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# Methods of connecting primary care patients with community-based physical activity opportunities: A realist scoping review

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## Abstract

Deemed a global public health problem by the World Health Organization, physical inactivity is estimated to be responsible for one in six deaths in the United Kingdom (UK) and to cost the nation's economy £7.4 billion per year. A response to the problem receiving increasing attention is connecting primary care patients with community-based physical activity opportunities. We aimed to explore what is known about the effectiveness of different methods of connecting primary care patients with community-based physical activity opportunities in the United Kingdom by answering three research questions: *1) What methods of connection from primary care to community-based physical activity opportunities have been evaluated?; 2) What processes of physical activity promotion incorporating such methods of connection are (or are not) effective or acceptable, for whom, to what extent and under what circumstances; 3) How and why are (or are not) those processes effective or acceptable?* We conducted a realist scoping review in which we searched Cochrane, Medline, PsycNET, Google Advanced Search, National Health Service (NHS) Evidence and NHS Health Scotland from inception until August 2020. We identified that five methods of connection from primary care to community-based physical activity opportunities had been evaluated. These were embedded in 15 processes of physical activity promotion, involving patient identification and behaviour change strategy delivery, as well as connection. In the contexts in which they were implemented, four of those processes had strong positive findings, three had moderately positive findings and eight had negative findings. The underlying theories of change were highly supported for three processes, supported to an extent for four and refuted for eight processes. Comparisons of the processes and their theories of change revealed several indications helpful for future development of effective processes. Our review also highlighted the limited evidence base in the area and the resulting need for well-designed theory-based evaluations.

**KEYWORDS**

behavioural medicine, evaluation research, exercise, health promotion, health psychology, health services research, physical activity, primary care, primary care research, referral and consultation, review, systematic reviews

# 1 | INTRODUCTION

## 1.1 | Background

> Lack of (physical) activity destroys the good condition of every human being.
>
> (Plato)

Deemed a global public health problem by the World Health Organization (WHO) (World Health Organisation, 2020), physical inactivity is a leading risk factor for noncommunicable diseases (World Health Organisation, 2018). Levels of physical inactivity in the United Kingdom (UK) are among the highest in the world (Savill et al., 2015) with 40% of adults (aged 18+ years not reaching the WHO-recommended physical activity levels) (World Health Organisation, n.d.). Physical inactivity is estimated to be responsible for one in six deaths in the United Kingdom and a £7.4 billion cost to the nation's annual economy (Public Health England, 2019). In addition to protecting against noncommunicable disease morbidity and premature mortality, and reducing financial burden, physical activity holds a host of other benefits, including reduced anxiety, depression and stress and increased mood, self-esteem, sleep quality, cognitive function and energy levels (Rhodes et al., 2017; White et al., 2017). Physical activity promotion is therefore a priority for public health improvement (Lion et al., 2019; Sparling et al., 2000; World Health Organisation, 2014).

Primary care professionals (PCP) are viewed as instrumental in physical activity promotion (Peckham et al., 2011). In the United Kingdom, the National Institute for Health and Care Excellence (NICE) recommends that such professionals promote physical activity (NICE, 2013). Health promotion is also included in the Royal College of General Practitioners (2019a) Curriculum, and undergraduate medical curriculums are increasingly including education in the importance, and promotion, of physical activity (Gates et al., 2019; Milton et al., 2020). PCP are well-placed to help address the problem of physical inactivity (Douglas et al., 2006; Williams, 2011) as they are in contact with a large proportion of the population (McPhail & Schippers, 2012; Wheeler et al., 2017) and are deemed a respected and trusted source of lifestyle advice (The NHS Information & Centre for Health & Social Care, 2008).

The inclusion of links to community-based support in promoting physical activity is a strategy receiving increasing attention (Global Advocacy for Physical Activity (GAPA) the Advocacy Council of the International Society for Physical Activity and Health (ISPAH) (2011); Jackson et al., 2014). In the United Kingdom several influential bodies, including NICE (2015), the Academy of Medical Royal Colleges (2015) and specifically the Royal College of General Practitioners (2019b), Public Health England (2019) and the Scottish Government recommend (2018) this, and the strategy is being implemented in practice in several ways. Exercise Referral Schemes (ERS)—first introduced in the 1990s as 'GP referral schemes' and 'exercise on prescription' (Rowley et al., 2018)—remain popular (Morgan et al., 2016; Sidford, 2006), and other methods of connecting primary care patients with community-based physical activity opportunities have been introduced. These include signposting by PCP (Bull & Milton, 2010) and connection by PCP to an intermediary (e.g. link worker or physical activity professional) who then connects patients with physical activity opportunities (Pescheny et al., 2019)—increasingly referred to in the United Kingdom as 'social prescribing' (Husk et al., 2020).

### What is known about this topic

- Primary care professionals (PCP) in the United Kingdom are increasingly connecting patients with community-based physical activity opportunities by several means, including Exercise Referral Schemes, signposting and connection with an intermediary who connects patients with opportunities.

### What this paper adds

- First synthesis of the evidence regarding the effectiveness for PCP and patients of methods of connection from primary care to community-based physical activity opportunities in the United Kingdom;
- Several useful indications for future development of effective physical activity promotion processes incorporating such methods of connection—facilitated by use of behavioural theory (the COM-B model and the CALO-RE Taxonomy);
- Identification of the need for a greater focus on the effectiveness of such methods of connection in primary evaluations.

## 1.2 | Review objectives

The aim of our review was to explore what is known about the effectiveness of different methods of connecting primary care patients with community-based physical activity opportunities in the United Kingdom. It was conducted as part of a larger project aiming to design and evaluate methods of connecting primary care patients to jog**scotland**—an established community-based physical activity opportunity (https://jogscotland.org.uk).

It is important to note a fundamental complexity in conducting the review: for a method of connection to be effective, that is for it to achieve a high percentage of eligible and willing patients taking up a physical activity opportunity, *two* sets of actors are required to undertake particular behaviours—(a) PCP must connect eligible and willing patients with the physical activity opportunity, (b) connected patients must take up the opportunity, that is enrol for and attend the first session. Both these behaviours were therefore of interest in our review. It is also important to note the inclusion of acceptability as an outcome in the review. Acceptability refers to how well an intervention—in this case a method of connection—is received by the target

population and the extent to which it meets the needs of that population and the organisational settings (Ayala & Elder, 2011) and is a necessary condition for effective interventions (Sekhon et al., 2017). Where no effectiveness evidence is available, acceptability evidence can provide insight into an intervention's potential effectiveness, and where evidence regarding both effectiveness and acceptability is available, acceptability can help to explain effectiveness. We therefore had four outcomes in our review: (a) effectiveness for PCP; (b) acceptability for PCP; (c) effectiveness for patients; (d) acceptability for patients. For the purposes of this review we employed the following outcome indicators: PCP connection rates (the percentage of eligible and willing patients connected with a physical activity opportunity) for effectiveness for PCP; PCP receptiveness and views regarding whether or not personal and organisational-setting needs were met for acceptability for PCP; patient uptake rates (the percentage of connected patients enrolling for and attending the first session of the physical activity opportunity) for effectiveness for patients; patient receptiveness and views regarding whether or not personal needs were met for acceptability for patients.

The development of the specific research questions was initially influenced by two factors: (a) our aim to evaluate all methods of connection from primary care to community-based physical activity opportunities; (b) the value of understanding how and why interventions succeed or fail in different contexts (Craig et al., 2018). A third factor became apparent during data extraction: as each method of connection occurred as part of a multi-stage process of physical activity promotion, evidence was not available regarding the effectiveness or acceptability of methods of connection per se, but rather regarding the processes of physical activity promotion as a whole. These processes included the identification of eligible and willing patients who would benefit from increasing their physical activity levels and the delivery of behaviour change strategies aiming to enhance the likelihood of those patients increasing their physical activity levels, as well as connection of patients with community-based physical activity opportunities. We therefore refined questions 2 and 3 to broaden their focus from 'methods of connection' to 'processes of physical activity promotion incorporating methods of connection'. We maintained a focus on methods of connection as much as possible as these are not married to the processes of physical activity promotion in which they are embedded. It is therefore useful to know as much as possible about their effectiveness and/or acceptability in order to inform development of future physical activity promotion processes incorporating connection from primary care to community-based physical activity opportunities. The final research questions were:

1. What methods of connection from primary care to community-based physical activity opportunities have been evaluated?
2. What processes of physical activity promotion incorporating such methods of connection are (or are not) effective or acceptable, for whom, to what extent and under what circumstances?
3. How and why are (or are not) those processes effective or acceptable?

## 2 | METHODS

### 2.1 | Study design

We undertook a realist scoping review which allowed a complementary combination of the *broad* focus of a scoping review (Arksey & O'Malley, 2005) and the *rich* data synthesis of a realist review (Pawson, 2002; Wong, Greenhalgh, et al., 2013). This enabled us to answer our research questions by: (a) identifying and mapping the extent, range and nature of the evidence (Arksey & O'Malley, 2005); (b) exploring the relationships between context, mechanisms and outcomes for each intervention or class of intervention through establishing initial programme theories and testing each component of those theories using relevant empirical evidence to enable refinement of programme theories (Pawson, 2002; Wong, Westhorp, et al., 2013). Despite increasing use of this type of evidence synthesis over the last decade (Brydges et al., 2017; Haynes et al., 2018; Kirst et al., 2012; Toohey & Rock, 2011), we could not identify any methodological guidance regarding realist scoping reviews. We therefore followed both scoping (Arksey & O'Malley, 2005; Levac et al., 2010; Peters et al., 2015) and realist review guidance (Pawson et al., 2005; Wong, Westhorp, et al., 2013), making modifications where necessary to combine the two. This enabled us to develop methodological guidance concerning realist scoping reviews (manuscript in preparation). In line with realist review guidance (Pawson et al., 2005) we did not pre-publish our review protocol. To report our findings, we follow the Enhancing the QUAlity and Transparency Of health Research (EQUATOR) network guidelines for reporting both scoping (Tricco et al., 2018) and realist (Wong, Greenhalgh, et al., 2013) reviews.

### 2.2 | Search strategy

We developed our search strategy in an iterative manner, holding multiple discussions among the research team and testing several potential search terms such as 'social prescribing', 'signposting', 'gym' before finalising the strategy. All types of research design had potential to contribute to the answering of our research questions, and both academic and grey literature was relevant. We did not set date limits on any searches, therefore all databases were searched from inception until October 2018, with an updated search conducted in August 2020. See Appendix S1 for final search strategy.

### 2.3 | Eligibility criteria

We considered documents for inclusion if they:

- Provided details of one or more methods of connection from primary care to community-based physical activity opportunities;

- Reported an evaluation (quantitative and/or qualitative), or provided data enabling an evaluation, of one or more methods of connection from primary care to community-based physical activity opportunities;
- Reported evaluations undertaken in the United Kingdom;
- Reported evaluations fully or mainly undertaken in an adult (18+ years old) patient population;
- Reported evaluations in which the connecting health professionals were fully or mainly PCP;
- Were written in English.

We excluded documents if they:

- Focussed on connection to condition-specific physical activity opportunities.

## 2.4 | Document selection

Two authors (RHR, KBC) independently determined eligibility of documents by applying the above eligibility criteria in a two-stage process: (a) screening of titles, abstracts, summaries, lists of contents; (b) screening of full texts. This process was assisted by the use of Covidence systematic review software (www.covidence.org). Any discrepancies were resolved by discussion, with a third author (SAC) consulted when necessary.

