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REVIEW ARTICLE

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# Identifying the active ingredients of training interventions for healthcare professionals to promote and support increased levels of physical activity in adults with heart failure: a systematic review

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**ABSTRACT**

Heart failure (HF) is characterised by breathlessness and fatigue that impacts negatively on patients' intentions to prioritise physical activity (PA). Healthcare professionals (HCPs) experience challenges when motivating patients to increase PA. It is essential to develop an understanding of how to support HCPs to deliver PA interventions. We aimed to identify active ingredients of HCP training interventions to enable delivery of PA interventions to HF patients. Nine databases were searched. Data were extracted on study characteristics, active ingredients, outcomes, and fidelity measures. Data were synthesised narratively, and a promise analysis was conducted on intervention features. Ten RCTs, which reported a training intervention for HCPs were included (N = 22 HCPs: N = 1,414 HF patients). Two studies reported the use of theory to develop HCP training. Seven behaviour change techniques (BCTs) were identified across the 10 training interventions. The most 'promising' BCTs were 'instruction on how to perform the behaviour' and 'problem solving'. Two studies reported that HCP training interventions had been formally evaluated. Fidelity domains including study design, monitoring and improving the delivery of treatment, intervention delivery, and provider training were infrequently reported. Future research should prioritise theory-informed development and robust evaluation of training interventions for HCPs to enable faithful and quality delivery of patient interventions.

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Heart failure; physical activity; healthcare professional; health behaviour change; behavioural intervention; training

## 1. Introduction

Healthcare professionals (HCPs) play a vital role in promoting and supporting the maintenance of physical activity behaviour in patients with long-term health conditions, including those with heart failure (HF) (Lang et al., 2018). Endorsement of interventions by HCPs is important for increased uptake and engagement of patients with physical activity (Jackson et al., 2005; Okwose et al., 2020),

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therefore HCPs are considered a critically important intervention component. They have been described as motivators, educators, enablers, and a source of support for HF patients (Lang et al., 2018).

Evidence-based guidelines for HCPs involved in the care of HF patients recommend that physical activity and exercise should be integrated into cardiac management (McDonagh et al., 2021). However, these guidelines lack acknowledgement of individual patient capabilities and baseline physical activity and fitness levels. Furthermore, they omit specific detail about 'how' HCPs can support their patients to achieve the specific guideline-recommended levels of physical activity and exercise, and do not refer to HCP training to support them with the delivery of patient interventions in practice. High-quality training for HCPs to enable them to promote physical activity and exercise and deliver interventions targeting these health behaviours has been recommended as an important element to improve fidelity and consistency of delivery of behavioural interventions (NICE, 2007). Improvements in HCP's knowledge and skills as an outcome of training are considered a prerequisite for effectively delivering patient interventions, optimising fidelity (Bellg et al., 2004) and enhancing patient outcomes (Cook et al., 2022).

The translation of theory and evidence-informed patient interventions from research into routine practice is frequently hindered due to the lack of systematically developed and evaluated HCP training interventions and resources for HCPs to use with patients (Potthoff et al., 2019). Implementation of interventions within routine practice is often slow and critically requires changing the behaviour of HCPs, which can prove challenging (Grimshaw et al., 2012; McGlynn et al., 2003; Woolf, 2008), particularly when it involves changing embedded and practiced ways of working (Brennan & Mattick, 2013).

Patient interventions targeting physical activity are often complex and involve many integrated factors (Mars et al., 2013) (i.e., changing both HCP behaviour and patient behaviour) which can pose a challenge for evaluation. However, a systematic and iterative approach to intervention development, utilising the best available evidence and theory (Campbell et al., 2000; Craig et al., 2008; Skivington et al., 2021) can guide intervention decisions and facilitate robust evaluation.

Developing interventions, including HCP training interventions informed by theory, is critically important to optimise intervention effectiveness. The active ingredients of interventions should target mechanisms of action (determinants of behaviour), with these being conceptualised as theoretical constructs (Michie et al., 2017). Theories of behaviour change aim to predict why and how behaviour change will occur and allow intervention developers to target the determinants that are most likely to change health behaviours (Michie et al., 2017). These determinants, or active ingredients include theories/models of health behaviour change, theory-linked behaviour change techniques (BCTs), and other intervention features such as mode, form, and information content. A BCT is the smallest, observable, and replicable active ingredient of an intervention, that can be used to change mechanisms of action, and in turn behaviour (Michie et al., 2013). BCTs afford a systematic method to identify and classify specific strategies used within interventions to try to change HCP behaviour, which should be clearly reported. However, the focus is frequently on the active ingredients of patient interventions and the training intervention for HCPs is often neglected, potentially impacting negatively on delivery of the patient intervention by HCPs. The BCT Taxonomy V1 (Michie et al., 2013) has been used previously to develop HCP training interventions to support the delivery of patient interventions (e.g., PARAS (Moore et al., 2022); iPrepwell (Durrand et al., 2022); Movement as Medicine (Avery et al., 2016), and it is important to understand which BCTs have previously been delivered as part of HCP training interventions to inform future training for HCPs.

HCPs report many barriers when delivering behaviour change interventions to patients, including a lack of time during routine consultations (Haighton et al., 2021; Keyworth et al., 2020), lack of prioritisation of delivery of behaviour change and low confidence to deliver interventions to patients (Keyworth et al., 2019). A recent qualitative study identified that HCP training content, in the context of physical activity and HF, should aim to enhance knowledge of HCPs (e.g., current physical

activity guidelines for patients with HF, and the benefits of patients with HF engaging in physical activity), skills (e.g., how to use specific BCTs to promote and support physical activity behaviour change and motivate patients to engage with physical activity), and confidence (e.g., opportunities to use role play during training to increase mastery) (Ashley et al., 2022).

A systematic review conducted by Hatfield et al. (2020) has demonstrated that training for HCPs can improve the quality of delivery of behaviour change interventions, and consequently impact positively on the health behaviour of patients. Therefore, HCP training interventions, that will address barriers and training needs of HCPs to improve the quality of delivery of behaviour change interventions in the context of physical activity and HF, are vitally important.

It is important to understand the active ingredients of HCP training interventions to change consultation behaviour and optimise faithful delivery of patient interventions in accordance with a protocol, which in turn enables a more reliable impact of the intervention on patient outcomes. We conducted a systematic review to identify the active ingredients of HCP training interventions to support the delivery of patient interventions targeting physical activity in the HF population, specifically including HCPs who are involved in the HF care pathway, and who are potential candidates for the promotion of physical activity to patients with HF.

## 2. Methods

### 2.1. Search strategy and study selection

This systematic review was conducted with reference to a protocol registered with PROSPERO (ID: CRD42020173267) (Ashley et al., 2020) and adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Page et al., 2021). A PRISMA checklist is provided (supplementary file 1).

