotion important and integral to their role. However, in agreement with previous reviews (Hébert et al., 2012; Huijg et al., 2015), I have identified a lack of training for physical activity behaviour change, low recall of PA guidelines and a perception that promotion of physical activity is ineffective. The provision of physical activity promotion training within medical curricula is known to be varied. Considerable heterogeneity exists in the quality and length of physical activity education programmes (ranging from two hours to four years), the application of behaviour change theories and counselling models,

and opportunities to practice counselling skills on patients (Dacey, Kennedy, Polak & Phillips, 2014). There are evidence gaps relating to the implementation of physical activity education programmes within nursing and allied HCP curricula, and within sub-speciality medical training. Addressing these gaps in future research is important because of the large number of nurses and allied health professionals identified in this review as promoting physical activity and the identified disparity in confidence to promote PA within specific diseases.

Understanding of the effectiveness of physical activity promotion is limited by the absence of formal standardised pathways for measuring, promoting and evaluating physical activity (Bélanger et al., 2015). Introducing such frameworks could confirm or contradict perceptions that promotion of physical activity is ineffective because patients lack motivation and support to increase their PA levels or are limited by health problems (Bull, Schipper, Jamrozik & Blansky, 1997; Karvinen et al., 2012; Leemrijse et al., 2015) and lead to improved PA promotion in the longer term.

HCPs who are themselves physically active may be more likely to promote PA to their patients (Florindo et al., 2015; Patra et al., 2015). This understanding is limited by inconsistent methods for measuring physical activity within reported studies and it is unclear whether the intensity of HCPs' personal physical activity influences the likelihood of PA promotion. This creates a strong argument for encouraging HCPs to be more aware of their own physical activity engagement and better evaluate how this impacts upon their practice.

2.4.2 Addressing policy, institutional and community barriers to physical activity promotion by healthcare professionals

The recently updated global physical activity guidelines are evidence-based statements on how much is good for health (World Health Organisation, 2020d). Advocacy to encourage political policy, systems and social support to increase the profile of physical activity is required. This includes convincing public health

bodies and sport and exercise medicine associations to support the physical activity agenda, and heads of academic institutions to integrate physical activity into medical and healthcare professional curricula (Milton et al., 2020). Within primary and secondary care, promotion of physical activity does not have the same profile as other lifestyle interventions, including smoking cessation, weight loss and diabetes control (Bauer, Briss, Goodman & Bowman, 2014; Puig Ribera et al., 2005). One barrier that contributes to this is a lack of funding allocated to the delivery of PA promotion, unlike other lifestyle factors. In the UK, for example, GPs have been paid to provide smoking cessation advice since 2012 (Szatkowski & Aveyard, 2015) and smoking cessation nurse specialists are employed to support people who are trying to stop. The same is true of diabetes control, with nurse specialists providing regular clinics to help diabetic patients maintain good glycaemic control (Scottish Government, 2018a). A similar framework-based service is required for patients who are insufficiently active. Until this is established, it will remain difficult for promotion of physical activity to achieve the same clinical focus as other higher profile lifestyle interventions.

In this review, HCPs perceived a lack of strategic resources to enable the promotion of physical activity. However, there are an increasing number of international and national online resources, such as Exercise is Medicine (American College of Sports Medicine, 2020) and Moving Medicine (Faculty of Sport and Exercise Medicine UK, 2021a), that provide structured guidance for both general and disease-specific promotion. In particular, the Moving Medicine resource in the UK attempts to address the issue of a lack of time, which is discussed in many studies included in this review (Bakhshi et al., 2015; Buchholz & Purath, 2007; Bull et al., 1995; Bull, Schipper, Jamrozik & Blansky, 1997; Douglas, Torrance et al., 2006b; Jørgensen et al., 2012; Karvinen et al., 2012; Lawlor et al., 1999; Leemrijse et al., 2015; McKenna et al., 1998; Morishita et al., 2014; Walsh et al., 1999), by providing guidance for one, five and 'more' minutes of conversation with patients. Furthermore, there is an

accompanying training course that aims to address the skills gap in having conversations about change that result in patients increasing their physical activity (Faculty of Sport and Exercise Medicine UK, 2021b). Robust evaluation and further development and promotion of such resources is necessary to raise the profile of PA promotion and provide evidence-based frameworks to inform future physical activity policy by HCPs.

Community-based opportunities for physical activity and environments that encourage active travel are widely acknowledged as important in encouraging an increase in PA (International Society for Physical Activity and Health, 2020). HCPs in the current review reported that a lack of such facilities was not a barrier to physical activity promotion (Bartlem et al., 2016; Bull, Schipper, Jamrozik & Blanksby, 1997; Jørgensen et al., 2012). This suggests that HCPs are aware of and able to recommend local opportunities for physical activity. Alternatively, it is possible that HCPs do not consider a lack of facilities to be a barrier because they do not even consider them in their promotional activities. Where physical activity referral schemes existed, they were valued (Bartlem et al., 2016; Bock et al., 2012; Keogh et al., 2017). Such schemes are internationally widespread and potentially offer a convenient and effective means for HCPs to help patients become more active (Hanson, Oliver, Dodd-Reynolds, Pearsons & Kelly, 2020). However, current understanding of effectiveness is limited by considerable heterogeneity in available data at scheme and systematic review level (Oliver, Hanson, Lindsay & Dodd-Reynolds, 2016). There are relatively few studies that have explored HCPs' perspectives of the evidence base for PA referral schemes, how this affects the likelihood of referral and the importance placed on such schemes in comparison to more general promotion of physical activity. This type of exploration lends itself to qualitative research and future studies of this nature are required.

2.4.3 Strengths and limitations

The strengths of this review are a comprehensive search strategy, including a range of evidence from diverse clinical settings, a focus on the factors that directly affect practice, and the use of a socio-ecological model to demonstrate the interconnectivity of influencers. This review is limited by the quality of the studies that have been included. Quality was assessed using the COREQ checklist for qualitative studies and the CASP toolkit for the quantitative studies. These methods offer guidance towards quality rather than a definitive score. Although all of the papers examined factors that influence the promotion of physical activity by HCPs, for many this was not the primary research focus. When coupled with the diversity of methodologies and data collection instruments, this may have impeded consistent data synthesis and reporting (Jones, M.L., 2004).

2.5 Conclusion

This study presents a systematic review and meta-synthesis of qualitative and quantitative evidence from both primary and secondary healthcare environments viewed from a socio-ecological perspective. The results show that HCPs acknowledge experiencing a number of barriers to the promotion of physical activity. These barriers fall within all domains of social ecology.

This review of the existing evidence points to inconsistencies among HCP populations in understanding the evidence that supports the benefits of physical activity and the levels of skill that exist in promoting it. These inevitably lead to inconsistencies in effective PA promotion. It is essential that this is understood more fully to allow the development of consistent and effective solutions to addressing the key barriers to physical activity promotion.

This depth of understanding cannot be gained through repeating quantitative cross-sectional studies. Future qualitative research exploring how HCPs'

personal values, knowledge, beliefs and behaviours influence practice would help to explain how these factors are linked. This may be valuable in identifying what is important to HCPs and provide a platform for the development of structured, focused pathways to achieving improvements in promotion of physical activity by HCPs.

Chapter 3. Methodological approach

3.1 Introduction

Two aspects within the systematic review were identified as requiring further study. The first was the lack of studies that have explored HCPs' perspectives of physical activity referral schemes, the importance placed on such schemes, and how intrapersonal/interpersonal factors affect physical activity promotion. The second was to evaluate an existing online physical activity promotion training resource for HCPs.

To undertake this work, I adopted a pragmatic approach. Pragmatism has been described as a philosophy that rejects the traditional notion that research may produce answers to complex questions by employing a single scientific method, with rigid categories and language (Tashakkori & Teddlie, 2016). Instead, pragmatism posits the belief that meaningful research results not from the inflexible definitions of a single methodology, but rather from a desire for improvement through exploring and understanding experiences (Dickstein, 1998). For this PhD, that meant thoroughly examining the existing evidence and developing questions, the answers to which had the potential to increase understanding. Subsequently, with the flexibility afforded by a pragmatic paradigm, the most appropriate methods to answer these questions were sought.

3.2 Reflection on underpinning beliefs

I approached this PhD project as an inexperienced researcher, but with considerable experience as a registered staff nurse working in a clinically specialised NHS cardiac unit. I have a well-developed interest in cardiovascular health and this complements my interest and participation in intensive physical activity through recreational sport. The concept of HCPs being potentially influential in promoting physical activity and being role models for health is one

that I strongly identify with – indeed, this is supported in the Nursing and Midwifery Council's code of practice (Nursing and Midwifery Council, 2015). A firm understanding that the clinical practice of HCPs, including the promotion of physical activity to patients, should have a well-established evidence base underpinned my drive to fully explore the subject of enquiry. From personal experience and anecdotal evidence I understood that the factors that influence the promotion of physical activity by HCPs were likely to be numerous and complex and that these may vary between HCPs' clinical disciplines and areas of practice. I also approached this thesis with an understanding of the evidence that time constraints, lack of confidence and patient apathy are often quoted as inhibitors of effective physical activity promotion (Bohman et al., 2015). What I did not know was how or whether HCPs' own personally-held beliefs, values and lifestyle choices affected their promotion activities.

Given that my clinical practice in cardiology incorporates the employment of practical skills that have been developed as a result of rigorous research and the establishment of a strong evidence base for nursing practice (Roper, Logan & Tierney, 2000), as well as my personal anecdotal understanding of the benefits and pitfalls of participating in physical activity, I was inclined to adopt a pragmatic (Dewey & Schilpp, 1938) approach to this PhD research project.

3.3 Context of the study

The WHO physical activity guidelines were important in guiding this research (World Health Organisation, 2010), particularly when viewed in the context of both global and national aspirations to increase levels of physical activity in order to promote and support improved health (Scottish Government, 2015b) and the increasing recognition of the adverse effects of inactivity and sedentary lifestyle choices on health (World Health Organisation, 2016).

The systematic review identified myriad potentially interacting factors that influence the ability of HCPs to promote physical activity. The principal factors

identified included that HCPs believe physical activity is beneficial to health and that PA promotion is important and integral to their role. Gaps in the availability of physical activity promotion education for HCPs, and perceptions that PA promotion is ineffective because patients lack motivation to be active, limited HCPs' knowledge and confidence to promote PA. Physical Activity Referral Schemes (PARS) were valued where they existed. HCPs' personal and professional beliefs and attitudes towards physical activity influenced the likelihood of promoting it.

3.4 Research philosophy

In order to achieve the research aims discussed above, an appropriate methodology needed to be adopted, one that would allow meaningful examination of the identified factors. To answer research question 2 (What factors influence the physical activity referral and promotion practices of healthcare professionals caring for adults with chronic diseases?), it seemed logical that I needed to talk to HCPs directly about their experiences of promoting physical activity. To answer research question 3 (How does engagement with an online physical activity promotion education programme affect student healthcare professionals' self-reported skills in motivating patients to be more active?), I needed to collect objective data to assess the feasibility, acceptability and efficacy of the intervention. I determined that the most effective way to answer the research questions fully was to adopt a methodological approach that combined these two approaches. The following paragraphs offer a description of research paradigms that may have been considered appropriate to the current PhD project, including a discussion concerning my rationale for selecting the study methodology that was finally adopted.

3.5 Qualitative research

Qualitative methodology was determined as being the most appropriate way to answer research question 2. This was because qualitative research aims to examine and develop an in-depth understanding of experiences in a realistic context (Liamputtong, 2005). This approach would allow free and full discussion with HCPs, capturing their accounts of their lived experiences in their own words. Qualitative research is concerned with the generation of theory through inductive reasoning with an interpretivist epistemology and a constructionist ontological stance (Baran & Jones, 2016). In contrast to quantitative research, which is driven by numbers and statistics, qualitative research has a focus on words as they are spoken or written by the sample group (Cobb & Hagemaster, 1987). Meticulous analysis of the narrative data leads to the development of themes and hypotheses.

Qualitative research paradigms are useful in gaining insight into poorly understood phenomena or to develop new knowledge of a subject (Corbin, 2015). For this reason, qualitative research is effective in exploring the beliefs, perceptions, experiences and activities of individuals (Moule, 2017). Qualitative research methods have been developed to fall broadly within four main categories – phenomenology, ethnography, grounded theory and thematic analysis.

- Grounded Theory – this is a systematic but flexible method of collecting and analysing data, where theories are developed from within the data. Beginning with a general subject of interest, theories are developed by the researcher making observations of the world as experienced and lived by the research participants (Charmaz, 2014). Grounded theory uses an iterative approach to data analysis. From this, theories and hypotheses develop from the data (Liamputtong, 2005; Speziale, 2011). The variations in guidance relating to the use of grounded theory can make this method confusing for some researchers. The assertion that

grounded theorists must ignore existing literature on their area of interest is now subject to scrutiny. Indeed, it is becoming accepted that engagement with extant literature is, in fact, essential in order to define the area of focus and offer a rationale for the research questions (Timonen, Foley & Conlon, 2018). The idea of the researcher as a blank slate is considered unrealistic and a rudimentary knowledge of a study subject does not compromise the principles of grounded theory (Charmaz, 2014). However, given that this PhD project began with a systematic review of existing literature and meta-synthesis of the evidence, grounded theory was discounted as a potential methodological approach.

- Phenomenology – this is the systematic, rigorous examination of the experiences of individuals as they happen on a daily basis. It facilitates the development of theories from data collected in the usual setting within which the event or phenomenon that is the subject of the study normally occurs (Mills & Birks, 2014). In phenomenological research, it can prove difficult for the researcher to avoid influencing the behaviour of participants and researcher-induced bias is an ever present limitation, although it has been argued that researchers' own experiences and opinions should not be neutralised in phenomenological research (Nelms, 2015). The researcher's own established beliefs and knowledge relating to the area of study must, however, be acknowledged as a potential limitation (Liamputtong, 2005). For the current project, phenomenology would have been unsuitable given the time and resources required for data collection.
- Ethnography – ethnographic studies typically use observational methods of data collection to examine cultures and the people who identify with the culture under study (Bryman, 2016). In order for the researcher to collect data that is rich and comprehensive enough to allow an ethnographic study, it may be necessary for the researcher to immerse

themselves within the observed culture and observe individuals living within the culture for an extended period of time. This can be time-consuming and present difficulties in gaining access to participants. The proximity of the researcher to participants risks introducing researcher bias (Liamputtong, 2005). For these reasons, an ethnographic research approach was not adopted in this project.

- Thematic analysis – this is a methodological approach that involves finding, analysing and reporting patterns and groups of meaning within the data (Ritchie & Lewis, 2014). It requires a systematic approach, with the researcher coding the data to identify overarching themes and sub-themes clustered beneath. Although thematic coding is common to other analytic methods, and considered by some not to be a method in its own right (Ryan & Bernard, 2000), it is also argued that its flexibility and ability to address an overall research question allows it to stand alone as a pragmatic methodological approach (Braun & Clarke, 2006).

The qualitative study described in this thesis collected data via semi-structured interviews rather than the observation of practice required of phenomenological and ethnographic studies (Atkinson, 2001) and analysis was conducted using thematic analysis, with a framework approach (Ritchie, Lewis & O'Connor, 2003).

Thematic analysis is a robust and systematic framework for coding qualitative data that allows identification of patterns or themes from the data as they develop in relation to a research question (Braun & Clarke, 2014). A framework approach to thematic analysis involves using an analytic tool that enables data to be summarised and displayed (Spencer et al., 2014). The framework approach was considered to be appropriate for this study as it was developed to be used in complex social situations with different levels of abstraction and can be used with data that may be more pre-determined, such as the semi-structured interviews used in this study (Ritchie & Lewis, 2014). There are five

stages in the framework approach (Ritchie et al., 2003): Familiarisation – the researcher becomes familiar with the data and aware of early themes; Identification – key themes are identified and assigned a code; Indexing – transcripts are annotated to identify patterns and developing themes; Charting – themes are grouped together in a thematic framework; and Mapping – a graphical representation of the themes is established, allowing a detailed examination of the framework. This is instrumental in allowing identification of commonalities and differences in the data (Gale et al., 2013). The framework forms a thematic matrix in which each participant is individually represented in rows, with corresponding sub-themes linked in columns.

It is important to acknowledge that there are potential disadvantages to using thematic analysis. The method limits inferences that may be made from the use of language and inflection through a continuous conversation, as data are extracted from multiple transcripts and organised thematically rather than chronologically (Braun & Clarke, 2006). A further possible disadvantage is the limitation of interpretation of data to being descriptive, unless it is aligned to an existing theoretical framework that supports the observations made from the data. There is a risk of researchers allowing their own assumptions and preconceptions to introduce an unacceptable level of bias to their thematic analysis of data, so a reflexive approach is necessary to ensure a more impartial and effective level of analysis (Braun & Clarke, 2019).

Reflexivity is the process of reflecting on oneself, the researcher, in order to emphasise the importance of self-awareness and perspective within qualitative research (Patton, 2015). Throughout this PhD project, I adopted an iterative, reflective approach to the development of my research and progress as a researcher. Reflection enabled me to pay critical attention to the theories and methodology that underpin the project and reflexive examination of how my own values and opinions had potential to influence my work (May & Perry, 2011). The method that I used to address the reflexive process is described in detail in Chapter Six of this thesis.

3.6 Quantitative research

Quantitative methodology was determined as being the most appropriate way to answer research question 3, (How does engagement with an online PA promotion education programme affect student healthcare professionals' self-reported skills in motivating patients to be more active?). Quantitative research may be described as concerning deductive reasoning to test theory, with a postpositivist epistemology and an objectivist ontological stance (Baran & Jones, 2016). Quantitative research encompasses a range of methods concerned with the systematic investigation of social phenomena, using statistical or numerical data (Bryman, 2016). This effectively disassembles the phenomenon under study and allows objective analysis of its component parts (Andrew, S., Halcomb & Dawson, 2013). Therefore, quantitative research involves measurement and assumes that the phenomena under study can be measured (Watson, 2015). Quantitative methods of research are designed to analyse data for trends and relationships and to verify the measurements made. Similar criteria are applied to verify, calculate and analyse data for all types of measurement. It is essentially deductive: measurements are made, data are analysed and conclusions are reached (Watson, 2015). Quantitative studies may be broadly categorised as experimental or observational.

- Experimental studies – these studies are designed to measure the efficacy of an intervention (Peat, 2002). Randomised controlled trials are an example of experimental studies and are widely regarded as the highest level of evidence supporting clinical guidelines (World Health Organisation, 2013). Randomised control trials are studies in which subjects are randomly assigned to one of two groups: one (the experimental group) receiving the intervention that is being tested, and the other (the comparison group or control) receiving no treatment, or an alternative treatment (Curtis & Drennan, 2013). Randomised

controlled trials are limited, principally by being conducted under experimental conditions, benefiting from larger sample sizes, and for social interventions they have limited applicability to real world interventions (Craig et al., 2008). A randomised controlled trial was considered inappropriate for this study as it was pilot testing an intervention within a relatively small sample group, within the limited resources of a PhD project. Case control studies are used to investigate the relationship between an exposure and a health outcome. The exposure can be any variable that precedes the outcome and may be a characteristic of the environment or of people. The purpose of all case control studies is to investigate whether the exposure causes the outcome (Herbert, 2017). Case control studies were inappropriate for this study, as all participants were exposed to the intervention, therefore no comparison could be done.

- Observational studies – cross-sectional studies, longitudinal studies and case control studies are the three principal categories of observational study. Cross-sectional studies or surveys are used to determine whether there are differences between participants. Data are collected from a number of participants at the same point in time, which may make the relevance of the findings limited by time (Moule, 2017).
- Longitudinal studies are used to measure changes over a period of time with data being collected at various points throughout the duration of the study (Bryman, 2016). A longitudinal study was considered to be most appropriate in this case, as the study aimed to measure changes after an intervention that was delivered over a pre-determined period of time.

The study described in Chapter Five was longitudinal in design and was originally conceived as a quantitative study. Demographic data were collected in

addition to pre and post measures to determine the change in perceived skills as a result of completing an online education programme. Significant attrition was seen in the participants who registered for the online programme when it began, with many participants failing to engage with the learning material. This study was being conducted at the start of the 2020 COVID-19 pandemic and this as a background to the dropout level left unanswered questions about why the attrition rate was so high. In keeping with the pragmatic approach to this research project, consideration was given to the most effective way to proceed and how best to answer the question of attrition. It was determined that introducing a qualitative component to the study would offer the best opportunity to explore participants' reasons for non-completion. Given the proposed use of different methods within the study, to answer questions about the same population, a mixed methods approach was adopted.

3.7 Mixed methods approach

The evolution of mixed methods research happened over several decades, from discussions about the scope of investigation made possible through the application of accepted, established paradigms and methods in behavioural and social sciences (Greene, 2008). Several descriptions of mixed methods have been offered, including the assertion that mixed methods designs are those that include both quantitative and qualitative methodology, with neither method directly associated with any particular research paradigm (Creswell & Plano Clark, 2011). Mixed methods research allows a pragmatic approach to the symbiotic integration of qualitative and quantitative methodology (Teddlie, 2009). Although the application of a mixture of qualitative and quantitative methods may be for a common goal of answering a research question, each methodology reaches conclusions through quite different epistemological and ontological stances. Indeed, the divergent lenses through which the two research paradigms view phenomena are at the heart of the argument for mixed

methods, offering a deeper insight than either quantitative or qualitative methods alone may achieve (Creswell, 2015). The opposing world views of qualitative and quantitative methodologies gave rise to concerns that the two may be incompatible (Hathcoat & Meixner, 2015). Some pragmatists, however, argue that there is no incompatibility between qualitative and quantitative methods, and that the focus should be upon how the two approaches may complement each other, rather than whether they will (Howe, 1988).

The acceptance that a variety of research methodologies may support a philosophical approach inclined towards mixed methods research resonated with my aspiration to use the most appropriate methodology to answer the research questions and to respond to the data as it emerged. In order to understand any dropout rate in the final study of this PhD, a mixed methods approach with an explanatory sequential design was considered appropriate (Creswell & Plano Clark, 2011). This was because it added scope and breadth to the study, may mitigate against the perceived weakness of any single methodology, and allows the close examination of contradictions in evidence (Watkins & Gioia, 2015) .

3.8 Summary of studies in PhD

This thesis is comprised of a series of three principal components involving both qualitative and quantitative research methodology in separate studies and a final study with a sequential mixed methods approach: 1) the systematic literature review described in Chapter Two; 2) a qualitative study exploring influences on the physical activity referral and promotion practices of healthcare professionals; 3) a mixed methods study with measures of uptake and adherence and pre and post-testing of perceptions of motivational interviewing skills for an online education programme. Semi-structured interviews were conducted with participants who dropped out of the programme (**Figure 3-1**).

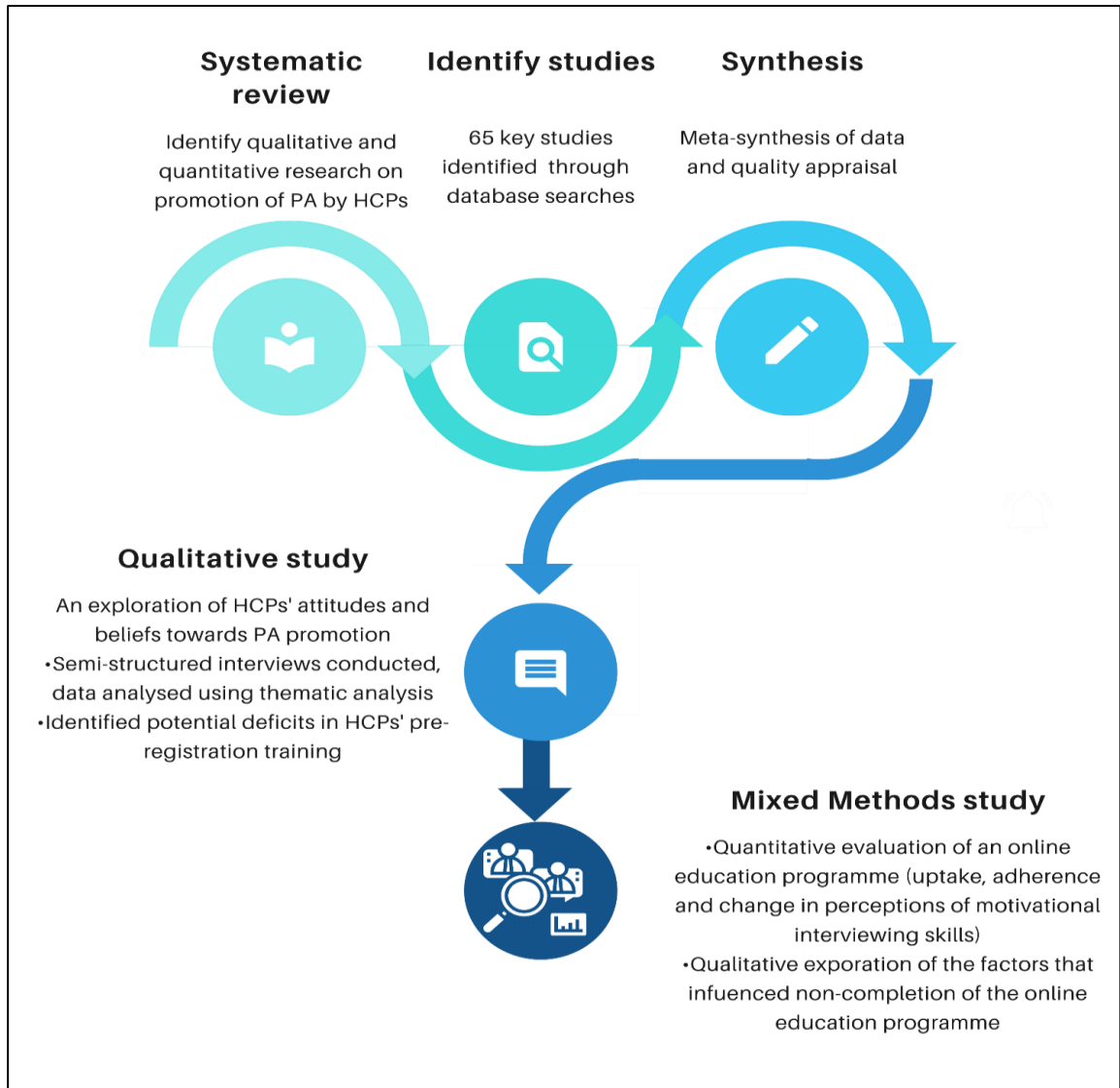


Figure 3-1: Flow diagram of studies in thesis

3.9 Data management and protection

In order to maintain confidentiality and research integrity, all data in this research project was collected, managed and stored in accordance with the principles outlined by the General Data Protection Regulation (GDPR) (European Parliament, 2016; Information Commissioner's Office, 2020). This was in compliance with Edinburgh Napier University's Data Protection Code of Practice (Edinburgh Napier University, 2019).

All research data were stored on Edinburgh Napier University's secure drive. The University-managed data storage is resilient, with multiple copies stored in more than one physical location and protection against corruption. Daily backups are kept for 14 days and monthly backups for an additional year. Any hard copies of data such as consent forms were stored on-campus in lockable fireproof cabinets before digital copies were made. At that point hard copies were destroyed.

Individual participants were assigned a unique identity number to ensure anonymity and all references to locations and individuals were removed after transcription. The list of unique identity numbers and participants' personal details were stored securely on the password-protected Edinburgh Napier University network. Only the research student and supervisors had access to the identity of the participants. Interview transcripts were stored on the secure research drive at Edinburgh Napier University.