## 2.5 | Document appraisal

In accordance with guidance on conducting realist reviews (Pawson et al., 2005; Wong, Westhorp, et al., 2013) two authors (RHR, KBC) independently appraised the relevance and rigour of the included documents. Relevance was determined by the number of the four outcomes of interest (PCP effectiveness, PCP acceptability, patient effectiveness and patient acceptability) addressed in the document and was classified as 'high', 'medium' or 'low' (See Appendix S2 for details of classifications). Rigour of documents reporting outcomes concerning acceptability was appraised using the five-item, methodologically eclectic 'rigour' tool of Dixon-Woods et al. (2006) and was classified as 'high', 'medium' or 'low' (See Appendix S2 for details of classifications). Such a tool was not appropriate for appraising rigour of documents addressing effectiveness outcomes as none of those documents reported *findings* regarding effectiveness. Rather they provided *data* that enabled *us* to undertake an evaluation of effectiveness. Appraisal of the methods and findings was therefore not useful—relevant appraisal of rigour related instead to the completeness of the data required to evaluate effectiveness. This was appraised using the question 'Were the data necessary to calculate effectiveness provided?' and was classified as 'high', 'medium' or 'low' (See Appendix S2 for details of classifications). Any discrepancies were resolved by discussion, with the option to consult a third author (SAC) if necessary. As per guidance concerning scoping reviews (Arksey & O'Malley, 2005; Levac et al., 2010) we took the decision not to exclude any documents based on their rigour. We rather took their relevance and rigour into account in the data synthesis as advocated by Dixon-Woods et al. (2006).

## 2.6 | Data extraction

Data extraction involved identifying key components of the methods of connection and the physical activity promotion processes in which they were embedded, along with the expected impacts/outcomes pertinent to the review. This required us to infer some elements of the processes based on reported information. Data extraction also involved eliciting theories of change (sequences of events leading to a desired outcome, together with underlying assumptions about mechanisms, where mechanisms refers to how and why the sequence might generate that outcome; Vogel, 2012). We inferred the underlying assumptions about how and why the processes of physical activity promotion incorporating methods of connection might generate the outcomes of interest in the review, as the included evaluations did not explicate these assumptions. To do so we employed the Capability, Opportunity, Motivation – Behaviour (COM-B) model (Michie, van Stralen, et al., 2011)—a framework for understanding behaviour/behaviour change. In this model behaviour is viewed as the result of individual decision-making, and as part of an interacting system involving the three components of *capability* to perform a behaviour (determined by psychological and physical capacity/incapacity), *opportunity* to perform a behaviour (determined by enabling/disabling external social and physical factors) and *motivation* to perform a behaviour (determined by energising/discouraging automatic and reflective mental processes). Data extraction also involved establishing evidence regarding effectiveness and acceptability. We calculated PCP connection rates and patient uptake rates using the data provided—effectively conducting primary evaluations—as these were not a focus of the included evaluations. Establishing acceptability required us to identify relevant findings employing different terms, as the included evaluations did not use the term 'acceptability'. Finally, data extraction involved identifying relevant information regarding context and mechanisms. For the purpose of our review 'context' included: (a) the actors, that is, the type of PCP and patients and their characteristics—specifically gender, age and physical activity level; (b) the circumstances, including the workload associated with the processes of physical activity promotion incorporating methods of connection for both sets of actors, as well as any other factors relating to capability, opportunity or motivation (Michie, van Stralen, et al., 2011) to engage with the processes. Identifying relevant information regarding mechanisms required us to analyse how and why the methods of connection and the physical activity processes in which they were embedded generated or did not generate the desired outcome(s), as again this was not a focus of the included evaluations. To do so we firstly developed initial programme theories, comprising key components of the methods of connection and the physical activity promotion processes in which they were embedded, expected outcomes/impacts as

relevant for the review and theories of change. We then established context-mechanism-outcome configurations to test and refine those theories. Where effectiveness evidence was not available, we employed acceptability evidence as the outcome. For processes where evidence regarding both was available, we employed acceptability evidence to help explain why the process was or was not effective.

To facilitate the process of data extraction we developed forms based on our research questions—one for PCP and one for patients. The data were extracted by KBC and reviewed by RHR. Any disagreements were resolved by discussion, with third and fourth authors (SAC and GO) consulted when necessary.

## 2.7 | Data synthesis

Data synthesis involved classifying evidence regarding workload, effectiveness and acceptability as 'high', 'medium' or 'low' (see Table 1 for details of classification schemes). It also involved categorising behaviour change strategies using the Refined Taxonomy of Behaviour Change Techniques to Help People Change Their Physical Activity and Healthy Eating Behaviours (CALO-RE Taxonomy) (Michie, Ashford, et al., 2011) to aid description and facilitate comparison, of the processes of physical activity promotion incorporating methods of connection. We developed separate forms to conduct the data syntheses for each of the three research questions.

For question 1 we identified the ways in which PCP connected patients with community-based physical activity opportunities. We classified these into overarching methods of connection and included detail regarding the different modes of implementation of each.

For question 2 we identified the processes of physical activity promotion in which the methods identified in question 1 were embedded. We then undertook comparisons of those processes to identify any syntheses that could occur as per standard realist (systematic) reviews within the realist scoping review. In other words, we sought opportunities to compare findings for a process or class of process implemented in multiple contexts. Each of the processes identified was unique, differing significantly from all the others, therefore such opportunities did not exist and it was necessary to conduct data synthesis separately for each process. Information regarding context was relevant for answering this question. We classified the workload component of context as 'high', 'medium' or 'low' for PCP and patients. See Table 1 for details of the classification schemes. Evidence concerning acceptability and effectiveness was also relevant for answering this question. We classified such evidence—for PCP and patients separately—as 'high', 'medium' or 'low'. See Table 1 for details of the classification schemes.

For question 3 we examined mechanisms underlying the processes that were (or were not) effective or acceptable and compared them with the hypothesised mechanisms in the theories of change contained in the initial programme theories. This enabled us to identify whether the evidence supported or refuted the hypothesised

**TABLE 1** Details of the classification schemes for workload, acceptability and effectiveness for PCP and patients

| | PCP | | | Patients | | |
|---|---|---|---|---|---|---|
| | **High** | **Medium** | **Low** | **High**[a,b] | **Medium**[a,b] | **Low**[a,b] |
| Workload | Patient identification plus in-person provision of 'brief intervention' plus connection with physical activity (PA) opportunity | Patient identification plus in-person provision of 'brief advice' plus connection with PA opportunity | Patient identification plus connection with PA professional/researcher to provide intervention and connect patient with PA opportunity | *Active* organisation of session with PCP or PA professional/researcher + *active* enrolment for PA opportunity | *Active* organisation of session with PCP or PA professional/researcher + *passive* enrolment for PA opportunity or *passive* organisation of session with PCP or PA professional/researcher + *active* enrolment for PA opportunity | *Passive* organisation of session with PCP or PA professional/researcher + *passive* enrolment for PA opportunity |
| Acceptability | Well-received and/or fully meet needs | Well-received but did not fully meet needs | Not well-received and/or did not fully meet needs | Well-received and/or fully meet needs | Well-received but did not fully meet needs | Not well-received and/or did not fully meet needs |
| Effectiveness[c] | >50% connection | 35%–50% connection | <35% connection | >50% uptake | 35%–50% uptake | <35% uptake |

[a]Active organisation/enrolment: patient must initiate contact with PCP or PA professional/researcher or provider of PA opportunity.

[b]Passive organisation/enrolment: patient must respond to contact initiated by PCP or PA professional/researcher or provider of PA opportunity.

[c]These cut-offs are in line with those of Pavey et al. (2011).

mechanisms, leading to discernment of necessary refinements to initial programme theories.

## 3 | FINDINGS

### 3.1 | Search results and document characteristics

We identified 1,030 records through database searching and 24 records from other sources. Following de-duplication we screened 1,004 titles, abstracts, summaries and lists of contents and 36 full texts for eligibility. Ten documents were included in the review. See Figure 1 for the process of document identification.

The ten documents were published between 1998 and 2016 and included peer-reviewed academic literature ($n$ = 4 journal articles reporting research studies) and grey literature ($n$ = 2 national evaluation final reports, $n$ = 3 local evaluation final reports, $n$ = 1 Master's thesis reporting on a local evaluation). Nine acknowledged funding sources. These included: health authorities ($n$ = 4); local councils ($n$ = 2), joint health authority and local council ($n$ = 1), charity foundation (commissioned by local council) ($n$ = 1) and national government ($n$ = 1). One evaluation took place in Scotland and the other nine in England. The design of the evaluations included Randomised Controlled Trial (RCT) ($n$ = 4), mixed method evaluation ($n$ = 4), quantitative evaluation ($n$ = 1) and qualitative evaluation ($n$ = 1). PCP participants included General Practitioners (GP), Practice Nurses, Health Care Assistants and Health and Wellbeing Advisors, as well as other primary care staff, such as Practice Managers. Patient participants were adults (18+ years old) who would benefit from undertaking greater levels of physical activity. Seven documents provided data enabling calculation of effectiveness for PCP (PCP connection rates). Three of these reported the *total* number of eligible and willing patients connected, enabling calculation of *full* connection rates. Four reported only a *partial* number of eligible and willing patients, allowing calculation of what we termed a *partial* connection rate. Two documents provided data enabling calculation of effectiveness for patients (patient uptake rates). We were able to identify acceptability evidence for PCP in four documents. We considered acceptability as an outcome in all four of these. We were able to identify acceptability evidence for patients in four documents—in two of these the evidence related to the whole process of physical activity promotion and in two the evidence concerned specific components of the process. We considered acceptability as an outcome in three of these documents and as a factor helping to explain effectiveness in one document. See Table 2 for details, and relevance and rigour classifications, of the included documents.

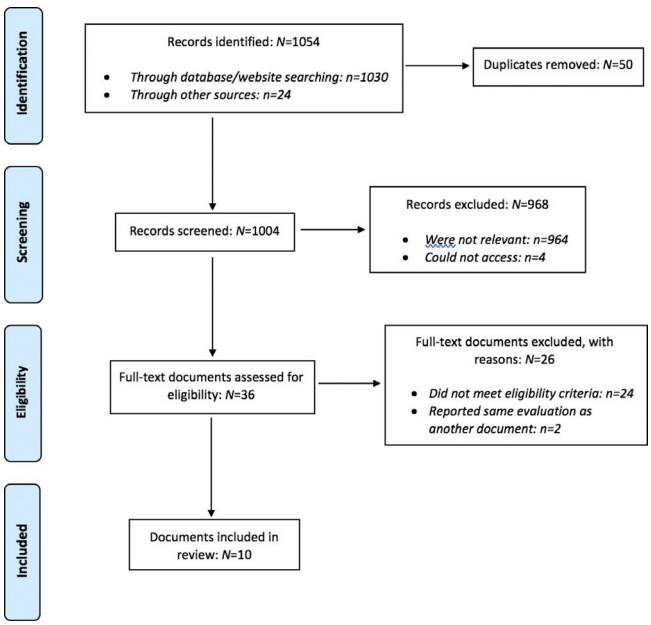


**FIGURE 1** The process of document identification. Figure adapted from Moher, Liberati, Tetxlaff, Altman & the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Group (2009) (Moher, Liberati, Tetzlaff, & Altman, 2009)

### 3.2 | What methods of connection from primary care to community-based physical activity opportunities have been evaluated?

We identified that five methods of connection from primary care to community-based physical activity opportunities had been evaluated—one method was employed in a direct route in which the PCP connected the patient with physical activity opportunities, the other four were employed in an indirect route in which the PCP connected the patient with an intermediary—a physical activity professional or researcher—who then connected the patient with opportunities.