Nine electronic databases were searched from inception to 23rd November 2021 using a combination of database-specific subject headings and keywords: MEDLINE (Ovid platform), CINAHL (EBSCO platform), PsycINFO (Ovid platform), EMBASE, Scopus, CDSR protocols, CDSR reviews, Web of Science, and the Cochrane Library. Prior to conducting the search, reviewers met to discuss potential search terms to be included in the search relevant to health behaviour change, physical activity, HCPs, and HF patients. The search strategy was designed and conducted by a Medical Sciences Librarian (LE) and no search limits or restrictions were imposed. Search terms that were specifically related to HCP training were not included in the search strategy as scoping searches demonstrated a lack of studies that reported specifically on HCP training interventions. Furthermore, several studies that included HCP training interventions would not have been captured by the search due to indexing. Our scoping searches indicated that the optimal approach would be to focus on identifying studies reporting on behavioural change interventions targeting physical activity in the context of HF, and subsequently assessing those studies for inclusion of a HCP training intervention. The reproducible searches for all search strategies are available as a supplementary file (supplementary file 2). Backward and forward citation searching were completed using Google scholar and Web of Science, respectively.

One reviewer (KA) screened titles and abstracts of all studies identified by the search (Stage 1) and a second reviewer (MYT) independently screened a 20% random sample. An inter-coder agreement was set at a threshold of >0.80 using Kappa (Landis & Koch, 1977). Agreement of articles identified for inclusion by reviewers was required to progress to full-text screening (Stage 2). If agreement was not achieved, an additional 20% of titles and abstracts of articles identified would be screened until the >0.80 threshold was met (Landis & Koch, 1977). Studies retained following the completion of stage 1 screening were obtained as full-text articles and independently assessed for eligibility by the same two reviewers (KA/MYT) using a study selection form (supplementary file 3). Any disagreements at stage 1 and 2 of study selection were discussed, and where agreement could not be reached, a third reviewer was asked to adjudicate (MC, DF, or LA).

### 2.2. Inclusion and exclusion criteria

Included studies were Randomised Controlled Trials (RCTs) or pilot RCTs of behavioural interventions that included a formal training intervention component to enable HCPs to deliver the intervention targeting physical activity behaviour (assessed objectively or subjectively) of adults with a diagnosis of HF (aged $\geq$ 18 years, with or without physical or mental health comorbidity). In the context of this systematic review, HCPs were those who provided clinical care to HF patients, including, but not limited to nurses, cardiologists, physiotherapists, and healthcare assistants. Control or comparator groups within eligible studies were usual/standard care.

Studies were excluded from the review in the following circumstances: (1) where physical activity was targeted exclusively within a laboratory or clinical setting (e.g., supervised exercise sessions using equipment within hospital sites), with no emphasis on habitual physical activity levels outside of these settings; (2) studies that investigated physical activity change in combination with a pharmacological agent; and (3) studies not published in English. Although it was not a requirement for included studies to report on the quality of life of HF patients, quality of life is frequently assessed in HF research, therefore we extracted quality of life outcome data where reported.

### 2.3. Data extraction

A standardised data extraction form was developed that captured the following information: description and active ingredients of the HCP training interventions and patient interventions (e.g., theory-linked BCTs [BCTTv1 (Michie et al., 2013)], mode of delivery, duration, intensity, information content, and theoretical underpinning); type and method of physical activity behaviour assessment (e.g., number of steps assessed with a pedometer); and quality of life. The focus is on the description in RCTs of the active ingredients of the training interventions for personnel to deliver a related intervention to patients.

The data extraction form was piloted by two reviewers (KA/MYT) using three included studies. Any discrepancies in data extraction were discussed and resolved to produce a final version of the form (supplementary file 4). Data were extracted from all included studies by one reviewer (KA) and verified by a second reviewer (MYT). Any discrepancies identified were resolved via discussion. Where necessary, a third reviewer (LA/DF) was consulted when an agreement could not be reached. All 10 corresponding authors of included studies were contacted to obtain missing data or to clarify any specific issues that could not be ascertained from the primary article, supplementary files, protocols, or associated articles. In total, 9 of the 10 corresponding authors responded and provided the additional information requested.

Before commencing data extraction, two reviewers (KA/MYT) completed the BCT taxonomy v1 (BCTTv1) training (BCT Taxonomy v1 online training, 2021) to facilitate reliable interpretation of intervention content in accordance with standardised BCT definitions. In terms of patient interventions, BCTs were not coded if present in both the intervention and comparator arms (i.e., only those used that were over and above usual/standard care were coded).

Data on treatment fidelity measures were extracted using a five-domain checklist of 16 strategies based on published guidance (Bellg et al., 2004). The checklist included strategies across five domains: (1) study design (to adequately test its hypotheses in relation to its underlying theory and clinical processes); (2) training providers (to ensure providers have been satisfactorily trained to deliver the intervention to study participants); (3) delivery of treatment (monitoring and improving the delivery of the intervention so that it is delivered as intended); (4) receipt of treatment (monitoring and improving the ability of patients to understand and perform treatment-related behavioural skills and cognitive strategies during treatment delivery); and (5) enactment of treatment skills (monitoring and improving the ability of patients to perform treatment-related behavioural skills and cognitive strategies in relevant real-life settings). An example checklist is provided as a supplementary file (supplementary file 5).

### 2.4. Study quality assessment

The Cochrane Collaboration Risk of Bias tool for RCTs (Higgins et al., 2019) was used to assess methodological quality and overall risk of bias (low, some concerns, or high) within and across included studies. Risk of bias assessment was undertaken independently by two reviewers (KA/MYT) with any disagreements resolved via discussion.

### 2.5. Data synthesis

Despite all included studies reporting physical activity outcomes, there was heterogeneity in how these outcomes were measured (e.g., subjectively, and objectively; steps, minutes of physical activity) and the duration of follow-up varied greatly between studies. Consequently, outcome measurements could not be meaningfully compared, and as such, the conduct of a meta-analysis was considered inappropriate. Instead, we conducted a narrative synthesis with reference to the Synthesis Without Meta-analysis (SWIM) guidelines (Campbell et al., 2020). A SWIM checklist is provided as a supplementary file (supplementary file 6). The narrative synthesis described data on the active ingredients of HCP training interventions.

### 2.6. Promise of intervention active ingredients

Promising active ingredients within HCP training and patient interventions (e.g., mode of delivery, duration, intensity, and specific BCTs) associated with positive changes in physical activity behaviour of patients with HF and quality of life outcomes were explored by calculating promise ratios (Gardner et al., 2016; Martin et al., 2013; Moore et al., 2018).

The first step involved classifying the promise of interventions: very promising (statistically significant between-group improvements in physical activity and quality of life outcomes in favour of the intervention group); quite promising (intervention groups with statistically significant within-group improvements in physical activity and quality of life outcomes, or improvements greater than those in a comparator group) or non-promising (lack of statistically significant improvements in outcomes either within or between groups).

