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**Assessing the psychosocial factors associated with adherence to exercise referral
schemes: a systematic review**

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Abstract

This paper aimed to systematically review the evidence base to uncover the key psychosocial factors that underpin adherence to an exercise referral scheme (ERS). Databases PsycINFO, MEDLINE, SPORTDiscus, Web of Science, PubMed, PsycARTICLES, Open Grey, and PsycEXTRA were systematically searched. A parallel results-based convergent synthesis was performed by identifying key themes from quantitative and qualitative studies separately. After applying inclusion and exclusion criteria, the review included 24 eligible studies. Key findings showed intrinsic motivation, psychological need satisfaction, social support, and self-efficacy to be the prominent psychosocial factors associated with ERS adherence. In addition, lower expectations for change when entering the scheme was associated with ERS adherence. This review should serve as a catalyst to provide evidence-based ERS and as such ERS providers should seek to place an emphasis on participants' expectations and beliefs when entering the scheme. Moreover, targeting the key factors of intrinsic motivation, psychological need satisfaction, social support, and self-efficacy throughout the duration of an ERS should serve to facilitate adherence.

Keywords: exercise prescription; GP referral; physical activity; exercise maintenance; correlates

Introduction

Physical inactivity remains a global public health priority,^{1,2} and is one of the top modifiable risk factors alongside smoking.³ In order to offset inactivity levels and improve health outcomes, services in primary care settings provide an opportunity to achieve this.^{4,5} Exercise referral schemes (ERS), also known as “exercise on prescription” or “GP referral”, involve a referral of an ‘at risk patient’ by a health professional (General Practitioner or allied health professional) to an exercise specialist to receive a time limited individualised exercise programme and support. ERS typically focus on patients who are sedentary and present with any one or more of the following health issues: diabetes mellitus, obesity, hypertension, hypercholesterolemia (‘at risk of cardiovascular disease’), non-clinical depression and anxiety, respiratory disorders, and musculoskeletal issues.⁶ The schemes are explicitly a low/moderate risk service thus aligning with a prevention model and excludes unstable or advanced stages of the above disease repertoire distinguishing it from other exercise rehabilitation pathways.⁷ The overt objective of the programme is to provide an environment for personalised care, exercise prescription, and social interaction to support a positive long-term physical activity (PA) change and prevent disease outcomes.⁸ The programmes typically offer free or discounted exercise sessions, motivational support, and planning for environmental barriers.⁹

The accumulating evidence related to the impact of PA on health and the subsequent publication of PA guidelines initiated endeavours in the United Kingdom (UK) to increase access to leisure centres.¹⁰ The creation and rapid expansion of ERS occurred in the UK in the 1990s with Scandinavian countries adopting similar schemes in quick succession. Belgium, Germany, Portugal, Netherlands and Spain also adopted programmes utilising the same aim and overarching format during this period.⁹ More recently Ireland has devised their

first national ERS framework to guide prospective services¹¹ and Switzerland has engaged in a thorough consultation to initiate nationwide ERS.¹²

Despite the continued interest across Europe, and historical utilisation of ERS, questions have been raised regarding their effectiveness for public health, with a lack of adherence cited as a key issue.^{10,13} The origins of the programme are atheoretical and the design and implementation are heterogeneous across and within countries.^{9,14} This creates difficulties when appraising ERS as programme characteristics, inclusion criteria, and the service delivery lacks standardised components or an explicit theoretical underpinning. The diversity and complex evolution of ERS impinges making direct inferences about what works, for whom, in what circumstances, and why.¹⁵

The recommendation to utilise theory to provide focus and target potential mechanisms of service adherence as well as to refine models in specific circumstances is widespread in the literature.^{16,17} Despite the large theoretical pool, four common frameworks account for 63% of health related studies.¹⁸ The transtheoretical model, theory of planned behaviour, social cognitive theory, and information motivational behavioural skills model represent the aforementioned dominance in the literature. Authors have consolidated the theoretical landscape as many constructs overlap and there is limited guidance on how to choose an individual theory.¹⁹ The Capability, Opportunity, Motivation- Behaviour (COM-B) model aspires to improve the accessibility of theory.²⁰ The consolidation of constructs provides theoretical weight for factors including: beliefs (in various domains), intentions, motivation, skills, knowledge, goals, identity, and emotions across multiple behaviours. Importantly, the consolidated framework highlights that external context provides an environment influencing these constructs.

Against this backdrop, self-determination theory (SDT) has gained traction in the PA literature and shifts the focus to examine how humans have basic needs which need satisfying

to foster motivation. These theoretical assumptions have been utilised in various PA initiatives including ERS.^{21,22} The role of practitioners to provide an environment to support autonomy, competence, and relatedness has been shown to increase ERS adherence, although typically examined as a by-product of the scheme as opposed to a priori practice considerations.^{23,24} Despite the recognition and potential utility of SDT the dominant paradigm in ERS focuses on effectiveness and little has been done to influence the training or appraisal of practitioner's skillsets.²⁵

Moreover, the translation from theory-informed to robust intervention planning in health services more broadly is not evident, with just 9% of studies articulating allegiance to all the chosen theory constructs and only 10% linking their intervention strategies to the underpinning behavioural determinants.^{26,27} Not surprisingly the presence of theory-driven ERS literature is sparse. This lacuna of shared practice is notable in the inconsistent findings related to PA adherence in ERS. Where studies have aspired to utilise theory informed practices the poor evaluation culture and implementation has limited inferences.^{22,27} Of note is the range of commitment and planning for SDT practices which are more consistent in the Scandinavian ERS literature.^{28,29} Moreover, the holistic view of primary care practice for lifestyle behaviours compared to singular behaviours is more evident in these countries compared to the UK. This may provide a partial explanation for the diversity of findings in the literature. The prescription programme in Sweden has shown impressive relative adherence and impact with a 17% dropout and significant improvement in PA for 73% of the cohort at one year follow-up.³⁰ Moreover, data from the Netherlands also indicate sustained adherence.^{31,32,33} Data across other European countries shows variance in scheme adherence and PA changes but most of the literature suggests that that the UK has a particularly variable adherence level.³⁴