The method employed in the direct route was active signposting, which involved the PCP actively communicating information about, and recommending attendance at, physical activity opportunities. The methods employed within the indirect route were:

1. active signposting followed by further active signposting—involving the PCP actively communicating information about, and recommending contact with an intermediary who actively communicates information about, and recommends attendance at, physical activity opportunities;
2. active signposting followed by referral/prescription—involving the PCP actively communicating information about, and recommending contact with an intermediary who facilitates enrolment in physical activity opportunities;
3. referral/prescription followed by active signposting—involving the PCP facilitating contact with an intermediary who actively communicates information about, and recommends attendance at, physical activity opportunities;

**TABLE 2** Details, and relevance and rigour classifications, of the ten included documents

| Document | Location | Aims | Design | Participants | Relevant outcomes | Appraisal |
|---|---|---|---|---|---|---|
| 1. Taylor Doust and Webborn (1998)<br>Peer-reviewed paper<br>Funded by South Thames Regional Health Authority Primary Care Development Fund | Hailsham, East Sussex, England | To examine the effects of a GP exercise referral programme on modifiable coronary heart disease risk factors<br>*Note: physical activity level was not included in eligibility criteria, rather assumption was made that increasing physical activity level would hold benefits despite current activity level* | Randomised Controlled Trial (RCT) | *Primary care professional (PCP):*<br>GP<br>*Patients:*<br>Adults with risk factors for coronary heart disease (CHD) | *PCP:*<br>• Effectiveness—full connection rate<br>*Patients:*<br>• Acceptability (whole process) (factor helping to explain effectiveness)<br>• Effectiveness—uptake rate | *Relevance:*<br>High<br>*Rigour (acceptability):*<br>Medium<br>*Rigour (effectiveness):*<br>Medium |
| 2. Harrison et al. (2005)<br>Peer-reviewed paper<br>Funded jointly by Health Authority/Primary Care Trust and Metropolitan Borough Council | North-west England | To assess the effectiveness of a primary care referral scheme on increasing physical activity at 1 year from referral | RCT | *PCP:*<br>GP<br>*Patients:*<br>Sedentary adults with additional CHD risk factors<br>*Note: one primary care locality funded the Scheme to accept sedentary patients regardless of other risk factors* | *PCP:*<br>• Effectiveness—partial connection rate<br>*Patients:*<br>• Acceptability—specific component(s) of process (outcome) | *Relevance:*<br>Medium<br>*Rigour (acceptability):*<br>High<br>*Rigour (effectiveness):*<br>Low |
| 3. Bull et al. (2008)<br>Final report for UK government<br>Funded by Department of Health, London Government | London, England | • To assess the relative success of different methods to recruit patients into the Physical Activity Care Pathway<br>• To assess the feasibility of delivery of the Care Pathway by different PCP<br>• To identify characteristics of patients recruited into the Care Pathway<br>• To conduct an economic analysis of the Care Pathway to the NHS<br>• To collate feedback from practitioners about their experiences of implementing the Care Pathway | Real-world quantitative and qualitative evaluation | *PCP:*<br>Entry route A:<br>GP, Health Care Assistance, Practice Nurse<br>Entry route B:<br>Practice Nurse, GP, Nurse Manager, Primary Care Manager, Health Care Assistant<br>*Patients:*<br>Sedentary adults and those at risk of adverse health outcomes associated with low activity levels<br>*Note: individuals aged 16 + years old were included* | *PCP:*<br>• Acceptability (outcome)<br>*Patients:*<br>• Acceptability—specific component(s) of process (outcome) | *Relevance:*<br>Medium<br>*Rigour (acceptability):*<br>Medium |

(Continues)

**TABLE 2** (Continued)

| Document | Location | Aims | Design | Participants | Relevant outcomes | Appraisal |
|---|---|---|---|---|---|---|
| 4. Sidford (2006)<br>Master of Philosophy thesis<br>No funding statement | Somerset, England | To explore the influence of referral scheme processes (referring PCP, central referral mechanism, leisure provider) and participant characteristics (age, gender, referral reason) upon their access to, and exit from, the scheme | Real-world quantitative evaluation | *PCP:*<br>GP, Practice Nurse, Physiotherapist, Dietician, Psychiatrist, Nurse Specialist, Cardiac Nurse, Smoking Cessation Officer, Healthy Lifestyle Co-ordinator<br>*Note: some non-primary care staff PCP participants, e.g. Dieticians and Psychiatrists were included*<br>*Patients:*<br>Sedentary individuals with specific health problems that would benefit from being introduced to structured and supported physical activity<br>*Note: individuals of all ages were included* | *PCP:*<br>• Effectiveness—full connection rate<br>*Patients:*<br>• Effectiveness—uptake rate | *Relevance:*<br>Medium<br>*Rigour (effectiveness):*<br>High |
| 5. Harland et al. (1999)<br>Peer-reviewed paper<br>Funded by NHS National R&D Programme on Cardiovascular Disease and Stroke | Newcastle, England | To evaluate the effectiveness of combinations of three methods to promote physical activity in primary care | RCT | *PCP:*<br>GP<br>*Patients:*<br>Sedentary adults (in an economically disadvantaged area) | *PCP:*<br>• Effectiveness—full connection rate | *Relevance:*<br>Low<br>*Rigour (effectiveness):*<br>Medium |
| 6. Stevens et al. (1998)<br>Peer-reviewed paper<br>Funded by North Thames NHS Executive Responsive Funding Programme | West London, England | To assess the cost-effectiveness of a primary care-based intervention aimed at increasing levels of physical activity in inactive people aged 45–74 | RCT | *PCP:*<br>GP<br>*Patients:*<br>Inactive people aged 45–74 | *PCP:*<br>• Effectiveness—partial connection rate | *Relevance:*<br>Low<br>*Rigour (effectiveness):*<br>Low |
| 7. ukactive (2015)<br>Final report for Birmingham City Council<br>Funded by Nesta Centre for Social Action Innovation Fund | Birmingham, England | To understand the effect of increased social action through group motivational interviewing sessions against the standard Let's Get Moving (LGM) programme<br>*Note: physical activity level was not included in eligibility criteria, rather assumption was made that increasing physical activity level would hold benefits despite current activity level* | Real-world quantitative and qualitative evaluation | *PCP:*<br>GP practice staff<br>*Patients:*<br>Overweight/obese sedentary adults with hypertension and/or first medication for hypertension in last 6 months and/or first medication for weight management drugs in last 6 months | *PCP:*<br>• Effectiveness—partial connection rate | *Relevance:*<br>Low<br>*Rigour (effectiveness):*<br>Low |

(Continues)

**TABLE 2** (Continued)

| Document | Location | Aims | Design | Participants | Relevant outcomes | Appraisal |
|---|---|---|---|---|---|---|
| 8. Loughren et al. (2014)<br>Final report for Gloucestershire County Council<br>Not explicitly stated but inferred funded by Gloucestershire County Council | Gloucestershire, England | • To explore stakeholder and PCP perceptions of the LGM Physical Activity Care Pathway Gloucestershire project<br>• To explore health trainers and physical activity deliverers' perceptions of the LGM Physical Activity Care Pathway Gloucestershire project | Real-world qualitative evaluation | *PCP:*<br>GP, Nurse Practitioner<br>*Patients:*<br>Sedentary adults (living in areas of high deprivation)<br>*Note: individuals aged 16 + years old were included* | *PCP:*<br>• Acceptability (outcome) | *Relevance:*<br>Low<br>*Rigour (acceptability):*<br>High |
| 9. Hotham (2016)<br>Final report for Kent County Council<br>Funded by Kent County Council | Kent, England | • To establish whether recruiting participants through systematic screening of GP surgery lists is recommended<br>• To establish whether recruiting participants through systematic screening of GP surgery patient lists is an effective method of recruitment<br>• To establish whether recruiting a practitioner workforce specifically to deliver interventions is feasible and effective<br>• To explore characteristics of service users who successfully changed their behaviour, who could be used to predict success in future cohorts or identify service users likely to require greater support | Real-world quantitative and qualitative evaluation | *PCP:*<br>GP practice staff (practice managers and receptionists)<br>*Patients:*<br>Overweight/obese sedentary adults (living in areas of high deprivation) | *PCP:*<br>• Effectiveness—partial connection rate<br>• Acceptability (outcome)<br>*Patients:*<br>• Acceptability – whole process (outcome) | *Relevance:*<br>High<br>*Rigour (acceptability):*<br>High<br>*Rigour (effectiveness):*<br>Low |
| 10. Jackson Myers Oates and Martin (2014)<br>Final report for Scottish Government<br>Not explicitly stated but inferred funded by Scottish Government | Scotland | • To assess the feasibility of implementing the Physical Activity Pathway across a range of primary care settings, with a view to generating learning about how best to embed the pathway within routine service delivery | Real-world quantitative and qualitative evaluation | *PCP:*<br>GP, Practice Nurse, Health and Wellbeing Advisor<br>*Patients:*<br>Sedentary individuals interested in becoming more active<br>*Note: individuals of all ages were included* | *PCP:*<br>• Acceptability (outcome) | *Relevance:*<br>Low<br>*Rigour (acceptability):*<br>Medium |

**TABLE 3** Details of the 15 processes of physical activity (PA) promotion incorporating methods of connection

| Process of connection | Stage 1: Approach to identifying eligible and willing patients[a] who would benefit from increasing their physical activity levels (with modes of implementation) | Stage 2: Behaviour change strategy aiming to enhance likelihood of patients increasing their physical activity levels[b] (with modes of implementation) | Stage 3: Method of connecting patients with community-based physical activity opportunities (with modes of implementation) |
|---|---|---|---|
| A Taylor et al. (1998) | **Inferred screening of GP practice register for patient eligibility** (unclear who by) | **1 – provide information on consequences of behaviour in general** (by trained assessor in person) | Indirect: **Active signposting to assessment with trained assessor** (by postal invitation letter from PCP/research team) + **Prescription of PA opportunities** (by in-person provision of signed prescription card inferred from trained assessor) |
| B Harrison et al. (2005) method of connection 1 | **Inferred consideration of eligibility of patient attending consultation** (inferred by PCP) + **Inferred assessment of PA level of eligible patient** (inferred by PCP in person) + **further determination of eligibility** (inferred by PCP) + **Inferred opting-in/no opting-out by eligible patient** (inferred by communication with PCP in person) + **Double-checking of patient eligibility by research team** | **1 – provide information on consequences of the behaviour in general** (by written information by post inferred from research team) **2 – provide information on consequences of the behaviour to the individual** (by exercise officer in person) | Indirect: **Referral to consultation with exercise officer** (by inferred in-person discussion with PCP + faxed referral form from PCP to research team + forwarding of eligible patient details from research team to exercise officer) + **Active signposting to PA opportunities** (by postal written information packs inferred from research team + discussion with exercise officer in person) |
| C Harrison et al. (2005) method of connection 2 | **Inferred consideration of eligibility of patient attending consultation** (inferred by PCP) + **Inferred assessment of PA level of eligible patient** (inferred by PCP in person) + **further determination of eligibility** (inferred by PCP) + **Inferred opting-in/no opting-out by eligible patient** (inferred by communication with PCP in person) + **Double-checking of patient eligibility by research team** | **1 – provide information on consequences of the behaviour in general** (by written information by post inferred from research team) | Indirect: **Referral to provision of information on local council-run PA facilities inferred by research team** (by inferred in-person discussion with PCP + faxed referral form from PCP to research team) + **Active signposting to PA opportunities** (by postal written information packs inferred from research team) |
| D (Bull et al. (2008) patient identification approach 1 | **Consideration of eligibility of patient attending consultation** (by PCP) + **Assessment of PA level of eligible patient** (inferred by PCP in person) + **further determination of eligibility** (inferred by PCP) + **Assessment of level of interest in attending/receiving Brief Intervention (BI) consultation (i.e. opting-in) of eligible patient** (inferred by PCP in person) | **37 – motivational interviewing 5 – goal setting (behaviour) 6 – goal setting (outcome)** (by PCP in person) | Direct: **Active signposting to PA opportunities** (by in-person discussion with PCP supported by Let's Get Moving (LGM) resource pack which patient took away) |
| E Bull et al. (2008) patient identification approach 2 | **Screening of hypertension register for patient eligibility** (by GP practice staff) + **Inferred sending of postal letter inviting eligible patient to attend assessment with PCP** (by GP practice staff) + **Inferred opting-in by eligible patient** (inferred by making/attending assessment) + **Assessment of PA level of eligible patient** (inferred by PCP in person) + **further determination of eligibility** (inferred by PCP) + **Assessment of level of interest in attending/receiving BI consultation (i.e. opting-in) of eligible patient** (unclear how this was conducted) | **37 – motivational interviewing 5 – goal setting (behaviour) 6 – goal setting (outcome)** (by PCP in person) | Direct: **Active signposting to PA opportunities** (by in-person discussion with PCP supported by LGM resource pack which patient took away) |

(Continues)

4. referral/prescription followed by further referral/prescription—involving the PCP facilitating contact with an intermediary who facilitates enrolment in physical activity opportunities.