Very or quite promising interventions that included a specific active ingredient in the HCP training interventions were summed and subsequently divided by the number of non-promising interventions that included the same active ingredient to calculate a 'promise ratio'. A promise ratio of $\geq 2$ meant that an active ingredient was 'promising' (Gardner et al., 2016).

## 3. Results

The electronic database search identified 28,155 references (Figure 1). Following removal of duplicates, 16,588 references remained. 372 studies were identified as potentially relevant following the first stage of study selection (screening of titles and abstracts). Following completion of full-text screening (n = 370 studies – two could not be retrieved), 10 studies fulfilled the review criteria and were included in the review (Bernocchi et al., 2017; Dalal et al., 2019; Dunbar et al., 2015; Frederix et al., 2015; Freedland, Carney, Rich, Steinmeyer, & Rubin, 2015; Jolly et al., 2009; Lang et al., 2018; Pozehl et al., 2018; Shoemaker et al., 2017; Smeulders et al., 2009) (supplementary file 7).

### 3.1. Study characteristics

A summary of characteristics for the 10 included studies is provided in Table 1. Four studies were conducted in the United States of America (USA) (Dunbar et al., 2015; Freedland et al., 2015; Pozehl et al., 2018; Shoemaker et al., 2017), three in the United Kingdom (UK) (Dalal et al., 2019;

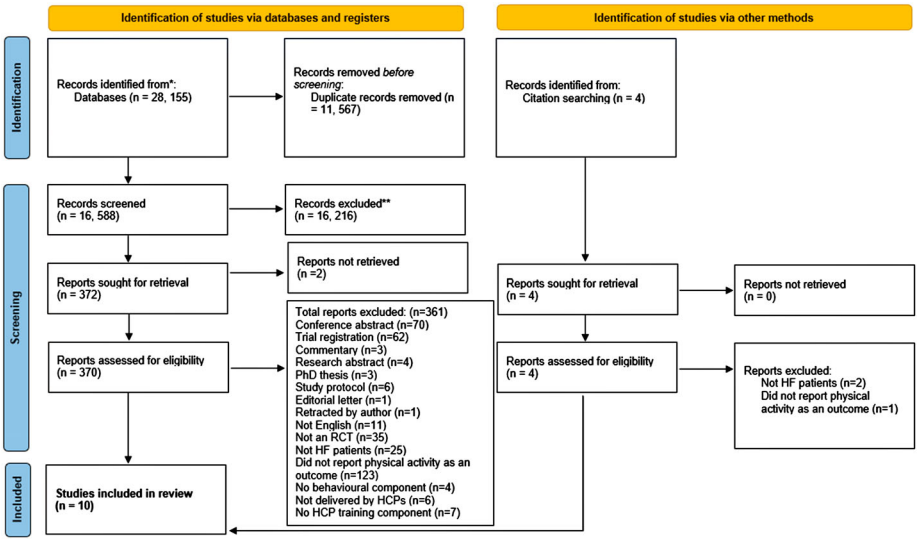


**Figure 1.** PRISMA flow diagram reporting the process of study selection.

Jolly et al., 2009; Lang et al., 2018), one in Belgium (Frederix et al., 2015), one in the Netherlands (Smeulders et al., 2009), and one in Italy (Bernocchi et al., 2017).

The patient interventions varied considerably in terms of duration (i.e., from 6 weeks to 18 months); type of intervention (e.g., cognitive behavioural therapy with relapse prevention telephone calls; choice of exercise; group-based education sessions; self-help materials; and home-based physical activity plan); social support (individual feedback versus group support and provision of coaching, or not). HCP training interventions also varied in terms of duration (i.e., from 1 to 4 days). The mode of delivery of HCP training interventions included face-to-face delivery; face-to-face and virtual delivery; and the provision of a training manual.

Four of the 10 patient interventions were rated as 'very promising' in relation to an increase in the physical activity behaviour of HF patients (Bernocchi et al., 2017; Frederix et al., 2015; Pozehl et al., 2018; Smeulders et al., 2009). One intervention was rated as 'quite promising' (Dunbar et al., 2015), and five were rated as 'non-promising' (Dalal et al., 2019; Freedland et al., 2015; Jolly et al., 2009; Lang et al., 2018; Shoemaker et al., 2017).

Further information about patient interventions and 'promising' active ingredients of these interventions is provided in supplementary file 8 (Tables 5–7).

### *3.2. Healthcare professional training interventions*

Six studies (Bernocchi et al., 2017; 2018; Freedland et al., 2015; Frederix et al., 2015; Shoemaker et al., 2017; Smeulders et al., 2009) reported the number of HCPs who participated in training, with a combined sample size of $N = 22$ (ranging from 2 HCPs (Bernocchi et al., 2017; Lang et al., 2018; Shoemaker et al., 2017) to 9 HCPs (Smeulders et al., 2009)). One study (Smeulders et al., 2009) included nine 'peer leaders' (patients with HF) alongside nine cardiac nurse specialists who attended the HCP training and assisted with the delivery of the intervention. The clinical roles of the HCPs in receipt of training and involved in the delivery of the patient intervention were explicitly stated in all 10 studies. The most frequently reported HCP role participating in training and subsequently responsible for intervention delivery was a nurse ($N = 6$) (Bernochi et al., 2017; Dalal et al., 2019; Dunbar et al., 2015; Jolly et al., 2009; Lang et al., 2018; Smeulders et al., 2009). Other HCP roles included a physiotherapist, physical therapist, therapist, community-based exercise professional, care provider, psychologist, and dietitian.