Despite emergent data outlining key characteristics of successful engagement in UK ERS,³⁵ there has not been a comprehensive exploration of psychosocial mechanisms of adherence. Importantly, qualitative literature provides a wealth of data to enhance the quantitative work which is restricted by a lack of theory-informed practice, selective outcome frameworks, and poor practitioner fidelity. The UK National Institute of Health and Care Excellence [NICE] published guidelines in 2014 regarding ERS, highlighting areas for future research to help enhance our understanding of ERS.⁸ Specifically, one of the recommendations was to investigate the factors that encourage the uptake of and adherence to an ERS, whilst also identifying any barriers preventing participation.

Morgan et al.³⁶ conducted a systematic review of the barriers and facilitators of ERS adherence in response to the NICE guidelines. They were interested in the perspectives of participants as well as ERS providers, commissioners and deliverers of the service. The authors identified a number of themes that contributed to the adoption and/or maintenance of ERS, including: support from providers, other attendees and family; and the personalised nature of sessions offered. Barriers to exercise during the schemes included: inconvenient timing of sessions, cost, location, an intimidating gym atmosphere, a dislike of the music and TV and a lack of confidence in using gym equipment. Whilst this review provided insight into the facilitators and barriers of ERS uptake and adherence, the psychosocial understanding of participants was lacking, thus not providing a comprehensive overview of the role of these factors in ERS adherence. Tobi et al.³⁷ cited that improved understanding is required of what contributes to adherence in order to better meet participants' needs when engaging with the scheme. Furthermore, Beck et al.³⁸ referred to the lack of clarity as to how the evidence base underpins the development of ERS, in particular the application of the most effective behaviour change technique (e.g. goal setting, promoting autonomous motivation or self-efficacy etc.). Thus, further analyses of the underpinning psychosocial factors for scheme

uptake and adherence is required to provide a holistic understanding, which can in turn inform future practice.

In order to address the issues discussed above, the objective of this paper was to systematically review the evidence base to uncover the key psychosocial factors that underpin adherence to an ERS. This will provide a clearer understanding of the psychosocial factors that contribute to PA engagement among at-risk populations, informing future research and evidence-based practice within exercise referral schemes.

Methods

This review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses Statement.³⁹ The review was registered (42017067175) with Prospero (Centre for Reviews and Dissemination), University of York, on 16/5/2017.⁴⁰

Literature search

The electronic databases PsycINFO, MEDLINE, SPORTDiscus, Web of Science, PubMed, PsycARTICLES, Open Grey, and PsycEXTRA were searched for relevant studies from their inception up until June 2017. In addition, a wide range of websites and grey literature were searched as well as through reference checking, citation tracking to identify further research and through contacting authors. A detailed description of the PsycINFO search is shown in Appendix 1, which was replicated for other databases.

Eligibility criteria

Studies were eligible if they: (i) included an ERS; (ii) provided an indicator of adherence, compliance or PA during or at the end of the scheme; (iii) assessed any psychosocial factor as a variable associated with or predictive of adherence, compliance or

PA, or as a differentiator between adherers and non-adherers; and (iv) included participants that were over 18 years old.

Studies were excluded if the intervention was not recognised as an ERS (i.e., cardiac rehabilitation, traditional exercise programme), indicators of success were only measured beyond the end of the scheme, or psychosocial variables were not assessed in relation to adherence to the scheme (i.e., assessed as an outcome rather than a predictor). Review papers and commentary articles were not considered; there were no further restrictions on study design. Included studies were reported in English language only, with no restriction on country of study.

Study selection

After duplicates were removed, titles and abstracts were screened for potential eligible studies. Full-text copies of articles were obtained if review of the title and abstract indicated that a study was eligible. If full-text copies were not available, the first author of the respective study was contacted to retrieve a copy. The reviewers were not blinded to authors or journal of publication. Two reviewers independently screened full-text articles with reasons included for exclusion from the review (see Figure 1). A consensus meeting between the reviewers was held to allay any opposing views of study selection.

Study quality assessment and risk of bias

Given the diversity in studies assessing adherence to ERS, the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies adapted from NIH (<https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort>) was used, similar to the work of Morgan et al.³⁶ The scale consists of 14 criteria, of which reviewers could select "yes," "no," or "cannot determine/not reported/not

applicable" in response to each item on the tool. For each item where "no" was selected, reviewers considered the potential risk of bias that could be introduced by that flaw in the study design or implementation. Cannot determine and not reported were also noted as representing potential flaws. Two reviewers independently assessed the methodological quality, with discrepancies being resolved by discussion until consensus was reached. Each study's relative quality is indicated in Table 1.

Data extraction

One reviewer performed the data extraction using a standard extraction form, which was checked by a second reviewer, with 20% of papers considered independently. Relevant data included: (1) authors and year, (2) location of study, (3) study type, including exact study design, (4) study aim, (5) target population, (6) description of the ERS, (7) how adherence was classified, (8) psychosocial variables assessed, (9) adherence/ compliance rates, and (10) results. When data were missing or further information was required, the corresponding authors were contacted.