Chapter 4. Healthcare professionals' attitudes and beliefs regarding physical activity promotion

4.1 Introduction

There is a global focus on increasing physical activity levels to promote health (World Health Organisation, 2010) and HCPs may be instrumental in efforts to achieve this (Douglas, Van Teijlingen et al., 2006; Buckley et al., 2020).

However, for HCPs involved in this work, there is a gap between beliefs about the importance of promoting physical activity and the effectiveness of their practice. Current evidence points to a number of factors that may influence the physical activity promotion activities of HCPs (Buchholz & Purath, 2007; Hausman et al., 2018; Karvinen et al., 2012). These include HCPs' personal engagement with physical activity, knowledge of the evidence for physical activity, awareness of current PA guidelines, and perceptions of how motivated patients may be to make lifestyle changes. It is clear that physical activity is not being effectively promoted in healthcare settings (Hébert et al., 2012; Cantwell et al., 2017).

The systematic literature review presented in Chapter Two of this thesis reveals that HCPs believe that physical activity is beneficial to health and that promoting it is important. Furthermore, there is evidence that suggests that HCPs who believe that the promotion of physical activity is an important part of their clinical role are more likely to actively promote it to their patients (Freene et al., 2017; Hardcastle et al., 2018; Lawlor et al., 1999). However, the systematic review also uncovered that HCPs believe that some patients lack motivation to increase their participation in physical activity and that this influences whether they think that promoting physical activity to this group is likely to be effective (Al-Ghamdi et al., 2018; Bélanger et al., 2015; O'Brien et al., 2017). HCPs who engage in higher levels of physical activity in their own lives were found to be more likely to promote it in practice (Burton et al., 2010; Morishita et al., 2014). It is of note that little is known about how HCPs' perceptions of the influence of

gender on exercise preferences and lifestyle choices may affect their promotion activities.

The literature review highlighted that HCPs self-report high levels of knowledge about physical activity generally (Al-Ghamdi et al., 2018; O'Brien et al., 2017; Walsh et al., 1999). However, studies that tested actual knowledge demonstrated low levels of knowledge of physical activity guidelines (Douglas, Torrance et al., 2006b; Florindo et al., 2015; Hardcastle et al., 2018). This may suggest that there is inconsistency between perceived knowledge and actual knowledge of physical activity promotion among HCP populations.

Physical activity referral schemes (PARS) represent a nationally widespread resource for HCPs to encourage increased engagement with physical activity (Hanson et al., 2021). They appear to be important to the physical activity promotion of HCPs, although there is little evidence for the long term success of PARS in increasing physical activity levels (Campbell et al., 2015; Pavey, Anokye & Taylor, 2011). There is evidence that where HCPs are unaware of provision for exercise, including PARS, in their communities, they are less likely to engage in physical activity promotion activities (Bélanger et al., 2015; Puig Ribera et al., 2005; Williams, T.L. et al., 2018). This may be important when considered in combination with other barriers to physical activity promotion, such as a lack of available time to discuss it.

Existing evidence, as presented in Chapter Two, is developed principally from quantitative studies, with fewer studies conducted using qualitative methodology. Consequently, less is known of how factors such as personally held beliefs, attitudes and the reasons for HCPs' lifestyle choices influence their promotion of physical activity in practice. Further qualitative studies may help to develop deeper understanding of the extant quantitative evidence and expand upon and update the evidence from existing qualitative research. The existing body of quantitative evidence identifies that PA promotion occurs at low levels (Freene et al., 2017), although HCPs perceive that PA is beneficial to health

and promoting it is part of their role (Buffart et al., 2009; Jørgensen et al., 2012). Decisions about whether to engage in PA promotion with patients are influenced by perceptions of effectiveness, the motivation and ability of patients to engage in PA, their own PA behaviour and the time required to discuss PA (Steptoe et al., 1999; Suija et al., 2010; Van der Ploeg et al., 2007). Existing qualitative evidence reinforces many of the quantitative findings about factors that influence HCP decisions about promoting PA to their patients, in particular about perceived effectiveness and patient motivation (Smith-Turchyn et al., 2016; Williams et al., 2018). There are only two qualitative studies, (Din et al., 2014 and Graham et al., 2005), that have examined HCPs' views' of PARS and these are limited to primary care. This does not reflect current PARS practice, where referrals are made from primary and/or secondary care. Additionally, these two studies focus on the influence of PARS processes, rather than the interaction of HCPs' beliefs, attitudes and personal PA choices with PARS referral. There is therefore a requirement for studies that include HCPs who refer to PARS from secondary care and that examine the interactions between how personally held beliefs and attitudes about PA influence general PA promotion and referral to PARS.

Therefore, the aim of this study is to increase understanding of factors that influence general physical activity promotion by HCPs and their interrelationships, and to explore factors that influence HCPs' referrals to a PARS.

4.2 Methods

A qualitative design using semi-structured interviews explored HCPs' perspectives of factors that influence their general promotion of physical activity and referral to a Scottish PARS. The rationale for this approach was to develop a thorough understanding of the experiences of HCPs through analysis of their personal accounts of lived experiences. This is described in detail in the

methodology chapter (Chapter Three) of this thesis. Results were reported using the Consolidated Criteria for Reporting Qualitative Research Guidelines (Tong et al., 2007). Ethical approval for this study was given NHS Research Ethics Committee approval (Reference: 17/NI/0112) and Edinburgh Napier University School of Health and Social Care Ethics Committee (Reference: SHSC/0002).

4.2.1 Context

PARS overview

The PARS was provided by a leisure trust in Scotland. The PARS accepts referrals from primary and secondary care to 10 local authority leisure centres, four community centres and one university sports centre. The primary aim of the service is to provide opportunities for adults with long term conditions to take part in physical activity. The PARS does not receive any National Health Service funding but forms part of the provider leisure trust's strategy for fulfilling their charitable objective to advance health through sport, active recreation and physical activity. As a result, the PARS is funded internally by the leisure trust providing the service.

Referrers

HCPs within the geographic catchment area for referral were made aware of the PARS by the leisure trust that delivered the scheme. Patient referral to the PARS was available to HCPs in both primary and secondary healthcare settings. This included GPs, primary and secondary care nursing staff, and allied health professionals from all clinical disciplines. The PARS receives approximately 1,000 referrals per year, is time unlimited and accepts people with a range of long term conditions.

Referral process

Referrals to the PARS are made via standardised forms sent to the PARS coordinator. Each PARS participant is allocated a venue and class based on home postcode proximity to a leisure centre and level of functionality as indicated on the referral form (determined by the referring HCP). Participants are invited to attend identified sessions by letter. In the case of non-attendance, response by the leisure centre staff was variable. Sometimes participants were telephoned by session instructors to establish reasons for lack of attendance and encourage re-engagement. Frequently there was no contact with participants as the PARS policy does not include follow up for non-attendance (Hanson et al., 2021).

Inclusion/exclusion

The PARS has clear inclusion criteria (e.g. cardiovascular disease, diabetes and stroke) but excludes conditions where physical activity is considered unsafe (**Table 4-1**).

Table 4-1: Inclusion and exclusion criteria for the PARS

PARS participant inclusion criteria	Exclusion criteria
Cardiovascular disease (CVD) secondary prevention (< 6 months post-cardiac event or procedure and having completed earlier phases of cardiac rehabilitation, or stable established CVD and 6 months post-cardiac event or procedure)	Blood pressure Resting blood pressure of systolic ≥ 180 mmHg or diastolic ≥ 100 mmHg
Falls (history of falls or at risk of falling)	Unstable angina (diagnosed within the previous month, following no established pattern, occurring at rest or with minimal exertion, not relieved by rest or oral medication taken at the onset of symptoms)
	Uncontrolled tachycardia

Type 1 or 2 diabetes (Stable, controlled condition, <3 episodes/week of hypoglycaemia, HbA1c <108mmol/mol)	(resting heart rate ≥100 bpm)
Stroke	Uncontrolled or new arrhythmias (no definition provided)
Multiple sclerosis	Unstable or acute heart failure (excessive breathlessness, unexplained weight gain > 2 kg over a five day period, ankle oedema)
Chronic obstructive pulmonary disease	
Rheumatic disease	
Tier 3 weight management (bariatric surgery considered potentially appropriate after completion of weight management programme)	

The PARS consists of a range of functionally stratified group physical activity sessions (**Table 4-2**) involving the gym, circuit classes and aqua-based activities but there is no target level of activity that participants are expected to achieve.

Table 4-2: Functional ability levels for the PARS

Functional level	Description
Level 1	Limited standing, balance and requires mobility aid
Level 2	Mobile (without aid) but difficulty with movement or activities of daily living
Level 3	Independently mobile
Level 4	Independently mobile and physically active

The leisure trust that delivers the PARS was selected for the current study as this PhD project is a component of a larger externally-funded project (Chapter One). The larger study was focused on the selected leisure trust – consequently this study focused on the same leisure trust.

4.2.2 Sample and procedure

A purposive sample of HCPs was recruited. The leisure trust provided a list of all HCPs who had referred at least four patients to the PARS in the previous year (n=58). HCPs who had referred less than four patients to the PARS in the previous year were considered to be ineligible as the intention was to interview participants who had knowledge of both the PARS and its referral process, and who had experience of promoting physical activity to their patients.

Eligible staff were 53 females and five males. The staff were from a range of different healthcare professions (dietitians (n=6), nurses (n=9), physiotherapists (n=35) and other allied healthcare professionals (n=4)). All participants worked in secondary care settings. Recruitment occurred by email invitation between May 2018 and April 2019. All identified HCPs were sent a participant information sheet (Appendix 2) and a consent form (Appendix 3). Potential participants were informed that taking part in the study was voluntary and that non-participation would not affect their involvement in referring to the PARS. To participate, HCPs returned a signed consent form via email. Non-respondents were sent a second email two weeks after the original invitation. Replies were received from 13 female HCPs.

One researcher, BF, then contacted these HCPs to arrange a face-to-face or telephone interview at a convenient time. Because all initial respondents were female, the PARS coordinator from the leisure trust emailed four male HCPs asking if they would consider participating in the study. This resulted in one male respondent agreeing to participate. The study was nested within a study about gender, so it was considered important to attempt to introduce some gender diversity in order to gain a variety of views.

An initial figure of 15 participants was considered to be an appropriate target for the study as this would offer enough data to provide the opportunity for saturation of themes (Braun & Clarke, 2013). Fourteen participants were recruited and it was unnecessary to engage in further recruitment efforts as no

new themes developed from later interviews with this sample (Green & Thorogood, 2018).

4.2.3 Data collection and management

Data collection

Based on the rationale for the selected qualitative methodological approach (Chapter Three), data were collected via semi-structured interviews. The interview guide (Appendix 4) was prepared from the findings of the systematic review. Topics covered included perceptions of the effect of physical activity on health, knowledge of physical activity guidelines, personal experience of physical activity, understanding of the PARS, the influence of gender on physical activity promotion, and perceived barriers and facilitators to HCPs promoting physical activity to their patients and referring them to the PARS. The interview guide was updated after completing the first two interviews by refining questions around gender influences to allow a more natural flow of conversation and elicit more considered and fuller responses. This refinement was developed through a process of the interviewer listening to the recorded interviews with another researcher (RG) and identifying that gender-related questions were closed in nature and did not encourage full responses. Open questioning techniques were role-played and the resultant open questions were introduced into the interview guide.

Interviews were conducted between June 2018 and May 2019. One researcher (BF) conducted all interviews after completing intensive qualitative interviewing training and mentoring occurred throughout from CH and LN, experienced qualitative researchers. Twelve interviews were conducted face-to-face in private at the HCPs' place of work. Participants' work settings were selected to minimise inconvenience and to allow the interviews to take place in an environment where participants felt comfortable, in order to limit inhibitions to

free flowing discourse (Green & Thorogood, 2018). Face-to-face interviews were preferred to allow the researcher to consider nuances of facial expression and body language when completing field notes. However, where this was not possible due to working commitments or preferences of the participants, interviews were conducted by telephone at their request (n=2).

Although telephone interviews removed the experience of body language and expression, they were considered to be acceptable to maximise the potential opportunities for recruitment and allow the participants an element of choice. Indeed, some people may prefer telephone conversations to face-to-face meetings and, as a consequence, may feel more able to be open and frank with their interviewer (Trier-Bieniek, 2012). Participants did not receive any reward for participation and were provided with a participant debrief sheet at the end of the interview to ensure that their interview experience met with the information provided before their interview (Appendix 4).

Data management

All interviews were audio-recorded on an encrypted device and transcribed verbatim. Field notes were taken immediately post-interview and focused on the quality of interaction, the environment that the interviews took place in, reflection on the interview and potential bias due to BF being a practising male HCP with a high personal level of physical activity. BF transcribed the first five interviews. This allowed the researcher to become familiar with the data and was useful in confirming that the interview guide was appropriate. The remaining interviews were transcribed by a professional transcription service.

Participants were assigned a unique identity number to ensure anonymity and references to location were removed after transcription. BF kept the list of unique identity numbers and participants' personal details securely on the password-protected Edinburgh Napier University network. Only the researcher and his supervision team had access to the identity of the participants. Interview

transcripts were stored on the secure research drive at Edinburgh Napier University.

Data analysis

Data were subject to thematic analysis (Braun & Clarke, 2012) using a framework approach (Ritchie et al., 2003). The framework approach to thematic analysis is useful to elucidate findings of qualitative research because it enables a researcher to look for patterns in the data. The framework method can be adapted for use with deductive or inductive coding, or a combination of these approaches (Gale et al., 2013). By coding and charting overarching themes encompassing numerous factors, themes that were both personal to the HCPs, and external factors that influenced HCPs' promotion of physical activity, were established. The rationale for selecting this approach is described in full in the methodology chapter (Chapter Three).

Analysis was completed by BF using NVivo 12 within the five phases of the framework approach (Ritchie et al., 2003). Phase one was Familiarisation – this early stage enabled the researcher to become familiarised with the data and sensitised to early themes through reading the transcripts and field notes, and reverting to the original recordings where necessary to note initial impressions. Phase two was Identification – this stage involved identifying key themes, issues or discussion points embedded in the transcripts and assigning a code, or name, to each that readily captured the essence of the theme. This process involved openly coding two transcripts before discussion with one supervisor (CH). CH also independently coded one transcript. Coding was compared and subsequently collated to allow themes to develop. Phase three was Indexing – this stage involved annotating transcripts to identify consistencies and developing themes. Phase four was Charting – during this stage themes were grouped together and arranged in a thematic framework. After discussion, BF and CH created a framework of initial themes. A further four transcripts were coded by BF before refinement of the framework. The remaining transcripts

were analysed using established codes where they had been identified. Combined with inductive coding, this left space to discover other unexpected aspects of the participants' experience without stifling the development of new themes. Finally, phase five was Mapping – during this stage the framework allowed for exploration of connections between participants and categories. Analysis went beyond descriptions of individual cases to develop themes identifying factors that HCPs believed had influenced their promotion of physical activity to their patient groups. A graphical representation of the themes was established. This allowed a detailed examination of the iteratively developed framework and helped to identify commonalities.

4.3 Results

4.3.1 Participant characteristics

In total, 14 HCPs took part in interviews. They were mainly female (93% n=13), and the most common profession was physiotherapists (42.8% n=6) (**Table 4-3**).

Table 4-3: Participant characteristics

Participant	Age Group (years)	Gender	Occupation
1	≥50	Female	Physiotherapist
2	≥50	Female	Physiotherapist
3	≥50	Female	Physiotherapist
4	25-49	Female	Dietician
5	25-49	Female	Physiotherapist
6	≥50	Female	Nurse
7	≥50	Female	Physiotherapist
8	≥50	Female	Nurse
9	≥50	Female	Nurse
10	25-49	Female	Occupational therapist
11	25-49	Female	Nurse
12	25-49	Female	Physiotherapist
13	25-49	Female	Dietician
14	≥50	Male	Dietician

All participants had obtained higher education qualifications. Two held diplomas, 10 were educated to BSc level, one had an MSc, and one had attained a PhD. Two participants had been qualified in their current roles for less than 15 years, five had been in post for 15 to 29 years, and seven for 30 years or longer.

Two overarching themes developed, each describing influencing factors that were either internal or external to the study participants. Within internal factors, three major sub-themes were identified: 1) Knowledge about evidence for the health benefits of physical activity; 2) HCPs' own engagement in physical activity; and 3) perceptions of physical activity promotion within HCPs' professional roles. Major external factor sub-themes were 1) components of the PARS and 2) patient specific factors (**Figure 4-1**).

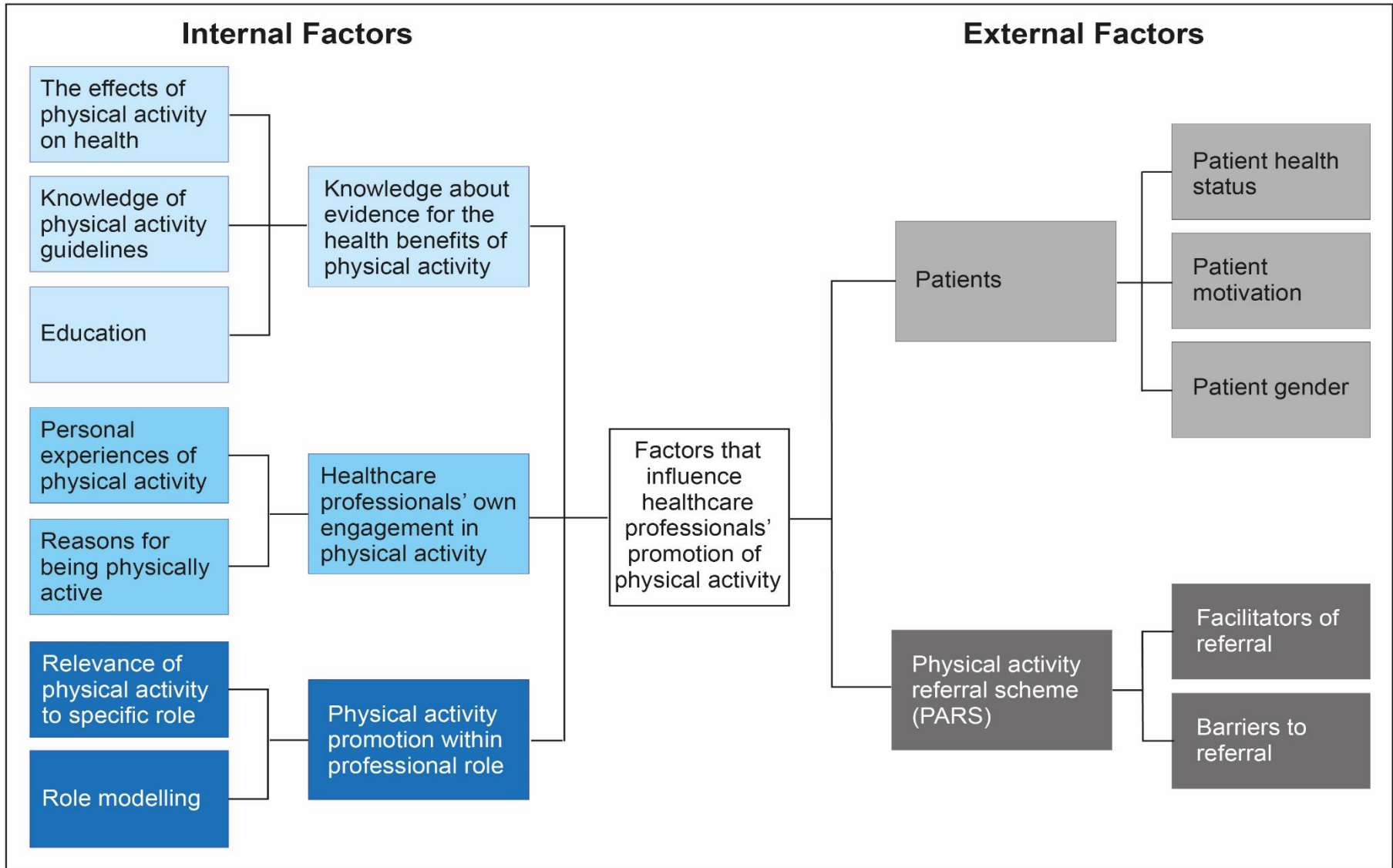


Figure 4-1: Thematic analysis of HCPs' perspectives

4.3.2 Healthcare professional internal factors

The study identified three interlinked internal factors (knowledge, perceptions of role and personal physical activity levels) that influence the likelihood of HCPs promoting physical activity. Knowledge of the health benefits of physical activity and of PA guidelines were integral to enthusiasm to promote it. This was closely linked to perceptions of the relevance of physical activity within study participants' professional roles. These elements were underpinned by HCPs' own engagement in physical activity and their personal reasons for being active.

4.3.3 Knowledge about evidence for the health benefits of physical activity

Participants' perceptions about their level of knowledge of the evidence base for the effects of physical activity on health, and its inclusion within healthcare, strongly influenced their promotion activities with patients. Perceived higher levels of knowledge about the benefits of physical activity for health contributed to feelings of confidence when promoting it. Three sub-themes of the effects of physical activity on health, knowledge of physical activity guidelines, and education, were identified.

The effects of physical activity on health

Study participants discussed their belief that participation in physical activity was a desirable behaviour for both HCPs and their patients, as it had positive effects on both physical and mental health, which were closely linked:

'I think it's crucial for physical health and mental health and you can't unknit the two' (Participant 10, physiotherapist).

Perceptions about the connection between physical activity and good mental health were integral to the likelihood of promoting it, with some participants highlighting its benefits to suggest its perceived importance:

'Mental health, physical health, wellbeing, mood, there's nothing negative about exercise' (Participant 6, nurse).

This was particularly notable since study participants were involved in predominantly physical rehabilitation services (falls prevention, cardiac rehabilitation and pulmonary rehabilitation).

Few of the participants referred to the scientific body of evidence that supports the benefits of PA on physical and mental health, preferring instead to recount anecdotes relating to their own experiences of it.

'It just removes lethargy, you feel invigorated, you just feel, you know, your appetite is better, you know you just generally have a sense of achievement' (Participant 2, physiotherapist).

One HCP did, however, indicate that they were aware of scientific evidence, without elaborating on the subject. Indeed, when asked further about sources of scientific evidence, they gave an answer that appeared to use deflection techniques in order to prevent further discussion on the subject. This may suggest that they had little confidence in their knowledge of the evidence base, and that they might have been aware of their knowledge gap and felt that they were expected to be familiar with the evidence:

'I could give you all of the research evidence which I'm sure you absolutely know' (Participant 1, physiotherapist).

Knowledge of PA guidelines

None of the study participants referred to international and national guidance supporting the promotion of physical activity for health, such as the then current World Health Organisation PA guidelines (World Health Organisation, 2010) or the UK Chief Medical Officer PA Guidelines (Department of Health and Social Care, 2019). When prompted, respondents reflected on the primary prevention

guidelines for adults aged 19-64 years (150 minutes of moderate activity per week, or 75 minutes of vigorous activity, or a combination of both, and muscle strengthening exercises on at least two days of the week) (Department of Health and Social Care, 2019) but none accurately described them. However, they did know that the recommendations existed and described variations of previous guidance.

'I know the current guidelines and it is either half an hour a day or from a programme point of view, I'll get them to do three, one moderate from a patient's point of view, three hours of moderate session per week' (Participant 3, physiotherapist).

Other participants indicated advising people to undertake '30 minutes of exercise per day' (Participant 11, nurse) and 'five days a week of 30 minutes of activity' (Participant 12, physiotherapist).

Knowledge and use of disease-specific guidance for physical activity also varied. Many participants spoke about local and national guidance. Some included guidance for PA within wider documents for the management of specific conditions:

'I don't know, I should know locally, but I can't think off the top of my head, but nationally ... there's the SIGN guidelines, for obesity in the SIGN guidelines (SIGN: Management of Obesity), the management of diabetes (SIGN: Management of Diabetes) and I can't tell you where but I'm pretty sure both of those mention diet and activity' (Participant 4, dietician).

Another participant explained that, when considering discussing physical activity with patients, they referred to a guideline that is specific to one category of patients with a focus on safety that recommends physical activity, but does not offer guidance on frequency or intensity:

'I use the national falls guidelines' (Participant 2, physiotherapist).

Some participants described protocols and initiatives that were developed to offer a framework for physical activity promotion within their practice specialism:

'It's the Royal College of Physicians and ACRP (Association of Chartered Physiotherapy in Respiratory Care) physiotherapy guidelines which are one of the drivers in the UK really. But there are all the other guidelines, but they are more rehab specific, I think, for frailty. All the different guidelines, that as a team we use, we try to explore at our business meeting' (Participant 3, physiotherapist).

Participants described their knowledge of physical activity guidelines as being accumulated largely through their own efforts rather than through institutional programmes of education and, in some cases, by an awareness of initiatives directed at patients. Although they were delivering evidence-based care, in compliance with guidelines for their clinical specialism, none of the participating HCPs revealed knowledge of techniques such as motivational interviewing (MI) that may prove useful in promoting physical activity effectively.

Education

Participants described their formal education in the promotion of physical activity as being largely absent, with no teaching of promotion methods in undergraduate programmes or in vocational education once they became registered HCPs:

'As an OT you don't receive anything really' (Participant 10, occupational therapist).

Many participants said that their skills in promoting physical activity were either self-taught or gained through experience or observation,

'Well, I think I've learned from shadowing other people' (Participant 6, physiotherapist).

Not only was education about the benefits of physical activity and the supporting evidence base lacking, but there was also a lack of education about how to effectively promote PA.

4.3.4 Healthcare professionals' own engagement with physical activity

Healthcare professionals' personal experiences of engagement in physical activity influenced their promotion of it to their patients. Indeed, all of the participants considered themselves to be physically active. Within this theme, two sub-themes developed – HCPs' personal experience of physical activity and HCPs' reasons for being physically active.

Personal experience of PA

All HCPs described themselves as physically active, although there was a disparity between what different individuals considered to be a physically active lifestyle. This varied from one participant who described themselves as physically active, walking their dog once a day, to another offering the same description of being physically active who engaged in competitive endurance sport.

One participant described a weekly routine of vigorous activity,

'I run a couple of times a week and I go to the gym' (Participant 1, physiotherapist).

while other participants described a more moderate level of PA,

'I go out walking every day. I've got a dog so I have to' (Participant 2, physiotherapist).

Participants undertook a wide variety of activities in a range of contexts with some preferring outdoor activities, while others preferred using a gym or attending exercise classes. One participant illustrated this saying,

'If it's a lovely evening I don't really want to be going to a class, I'd rather be outdoors' (Participant 2, physiotherapist).

Another participant expressed more structured preferences:

'I've got a personal trainer, I'm at the gym three times a week, and I'm also doing park running' (Participant 9, nurse).

With perceptions of being physically active, participants described a range of intensity and frequency options, without relating these to whether and how their personal activity met the PA guidelines.

Reasons for being physically active

When discussing their reasons for being physically active, HCPs gave varied reasons for their continuing engagement. Some participants exercised mainly because they believed that there were associated health benefits:

'If I want to live long and prosper, I'm going to have to make sure that I'm healthy' (Participant 12, physiotherapist).

Many identified that physical activity improved their mood and supported their stress management and mental health by allowing them to forget about professional and personal problems.

'Running is the only time where my head is completely clear. There's none of the white noise that is in my usual day I guess. I will use it to think if I have something I need to think about specifically, but usually all I can think of is breathing and running' (Participant 5, physiotherapist).

Other participants clearly enjoyed physical activity and the opportunity to exercise outside.

'I just enjoy it, I just feel so much better, I enjoy the peace and quiet and the fresh air and feeling invigorated at the end of it' (Participant 2, physiotherapist).

Furthermore, the reasons for participants' initial/early engagement with physical activity varied, from family activities with parents and siblings, to participation in competitive sports through school and sport clubs. One participant described participation in sports organised by their school:

'At school I was on the hockey team and I used to run' (Participant 5, physiotherapist).