**Table 1.** Summary of HCP training intervention content for the included studies.

| Study, country of origin and setting | Description of healthcare professional training intervention |
|---|---|
| ***Dalal et al., 2019***<br>Multicentre parallel, two group, randomised superiority trial<br>UK<br>Home-based<br>REACH-HF | **Healthcare professional training:** 3-day training course involving the theory and process of facilitation (building rapport using patient-centred counselling techniques, empowerment and support of self-management, building understanding of the condition); using behaviour change techniques; techniques for managing stress and anxiety; contents of the manual; supporting exercise and physical activity using intervention materials; facilitation of the Family and Friends Resource and medical/nursing issues. The training was linked by three case studies of HF patients and opportunities to practice facilitation techniques and to problem-solve.<br>*N* = Not reported<br>*Healthcare professional(s) receiving training:* Facilitator (Nurse or Physiotherapist background)<br>*Training duration:* 3 days<br>*Mode of delivery:* Face-to-face delivery and use of a manual/syllabus<br>*Theory:* Intervention mapping<br>*Assessment of training:* Adherence to intervention protocols by the facilitators was ascertained through audio recordings of interviews and a fidelity checklist. |
| ***Lang et al., 2018***<br>Single-centre, parallel group randomised controlled pilot trial<br>UK<br>Home-based<br>REACH-HF | **Healthcare professional training:** 3-day training course including the theory and process of facilitation (building rapport using patient-centred counselling techniques, empowerment, and support of self-management, building understanding of the condition); using behaviour change techniques; techniques for managing stress and anxiety; contents of the manual; supporting exercise and physical activity using the intervention materials; facilitation of the Family and Friends Resource and medical/nursing issues. The training was linked by three case studies of HF patients and opportunities to practice facilitation techniques and to problem-solve potentially difficult situations.<br>*N* = 2<br>*Healthcare professional(s) receiving training:* Two Cardiac nurses<br>*Duration:* 3 days<br>*Mode of delivery:* Face-to-face delivery and use of a manual/syllabus<br>*Theory:* Intervention mapping<br>*Assessment of training:* Fidelity of the REACH-HF manual delivery by intervention facilitators (a sample of patient-facilitator contacts for a sample of six patients were audio recorded and independently reviewed using a 13-item checklist). |
| ***Shoemaker et al., 2017***<br>Multi-centre, single-blind, randomised controlled pilot trial<br>USA<br>Home-based<br>Feedback/ encouragement group and coaching/ exercise group | **Healthcare professional training:** The Health Coach was a certified health educator and wellness coach, with specific training and competency-based curricula. Motivational interviewing was a core competency.<br>The physical therapist received continuing education in motivational interviewing.<br>*N* = 2<br>*Healthcare professional(s) receiving training:*<br>Group A: One member of the research team.<br>Group B: One health and wellness coach and one physical therapist.<br>*Duration of training:* Not reported<br>*Mode of delivery:* Not reported<br>*Theory:* Not reported<br>*Assessment of training:* Not reported |
| ***Freedland et al., 2015***<br>Single-centre, single-blind, parallel group randomised clinical trial. | **Healthcare professional training:** Weekly clinical supervision meetings included case presentations, clinical problem-solving, and protocol adherence reviews. Audio recording of a recent treatment session was listened to and independently code it on the NIMH Collaborative Study Psychotherapy Rating Scale (CSPRS). As well as discussions around protocol adherence. |

(*Continued*)

**Table 1.** Continued.

| Study, country of origin and setting | Description of healthcare professional training intervention |
|---|---|
| USA<br>Academic medical centre and home-based<br>CBT | *N* = 4<br>*Healthcare professional(s) receiving training:* Two masters-level and two doctoral-level therapists.<br>*Duration of training:* None reported<br>*Mode of delivery:* Face-to-face group supervision meetings<br>*Theory:* None reported<br>*Assessment of training:* The therapists completed a CBT technique checklist after each session to document fidelity to the intervention protocol. Therapists also took part in protocol adherence reviews. |
| ***Pozehl et al., 2018***<br>Multi-centre, prospective, randomised two-group repeated measures experimental design<br>USA<br>Health-care exercise facility and home-based<br>HEART camp | **Healthcare professional training:** Nine hours delivered across four sessions initially, followed by group-based booster sessions, including learning discussions, role plays and video clips. Training was delivered by a nurse, who was also study co-investigator.<br>N = Not reported<br>*Healthcare professional(s) receiving training:* Coach trainer (community-based exercise professional) - trained by a nurse and a group education session leader<br>*Duration of training:* Nine hours delivered across four sessions initially, followed by 1-hour booster sessions every 8-12 weeks throughout the 4-year time period. Over five years, coaches participated in 19 hours of booster training sessions in addition to the initial training sessions.<br>*Mode of delivery:* Group-sessions were delivered via distance technology. Coaches at the distant site attended one in-person visit at the facility nearest to the HEART Camp research team.<br>*Theory:* Not stated<br>*Assessment of training:* Healthcare professionals participated in an additional 19 hours of booster training, held every 8-12 weeks via distance technology. These included documented coach use of the adherence database, video recordings of coaching sessions, coach and patient interviews, and coach perception of the training programme (Coach Assessment of HEART Camp Training Questionnaire). |
| ***Frederix et al., 2015***<br>Multi-centre, prospective randomised controlled clinical trial<br>Belgium<br>Centre-based cardiac rehabilitation plus home-based telerehabilitation | **Healthcare professional training:** During the training period, the care provider received a specific course on how to detect and what to do in case of alarming signs/symptoms. A cardiologist provided support and feedback during the intervention period.<br>*N* = 3<br>*Healthcare professional(s) receiving training* = One care provider (involved in the cardiac care pathway), one Psychologist and one Dietitian.<br>*Duration of training:* Not reported.<br>*Mode of delivery:* Not reported.<br>*Theory:* Not reported.<br>*Assessment of training:* Not reported. |
| ***Dunbar et al., 2015***<br>Multi-centre, two-group randomised design<br>USA<br>HF clinic and home-based<br>HF-Diabetes self-care intervention | **Healthcare professional training:** Interventionists were trained in education and counselling principles, intervention content, use of the intervention materials (education and activity), how to establish rapport during telephone interventions, and how to assess response to the intervention sessions. They were also trained in how to conduct home visits. Retraining took place periodically.<br>*N* = Not reported<br>*Healthcare professional(s) receiving training:* Research nurse<br>*Duration of training:* Not reported<br>*Mode of delivery:* Not reported<br>*Theory:* Not reported<br>Assessment of training: Re-training took place periodically. |
| ***Smeulders et al., 2009***<br>Multi-centre, two-group randomised controlled trial<br>Netherlands<br>Setting not reported | **Healthcare professional training:** All leaders in the study received training on the CDSMP protocol for 4 days prior to the intervention period. The training was provided by one of the authors (E.S.) and one CHF nurse specialist who had both been instructed as master trainers. The leaders learned how to facilitate the process of action planning and problem solving and how to introduce cognitive symptom management techniques to the participants in the classes.<br>N = 18 (9 HCPs and 9 peer leaders) |

| | |
|---|---|
| Chronic disease self-management programme (CDSMP) | *Healthcare professional(s) receiving training:* Nine cardiac nurse specialists and nine peer leaders (chronic HF patient).<br>*Duration of training:* 4 days<br>*Mode of delivery:* Not reported<br>*Theory:* Not reported<br>*Assessment of training:* Not reported. |
| ***Bernocchi et al., 2017***<br>A consecutive, multi-centre, open, randomised controlled trial<br>Italy<br>Home-based<br>Telerehabilitation home-based programme (Telerehab-HBP) | **Healthcare professional training:** Group training sessions, organisational meetings and planning prior to the intervention delivery. No further details were reported.<br>*N* = 2<br>*Healthcare professional(s) receiving training:* One Nurse tutor and one physiotherapist tutor<br>*Duration of training:* Not reported<br>*Mode of delivery:* Not reported<br>*Theory:* Not reported<br>*Assessment of training*: Not reported |
| ***Jolly et al., 2009***<br>Clinical randomised controlled trial<br>UK<br>Supervised sessions and home-based.<br>BRUM-CHF | **Healthcare professional training:**<br>Nurses were trained by a one-day observation visit to the centre at Leicester, where a similar programme was delivered.<br>N = Not reported<br>*Healthcare professional(s) receiving training:* Specialist HF nurse.<br>*Duration of training:* One day.<br>*Mode of delivery:* Face-to-face observation.<br>*Theory:* Not reported<br>*Assessment of training:* Not reported |

Abbreviations: HF, Heart Failure; N, Number; RCT, Randomised Controlled Trial; SD, Standard Deviation.