Data synthesis

Due to the heterogeneity of study populations and the assessment of adherence and outcome measures, statistical pooling of the data was not possible. Thus, a parallel results-based convergent synthesis was performed, which involves independent syntheses of qualitative and quantitative research studies and an interpretation of the results in the discussion.⁴¹ Quantitative and qualitative studies were synthesized using narrative synthesis.⁴² Two authors completed synthesis of data independently before amalgamating. Triangulation was used to determine convergence and corroboration across the data types and between investigators. Discussion of key themes between two authors occurred having

appraised the other's synthesis of data. Key factors were agreed upon given the similarity in identifying and weighting pertinent themes across the syntheses.

Results

Study selection

The process of identifying studies is shown in Figure 1. The initial search strategy identified 6,039 studies, of which 5,637 were left after removing duplicates. Based on their title and abstract, 5,520 studies were excluded. Eleven studies could not be obtained in full-text despite a request to the authors, and are therefore not included in the review. After applying inclusion and exclusion criteria for full-text versions, 24 studies were left to be included.

[Insert Figure 1 here]

Study characteristics

In total, 2,531 participants aged 18-80 years old were assessed through studies included in the present review. Ten quantitative, ten qualitative, and four mixed-methods studies were included. Two studies^{59,64} were assessed as high quality, 17 studies^{24,27,44,45,46,48,49,51,52,54,55,56,58,61,62,63} were assessed as moderate quality, and five studies^{43,47,50,53,60} were assessed as low quality. Twenty-one of the 24 studies were UK-based, with one study each from Netherlands, Sweden, and USA. Table 1 provides an overview of all relevant studies characteristics.

[Insert Table 1 here]

Adherence

Measures of adherence and compliance were varied with quantitative studies using attendance records,^{24,43,45,46,54,63} self-reported PA,^{49,59,62,64} or exercise facilitator rating.⁴⁴ The remaining qualitative studies assessed participants who had either adhered, completed, attended or were still attending sessions during the ERS.^{27,47,48,50,51,52,53,55,56,60,61} Adherence to the schemes across studies was also varied, ranging from 23%⁴⁶ to 81%⁵⁸ adherence rates. Comparable adherence rates were observed across several studies with 42-51% compliance.^{27,44,53,54,55}

Quantitative studies

There were three randomized trials,^{59,63,64} seven prospective correlational designs,^{24,44,46,49,54,55,58} and the quantitative element of mixed-methods studies^{53,62} included in the review. The duration of the ERS across studies ranged from six weeks,²⁴ eight weeks,^{46,64} 10-weeks,^{53,63} 12-weeks,^{44,54,55,58} four months,⁵⁹ and six months.⁴⁹

Baseline characteristics

One study showed adherers to exhibit higher levels of self-determined motivation at baseline than partial-adherers and dropouts,²⁴ though there were no baseline differences between adherers and non-adherers in motivational regulations across other studies.^{44,46,58} One study showed competence need satisfaction to be higher among adherers than dropouts at baseline, but no differences among autonomy and relatedness,³³ whilst other studies showed psychological need satisfaction to not be significantly different at baseline between adherers and non-adherers.^{44,46} Adherers had lower expectations for change for personal development at baseline than dropouts.⁵⁴ There were no differences between adherers and non-adherers in self-efficacy and expectations of change for health and fitness.⁵⁴ Where an ERS intervention was compared to controls, there were no reported baseline differences

between participants in different doses of exercise in motivation,⁵⁹ or between ERS participants and controls in physical self-worth,⁶³ self-perception,⁶³ self-efficacy,⁶⁴ perceived benefits and barriers,⁶⁴ and processes of change.⁶⁴

Motivation

Five of the quantitative studies assessed motivation as a predictor of adherence.^{24,44,45,58,59} One study showed self-determined motivation to be higher among adherers than partial adherers and dropouts as a result of the ERS, with all participants reporting higher levels of autonomous motivation from baseline to scheme-end.²⁴ Another study showed self-determined motivation when measured at 4-weeks into the scheme to significantly explain 12-16% of the variance of total adherence⁴⁶ with improvements in intrinsic motivation from pre-post significantly predicting adherence.⁵⁸ When considering specific motivational regulations, one study found integrated and introjected regulations to emerge as positive predictors of adherence, though identified regulation was a negative predictor of total exercise.⁴⁴ Changes in identified regulation significantly predicted changes in activity⁵⁸ though changes in motivational regulations did not significantly predict changes in habitual PA through the duration of the ERS.⁵⁸ However, one study showed an overall decrease in motivation from baseline to four months.⁵⁹

Self-efficacy

Four of the quantitative studies assessed self-efficacy.^{44,49,54} In one study, self-efficacy significantly improved for adherers throughout the scheme but deteriorated for dropouts,⁵⁴ with self-efficacy improving as a result of the ERS intervention.^{49,54} In another study, Edmunds et al.¹⁷ identified that the self-efficacy to overcome barriers to exercise was higher in those that had greater adherence to the scheme, whilst van Sluijs et al.⁶⁴ observed that both

self-efficacy for making time for exercise and self-efficacy for resisting relapse from baseline to 8-weeks was an indicator of ERS adherence.