Another HCP also felt that their involvement in sport at school was influential in their current level of physical activity and suggested that there was a generational element to their engagement with it.

'I think just that [participant's] generation, everybody was out, everybody was playing. The school were really involved in outdoor activity and games and things like that' (Participant 11, nurse).

Although they discussed the reasons for exercising as adults as being different to those that drove their physical activity when they were younger, most participants believed that their early PA was habit-forming and still underpinned their reasons for being physically active. One participant said:

'Probably because it's like a habit, it's just always been there, even as a kid I did swimming and I swam for the school' (Participant 4, dietitian).

Social aspects such as classes and mass participation events appeared to provide motivation for some HCPs' current engagement in physical activity:

'Running sportives, I did a half marathon run' (Participant 10, occupational therapist).

Some of the participants felt that taking part in physical activity formed a part of their identity:

'I mean, I exercise a heck of a lot so, you know, that defines me'
(Participant 10, occupational therapist).

4.3.5 Physical activity promotion within the professional role

Most study participants believed that the promotion of physical activity to their patients formed an integral part of their role as HCPs. There were varying degrees of investment in this, with many study participants expressing a belief that their clinical role required that they promote physical activity to their patients. Others felt that while PA promotion was a defined component of healthcare, the promotion of physical activity was more appropriately carried out by professions other than their own. Two sub-themes developed as a consequence – relevance of physical activity to a specific role, and role modelling.

Relevance of physical activity to specific role

The view that HCPs have a responsibility within their clinical role to promote physical activity to their patients appeared to be particularly prevalent among physiotherapists. One participant said that they believed PA promotion to be inextricably linked to their practice:

'Huge, I mean, in the context of my NHS role, it's something that we advise on every single day' (Participant 1, physiotherapist).

Another participant expressed a belief that the promotion of physical activity was, in fact, the most important aspect of their clinical role:

'Well, it's integral to our role, I mean, I think as a physiotherapist that's what you do, that's the biggest part of it' (Participant 2, physiotherapist).

A few, however, felt that promotion of physical activity was more appropriately carried out by clinical disciplines other than their own. One HCP implied that the promotion of physical activity was a lower priority for them than for other clinical staff. Indeed, they suggested that they would defer to others when considering discussing PA:

'But, I have to say, it's low on my tick list, I would have to ask my physio colleagues about that. I don't know' (Participant 10, occupational therapist).

Some study participants recognised that it was a challenge to encourage all HCPs to be proactive in the promotion of physical activity. One HCP described the difficulties in challenging the opinion that PA promotion is appropriate for some HCPs, but not for others:

'I think that the issue often is that it's trying to get other staff members to think that it is part of their role as well, but it is part of their pledge, you know, it falls naturally to us' (Participant 1, physiotherapist).

Role modelling

Many HCPs spoke about their perception that within their roles they were considered to be knowledgeable and professional and thus sources of credible information and advice. They believed that they were conspicuous in their communities and were viewed as role models for health and that this was important, although they did not specify whether their concept of being a role model extended from their professional practice to private life. One participant felt that their own physical activity levels influenced their sense of credibility when promoting it in clinical practice:

'You recognise the need for physical activity in your own life, I'm like an advocate for it every day at work, so I would have a real cheek to go and sit and be a bit lazy' (Participant 5, physiotherapist).

Another HCP felt that they could only recommend increasing PA with any credibility if they themselves were physically active:

'I don't feel that I could recommend things if it was something I was unable to do myself' (Participant 1, physiotherapist).

HCPs felt that they should be seen to practise what they preach and some said that they would feel uncomfortable in recommending that their patients increase their PA levels if it was evident that they themselves were not physically active. One study participant said:

'I am very aware, as a healthcare professional, that I have to practice what I preach, there's no point telling patients to be more active and not doing it myself' (Participant 1, physiotherapist).

HCPs used anecdotes of their own experience of physical activity to motivate patients and give relatable examples of how increasing PA levels can improve and support health. One participant felt that they could discuss physical activity more believably and positively because they engaged in it themselves and could directly relate their own experiences to their patients.

'It's important that they know the benefits of exercise, and if you're talking about something you're engaged in, you know, you're more positive about it' (Participant 5, physiotherapist).

4.3.6 External factors

Factors that influenced the promotion of physical activity that were not directly related to the HCPs themselves were considered external, and they related specifically to HCPs' patients and to the PARS that they referred the patients to.

4.3.7 Patients

HCPs identified multiple factors relating specifically to their patients that influenced whether and how much they promoted physical activity. Patient-related factors influenced whether HCPs believed that patients would, or in some cases could, realistically attend the PARS or increase their physical activity levels in a sustainable way. Influential patient factors could be grouped into three distinct sub-themes – health status, perceived motivation, and gender.

Patient health status

Most participants' promotion activity was influenced by their perception of whether a patient was fit to participate in physical activity. The perception of patients' fitness to exercise was influenced by age and the presence of co-morbidities:

'We base it on that, base it on their abilities and their past medical history really, and see what they are able to do' (Participant 1, physiotherapist).

In many cases where a patient had multiple co-morbidities, or was perceived to have limited mobility, the HCPs would not engage in a conversation about increasing physical activity.

'If somebody came in and they could barely stand up, no, I don't think we would have a physical activity conversation' (Participant 1 physiotherapist).

Some participants said that the patients' age influenced their perception of their patients' frailty, which then influenced their decision to discuss physical activity or not. There was a belief that younger patients are better able to engage in it and may gain more benefit:

'We occasionally get the younger one and that's great, you know. We think we might be able to do more for those people perhaps' (Participant 10, occupational therapist).

One participant suggested that older people may have well-established patterns of behaviour that are difficult to alter:

'I would say a lot of our clients are heading towards 90, so it's very entrenched ingrained behaviour' (Participant 1, physiotherapist).

There was also a perception that patients who had severe mobility limitations had greater priorities in their lives than increasing physical activity. This influenced whether HCPs considered it appropriate to discuss PA or not:

'People who are immobile, really struggling to move, don't want to talk about increasing their movement, its more about comfort and pain management sometimest' (Participant 1, physiotherapist).

Some participants expressed concerns that physical activity may result in adverse effects for some patients. This, however, was in the context of risk assessment with a view to safety during physical activity and related to specific conditions that were viewed to be prohibitive:

'There are a lot of people that maybe have more of an acute, sort of, episode that wouldn't be well enough to exercise' (Participant 11, nurse).

A small number of HCPs expressed a belief, or a desire to believe, that discussing increasing physical activity with patients was always appropriate, and that regardless of their patients' age or physical ability there was always merit in promoting it:

'But I would be struggling to say that there is any past medical history that absolutely contraindicates exercise, I'll perhaps just say that' (Participant 1, physiotherapist).

Patient motivation

HCPs' perceptions of how motivated their patients were to improve health and be active, and thus how likely they would be to engage in physical activity, was influential in their PA promotional activity. Participants believed that patients who lack motivation would not attend exercise classes and this made them reluctant to discuss it with those patients. One participant stated that they made this judgement without necessarily asking the patient:

'I think we've got quite good at identifying the people that we just know there's no point' (Participant 2, physiotherapist).

Another agreed that patient motivation was important and that some will not attend exercise classes. In contrast to the previous example, they reached this conclusion in conversation with their patients rather than making an assumption:

'Some people are not interested in physical activity, they are quite clear on that' (Participant 5, physiotherapist).

Many of the study participants felt that patients who lacked motivation were abdicating responsibility for their own health, suggesting that some of their patients would prefer to be given medication rather than engage in physical activity:

'They think the doctor will have some sort of magic pain killer, even though they've been through pain clinic potentially' (Participant 1, physiotherapist).

This sense that patients lack motivation to exercise was further supported by participants expressing disappointment when encountering patients who, after a period of time, reverted to a sedentary lifestyle after previously engaging with a clinically-led rehabilitation programme that included a PA element:

'We would leave them to get on with it and then we would find them getting re-referred back, maybe sometimes two years down the line, because they just let their home exercise programmes lapse'

(Participant 2, physiotherapist).

Patient Gender

Study participants believed that there were fundamental differences affecting how and why men and women engage in physical activity. It was evident that HCPs' beliefs and attitudes to gender were influential factors in the promotion of PA, and in their perception of physical activity engagement within their patient groups.

While initially some participants felt that gender had little or no influence in PA promotion,

'No, I don't think I would change my approach necessarily based on gender, I think it's just person-specific' (Participant 5, physiotherapist).

an equal number suggested that it was very influential, identifying that men and women may have different expectations of, and motivation to participate in, physical activity.

'I think they [females] are more likely to be sociable, that is a real generalisation, because within the group, there'll be some people who are very shy and won't want to engage in each gender but women I think go for the social, males go for the exercise'

(Participant 3, physiotherapist).

Perceptions of these differences influenced physical activity promotion by HCPs. Most believed that more women were referred to the PARS than men, but stated that an equal number of men and women actually attended the classes. In many cases beliefs were representative of the prevalence of either men or women attending the HCPs' clinical areas.

Many suggested that women were more body conscious and exercised for predominantly social reasons.

'I think probably because there's more of a kind of body awareness in women' (Participant 5, physiotherapist).

'I think the women definitely like to go for a wee social' (Participant 2, physiotherapist).

4.3.8 The physical activity referral scheme

Healthcare professionals identified that several factors that influenced their promotion of physical activity related specifically to the PARS, including their knowledge of how the PARS worked, their perception of patients' journeys and how they received feedback, and their perceptions of factors influencing referral.

Facilitators of referral

Most HCPs had good knowledge of the PARS and could describe in detail its principal aims, identified qualifying criteria for patients, the referral process, and gave a description of what the PARS offered their patients:

'So, within (the PARS) there's different, kind of, pathways that the (PARS) have built up. So, they've done an awful lot of work, especially within cardiac rehab. But then they've done things round about cancer, people who have got, kind of, arthritic type bone discomfort. Also, with the (PARS), it's about people with long term conditions.' (Participant 9, nurse).

HCPs were positive about the PARS. Many believed that it complements their own clinical interventions, is an integrated component of healthcare, and thus a natural progression for patients who attend:

'Em, and that was integral originally, that we would be able to do direct referral to the service, em, so it's been invaluable' (Participant 2, physiotherapist).

Study participants identified PARS-related factors that helped to facilitate their promotion of physical activity. They believed that the referral system was uncomplicated and easy to complete:

'We refer directly, we've got an email address, we've got an email form, or we'd stick it in the post. I think we email at the moment but it's a very straightforward simple form' (Participant 2, physiotherapist).

HCPs found the staff at the PARS to be accessible and helpful in guiding their referral activity and they believed that the tiered delivery of classes offered opportunities for inclusion of a broad range of patients with varying physical abilities. HCPs suggested that the provision of feedback from the PARS relating to the success of their referrals would help to focus efforts on referral and could represent a significant facilitator of it in the future. Most HCPs stated that the only feedback they received came from patients rather than the PARS. While lack of feedback was not identified as a barrier, inclusion would be seen to be an improvement in the process.

Although knowledge of the PARS was considered to be good, HCPs said that there was no training offered by the PARS that participating HCPs referred patients to. One participant indicated that the information received related only to the administrative process of referral:

'I don't think we've had any training. We did have somebody come and talk to us about [PARS] but it was very brief, like 15 minutes'

and it was basically how to refer' (Participant 10, occupational therapist).

However, HCPs believed that the PARS was of real benefit to the patients who attended:

'And I think it's fantastic that they've got that service here. I mean, if it stopped or we didn't have it, I think it would have a significant impact, not only on people's ability to access, kind of, physical activity but also people's social side' (Participant 11, nurse).

Barriers to referral

Healthcare professionals identified a number of barriers to the promotion of physical activity through referral to the PARS. The most significant barriers were perceived patient fitness to exercise, the fee charged for attending the PARS as many patients live in areas affected by social deprivation, transport from remote and rural communities, and the waiting lists for classes. Other barriers identified were lack of time to discuss physical activity during consultations. Participants also noted that some patients found the classes to be intimidating. They also highlighted other clinical or social priorities:

'It's tempting to say no, not in reality, if I had somebody that absolutely was wheelchair bound, frail, struggling to get around, you know, of course we could speak about physical activity, in reality you know their day to day struggle is not that' (Participant 1, physiotherapist).

Some participants expressed a reluctance to refer patients to exercise classes as they had concerns over the safety of engagement in physical activity for specific categories of patients:

'I suppose people that have acute medical conditions, cardiac issues, some of the people we see have respiratory problems,

COPD and things and that might be something that I would be less comfortable referring people with' (Participant 11, nurse).

One participant expressed an opinion that patients with existing medical conditions may not feel safe engaging in physical activity outside of a hospital or clinical setting:

'For a patient it was always, they always seemed to feel a little bit safer coming to exercise in a hospital. Or with a health care professional rather than going into, like, a leisure type facility' (Participant 12, physiotherapist).

Another participant suggested that while they were keen to promote physical activity to patients, some patients would perhaps receive less support from the PARS than they would from the therapies being provided in the HCPs' own clinical area:

'They may be physically able to be in a supported environment but there is maybe not enough support in a [PARS] class. They can be quite a big jump' (Participant 3, physiotherapist).

4.4 Discussion

Two overarching themes were identified in this study. Firstly, internal factors, with participants describing their own knowledge in relation to aspects of physical activity, how its promotion was perceived by participants in relation to their own clinical roles, and how HCPs' personal engagement in physical activity influenced its promotion in practice. Secondly, external factors, where participants discussed patient-related factors that influenced their promotion of physical activity, and influential factors relating specifically to the PARS.

4.4.1 Internal factors

HCPs' personal perceptions of PA

This study examined HCPs' personal perceptions of physical activity and factors that they believed may affect how and to whom they promote it. Importantly, this study investigated HCPs' opinions on whether and how those factors influenced their practice.

Promoting physical activity is part of HCPs' role

HCPs generally considered the promotion of physical activity to be an integral component of their professional roles. This was consistent with the findings of the systematic review (Chapter Two). Some HCPs believed that other clinical disciplines than theirs may more appropriately promote physical activity, in agreement with other studies suggesting that physiotherapists are often considered to be the main source of PA advice in healthcare (Roberts et al., 2019). There is evidence that, even among physiotherapists, the view that they are considered to be the HCPs most suitable to promote PA is prevalent (West et al., 2021).

This is interesting given the relatively small population of physiotherapists when compared to nurses for example. In the UK there are currently more than 600,000 registered nurses in practice (Nursing and Midwifery Council, 2020c) compared to around 74,000 registered physiotherapists (Health and Care Professions Council, 2018). This difference in the population of HCPs is likely to result in a greater number of patients coming into contact with nurses rather than physiotherapists. Consequently, it seems logical to assume that by virtue of the greater number of patient interactions, there are a much greater number of opportunities for nurses to promote physical activity to more patients. Yet opportunities for this may be missed if responsibility for physical activity defaults principally to physiotherapists. Further research would help to establish the potential effects of strategies designed to encourage HCPs in different

disciplines to believe that their contribution to the promotion of physical activity is of equal importance.

HCPs' personal engagement with physical activity

In this study, HCPs who were physically active were more likely to promote physical activity regularly to their patient groups. This has been demonstrated previously and could form an important focus for future educational developments (Buckley et al., 2020; Burton et al., 2010; Hardcastle et al., 2018). Role modelling is an important element of behaviour change theories.

Evidence suggests that HCPs are expected to 'practice what they preach' by their patients in order for their advice to be considered credible (Blake, Malik, Mo & Pisano, 2011). HCPs being seen to take responsibility for their own health, and being good role models for healthy living, has been posited as being key to implementing national health policies, including physical activity (Department of Health, 2010). Most HCPs in the current study described themselves as being physically active. However, self-reported levels of PA were at different levels of intensity. The subjective nature of self-reported physical activity has been well documented and this feature makes self-reported PA problematic as a measurement (Chan, 2009).

It was clear that there was a variable perception of what constitutes being physically active amongst participants. Without a common understanding, it is problematic to unambiguously establish whether the HCPs' own participation in physical activity, and the intensity level of their exercise, influenced their promotion practices. It is possible that their perception that they are physically active, rather than actually being physically active, is influential.

Given the variable perceptions of what constitutes physical activity among HCPs in this study, and the fact that the influence of HCPs own physical activity intensity levels was not well understood, greater understanding is required. The overall physical activity of HCPs and its level of intensity may be more accurately measured in the future by the use of wearable fitness trackers. In

contrast to the limitations of self-reporting methods, there is developing evidence that wearable fitness trackers offer more accurate and valid measurements of physical activity, including distance, step count, energy expenditure and heart rate (Evenson, Goto & Furberg, 2015). Better understanding of HCPs' levels of engagement with physical activity could offer a more accurate insight into the real influence of their PA levels on their promotion of it in practice.

The potential for wearable fitness trackers in measuring PA must, however, be considered against the digital divide between those who can and those who cannot afford the tracking devices. Régnier and Chauvel (2018) report that individuals from more affluent socio-economic groups were more likely to use wearable fitness trackers than those from less affluent groups. Levels of health and technology literacy are also important in the adoption of wearable fitness trackers, and there is a similar socio-economic gap identified (Mackert et al, 2016). This poses questions about whether HCPs are likely to utilise such technology to better understand their levels of physical activity and whether those who do are more likely to be paid higher salaries. The current study does not explore whether the HCPs who participated had sufficient income, technology literacy and inclination to buy and use wearable technology. This is one aspect of potential future research to better understand HCPs' levels of physical activity and how this influences its promotion.

The description and understanding of what constitutes 'physical activity' among the adult population is diverse (Fletcher et al., 2018). The current study highlights that the diversity of understanding also appears to be true of HCPs. There is evidence that populations of HCPs have high levels of obesity and being overweight (Kyle, Neall & Atherton, 2016), and this is known to be closely associated with increasingly less active lifestyle choices (Jebb & Moore, 1999). The results of this study show considerable variance between participants' definitions of their active lifestyles. Some participants in this study considered themselves to be active and described a lifestyle involving primarily short daily walks. However, others who also described themselves as active engaged in

vigorous daily exercise for prolonged periods of time. This inconsistency in opinions of what constitutes an active lifestyle is important as, although there is evidence that some exercise is better than none, more is better (World Health Organisation, 2016).

Previous research has not examined whether the intensity of HCPs' personal physical activity influences their PA promotion. This raises a number of interesting questions, such as whether those HCPs who take part in moderate exercise can more readily relate to the potential for a less able person to be active. One potential problem highlighted by a recent study of high exercisers is that they may stigmatise or condescend to people who are obese, negatively impacting their ability to influence behaviour change (Flint & Reale, 2018). Further research among both HCPs and patients is required to develop better understanding of the influence of HCPs' personal physical activity intensity on outcomes for patients. This may be particularly influential, as most participants felt that their perceptions that they led active lives directly influenced their PA promotion activities with their patients.

4.4.2 External factors

HCPs' perceptions of patient-related factors

It was evident in the present study that HCPs felt that their promotion of physical activity was influenced by several factors related specifically to their patients, that they had little individual ability to control. These included patients' health status, patient motivation and gender.

Patients' health status

HCPs believed that the health status of their patients was influential in their ability and willingness to promote physical activity. This finding is similar to others, who demonstrated that HCPs' concerns and assumptions about their patients' frailty, or safety in exercising, contributed to physical activity not being discussed (Din et al., 2014). There was concern that increasing physical activity

for some patients might present a risk to their safety, and that others were simply too frail or infirm to exercise. No participants mentioned that any formal assessments of frailty or capacity for exercise were carried out. Furthermore, there was little awareness of the current physical activity guidelines, including those for older people (World Health Organisation, 2020c), and no knowledge of current guidelines for people in specific risk categories, such as falls, where there is evidence that appropriate physical activity is of benefit in reducing risk (Scottish Government, 2019). This raises the possibility that absence of knowledge of the current physical activity guidelines might mean that for a category of patients perceived to be frail or infirm, opportunities to promote PA may be missed.

Patient motivation

HCPs reflected on how motivated their patients were to make lifestyle changes. This revealed that, in some cases, they felt that if their patients were lacking in motivation to change, then their efforts to promote physical activity would prove futile. Existing literature suggests that levels of patient motivation to change their behaviour is considered by HCPs to be highly influential in the success of PA promotion activities in effecting lifestyle changes (Carstairs et al., 2020; Graham et al., 2005; Stuij, 2018).

While this study supports these findings, motivation to change is difficult to gauge. Because motivation is a construct that cannot be observed or recorded, some skill is required to make a realistic assessment of how motivated an individual is (Touré-Tillery & Fishbach, 2014). In this study, it is clear that, although patients' level of motivation to change their physical activity behaviour was considered to be important, participants did not formally assess this, with most making a judgement based on their experiences. An implication of this is that they do not possess the knowledge and skills that are required to accurately measure their patients' level of motivation to change. An understanding of behaviour change theory might offer some of the essential skills required to assess motivation to change (Michie et al., 2014). In discussions about the evidence that underpins their PA promotion practices, no

HCPs described theories of behaviour change such as the transtheoretical model (Prochaska & Diclemente, 1986), or social cognitive theory (Bandura, 1986). Although not examined directly in this study, no participants described use of recognised behaviour change techniques when asked about their physical activity promotion. It is possible that they are unfamiliar with the underpinning theories and techniques that may include goal setting, action planning, barrier identification and task setting (Michie et al., 2011).

Gender

HCPs in this study believed that their PA promotion practices were not influenced by their patients' gender, and patients' PA preferences were not perceived by participants to be strongly gender driven. This was contrary to existing evidence that shows exercise preferences are indeed influenced by gender, including who people like to exercise with and the type of activity undertaken (Dunlop & Beauchamp, 2011).

There is evidence that men, regardless of age, engage in higher levels of regular physical activity than women (Matud & Díaz, 2020). Participants did, however, make comments indicating that they held some well-established opinions based on their own views and understanding of gender, including beliefs that women are more interested in social aspects of exercise than men, and that men may be more interested in exercise that incorporates an element of competition. Indeed, these opinions are supported by recent evidence that both men and women feel that the social component of exercise is of greater interest to women and that men were more likely to prefer competition in exercise (Hanson et al., 2021; van Uffelen, Khan & Burton, 2017). This dichotomy between HCPs' perceptions of the effect of gender on their practice, and their descriptions of how gender influences their opinions and beliefs, suggests that the level of awareness of the effects of gender-driven preferences is low among HCPs. It could also point to poor recognition of their own innate gender bias.

Previous research has revealed that while the long term effectiveness of physical activity interventions such as PARS is not well proven (Campbell et al.,

2015; Pavey et al., 2011), who is referred might be influential on PARS effectiveness (Pavey, Taylor & Hillsdon, 2012). This points to a need for HCPs to be aware of factors that may influence participation in physical activity for individuals, including gender, to ensure that patients are referred to appropriate services. Poor understanding of individual preferences based upon gender may be influential in preventing HCPs from making appropriate individually-tailored recommendations to their patients, subsequently preventing effective promotion of physical activity.

As well as patient-specific influencers, there was also a perception that the systems, processes and services of the PARS influenced, and in many cases presented barriers, to the promotion of PA.

4.4.2 The physical activity referral scheme

PARS are interventions designed to increase physical activity and they are internationally widespread (Martín-Borràs et al., 2018). In the UK, PARS are available for referrals from HCPs, predominantly of patients who have chronic or non-communicable diseases (Hanson et al., 2021). Existing evidence suggests that HCPs experience numerous barriers to PARS referral, including availability of exercise classes, poor awareness of PARS in their communities, and a lack of feedback from PARS regarding referral success (Carstairs et al., 2020; Graham et al., 2005; Smith-Turchyn et al., 2016).

Participants in this study were largely positive about the PARS that they referred patients to and valued it as a health intervention that had real health benefits for their patients. They cited the ease of the referral process and the expertise of the exercise professionals as important facilitators of their referral activities. In common with existing literature, however, they did identify some barriers to referral. These included the financial cost to participants and lack of accessibility to communities with poor travel links (Din et al., 2014; Smith-Turchyn et al., 2016). HCPs believed that feedback from the PARS regarding the uptake among referred patients would allow them to gauge the success of

their referral activities. This has been reported by previous studies that identify an absence of feedback as a barrier to referral (Din et al., 2014; Graham et al., 2005). Provision of structured feedback regarding success could be an important facilitator of referrals and might serve to maintain focus on physical activity promotion.

The current study reveals that there is no training provided that is aimed at developing skills in discussing the PARS with patients in the context of physical activity promotion, either from the scheme providers or HCPs' employers. Rather, information is provided that outlines the administrative aspects of the scheme, such as the referral process.

Consequently, it is unknown whether referrals and subsequent levels of physical activity would improve if targeted training was offered to referring HCPs.

4.4.3 HCPs' knowledge and education

There were differences in both knowledge of physical activity guidelines and of evidence supporting its promotion, and differences among HCPs in understanding what constitutes an active lifestyle with adequate physical activity to benefit health. These inconsistencies may reflect differences in access to educational resources between HCPs' clinical disciplines and an informal approach to teaching HCPs about both the benefits of physical activity and the skills required to promote it effectively. In this study, there was a general lack of knowledge of the then current national physical activity guidelines, including those issued by the WHO that underpin the UK government guidelines (World Health Organisation, 2010).

Knowledge of guidelines

The findings of previous studies suggest that, when asked, few HCPs can accurately describe local or national physical activity guidelines (Douglas, Torrance et al., 2006b; Freene et al., 2017). This is consistent with the findings of this study. Some participants were able to describe only a part of the guidelines, or closely – yet inaccurately – outline a version of current or previous guidance. Others referred to outdated local policies, with some simply stating that guidelines did exist but they were unable to outline them. This inconsistent gap in knowledge may reflect the fact that there is no standardised provision of education in the promotion of physical activity for HCPs at undergraduate level, or a consistent approach to providing this post-registration. Previous studies have identified the gap in formal PA promotion training for HCPs as a barrier to promotion of physical activity (Bélanger et al., 2015; De Vivo & Mills, 2019). Little is known of how and why some HCPs develop skills and knowledge that enable PA promotion while others do not, or about sources of information and evidence that HCPs refer to. This study, however, reveals that among HCPs who actively promote physical activity, the skills and ability to do so were largely self-acquired as they gained experience and confidence in their roles.

Few resources exist that HCPs may use to access education relating to the promotion of physical activity. One online education programme for PA promotion that is available in the UK is Moving Medicine (Faculty of Sport and Exercise Medicine UK, 2018). The Moving Medicine website provides resources for improving knowledge of the benefits of physical activity and an Active Conversations education programme that develops HCPs' PA promotion skills. This programme teaches the principles of motivational interviewing (MI) (Miller, 1983), a technique that allows the integration of therapeutic conversations – in this case relating to physical activity – into routine clinical interactions. Access to Moving Medicine or similar resources could help to address the gap in HCPs' knowledge of PA promotion practice and teach them how to become more effective in promoting physical activity, regardless of the time available during

consultations, with the potential for a consequent positive impact on public health (Buckley et al., 2020). Presently, HCPs do not have access to this or similar resources embedded in either pre or post-registration programmes of education. Instead, as highlighted previously in this study, where motivated or required to do so, they develop their own skills and knowledge through self-directed or vocational knowledge acquisition.

This concept of HCPs having responsibility for their own professional development is not new. Indeed, professional regulatory bodies including the Nursing and Midwifery Council (NMC) and the Health and Care Professions Council (HCPC) expect their members to remain abreast of the current evidence to inform their practice. Both the NMC and HCPC have continuing professional development requirements for revalidation and expect their members to continually update their knowledge (Nursing and Midwifery Council, 2019a; The Health and Care Professions Council, 2013). Indeed, both regulatory bodies have reviewed their standards for education to include a greater focus on health promotion (Nursing and Midwifery Council, 2019b; The Health and Care Professions Council, 2013). However, given the influence of physical activity on health and the current global focus on the need to increase PA levels, HCPs, particularly those who are relatively newly qualified, may be considered to be disadvantaged by the absence of formal training and education in the skills required for PA promotion. This may contribute to the variance in knowledge and skills in the HCP population and will translate directly into variance in patient experience of PA promotion in interactions with HCPs.