### 3.3. Intervention promise - healthcare professional training interventions

Due to the lack of studies reporting on the outcomes of HCP training interventions, we used the outcomes of patient interventions (i.e., changes in physical activity and quality of life) to calculate promise ratios.

Table 2 presents promise ratios for active ingredients of HCP training interventions associated with increases in physical activity behaviour of patients with HF and improvements in quality of life.

Five studies reported the duration of training interventions delivered to HCPs (Dalal et al., 2019; Jolly et al., 2009; Lang et al., 2018; Pozehl et al., 2018; Smeulders et al., 2009). The most 'promising' duration of training associated with an increase in physical activity behaviour of HF patients was 4 days, as reported by two studies (Pozehl et al., 2018; Smeulders et al., 2009). The most 'promising' duration of training associated with improvements in the quality of life of HF patients was 3 days, as reported by two studies (Dalal et al., 2019; Lang et al., 2018), although 3 days were not 'promising' for increasing physical activity behaviour of patients with HF.

The mode of delivery of training was reported (or obtained from corresponding study authors) in five studies (Dalal et al., 2019; Freedland et al., 2015; Jolly et al., 2009; Lang et al., 2018; Pozehl et al., 2018). None were found to be more 'promising' in terms of association with increased physical activity behaviour of patients with HF. However, in-person delivery was reported in four 'promising' training interventions (Dalal et al., 2019; Freedland et al., 2015; Jolly et al., 2009; Lang et al., 2018) when associated with improvements in quality of life. The mode of training delivery to HCPs was not explicitly stated in the remaining five studies.

Two 'promising' studies associated with improvements in the quality of life of patients with HF (Dalal et al., 2019; Lang et al., 2018) reported adopting a theoretical approach (intervention mapping) to the development of their training programme to facilitate the delivery of the patient intervention by HCPs. No other studies explicitly reported the use of a theory or model of behaviour change in the context of HCP training development or evaluation.

At least one BCT was coded within HCP training interventions for six studies (Dalal et al., 2019; Dunbar et al., 2015; Freedland et al., 2015; Jolly et al., 2009; 2018; Pozehl et al., 2018). Two of these six studies were rated as 'promising' when associated with increases in the physical activity behaviour of patients with HF (Dunbar et al., 2015; Pozehl et al., 2018).

Seven different BCTs were identified across HCP training interventions reported in six studies. The median number of BCTs used within training interventions was 1.5 (IQR = 2) informed by data coded from 6 studies. The most frequently coded BCTs were 'problem-solving' ($n = 4$ studies), 'Instruction on how to perform the behaviour' ($n = 3$ studies), and 'Behavioural practice/rehearsal' ($n = 3$ studies). The BCT considered most 'promising' when associated with an increase in physical activity behaviour of patients with HF was 'instruction on how to perform the behaviour' ($n = 3$ studies). The most 'promising' BCTs associated with improvements in the quality of life of patients with HF were 'problem solving' ($n = 3$ studies), 'instruction on how to perform the behaviour' ($n = 2$ studies) and 'behavioural practice/rehearsal' ($n = 2$ studies).

### 3.4. Evaluation and fidelity of HCP training interventions

Two studies reported audio recording delivery of patient interventions by HCPs and assessing delivery against a fidelity checklist (Dalal et al., 2019; Lang et al., 2018). Two studies reported that HCPs completed a fidelity checklist post-intervention delivery to ascertain adherence to the study protocol (Freedland et al., 2015; Pozehl et al., 2018); and one of these studies reported that HCPs attended a protocol adherence review (Freedland et al., 2015). Two studies reported regular re-training (Dunbar et al., 2015; Pozehl et al., 2018), and one study provided explicit details of the training and re-training to minimise drift from the study protocol, including a 1-hour booster session every 8–12 weeks, with 19 hours of re-training in total (Pozehl et al., 2018).

**Table 2.** Promise ratios for active ingredients of healthcare professional training interventions.

| | Physical activity outcome (patient intervention) | | | | Quality of Life outcome (patient Intervention) | | | |
|---|---|---|---|---|---|---|---|---|
| Active ingredient of HCP training intervention | **Frequency** | **Presence in very/quite promising interventions** | **Presence in non-promising interventions** | **Promise Ratio** | **Frequency** | **Presence in very/quite promising interventions** | **Presence in non-promising interventions** | **Promise Ratio** |
| *Duration (days)* | | | | | | | | |
| 1 | 1 | 0 | 1 | 0.00 | 1 | 1 | 0 | 1.00 |
| 3 | 2 | 0 | 2 | 0.00 | 2 | 2 | 0 | 2.00 |
| 4 | 2 | 2 | 0 | 2.00 | 0 | 0 | 0 | 0.00 |
| *Mode* | | | | | | | | |
| Face-to-face | 4 | 0 | 4 | 0.00 | 4 | 4 | 0 | 4.00 |
| Face-to-face and virtual | 1 | 1 | 0 | 1.00 | 0 | 0 | 0 | 0.00 |
| Provided with a manual | 2 | 0 | 2 | 0.00 | 2 | 2 | 0 | 2.00 |
| Theory-based | 2 | 0 | 2 | 0.00 | 2 | 2 | 0 | 2.00 |
| *BCTs* | | | | | | | | |
| 1.2 Problem solving | 4 | 1 | 3 | 0.33 | 3 | 3 | 0 | 3.00 |
| 4.1 Instruction on how to perform the behaviour | 3 | 2 | 1 | 2.00 | 2 | 2 | 0 | 2.00 |
| 8.1 Behavioural practice/rehearsal | 3 | 1 | 2 | 0.50 | 2 | 2 | 0 | 2.00 |
| 2.2 Feedback on behaviour | 2 | 1 | 1 | 1.00 | 1 | 1 | 0 | 1.00 |
| 6.1 Demonstration of the behaviour | 2 | 1 | 1 | 1.00 | 1 | 1 | 0 | 1.00 |
| 1.5 Review behaviour goal(s) | 1 | 0 | 1 | 0.00 | 1 | 1 | 0 | 1.00 |
| 5.1 Information about health consequences | 1 | 0 | 1 | 0.00 | 1 | 1 | 0 | 1.00 |

Note: For the purposes of calculating promise ratios, the outcome of patient interventions was used to classify the 'promise' of interventions, and the presence/absence of specific active ingredients in HCP training interventions were used to calculate the promise ratios.