Psychological need satisfaction

Three of the quantitative studies assessed psychological need satisfaction.^{44,46,58} One study showed autonomy, relatedness, and competence to successfully predict adherence, accounting for 18-26% of the variance when measured at mid-scheme.⁴⁶ Another study showed those who adhered more reported a greater increase in relatedness throughout the ERS.⁴⁴ In addition, need satisfaction was associated with more intrinsic levels of motivation which in turn was associated with higher PA.⁴⁴ However, one study showed changes in need satisfaction did not significantly predict programme adherence.⁵⁸

Expectations for change

Two studies assessed participants' expectations for change over the course of an ERS.^{53,54} Jones et al.⁵³ observed that completers had lower expectations for change than dropouts, with lower expectations of change related to ERS adherence.⁵⁴ The authors also highlighted that the confidence to achieve aspirations was higher in completers,⁵³ with adherers closer to achieving their expected changes for health and fitness than non-adherers.⁵⁴

Qualitative studies

Nine studies used interviews,^{27,45,48,50,51,52,53,60,61} three studies used focus groups,^{43,55,56} and one study used a combination of interviews and focus groups.⁴⁷ The duration of the ERS across studies varied from eight weeks,⁴⁵ 10-weeks,^{50,51,53} 12-weeks,^{47,55,60} 14-weeks,⁴⁸ 16-weeks,²⁷ 26-weeks⁵⁶ and 16 sessions over an unspecified period.⁴³

The following section provides overarching themes, which represent the prominent psychosocial factors identified through qualitative studies. Specific psychosocial factors are described within each overarching theme.

Social support

Several qualitative studies identified social support as a key component of ERS engagement.^{27,43,47,48,50,51,55,56,61} Three common themes were consistent across studies: (i) group settings and social inclusion, (ii) social support provided by the service staff, and (iii) accountability.

Group settings and social inclusion. Exercising as part of a group provided social support to participants during the ERS.^{27,43,47,48,50,55,56,61} Engaging with others whilst on the ERS served as a forum to exchange ideas,⁴³ provide a sense of community,⁴⁷ and provide a platform for peer modelling.^{47,56} Participants were able to feel part of a group,⁵⁶ and valued being surrounded by others who were going through a similar experience²⁷ with the ERS an opportunity for participants to meet other people and expand social networks,⁶¹ as well as provide an incentive to attend the programme.^{48,55}

Social inclusion was a pertinent theme across multiple studies.^{50,51,52,56} The gym environment was seen as a social outlet that enhanced a sense of purpose and provided a sense of social inclusion⁵⁰ and a way of countering social isolation.⁵¹ Inclusion was influenced by other scheme patients, other exercisers, staff, and the surroundings.⁵⁶ Those around the participants provided positive reinforcement and lived experience of adherence along with encouragement that created a drive for engagement.⁵⁰

Social support provided by staff. The support of both the referring practitioner and the

exercise facilitator was apparent across studies for ERS adherence.^{27,47,50,51,55,56,61} Dimensions of support provided by the facilitator included technical and professional support, supervision, and attention to support changes in exercise-related beliefs.^{27,50} Exercise specialist knowledge from the facilitator was required for ERS adherence, which helped to increase competence to perform the exercise.^{27,50,51,56,61} Interpersonal skills of the facilitator were also key to ERS adherence.^{47,50,56} The general practitioner was highlighted as an important resource indicative of engagement in the service through easing concerns, showing enthusiasm and stressing the importance of exercise.^{55,61}

Accountability. Accountability was outlined as being important for ERS adherence,^{43,48,50,55} with participants feeling a level of accountability to the exercise group and were therefore more likely to attend sessions and maintain lifestyle changes.⁴³ Participants also felt accountable to the health practitioner who referred them to the ERS as well as their exercise practitioner.⁵⁰ The follow-up appointments acted for some participants as an accountability measure⁴⁸ as well as the structured and supervised elements of the ERS.⁵⁰

Motivation and psychological need satisfaction

Motivation. Motivation was a factor identified across multiple studies as supporting ERS adherence.^{27,45,50,51,56,61} Extrinsic motives were apparent at the start of the scheme and more internal motives towards the latter stages of the scheme.^{45,51,61} *External motives* were evident through participants' recognition of the associated benefits,^{45,51,61} follow-up appointments with the health practitioner providing an incentive to monitor progress,⁴⁸ and health professional advice serving as a catalyst for participants playing a proactive role in eradicating illness.²⁷ Hardcastle and Taylor⁵¹ deduced a shift to more *intrinsic motives*; with participants' initial focus on weight loss being replaced by a drive to feel fitter, more

energetic and gain knowledge.⁵⁵ Participants attributed adherence to intrinsic motives including enjoying exercise and wanting to do it freely.^{45,60} Indeed, participants looked forward to exercising,^{45,61} had an inherent interest in exercising,⁴⁵ and experienced enjoyment of the process of engaging in the activity.⁵⁶ Finally, Fenton et al.⁴⁷ noted that those who continually engaged in an ERS were more likely to be intrinsically motivated.

Enjoyment. There were a number of different elements that encompassed enjoyment, including: the pleasure and enjoyment participants got from attending the ERS;^{47,56} enjoyment of being in a secure environment where specialists took good care of them;⁶¹ and the positive feelings of happiness with exercise becoming a source of pleasure in itself.⁶⁰

Psychological need satisfaction. Autonomy and competence were highlighted as beneficial for ERS adherence, with feelings of autonomy and personal control being related to a commitment to exercise and exercise providing a platform for participants to do something on their own.⁵¹ An internal locus of control was associated with ERS engagement,⁶⁰ with control oriented values congruent with PA behaviour change (e.g. the importance of independence of action).⁵² Participants' dialogue in separate studies whilst discussing other themes (i.e., intrinsic motivation) expressed elements of choice, empowerment and providing rationale which resonates with participants satisfying their needs for autonomy and control.^{45,47} Mills⁵⁷ identified that if the scheme offers choice and flexibility the patients feel positive outcomes are more easily achieved.