These methods were implemented in several different ways. See Figure 2 for an overview of the methods of connection including modes of implementation.

**TABLE 3** (Continued)

| Process of connection | Stage 1: Approach to identifying eligible and willing patients[a] who would benefit from increasing their physical activity levels (with modes of implementation) | Stage 2: Behaviour change strategy aiming to enhance likelihood of patients increasing their physical activity levels[b] (with modes of implementation) | Stage 3: Method of connecting patients with community-based physical activity opportunities (with modes of implementation) |
|---|---|---|---|
| F<br>Sidford (2006) | **Consideration of eligibility of patient attending a consultation** (inferred by PCP) + **Inferred assessment of PA level of eligible patient** (inferred by PCP in person) + **further determination of eligibility** (inferred by PCP) + **Inferred opting-in/no opting-out by eligible patient** (inferred by communication with PCP in person) + **Double-checking of patient eligibility by Exercise Scientist** | **5 – goal setting (behaviour)**<br>**6 – goal setting (outcome)** (by exercise scientist by telephone) | Indirect:<br>**Referral to consultation with exercise scientist** (by in-person discussion with PCP + inferred electronic referral form from PCP to local Primary Care Trust + forwarding to exercise scientist) + **Referral to PA opportunities** (by telephone discussion with exercise scientist + provision of 'personal client record' to leisure provider) |
| G<br>Harland et al. (1999) patient identification approach 1 | **Consideration of eligibility of patient attending consultation** (inferred by PCP) + **Inferred assessment of PA level of eligible patient** (inferred by PCP in person) + **further determination of eligibility** (inferred by PCP) + **Inferred opting-in/no opting-out by eligible patient** (inferred by communication with PCP in person) | **1 – provide information on consequences of behaviour in general** (inferred with PA researcher in person) | Indirect:<br>**Active signposting to baseline assessment/Brief Advice (BA) inferred with PA researcher** (by in-person provision of PCP-signed recruitment card to be given to PA researcher in GP practice waiting room) + **Active signposting to PA opportunities** (by in-person discussion inferred with PA researcher supported by written information pack which patient took away) |
| H<br>Harland et al. (1999) patient identification approach 2 | **Screening of GP practice register for patient eligibility** (unclear who by) + **Inferred assessment of PA level of eligible patient** (unclear how this was conducted) + **Further determination of eligibility of patient based on PA level** (unclear who by) + **Inferred opting-in/no opting-out by eligible patient** (unclear how this was undertaken) | **1 – provide information on consequences of behaviour in general** (inferred with PA researcher in person) | Indirect:<br>**Active signposting to baseline assessment/BA inferred with PA researcher** (by postal invitation letter [unclear who sent]) + **Active signposting to PA opportunities** (by in-person discussion inferred with PA researcher supported by written information pack which patient took away) |
| I<br>Stevens et al. (1998) method of connection 1 | **Screening of GP practice register for patient eligibility** (unclear who by) + **Assessment of PA level of eligible patient** (by postal questionnaire (unclear who by) + **Inferred opting-in by eligible patient** (by completing and returning postal questionnaire) + **Further determination of eligibility of opted-in patient based on PA level** (unclear who by) + **Inferred further screening of medical records for patient eligibility** (unclear who by) | **No detail of BCTs provided** | Indirect:<br>**Active signposting to consultation with Exercise Development Officer** (by postal invitation letter from PCP) + **Active signposting to PA opportunities** (by in-person discussion with Exercise Development Officer including offering of personalised PA programme combining leisure centre- and home-based activities inferred patient took this away) |
| J<br>Stevens et al. (1998) method of connection 2 | **Screening of GP practice register for patient eligibility** (unclear who by) + **Assessment of PA level of eligible patient** (by postal questionnaire [unclear who from]) + **Inferred opting-in by eligible patient** (by completing and returning postal questionnaire) + **Further determination of eligibility of opted-in patient based on PA level** (unclear who by) + **Inferred further screening of medical records for patient eligibility** (unclear who by) | **No detail of BCTs provided** | Indirect:<br>**Referral to information about PA opportunities (inferred) from research team** (by inferred forwarding of eligible patient details to research team [unclear who by]) + **Active signposting to PA opportunities** (by postal written information packs inferred from research team) |

(Continues)

**TABLE 3** (Continued)

| Process of connection | Stage 1: Approach to identifying eligible and willing patients[a] who would benefit from increasing their physical activity levels (with modes of implementation) | Stage 2: Behaviour change strategy aiming to enhance likelihood of patients increasing their physical activity levels[b] (with modes of implementation) | Stage 3: Method of connecting patients with community-based physical activity opportunities (with modes of implementation) |
|---|---|---|---|
| K ukactive (2015) | **Screening of GP practice register for patient eligibility** (by GP practice staff) + **Sending of postal letter informing eligible patient of LGM Programme** (by GP Practice Manager) + **No opting-out by eligible patient** (by contacting GP practice or LGM team) | **37 – motivational interviewing** (by Community Exercise Professional in person) | Indirect: **Referral to consultation with CEP** (by forwarding of eligible and non-opted-out patient details to LGM team by practice staff) + **Active signposting to PA opportunities** (by in-person discussion with Community Exercise Professional) |
| L Loughren et al. (2014) | **No information regarding eligible patient identification provided** + **Assessment of PA level of eligible patient** (unclear how this was conducted) + **Further determination of eligibility of patient based on PA level** (unclear who by) + **Inferred no opting-out by eligible patient** (unclear how this was undertaken) | **37 – motivational interviewing** (by Community Health Trainer in person) | Indirect: **Referral to BI consultation with Community Health Trainer** (by sending of completed PA questionnaire to LGM administrator by PCP [unclear whether in-person discussion occurred]) + **Active signposting to PA opportunities** (by in-person discussion with Community Health Trainer) |
| M Hotham (2016) | **Screening of GP practice register for patient eligibility** (by GP Practice Manager) + **Sending of postal letter inviting eligible patient to take part in LGM Programme** (by GP practice staff) + **No opting-out by eligible patient** (unclear how this was undertaken) + **Inferred sending of eligible and non-opted-out patient details to ukactive team/Community Exercise Professional** (inferred by GP practice staff) + **Assessment of PA level of non-opted-out patient** (by telephone call from ukactive team) + **further determination of eligibility of patient based on PA level** (by ukactive team) + **Opting-in/no opting-out by eligible patient** (by communication with ukactive/ making appointment with Community Exercise Professional by telephone) | **37 – motivational interviewing** (by Community Exercise Professional in person) | Indirect: **Referral to consultation with ukactive/ Community Exercise Professional** (by forwarding of eligible and non-opted out patients details to ukactive team by practice staff) *(followed by final two steps of approach to identifying eligible and willing patients)* + **Active signposting to PA opportunities** (by in-person discussion with Community Exercise Professional) |
| N Jackson et al. (2014) behaviour change strategy 1 | **Assessment of PA level of patient attending condition-specific clinics/Keep Well checks/ lifestyle or health and wellbeing advice courses** (inferred by PCP in person) + **determination of eligibility** (inferred by PCP) + **Assessment of level of interest of eligible patient in being more physically active (i.e. opting-in) of eligible patient** (inferred by PCP in person) | **1 – provide information on consequences of behaviour in general**<br>**2 – provide information on consequences of behaviour to the individual** (by PCP in person) | Direct: **Active signposting to PA opportunities** (by in-person discussion with PCP supported by Active Scotland website) |
| O Jackson et al. (2014) behaviour change strategy 2 | **Assessment of PA level of patient attending a consultation/seeking advice at 'drop in' health advisory services/random selection from GP reception** (inferred by PCP in person) + **determination of eligibility** (inferred by PCP) + **Assessment of level of interest of eligible patient in being more physically active (i.e. opting-in) of eligible patient** (inferred by PCP in person) | **1 – provide information on consequences of behaviour in general**<br>**2 – provide information on consequences of behaviour to the individual**<br>**5 – goal setting (behaviour)**<br>**6 – goal setting (outcome)**<br>**35 – relapse prevention/coping planning**<br>**37 – motivational interviewing** (by PCP in person) | Direct: **Active signposting to PA opportunities** (by in-person discussion with PCP supported by Active Scotland website) |

[a]That is, those whom PCP had the opportunity to connect with PA opportunities as they met the eligibility criteria and they opted in/did not opt out (and in the case of Randomised Controlled Trials they met the eligibility criteria for the trial).

[b]All of the processes included Behaviour Change Technique 20—provide information on where and when to perform the behaviour (Michie, Ashford, et al., 2011)—as part of the method of connection.

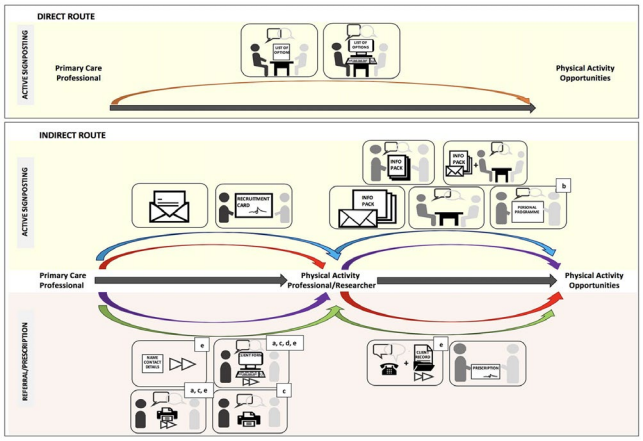


**FIGURE 2** The five methods of connection, including modes of implementation, from primary care to community-based physical activity opportunities. Orange: active signposting; Blue: active signposting followed by active signposting; Red: active signposting followed by referral/prescription; Purple: referral/prescription followed by active signposting; Green: referral/prescription followed by referral/prescription. [a]Two-step physical activity professional/researcher process; [b]Inferred patient took information away; [c]Inferred in-person discussion; [d]Inferred that referral was made electronically; [e]Did not provide information about mode of forwarding

### 3.3 | What processes of physical activity promotion incorporating such methods of connection are (or are not) effective or acceptable, for whom, to what extent and under what circumstances?

As mentioned previously, processes of physical activity promotion incorporating methods of connection involved three stages: (a) identification of eligible and willing patients who would benefit from increasing their physical activity levels—there were multiple approaches taken to this; (b) delivery of behaviour change strategies aiming to enhance the likelihood of those patients increasing their physical activity levels—there were several such strategies employed; (c) connection of patients with community-based physical activity opportunities—using the methods outlined in Figure 2 and described in Table 3. We identified a total of 15 different processes of physical activity promotion. See Table 3 for details.