Two studies published a separate article describing their training programme, including a formal assessment of fidelity of delivery (Dalal et al., 2019; Pozehl et al., 2018). Pozehl et al., (2018), used implementation strategies including booster sessions; interactive discussion; site visits by team members; and individualised feedback provision to interventionists (HCPs). HCPs demonstrated >90% adherence to activities and protocol throughout the four-year period. Dalal et al. (2019) included fidelity assessment as part of a process evaluation, which involved an assessment of audio-recordings of patient contacts. Fidelity was assessed against a 13-item fidelity checklist using a 0–6 scoring system for each domain assessed. Fidelity was reported as 'adequate', with a score ≥3/6 in each fidelity domain assessed.

Treatment fidelity measures of the 10 included studies were extracted using a 16-item checklist, assessing 5 domains of fidelity (Bellg et al., 2004). These are summarised in Table 3.

All included studies scored <63% across all 5 domains of treatment fidelity. All five fidelity domains scored <44%, with monitoring and improving receipt of treatment scoring the highest (44%), monitoring and enactment of treatment skills scored 40%, monitoring and improving provider training scored 30%, monitoring and improving delivery of treatment scored 25%, and strategies for design of study scored 17%.

The treatment fidelity strategy employed by most studies ($n = 7$) was ensuring participant comprehension. The fidelity domains for the design of the study, monitoring and improving the delivery of treatment, and for monitoring and improving provider training were reported least frequently. Four treatment fidelity strategies were not explicitly reported in any of the 10 included studies (plan for implementation setbacks, accommodate provider differences, control for provider differences, ensure participant ability to use cognitive skills), which all related to training of HCPs.

### 3.5. Methodological quality assessment

A summary of methodological quality assessment for all 10 included studies is presented in Table 4. The overall risk of bias for six studies was rated as 'low' (Dalal et al., 2019; Freedland et al., 2015; Frederix et al., 2015; Jolly et al., 2009; Lang et al., 2018; Shoemaker et al., 2017), and four studies were rated as having 'some concerns' (Bernocchi et al., 2017; Dunbar et al., 2015; Pozehl et al., 2018; Smeulders et al., 2009).

Dunbar et al., (2015) and Smeulders et al., (2009) were rated as having 'some concerns' on the basis that participants had knowledge of the intervention/intervention arms, and this might have influenced self-reported outcomes. Pozehl et al., (2018) were rated as having 'some concerns' due to lack of information reported relating to their randomisation process. Bernocchi et al. (2017) were rated as having 'some concerns' due to a lack of information related to the blinding of participants and research team members. Although Lang et al., (2018) reported evidence of imbalances between their intervention and control groups, with their demographic characteristics and outcome scores at baseline, their randomisation process was considered robust. Therefore, with reference to the Cochrane Handbook (Higgins et al., 2019) that states 'It is important that baseline imbalances that are consistent with chance are not interpreted as evidence of risk of bias' the study was rated as low risk of bias.

## 4. Discussion

This systematic review identified 10 RCTs that included training to enable HCPs to deliver interventions targeting the physical activity behaviour of patients with HF. Findings identified a lack of explicit reporting on the use of theory to inform the development and evaluation of HCP training interventions, and a lack of intervention description (i.e., mode of delivery, form, and content). Similarly, intervention fidelity strategies to improve the design of the study were frequently omitted, as well as monitoring and improving the delivery of treatment and monitoring and improving provider training (i.e., two of the ten studies included in the review involved an assessment of fidelity of delivery by HCPs).

**Table 3.** Treatment fidelity scores within each of the five fidelity domains for each HCP training intervention.

| | | Bernocchi et al., 2017 | Dalal et al., 2019 | Dunbar et al., 2015 | Frederix et al., 2015 | Freedland et al., 2015 | Jolly et al., 2009 | Lang et al., 2018 | Pozehl et al., 2018 | Shoemaker et al., 2017 | Smeulders et al., 2009 | Total (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Treatment fidelity strategies for design of study | Ensure same treatment dose within conditions | N | N | Y | N | N | Y | N | Y | N | Y | 4 (40%) |
| | Ensure equivalent dose across conditions | N | N | Y | N | N | N | N | N | N | N | 1 (10%) |
| | Plan for implementation setbacks | N | N | N | N | N | N | N | N | N | N | 0 (0%) |
| | Overall | | | | | | | | | | | **5 (17%)** |
| (2) Treatment fidelity strategies for monitoring and improving provider training | Standardise training | N | Y | N | N | N | N | Y | Y | N | Y | 4 (40%) |
| | Ensure provider skill acquisition | N | Y | N | N | N | N | Y | Y | N | Y | 4 (40%) |
| | Minimise 'drift' in provider skills | N | N | N | Y | Y | N | N | Y | N | N | 3 (30%) |
| | Accommodate provider differences | N | N | N | N | N | N | N | Y | N | N | 1 (10%) |
| | Overall | | | | | | | | | | | **12 (30%)** |
| (3) Treatment fidelity strategies for monitoring and improving delivery of treatment | Control for provider differences | N | N | N | N | N | N | N | N | N | N | 0 (0%) |
| | Reduce differences within treatment | N | Y | Y | N | Y | N | Y | Y | N | Y | 6 (60%) |
| | Ensure adherence to treatment protocol | N | Y | N | N | N | N | Y | Y | N | N | 3 (30%) |
| | Minimise contamination between conditions | N | N | N | Y | N | N | N | N | N | N | 1 (10%) |
| | Overall | | | | | | | | | | | **10 (25%)** |
| (4) Treatment fidelity strategies for monitoring and improving receipt of treatment | Ensure participant comprehension | Y | Y | Y | N | N | N | Y | Y | Y | Y | 7 (70%) |
| | Ensure participant ability to use cognitive skills | N | N | N | N | N | N | N | N | N | N | 0 (0%) |
| | Ensure participant ability to perform behavioural skills | Y | Y | N | N | N | N | Y | Y | Y | Y | 6 (60%) |
| | Overall | | | | | | | | | | | **13 (44%)** |
| (5) Treatment fidelity strategies for monitoring and improving enactment of treatment skills | Ensure participant use of cognitive skills | N | Y | N | N | N | N | Y | N | N | N | 2 (20%) |
| | Ensure participant use of behavioural skills | Y | Y | N | N | N | N | Y | Y | Y | Y | 6 (60%) |
| | Overall | | | | | | | | | | | **8 (40%)** |
| | Total out of 16 (%) | 3 (19%) | 8 (50%) | 4 (25%) | 2 (13%) | 2 (13%) | 1 (6%) | 8 (50%) | 10 (63%) | 3 (19%) | 7 (44%) | |