Beliefs. Acquiring knowledge and the subsequent influence on altered health beliefs was associated with ERS adherence.^{47,52,55} The role of education is proposed to challenge beliefs related to the benefits and consequences of lifestyle behaviours.^{47,55} Studies also identified

that altered beliefs around personal responsibility was associated with successful engagement with the scheme and sustained lifestyle changes.^{47,52}

Successful adherence was also attributed to altered beliefs in relation to the perceived importance of PA. The experience of the programme offered an opportunity to compare themselves to other patients, reflect on the relationship between participation and positive feelings, and engage in vicarious experiences which impacted attitude and the perceived utility of the programme.^{48,50,51,52} The initial beliefs of participants may also contribute to adherence to the scheme, with positive beliefs focusing on the appropriateness of referral, utility of exercise and commitment to the scheme preceding ERS adherence.^{47,48,50}

Exercise identity and self-regulation

Exercise identity. Exercise identity involved exercise being part of ERS adherers' life, through making it a part of their routine and habitual scheduling,⁵¹ and actively thinking about how often they believe they should be exercising.⁴⁵ An exercise identity was also an expression of related beliefs and values through prioritising exercise.⁵¹ Separate factors contributed to an exercise identity across studies, including intrinsic motivation, self-esteem, self-efficacy and self-regulation⁴⁵ and feelings of achievement, autonomy, control, social interaction and a sense of belonging.⁵¹

Self-regulatory strategies. Strategies to help self-regulate exercise over the ERS period, such as scheduling exercise, setting goals, monitoring health and making appropriate lifestyle changes, were adopted by adherers to the scheme.⁴⁵ The routine of exercising in a structured environment was a reason for participants to “get out of the house”,⁴⁸ with those who remained committed to exercise adopting active planning strategies and prioritised exercise over more routine habits.⁵¹

Self-efficacy. Across three studies,^{45,55,60} self-efficacy levels among participants were decidedly low at the start of the scheme; however, this increased throughout the scheme and had a positive influence on their exercise during the ERS. Self-efficacy was deemed an essential element of action⁵² with an increase in self-efficacy becoming a helpful source of progress through the ERS.⁴⁵ Self-efficacy increased through familiarity with other people, the surroundings (i.e., equipment), and the procedures, for example being aware of what takes place in a reassessments session.⁵⁶

Discussion

The present review sought to extend the work of Morgan et al.³⁶ by uncovering the key psychosocial factors associated with ERS adherence. The findings from this systematic review showed intrinsic motivation, psychological need satisfaction, social support, and self-efficacy to be the prominent factors in contributing to ERS adherence.

Motivation was a prominent and routinely captured concept across both quantitative and qualitative studies. There however appears to be limited consensus regarding how it is examined and presented in relation to adherence. Some studies for example, seek to compare differences, others to make predictions, whilst some scrutinise to explore the role of individual elements of motivation. This is evident across both quantitative and qualitative data sources. However, it is apparent that intrinsic motivation is principally cited as the type of motivation required for optimising ERS adherence. Engrained within SDT,⁶⁵ intrinsic motivation refers to participants engaging with the ERS due to their interest in and enjoyment of exercise. Multiple studies suggested intrinsic motivation develops from extrinsic motivation through the duration of the ERS^{45,46,51} and that intrinsic motivation increases through the ERS.⁵⁸ Thus, encouragement of the factors that contribute to intrinsic motivation

could be essential within ERS. A mechanism by which intrinsic motivation can be developed through an ERS as highlighted by the studies in this review is through psychological need satisfaction. Ryan and Deci's⁶⁶ basic needs theory asserts that satisfaction of the three needs for autonomy, relatedness and competence contribute to more self-determined motives and greater psychological wellbeing. Findings from the present review highlight the role of these three factors in contributing to intrinsic motivation,⁴⁴ and overall ERS adherence.^{46,47,51} In particular, one qualitative study suggested autonomy could be central to need satisfaction⁴⁵ with one quantitative study showing relatedness to be central to adherence to ERS.⁴⁴ Though it should be pointed out that need satisfaction had no effect on ERS adherence or habitual PA in another study.⁵⁸ Nevertheless, intrinsic motivation and satisfaction of the three basic psychological needs have shown to be common correlates of ERS adherence and should be targeted during the course of an ERS.

Social support was another factor that was prominent across many studies in being associated with ERS adherence. Social support came from a number of different sources, including group settings and social inclusion, and social support provided by ERS staff. Previous reviews have shown consistent positive associations between social support and PA participation^{67,68} with Morgan et al.³⁶ showing social support to be a component of ERS success. Social support occurred as a theme across many qualitative studies,^{27,43,47,48,50,51,55,56,61} highlighting the personal views of participants deeming social support to be important for them in adhering to an ERS. That there was no quantitative consensus of social support being important is a noteworthy finding, and one which is in line with recent reviews showing inconclusive associations between overall support (from various types and sources) and PA maintenance.^{69,70} The lack of quantitative findings from the present review may be down to Scarapicchia et al.'s⁷⁰ explanation of variances across study designs limiting the types and sources of social support being effectively captured in this

manner. The inclusion of evidence drawn from a comprehensive range of study designs allows this insight into the value of social support to be reviewed. Thus, with the knowledge that participants value social support during their ERS experience, further quantitative testing of this should take place using longitudinal methods and standardised measures to contribute to this evidence base.⁷⁰

Self-efficacy was the remaining prominent psychosocial factor that was related to ERS adherence across studies. Self-efficacy significantly improved for adherers throughout the scheme,^{49,54} with self-efficacy for making time for exercise and self-efficacy for resisting relapse increasing throughout the ERS⁶⁴ and self-efficacy to overcome barriers to exercise higher in those that had greater adherence.⁴⁴ Qualitative studies highlighted that participants' levels of self-efficacy were low at baseline but improved throughout the ERS and had a positive influence on their motivation to exercise.^{45,55,60} Self-efficacy is widely considered a key correlate of PA behaviour^{1,71} so it is no surprise it is an important factor for ERS adherence. As with social support, the various facets involved with self-efficacy require further exploration. For instance, where the qualitative studies found self-efficacy as a construct more broadly (i.e., exercise task specific) to be related to ERS adherence, the quantitative studies were able to differentiate between different types of self-efficacy (i.e., making time for exercise, overcoming barriers etc.). Thus, further research should look to establish the key components of self-efficacy that are most important for ERS adherence.