Evidence concerning PCP behaviour, that is whether or not PCP connected eligible and willing patients with physical activity opportunities, was available for all 15 processes. However, we were only able to calculate *full* connection rates for two of those processes (A, F). Both processes were highly effective. We were able to calculate the *full* connection rate for PCP of two further processes (G and H) in combination. These processes were of low effectiveness. We were able to calculate *partial* connection rates of six processes (B, C, I, J, K, M). The partial effectiveness of processes B, C and J was high. The partial effectiveness of processes I, K and M was low. Acceptability evidence was reported for three processes (L, N, O). The acceptability of process N was medium and the acceptability of processes L and O was low. Acceptability evidence was reported for a further two processes (D, E) in combination. These were of medium acceptability.

Evidence concerning patient behaviour, that is whether or not patients took up the PA opportunity following connection, was available for only seven processes (A, F, M, B, C, D, E) and mainly regarded acceptability. We were able to calculate patient uptake rates for only two of these processes (A, F). Both processes were highly effective. Findings regarding the acceptability of the overall process for patients were available and considered as an outcome for only one process (M). Its acceptability was high. Findings regarding the acceptability of specific components of the process were available for two processes (B, C). The acceptability of the information provided in process B was high whereas the acceptability of that provided in process C was low. Findings regarding the acceptability of specific components of the processes were reported for two further processes (D, E) in combination. The 'Let's Get Moving' (LGM) resource pack was of medium acceptability.

We were able to have at least a moderate level of confidence in the credibility of acceptability evidence. All relevant documents containing this evidence scored 'high' or 'medium' for rigour. Despite the rigour of the documents containing effectiveness evidence ranging from 'high' to 'low', we were able to have a high level of confidence in the credibility of this evidence as the evidence contained in documents scoring 'low' for rigour was explicitly presented as *partial* connection rates, rather than *full* connection rates. See Tables 4 and 5 for details of the context, that is for whom and in what circumstances the findings apply, and outcomes for each of the processes for patients and PCP respectively.

Consideration of the PCP and patient outcomes for each process in combination revealed strong positive findings for four of the processes in the contexts in which they were implemented (A, F, B, J). Those processes had only evidence of 'high' effectiveness or acceptability. Processes A and F were highly effective for both PCP and patients. The partial effectiveness for PCP of process B was high, while the acceptability of information provided was high for patients. The partial effectiveness for PCP of process J was also high, however there was no evidence regarding the effectiveness or acceptability for patients. Consideration of the PCP and patient outcomes for each process in combination also revealed moderately positive findings for three processes (D, E, N). Those processes had only evidence of 'medium' effectiveness or acceptability. Processes D and E were of medium acceptability for PCP and the LGM resource pack was of medium acceptability for patients. Process N was of medium acceptability for PCP, however there was no evidence regarding the effectiveness or acceptability for patients. Finally consideration of the PCP and patient outcomes for each process in combination revealed negative findings for eight of the processes in the contexts in which they were implemented (G, H, I, K, C, M, L, O). Those processes had some evidence of 'low' effectiveness or acceptability. Processes G, H, I and K were not effective for PCP and there was no evidence concerning the effectiveness or acceptability for patients. Despite high partial effectiveness for PCP, the information provided in process C was of low acceptability for patients. The partial effectiveness of

**TABLE 4** The context and outcomes for the 15 processes of physical activity (PA) promotion incorporating methods of connection for PCP

| | Context | | Outcome | | |
|---|---|---|---|---|---|
| | | | Effectiveness | | |
| Process | Whom | Circumstances | Full connection rate | Partial connection rate | Acceptability |
| A | GP | **Workload:** Low | **High** 97.9%–100.0% (95–97/97) | | |
| F | GP, Practice Nurse, Physiotherapist, Dietician, Psychiatrist, Nurse Specialist, Cardiac Nurse, Smoking Cessation Officer, Healthy Lifestyle Co-ordinator | **Workload:** Low | **High** 88.8% (3,120/3,512) | | |
| G | GP | **Workload**: Low | **Low** 21.1% (523/2,479) | | |
| H | GP | **Workload**: Low | | | |
| B | GP | **Workload**: Low | | **High** 84.4% (232/275) | |
| C | | | | **High** 100.0% (270/270) | |
| I | GP | **Workload**: Low | | **Low** 34.7% (126/363) | |
| J | | | | **High** 100.0% (351/351) | |
| K | GP practice staff | **Workload**: Low | | **Low** 17.1% (414/2,425) | |
| M | GP practice staff (practice managers and receptionists) | **Workload:** Low<br>**Other:**<br>• Communication templates and data extraction guides provided by ukactive<br>• Mail-out funded by project budget | | **Low** 12.2% (242/1,981) | **Medium**<br>*Practice not using Vision:*<br>• Impact on practice manager workload minimal, with majority of work falling to reception staff<br>• Ran smoothly and had no adverse effects on receptionists' workload<br>• Access to IT system at GP practice organised externally and took a couple of weeks, however once this was done accessing the appropriate systems was not problematic<br>*Practice using Vision:*<br>• Struggled to export the patient lists to Docmail due to type of software used<br>• Practice staff had to do the reports manually, which increased their workload and pressure—became easier with practice |

(Continues)

| | Context | | Outcome | | |
|---|---|---|---|---|---|
| | | | Effectiveness | | |
| Process | Whom | Circumstances | Full connection rate | Partial connection rate | Acceptability |
| L | GP, Nurse Practitioner | **Workload:** Low | | | **Low**<br>• Difficult to sell Let's Get Moving (LGM)/engage patients when just presenting an A4 piece of paper and general practice physical activity questionnaire (GPPAQ)<br>• Difficult to find time to explain LGM to patients— highly pressured appointments, competing priorities |
| N | GP, Practice Nurse, Health and Wellbeing Advisor, Practice Manager, administrative and IT staff | **Workload:** Medium<br>**Other:**<br>• Brief advice (BA) occurred within existing consultation (10 min for GP, 20 min for Practice Nurse, 10–45 min for Health and Wellbeing advisors)<br>• Signposting limited to Active Scotland website—does not necessarily contain relevant and accurate/locally specific resources<br>• Training provided<br>• No financial incentives provided | | | **Medium**<br>*Screening tool:*<br>• Time to complete and record screening tool within consultation appointment was barrier to completing eligibility assessment properly<br>• View that screening tool did not fit well into consultation was barrier to completing eligibility assessment properly<br>*Brief Advice:*<br>• General belief that possible to deliver BA within consultation, however not always possible<br>*Signposting:*<br>• Limited, or PCP's limited knowledge of, affordable, quality/appropriate, up-to-date, and accessible opportunities to which people could be signposted—difficulties keeping abreast of/up-to-date with available opportunities<br>*Future recommendations:*<br>• Need incentives—financial and senior management buy-in |
| O | | **Workload:** High<br>**Other:**<br>• Brief Intervention (BI) occurred within existing consultation (10 min for GP, 20 min for Practice Nurse, 10–45 min for Health and Wellbeing advisors)<br>• Signposting limited to Active Scotland website—does not necessarily contain relevant and accurate/locally specific resources<br>• Training provided<br>• No financial incentives provided | | | **Low**<br>*Screening tool:*<br>• Time to complete and record screening tool within consultation appointment barrier to completing eligibility assessment properly<br>• View that screening tool did not fit well into consultation was barrier to completing eligibility assessment properly<br>*Brief Intervention:*<br>• General belief that not possible to deliver BI within consultation due to lack of time and competing demands<br>*Signposting:*<br>• Limited, or PCP's limited knowledge of, affordable, quality/appropriate, up-to-date, and accessible opportunities to which people could be signposted— difficulties keeping abreast of/up-to-date with available opportunities<br>*Future recommendations:*<br>• Need incentives—financial and senior management buy-in |

(Continues)

**TABLE 4** (Continued)

| | Context | | Outcome | | |
|---|---|---|---|---|---|
| | | | Effectiveness | | |
| Process | Whom | Circumstances | Full connection rate | Partial connection rate | Acceptability |
| D<br>E | GP, Health Care Assistant, Practice Nurse<br>Practice Nurse, GP, Nurse Manager, Primary Care Manager, Health Care Assistant | **Workload:**<br>High<br>**Other:**<br>• Training provided<br>• No financial incentives provided | | | **Medium**<br>*Experience of using GPPAQ:*<br>• Overall response positive<br>• Electronic version which automatically generates the Physical Activity Index was particularly useful<br>• Helped to initiate discussions about PA<br>• Useful for raising patients' awareness of their current PA levels<br>• Using it in consultations with patients whose first language was not English was challenging<br>*Experience of using Motivational Interviewing (MI) with patients:*<br>• Patients receptive to BI consultation<br>• MI helped them to discuss what PA they could do as opposed to what they couldn't<br>• Beneficial in terms of developing goals and increasing likelihood of longer-term behaviour change<br>• Time was a barrier in delivering MI-consistent consultations<br>• Language issues were a barrier, although this was not specific to using MI<br>*Risk stratification and signposting:*<br>• Risk stratification criteria very useful and a 'safety net' for practitioners<br>• Risk stratification and selecting appropriate signposting opportunities was difficult for patients with co-morbidities<br>• Some practices did not have many PA opportunities within the local area and were therefore limited to where they could signpost patients to<br>• Pedometers were frequently used as a signposting option and patients liked using them and having targets to achieve<br>*Resources:*<br>The practitioner support pack<br>• Found useful—used regularly to refresh what had been learned in training<br>• Helped to communicate design, aim and delivery of Care Pathway to other practitioners<br>The LGM pack<br>• Patients liked having a resource to take away at end of consultation<br>• Helped to increase patients' awareness of local PA opportunities<br>• Patients liked PA monitoring sheet and enjoyed showing their progress to practitioner<br>• Most practitioners chose to put the British Heart Foundation leaflets in pack<br>• Recommended that the resource be published in other languages<br>*Future recommendations:*<br>• Practice Nurses are best placed to deliver Care Pathway—appropriate qualifications, more time and better cost-effectiveness<br>• Provide financial incentives—most GPs support PA promotion in primary care in theory, however in practice significant financial backing is needed—it was recommended that PA be included in the Quality and Outcomes Framework |

**TABLE 5** The context and outcomes for the 15 processes of physical activity (PA) promotion incorporating methods of connection for patients

| | Context | | Outcome | | |
|---|---|---|---|---|---|
| | | | | Acceptability | |
| Process | Whom | Circumstances | Effectiveness (uptake rate) | Full process | Specific component(s) of process |
| A | **Population:**<br>Adults aged 40–70 with risk factors for coronary heart disease (CHD)<br>**Sample:**<br>*Gender* - 36 (37.1%) male, 61 (62.9%) female<br>*Age* - Average 54.1 years<br>*PA level* - 56 (58%) doing moderate/vigorous activity in past week at baseline | **Workload:** High<br>**Other:**<br>• Up to 20 leisure centre sessions at half the normal admission price | **High**<br>85.6%–89.5% (83–85/95–97) | | |
| F | **Population:**<br>Sedentary individuals of all ages with specific health problems that would benefit from being introduced to structured and supported PA<br>**Sample (included in data analysis):**<br>*Gender* – 1,116 (37.7%) male, 1,842 (62.3%) female<br>*Age* – Average 50.3 years | **Workload**: Low | **High**<br>62.0%–75.4% (1,934/2,566–3,120) | | |
| M | **Population:**<br>Overweight/obese sedentary adults aged 18+ (living in areas of high deprivation)<br>**Sample (attending Brief Intervention/ signposting session):**<br>*Gender* – 89 (36.0%) male, 158 (64.0%) female<br>*Age* – average 58.16 years<br>21–30:6 (2.4%), 31–40:27 (10.9%), 41–50:33 (13.4%), 51–60:63 (25.5%%), 61–70:71 (28.7%), 71–80:44 (17.8%), 81–90:3 (1.2%) | **Workload**: Medium | | **High**<br>Well-received and met needs<br>*Let's Get Moving (LGM) intervention*<br>• Overall feedback positive<br>• Appreciated collaborative approach to change behaviour and noted how it differed to previous experience where they felt 'talked at'<br>• Appreciated personalised advice<br>• Improved levels of motivation to either lose weight and/or engage in more PA<br>• Benefited from chance to set realistic goals<br>• One-to-one support important in facilitating positive changes in behaviour<br>• Not quite what expected—expected organised exercise classes rather than being offered advice about activities that could be undertaken or a personalised exercise programme from the Community Exercise Professional rather than referral to a gym<br>*Recruitment*<br>• GP-headed invitation letter does not seem to have consciously influenced decisions to join the programme<br>*Practical arrangement*<br>• Highlighted ease, flexibility and efficiency of appointment-booking process<br>• No difficulties in relation to face-to-face sessions | |