**Table 4.** Summary of risk of bias within and between the included studies.

| Study | Randomisation process | Deviations from intended interventions | Missing outcome data | Outcome measurement | Selection of the reported result | Overall risk of bias |
|---|---|---|---|---|---|---|
| Bernocchi et al., 2017 | LOW | SOME CONCERNS | LOW | LOW | LOW | SOME CONCERNS |
| Dalal et al., 2019 | LOW | LOW | LOW | LOW | LOW | LOW |
| Dunbar et al., 2015 | LOW | LOW | LOW | SOME CONCERNS | SOME CONCERNS | SOME CONCERNS |
| Frederix et al., 2015 | LOW | LOW | LOW | LOW | LOW | LOW |
| Freedland et al., 2015 | LOW | LOW | LOW | LOW | LOW | LOW |
| Jolly et al., 2009 | LOW | LOW | LOW | LOW | LOW | LOW |
| Lang et al., 2018 | LOW | LOW | LOW | LOW | LOW | LOW |
| Pozehl et al., 2018 | SOME CONCERNS | LOW | LOW | LOW | LOW | SOME CONCERNS |
| Shoemaker et al., 2017 | LOW | LOW | LOW | LOW | LOW | LOW |
| Smeulders et al., 2009 | LOW | LOW | LOW | SOME CONCERNS | LOW | SOME CONCERNS |

Previous research has emphasised the need to draw upon existing theories and models of behaviour change to target HCP behaviour and to facilitate the implementation of research evidence into healthcare practice (Clarkson et al., 2008; Eccles et al., 2011; Godin et al., 2008). Explicit use of theory when developing and evaluating interventions is important to improve effectiveness. This works by identifying and targeting constructs that are associated with a change in the target behaviours to increase the likelihood that behavioural change will occur (Michie & Prestwich, 2010). Additionally, the use of theory can facilitate a robust evaluation and lead to an increased understanding of why interventions are effective or not, and which intervention components can facilitate behaviour change (Michie & Abraham, 2004). Appropriate frameworks are available to inform the development and evaluation of behavioural interventions targeting consultation behaviour and delivery of interventions to patients. These include the Behaviour Change Wheel (Michie et al., 2014) and the Medical Research Council (MRC) Framework for the development and evaluation of complex interventions (Skivington et al., 2021). The use of appropriate frameworks for developing interventions emphasise the importance of using theory to inform and support decisions about design, however, some frameworks lack guidance on how to appropriately select and operationalise theory in practice (De Silva et al., 2014). This may, in part explain the lack of reporting of theoretical underpinning of HCP training interventions (Prestwich et al., 2015). In contrast, this systematic review highlighted that patient interventions were more likely to be developed using theory (5 of 10 studies) when compared to HCP training interventions (2 of 10 studies). There is a clear need for intervention developers to recognise that HCP training interventions should have parity with patient interventions in terms of development and evaluation. It is important to regard HCP training programmes as interventions that aim to change behaviours, and to plan the evaluation of them in the same way as patient interventions. The systematic development of HCP training interventions is important to enable HCPs to acquire knowledge, skills, and confidence to improve and deliver interventions faithfully to patients and to the required quality standards in practice. Essentially, HCP training interventions target changes in behaviours, particularly when replacing outdated practices with new practices as evidence emerges, therefore in this regard the findings of this review are critically important.

The most 'promising' duration of HCP training intervention associated with increases in physical activity behaviour of patients with HF was delivery across four sessions. However, studies did not provide sufficient detail regarding these sessions (i.e., whether they were delivered as whole training

days, delivered consecutively, or partial training days delivered across a specified time period). Linked to duration, intensity, and specific content should also be reported but is frequently omitted, or at least not reported to a level that facilitates replicability. Whilst the delivery of training interventions across four sessions could be optimal for HCPs to acquire the required knowledge and skills to deliver interventions faithfully, research evidence consistently reports lack of time as the primary barrier to HCPs promoting physical activity and supporting their patients routinely to achieve guideline-recommended levels of physical activity (Haighton et al., 2021; Keyworth et al., 2020). Therefore, the duration of future HCP training interventions should be carefully considered and take into account the feasibility of implementation within clinical care settings, as well as acceptability to HCPs in receipt of training, their managers who authorise training time, and facilitators delivering the training interventions (Sekhon et al., 2017).

The current systematic review identified seven individual BCTs across all HCP training intervention descriptions (problem solving, instruction on how to perform the behaviour, feedback on behaviour, demonstration of the behaviour, review behavioural goal(s), and information on health consequences). However, only one of these BCTs (instruction on how to perform a behaviour) was identified as 'promising' when associated with an increase in the physical activity behaviour of patients with HF. This further emphasises the importance of training interventions to maximise the faithful delivery of promising active intervention ingredients. As reported in the BCT taxonomy V1 (Michie et al., 2013), BCTs are regularly delivered in clusters, and the BCT 'instruction on how to perform the behaviour' is often coded/delivered alongside 'demonstration of behaviour' and 'behavioural practice/rehearsal', yet these BCTs were only coded together in one study included in this review.

Turner et al., (2021) systematically developed a theory-informed HCP training package (i.e., the STAMINA TRIAL) to facilitate the promotion of exercise to patients with cancer during standard care. Underpinning theories and frameworks included, Social Cognitive Theory (Bandura, 1986), the Necessity and Concerns Framework (Horne et al., 2013), and Theories of Habit (Gardner & Rebar, 2019). This study outlined the theory-and evidence-informed development of a training intervention to support HCPs involved in the care of patients with secondary prostate cancer. Exercise recommendations and referrals were made in accordance with National Institute for Health and Care Excellence (NICE) recommendations. As such, the study authors suggested that the intervention development process and outcomes may provide a template for the development of training interventions for HCPs, promoting uptake of exercise in the context of other long-term conditions. Findings suggest that HCPs delivering interventions to increase the physical activity behaviour of individuals with long-term conditions potentially face similar challenges and require a specific skill set to optimise faithful delivery of interventions targeting increases in physical activity (Turner et al., 2021).

The findings of this systematic review further highlight the omission of important intervention fidelity strategies, specifically in relation to the design of interventions, strategies for monitoring and improving delivery of treatment and strategies for monitoring and improving provider training. These findings support those of other systematic reviews that highlight the omission and poor reporting of fidelity assessment in behaviour change intervention studies (Avery et al., 2012; Moore et al., 2015; Toomey et al., 2020). In the context of this systematic review, the study that scored highest for fidelity (Pozehl et al., 2018) included a detailed training component for HCPs in terms of content, duration, and mode of delivery, and conducted an evaluation of intervention delivery. These strategies increase confidence that any improvements in patient outcomes are a result of the intervention (i.e., faithful and quality delivery of a patient intervention by HCPs), and this study was subsequently rated as 'promising' for increasing the physical activity behaviour of patients with HF. Eight of the ten included studies relied on one-off training sessions for HCPs. Two of ten studies (Dunbar et al., 2015; Pozehl et al., 2018) explicitly reported on-going supervision and feedback to HCPs to minimise skill drift, and both studies were rated as 'promising' for increasing the physical activity behaviour of patients with HF.

The lack of reporting on HCP training interventions creates several difficulties when interpreting the impact of behavioural interventions on patient outcomes. Omission of detailed descriptions of

active ingredients of behavioural interventions can substantially hinder replication and the effective translation of research into practice (Dombrowski et al., 2016; Michie et al., 2011).