It is possible that a consistent approach to the development of knowledge and skills in physical activity promotion among the HCP population would result in improvement in its promotion against WHO targets (World Health Organisation, 2010). It may be argued that this approach to education and training could empower HCPs to be confident and competent in the promotion of physical activity at an early stage in their career. Given that PA promotion is considered to be an intrinsic component of clinical care as identified in this and previous

studies (Aldossary et al., 2013; Cantwell et al., 2017; Douglas, Torrance et al., 2006b), enabling HCPs to effectively and consistently promote physical activity must be considered to be as important as all other interventions and therapies at their disposal. Yet, despite this, it seems that the required skills are not routinely taught.

The absence of formal training in PA promotion has been identified in previous studies that focused on HCPs in practice in primary care settings (Din et al., 2014; Puig Ribera et al., 2005; Smith-Turchyn et al., 2016). The present study supports those findings and, importantly, demonstrates that HCPs in secondary care have a similar experience. This suggests that the gap in training is widespread throughout the HCP population. There is a clear need to support HCPs in their promotion of physical activity to enable them to contribute to population-wide increases in PA. Given that HCP education is delivered at university level, PA promotion training at undergraduate level would be appropriate. Such a strategy would enable well-timed teaching of the fundamental skills that are required to promote physical activity effectively, although it must be acknowledged that students would require the opportunities to practise the skills to achieve and maintain proficiency. These skills would augment the teaching that is currently delivered in most undergraduate programmes, that physical activity is important for health. Knowledge of both the theoretical benefits of PA, with the skills to effectively promote it, would consolidate PA education for HCPs. Consequently, this approach would produce HCPs who are well prepared to promote physical activity, and could make a real difference for their patients. This may result in a population of HCPs who are confident in promoting physical activity to their patient groups and who are competent in doing so immediately post-registration. Further research is required to investigate whether delivering education in PA promotion to HCPs in pre-registration degree programmes would improve their skills in promoting PA to their patients.

4.4.4 Strengths and limitations

This study has a number of conceptual and methodological strengths. Firstly, the research questions posed and answered were based on the findings of an exhaustive systematic literature review. In the included studies, the promotion of physical activity has been discussed by authors who examined the experiences of diverse healthcare populations, including both patient groups and clinicians. Basing the research questions on the evidence derived from synthesis of the findings from the existing literature provided a robust basis for research and ensured a framework for presenting the relevant findings.

Secondly, this study uses proven, robust methodology. Semi-structured interviews were conducted at a place of the participants' choosing, or by telephone, with the aim of putting them at ease to allow them to express their views freely. The interviewer undertook interview training and the interview guide was reviewed and updated. Data were analysed by two researchers to ensure a high degree of accuracy and fidelity. The use of well-established data analysis software ensured consistency and allowed the presentation of analysis in a recognised format. The sample was of a meaningful size for qualitative research and it included a multidisciplinary population, offering insight from diverse professional perspectives.

The limitations of this study were a lack of diversity in the sample group that included predominantly female, white British, highly-experienced individuals with similar qualification profiles. Participants were only recruited from secondary care practice areas and it is likely that there is an overstatement of how physically active participants were, driven perhaps by the social desirability of a visibly active lifestyle. The individuals who volunteered to take part were potentially those who were most positive about promoting physical activity, meaning that the views of non-referrers were not explored.

4.5 Conclusion

Despite local and national efforts to promote physical activity in healthcare settings, there are inconsistencies in its promotion among HCPs. These

inconsistencies may be as a result of a gap in the delivery of education relating specifically to the promotion of physical activity. It is clear that current strategies for educating HCPs in the evidence for PA promotion, and the skills required to effectively promote PA, are ineffective. This may contribute to the varying levels of knowledge of physical activity guidelines among HCP populations and consequently lead to opportunities being missed to promote it to patients. The influence of HCPs' knowledge of physical activity and how to promote it appears to be important in both their understanding of what levels of physical activity influence health, and their ability to discuss it with their patients. It is possible that a consistent level of knowledge among HCPs would result in consistent understanding of PA, and that this in turn may facilitate consistent and more effective PA promotion in clinical practice. This study therefore highlights a need for further research examining whether incorporation of formal training in physical activity promotion skills in settings such as higher education would result in HCPs who are more confident and competent in the promotion of PA to their patient groups.

Chapter 5. How does engagement with an online education programme affect student healthcare professionals' self-reported skills in motivating patients to be more active?

5.1 Introduction

As outlined in Chapter One of this thesis, regular physical activity reduces the risk of cardiovascular disease, diabetes and some cancers (Lee et al., 2012). Additionally, it is strongly associated with positive effects on mental health (Josefsson et al., 2014), particularly in managing the symptoms of depression and anxiety (Saxena et al., 2005). Globally, physical inactivity is estimated to cause 6% of coronary heart disease, 7% of type 2 diabetes and 10% of breast and colon cancers (Lee et al., 2012). Despite the known health benefits of physical activity, worldwide, one in four adults do not undertake enough exercise to maintain good health (World Health Organisation, 2017).

Healthcare professionals potentially play an important role in the promotion of physical activity. Not only do HCPs have access to diverse sections of the population, but they are also perceived as having credible professional knowledge and to be able to support individuals in finding appropriate activities (Douglas, Van Teijlingen et al., 2006). Consequently, national health policy guidance recommends HCPs provide advice about physical activity to their patients. For instance, in the UK, NICE recommends that HCPs should offer brief advice about increasing physical activity to inactive individuals who are otherwise well (National Institute for Health and Care Excellence, 2013). Despite these policy recommendations, physical activity has been reported as less likely to be discussed by HCPs than smoking, diet and alcohol, with one study reporting that 69% of HCPs offer smoking cessation counselling compared to 23% promoting physical activity (Graham et al., 2005). This situation has not improved in more than a decade as the findings of a more recent study suggest that 72% of general practitioners do not discuss physical activity with their patients (Chatterjee et al., 2017).

The failure to implement policy recommendations may be influenced by a gap in the programmes of education that are provided to HCPs. Qualitative studies have reported that HCPs believe that they have inadequate knowledge of how to effectively promote physical activity, and inadequate knowledge of the beneficial or harmful effects of this on their patients (Morishita et al., 2014). Previous quantitative studies, however, have reported that HCPs believe that their knowledge and skills are good enough to facilitate the promotion of physical activity to their patients (Aldossary et al., 2013; Douglas, Torrance et al., 2006b). The differences in findings between the qualitative and quantitative evidence may reflect differences in how questions around promotion of physical activity are posed by different research methods. Although not examined by previous research, it is possible to hypothesise that the differences reported may be influenced by an absence of consistent PA promotion education in HCPs' pre-registration programmes. HCPs need to know what physical activity is, how to promote it, and to whom. HCPs must develop the relevant skills to do so effectively. Education in physical activity should be included in pre-registration HCPs' curricula as outlined by the Nursing and Midwifery Council (Nursing and Midwifery Council, 2020d) and the Health and Care Professions Council (Health and Care Professions Council, 2020). Despite this, there is evidence that the promotion of physical activity is not routinely taught in pre or post-registration training for HCPs (Din et al., 2014; Puig Ribera et al., 2005). The systematic review for this PhD suggested that the discrepancy between HCPs' perceptions of their own knowledge and skills relating to PA promotion, and their actual knowledge in practice, may be as a result of absent or inconsistent approaches to training and education. The qualitative study presented earlier in Chapter Four also supports this and reports that little formal training exists for HCPs, with most participants relying on their own efforts and, in some cases, outdated knowledge of local policies and guidelines.

Guidance, such as the NICE physical activity guidelines for primary care HCPs, exist to support efforts in promoting PA (National Institute for Health and Care Excellence, 2013). However, there is little professional or vocational training available in the UK to enable achievement of the aims of the guidelines

(Buckley et al., 2020). One education resource available online to HCPs in England and Wales is Moving Medicine - Active Conversations (Faculty of Sport and Exercise Medicine UK, 2018). The programme delivers an education package that supports HCPs in promoting physical activity through motivational interviewing techniques.

Motivational interviewing (MI) is an evidence-based, client-centred method of intervention that focuses on developing individuals' innate motivation and behaviour change by exploring and resolving ambivalence towards change (Fontaine et al., 2016). This is achieved through conversations that support the individual's beliefs and values and which empathise with resistance to change in behaviour while encouraging change (Pietrabissa, Sorgente & Castelnuovo, 2015). The efficacy of MI in improving health behaviours has been widely demonstrated (Rubak et al., 2005; Söderlund et al., 2011; Stonerock & Blumenthal, 2016) and this proven success has informed the development of the Moving Medicine - Active Conversations online training programme (Faculty of Sport and Exercise Medicine UK, 2018).

The Moving Medicine - Active Conversations (Faculty of Sport and Exercise Medicine UK, 2018) online education programme was developed to improve HCPs' ability to promote physical activity to their patients in conversations framed by MI. The course is comprised of six modules covering the key principles of MI with a test at the end of each module (Faculty of Sport and Exercise Medicine UK, 2018). The programme provides links to the Moving Medicine website (Faculty of Sport and Exercise Medicine UK, 2018), that in turn has links to information relating to physical activity guidelines including WHO, Public Health England and UK Government recommendations. It is unclear how effective the programme is in developing PA promotion motivational interviewing skills or in directing participants to these resources. The programme has been tested and independently evaluated in a small scale study among hospital-based medical doctors in a pilot study based at a hospital location in England (Copeland et al., 2019), but it is not currently being tested in an undergraduate or post-graduate HCP population. The programme was found

to be well received, with participants finding value in the course content and learning outcomes. Given that some HCPs feel unprepared for promotion of physical activity, and that pre-registration education is provided in universities, there is potential merit in testing the programme in this environment.

This pilot study will therefore examine and explore the effectiveness of the Moving Medicine - Active Conversations online education programme delivered to both pre and post-registration student HCPs in improving their ability to promote physical activity in conversation with their patients through motivational interviewing.

5.1.1 Aim

The aim of this study is to assess whether student nurses and physiotherapists completed the Moving Medicine - Active Conversations online education programme and whether completion results in improved self-reported motivational interviewing skills and knowledge of the UK physical activity guidelines.

Research questions:

1. To what extent do HCP students engage with the Active Conversations online education programme?
2. What factors influence HCP students' engagement with the Active Conversations online education programme, and how?
3. Does completion of the Active Conversations online education programme result in increased self-reported proficiency in motivational interviewing skills?
4. Are student demographics (age, gender, course and year of training) associated with (a) completion of the Active Conversations online education programme and (b) increased self-reported proficiency in motivational interviewing skills?

5. Does completion of the Active Conversations online education programme result in increased knowledge of PA promotion guidelines?

5.2 Methods

5.2.1 Study design

This is a mixed methods study employing an explanatory sequential design (Creswell & Plano Clark, 2011), incorporating dominant quantitative methods, with qualitative methods being employed to develop a deeper understanding of the results of the initial quantitative phase. First, a quantitative approach examined engagement and whether completing the Moving Medicine - Active Conversations online education programme resulted in a change in perceived motivational interviewing skills and knowledge of UK physical activity guidelines. The initial results allowed identification of potential participants for a second, qualitative component consisting of semi-structured interviews and responses to open survey questions exploring factors that contribute to course dropout. Edinburgh Napier University's School of Health and Social Care research and integrity committee gave ethical approval for this study (REF: SHSC19025).

A mixed methods approach was considered appropriate as it allowed collection of both quantitative and qualitative data and integration of the two components. Combining statistical data with accounts of lived experiences allowed a more thorough exploration of the research questions than either quantitative or qualitative data alone (Creswell, 2015).

5.2.2 Context

The Moving Medicine - Active Conversations online education programme comprises seven modules that include an introduction module (**Table 5-1**). The modules cover the key principles of MI within the context of physical activity

promotion, with a quiz at the end of each module (Faculty of Sport and Exercise Medicine UK, 2018).

Table 5-1: Moving Medicine - Active Conversations modules

Module	Description
Introduction	An overview of the course including videos from the programme developers and opportunities to use the features of the online platform.
1: Change talk	Develop knowledge and skills in 'change talk' and empathic listening, asking open questions, summarising conversations, understanding how to reduce resistance to change, and developing a conversational approach.
2: Asking and listening	Develop a deeper understanding of open questions, affirmations, reflections and summarising. Encourage a person-centred approach to sharing information and advice, improve empathic listening, and develop strategies that allow people to verbalise and hear their own reasons for becoming more active.
3: Building confidence	Help participants to understand the nature of affirmations and become better at making them, understand the main determinants of self-efficacy, get better at strengthening self-efficacy/building patient confidence, know the six common mistakes when talking with people about physical activity.
4: Developing discrepancy	Teach participants to know what discrepancy is and why it is important, become better at developing discrepancy in other people's minds by helping them explore two possible futures, and become better at having one-minute conversations about physical activity. Participants are encouraged to share information in a neutral way with Ask-Share-Ask strategy,

	and to build readiness to become more active using importance and confidence-scaling questions.
5: Transition to planning, and planning	Develop understanding of summarising and the transition from exploring possible reasons for physical activity and ideas about how to become more active, helping a person come to a decision. Improve skills in drawing a person-centred and personalised plan for becoming and staying more active. Understand that as and when people do take steps to become more active, that returning (relapsing) to a less active lifestyle is a very common outcome. Get better at using 'relapse prevention' strategies and tools to increase the chances that once people have become more active they stay that way into the future. Practise and become comfortable with the five-minute Moving Medicine conversation.
6: Pulling it all together	Integrating the different skills that the programme introduced. Combining new processes (Engage, Focus, Evoke and Plan) and Strategies (Share information, explore reasons, build confidence, transition to planning, person-centred plan development, signposting, etc.) into a single conversation. Make good use of the Moving Medicine resources and website and get better at this conversational style into the future.

The education programme is provided by Moving Medicine (Faculty of Sport and Exercise Medicine UK, 2018) and hosted on the Moodle Virtual Learning Environment (Moodle, 2020) online platform that is maintained by the programme developers. Participants are expected to complete the programme over a 14-week period. The programme provides links to information relating to PA guidelines including the UK Chief Medical Officers' physical activity guidelines (Department of Health and Social Care, 2019) and the UK Government's PA guidelines (UK Government, 2019).

5.2.3 Sample

The sample for this pilot study was recruited from a potential pool of pre-registration HCP students. Participation was extra-curricular to their formal studies and voluntary. The study assessed two elements of MI competence (technical and relational competence) and a target sample size of (n~20) was established.

A convenience sample of participants who dropped out of the programme was recruited for the qualitative element of the study – sample size was determined by the number of participants who dropped out of the programme during the initial quantitative phase.

Inclusion criteria – Quantitative

Students at Edinburgh Napier University who were:

- Enrolled on pre-registration MSc courses in adult nursing and physiotherapy. (This cohort of students was selected as they were all post-graduate students. Many of the physiotherapy students had an undergraduate sports science-related degree and these often contain teaching in behaviour change theories/motivational interviewing).
- Either undertaking a clinical placement or had the opportunity to practise new skills and reflect on their practice within their peer groups in clinical practice.

Exclusion criteria – Quantitative

Within the two MSc courses, there were no exclusion criteria.

Inclusion criteria – Qualitative

Participants who had:

- Completed the pre-engagement survey and registered for the online education programme, but who had not completed the programme.

Exclusion criteria – Qualitative

Participants who had:

- Registered to take part in the study but did not register for the online education programme.
- Fully completed the programme.

5.2.4 Recruitment

Quantitative

Eligible MSc student nurses and physiotherapists attended a study presentation that was organised by their MSc programme leaders and delivered by the researcher during a course lecture. Following this, potential participants were sent an email from their programme leader on behalf of the researcher, inviting them to participate in the study. The email included a participant information form (Appendix 5) and a link to an online consent form (Appendix 4) in NOVI Survey (3rd Millennium, 2021), a provider of secure online survey software. A follow-up email was sent one week later to potential participants who did not respond to the initial email. Participants returned signed consent via email to the researcher in order to register for the study. The researcher had no access to the personal details of any students until they had given signed consent to take part. Once signed consent was given, participants were able to access the Moving Medicine - Active Conversations programme online.

Qualitative

Participants who had completed the pre-engagement survey and registered for the online education programme but had not fully completed the programme were identified from course data that were captured by the course providers' Moodle platform. These participants (n=18) were invited by email to take part in

audio-recorded semi-structured interviews. All participants were sent a participant information sheet (Appendix 5) and consent form (Appendix 5). Participants were asked to electronically sign and return the consent forms to the researcher. Interviews were undertaken by telephone at times that were convenient to participants. Telephone interviews were used rather than face-to-face interviews in order to prevent infection risk, in accordance with the current guidance relating to the COVID-19 pandemic.

5.2.5 *The effect of the COVID-19 pandemic*

The COVID-19 pandemic resulted from widespread global infection by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (World Health Organisation, 2020a). The first diagnosed case of COVID-19 in the UK was reported on 30 January 2020 (Lillie et al., 2020). The impact of the pandemic was significant across all aspects of society and healthcare was severely impacted by an increased number of acutely-ill patients, compounded by high numbers of staff sickness among health workers (Willan, King, Jeffery & Bienz, 2020).

This had a significant impact on student nurses and physiotherapists, particularly those in clinical practice placements. In accordance with regulations introduced by regulatory bodies including the NMC (Nursing and Midwifery Council, 2020a), many students were unable to complete practice placements due to their supernumerary status and mentor supervision being suspended. Some students entered paid placements arranged by the Scottish Government, that meant that they were no longer treated as students in practice (Scottish Government, 2020).

Completion of the online Moving Medicine - Active Conversations education programme relied upon participants' ability to practise their new MI skills in clinical practice or within their peer groups. Given that several participants were no longer able to meet with their peers, or complete student practice placements, it is reasonable to posit the view that the COVID-19 pandemic and

its resultant restrictions may have negatively affected completion of the online education programme by some participants.

5.3 Data collection

5.3.1 Quantitative questionnaire data

Participants were asked to complete an online questionnaire pre-programme via NOVI Survey (Appendix 6). The questionnaire included items relating to demographic data (age, gender, course, year of course and other qualifications). It also contained the Motivational Interviewing Treatment Integrity Code (MITI 4) (Moyers et al., 2014) to allow for assessment of participants' self-perception of their motivational interview skills in two key MI components: 1) technical components including cultivating change talk and softening sustain talk; 2) relational components including partnership and empathy. MITI 4 is a validated behavioural coding process that allows assessment of how well clinicians are using MI by assessing coded components within two key domains (Moyers et al., 2016) (**Table 5-2**).

Table 5-2: Description of MITI 4 codes

MITI Code	Brief Description
<i>Globals</i>	
Cultivating change talk (CC)	Encourages the client's own language in favour of the change goal and confidence for making that change.
Softening Sustain Talk (SS)	Avoids a focus on the reasons against changing or maintaining the status quo.
Partnership (P)	Conveys an understanding that expertise and wisdom about change reside mostly with the client.
Empathy (E)	Understands or makes an effort to grasp the client's perspective and experience.
<i>Behaviour Counts</i>	

Giving Information (GI)	Gives information, educates, provides feedback or expresses a professional opinion without persuading, advising or warning.
Questions (Q)	Questions (open or closed).
Simple Reflection (SR)	Reflects a client's statement with little or no added meaning or emphasis.
Complex reflection (CR)	Reflects a client's statement with added meaning or emphasis.
Affirm (AF)	States something positive about the client's strengths, efforts, intentions or worth.
Emphasise Autonomy (EA)	Highlights a client's sense of control, freedom of choice, personal autonomy, ability and obligation about change.
Confront (C)	Directly and unambiguously disagreeing, arguing, correcting, shaming, blaming, criticising, labelling, warning, moralising, ridiculing or questioning a client's honesty.
Seek Collaboration (Seek)	Attempts to share power or acknowledge the expertise of a client.
Persuade with permission (PwP)	Emphasis on collaboration or autonomy, support while using direct influence.
Persuasion (Per)	Overt attempts to change a client's opinions, attitudes or behaviours using a tool such as logic, compelling arguments, self-disclosure, facts, biased information, advice, suggestions, tips, opinions or solutions to problems.

Summary Measures

Total MI Non Adherent (MINA)	MI-Non-adherent Behaviours = (Total Per) + (Total Co)
Total MI Adherent (MIA)	MI-Adherent Behaviours = (Total EA) + (Total AF)

Reflection to Question Ratio (R:Q)	Reflections to Question Ratio = (Total Reflections)/(Total Questions)
Relational	Relational = [(Partnership)+(Empathy)]/2
Technical	Technical = [(Cultivating)+(Softening)]/2
%CR	Per cent Complex Reflections = CR/(SR + CR)

Note. Reprinted from 'The Motivational Interviewing Treatment Integrity Code (MITI 4): Rationale, Preliminary Reliability and Validity'. Moyers et al., (2016). *Journal of Substance Abuse Treatment*.

Reliability of MITI 4 across four raters, with the exception of two components, was in the good to excellent range. The MITI 4.0 represents a reliable method for assessing the integrity of MI including both the technical and relational components of the method (Moyers et al., 2016).

The MITI 4 tool is considered to be the benchmark for assessing MI treatment integrity (Moyers et al., 2016). It is regarded as easier to use than its parent instrument, the Motivational Interviewing Skill Code (MISC) (Schoo, Lawn, Rudnik & Litt, 2015), since it is not necessary to rate the patients' behaviour during therapeutic interactions. As the focus of this study is upon the behaviour of the student HCPs rather than the client, the MITI 4 was selected. Although MITI 4 is designed for observational assessment, previous research has shown that MITI 4 may be successfully adapted and used in the collection of self-reported MI data (Schoo et al., 2015). Collecting self-reported data was preferred, as observed practice would have been too time-consuming and would require greater resources than were available.

Finally, the questionnaire tested participants' knowledge of national physical activity guidelines (Department of Health and Social Care, 2019). Although no teaching relating directly to the guidelines was embedded in the course, current online resources were signposted to participants within the relevant modules, with the expectation that participants would access those links.

Using previously established methodology (Rowley, 2014), two researchers (BF and CH) compiled a series of correct and incorrect questions based on the

physical activity guidelines developed by the UK Chief Medical Officers and published by the UK Government (UK Government, 2019). Three questions, each with multiple correct and incorrect answers were presented to participants, who were then asked to identify all answers that they thought were correct. The statements were designed to create a blend of statements that were clearly either correct or incorrect, and others with more subtle differences between the correct and incorrect options. This approach was adopted to help limit the chances of participants consistently being able to guess the correct answers.

Post programme, participants were asked to complete a second questionnaire (Appendix 7) that included the MITI4, physical activity knowledge questions, and questions about their experience of the course. Seven-point Likert scale items (totally agree, to totally disagree) were used to assess participants' experience of the programme in the following domains – ease of access, relevance to practice, achievement of learning outcomes, enjoyed discussion boards, learned new skills, and would recommend the programme to others. Likert scales were used because they have proven to be useful in assessing attitudes (Croasmun, 2011). In addition, participants were invited to make freely written open comments describing their experience of the Moving Medicine - Active Conversations online education programme. These questions were included to allow a fuller understanding of participants' opinions of the programme than revealed by the Likert scale statements. All participants were asked to complete the second questionnaire, regardless of whether they completed the Active Conversations programme.

5.3.2 Quantitative attendance data

A data sharing agreement between the University and the programme providers allowed for examination of course completion data. Data relating to participants' learning activities while engaging with the online programme were captured via Moodle (Moodle, 2020), the digital platform that was used to host the learning resources. Moodle is an open source learning platform that is widely used in the delivery of web-based education, facilitating the delivery of programmes and

analysis of user engagement statistics (Moodle, 2020). Moodle data available for every participant for each online module included the number of days (occasions) students engaged with the programme, the number of forum posts made, number of file views, number of potential file views, and end of module quiz scores. File views represented occasions where a participant was invited to undertake an activity by clicking on an embedded link. Activities included watching videos or tutorials, accessing an external resource using a signposted URL, and structured reflection. Although the number of days that participants were actively logged on to the programme was captured, the period of time engaged on each day was not. Consequently, each day engaged represents a day that a participant logged on for an unspecified period of time.

5.3.3 Qualitative data

Qualitative data were collected via audio-recorded semi-structured telephone interviews and the freely written responses to open questions in the post-engagement survey. To ensure that an effective and consistent approach to data collection was employed, an interview guide (Kallio et al., 2016) (Appendix 5) was prepared. The interview guide explored factors that participants believed had contributed to dropout from the Moving Medicine - Active Conversations online programme as their data did not form part of the quantitative post-engagement survey due to non-completion of the online education programme or final survey. The guide allowed participants free expression of their opinions with prompts to explore their positive and negative experiences of the programme, their perspectives on the relevance of the course to their clinical practice, and the perceived influence of the COVID-19 pandemic on their progress on the programme. The interview guide was reviewed after the first interview and required no amendments. Interviews were conducted by one researcher (BF) with mentoring throughout by CH.

All interviews were audio-recorded on an encrypted device and transcribed verbatim by BF. Field notes were made immediately post-interview and focused on the quality of interaction, reflection on the interview, and potential bias due to

BF being a practicing HCP who participates in regular intensive physical activity.

Participants were assigned a unique identity number to ensure anonymity and references to locations and individuals were removed after transcription. BF kept the list of unique identity numbers and participants' personal details securely on the password-protected Edinburgh Napier University network. Only the researcher and supervisory team had access to the identity of the participants. Interview transcripts were stored on the secure research drive at Edinburgh Napier University.

5.3.4 Data analysis

Quantitative and qualitative data were summarised and interpreted in accordance with the descriptions offered in the following paragraphs. Subsequent integration of related results allowed comparisons between selected statistical results from the quantitative phase and potential explanations for those results that were revealed in the qualitative phase (Creswell & Plano Clark, 2011).

5.3.5 Quantitative

The quantitative data were analysed using SPSS 26 (IBM, 2020). Descriptive statistics were calculated for gender, age, qualifications, clinical discipline, year of study, completion of study questionnaire and completion of the online education programme. A Fisher's exact test (Walker, 2010) for association was conducted to establish whether gender, age, qualifications, clinical discipline and year of study were statistically significant in influencing completion or drop-out of the online education programme. The Fisher's exact test was used as the small sample size made chi-square testing invalid (Delucchi, 1983). Median and IQR MITI 4 domain scores were calculated for each group pre and post-engagement with the online programme. Due to the ordinal nature of the MITI 4 scoring, Wilcoxon signed-rank tests explored differences between pre-engagement test scores and post-engagement test scores.

An exact McNemar's test (Pembury Smith & Ruxton, 2020) was used to determine if there was a statistically significant difference between participants identifying correct and incorrect statements relating to current national physical activity guidelines pre and post-engagement with the online education programme. Answers were taken from questionnaires that were completed post-engagement with the online programme and compared to the answers to the same questionnaire completed pre-engagement. Descriptive statistics were calculated for Moodle access data (engagement in modules, engagement in moderated forums, file views and completion of end of module quizzes).

5.3.6 Qualitative

Qualitative data were subject to thematic analysis (Braun & Clarke, 2012). This approach allowed the development of themes from the data and the identification of commonality of experience or patterns among the participants. By coding and charting overarching themes, themes that were personal to the participants and themes related to the online programme and digital platform that affected participants' engagement in the Moving Medicine - Active Conversations online programme were established.