(Continues)

**TABLE 5** (Continued)

| | Context | | Outcome | | |
|---|---|---|---|---|---|
| | | | | Acceptability | |
| Process | Whom | Circumstances | Effectiveness (uptake rate) | Full process | Specific component(s) of process |
| B | **Population:**<br>Sedentary adults aged 18+ with additional CHD risk factors<br>*Note: one primary care locality funded the Scheme to accept sedentary patients regardless of other risk factors*<br>**Sample (baseline):**<br>*Gender* – 90 (32.7%) male, 185 (67.3%) female<br>*Age* – 18–44:111 (40.4%), 45–59:101 (36.7%), 60+: 63 (22.9%) | **Workload:**<br>Medium<br>**Other:**<br>• 12-week pass providing reduced entrance fees to council-run PA facilities | | | **High**<br>Information provided met needs |
| C | **Population:**<br>Sedentary adults aged 18+ with additional CHD risk factors<br>*Note: one primary care locality funded the Scheme to accept sedentary patients regardless of other risk factors*<br>**Sample (baseline):**<br>*Gender* – 92 (34.1%) male, 178 (66.0%) female<br>*Age* –18–44:107 (39.6%), 45–59:98 (36.3%), 60+: 65 (24.1%) | **Workload:**<br>Medium | | | **Low**<br>Information provided did not meet needs |
| D<br>E | **Population:** sedentary adults aged 16–74 and those at risk of adverse health outcomes associated with low activity levels<br>**Sample (attending follow-up consultation):** sedentary[1]<br>*Gender* – 45 (44.6%) male, 56 (55.4%) female<br>*Age* – Average 55.7 years, range 15–88 years | **Workload:**<br>Medium<br>**Workload:** High/Medium[a] | | | **Medium**<br>LGM resource pack met needs to a certain extent |

[a]Unclear whether active or passive organisation of PCP session was required by patient.

**TABLE 6** The outcomes for the 15 processes of physical activity (PA) promotion incorporating methods of connection for PCP and patients

| | Outcomes | | | | | |
|---|---|---|---|---|---|---|
| | PCP | | | Patients | | |
| | Effectiveness | | | | Acceptability | |
| Process | Full connection rate | Partial connection rate | Acceptability | Effectiveness (uptake rate) | Full process | Specific component(s) of process |
| A | High | | | High | | |
| B | | High | | | | High |
| C | | High | | | | Low |
| D | | | Medium | | | Medium |
| E | | | | | | |
| F | High | | | High | | |
| G | Low | | | | | |
| H | | | | | | |
| I | | Low | | | | |
| J | | High | | | | |
| K | | Low | | | | |
| L | | | Low | | | |
| M | | Low | Medium | | High | |
| N | | | Medium | | | |
| O | | | Low | | | |

process M was low and the acceptability was medium for PCP, despite high acceptability for patients. The acceptability of processes L and O was low for PCP and there was no evidence regarding the effectiveness or acceptability for patients. See Table 6 for the outcomes for PCP and patients.

Despite the uniqueness of each of the processes, and the different contexts in which they were implemented, comparisons of them yielded some noteworthy findings. Firstly, relating to directness of connection and associated workload for PCP, all the processes with strong positive findings employed an indirect route involving a low workload for PCP (A, F, B, J). However, most of the processes with strong negative findings also utilised an indirect route involving a low workload for PCP (G, H, I, K, C, M, L). All the processes with moderately positive findings employed a direct route involving a medium-high workload for PCP (D, E, N). However, the findings regarding the direct route process with the highest workload for PCP (O) were negative. Secondly, all the processes with strong positive findings involved some form of referral/prescription: by PCP to an intermediary in two cases (B, J); an intermediary to the physical activity opportunity in one case (A); and both PCP to an intermediary and the intermediary to the physical activity opportunity in one case (F). In contrast, the processes with negative findings were more active-signposting-based, with none involving referral/prescription by PCP or an intermediary to a physical activity opportunity and only around half involving referral/prescription by PCP to an intermediary (K, C, M, L). All the processes with moderately positive findings involved active signposting by PCP to the physical activity opportunity (D, E, N). In both the processes with strong positive findings and those with negative findings the mode of implementation of referral/prescription was mixed, including in-person (A, F, B, C), telephone (F) and postal letter (J, K, M). Thirdly, the workload for patients for the processes with strong positive findings ranged from low to high (A, F, B), while for the processes with negative findings this was medium (C, M). The one process with strong positive findings for which the patient workload was high (A) involved *prescription* of a physical activity opportunity by an intermediary—such prescription facilitates action by the patient to organise the session with PCP or an intermediary and/or to enrol for a physical activity opportunity and attend the first session. Finally, the two processes in which patients were offered financial discounts for physical activity opportunities had strong positive findings (A, B).

## 3.4 | How and why are (or are not) those processes effective or acceptable?

The theories of change of the initial programme theories were highly supported for three of the processes with strong positive findings (A, F, B)—that is *all* components of those theories were supported by the effectiveness and/or acceptability evidence. The theories of change were supported to an extent for one of the processes with strong positive findings (J) and the three processes with moderately positive findings (D, E, N). In these cases, *some*

**TABLE 7** The initial programme theories of the 15 processes of physical activity (PA) promotion incorporating methods of connection with indications of components supported and components requiring refinement

| Process | Expected impact/outcomes | | Theory of change (sequence of events leading to desired outcome, *underlying assumptions about how and why sequence might generate that outcome*) |
|---|---|---|---|
| | PCP | Patient | |
| A | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible patient<br>• PCP actively signposts patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[d,e]<br>• Patient actively organises session with PA professional/researcher, and attends<br>• *Signposting by PCP generates patient capability and motivation to do so*[c,e]<br>• PA professional/researcher conducts information session with patient and prescribes PA opportunity<br>• Patient actively enrols, facilitated by prescription form, for PA opportunity and attends first session*Session with PA professional/researcher + provision of signed prescription form + up to 20 sessions at half the normal admission price generates patient capability, opportunity and motivation to do so*[d,e] *(does not appear that concerns regarding long waiting times before introductory session [up to five weeks], inconvenient times [during off peak hours, 9 a.m.–5 p.m.] or lack of staff support in a sometimes crowded and noisy exercise room impacted capability, opportunity or motivation to attend)*<br>*Note: Patient views about concept of GP referral to a leisure centre-based exercise programme: 50% positive, 35% mixed, 15% negative—could have impacted patient motivation to undertake necessary behaviours for connection to, and uptake of, the physical activity opportunity* |
| B | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible and willing patient<br>• PCP refers patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[c,e]<br>• PA professional/researcher checks patient's eligibility<br>• Patient passively organises session with PA professional/researcher, and attends<br>• *Referral by PCP generates patient capability, opportunity and motivation to do so*[c,e]<br>• Inferred research team sends postal written information pack actively signposting patient to PA opportunity<br>• PA professional/researcher conducts information session with patient and actively signposts patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Postal information pack + session with PA professional/researcher + 12-week pass providing reduced entrance fees to council-run PA facilities generates patient capability, opportunity and motivation to do so*[a,h] |
| C | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible and willing patient<br>• PCP refers patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[c,e]<br>• PA professional/researcher checks patient's eligibility<br>• Inferred research team sends postal written information pack actively signposting patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Postal information pack generates patient capability and motivation to do so*[a,f] |
| D | PCP connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• Patient passively organises session with PCP<br>• *In-person invitation from PCP generates patient capability, opportunity and motivation to do so*[a,e]<br>• PCP conducts motivational interviewing goal-setting session with patient and actively signposts patient to PA opportunity supported by Let's Get Moving (LGM) resource pack which patient takes away<br>• *Training provided generates PCP capability and motivation to do so despite high workload and no financial incentives*[a,g]<br>• Patient actively enrols for PA opportunity and attends first session*Session with PCP + LGM resource pack generates patient capability and motivation to do so*[a,g] |

(Continues)

**TABLE 7** (Continued)

| Process | Expected impact/outcomes | | Theory of change (sequence of events leading to desired outcome, *underlying assumptions about how and why sequence might generate that outcome*) |
|---|---|---|---|
| | PCP | Patient | |
| E | PCP connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• Patient potentially actively organises session with PCP<br>• *Invitation letter from PCP generates patient capability, opportunity and motivation to do so*[a,e]<br>• PCP conducts motivational interviewing goal-setting session with patient and actively signposts patient to PA opportunity supported by LGM resource pack which patient takes away<br>• *Training provided generates PCP capability and motivation to do so despite high workload and no financial incentives*[a,g]<br>• Patient actively enrols for PA opportunity and attends first session*Session with PCP + LGM resource pack generates patient capability and motivation to do so*[a,g] |
| F | PCP connects patient with PA professional/ researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible and willing patient<br>• PCP refers patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[d,e]<br>• PA professional/researcher checks patient's eligibility<br>• Patient passively organises session with PA professional/researcher, and attends<br>• *Referral by PCP generates patient capability, opportunity and motivation to do so*[d,e]<br>• PA professional/researcher conducts goal-setting session by telephone with patient and refers patient to PA opportunity<br>• Patient passively enrols for PA opportunity and attends first session*Session with PA professional/researcher generates patient capability, opportunity and motivation to do so*[d,e] |
| G | PCP connects patient with PA professional/ researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• PCP actively signposts patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[d,e]<br>• Patient actively organises session with PA professional/researcher, and attends<br>• *Signposting by PCP generates patient capability and motivation to do so*[b,e]<br>• PA professional/researcher conducts information session with patient and actively signposts patient to PA opportunity supported by written information pack which patient takes away<br>• Patient actively enrols for PA opportunity and attends first session*Session with PA professional/researcher + written information pack generates patient capability and motivation to do so*[a,e] |
| H | PCP connects patient with PA professional/ researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• PCP actively signposts patients to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[d,e]<br>• Patient actively organises session with PA professional/researcher, and attends<br>• *Signposting by PCP generates patient capability and motivation to do so*[b,e]<br>• PA professional/researcher conducts information session with patient and actively signposts patient to PA opportunity supported by written information pack which patient takes away<br>• Patient actively enrols for PA opportunity and attends first session*Session with PA professional/researcher + written information pack generates patient capability and motivation to do so*[a,e] |
| I | PCP connects patient with PA professional/ researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible and willing patient<br>• Inferred PCP actively signposts patients to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[c,e]<br>• Patient actively organises session with PA professional/researcher, and attends<br>• *Signposting by PCP generates patient capability and motivation to do so*[b,e]<br>• PA professional/researcher conducts (unclear what type of) session with patient, offers patient a personalised PA programme combining leisure centre- and home-based activities and actively signposts patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Session with PA professional/researcher + personalised PA programme generates patient capability and motivation to do so*[a,e] |

(Continues)