A further observation from the present review is that lower expectations for change and subsequent exercise beliefs when entering the scheme were related to ERS adherence.^{47,48,50,53,54} There were no other baseline psychosocial variables that were deemed critical for ERS adherence, with no differences observed between adherers and non-adherers at this stage across the majority of studies. This puts service providers in a unique position to

tailor their schemes to help foster adherence levels and influence participants to exhibit the desired psychosocial components for exercise maintenance throughout the scheme.

The potential to make inferences from the literature is impinged by critical issues in the field. Importantly, the majority of the research is undertaken in established ERS where the heterogeneity of service elements is vast. The varied interpretations and iterations of the services with no uniform allegiance to a core service specification has resulted from the poor history of vague policy and local evolution of ERS.⁷² Subsequently, exercise referral services operate without pre-defined operating procedures, clear intervention detail, and underpinning evidence.^{8,73,74} Notable factors that contribute to issues in the literature include: diverse referral criteria and programme format, non-standardised measurement tools and evaluation practices, and a lack of focus on behaviour change in the delivery of the schemes.^{8,38,74} The literature highlights the array of contextual factors that may moderate the effectiveness of ERS and there has been limited attention to these facets in the current evidence base.

The present review is not without its limitations. First, we sought to assess the psychosocial factors associated with ERS adherence or PA behaviour throughout the ERS. This approach was taken to capture all the routinely reported behaviour measures associated with scheme adherence (of which PA is one) so as not to limit an already small evidence base within ERS settings. Despite adherence being applicable to PA behaviour change and maintenance, there was variability in the way this was captured (i.e., attendance log vs self-report), which could have implications for the interpretation of findings. Second, despite including articles from outside of the UK, we restricted the selection of studies to English language only, though this has been refuted as a bias in systematic reviews.⁷⁵ Third, the methodological quality of the majority of studies was moderate, suggesting greater rigour is required when designing and implementing studies to assess the psychosocial factors associated with ERS adherence. Finally, publication bias should also be taken into account

when interpreting the findings from this review. Whilst efforts were made to include all types of publications including unpublished theses, the unpublished material on ERS will not have been captured, which may have further informed our understanding of the contributing factors to ERS adherence.

The findings from this review provide a number of practical implications for ERS providers. Firstly, practitioners may look to consult participants on their expectations for change when entering the scheme, ensuring they are not overly optimistic. Secondly, ERS providers should seek to enhance intrinsic motivation, psychological need satisfaction, social support, and self-efficacy through the duration of an ERS. Providers could look to foster intrinsic motivation through providing choice to participants (autonomy), allowing participants to feel connected to others whilst engaged with the ERS (relatedness) and help to improve participants' ability to exercise (competence). In addition, providing support networks to participants through other service participants, friends, and family will help to provide social support; with the role of the exercise facilitator being particularly important from informational and relational standpoints as well as accountability and motivation. Self-efficacy can take many forms (i.e., to overcome barriers, scheduling exercise, exercise-specific) and all should be taken into account to help participants enhance self-efficacy levels throughout the ERS so they can be confident in their ability to successfully build exercise into their lives.

Perspective

This is the first paper to systematically review the explicit psychosocial factors associated with ERS adherence. Indeed, whilst the work of Morgan et al.³⁶ provided much needed insight into the facilitators and barriers of ERS uptake and adherence, the present review provides knowledge and awareness from a psychosocial perspective, thus

encompassing a more holistic understanding. As such, ERS providers should seek to use the information provided to inform their practices in order to enhance participant engagement, increase adherence, and subsequently promote health outcomes through physical activity. Specifically, the key factors associated with ERS adherence were intrinsic motivation, psychological need satisfaction, social support, and self-efficacy. There were also a multitude of other factors that may play a role in participants adhering to an ERS. This review should serve as a catalyst to provide evidence-based ERS.

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Figure 1. PRISMA flow diagram