5.4 Results

A total of 43 students completed the online consent form and 39 completed the pre-engagement questionnaire. Of these, 28 (71.8%) registered with the online programme and started the first module and 14 (35.9%) of those who started the study completed the post-engagement questionnaire (**Figure 5-1**).

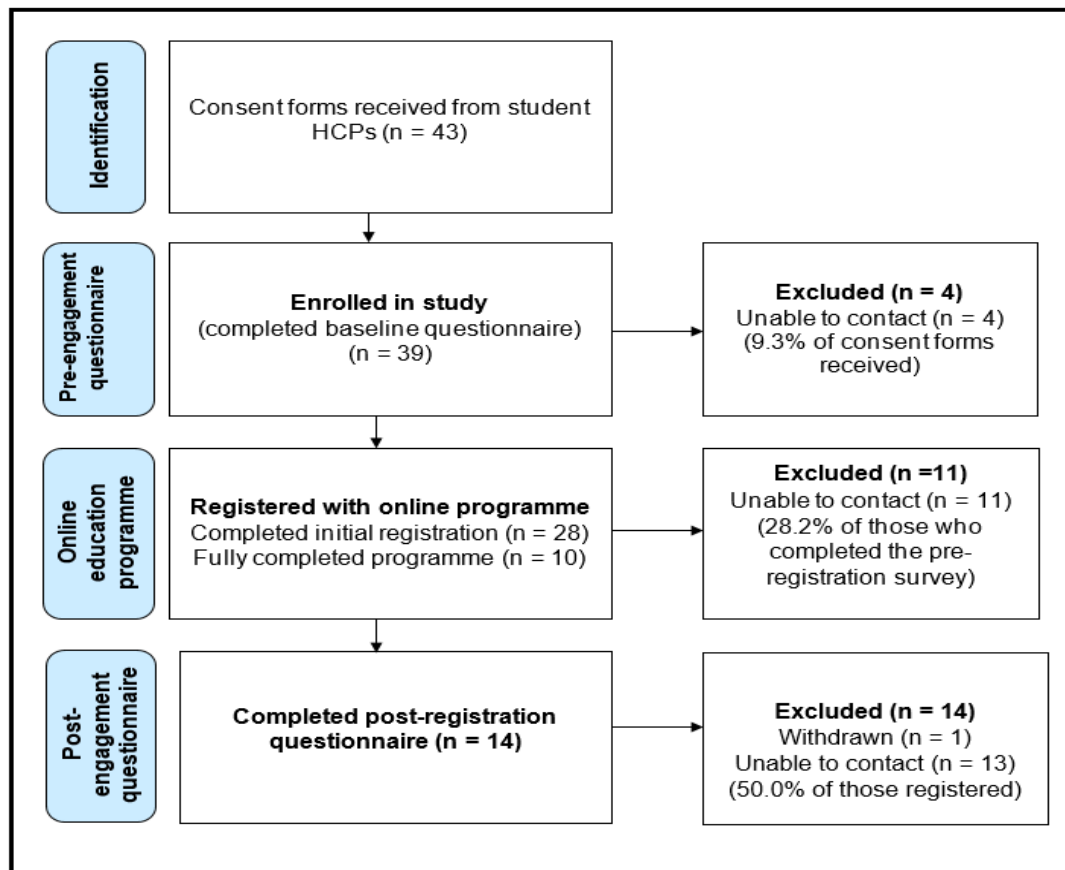


Figure 5-1: Participant recruitment and registration

5.4.1 Participant characteristics

Participants were mostly female, aged <30 years, and all were educated to Bachelor’s degree level or higher. Of the ten participants who successfully completed the online education programme, one was a student nurse and the remaining nine were student physiotherapists (**Table 5-3**).

Table 5-3: Demographic characteristics of participants

All study participants	Did not start programme	Dropped out of programme	Completed programme
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Characteristic	(n=39)	%	(n11)	%	(n=18)	%	(n=10)	%
Sex								
Female	28	71.8	9	81.8	13	72.2	6	60.0
Male/other*	11	28.2	2	18.2	5	27.8	4	40.0
Age Group								
<25 years	17	43.6	3	27.3	9	50.0	5	50.0
≥25 years	22	56.4	8	72.7	9	50.0	5	50.0
Qualifications								
Bachelor's degree	33	84.6	11	100.0	13	72.2	9	90.0
Master's degree	6	15.4			5	27.8	1	10.0
Clinical role								
Nurse	21	53.8	7	63.6	13	72.2	1	10.0
Physiotherapist	18	46.2	4	36.4	5	27.8	9	90.0
Year of Study								
1	31	79.5	9	81.8	16	88.9	6	60.0
2&3	8	20.5	2	18.2	2	11.1	4	40.0

*Other – includes transgender, agender, intersex, non-binary, and not disclosed

5.4.2 Course completion and dropout

Of those who started (n=28), 35.7% (n=10) completed the Active Conversations online education programme. Sex, age group, gender, year of study and level of qualifications were not significant predictors of programme completion. Physiotherapy students were significantly more likely to complete the online education programme than nursing students $p = 0.006$.

5.4.3 Participant engagement in the online programme

During the introduction module, 18 of the 28 participants who registered for the programme logged on and engaged with the learning material. A total of 34 days engaged was reported – this represents an average of 1.89 active days per participant who logged on. The first module after introduction saw the greatest level of days engaged (n=49). In the final module, 11 participants logged on and engaged with the programme. These participants were each

active for an average of 2.78 days, representing an average of 0.96 days per registered participant (**Table 5-4**).

Table 5-4: Participant engagement

Module	No. of participants who engaged	Total no. of engagements	Mean engagement per participant
Introduction	18	34	1.89
1: Change talk	16	49	3.06
2: Asking and listening	18	23	1.28
3: Building confidence	15	18	1.20
4: Developing discrepancy	12	15	1.25
5: Transition to planning, and planning	12	16	1.33
6: Pulling it all together	11	14	2.78

During the introduction module, 17 participants actively took part in moderated discussion forums, making 18 forum posts, an average of 0.64 posts per registered participant and one per active participant. The most forum posts were made during module two, with 12 participants submitting 79 posts, an average of 2.82 posts per registered participant and 6.58 per active participant. During the final module, nine participants made 48 forum posts, an average of 1.71 posts per registered participant and 5.33 posts per active participant

(**Table 5-5**).

Table 5-5: Moderated forum participation

Module	No. of participants who engaged	Total no. of forum posts	Mean posts per participant
Introduction	17	18	1.00
1: Change talk	13	61	4.07
2: Asking and listening	12	79	6.58
3: Building confidence	10	42	4.20
4: Developing discrepancy	8	38	4.75
5: Transition to planning, and planning	8	42	5.25
6: Pulling it all together	9	48	5.33

The number of file views per participant and the number of potential file views available to all participants was reported. In the introduction, 18 participants viewed 99 of a potential 108 files. The greatest number of file views occurred in module 1 when 14 participants viewed 117 of a potential 308 files. During the final module, nine participants viewed a total of 45 of a potential 224 files (

Table 5-6).

Voluntary self-administered end of module quizzes were completed by 11 participants after module 1, eight after module 2, four after module 3 and two after module 4. The quizzes for modules 5 to 7 were not completed by any participants.

Table 5-6: Participant file views

Module	No. of participants who view files	Total no. of files viewed	Potential number of files to view	Average views per participant
Introduction	18	99	108	5.5
1: Change talk	14	117	308	8.3
2: Asking and listening	12	172	320	14.3
3: Building confidence	10	102	298	10.2
4: Developing discrepancy	8	91	301	11.4
5: Transition to planning, and planning	7	102	276	14.5
6: Pulling it all together	9	145	224	16.1

5.4.4 MITI 4 scores modulation post-engagement

Results are reported for course completers only (n=10). Median pre-tech global domain score was 3.0 (2.5-3.5) and post-tech global domain score was 3.5 (2.8-4.5). Median pre-relational global domain score was 4.0 (3.5-4.5) and post-relational global domain score was 4.0 (3.5-5.0). There were no significant differences in pre and post-test technical global scores ($p=0.647$) and pre and post-test relational global scores ($p=0.145$).

5.4.5 Knowledge of physical activity guidelines

From a selection of correct and incorrect statements relating to current UK physical activity guidelines (Department of Health and Social Care, 2019), participants selected more correct answers and fewer incorrect answers post-engagement with the online education programme than they did pre-engagement (**Table 5-7**). No participants gave correct answers to all questions either pre or post-engagement with the Moving Medicine - Active Conversations programme. Results are reported for course completers only (n=10).

Table 5-7: Knowledge of physical activity guidelines

Correct statements	Selected pre-engagement (n)	Selected post-engagement (n)	McNemar's results (p-value)
Adults aged 19-64 years should do at least 150 minutes (2 1/2 hours) of moderate intensity activity or do at least 75 minutes of vigorous intensity activity throughout the week, or an equivalent combination of moderate and vigorous intensity activity in bouts of at least 10 minutes duration	8	10	0.500
Adults aged 19-64 years should minimise the amount of time spent being sedentary (sitting) for extended periods	9	10	0.625
Adults aged 19-64 years should undertake muscle strengthening activities involving major muscle groups on at least two days per week	8	10	0.500
Older adult guidelines are the same as for those aged 19-64 years	10	9	1.000
Older adults at risk of falls should incorporate balance and co-ordination exercises on at least two days of the week	8	10	1.000
Incorrect statements			

Adults aged 19-64 years should do a minimum of 30 minutes of moderate intensity activity on every day of the week	5	2	0.250
Adults aged 19-64 years should do at least 60 minutes of vigorous activity in bouts of at least 15 minutes duration throughout the week	3	0	0.500
Adults aged 19-64 years should do at least 20 minutes of moderate or vigorous physical activity on three days per week	2	1	1.000
Adults aged 19-64 years should undertake muscle strengthening exercises whenever they have time to do so	3	1	1.000
Adults aged 19-64 years should undertake muscle strengthening activities involving major muscle groups on most days	0	0	Not calculated
There is no specific guidance relating to muscle strengthening activities	5	4	0.500
In older age it is less important to be physically active	0	0	Not calculated
Older adults at risk of falls should incorporate balance and co-ordination exercises on at least four days of the week	0	0	Not calculated

An exact McNemar's (Pembury Smith & Ruxton, 2020) test determined that the difference between the selected answers pre and post-engagement with the online education programme was not statistically significant for any of the provided correct and incorrect statements.

5.4.6 Experience of the programme

Participants who had completed the pre-engagement survey and who had registered for the online education programme were largely positive about their experience. This was particularly the case within the domains of relevance to practice, learning new skills and recommending to others. Indeed, only three responses across the seven domains fell within the disagree slightly to totally disagree section of the scale (**Table 5-8**).

Table 5-8: Experience of the online programme

	Totally disagree n (%)	Disagree n (%)	Disagree slightly n (%)	Neither agree or disagree n (%)	Agree slightly n (%)	Agree n (%)	Totally agree n (%)	Median	IQR
Easy to access	1 (7.7)	1 (7.7)	0	0	0	7 (53.8)	4 (30.8)	6	1
Relevant to practice	0	0	1(7.7)	0	1 (7.7)	2 (15.4)	9 (69.2)	7	1
Achieved learning outcomes	0	0	0	2 (16.7)	0	4 (33.3)	6 (50)	6.5	1
Enjoyed discussion board	1 (7.7)	0	0	2 (15.4)	5 (38.5)	3 (23.1)	2 (15.4)	5	2
Learned new skills	0	0	0	1 (7.7)	1 (7.7)	4 (30.8)	7 (53.8)	7	1
Would recommend	0	0	0	2 (15.4)	2 (15.4)	2 (15.4)	7 (53.8)	6.5	2

5.4.7 Qualitative component

Three participants took part in semi-structured interviews, one male and two females. One participant was a nurse and two were physiotherapists. All were educated to a minimum of Bachelor's degree level and one had an MSc. Two participants were aged <25 years and one was aged >30 years.

The qualitative data identified three key themes that affected the participants' engagement with the online education programme – personal factors, the online platform and the COVID-19 pandemic. The written responses (n=5) to the open questions offered insight into how the participants valued the content of the course and whether they felt that completion was worthwhile.

5.4.8 Personal factors

Participants described several areas of their personal lives that affected their formal university studies and subsequently inhibited their progress through the online Moving Medicine - Active Conversations programme. Problems with coping with the demands of a post-graduate programme of education were influential in limiting their time to participate fully. Consequently, their university education programme was prioritised over the extra-curricular online education programme that was tested in this study:

'I just had too much to do, I was doing my Master's and that was the priority' (Participant 1, nurse).

'It wasn't really part of my course so it just slipped down the list, then it was too late to catch up' (Participant 2, physiotherapist).

'There was more content and tasks than anticipated which took up a lot of time' (Participant, 1 nurse).

Additionally, participants spoke about how their mental health influenced their participation in the online education programme. A combination of concerns over family matters against the backdrop of the developing COVID-19 pandemic

created a level of anxiety for some that prevented them from concentrating on the online Moving Medicine - Active Conversations programme:

'My anxiety was over childcare and taking too much on, it reached the stage where I just didn't think about it (the course)' (Participant 1, nurse).

'I was still grieving for my <relation> and just couldn't be bothered with it (university), so I took some time out' (Participant 1, nurse).

5.4.9 The online platform

Despite being familiar with the Moodle platform from their MSc studies, participants described difficulties in accessing and registering with the online Moving Medicine - Active Conversations education programme. These presented obstacles to engagement and progress. Some found that they were unable to register for the online programme initially and, where they could not have this resolved swiftly by the programme administrators, they felt that they had missed too much content to continue. Others found it difficult to navigate through the online programme menus, with the result that they felt unable to keep track of their progress, leading to disengagement.

'I couldn't get registered on the programme at first, it took a few emails to sort it but then I think I'd missed the start' (Participant 3, physiotherapist).

'It wasn't easy to use, maybe it was my computer but it just never seemed to work' (Participant 3, physiotherapist).

'I couldn't really work out where I was if I didn't access it for a while, then I couldn't go back and catch up, so eventually I was too far behind' (Participant 2, physiotherapist).

5.4.10 COVID-19 pandemic

Participants spoke generally about the effects of the COVID-19 pandemic on their studies and how it influenced their ability to engage with the online Moving Medicine - Active Conversations education programme. Most felt that the pandemic had a negative effect on their progress through the programme. For some, this meant that they decided to work in clinical practice in response to an increased demand for healthcare staff, and this limited the time that they had available to complete the online programme. Others spoke about general concerns over the impact of the pandemic on their lives, meaning that they could not concentrate on education, including the online programme in this study:

'I did not finish the programme due to the pandemic and lack of time in putting skills to practice' (Participant 1, nurse).

'The COVID lockdown was a nightmare for everybody, I had already switched off from uni and went back to do more shifts' (Participant,1, nurse).

'Coronavirus restrictions made it hard to practise some of the activities. It was even harder to concentrate on studying with everything that was going on' (Participant 3, physiotherapist).

5.5 Discussion

A total of 72% of those who completed the baseline questionnaire went on to enrol on the Moving Medicine - Active Conversations online programme. Of this group, 35.7% proceeded to fully complete the online programme. Overall, dropout levels were high but the only statistically significant demographic variable that influenced successful completion of the online education programme was the participants' clinical discipline (being a physiotherapist).

Participants who successfully completed the online programme increased their self-reported competence in promoting physical activity through MI techniques, although this increase was not statistically significant. Similarly, there was an overall modest improvement in participants' knowledge of national physical activity guidelines post-engagement with the online education programme when compared with their knowledge pre-engagement. Participants who completed the online programme described their experiences in mostly positive terms and valued the content of the course and the learning that it offered. Those who enrolled but did not complete the online programme cited personal circumstances, study commitments, issues with the function of the online platform and the COVID-19 pandemic as being influential in their failure to fully engage with and complete the programme. Only one nurse responded to the request to take part in the qualitative part of the study, so it was not possible to gain a greater understanding of why course completion was so different between the two disciplines via this element of the study.

5.5.1 Uptake, adherence and completion

Uptake for the online education programme of those who completed consent forms was 72% – however, 64% of this group did not proceed to complete the course. Understanding of how and why online education programmes are or are not attractive to potential participants could be key to their success. Because of the diversity both in populations of HCPs and of online training that is available

to HCPs, a like-for-like comparison with existing literature is difficult to make. A previous study that tested an online smoking cessation programme found that 77% of consenting participants engaged with the programme (Bialous et al., 2017). However, this was tested in a population of registered nurses in practice. Graj, Sheen, Dudley, Sutherland-Smith and McGillivray (2019) report an 80% uptake and completion rate in their evaluation of an online education programme delivered to student psychologists. Importantly, the programme that was the subject of their evaluation was embedded as a compulsory component of an undergraduate course, although completing the research questionnaires was voluntary. This is in contrast to the current study, where participation in the Moving Medicine - Active Conversations programme was entirely voluntary and did not constitute a component of a formal course of education. The elective nature of participation may have contributed to completion being of low priority for some participants.

As has already been outlined, there was a high number of drop-outs from the online education programme that was evaluated in this study. Notably, significantly more student physiotherapists than student nurses completed the online programme, despite the fact that fewer student physiotherapists than student nurses were initially recruited to participate in the study. An equal number of student physiotherapists and student nurses registered and started the online programme. However, only one student nurse completed. This equity in numbers of students from each discipline starting the online programme serves to clearly highlight a differential between the two groups in completing it.

Currently, there are differences in how the required skills to effectively promote physical activity are taught to different groups of student HCPs.

Physiotherapists are taught the fundamental skills of MI during pre-registration training, although without specific application to promotion of physical activity (The Health and Care Professions Council, 2013), while student nurses receive only rudimentary teaching of the principles of MI and its application. Nurse PA promotion education is related to specific health conditions without reference to the use of MI (Nursing and Midwifery Council, 2018a). Studies have found that

the teaching of MI skills has been effective in improving HCPs' confidence and competence in having discussions with their patients with a view to improving health behaviours (Fortune et al., 2019; Martino et al., 2007). Despite the limited teaching in MI skills that student nurses currently receive, evidence suggests that the ability to use MI techniques in patient interactions should be considered to be a core nursing skill (Östlund et al., 2014). It is possible that greater familiarity with the principles of MI contributed to the higher number of student physiotherapists who completed the programme. Furthermore, the study described in Chapter Four of this thesis reported that some HCPs consider physiotherapists to be the most appropriate people to promote physical activity. T. L. Williams et al. (2018) reported that this view may also be prevalent among physiotherapists. If HCPs, including physiotherapists, most strongly associate the physiotherapy discipline with promotion of physical activity, this may offer insight into reasons why a significantly greater number of student physiotherapists than student nurses completed the online programme.

It is, however, reasonable to assume that there were several contributing factors to the number of participants overall who failed to complete the programme. Some participants described challenges in their personal lives as barriers to engagement, and the pressures of post-graduate study made it difficult for some participants to successfully complete the programme in addition to their university course work. It is possible that the attrition level was influenced by the timing of the online programme and questionnaires being delivered during the early stages of the COVID-19 pandemic. The pandemic resulted in some nursing students returning to practice and being unable to practise newly-acquired MI skills, thereby effectively preventing participation in the Moving Medicine - Active Conversations programme. In adherence to the prevailing guidance (Scottish Government, 2020), student physiotherapists were withdrawn from clinical practice and only student nurses could remain on placement. In contrast, student nurses were offered the opportunity of paid employment as clinical support workers during the pandemic. The ability to earn an income incentivised many to accept this offer. The net effect of this was that

student physiotherapists had reduced ability to practise new skills, while nursing students worked in paid practice roles, limiting their time available for additional study.

There is growing evidence that the ability to conduct research has been adversely affected by the COVID-19 pandemic. Abshire et al. (2020) report that social distancing measures inhibited participant recruitment, enrolment and continued involvement in research studies. It has also been reported that the delivery of education for HCPs has been significantly disrupted. Carolan, Davies, Crookes, McGhee and Roxburgh (2020) suggest that the transition to purely online learning for some students presents challenges where they have limited digital literacy and they may struggle with the absence of human engagement and camaraderie. They further suggest that anxieties caused by increased family and social responsibilities contributed to discomfort with the rapid forced shift to online learning that the pandemic necessitated. Given the combined effects of the COVID-19 pandemic on both the conduct of research and the delivery of education for HCPs, it seems likely that the effects of the pandemic were influential on the level of completing participants.

Despite the differences between the two participating groups, there were some common factors that may reasonably have been considered influential in successful completion of the online education programme. The online programme was not an embedded component of their post-graduate course of education, therefore it did not in any way influence their progress towards their target degree. However, the regulatory bodies for both nurses (Nursing and Midwifery Council, 2020b) and physiotherapists (Health and Care Professions Council, 2020) clearly state that the promotion of positive health behaviours including physical activity is a core competency that is required of their members. If completion of a similar online programme was necessary for participants to successfully complete their formal programme of study, this would undoubtedly ensure greater levels of engagement and completion as well as satisfying regulatory requirements. Any incorporation of future online education programmes in formal programmes of higher education for HCPs

would first require ratification and approval by the relevant regulatory bodies, in this case the NMC (Nursing and Midwifery Council, 2020d) for student nurses, and Health and Care Professions Council (HCPC, 2020) for student physiotherapists.

The marked difference between the two clinical disciplines in engagement with and completion of the online education programme could suggest that the student physiotherapists found the content to be more relevant to their desired learning outcomes and clinical practice than the student nurses. However, this is not explored in the current study due to the low number of student nurses who participated in the qualitative element. When considering the differences between the two clinical disciplines, it appears to be perspicacious to suggest that a standardised programme when delivering the course to different HCP disciplines may not be effective. Perhaps this points to a need for a more tailored approach to the delivery of future iterations of the online education programme with cognisance of the different educational backgrounds, learning expectations and clinical application for different HCP disciplines.

5.5.2 Did the programme work?

It has been reported in previous studies that online learning for HCPs has produced neutral or positive results when compared to face-to-face delivery of education (Pei & Wu, 2019; Richmond et al., 2017). While the evidence suggests that online education for HCPs is feasible in general, mitigation must be made for potential barriers to its efficacy, including isolation, time constraints and the amount of work required to complete the programme of learning (Regmi & Jones, 2020).

An overall increase in knowledge of current national physical activity guidelines (UK Government, 2019) was seen in participants who completed the online education programme. Although the reported increase in knowledge was not statistically significant, this may be as a result of the small sample size limiting the magnitude of change. None of the participants in this study accurately described all components of the current physical activity guidelines. This is

similar to previous studies that have measured knowledge of physical activity guidelines and report low levels of knowledge, with only 16% (Freene et al., 2017) and 9% (Douglas, Van Teijlingen et al., 2006) of HCPs being able to accurately describe current guidelines. However, in the current study, participants were able to select a high percentage of correct answers without being 100% accurate. This raises a potentially important question of whether general awareness of the guidelines and how to access them is more important than accurate knowledge of the guidelines. Further study would help to establish whether a more rudimentary, but perhaps more achievable, wide scale knowledge of guidelines is enough to positively influence the promotion of physical activity. Teaching of the PA guidelines was not embedded in the content of the programme but links to the relevant external online resources were signposted in the course modules instead. As there was still some improvement in knowledge about the national guidelines, participants appeared adequately motivated to access this information. This may suggest that the participants who were committed to completing the programme were skilled in self-directed study and for this group of participants the online education programme was an appropriate learning intervention.

In the group of participants who successfully completed the programme, there was a modest, but not statistically significant, increase in participants' self-reported levels of competence in the use of MI techniques in their promotion of physical activity. Several factors may have contributed to the limited modulation in perceived MI competence. It is possible that the small sample size may have resulted in the study being underpowered to detect a difference if one existed. Existing research suggests that self-reported data is often over or understated depending upon the subjects' opinion of what measure may be either desirable or undesirable (Schoo et al., 2015). Confidence does not directly equate to competence (Ndokera, Holland & Nohavicka, 2016) and it is possible that participants may have overstated their level of competence when they used the MITI 4 tool in the pre-engagement survey.

Both pre and post-engagement surveys included the MITI 4 tool that was adapted to allow self-reporting of MI competence. The MITI 4 was originally designed for use by a third party observer rather than for self-reporting. It was, however, successfully used in previous research as a tool for self-reporting MI competence (Schoo et al., 2015). The MITI 4 relies upon the user having a good understanding of the basic principles of MI and familiarity with the terminology used in assessing MI competence (Moyers et al., 2016). Given that the participants were all student HCPs, it is reasonable to assume that their practical knowledge of MI and its assessment was both varied and limited, certainly at the point of completing the pre-engagement survey. This possible limited understanding of the key principles and language of MI in a student population may have resulted in inconsistencies in participants understanding and self-reporting MI competence. In future studies, where resources allow, observational assessment by experienced MI facilitators rather than self-reporting may offer more consistent objective measurement.

Previous evaluations of online MI education programmes have reported positive results, although the interventions aligned MI with general health promotion rather than physical activity specifically. Keifenheima et al. (2018) report that a mandatory MI course delivered to medical students produced an improvement in knowledge and MI skills. However, their study did have a control group and the mandatory nature of the programme ensured a larger sample (n=91). In common with the current study, Keifenheima et al. (2018) also report that, among completing participants, the experience of the programme was considered to be positive, with most participants finding it to be acceptable. The positive reception to MI training was also reported by Fontaine et al. (2016) in their evaluation of an online MI programme delivered to registered nurses. Their results are interesting as their study recruited a sample of registered nurses, rather than the pre-registration participants in the current study. The results of their evaluation were that the MI programme was highly acceptable to participants, who reported that they would be more likely to practice MI techniques as a result. In the current study, although the number of active

participants decreased as the programme progressed, the number of forum posts submitted and file views per participant increased. This suggests that the participants who completed the Moving Medicine - Active Conversations online education programme became more engaged with the learning material through the programme and demonstrated acceptability of the programme.

It is evident from this study that there were differences between the student nurses' and student physiotherapists' experience of the Moving Medicine - Active Conversations programme. Current evidence points to some established commonality however, in that the teaching of MI to HCPs is generally effective in improving their ability to promote health-improving behaviours that could include promotion of physical activity. This has been found in studies among diverse populations of HCPs, including medical doctors (Kaltman & Tankersley, 2020), physiotherapists (Fortune et al., 2019) and nurses (Howard & Williams, 2016). Evidence also supports the delivery of MI education for HCPs at undergraduate level with teaching of MI being integrated in undergraduate programmes (Curtin & Trace, 2013; Andrew, E. et al., 2019). Despite this, the delivery of MI education to HCPs remains inconsistent and is dependent on the HCPs' chosen clinical discipline.

Although the evidence for online learning in healthcare may be considered to be immature (Carolan et al., 2020), there are examples of successful delivery of online programmes, particularly those delivered using a spaced education system (Kerfoot et al., 2007). Spaced education refers to the psychological research finding that information presented and repeated over spaced intervals is learned and retained more efficiently than information presented at a single time-point (Kerfoot et al., 2010). The success of this system (Grad et al., 2021; Menon et al., 2020) has led to the proliferation of online micro-learning platforms (Hug, 2007) that are able to host and deliver online programmes of education such as Qstream (Qstream Inc., 2021).

It is, however, important that online education programmes are accessible and function well. Some participants in the current study found that an inability to

access the programme or to easily resolve technical problems inhibited their progress and resulted in non-completion. Further research would help to further establish the case for online education in MI with a physical activity promotion focus. The acceptability of the programme described in this study, and the evidence of success in delivering online learning in microlearning environments, may support the case for testing online delivery of MI programmes using diverse methods.

In the future, it may be prudent to consider adaptations to this programme prior to delivery and testing. Embedding the programme within a module of formal education, with completion being a necessary component of a higher education programme may result in a lower level of attrition. Recognition should be made that the content may need to be adapted to meet the learning needs and expectations of different populations of HCPs. This could help in making the programme accessible to greater numbers of HCPs as opposed to being focussed primarily on medical doctors.