**TABLE 7** (Continued)

| Process | Expected impact/outcomes | | Theory of change (sequence of events leading to desired outcome, *underlying assumptions about how and why sequence might generate that outcome*) |
|---|---|---|---|
| | PCP | Patient | |
| J | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible and willing patient<br>• Inferred PCP refers patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[c,e]<br>• Inferred research team sends postal written information pack actively signposting patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Postal information pack generates patient capability and motivation to do so*[a,e] |
| K | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• PCP refers patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[c,e]<br>• Patient passively organises session with PA professional/researcher, and attends<br>• *Referral by PCP generates patient capability, opportunity and motivation to do so*[b,e]<br>• PA professional/researcher conducts motivational interviewing session with patient and actively signposts patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Session with PA professional/researcher generates patient capability and motivation to do so*[a,e] |
| L | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • Inferred PCP identifies eligible and willing patient<br>• Inferred PCP refers patient to PA professional/researcher<br>• *Low workload required generates PCP capability and motivation to do so*[a,f]<br>• Patient passively organises session with PA professional/researcher, and attends<br>• *Referral by PCP generates patient capability, opportunity and motivation to do so*[a,e]<br>• PA professional/researcher conducts motivational interviewing session with patient and actively signposts patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Session with PA professional/researcher generates patient capability and motivation to do so*[a,e] |
| M | PCP connects patient with PA professional/researcher who connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies likely eligible and willing patient<br>• PCP refers patient to PA professional/researcher<br>• *Low workload required + provision of communication templates and data extraction guide + funding of mail out generates PCP capability, opportunity and motivation to do so*[c,g]<br>• PA professional/researcher further determines eligibility and willingness of patient<br>• Patient passively organises session with PA professional/researcher, and attends<br>• *Referral by PCP generates patient capability, opportunity and motivation to do so*[b,e]<br>• PA professional/researcher conducts motivational interviewing session with patient and actively signposts patient to PA opportunity<br>• Patient actively enrols for PA opportunity and attends first session*Session with PA professional/researcher generates patient capability and motivation to do so*[a,h] |
| N | PCP connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• Patient passively organises session with PCP<br>• *In-person invitation from PCP generates patient capability, opportunity and motivation to do so*[a,e]<br>• PCP conducts information session with patient and actively signposts patient to PA opportunity<br>• *Training provided + occurrence within existing consultation generates PCP capability and motivation to do so despite medium workload, limitations of signposting resource (Active Scotland website) and no financial incentives*[a,g]<br>• Patient actively enrols for PA opportunity and attends first session*Session with PCP generates patient capability and motivation to do so*[a,e] |

(Continues)

**TABLE 7** (Continued)

| Process | Expected impact/outcomes: PCP | Expected impact/outcomes: Patient | Theory of change (sequence of events leading to desired outcome, *underlying assumptions about how and why sequence might generate that outcome*) |
|---|---|---|---|
| O | PCP connects patient with PA opportunity | Patient takes up PA opportunity | • PCP identifies eligible and willing patient<br>• Patient passively organises session with PCP<br>• *In-person invitation from PCP generates patient capability, opportunity and motivation to do so*[a,e]<br>• PCP conducts information, goal-setting and coping-planning motivational interviewing session with patient and actively signposts patient to PA opportunity<br>• *Training provided + occurrence within existing consultation generates PCP capability and motivation to do so despite high workload, limitations of signposting resource (Active Scotland website) and no financial incentives*[a,f]<br>• Patient actively enrols for PA opportunity and attends first session*Session with PCP generates patient capability and motivation to do so*[a,e] |

[a]No effectiveness evidence to allow testing.
[b]Refuted by effectiveness evidence – refinement required.
[c]Supported to an extent by effectiveness evidence.
[d]Fully supported by effectiveness evidence.
[e]No acceptability evidence to allow testing.
[f]Refuted by acceptability evidence – refinement required.
[g]Supported to an extent by acceptability evidence.
[h]Fully supported by acceptability evidence.

components of those theories were supported and *no* components were refuted by the effectiveness and/or acceptability evidence. The theories of change were refuted for the eight processes with negative findings (G, H, I, K, C, M, L, O). For these, some components of those theories of change were not supported by the effectiveness and/or acceptability evidence. Those theories therefore required refinement. Additionally only one process explicitly provided a possible explanation for the success of its theory of change (A), and that explanation was at a general level: patient views about the concept of GP referral to a leisure centre-based exercise programme were 50% positive, 35% mixed and 15% negative. See Table 7 for details of the initial programme theory of each of the processes together with indications of components supported and components requiring refinement. See Tables 8 and 9 for details of the outcomes of testing of the initial programme theories for PCP and patients respectively.

Comparisons of the findings regarding theories of change again revealed some noteworthy findings. Firstly, the theories of change that were not supported by the empirical evidence were mainly refuted on components concerning the patient behaviour (C, G, H, I, K, M). Only two were refuted on the components concerning the PCP behaviour (L, O). The majority of the theories of change refuted on the patient components were refuted at the point of organising the session with an intermediary (G, H, I, K, M), with only one refuted at the point of enrolling for, and attending the first session of, the physical activity opportunity (C). Secondly, regarding the components of theories of change relating to the point of patients enrolling for, and attending the first session of, the physical activity opportunity, all those positing that inclusion of an in-person session generates patient capability and motivation to undertake this behaviour were supported (A, B, D, E, F, M). Conversely, this component was refuted in the one theory positing that a postal information pack alone would engender patient capability and motivation to enrol for, and attend the first session of, the physical activity opportunity (C). Thirdly, the components of theories of change positing that low workload generates PCP capability and motivation to connect patients were mainly supported (A, B, C, F, G, H, I, J, K, M), with only one refuted (L). Finally, the components of theories of change positing that providing training achieves PCP capability and motivation to connect patients, despite a medium-high workload and no financial incentives, were also mainly supported (D, E, N)—this component was only refuted in the process that was most onerous for PCP (O).

## 4 | DISCUSSION

### 4.1 | Key findings

Ten documents were included in our review aiming to explore what is known about the effectiveness of different methods of connecting primary care patients with community-based physical activity opportunities in the United Kingdom.

We identified that five methods of connection from primary care to community-based physical activity opportunities had been evaluated. One method—active signposting—was employed in a direct route in which the PCP connected the patient with physical activity opportunities. The other four methods involved the PCP connecting the patient with an intermediary who then connected the patient with opportunities, and were: (a) active signposting followed

**TABLE 8** The outcomes of testing of the initial programme theories for PCP

| Process | Effectiveness: Full connection rate | Effectiveness: Partial connection rate | Acceptability | Outcome of testing of underlying assumptions about mechanisms regarding PCP connecting patient to PA professional/researcher | Outcome of testing of underlying assumptions about mechanisms regarding patient organising and attending session with PA professional/researcher (if necessary) and being connected with PA opportunity |
|---|---|---|---|---|---|
| A | High<br>97.9%–100%<br>(95–97/97) | | | **Underlying assumptions supported:** 100% of all eligible patients signposted to PA professional/researcher<br>• 345 eligible patients (following exclusion of 44 ineligible) signposted to session with PA professional/researcher | **Underlying assumptions supported:** 97.9%–100% of all eligible and willing patients prescribed PA opportunity<br>• 142 (41.2% of those signposted) willing patients organised and attended session with PA professional/researcher<br>• 97 (65.5% of eligible and willing patients) randomised to process A<br>• 95–97 (97.9%–100%) prescribed PA opportunity |
| F | **High**<br>88.8%<br>(3,120/3,512) | | | **Underlying assumptions supported:** 100% of all eligible and willing patients referred to PA professional/researcher<br>• 3,712 patients (following removal of 50 duplicate referrals) deemed eligible by PCP and referred to PA professional/researcher | **Underlying assumptions supported:** 88.8% of all eligible and willing patients signposted to PA opportunity<br>• 3,512 (94.6% of referred patients) deemed eligible by PA professional/researcher<br>• 3,120 (88.8% of those deemed eligible by PA professional/researcher) organised and attended session with PA professional/researcher<br>• 3,120 (100% of those attending session) referred to PA opportunity |
| G<br>H | **Low**<br>21.1%<br>(523/2,479) | | | **Underlying assumptions supported:** 100% of all eligible and willing patients referred to PA professional/researcher<br>• 2,479 eligible patients signposted to PA professional/researcher | **Underlying assumptions refuted:** 21.1% of all eligible and willing patients signposted to PA opportunity<br>• 523 (21.1% of signposted patients) organised and attended session with PA professional/researcher<br>• 523 (100% of patients attending session signposted to PA opportunity) |
| B | | **High**<br>84.4%<br>(232/275) | | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients referred to PA professional/researcher<br>• 830 patients deemed eligible by PCP for scheme by PCP and referred to PA professional/researcher | **Underlying assumptions supported:** 84.4% of reported number of eligible and willing patients signposted to PA opportunity<br>• 720 (86.7% of referred patients) deemed eligible for scheme by PA professional/researcher<br>• 545 (75.7% of patients deemed eligible by PA professional/researcher) met criteria for randomised controlled trial (RCT) and were randomised<br>• 275 (50.5% of eligible patients meeting criteria for RCT, 38.2% of patients eligible for scheme) randomised to process B<br>• 232 (84.4% of those randomised to process B) organised and attended session with PA professional/researcher<br>• 232 (100% of those attending session) signposted to PA opportunity |

(Continues)

**TABLE 8** (Continued)

| Process | Effectiveness | | Acceptability | Outcome of testing of underlying assumptions about mechanisms regarding PCP connecting patient to PA professional/researcher | Outcome of testing of underlying assumptions about mechanisms regarding patient organising and attending session with PA professional/researcher (if necessary) and being connected with PA opportunity |
|---|---|---|---|---|---|
| | Full connection rate | Partial connection rate | | | |
| C | | **High**<br>100.0%<br>(270/270) | | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients referred to PA professional/researcher<br>• 830 patients deemed eligible by PCP for scheme by PCP and referred to PA professional/researcher | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients signposted to PA opportunity<br>• 720 (86.7% of referred patients) deemed eligible for scheme by PA professional/researcher<br>• 545 (75.7% of patients deemed eligible by PA professional/researcher) met criteria for RCT and were randomised<br>• 270 (49.5% of eligible patients meeting criteria for RCT, 37.5% of patients eligible for scheme) randomised to process C<br>• 270 (100% of those randomised to process C) signposted to PA opportunity |
| I | | **Low**<br>34.7%<br>(126/363) | | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients referred to PA professional/researcher<br>• 2,253 stage 1 eligible patients<br>• 1,288 (57.2% of stage 1 eligible patients) returned PA questionnaire to be screened for stage 2 eligibility<br>• 827 (36.7% of stage 1 eligible patients) stage 2 eligible<br>• 714 (86.3% of stage 2 eligible patients) stage 3 eligible<br>• 363 (57.6% of eligible and willing patients) randomised to process I<br>• 363 (100% of eligible and willing patients) signposted to PA professional/researcher | **Underlying assumptions refuted:** 34.7% of reported number of eligible and willing patients signposted to PA opportunity<br>• 126 (34.7% of signposted patients) organised and attended session with PA professional/researcher<br>• 126 (100% of those attending session) signposted to PA opportunity |
| J | | **High**<br>100.0%<br>(351/351) | | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients referred to PA professional/researcher<br>• 2,253 stage 1 eligible patients<br>• 1,288 (57.2% of stage 1 eligible patients) returned PA questionnaire to be screened for stage 2 eligibility<br>• 827 (36.7% of stage 1 eligible patients) stage 2 eligible<br>• 714 (86.3% of stage 2 eligible patients) stage 3 eligible<br>• 351 (49.2% of eligible and willing patients) randomised to process J<br>• 351 (100% of eligible and willing patients) referred to PA professional/researcher | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients signposted to PA opportunity<br>• 351 (100% of those referred to PA professional/researcher) signposted to PA opportunity |

(Continues)