HCPs often fail to implement evidence-based practice due to well-documented barriers in relation to knowledge, personality, and beliefs (Waller & Turner, 2016). In order to optimise the fidelity of delivery of evidence-based practice, specific emphasis should be placed on HCP (interventionist) training (Sprang et al., 2008), ensuring adequate knowledge, awareness, and competence (Fairburn & Cooper, 2011), adherence to protocols (Perepletchikova, 2011), and utilising strategies that develop and consolidate new skills that become integrated as part of usual practice (e.g., demonstrations of intervention delivery, role-play exercises during training and monitoring of intervention delivery with the provision of feedback to support practice and rehearsal of the behaviour). According to several theories and models of behaviour change (e.g., Operant Learning Theory [Skinner, 1953]), habit-formation occurs when a behaviour is practiced, rehearsed, and positively reinforced; therefore, fidelity strategies focused on monitoring of delivery, provision of feedback and provision of refresher training, is important to facilitate habitual evidence-based practice by HCPs and support HCPs with developing skills to optimise faithful delivery of an intervention. This is particularly important when updating practices, i.e., replacing old habits with new habits, or outdated practices with new practices (Potthoff et al., 2022).

### 4.1. Strengths and limitations

Previous systematic reviews have focused on active ingredients of effective interventions delivered to patients with HF to target physical activity behaviour (Amirova et al., 2021). However, in the content of HF and the wider behavioural change literature, there has been less focus placed on HCP training as a core intervention component. The systematic development of HCP training interventions is critically important to enable HCPs to acquire the relevant knowledge (e.g., current physical activity recommendations for people with long-term health conditions), skills (e.g., ability to use BCTs to promote and support physical activity behaviour of patients), and confidence to deliver patient interventions faithfully and to the required quality standard in accordance with evidence-based practice. A systematic review conducted by Hatfield et al., (2020) reported that HCP training has a positive impact on the health behaviour change of HF patients for up to 12 months and is therefore a crucial component of any intervention. The current systematic review aimed to address this evidence gap by identifying the content of training interventions for HCPs associated with effectiveness and exploring the strategies used to assess the fidelity of delivery of interventions to HF patients. However, the lack of reporting of training interventions in general, and the lack of evaluation of the training provided prevented any firm conclusions in this regard. As such, a strength of this review is the key recommendations it makes to those developing interventions for HCPs to move the field forward.

It should be acknowledged that our search strategy did not include HCP training-related search terms. Therefore, studies that report on evaluations of HCP training interventions (but not corresponding patient interventions) were not captured by the search. Furthernore, due to the lack of formal evaluation of included HCP training interventions, the promise of interventions was based on outcomes of patient interventions (e.g., physical activity and QoL). Therefore, firm conclusions about the active ingredients of HCP training interventions cannot be made. Effect size is not considered when calculating promise ratios, therefore these analyses should be considered exploratory undertaken to identify any potential foci of future research.

The coding of BCTs included in interventions (HCP training and patient interventions) was limited to descriptions provided by study authors, the majority without explicit reference to a reliable published BCT taxonomy (e.g., Michie et al., 2013). Additionally, some difficulties were experienced when coding BCTs whereby the target behaviour was not explicit, for example, some studies reported on interventions that targeted more than one patient behaviour and provided limited descriptions of intervention content to ascertain which BCTs were used to target physical activity behaviour. Therefore, additional BCTs may have been utilised by the included studies.

It is worth noting that there have been issues reported in the literature about the usefulness of BCTs in HCP training. For example, they have not been used as frequently during HCP training, and therefore, difficult to evaluate their usefulness. Furthermore, specific BCTs are not applicable to HCP training interventions (e.g., Biofeedback) (Pearson et al., 2020). Despite this, literature reports that it is possible to understand and reliably code the active content of training interventions in terms of BCTs, which can ultimately lead to robust evaluations and an understanding of the BCTs that are associated with effectiveness (Pearson et al., 2020). The aim of this systematic review was to identify the active ingredients of HCP training interventions. Ten studies were identified that fulfilled the review criteria, however, lack of reporting on training intervention content and evaluation, and heterogeneity of the interventions overall prevented a meta-analysis and subsequent moderator analyses from being conducted. As such, the active ingredients of training interventions associated with an increase in physical activity behaviour of patients with heart failure is inconclusive, although a promise analysis provided some direction.

### 4.2. Future research

There is a pressing need for future research to treat HCP training as interventions in the same ways as patient interventions, and to develop and implement HCP training interventions informed by theory. In addition, the use of appropriate fidelity measures will enable a more robust assessment of the impact on patient receipt of interventions and associated outcomes. Intervention fidelity has been highlighted as a crucial moderator contributing to the variation in the reported effectiveness of behavioural interventions targeting physical activity behaviour (Bellg et al., 2004; Greaves et al., 2011). Inadequate focus on intervention fidelity for HCP training and patients can result in inaccurate conclusions of intervention effectiveness and further hinders the translation of research into routine practice (Bellg et al., 2004).

Future research is required to improve our understanding of what works and why in HCP training interventions to inform intervention optimisation (Moore et al., 2015), specifically in terms of the development, evaluation and reporting on the mode, form, and information content of training interventions. These data are vital for the replication of effective interventions in routine practice (Robb et al., 2011). A survey conducted by McGee et al., (2018) reported that poor knowledge and understanding of the importance of fidelity is one of the main barriers to intervention fidelity among HCPs; therefore, the purpose and value of associated strategies should be written into research proposals, funding applications and clearly articulated and justified before, during and following delivery of HCP training. Additionally, intervention developers should consider on-going support/mentoring of HCPs by appropriately qualified professionals in health behaviour change throughout the intervention period and beyond, to enhance the quality of delivery, minimise skill drift and enhance the effectiveness of interventions. Retraining to minimise skill drift of HCPs has been recommended as an important fidelity component (Bellg et al., 2004; Cook et al., 2022; Waller & Turner, 2016) and should be considered during the development of future training interventions for HCPs to enable sustained behavioural change.

Finally, in the context of HF, future research should focus on changing both consultation behaviour of HCPs using theory and evidence-based interventions, as well as the physical activity behaviour of patients with HF, recognising training as an important intervention component.

## 5. Conclusions

This systematic review identified a small number of HCP training interventions in the context of physical activity behaviour change in patients with HF. The training interventions identified were poorly described, and rarely evaluated. The lack of theoretical underpinning of training interventions for HCPs, description, and robust evaluation, including strategies to improve the fidelity of delivery and receipt by patients with HF highlights several areas for improvement rather than any clear

direction in terms of intervention development. This creates difficulties with establishing whether HCP training interventions are sufficient to change consultation behaviour and optimise faithful delivery of patient interventions in accordance with a protocol, which in turn enables a more reliable impact of the intervention on patient outcomes. Future research would benefit from parity in transparent reporting of development processes, active ingredients of both HCP training and patient interventions alongside robust fidelity assessments.

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