5.5.3 Assessment

It should be noted that there were assessments available to the participants in the online education programme. These were formative assessments (Koh, 2010) that were intended to be completed at the conclusion of each module to allow participants to assess their own knowledge of the preceding material. Although the assessments were prominent in the module material, it was not a requirement of progress to the next module that the assessments be completed. Perhaps as a consequence of the optional nature of completing the module assessments, few participants completed them after module two. Assessment within the programme may be important in both supporting learning and introducing an element of adaptability in the delivery of learning material. The concept of the importance of assessment to both the effective development and delivery of education has a well-established evidence base (William et al.,

2010). Current evidence points to the development of assessment for learning as being fundamental to both the delivery of education and the improvement of education for individual learners (William, 2011).

5.5.4 Strengths and limitations

There are three major strengths of this study. The first is the development of the research questions from the findings of the literature review and the qualitative study that were presented earlier in this thesis. These studies were instrumental in informing decisions on the research methodology and ensured that this study is a logical development of the thesis and that it advances knowledge developed in the earlier studies. Using knowledge developed from the earlier studies that included synthesis of established evidence ensured that this study has a robust research framework and allows a logical, sequential presentation of results.

The second major strength is the use of proven, rigorous methodology. The mixed methods approach used provides a better understanding of the data than either the qualitative or quantitative components may have allowed in isolation. The third major strength of this study is that it is unique in presenting for the first time an evaluation of the Moving Medicine - Active Conversations programme, delivered to pre-registration HCPs.

The limitations of the study are a lack of diversity in the sample group, that included mostly female physiotherapists from one academic institution, and a high level of participants failing to complete the online education programme. Consequently, the results may be underpowered. Participants' MI competence was self-reported and it is likely that levels of competence were overstated in the pre-engagement survey. Participants were only selected from populations of student nurses and physiotherapists studying for MSc qualifications. The inclusion of other allied health professionals and undergraduate HCPs may have offered broader insights and different levels of completion.

5.6 Conclusions

This study shows that, although the difference in measured results was not statistically significant, an online education programme that is designed to teach HCPs core MI skills with a specific focus on the promotion of physical activity to their patient groups has the potential to have a positive effect on participants' competence in promoting it.

Positive comments from participants, and high levels of forum and discussion board activity, suggest that the online education programme was well received and enjoyed by the participants who completed it. This may indicate an appetite among motivated HCPs for formal physical activity promotion education and could offer some insight into the performance of the programme that the survey results did not reveal.

The local, national and global ambitions to increase levels of physical activity to benefit health are well documented. The existing evidence supporting the benefits of MI in effecting behaviour change for health improvement, and the potential for HCPs to promote physical activity, is firmly established. Therefore, it seems logical to suggest that the teaching of MI techniques to pre-registration HCPs with a focus on the promotion of physical activity integrated within undergraduate programmes could indeed help to produce future generations of HCPs with well-developed PA promotion skills. This in turn could make a contribution to increasing levels of physical activity within the HCPs' patient populations.

The findings of this study suggest that delivery of future programmes may benefit from a tailored approach in recognition of the diverse nature of education backgrounds, cultural differences and learning needs among various clinical disciplines. Integration of MI education aimed at promotion of physical activity with pre-registration HCPs' university-based undergraduate

programmes could establish fuller engagement with the learning material and allow a bespoke approach, ensuring that the learning needs of specific clinical disciplines are met. This could be instrumental in developing consistency in both confidence and competence in promoting physical activity across the spectrum of HCPs.

Further research is needed to better establish the effect of completion of online education programmes on HCPs' competence in using MI to effectively promote physical activity to their patients. A larger sample with a control group would generate more informative data. Improved metrics, including a greater level of detail relating to participants' engagement with the programme, would offer a further layer of data within which important variables may be identified, allowing nuanced development of the online education programme and delivery platform. The MITI 4 tool may be an effective method of measurement of competence modulation between pre and post-engagement, particularly if this is used with an independent observer scoring the participants' performance pre and post-engagement with the online education programme.

Chapter Six: Discussion

6.1 Discussion

The research completed in this thesis explores the factors that influence the physical activity promotion practices of healthcare professionals caring for adults with chronic diseases. This PhD project is a component part of a larger study. The larger study examines the reasons why men living with at least one long term condition did not participate in a PARS designed to support their physical recovery and psychosocial wellbeing. Although this PhD project does not have a specific focus on gender-related factors, its contribution to the larger study consists of an examination of more general influences on physical activity promotion from the perspective of HCPs. It is formed of three studies: 1) a systematic review of the existing literature that presents evidence relating to HCPs' promotion of physical activity and the factors that influence it; 2) a qualitative study that explores influential factors on HCPs' physical activity promotion and the personally-held attitudes and beliefs relating to PA promotion among practising HCPs; and 3) a mixed methods study that tested the effects of an online education programme on student nurses' and physiotherapists' self-reported knowledge and competence in using motivational interviewing techniques in the promotion of physical activity. The third study incorporates a qualitative exploration of reasons that prevented completion of the online education programme. This chapter presents the key findings from each study, discusses the theoretical advances from this programme of research and makes recommendations for the direction of future research.

This PhD project highlights some fundamental differences between HCPs' clinical disciplines in terms of perception of physical activity promotion within their roles, the level of education that they receive relating to PA promotion and behaviour change theory, and the clinical profiles of their patients. Most HCPs believe that promoting physical activity to their patient groups is an important integral part of their professional role and this belief is widely reported in extant literature (Bock et al., 2012; Van der Ploeg et al., 2007). Despite the prevalence

of this opinion, there were some differences in how it translated into practice. There appears to be an acceptance that physiotherapists, for example, are the HCPs most appropriately placed to promote physical activity. This is supported by the findings of the qualitative study discussed in Chapter Four, where some participants felt that it was more appropriate that physiotherapists, rather than other HCPs, promote physical activity. Physiotherapists certainly felt very strongly that PA promotion was an integral component of their role and this has been reported by other studies (West et al., 2021). It is suggested that undergraduate physiotherapists receive a more fully developed education than undergraduate nurses in both MI skills and the promotion of physical activity, although not necessarily MI skills specific to PA promotion (Fortune et al., 2019). This focus on the role that physiotherapists play in the promotion of physical activity was evident in the mixed methods study described in Chapter Five. In that study it was predominantly physiotherapists who completed the online education programme. This suggests a greater level of understanding and commitment to the promotion of physical activity by physiotherapists, even at the pre-registration stage of their career. Evidence has been developed that suggests that teaching MI to undergraduate physiotherapy students improves their confidence and skills in using the techniques in conversations with patients (Fortune et al., 2019). This may point to the influence of the delivery of pre-registration education as being formative in the development of career-long habitual PA promotion practices. When considering the differences in the perceptions of the roles that different HCPs fulfil in promoting physical activity, it makes sense that there will be variations in how diverse populations of HCPs deliver physical activity promotion activities, and view their own contribution to promoting PA. Yet the promotion of physical activity forms a key component of the expected standards of practice for HCPs (Health and Care Professions Council, 2020; Nursing and Midwifery Council, 2018a). National governments have committed to increasing population levels of physical activity (Scottish Government, 2015a; UK Government, 2019) and international guidance on the

promotion of physical activity for health has been widely accepted by governments and health authorities (World Health Organisation, 2016).

HCPs' self-perceived knowledge of the evidence for physical activity being of benefit to health appeared to be important in driving their promotion and referral activities. The study in Chapter Four of this thesis reported that all of the participants offered well-developed opinions that physical activity is beneficial to health, and that participating in physical activity was a positive health behaviour for both HCPs and their patients. This is in agreement with existing literature that reports largely positive opinions among HCPs of the beneficial effects of physical activity on health (Patra et al., 2015; T. L. Williams et al., 2018).

Participating HCPs expressed opinions that inextricably linked physical activity to both physical and mental health benefits. Despite these firmly held opinions, few of the participants referred to the scientific evidence base for the effects of physical activity on health, instead offering anecdotal accounts of their own experiences as underpinning their beliefs. This is in keeping with existing evidence suggesting that knowledge of the guidelines for physical activity and the underpinning evidence is low among HCP populations (Alderman et al., 2020). Indeed, none of the participants in the study in Chapter Four referred to current national or international guidelines developed to support the promotion of physical activity (UK Government, 2019; World Health Organisation, 2010). When prompted, some participants inaccurately described the guidance offered by out of date publications, or a combination of previous guidelines – however, all were aware that guidelines did exist. The knowledge that HCPs had relating to physical activity and its promotion was largely accumulated through their own efforts or by necessity as part of their clinical roles. No participants had received formal education in the skills required to promote physical activity to their patients, either pre or post-registration.

In order to achieve a consistently effective level of physical activity promotion by HCPs, regardless of their clinical focus, some of the real and perceived inconsistencies between the different professions might first need to be addressed. It is clear that education delivered early in an HCP's career is

influential in directing their habitual practice as a registered professional (Ali & Watson, 2011). Consequently, delivery of PA promotion education to all HCPs pre-registration may be useful in establishing physical activity as a key component of their health promotion activities, and could prove to be instrumental in contributing to the achievement of national and international targets (World Health Organisation, 2020c). Incorporating the promotion of physical activity into formal programmes of education may be important, as the initial teaching and training that HCPs receive pre-registration forms the knowledge and skill base upon which their practice is founded (Drummond & Standish, 2007).

HCPs themselves stated, in the studies presented in Chapters Four and Five, that they consider education to be important in informing their practice. In concordance with this, HCPs' regulatory bodies insist upon degree level teaching pre-registration (Health and Care Professions Council, 2020; Nursing and Midwifery Council, 2020b). This confirms that an appropriate level of education is considered to be essential to the development of consistent effective practice. Introducing training for physical activity promotion at an early career stage may be effective in positioning it as a fundamental component of clinical practice. The low completion rate of the Moving Medicine - Active Conversations described in Chapter Five, could be overcome by future programmes being integrated in mandatory programmes of education.

The inconsistencies in HCPs' knowledge and understanding of physical activity promotion demonstrated by the literature review in Chapter Two, and in the qualitative study in Chapter Four, could contribute to inconsistent, low levels of PA promotion. Incorporation of physical activity promotion education early in HCPs' careers could help to ensure that all HCPs, rather than only those more commonly associated with movement, have the fundamental skills required to discuss physical activity with their patients. Consequently, this could enable the HCP population to more effectively promote physical activity in their patient consultations.

The teaching of motivational interviewing has been proven to be effective in developing skills that allow collaborative person-centred conversations to take place, with the purpose of establishing and strengthening patients' motivation to change behaviour (Schoo et al., 2015). Previous studies have reported that the incorporation of MI skills in pre-registration training results in greater confidence and skills in having therapeutic conversations with patients (Bell & Cole, 2008; Howard & Williams, 2016). There is evidence that MI training can be successfully delivered in a variety of formats and it could be readily incorporated into online programmes of education (Fontaine et al., 2016).

The study presented in Chapter Five demonstrates that a programme of teaching based on MI for the promotion of physical activity was positively received by student physiotherapy participants, who expressed an appetite for this form of education delivery and content. This, when considered with the evidence supporting the success of MI training in previous studies, presents a compelling case for further study of the effects of teaching MI for PA promotion to pre-registration HCPs. However, given the high dropout rate of student nurses in the study, there is a need to investigate the reasons why this course was less successful for this student group. This includes a need to investigate how important student nurses consider promotion of physical activity to be in the context of their training, and ways to increase relevance of MI training for future practice.

The Social Ecological Model (SEM) (Collins et al., 2010) was used to help frame the research questions in this thesis. The intent was to use the model to categorise and consider interactions between the recognised multifactorial influences on the promotion of physical activity and to provide a framework within which the less well understood aspects could be isolated and examined (Simons-Morton, 2012). Through this lens, it became clear that the majority of influences were perceived by HCPs through the intrapersonal and interpersonal domains of the SEM. In the intrapersonal domain, HCPs had varied knowledge of the benefits of physical activity for health and how to promote it successfully, that influenced confidence to do so. Although HCPs reported perceiving their

own levels of knowledge as being high, studies that tested this found that knowledge of physical activity guidelines and the supporting evidence base was low.

The focus of HCPs on factors within the intrapersonal and interpersonal domains may stem from the perception that these typically describe factors that individuals have an element of control over, and can easily identify with (Firestone, Yi, Bartley & Eisenhower, 2015). Individuals can readily articulate preferences about who they exercise with and what type of exercise they undertake, and they may have opinions on whether they enjoy a particular activity. These elements are firmly within the intrapersonal and interpersonal domains and represent areas that are influenced by conscious personal choices and preferences, and that are interrelated (Owens, 2006). These interrelated choices and preferences could drive decisions about what exercise is undertaken and at what level of intensity, and will be different for everybody. Given the elements of choice and preference that exist within the intrapersonal and interpersonal domains, it seems likely that factors therein are influential on PA promotion decisions. This may lead, for example, to HCPs making value judgements about others who are not active. The study described in Chapter Four reveals that HCPs did make judgements about less active patients, particularly concerning motivation to exercise, and this influenced their decision to promote physical activity or not.

Although intrapersonal and interpersonal factors are the most commonly discussed by HCPs, other less well recognised factors may be influential on the efficacy of their promotion of physical activity. Factors that fall within the institutional, community and public policy domains of the socio-ecological model were recognised, but not well explored (other than lack of time) in the studies analysed by the systematic review in Chapter Two. Participants in the study described in Chapter Four also discussed factors within those domains, but with much less frequency. This is certainly reflective of the extant evidence base that concentrates on what are popularly described as “the most common barriers” (Jones, M. et al., 2021), leaving the real influence of other factors less well

understood among HCP populations. It may be important that HCPs better understand factors that they are less able to directly influence, as this could inform decisions about what advice to give, and to whom. Although not examined in this PhD project, there is evidence that some people simply do not enjoy exercise and prefer to spend their time in other ways (Hoare, Stavreski, Jennings & Kingwell, 2017). There is growing anecdotal evidence that women in particular do not feel safe exercising outside alone, particularly in the dark (BBC News, 2021; Nuffield Health, 2021). Individuals in lower economic categories are less likely to engage in physical activity and often have less access to affordable exercise provision (Bantham et al., 2021). In addition to the influences that HCPs have some control over, awareness of other factors that affect whether individuals can or want to engage in more physical activity could be vital in determining whether PA promotion activities actually work. It appears that effective PA promotion could depend upon an approach that is informed by multiple perspectives that recognise the various components of barriers and facilitators to physical activity (Van Stappen et al., 2018).

Among the wider influences on promotion of physical activity are those that may be considered to be institutional barriers. These are closely linked to community and policy related factors, although fewer studies report findings within these domains than in the intrapersonal and interpersonal domains. Lack of time to promote physical activity is a commonly cited barrier to promotion and this is linked to perceptions of provision of resources for physical activity at both institutional and community levels (Albert et al., 2020). The systematic review in Chapter Two of this thesis also reported that, in some cases, HCPs believe that an absence of exercise providers in their communities inhibits the promotion of physical activity. This may be linked to a perceived lack of funding for PA provision or a lack of knowledge about existing opportunities, which in developed countries tend to be widespread. These include both formal PARS and informal recommendations for activities such as sports or walking. The research conducted in this thesis is part of a wider study of a Scottish PARS delivered at community level. Such schemes are internationally available and

provide an opportunity for HCPs to refer patients into supervised physical activity (Sowden & Raine, 2008). There is a growing understanding of the influences on PARS engagement after referral, but a limited understanding of the barriers to referral by HCPs. Increasing understanding is important because unless PARS receive appropriate referrals, they are being set up to fail (Hanson et al., 2019). At an institutional level, PARS protocols and systems are elements that may influence the willingness of HCPs to refer patients. This is demonstrated in the study in Chapter Four, where HCPs reported that they received no feedback from the PARS about how their patients progressed after referral and so were unable to make judgements about effectiveness.

Less is known about broader, informal promotion by HCPs of community physical activity opportunities such as sports clubs, but a lack of guidelines and protocols were reported barriers to PA promotion activities in general. This includes a lack of guidance about the medico-legal implications of recommending a particular physical activity and where liability lies should an injury or medical issue occur as a result of participation (Din et al., 2014). At a policy level, clarity is needed. The cost of activities for patients is a further barrier reported by HCPs and this is an area worthy of future investigation. In order to achieve a more holistic approach to the promotion of physical activity, a greater understanding by HCPs of the wider influences on PA promotion and engagement might be necessary.

Promotion of physical activity is influenced by HCPs' own engagement with it and these factors interact to influence the perceived importance of its promotion. It is widely recognised that HCPs believe that promotion of physical activity is important (Aldossary et al., 2013; Douglas, Torrance et al., 2006b), yet there has been little exploration of why they believe it is important, or an examination of the knowledge and behaviours that underpin that belief. The systematic review in Chapter Two of this thesis reported that HCPs in secondary care considered PA promotion to be of less importance than those in primary care, with other disease-specific interventions having greater clinical

priority. There is less confidence in HCPs' perceptions of their own levels of knowledge of PA promotion in secondary care, than in primary care.

HCPs believed that their personal engagement with physical activity positively influenced their promotion of it. Indeed, studies suggest that HCPs who are physically active are more likely to promote physical activity to their patients than their sedentary peers (Burton et al., 2010; Karvinen et al., 2012). However, although many HCPs described themselves as being active, and they believed that this influenced their promotion of physical activity, there was inconsistent measurement of how active they were. It is not known whether HCPs' personal exercise intensity is important in influencing their likelihood of promoting physical activity, or of success in its promotion. Further research is necessary to examine this.

Little is known about how HCPs' perceptions of patients' gender-related preferences affect their physical activity promotion activities. There is, however, evidence that gender plays a role in physical activity promotion by HCPs, particularly the referral of patients to PARS, with fewer men than women being referred (Hanson et al., 2013). An internal service evaluation of the PARS in Chapter Four reported that 59.4% of referrals received during the study period were female (Prendergast, 2019). This suggests that, at the point of referral, gender may influence who HCPs refer to PARS. Within the study described in Chapter Four, it is clear that within diverse patient populations, gender is influential in HCPs' perspectives on why and how people engage in physical activity. Many participants initially stated that gender plays little part in determining how and to whom they promoted physical activity. However, they then contradicted this by describing their perceptions of distinct gender differences. They believed that women are more body aware than men and more interested in the social aspects of physical activity, while men are more focused on the results and benefits of their activities, and attended the PARS with greater focus on fitness than on socialising. This has been reported by previous studies (Van Uffelen et al., 2017). A better understanding of how HCPs understand gender influences on physical activity may help to address the

current imbalance between men and women being referred to PARS. This is important, as it may be symptomatic of an imbalance in physical activity being discussed in general more with women than men.

Throughout this work, it has been demonstrated that HCPs make judgements about patient motivation and capability when deciding whether to promote physical activity; many do not believe that it is worthwhile unless the patient is motivated to exercise. It has been identified in Chapters Two and Four that perceptions of how motivated patients are may be influential in levels of physical activity promotion. It has also been reported previously that people who exercise regularly may have inherent negative opinions of others who are less active, including beliefs that they are lazy or lack motivation (Robertson & Vohora, 2008). Given that all of the participants in the study reported in Chapter Four described themselves as active, this could be influential on their physical activity promotion decisions. Little is known about how inactive populations of HCPs promote physical activity – further research could develop a greater understanding of the influence of participation in physical activity among this group on its promotion. Regular exercisers are less inclined to offer advice on physical activity to those who they perceive as being less active (Ntoumanis et al., 2018). If this view is prevalent among active HCPs, it may be influential in inhibiting their promotion of physical activity to this group. These judgements are not always underpinned by actual evidence of a lack of motivation in the patients. Formal assessment of motivation or behaviour change was not routinely discussed.

A lack of knowledge about behaviour change theories may lead to a didactic approach to promoting physical activity. Brief interventions have been shown to be of benefit in promoting physical activity and are included in national guidelines in the UK (National Institute for Health and Care Excellence, 2013). Brief interventions are used successfully in other areas of lifestyle health promotion, although more intensive behavioural support has been demonstrated to work better. For example, in smoking cessation, brief interventions increase the frequency of quit attempts [risk ratio (RR) 1.24, 95%

confidence interval (CI): 1.16–1.33] but not as much as behavioural support for cessation (RR 2.17, 95% CI 1.52–3.11) (Aveyard et al., 2012). In promotion of physical activity, more intensive behavioural support interventions such as PARS are not necessarily theoretically driven (Buckley et al., 2018). It is possible that this could be a contributing factor to the lack of long term proven effects of PARS.

Because behaviour change is complex, it is unsurprising that theoretically driven interventions work better than brief interventions. Behaviour change theories provide a proven structure within which different and often complex processes of change are identified, and linked to each other and components of an intervention (Michie et al., 2014). Self-Determination Theory (Deci & Ryan, 1985) was developed to provide a framework for the study of motivation, personality and behaviour. Self-Determination Theory is a blend of five mini theories that aim to explain a different aspect of motivation or personality (Michie et al., 2014). The Transtheoretical Model of behaviour change that was developed by Prochaska and Diclemente (1986) posits the theory that behaviour change occurs over five stages: Precontemplation – not planning to change within six months; Contemplation – thinking about change within six months; Preparation – taking steps towards change within the next month; Action – attempting to make a change; Maintenance – having effected change that has lasted for at least six months. Motivational Interviewing (MI) is described in detail in Chapter Five of this thesis and includes a combination of Self-Determination Theory and the Transtheoretical Model of behaviour change (Rollnick & Miller, 1995). Motivational interviewing allows therapeutic conversations to take place, using techniques underpinned by theories that are proven to be effective in supporting positive behaviour change (Rubak et al., 2005).

While a range of behaviour change theories have been taught in pre-registration HCP education programmes, there has been limited consensus about which theories are of most value (Gainforth et al., 2021). This could potentially lead to a disjointed experience for learners, or even a lack of underpinning skills to

effectively support patients to make beneficial change. Consequently, opportunities to promote physical activity may be missed based on decisions that are informed by personal perceptions rather than evidence. Both the systematic review and qualitative study contained within this thesis identify that HCPs show a low level of skill in discussing physical activity with patients. When this is coupled with an interaction between interpersonal and intrapersonal factors, as identified by this research in Chapters Two and Four, the gap in skills in talking about physical activity may limit HCPs' ability to counter their own negative perceptions of their patients' motivation to exercise. One possible solution is increasing educational opportunities to improve functional knowledge among HCP populations and consequently improve skill and confidence in promoting physical activity.

In summary, the results of the research described in this thesis reaffirm that HCPs across a range of disciplines consider physical activity to be beneficial to health, and that its promotion is important. The physical activity promotion activities of HCPs are limited by their perceptions of their patients' health status and motivation to exercise. Judgements on those factors are made in the absence of good knowledge of current physical activity guidelines and evidence relating to PA promotion. There is variation in HCPs' levels of knowledge, education and confidence to promote physical activity and these factors are influential on their promotion practices. Perceptions of their own professional role in the promotion of physical activity are important. In many cases physiotherapists are considered to be the most appropriate HCPs to promote PA. This echoes the participation levels in an online education programme, where significantly more student physiotherapists than student nurses completed it. This thesis further demonstrates that an online education programme focused on MI for the promotion of physical activity was highly acceptable to study participants who completed it. Although there was a high level of attrition in this study, further research with a larger cohort of participants could offer greater clarity of efficacy and acceptability.

6.2 Strengths and limitations of the thesis

There are a number of conceptual and methodological strengths of the current project. The first major strength is that the research questions posed and answered were based on the findings of an exhaustive systematic literature review. Previous reviews have focused on studies in primary care, or those featuring HCPs with unique clinical specialisms. The review presented in Chapter Two of this thesis had a broad scope, incorporating HCPs from all disciplines and all clinical settings. This approach provides the most robust basis for synthesis of existing knowledge and ensures that the research questions are soundly based in empirical evidence.

The second major strength of this thesis is the mixed methodological approach to the design of the studies. The incorporation of both quantitative and qualitative methodology allows a thorough examination of the factors that influence HCPs' promotion of physical activity, with exploration of the real life reasons that help to explain some of those effects. This approach allows an element of flexibility in responding to data. This is particularly true of the study presented in Chapter Five, as it became apparent that a qualitative exploration was required to answer questions relating to participant attrition.

The third key strength of this study is that it is firmly rooted in current practice. The immediacy of the issues on health relating to declining levels of physical activity have been discussed previously. This thesis focuses on HCPs who are patient-facing now, either in clinical practice or on practice placement. This population has immediate problems with promoting physical activity to their patient groups. Consequently, improvements developed through research and informed by this thesis have the potential to have positive effects within short timescales that could translate to benefits for patients by increasing levels of physical activity.

It is important that the findings presented in this thesis are interpreted within the context of limiting factors. The first limitation to be noted is the potential for the introduction of researcher bias. I wrote this thesis while I was a practising nurse

with a personal interest in high intensity sport and a professional interest in cardiovascular health. It is likely therefore that I had opinions on the subject of inquiry and innate expectations of the data. In order for the effects of potential bias to be limited, I engaged in reflective and reflexive practice throughout the completion of this PhD project. This is described in detail in the following section.

A further limitation that must be acknowledged concerns the sample groups that were recruited to the studies described in Chapters Four and Five. The study presented in Chapter Five includes a sample from one Scottish educational institution, and reported high levels of dropout. This may have had the effect of limiting data interpretation. It is possible that the collected data came from a population who, by virtue of their agreement to participate in a study in physical activity promotion, are professionally interested and perhaps more active in promoting it. This means that there is potential for the data to be representative of a group who already have positive opinions of the concept of HCPs promoting physical activity. Consequently, there is a risk of sampling bias, as those HCPs who are less interested in physical activity may be less likely to participate (Bourgeault, Dingwall & De Vries, 2010).

A further limitation of the current project may lie in the use of self-reporting measures for collecting research data. All data used in the study in Chapter Five of this thesis were collected through self-report questionnaires. It has been suggested that there may be issues inherent within such a method related to participants' comprehension or interpretation of the content of self-report questionnaires, that would call into question the validity of such a method (Chan, 2009). While it may not be possible to state conclusively that all participants extracted identical understanding from the questionnaires they completed, the potential for discrepancies being present was partially controlled through the recruitment of participants who were all at similar stages of a post-graduate education programme.

The MITI-4 tool was used for self-report data collection but, although not developed for this purpose, it has been used in this way in previous studies identified in Chapter Five. However, given the limitations on resources and time that were present in completing this PhD research project, it would have been impossible to observe and score individual participants' interactions with their patients or peers in accordance with the original intention for MITI-4. Consequently, employing a data collection strategy of self-reporting was the only viable approach.

Finally, the COVID-19 pandemic must be recognised as a limitation. Although the more general effects of the COVID-19 pandemic on this PhD project are described in section 5.2.5, it appears to have had a specific influence on the study that is presented in chapter 5. All of the participants who were interviewed in the qualitative component of the study cited the pandemic as an influential factor in their non-completion of the education programme. It is of note that this seems to have disproportionately affected nurses more than physiotherapists. A reason for this may be that student nurses opted to accept paid employment in clinical practice during the pandemic, or had the option of accelerated registration. What is unclear is whether other factors would have been equally influential in the absence of a pandemic.

6.3 Reflection/reflexivity

Throughout this PhD project, I adopted an iterative, reflective approach to the development of the research and my progress as a researcher. Reflection enabled critical attention to be paid to the theories and methodology that underpin the project and reflexive examination of my own values and opinions (May & Perry, 2011). Reflexivity is a process through which the significance of a researcher's personal, political and cultural influences is recognised (Alley, Jackson & Shakya, 2015). Reflexive practice as a methodological tool can provide researchers and practitioners with new insights and increased self-awareness, as they are able to critically examine the nature of their work and

acknowledge how prior assumptions, experiences and biases may have shaped the data and influenced their qualitative research (Patton, 2015). Throughout my PhD, I reflected on how my personal views, experiences and clinical experience may have influenced the design and outcomes.