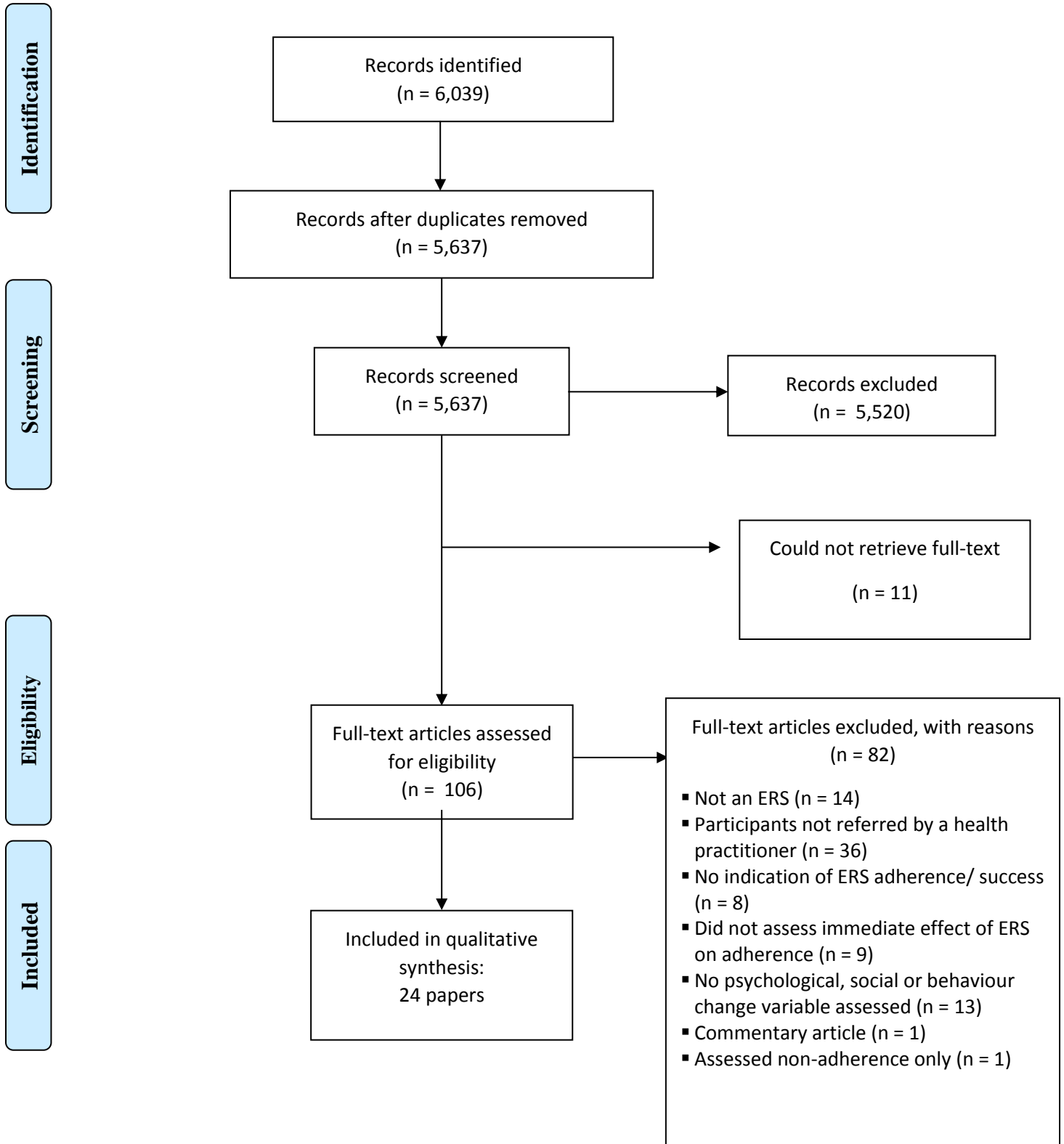


Table 1. Summary of included studies

Authors (year)	Study design & quality	Participants	ERS Intervention	Comparators	Adherence measure
Bozack et al. ⁴³	Qualitative (focus groups) ^c	<i>N</i> =18, 64.9% female; Mean age 61.0 years	16 supervised sessions; focusing on activity and nutrition; free of charge	Group setting for social support Accountability	Attendance through the ERS
Edmunds et al. ⁴⁴	Quantitative (prospective) ^b	<i>N</i> =49, 84% female; Mean age 44.98 years	12-weeks unsupervised	Perceived autonomy support Psychological need satisfaction Motivation Barriers self-efficacy Commitment Behavioural intention	Fitness instructor rating based on attendance log
Eynon et al. ⁴⁵	Qualitative (interviews) ^b	<i>N</i> =9, 55.5% female; Mean age 49.9 years	8-week unsupervised free of charge	Identified regulation Intrinsic regulation Exercise identity Self-esteem Self-efficacy Self-regulatory strategies	Attendance to >16 sessions
Eynon et al. ⁴⁶	Quantitative (prospective) ^b	<i>N</i> =124, 60.4% females; Mean age 48.0 years	8-week unsupervised free of charge	Motivation Psychological need satisfaction	Attendance to >16 sessions
Fenton et al. ⁴⁷	Qualitative (focus groups and interviews) ^c	<i>N</i> =13; 62% female; age range 64-82 years	12-weeks free of charge	Knowledge Psychological outcomes Social outcomes	Current and former attenders

Graham ⁴⁸	Qualitative (interviews) ^b	<i>N</i> =12; Gender not specified; age range 46-67 years	14-weeks	Accountability Experience of exercise Exercise advice Spouse activity Health attitude Family Personal control Monitoring Support Enjoyment	Former attenders
Hardcastle et al. ⁴⁹	Quantitative (prospective) ^b	<i>N</i> =207, 65% female; Age not specified	Behaviour change counselling through motivational interviewing for 6-months	Stage of change Self-efficacy Motivation Perceived behavioural control Attitudes Social support	Self-reported physical activity
Hardcastle & Taylor ⁵⁰	Qualitative (interviews) ^c	<i>N</i> =15; All female; age range 50-80 years	10-week exercise programme	Informal networks Perceptions of control Sources of belief Social support	Attendance through the ERS
Hardcastle & Taylor ⁵¹	Qualitative (interviews) ^b	<i>N</i> =15; All female; age range 43-77 years	10-week exercise programme	Exercise identity Feelings of achievement Autonomy and control Social interaction and a sense of belonging	Attendance through the ERS
Hutchison et al. ⁵²	Qualitative (interviews) ^b	<i>N</i> =21; 57.1% female; age range 38-62 years	6-12 week exercise programme	Individual core beliefs or values Situational/informational cues	Attendance through the ERS