**TABLE 8** (Continued)

| Process | Effectiveness | | Acceptability | Outcome of testing of underlying assumptions about mechanisms regarding PCP connecting patient to PA professional/researcher | Outcome of testing of underlying assumptions about mechanisms regarding patient organising and attending session with PA professional/researcher (if necessary) and being connected with PA opportunity |
|---|---|---|---|---|---|
| | Full connection rate | Partial connection rate | | | |
| K | | **Low**<br>17.1%<br>(414/2,425) | | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients referred to PA professional/researcher<br>• 2,425 eligible and willing patients referred to PA professional/researcher | **Underlying assumptions refuted:** 17.1% of reported number of eligible and willing patients signposted to PA opportunity<br>• 435 (19.9% of patients referred to PA professional/researcher) organised session with PA professional/researcher<br>• 414 (95.2% of patients that organised session with PA professional/researcher, 17.1% of patients referred to PA professional/researcher) attended session<br>• 414 (100% of patients attending session) signposted to PA opportunity |
| M | | **Low**<br>12.2%<br>(242/1,981) | **Medium**<br>Well-received and met needs to a certain extent | **Underlying assumptions supported:** 100% of reported number of eligible and willing patients referred to PA professional/researcher<br>• 2,244 stage 1 eligible and willing patients referred to PA professional/researcher**Underlying assumptions partially supported:** medium acceptability | **Underlying assumptions refuted:** 12.2% of reported number of eligible and willing patients signposted to PA opportunity<br>• 1,981 patients deemed stage 2 eligible by PA professional/researcher<br>• 292 (14.7% of stage 2 eligible patients) organised session with PA professional/researcher<br>• 242 (82.9% of patients that organised session with PA professional/researcher, 12.2% of patients referred to PA professional/researcher who were stage 2 eligible) attended session with PA professional/researcher<br>• 242 (100% of patients attending session) signposted to PA opportunity |
| L | | | **Medium**<br>Well-received and met needs to a certain extent | **Underlying assumptions partially supported:** medium acceptability | |
| N | | | **Medium**<br>Met needs to a certain extent | **Underlying assumptions partially supported:** medium acceptability | |
| O | | | **Low**<br>Did not meet needs | **Underlying assumptions refuted:** low acceptability | |
| D | | | **Medium**<br>Well-received and met needs to a certain extent | **Underlying assumptions partially supported:** medium acceptability | |
| E | | | | | |

**TABLE 9** The outcomes of testing of the initial programme theories for patients

| Process | Effectiveness (uptake rate) | Acceptability | | Underlying assumptions about mechanisms supported or refuted |
|---|---|---|---|---|
| | | Whole process | Specific components of process | |
| A | **High**<br>85.6%–89.5%<br>(83–85/95–97) | | | **Underlying mechanisms supported:** 85.6%–89.5% of patients prescribed physical activity (PA) opportunity took up opportunity<br>**Additional mechanisms and explanations for effectiveness from empirical evidence:**<br>*Concerns:*<br>• Long waiting times before introductory session (up to 5 weeks)—could have impacted motivation to attend but did not appear to do so<br>• Inconvenient times (during off peak hours, 9 a.m.-5 p.m.)—could have impacted opportunity and motivation to attend but did not appear to do so<br>• Lack of staff support in a sometimes crowded and noisy exercise room—could have impacted capability and motivation to attend but did not appear to do so<br>*Views about concept of GP referral to a leisure centre-based exercise programme:*<br>• 50% positive<br>• 35% mixed<br>• 15% negative |
| F | **High**<br>62.0%–75.4%<br>(1,934/2,566–3,120) | | | **Underlying mechanisms supported:** 62.0%–75.4% of patients referred PA opportunity took up opportunity |
| M | | **High**<br>Well-received and met needs | | **Underlying mechanisms supported:** High acceptability of whole process |
| B | | | **High**<br>Information provided met needs | **Underlying mechanisms partially supported:** High acceptability of component of process |
| C | | | **Low**<br>Information provided did not meet needs | **Underlying mechanisms partially refuted:** Low acceptability component of process |
| D<br>E | | | **Medium**<br>'Let's Get Moving' resource pack met needs to a certain extent | **Underlying mechanisms partially supported:** Medium acceptability of component of process |

by further active signposting; (b) active signposting followed by referral/prescription; (c) referral/prescription followed by active signposting; (d) referral/prescription followed by further referral/prescription. These methods were implemented in several different ways.

Methods of connection were embedded in 15 processes of physical activity promotion. These involved the identification of eligible and willing patients who would benefit from increasing their physical activity levels and the delivery of behaviour change strategies aiming to enhance the likelihood of those patients increasing their physical activity levels, as well as connection of patients with community-based physical activity opportunities. In the contexts in which they were implemented, four of those processes had strong positive findings, three had moderately positive findings and eight had negative findings.

The findings of comparisons of the processes generated several indications useful for future development of effective processes of physical activity promotion incorporating methods of connection from primary care to community-based opportunities: (a) although helpful, an indirect route of connection with a low workload for PCP does not ensure effectiveness; (b) a direct route is more likely to be effective if it is not highly demanding of PCP; (c) while active signposting may be an effective method of connection in direct routes, a method of connection involving referral/prescription seems to be more effective in indirect routes; (d) the specific mode of implementation of referral/prescription might not be one of

the most influential factors of effectiveness; (e) the workload for patients per se may not be one of the most influential factors of effectiveness, however facilitation of patient action, through referral or prescription, might be a key influential factor; (f) financial discounts for physical activity opportunities for patients may positively influence effectiveness.

The theories of change contained in the initial programme theories were highly supported for three of the processes with strong positive findings. They were supported to an extent for one of the processes with strong positive findings and the three processes with moderately positive findings. They were refuted for the eight processes with negative findings. The findings of comparisons of the theories of change also generated several indications helpful for future development of effective processes of physical activity promotion incorporating methods of connection from primary care to community-based opportunities: (a) the importance of strategies to enhance patient capability and motivation to undertake the behaviours required for connection to, and uptake of, a physical activity opportunity, including a particular need for improved strategies to enhance patient capability and motivation to organise the session with an intermediary; (b) inclusion of an in-person session may be a strategy necessary for patient capability and motivation to uptake a physical activity opportunity; (c) ensuring a low workload appears to be an effective strategy to enhance the capability and motivation of PCP to connect patients; and (d) so long as the process is not too demanding for PCP, providing training is an effective strategy for enhancing the capability and motivation of PCP to connect patients.

## 4.2 | Strengths and limitations

Our review is the first synthesis of the evidence regarding the effectiveness for PCP and patients of methods of connection from primary care to community-based physical activity opportunities in the United Kingdom. In order to answer the research questions the review overcame significant challenges: (a) the use of a relatively novel type of evidence synthesis which lacks methodological guidance; (b) the focus on *two* sets of actors and *two* outcomes for each; (c) the need to further interpret findings provided, as well as to conduct secondary data analysis. Our review has several other strengths. The use of realist methodology facilitated understanding of how and why processes succeeded or failed in different contexts. It also enabled development of realist programme theories relevant not only for the case of physical activity promotion but also for other cases of health promotion involving connection from primary care to community-based opportunities, including social prescribing activities (Wong, Westhorp, et al., 2013). The inclusion of grey literature was a particular strength as less than half of the documents included were from academic journals, which, along with the types of sources of funding reported, indicates the 'real-world' application of the topic. The use of behavioural theory—the COM-B behavioural model and the CALO-RE Taxonomy of behaviour change techniques—facilitated secondary analysis and interpretation of primary evaluation data/findings, thereby enhanced the evidence base in the area.

The main limitation of the review is the dearth of evidence regarding the effectiveness of different methods of connecting primary care patients with community-based physical activity opportunities in the United Kingdom. Limited attention has been paid to the effectiveness and acceptability of such methods, and the processes of physical activity promotion in which they are embedded, in primary evaluations. Despite undertaking of secondary data analysis for the included primary evaluations, evidence regarding effectiveness for both PCP and patients was available for only two of the fifteen identified processes. There was greater emphasis on acceptability than on effectiveness in the included evaluations, however, while a necessary condition for effectiveness, acceptability does not *guarantee* effectiveness. Such evidence is therefore more useful in combination with effectiveness evidence to enable understanding of *how* and *why* a process was or was not effective. The lack of evidence precluded definite conclusions regarding their outcomes, and the underlying theories of change. It is important to note that full evaluations might have led to different conclusions regarding outcomes and theories of change, as well as greater understanding of *why* theories of change were supported or refuted. A further limitation was the inclusion of only documents written in English, however given the UK context, we do not perceive this to be a significant limitation.

## 4.3 | Comparisons with existing literature

The paucity of evidence specific to the effectiveness of methods of connecting primary care patients to community-based opportunities limits comparisons of our review with existing literature. Our findings were in line with those of the theory-driven qualitative study we conducted as part of the same larger research project (Carstairs et al., 2020). Our qualitative study explored primary care patient and PCP views regarding methods of connection. Patients and PCP discussed three methods of connection from primary care to community-based physical activity opportunities that they believed could be effective: informal passive signposting; informal active signposting; and formal referral/prescription. Similar to our review, the use of the COM-B model to understand perceived barriers and facilitators to their potential effectiveness provided useful insight to the future development of processes of connection with methods embedded. Of note in the wider social prescribing field is a recent UK-based realist review identifying a dearth of evidence regarding the effectiveness of methods of connection from primary care to community-based activities (Husk et al., 2020). The need for improvement in the evidence base in this area is corroborated by other social prescribing literature, which also advocates the importance of theory-based evaluation of methods of connection (Hopewell, 2017; Kellezi et al., 2019; Price, Hookway, & King, 2017; Roland et al., 2020; Stevenson, 2019)—a point receiving less attention in the physical activity-specific literature.

### 4.4 | Recommendations

The findings of our review have several implications for both practice and research in the area. Firstly, future development of processes of physical activity promotion—and other health promotion—involving connection from primary care to community-based opportunities, including social prescribing activities, should take into account the useful indications from our review in order to enhance their effectiveness. Secondly, well-designed theory-based evaluations are needed to progress the evidence base in the area. Such evaluations should be built in to the design and implementation of processes of physical activity promotion incorporating methods of connection from the outset, and efforts should be made to capture in practice the data necessary for such evaluations. This includes data relating to the effectiveness of all three stages of the processes: (a) approaches to identifying eligible and willing patients who would benefit from increasing their physical activity levels; (b) behaviour change strategies aiming to enhance the likelihood of patients increasing their physical activity levels; (c) methods of connecting patients with community-based physical activity opportunities. These data should be complemented by data regarding how and why the processes are or are not effective for PCP and patients. Thirdly, regarding the first two stages of the processes, although not a focus of our review, we observed in several of the 15 processes low willingness of patients to actively participate in eligibility checks, and low willingness of eligible patients to participate in processes of physical activity promotion and thus be connected with community-based opportunities. Research into techniques and strategies to improve the willingness of potentially eligible patients to participate in eligibility checks, and the willingness of eligible patients to participate in processes of physical activity promotion, would therefore be beneficial. In particular our review identified a need for a focus on techniques and strategies to enhance patient capability and motivation to organise the session with an intermediary in indirect routes.

## 5 | CONCLUSIONS

The evidence base concerning the effectiveness of methods of connection from primary care to community-based physical activity opportunities is lacking. Our review revealed several indications useful for the future development of such methods and the processes of physical activity promotion in which they are embedded. It also highlighted the need for well-designed theory-based evaluations.

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### CONFLICTS OF INTEREST

All the authors declare no competing interests.

### AUTHOR CONTRIBUTIONS

Conceptualization and design: GO, KBC, RHR and SAC; conduction of review, including analysis and interpretation: KBC, RHR, SAC, GO and FS; funding acquisition: GO, FS, KBC and RHR; manuscript drafting: KBC and RHR; manuscript revision: GO, SAC and FS. All authors approved and are accountable for the final version of the manuscript.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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