The initial approach to the research in this PhD project was influenced by my inexperience as a researcher and my initial natural inclination towards post-positivism, born perhaps from my work in clinical practice as a registered nurse. I worked in an acute cardiac environment, caring for a range of different individuals with varying cardiac conditions, all of whom responded differently to interventions and interactions with HCPs. I had well developed views on the beneficial effects of physical activity on health and had strong opinions that HCPs in general, and nurses in particular, should be role models for health and that they should actively engage their patients in conversations designed to promote physical activity. I undoubtedly viewed the world of healthcare through the lens of cardiovascular health and I was firmly invested in the evidence supporting physical activity as being effective, perhaps essential, in improving and supporting health (Leon, 1997). Those views and opinions appeared well supported by international targets to increase physical activity levels (World Health Organisation, 2010), and by the standards for practice outlined by my professional regulatory body (Nursing and Midwifery Council, 2015).

At the initial stage of this PhD project, when planning the literature review and developing meaningful research seemed enormous hurdles, I engaged in regular intensive physical activity for recreation and health. I actively counselled patients regarding the benefits of physical activity and strongly identified with the concept of HCPs as role models for health. With some concern I observed the deteriorating state of physical health among my nursing peers, with increasing levels of weight gain and obesity among healthcare workers, in nursing more than other groups of HCPs (Kyle et al., 2016).

My own knowledge, beliefs and values relating to physical activity, both from a clinical and personal perspective, were instrumental in driving my curiosity and

exploration of the subject of my inquiry. I also recognised that those same drivers had the potential to influence the research process and my interpretation of findings artificially. It has been suggested that in qualitative research there is a clear distinction between the knower (the researcher) and the known (the research subject) and that the knower views the known through a selected lens (May & Perry, 2011). In this case the lens could be considered to be my own biases developed from my personal and professional experiences and interpretation of knowledge. While the lens undoubtedly exists and is in fact of value, it is not necessary for the lens to distort the knower's view of the known (May & Perry, 2011). The 'knower, known, lens' analogy proved to be an important revelation for me. It unlocked an ability to both accept that my own biases existed and were unavoidable, while allowing me to consciously develop some distance from the data that allowed as much impartial exploration as was possible. This was not an instantaneous process however, and the development of the skills required to establish and maintain an inquisitive distance from the data as they were collected, and to remain objective, did not come naturally.

To assist in developing a reflexive approach to my research and to identify intruding subjectivities and prejudgements, I kept a reflective diary. It has been suggested that keeping a reflective journal or diary is useful in demonstrating transparency in the research by highlighting the possible influence of bias (Ortlipp, 2008). A reflective diary may also be useful in developing confidence in inexperienced researchers. Although common in qualitative studies, it has proven to be desirable, although infrequently used in mixed methods approaches to research (Khoo-Lattimore, Mura & Yung, 2019). Keeping a reflective diary proved to be particularly helpful in refining qualitative interviewing techniques. After the first two interviews in my qualitative study I reviewed the entries in my reflective diary. I was a little surprised to note that I had expressed disappointment in some of the participants' responses to questions and an opinion that the participants were overstating their own levels of physical activity, perhaps to appear virtuous. I discussed these comments

with an academic supervisor and reviewed the transcripts of the first two interviews at the same time. This proved to be an important step in developing my interviewing technique and the discipline to remove my own biases from the interview process as much as was possible. This was achieved through recognising that I frequently made supportive comments when the conversation turned to the health benefits of physical activity, thereby reaffirming any positive comments made by the interviewee. I also, initially, gave little opportunity for interviewees to respond to questions that required some consideration, and often prompted an answer. In future interviews, I consciously resisted the urge to fill any conversational gaps and allowed the participant time to consider their responses, recognising that silence is not always awkward. I was also conscious that my role as a registered nurse might influence my research approach. This was illuminated by a reflective diary entry that captured my disappointment in the physical activity promotion efforts made by nurses. Once aware of the implications of this, I adjusted my thought processes and attempted to think of the participants only as HCPs, rather than to group them within their clinical disciplines. This was important, as in order for the data collection to be consistent and not distorted by my own biases, it was imperative that all participants were interviewed in the same way with no greater expectation of some than others. Reviewing the reflective diary, and discussing the challenges that it revealed with supervisors, was a key developmental activity for me.

As this research project was conducted in part fulfilment of a research degree, I had regular opportunities to reflect upon my progress as a researcher through supervision meetings. Working with supervisors who had a range of research expertise was instrumental in helping me to develop reflexivity in reflection and to develop the discipline required to be self-critical. Guidance from experienced researchers proved to be invaluable. It enabled me to recognise the potential for my biases to influence how the subject of inquiry was studied, and to mitigate for that. It enabled development of the balance required to acknowledge that my biases and opinions existed and, at least in part, drove my academic curiosity.

Indeed, it is argued that researchers' own values, opinions and knowledge allow interpretation of research output to have contextual relevance to their clinical practice, and thus discerns practical meaning from new knowledge (D'Cruz, Gillingham & Melendez, 2019). Surely this is fundamental to the reason for conducting research in the first place.

6.4 Unique contribution

A number of unique contributions have been made to extant literature through the studies discussed above. The systematic literature review that is described in Chapter Two provided a comprehensive meta-synthesis of existing evidence. The review was undertaken without the restriction of focusing on either primary or secondary care as in previous reviews (Hébert et al., 2012; Huijg et al., 2015). Inclusion was not limited by specific HCP clinical discipline. Synthesis of the evidence through the lens of the socio-ecological model offered a unique perspective that allowed consideration of multiple levels of influence on HCPs' PA promotion activities. This approach in particular allowed thorough examination of less well understood interactions between intrapersonal and interpersonal factors.

The qualitative study presented in Chapter Four is unique in the approach to identification and recruitment of the sample population. Previous studies have focussed on either HCPs in practice in primary care, or HCPs who have a specific clinical focus, regardless of whether the participants were actively engaged in promotion of physical activity. This study identifies a sample population that is not limited by clinical discipline and includes HCPs who were known to be actively promoting physical activity. The qualitative design of the study allowed the voices of HCPs to be heard, who by virtue of their PA promotion practice had first-hand knowledge of factors that influenced how they promoted it.

The third study conducted was the first examination of the acceptability, uptake, adherence, and completion of the Moving Medicine - Active Conversations

online education programme within a population of pre-registration HCPs. In addition, it was the first time that the online programme had been made available to a population of Scottish HCPs. To my knowledge, this study is the only one that explores the perceived influence on PA promotion competence of teaching the skills of MI to pre-registration HCPs with a specific focus on physical activity promotion. This study exposes differences between different HCPs' disciplines in their approach to PA promotion and reveals an appetite among student physiotherapists for this type of educational approach.

6.5 Implications for practice

This research in this PhD project suggests that a consistent approach to the delivery of HCPs' pre and post-registration education, with a focus on physical activity promotion, may be influential in improving the ability of HCPs to effectively and consistently promote PA to their patient populations.

- There is limited training available for HCPs to promote physical activity in current education curricula. The inclusion of education rooted in the principles of MI, with a focus on PA promotion, may be effective in improving HCPs' promotion of physical activity and in changing patients' PA behaviour. If this is delivered in pre-registration HCP higher education programmes, it may help to ensure a consistent level of knowledge and skills in promotion of physical activity across the population of practising HCPs. The development of the skills and knowledge required to effectively promote physical activity at an early career stage could ensure that PA promotion becomes a well-executed and habitual fundamental component of health promotion.
- Although physiotherapists may be viewed by HCPs as the best providers of PA promotion advice, their limited patient reach means that there is a need to focus on how to get nurses and allied health professionals to better engage with PA promotion. Consistent strategies, including pre and post-registration education, should be employed to enable HCPs to

equally invest in physical activity promotion as a key health promotion activity in their daily practice.

- Although HCPs were unable to accurately describe the local and national PA guidelines, they were in many cases aware that guidelines existed. Therefore there is a need to ensure that access to relevant guidelines that are underpinned by a well-developed evidence base are readily available to all HCPs.
- There is variation in how HCPs describe their own activity levels and little understanding of how this influences their promotion of physical activity. Ensuring that HCPs have good knowledge of the PA guidelines and understanding of physiological changes that result from different levels of exercise intensity may help to achieve some consistency in understanding that any physical activity is beneficial to health, but more is better.

6.6 Future research directions

The research in this PhD has identified several areas for potential future research:

- Establish what approaches to the delivery of pre-registration PA promotion education are effective in improving skills that will enhance the ability of HCPs to have conversations that result in patients changing their physical activity behaviour. The study described in Chapter Five piloted one such approach but this was limited in numbers of participants and the absence of a control group. Further research with a larger varied sample, including a control group, would enable a more revealing examination of the effects of MI training with a focus on the promotion of physical activity embedded within pre-registration education.
- Exploration of the underlying reasons why physiotherapists are considered the most appropriate HCPs for promotion of physical activity and how nurses can be encouraged to engage more with this agenda.

This may be important in the development of interventions that could help to elevate promotion of physical activity as a component of daily practice in nursing and allied health professional populations as well as physiotherapists.

- Explore how HCPs' personal choice of frequency, intensity and type of physical activity influence their promotion of it. This research should explore the interaction between HCPs' physical activity levels and their perceptions of the benefits of moderate versus vigorous activity, patient capabilities for physical activity, and likelihood of success of PA promotion.

6.7 Conclusions

In conclusion, this thesis represents a thorough examination and exploration of factors that influence promotion of physical activity by HCPs. It has been undertaken against the backdrop of a growing evidence base that global levels of physical activity are declining. The number of adults physically active enough to benefit their health is falling and there is an international effort to halt this trend and increase population levels of physical activity. Healthcare professionals could be instrumental in increasing physical activity engagement in their communities. In light of the potential health crises that low levels of physical activity could contribute to, there is an urgent need to better understand what factors influence the promotion of physical activity by HCPs.

The research presented in this thesis reveals that influential factors fall within several categories, yet they are interlinked. The thesis uses a socio-ecological model to examine influential factors within different domains and to identify how they are interrelated.

The experiences of practising HCPs were explored to gain insights into their perspectives on promoting physical activity, specifically through referral to a community based PARS. The thesis also investigates whether completing an online education programme would affect HCPs' self-reported skills in

promoting physical activity using MI. This demonstrated that the programme is considered to be valuable by the participants and highlighted the differences in how different HCP professions engage with promotion of physical activity.

This thesis contributes to the knowledge base by synthesising evidence from a wider range of sources than previous reviews have included, and by categorising findings within the framework of a socio-ecological model.

Furthermore, it provides an increased understanding of HCPs' perspectives on factors that influence their promotion of physical activity. The findings of this thesis suggest that formal education in PA promotion, particularly using proven MI techniques, could be well received by HCPs and might contribute to improved promotion of physical activity.

Appendix 1 Systematic review search strategy

S19 S15 AND S16 Limiters - Human; Age Groups: All Adult

Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 182

S18 S15 AND S16 Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 336

S17 S15 AND S16 Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 336

S16 S9 AND S12 Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 10,363

S15 S13 OR S14 Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 84,821

S14 TI (perception* or belief* or attitude*) Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 59,061

S13 (MH "Attitude of Health Personnel") Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 31,362

S12 S10 OR S11 Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 119,692

S11 "physical activit*" or "exercise N2 referral" Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 50,706

S10 (MH "Exercise+") Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 79,788

S9 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 1,043,008

S8 doctor* or physician* or clinician* or general practi* or nurs* or nurse practi* or "practice nurse" or "rehab* nurs*" or physiotherap* or "occupational therap*" or dietician*
Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 1,016,629

S7 (MH "Occupational Therapists") Search modes - Boolean/Phrase Interface - EBSCOhost
Research Databases

Search Screen - Advanced Search

Database - 5,896

S6 (MH "Physical Therapists") Search modes - Boolean/Phrase Interface - EBSCOhost
Research Databases

Search Screen - Advanced Search

Database - 8,054

S5 (MH "Nurses") OR (MH "Nursing Staff") or (MH "Nurse Practitioners") OR (MH "Nurse
Specialists") OR (MH "Nurses, Community Health") Search modes - Boolean/Phrase
Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 67,702

S4 (MH "Physicians") Search modes - Boolean/Phrase Interface - EBSCOhost
Research Databases

Search Screen - Advanced Search

Database - 47,207

S3 (MH "Physicians, Family") or "general pract*" Search modes - Boolean/Phrase
Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - 31,949

S2 (MH "Allied Health Personnel") Search modes - Boolean/Phrase Interface - EBSCOhost
Research Databases

Search Screen - Advanced Search

Database - 2,935

S1 (MH "Health Personnel") Search modes - Boolean/Phrase Interface - EBSCOhost
Research Databases

Search Screen - Advanced Search

Database - 25,400

Appendix 2 References for tables 2-4, 2-5 and 2-6

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Appendix 3 Study one participant information sheet, consent form and debrief

Participant information sheet

Exploration of healthcare professionals' beliefs and attitudes to referring patients with a long term condition to an exercise on referral scheme

You are invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish. Contact me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

The aim of the study is to explore how the beliefs and attitudes of healthcare professionals influence advice relating to physical activity and referrals to the Active Options 2 exercise on referral scheme.

Why have I been asked to take part?

You have been asked to take part as you are a health professional who has made referrals to the Active Options 2 exercise on referral scheme.

Do I have to take part?

No, it is up to you to decide whether or not to take part. Before you decide whether to take part or not, please read this information sheet. If you decide to participate, please sign the enclosed consent form and return it either electronically or in the envelope provided. Deciding not to take part or withdrawing from the study will not affect your ability to refer to the Active Options 2 exercise on referral scheme.

What will happen if I take part?

If you agree to participate, you will be invited to take part in an interview with a researcher, (this may be in person or by telephone), who will ask you questions relating to the Active Options 2 exercise on referral scheme. These will include questions regarding your attitude and beliefs relating to physical activity and health. You will also

be asked questions about how you feel about the role of health professionals in promoting physical activity, including the Active Options 2 exercise on referral scheme. In addition, you will be asked to discuss any perceived barriers to promoting physical activity, and which factors might enable you to provide advice relating to physical activity. The interview will be audio-recorded. After the interview you will be sent a copy of the transcription to check for accuracy. It is anticipated that these interviews will take 30 to 40 minutes.

If you decide to withdraw from the study, we will ask for your consent to retain any information you provided before your withdrawal for analysis.

What are the possible benefits of taking part?

You may not get a direct benefit from taking part in the study. The findings may help healthcare professionals and providers of physical activity programmes to understand what works best to support people to be more active, which may benefit future participants.

What are the possible disadvantages and risks of taking part?

It is not thought that there are many disadvantages, however, if you agree to participate, being interviewed will take up some of your time.

What happens when the study is finished?

At the end of the research the data you have provided will be destroyed once the findings of the study have been published. The data will be stored for no longer than ten years.

Will my taking part in the study be kept confidential?

All the information collected during the course of the research will be kept confidential as per the Data Protection Act (1988) and there are strict laws which safeguard your privacy at every stage. From May 2018, The Data Protection Act (1988) will be replaced by the General Data Protection Regulation (GDPR). Your name will be removed from the data and replaced with a unique code so that you cannot be recognised from it. Only the research team will know which participant has been allocated which unique code. When the findings of the study are published only the code will be used and your name will not appear anywhere. Within the findings, quotations from the interview

transcripts will be used to provide explanation and illustrate emerging themes. The research team will ensure that you will not be identifiable from any quotations used to explain the research findings.

What will happen to the results of the study?

The study will be written up as a report and the findings published in healthcare and physical activity journals and presented at conferences. You may request a summary of the findings.

Who is organising the research and why?

The principal investigator organising the study is Dr Susan Dawkes, an Associate Professor of nursing at Edinburgh Napier University, and is part of a research study funded by the Burdett Trust. The research will be carried out by Bruce Forrest who is a Staff Nurse in the Cardiology Department at the Royal Infirmary of Edinburgh and a PhD Student at Edinburgh Napier University.

Who has reviewed the study?

The study proposal has been reviewed by the The Research Integrity Committee at Edinburgh Napier University. The South-East Scotland Research Ethics Committee and NHS Fife Research and Development Department also reviewed the study proposal, (approval to be confirmed).

If you have further questions about the study please contact:

Bruce Forrest on [REDACTED] or email [REDACTED]

If you would like to discuss this study with someone independent of the study please contact:

Dr. Anne Rowat, Lecturer, School of Health and Social Care, Edinburgh Napier University. [REDACTED] or email a.rowat@napier.ac.uk

Exploration of healthcare professionals' beliefs and attitudes to referring patients with a long-term condition to an exercise on referral scheme

I have read and understood the participant information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in this study.

I understand that I have the right to withdraw from this study at any stage without ~~giving~~ any reason.

If I withdraw from the study I agree for any information I have provided prior to that ~~to~~ be kept by the research team for analysis.

I understand that data collected for the study may be shared with other ~~researchers~~ on an anonymous basis. Data sharing will only be conducted as per ~~the~~ European Union General Data Protection Regulation (2017).

I would like to be sent a summary of the findings of the study.

I agree to participate in this study.

Please choose one from the following two choices]

I am happy to take part in an audio-recorded interview at a convenient location

Or

I would prefer to take part in a telephone interview

Telephone number (if telephone interview is requested) _____

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher

Name of researcher: Bruce Forrest
Address: School of Health and Social Care, Edinburgh Napier University,
Sighthill Campus, Edinburgh EH11 4BN
Email / Telephone: bruce.forrest@napier.ac.uk / XXXXXXXXXX

Participant debrief sheet

Healthcare professionals' attitudes and beliefs regarding physical activity promotion.

Thank you for taking part in this research study. Please take time to read the following information, which explains the study that you have participated in. Please contact me if there is anything that is not clear or if you would like more information.

What was the purpose of the study?

The aim of the study was to explore how healthcare professionals' attitudes and beliefs regarding physical activity influence their promotion of physical activity, in particular the Active Options 2 scheme.

What will happen to the information that I have provided?

The anonymised information collected for the study will be used as part of a wider evaluation of the Active Options 2 exercise on referral scheme that is funded by the Burdett Nursing Trust. It may be used in a peer reviewed publication journal, industry reports and/or presented at a conference.

Will I receive any individual feedback?

You will not normally receive any individual feedback, however you will be sent a copy of your interview transcript to read and check for accuracy.

How will I find out about the results?

The results of the study will be presented at an interactive staff workshop. A summary of the results will be available from the researcher (Bruce Forrest). You will be sent a copy of this summary via email if you have requested this.

Have I been deceived in any way during the project?

No, you have not been deceived in any way during the project.

If I change my mind and wish to withdraw the information I have provided, how do I do this?

If you change your mind and wish to withdraw from the study, please contact Dr. Coral Hanson by telephone on [REDACTED] or email c.hanson@napier.ac.uk. If you decide to withdraw from the study, any information you provided before your withdrawal will be kept for analysis unless you specifically request otherwise. This decision will not affect your employment with NHS Fife, and you will not be treated any differently by your employer if you choose to withdraw from the project.

If you have further questions about your participation in this study please contact:
Coral Hanson on [REDACTED] or email c.hanson@napier.ac.uk

If you would like to discuss this study with an independent person please contact:
Ann Rowat, Lecturer in the School of Health and Social Care on [REDACTED] or email a.rowat@napier.ac.uk

Appendix 4 Study one semi-structured interview guide

Semi-Structured Interview Guide

Understanding of AO2 programme:

- What knowledge does the HCP have of the AO2 programme and the reasons for its introduction?
- Establish understanding of the qualifying criteria, and exercise levels provided by the scheme.
- How well do they understand the referral process?
- How does the HCP think that patients feel about being referred? What factors do they feel are influential in success or failure to attend?
- Gain insight into the HCPs' sense of the AO2 scheme's efficacy, do they believe that it is of real benefit to the participants?

Beliefs and attitudes to physical activity and its effect on health:

- Establish the HCPs' beliefs regarding whether PA is beneficial to health.
- Explore the HCPs' opinion of their role in promoting physical activity. Education, role model?
- What barriers does the HCP feel that they encounter to taking part in physical activity and to recommending physical activity to others in the clinical setting?
- Does the HCP believe that there are any factors which may facilitate the provision of advice relating to physical activity and AO2?
- Does the HCP believe that there is a difference between how men and women engage with physical activity?
- Does the HCP approach advice relating to physical activity differently when speaking to men or women?
- Does the HCP believe that more men or more women are referred, and why?
- Explore the HCPs' personal engagement with physical activity. What, if any, activities do they take part in, how regularly and why/why not?

Appendix 5 Study two participant information forms, consent forms and interview guide

Participant information (quantitative component)

Do pre/post registration student allied health professionals report being better able to promote physical activity to patients after engagement with the Moving Medicine programme when compared to perceived ability before completing the programme?

A component of Scottish Men's pARTicipation after Exercise Referral (SMARTER study)

You are invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish. Contact me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

The aim of the study is to measure whether student nurses', midwives' and allied health professionals' knowledge and skills in promoting physical activity through conversation with their patients improves after engagement with the Moving Medicine - Active Conversations online education programme.

Why have I been asked to take part?

You have been asked to take part as you are a pre-registration nurse, midwife or allied health professional enrolled on a pre-registration programme at Edinburgh Napier University.

Do I have to take part?

No, it is up to you to decide whether to take part. Before you decide whether to take part or not, please read this information sheet. If you decide to participate, please complete the online consent declaration by following the provided link. Deciding not to take part or withdrawing from the study will not affect your progress on the programme of study at Edinburgh Napier University.

What will happen if I take part?

If you agree to participate, you will be invited to complete a questionnaire via Novi-Survey that will assess your perception of your knowledge and skills when discussing physical activity with patients. This will include your questioning technique, tone of voice and empathy. The questionnaire will also ask for your age, gender, course, year of course and other qualifications. Additionally, you will be asked about the current UK guidelines relating to physical activity.

You will then complete an online modular teaching programme, Moving Medicine Active Conversations via an external Moodle site (learn.academyforhealthcoaching.co.uk). It will include the development of open questioning techniques, summarising information, initiating conversations, and enabling people to verbalise their own feelings about physical activity. The programme is comprised of six modules with the aim of completing one module per week. You will learn about improving your practice through reflection and participation in moderated online discussions, and you will gain insight into useful techniques that may allow you to motivate your patients to become more active.

Motivational interviewing experts Dr Tim Anstiss and Dr Amanda Pitkethly will moderate the online discussions. Data relating to your use of the Moodle site (e.g. time spent on each element of the course, whether you click on course links on) will be examined so that we can understand how participants engage (or do not engage) with the online module.

At the end of the study, you will be invited to complete a further questionnaire to assess how your knowledge and skills have developed. We will ask you to complete this even if you have not engaged in the whole of the course.

It is anticipated that completion of the online programme and associated practice conversations will take a maximum of 16 hours. The course starts in November and will be completed by December 2019.

If you decide to withdraw from the study, we will ask for your consent to retain any information you provided before your withdrawal for analysis. You can request that any data that you have provided be destroyed up until the point of analysis, which will be in January 2020. If you wish to do this, you can email bruce.forrest@napier.ac.uk.

The course is not assessed, but you will receive a certificate of completion and 16 CPD points if you complete it.. This is accredited by the Faculty of Sport and Exercise Medicine UK.

What are the possible benefits of taking part?

You may acquire or develop knowledge and skills, which may allow you to more effectively promote physical activity to your patients. The findings may help healthcare professionals and providers of education programmes to understand what works best to support healthcare professionals to motivate their patients to live more active lives.

What are the possible disadvantages and risks of taking part?

It is not thought that there are many disadvantages, however, if you agree to participate, completing the online programme and questionnaires will take up some of your time.

What happens when the study is finished?

At the end of the research, the data you have provided will be destroyed once the findings of the study have been published. The data will be stored for no longer than ten years.

Will my taking part in the study be kept confidential?

All the information collected during the course of the research will be kept confidential as per the Data Protection Act (1988) and there are strict laws, which safeguard your privacy at every stage. From May 2018, the Data Protection Act (1988) was replaced

by the General Data Protection Regulation (GDPR). Your name will be removed from the data and replaced with a unique code so that you cannot be recognised from it. Only the research team will know which participant has been allocated which unique code. When the findings of the study are published only the code will be used and your name will not appear anywhere.

What will happen to the results of the study?

The study will be written up as a report and the findings published in healthcare and physical activity journals and presented at conferences. You may request a summary of the findings.

Who is organising the research and why?

The principal investigator organising the study is Professor Susan Dawkes, a Professor of Nursing at Edinburgh Napier University, and is part of a larger research study funded by the Burdett Trust. Bruce Forrest, who is a Staff Nurse in the Cardiology Department at the Royal Infirmary of Edinburgh and a PhD Student at Edinburgh Napier University, will carry out the research.

Who has reviewed the study?

The study proposal has been reviewed by the Research Integrity Committee at Edinburgh Napier University (approval to be confirmed).

If you have further questions about the study please contact:

Bruce Forrest on [REDACTED] or email bruce.forrest@napier.ac.uk

If you would like to discuss this study with someone independent of the study, please contact:

Dr. Anne Rowat, Lecturer, School of Health and Social Care, Edinburgh Napier University. [REDACTED] r email a.rowat@napier.ac.uk

Consent form (quantitative component)



Do pre/post registration student allied health professionals report being better able to promote physical activity to patients after engagement with the Moving Medicine Active Conversations programme when compared to perceived ability before completing the programme?

I have read and understood the participant information sheet and this consent form (Version 3 Dated 13.09.19).

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in this study.

I understand that I have the right to withdraw from this study at any stage without giving any reason.

If I withdraw from the study, I understand that I can request for any information I have provided to be destroyed up until January 2020, when data will be analysed.

I understand that data collected for the study may be shared with other researchers on an anonymous basis. Data sharing will only be conducted as per the European Union General Data Protection Regulation (2017).

I would like to be sent a summary of the findings of the study.

I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher

Name of researcher: Bruce Forrest

Address: School of Health and Social Care, Edinburgh Napier University,
Sighthill Campus, Edinburgh EH11 4BN

Email / Telephone: bruce.forrest@napier.ac.uk [REDACTED]

Information sheet (qualitative component)

What factors influenced the level of engagement in the Moving Medicine – Active Conversations online programme among participants who did not complete the course?

A component of Scottish Men's pARTicipation after Exercise Referral (SMARTER study)

You are invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish. Contact me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

The aim of the study is to gain insight into the experiences of people who registered for the Moving Medicine – Active Conversations programme but did not fully complete the course. This will allow a deeper understanding of how relevant the course is to different individuals, and, may allow refinement and improvement of this type of education resource in the future.

Why have I been asked to take part?

You have been asked to take part as you are a pre-registration nurse, midwife or allied health professional enrolled on a pre-registration programme at Edinburgh Napier University. You registered for the Moving Medicine-Active Conversations programme and did not fully complete the course.

Do I have to take part?

No, it is up to you to decide whether to take part. Before you decide whether to take part or not, please read this information sheet. If you decide to participate, please complete the attached consent form. Deciding not to take part or withdrawing from the study will not affect your progress on the programme of study at Edinburgh Napier University.

What will happen if I take part?

If you agree to participate, you will be invited to take part in a short telephone interview with a researcher who will ask you questions about your experience of the Moving medicine-Active Conversations online programme. The questions will explore the aspects of the programme that you thought were good, and those that you feel need to be improved. In particular, the questions will seek to establish the reasons for you not completing the course.

The interviews will be recorded using an encrypted device, and it is anticipated that the interviews will take no longer than 30 minutes. If you decide to withdraw from the study, we will ask for your consent to retain any information you provided before your withdrawal for analysis. You can request that any data that you have provided be destroyed up until the point of analysis, which will be in September 2020. If you wish to do this, you can email bruce.forrest@napier.ac.uk.