Jones et al. ⁵³	Mixed ^c	<i>N</i> =17; 70.6% female; age not specified	10-week exercise programme	Behavioural determinants Expectations of change Confidence	Attendance through the ERS
Jones et al. ⁵⁴	Quantitative (prospective) ^b	<i>N</i> =113, 57.89% female; 47% over 55 years	24 supervised sessions over 12-weeks	Stage of change Self-efficacy Expectations of change and achievement change Social support	Attendance to the 24-sessions
McNair ⁵⁵	Quantitative (prospective) ^b	<i>N</i> =244, 55% female; 61% of the sample were aged 46-60 years	12-weeks	Social support	Attend a consultation at 12-weeks & self-reported physical activity
McNair ⁵⁵	Qualitative (focus groups) ^b	<i>N</i> =28, 86% female; Mean age 57 years	12-weeks	Social support	Attend a consultation at 12-weeks & self-reported physical activity
Mills et al. ⁵⁶ <i>Mills</i> ⁵⁷	Mixed-methods (qualitative element relevant to review) ^b	<i>N</i> =17; 76.5% female; age range 31-68 years	Up to 26-week exercise programme	Motivation Self-efficacy Feeling secure	Attendance through the ERS
Moore et al. ²⁷	Mixed-methods (qualitative element relevant to review) ^b	<i>N</i> =32, 87.5% females; Mean age 59.8 years	16-week exercise programme	Motivation Social support Confidence	Attendance through the ERS
Morton et al. ²⁴	Quantitative (prospective) ^b	<i>N</i> =30, 73.3% females; Mean age 51.9 years	6-weeks	Motivation	Attendance to >6 sessions

Rahman et al. ⁵⁸	Quantitative (prospective) ^b	N=293, 73.90% females; Mean age 54.49 years	Free of charge, 12-week supervised programme	Motivation Psychological need satisfaction	Attendance to classes
Rome et al. ⁵⁹	Quantitative (Randomized trial) ^a	N=528, age and gender not specified for whole sample	4-month exercise programme	Motivation	Self-reported physical activity
Sharma et al. ⁶⁰	Qualitative (interviews) ^c	N=9; 55.6% female; age range 37-61 years	Physiotherapist led 3-month exercise programme	Control Motivation Confidence	Attendance through the ERS
Stathi et al. ⁶¹	Qualitative (interviews) ^b	N=13; 38.5% female; age range 63-79 years	Not specified.	Overcoming barriers Motivation	Attendance through the ERS
Taket et al. ⁶²	Mixed-methods (quantitative element relevant to review) ^b	N=224, 53.3% females; Mean age not specified	Individualised physical activity counselling	Stage of Change	Self-reported physical activity
Taylor & Fox ⁶³	Quantitative (Randomized trial) ^b	N=142, 53.3% females; Mean age not specified	10-week exercise programme - 2 sessions per week at £1.30 each	Physical self-worth	Attendance through the ERS
van Sluijs et al. ⁶⁴	Quantitative (Randomized trial) ^a	N=358, 49.2% females; Mean age not specified	8-weeks; two visits with the GP and two telephone booster calls by a physical activity counselor	Self-efficacy Benefits/ barriers Social support Processes of change	Self-reported physical activity

^aAll or most of the checklist criteria have been fulfilled, and where they have not been fulfilled the conclusions are very unlikely to alter

^bSome of the checklist criteria have been fulfilled, and where they have not been fulfilled, or are not adequately described, the conclusions are unlikely to alter

^cFew or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter

PsycInfo

#	Searches
1	((exercis* or physical activit*) adj3 (fit* or train* or activit* or promot* or program* or intervention*)) and (refer* or prescri* or subsid*).ti,ab.
2	((exercis* or physical activit*) adj3 (refer* or prescri* or subsid*).ti,ab.
3	((dance or yoga or tai chi or pilates or run* or walk* or gym or swim* or fit camp* or boot* camp* or Fit* club* or class*) adj3 (refer* or prescri* or subsid*).ti,ab.
4	(sport* adj3 (refer* or prescri*).ti,ab.
5	((exercis* or physical activit*) adj3 (service* or scheme* or supervis*).ti,ab.
6	(Exercise/ or Physical Activity/)
7	1 or 2 or 3 or 4 or 5 or 6
8	(exercis* or physical*).ti,ab. (family medicine\$ or family practice\$ or general practice\$ or primary care or primary health care or primary health service\$ or primary healthcare or primary medical care or family medical practice\$ or family doctor\$ or family physician\$ or family practitioner\$ or general medical practitioner\$ or general practitioner\$ or local doctor\$).ti,ab.
9	
10	Family Physicians/
11	Primary Health Care/
12	Community Health/
13	Health Care Services/
14	Intervention/
15	(community healthcare or community health care).ti,ab.
16	(GP or GPs).ti,ab.
17	general practic*.ti,ab.
18	9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17
19	(referral* or promot* or program* or intervent*).ti,ab.
20	7 or 8
21	18 and 19
22	20 and 21
23	(adher* or compli* or complet* or succes* or attend* or participat* or maint* or retent* retain* or continu* or achiev* or engag* or prolong* or sustain* or progress*).ti,ab.
24	22 and 23
25	(predict* or correlat* or factor* or determinant* or facilitator* or barrier* or associat* or caus* or element).ti,ab.

26 24 and 25

27 (baby* or babi* or child* or adolescent* or school* or pediatric* or paediatric*).ti,ab.

28 26 not 27

29 animals not humans/

30 28 not 29

31 30

32 limit 30 to english language

33 "cardiac rehab*".sh. or "cardiac rehab*".ti. or "cardiac rehab*".ab.

34 32 not 33

35 clinical.sh. or clinical.ti. or clinical.ab.

36 34 not 35

37 "psyc*".ab,ti.

38 social.ab,ti.

39 "theor*".ab,ti.

40 37 or 38 or 39

41 36 and 40