What are the possible benefits of taking part?

The findings may help healthcare professionals and providers of education programmes to understand what works best to support healthcare professionals to motivate their patients to live more active lives.

What are the possible disadvantages and risks of taking part?

It is not thought that there are many disadvantages, however if you agree to participate, the interviews will take up a small amount of your time.

What happens when the study is finished?

At the end of the research, the data you have provided will be destroyed once the findings of the study have been published. The data will be stored for no longer than ten years.

Will my taking part in the study be kept confidential?

All the information collected during the course of the research will be kept confidential as per the Data Protection Act (1988) and there are strict laws, which safeguard your privacy at every stage. From May 2018, the Data Protection Act (1988) was replaced by the General Data Protection Regulation (GDPR). Your name will be removed from

the data and replaced with a unique code so that you cannot be recognised from it. Only the research team will know which participant has been allocated which unique code. When the findings of the study are published only the code will be used and your name will not appear anywhere. For further information relating to the protection of your privacy, please refer to the attached Privacy Notice.

What will happen to the results of the study?

The study will be written up as a report and the findings published in healthcare and physical activity journals and presented at conferences. You may request a summary of the findings.

Who is organising the research and why?

The principal investigator organising the study is Professor Susan Dawkes, a Professor of Nursing at Edinburgh Napier University, and is part of a larger research study funded by the Burdett Trust. Bruce Forrest, who is a Staff Nurse in the Cardiology Department at the Royal Infirmary of Edinburgh and a PhD Student at Edinburgh Napier University, will carry out the research.

Who has reviewed the study?

The study proposal has been reviewed by the Research Integrity Committee at Edinburgh Napier University.

If you have further questions about the study please contact:

Bruce Forrest on [REDACTED] or email bruce.forrest@napier.ac.uk

If you would like to discuss this study with someone independent of the study, please contact:

Dr. Anne Rowat, Lecturer, School of Health and Social Care, Edinburgh Napier University. [REDACTED] or email a.rowat@napier.ac.uk

Consent form (qualitative component)



What factors influenced the level of engagement in the Moving Medicine – Active Conversations online programme among participants who did not complete the course?

- I have read and understood the participant information sheet, privacy notice, and this consent form (Version 4 Dated 30.07.20).
- I have had an opportunity to ask questions about my participation.
- I understand that I am under no obligation to take part in this study.
- I understand that I have the right to withdraw from this study at any stage without giving any reason.
- If I withdraw from the study, I understand that I can request for any information I have provided to be destroyed up until September 2020, when data will be analysed.
- I understand that data collected for the study may be shared with other researchers on an anonymous basis. Data sharing will only be conducted as per the European Union General Data Protection Regulation (2016/679).
- I would like to be sent a summary of the findings of the study.
-
- I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher

Name of researcher: Bruce Forrest

Address: School of Health and Social Care, Edinburgh Napier University,
Sighthill Campus, Edinburgh EH11 4BN

Email / Telephone: bruce.forrest@napier.ac.uk / [REDACTED]

Study two semi-structured interview guide

What factors influenced the level of engagement in the Moving Medicine – Active Conversations online programme among participants who did not complete the course?

Preface: Set the interviewee at rest, establish rapport; thanks for agreeing to participate; explain the purpose of the interview (to explore their experience of the Moving Medicine - Active Conversations programme, and understand the factors that impeded their progress to completion).

Reaffirm consent and reiterate that they are free to withdraw from the study at any time.

Record demographic/personal info to start:

- Name
- Clinical role

No.	Question	Potential prompts if required
1	<p>Why did they not complete the online programme?</p> <p>You registered for the online programme and completed the research survey, thanks for that. However you did not complete the course and I am really interested in understanding why. Could you tell me a bit about your experience of the course, and what you feel may</p>	<ul style="list-style-type: none">• Was registration straightforward?• How did you feel about completing the research surveys?• How user friendly was the online platform?• How relevant was the content to your clinical practice?• What was good about the course?• What needs to be changed?• Did the COVID-19 pandemic affect your progress?

	have prevented you from completing it?	
2	Is there anything else that you would like to tell me?	

Appendix 6 Study two pre-engagement questionnaire

Please complete the following details about yourself:

	<input checked="" type="checkbox"/>	
Gender		Male
		Female
		Intersex
		Prefer not to say
Age		
Qualifications (please tick all that apply): <input checked="" type="checkbox"/>		
		HNC
		HND
		BA
		BSc
		MA/MSc/MRes
		Other (please state)
Clinical role		Nurse
		Physiotherapist
		Social worker

		Occupational therapist
Programme of study		BA/BN
		BSc
		MA/MSc
Year of study		1
		2
		3
		4

Physical activity has been identified by the World Health Organisation as crucial in the prevention of disease and early mortality. Answer the following questions on the current UK physical activity guidelines by ticking all correct answers (more than one answer may be correct in each question).

1.

	Tick
Adults aged 19-64 years should do at least 150 minutes (2 1/2 hours) of moderate intensity activity or do at least 75 minutes of vigorous intensity activity throughout the week, or an equivalent combination of moderate and vigorous intensity activity in bouts of at least 10 minutes duration	

Adults aged 19-64 years should do a minimum of 30 minutes of moderate intensity activity on every day of the week	
Adults aged 19-64 years should do at least 60 minutes of vigorous activity in bouts of at least 15 minutes duration throughout the week.	
Adults aged 19-64 years should do at least 20 minutes of moderate or vigorous physical activity on 3 days per week	
Adults aged 19-64 years should minimise the amount of time spent being sedentary (sitting) for extended periods	

2.

	Tick
Adults aged 19-64 years should undertake muscle strengthening exercises whenever they have time to do so	
Adults aged 19-64 years should undertake muscle strengthening activities involving major muscle groups on at least two days per week	
Adults aged 19-64 years should undertake muscle strengthening activities involving major muscle groups on most days	
There is no specific guidance relating to muscle strengthening activities	

3.

	Tick
Older adult guidelines are the same as for those aged 19-64 years.	
In older age it is less important to be physically active	

Older adults who participate in any amount of physical activity will gain some health benefits, meaning that some physical activity is better than none, and more physical activity provides better health benefits should engage in 30mins of moderate intensity physical activity every day	
Older adults at risk of falls should incorporate balance and co-ordination exercises on at least four days of the week	
Older adults at risk of falls should incorporate balance and co-ordination exercises on at least two days of the week	

During your clinical work you will spend time talking with patients about their lifestyle and how they might change some of their behaviours in a way that will benefit their health (for example stopping smoking, eating more healthily or increasing their physical activity). One way to do this is to focus on setting goals for change. In order to do this successfully, you may use a technique called motivational interviewing. This study will assess your self-perceptions of your skill levels in motivational interviewing prior and post participation in a motivational interviewing training course. Please read the following questions and tick one box within each section that you think best describes how you talk to your patients now:

1. Cultivating change talk

Change talk occurs when during conversations with your patients they give a verbal clue that they have a desire to make a change in their lives, for example, "I don't know what to do, but something has to change". Cultivation of change talk means that you encourage the patient to use their own language in favour of change, you identify when they do so, and you structure the conversation in a way that elicits and reinforces change talk.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I pay no explicit attention to, or preference for, my patient's language in favour of changing.</p> <ul style="list-style-type: none"> • I only ask for a history of the problem • I structure the conversation to focus only on the problems my patient is experiencing • I do not show interest or concern for patient values, strengths, hopes or past successes • I am focused on providing education as the interaction with the patient • I supply reasons for change rather than encouraging them from the patient • I ignore change talk when it is offered 	
<p>I sporadically attend to my patient's language in favour of change and frequently miss opportunities to encourage change talk</p> <ul style="list-style-type: none"> • I pay superficial attention to my patients language about the change goal • I do not ask my patient about the potential benefits of change • I lack curiosity or have minimal interest in my patients values, strengths and past successes 	
<p>I often attend to my patient's language in favour of change, but miss some opportunities to encourage change talk</p> <ul style="list-style-type: none"> • I miss opportunities to encourage my patient's language in favour of change 	

<ul style="list-style-type: none"> • I give equal time and attention to sustain talk and change talk, for example using decisional balance after momentum for change is emerging 	
<p>I consistently attend to my patient’s language about change and make efforts to encourage it</p> <ul style="list-style-type: none"> • More often than not, I acknowledge my patient’s reasons for change and explore when they are offered • I often respond to change talk with reflections that do not encourage deeper exploration from my patient • I express curiosity when my patients offer change talk • I may explore patients’ values, strengths, hopes and past successes related to target goal 	
<p>Clinician shows a <i>marked and consistent</i> effort to increase the depth, strength or momentum of the patient’s language in favour of change</p> <ul style="list-style-type: none"> • Over a series of exchanges, I shape the patient’s language in favour of change • I use structured therapeutic tasks as a way of eliciting and reinforcing change talk • I do not usually miss opportunities to explore more deeply when patients offer change talk • I strategically elicit change talk and consistently respond to it when offered • I rarely miss opportunities to build momentum of change talk 	

2. Softening Sustain Talk

Softening sustain talk is a process through which you avoid a focus on the reasons against changing or for maintaining/sustaining the status quo. You should avoid lingering in discussions concerning the difficulty or undesirability of change. Although you might sometimes choose to attend to sustain talk to build rapport, in general you

should spend only as much time as needed to bring the discussion into more favourable territory for building motivation.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I consistently respond to the patient's language in a manner that facilitates the frequency or depth of arguments in favour of the status quo.</p> <ul style="list-style-type: none"> • I explicitly ask for arguments against change, query difficulties • I actively seek elaboration when sustain talk is offered through questions, reflections, or affirmations • I give preferential attention to and reinforcement of sustain talk when it occurs alongside change talk • I maintain curiosity and focus about reasons not to change 	
<p>I usually choose to explore, focus on, or respond to the patient's language in favour of the status quo.</p> <ul style="list-style-type: none"> • I often deepen the discussion of barriers or difficulties of change when patients mention them • I ask about barriers to change on more than one occasion during the interview, even if the patient does not bring it up • I often reflect benefits of the status quo 	

<p>I give preference to the patient’s language in favour of the status quo, but may show some instances of shifting the focus away from sustain talk.</p> <ul style="list-style-type: none"> • I missed some opportunities to shift focus away from sustain talk • I attend to benefits of status quo even when patient offers change talk 	
<p>Clinician typically avoids an emphasis on patient language favouring the status quo.</p> <ul style="list-style-type: none"> • I do not explicitly ask for reasons not to change • I pay minimal attention to sustain talk when it occurs • I do not seek elaboration of sustain talk • I avoid investigating and I do not focus on patient’s reasons to maintain the status quo • I do not linger in discussions about barriers to change 	
<p>I show a marked and consistent effort to decrease the depth, strength, or momentum of the patient’s language in favour of the status quo</p> <ul style="list-style-type: none"> • I use structured therapeutic task(s) to shift the focus of sustain talk toward the target change goal • I may use double-sided reflections (ending with a reflection of change talk) to move the conversation away from sustain talk 	

3. Partnership

The concept of partnership describes the extent to which you convey an understanding that expertise and wisdom about change resides mostly within the patient. Partnership occurs when you behave as if the interview is occurring between two equal partners, both of whom have knowledge that might be useful in solving the change under consideration.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I actively assume the expert role for the majority of the interaction with the patient. Collaboration or partnership is absent</p> <ul style="list-style-type: none"> • I explicitly take the expert role by defining the problem, prescribing the goals, or laying out the plan of action • I actively force a particular agenda for the majority of the interaction with the patient • I deny or minimise patient ideas • I dominate conversation • I argue when patient offers alternative approach • I often exhibit the righting reflex 	
<p>I superficially respond to opportunities to collaborate</p> <ul style="list-style-type: none"> • I rarely surrender the expert role • I make minimal or superficial enquiry of patient input • I often sacrifice opportunities for mutual problem solving in favour of supplying knowledge or expertise • I make minimal or superficial responses to the patient's potential agenda items, knowledge, ideas and/or concerns 	

<ul style="list-style-type: none"> • I occasionally may correct the patient or refute what the patient has said 	
<p>I incorporate patients' contributions but do so in a lukewarm or erratic fashion</p> <ul style="list-style-type: none"> • I may take advantage of opportunities to collaborate, but do not structure interaction to solicit this • I miss some opportunities to collaborate when initiated by the patient • The righting reflex is largely absent • I sacrifice some opportunities for mutual problem solving in favour of supplying knowledge or advice • I seem to be in a stand-off with the patient 	
<p>I foster collaboration and power sharing so that the patient's contributions impact the session in ways that they otherwise would not</p> <p>I do some structuring of sessions to ensure patient input</p> <ul style="list-style-type: none"> • I search for agreement on problem definition, agenda setting, and goal setting • I solicit patients' views in more than a perfunctory fashion • Engage patients in problem solving or brainstorming • I do not attempt to educate or direct if patient "pushes back" with sustain talk • I do not insist on resolution unless patient is ready 	
<p>I actively foster and encourage power sharing in the interaction in such a way that patient's contributions substantially influence the nature of the session</p> <ul style="list-style-type: none"> • I genuinely negotiate the agenda and goals for the session • I indicate curiosity about patient ideas through querying and listening • I facilitate patient evaluation of options and planning • I explicitly identify the patient as the expert and decision maker • I temper advice giving and expertise depending on patient input 	

<ul style="list-style-type: none"> • I favour discussion of patient's strengths and resources rather than probing for deficits 	
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4. Empathy

Empathy is the extent to which you understand or make an effort to grasp the patient's perspective and experience (i.e., how much you attempt to "try on" what the patient feels or thinks). Empathy should not be confused with sympathy, warmth, acceptance, genuineness, support or patient advocacy.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I actively assume the expert role for the majority of the interaction with the patient. Collaboration or partnership is absent</p> <ul style="list-style-type: none"> • I explicitly take the expert role by defining the problem, prescribing the goals, or laying out the plan of action • I actively force a particular agenda for the majority of the interaction with the patient • I deny or minimise patient ideas • I dominate conversation • I argue when patient offers alternative approach • I often exhibit the righting reflex 	
<p>I superficially respond to opportunities to collaborate</p> <ul style="list-style-type: none"> • I rarely surrender the expert role • I make minimal or superficial enquiry of patient input • I often sacrifice opportunities for mutual problem solving in favour of supplying knowledge or expertise • I make minimal or superficial responses to the patient's potential agenda items, knowledge, idea and/or concerns 	

<ul style="list-style-type: none"> • I occasionally may correct the patient or refute what the patient has said 	
<p>I incorporate patients' contributions but do so in a lukewarm or erratic fashion</p> <ul style="list-style-type: none"> • I may take advantage of opportunities to collaborate, but do not structure interaction to solicit this • I miss some opportunities to collaborate when initiated by the patient • The righting reflex is largely absent • I sacrifice some opportunities for mutual problem solving in favour of supplying knowledge or advice • I seem to be in a stand-off with the patient 	
<p>I foster collaboration and power sharing so that the patient's contributions impact the session in ways that they otherwise would not</p> <ul style="list-style-type: none"> • I do some structuring of sessions to ensure patient input • I search for agreement on problem definition, agenda setting and goal setting • I solicit patient views in more than a perfunctory fashion • Engage patients in problem solving or brainstorming • I do not attempt to educate or direct if patient "pushes back" with sustain talk • I do not insist on resolution unless the patient is ready 	
<p>I actively foster and encourage power sharing in the interaction in such a way that the patient's contributions substantially influence the nature of the session</p> <p>I genuinely negotiate the agenda and goals for the session</p> <ul style="list-style-type: none"> • I indicate curiosity about patient ideas through querying and listening • I facilitate patient evaluation of options and planning • I explicitly identify the patient as the expert and decision maker • I temper advice giving and expertise depending on patient input • I favour discussion of patient's strengths and resources rather than probing for deficits 	

Appendix 7 Study two post-engagement questionnaire

Physical activity has been identified by the World Health Organisation as crucial in the prevention of disease and early mortality. Answer the following questions on the current UK physical activity guidelines by ticking all correct answers (more than one answer may be correct in each question).

1.

	Tick
Adults aged 19-64 years should do at least 150 minutes (2 1/2 hours) of moderate intensity activity or do at least 75 minutes of vigorous intensity activity throughout the week, or an equivalent combination of moderate and vigorous intensity activity in bouts of at least 10 minutes duration	
Adults aged 19-64 years should do a minimum of 30 minutes of moderate intensity activity on every day of the week	
Adults aged 19-64 years should do at least 60 minutes of vigorous activity in bouts of at least 15 minutes duration throughout the week.	
Adults aged 19-64 years should do at least 20 minutes of moderate or vigorous physical activity on 3 days per week	
Adults aged 19-64 years should minimise the amount of time spent being sedentary (sitting) for extended periods	

2.

	Tick
Adults aged 19-64 years should undertake muscle strengthening exercises whenever they have time to do so	
Adults aged 19-64 years should undertake muscle strengthening activities involving major muscle groups on at least two days per week	

Adults aged 19-64 years should undertake muscle strengthening activities involving major muscle groups on most days	
There is no specific guidance relating to muscle strengthening activities	

3.

	Tick
Older adult guidelines are the same as for those aged 19-64 years.	
In older age it is less important to be physically active	
Older adults who participate in any amount of physical activity will gain some health benefits, meaning that some physical activity is better than none, and more physical activity provides better health benefits should engage in 30mins of moderate intensity physical activity every day	
Older adults at risk of falls should incorporate balance and co-ordination exercises on at least four days of the week	
Older adults at risk of falls should incorporate balance and co-ordination exercises on at least two days of the week	

During your clinical work you will spend time talking with patients about their lifestyle and how they might change some of their behaviours in a way that will benefit their health (for example stopping smoking, eating more healthily or increasing their physical activity). One way to do this is to focus on setting goals for change. In order to do this successfully, you may use a technique called motivational interviewing. This study will assess your self-perceptions of your skill levels in motivational interviewing prior and post participation in a motivational interviewing training course. Please read the following questions and tick one box within each section that you think best describes how you talk to your patients now:

5. Cultivating change talk

Change talk occurs when during conversations with your patients they give a verbal clue that they have a desire to make a change in their lives, for example, “I don’t know what to do, but something has to change”. Cultivation of change talk means that you encourage the patient to use their own language in favour of change, you identify when they do so, and you structure the conversation in a way that elicits and reinforces change talk.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I pay no explicit attention to, or preference for, my patient’s language in favour of changing.</p> <p>I only ask for a history of the problem</p> <ul style="list-style-type: none"> • I structure the conversation to focus only on the problems my patient is experiencing • I do not show interest or concern for patient values, strengths, hopes or past successes • I am focused on providing education as the interaction with the patient • I supply reasons for change rather than encouraging them from the patient • I ignore change talk when it is offered 	
<p>I sporadically attend to my patient’s language in favour of change and frequently miss opportunities to encourage change talk</p> <ul style="list-style-type: none"> • I pay superficial attention to my patients language about the change goal • I do not ask my patient about the potential benefits of change • I lack curiosity or have minimal interest in my patients values, strengths and past successes 	

<p>I often attend to my patient's language in favour of change, but miss some opportunities to encourage change talk</p> <ul style="list-style-type: none"> • I miss opportunities to encourage my patient's language in favour of change • I give equal time and attention to sustain talk and change talk, for example using decisional balance after momentum for change is emerging 	
<p>I consistently attend to my patient's language about change and make efforts to encourage it</p> <ul style="list-style-type: none"> • More often than not, I acknowledge my patient's reasons for change and explore when they are offered • I often respond to change talk with reflections that do not encourage deeper exploration from my patient • I express curiosity when my patients offer change talk • I may explore patients' values, strengths, hopes and past successes related to target goal 	
<p>Clinician shows a <i>marked and consistent</i> effort to increase the depth, strength, or momentum of the patient's language in favour of change</p> <ul style="list-style-type: none"> • Over a series of exchanges, I shape the patient's language in favour of change • I use structured therapeutic tasks as a way of eliciting and reinforcing change talk • I do not usually miss opportunities to explore more deeply when patients offer change talk • I strategically elicit change talk and consistently respond to it when offered • I rarely miss opportunities to build momentum of change talk 	

6. Softening Sustain Talk

Softening sustain talk is a process through which you avoid a focus on the reasons against changing or for maintaining/sustaining the status quo. You should avoid lingering in discussions concerning the difficulty or undesirability of change. Although you might sometimes choose to attend to sustain talk to build rapport, in general you

should spend only as much time as needed to bring the discussion into more favourable territory for building motivation.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I consistently respond to the patient’s language in a manner that facilitates the frequency or depth of arguments in favour of the status quo.</p> <ul style="list-style-type: none"> • I explicitly ask for arguments against change, query difficulties • I actively seek elaboration when sustain talk is offered through questions, reflections or affirmations • I give preferential attention to and reinforcement of sustain talk when it occurs alongside change talk • I maintain curiosity and focus about reasons not to change 	
<p>I usually choose to explore, focus on, or respond to the patient’s language in favour of the status quo.</p> <ul style="list-style-type: none"> • I often deepen the discussion of barriers or difficulties of change when the patient mentions them • I ask about barriers to change on more than one occasion during the interview, even if the patient does not bring it up • I often reflect benefits of the status quo 	
<p>I give preference to the patient’s language in favour of the status quo, but may show some instances of shifting the focus away from sustain talk.</p> <ul style="list-style-type: none"> • I missed some opportunities to shift focus away from sustain talk • I attend to benefits of status quo even when patient offers change talk 	
<p>Clinician typically avoids an emphasis on patient language favouring the status quo.</p> <ul style="list-style-type: none"> • I do not explicitly ask for reasons not to change 	

<ul style="list-style-type: none"> • I pay minimal attention to sustain talk when it occurs • I do not seek elaboration of sustain talk • I avoid investigating and I do not focus on patient's reasons to maintain the status quo • I do not linger in discussions about barriers to change 	
<p>I show a marked and consistent effort to decrease the depth, strength or momentum of the patient's language in favour of the status quo</p> <ul style="list-style-type: none"> • I use structured therapeutic task(s) to shift the focus of sustain talk toward the target change goal • I may use double-sided reflections (ending with a reflection of change talk) to move the conversation away from sustain talk 	

7. Partnership

The concept of partnership describes the extent to which you convey an understanding that expertise and wisdom about change resides mostly within the patient. Partnership occurs when you behave as if the interview is occurring between two equal partners, both of whom have knowledge that might be useful in solving the change under consideration.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I actively assume the expert role for the majority of the interaction with the patient. Collaboration or partnership is absent</p> <ul style="list-style-type: none"> • I explicitly take the expert role by defining the problem, prescribing the goals, or laying out the plan of action • I actively force a particular agenda for the majority of the interaction with the patient • I deny or minimise patient ideas • I dominate conversation • I argue when the patient offers an alternative approach • I often exhibit the righting reflex 	

<p>I superficially respond to opportunities to collaborate</p> <ul style="list-style-type: none"> • I rarely surrender the expert role • I make minimal or superficial enquiry of patient input • I often sacrifice opportunities for mutual problem solving in favour of supplying knowledge or expertise • I make minimal or superficial responses to the patient’s potential agenda items, knowledge, ideas and/or concerns • I occasionally may correct the patient or refute what the patient has said 	
<p>I incorporate patients’ contributions but do so in a lukewarm or erratic fashion</p> <ul style="list-style-type: none"> • I may take advantage of opportunities to collaborate, but do not structure interaction to solicit this • I miss some opportunities to collaborate when initiated by the patient • The righting reflex is largely absent • I sacrifice some opportunities for mutual problem solving in favour of supplying knowledge or advice • I seem to be in a stand-off with the patient 	
<p>I foster collaboration and power sharing so that the patient’s contributions impact the session in ways that they otherwise would not</p> <ul style="list-style-type: none"> • I do some structuring of sessions to ensure patient input • I search for agreement on problem definition, agenda setting, and goal setting • I solicit patients’ views in more than a perfunctory fashion • Engage patients in problem solving or brainstorming • I do not attempt to educate or direct if patient “pushes back” with sustain talk • I do not insist on resolution unless patient is ready 	
<p>I actively foster and encourage power sharing in the interaction in such a way that patient’s contributions substantially influence the nature of the session</p>	

<ul style="list-style-type: none"> • I genuinely negotiate the agenda and goals for the session • I indicate curiosity about patient ideas through querying and listening • I facilitate patient evaluation of options and planning • I explicitly identify the patient as the expert and decision maker • I temper advice giving and expertise depending on patient input • I favour discussion of the patient's strengths and resources rather than probing for deficits 	
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8. Empathy

Empathy is the extent to which you understand or make an effort to grasp the patient's perspective and experience (i.e., how much you attempt to "try on" what the patient feels or thinks). Empathy should not be confused with sympathy, warmth, acceptance, genuineness, support, or patient advocacy.

Thinking about the conversations that you have with your patients when you are trying to encourage them to change their physical activity behaviour, which of the following best describes your approach:

	Tick
<p>I actively assume the expert role for the majority of the interaction with the patient. Collaboration or partnership is absent</p> <ul style="list-style-type: none"> • I explicitly take the expert role by defining the problem, prescribing the goals, or laying out the plan of action • I actively force a particular agenda for the majority of the interaction with the patient • I deny or minimise patient ideas • I dominate conversation • I argue when the patient offers an alternative approach • I often exhibit the righting reflex 	
<p>I superficially respond to opportunities to collaborate</p> <ul style="list-style-type: none"> • I rarely surrender the expert role • I make minimal or superficial enquiry of patient input 	

<ul style="list-style-type: none"> • I often sacrifice opportunities for mutual problem solving in favour of supplying knowledge or expertise • I make minimal or superficial responses to patient's potential agenda items, knowledge, ideas and/or concerns • I occasionally may correct the patient or refute what the patient has said 	
<p>I incorporate patients' contributions but do so in a lukewarm or erratic fashion</p> <ul style="list-style-type: none"> • I may take advantage of opportunities to collaborate, but do not structure interaction to solicit this • I miss some opportunities to collaborate when initiated by the patient • The righting reflex is largely absent • I sacrifice some opportunities for mutual problem solving in favour of supplying knowledge or advice • I seem to be in a stand-off with the patient 	
<p>I foster collaboration and power sharing so that the patient's contributions impact the session in ways that they otherwise would not</p> <ul style="list-style-type: none"> • I do some structuring of sessions to ensure patient input • I search for agreement on problem definition, agenda setting and goal setting • I solicit patient views in more than a perfunctory fashion • Engage patients in problem solving or brainstorming • I do not attempt to educate or direct if patient "pushes back" with sustain talk • I do not insist on resolution unless patient is ready 	
<p>I actively foster and encourage power sharing in the interaction in such a way that the patient's contributions substantially influence the nature of the session</p> <ul style="list-style-type: none"> • I genuinely negotiate the agenda and goals for the session • I indicate curiosity about patient ideas through querying and listening • I facilitate patient evaluation of options and planning • I explicitly identify the patient as the expert and decision maker • I temper advice giving and expertise depending on patient input 	

<ul style="list-style-type: none"> I favour discussion of the patient's strengths and resources rather than probing for deficits 	
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Below you will find six statements relating to the completion of the Moving Medicine - Active Conversations programme. Based on your experience of the programme, please indicate your level of agreement with the statements using the scale provided below. Please tick only one option for each statement.

	Totally disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Totally agree
I found the programme to be easy to access and navigate							
The content of the programme was of relevance to my field of practice							
The programme allowed me to achieve my learning outcomes							
I enjoyed using the moderated							

discussion boards							
I learned new skills that I will put to use in practice with my patients							
I would recommend the programme to my peers							

In your own words, please comment on what was good about the programme, and suggest any ways in which you think the programme could be improved:

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