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Observational Study

Barriers and facilitators to participating in cardiac rehabilitation and physical activity: A cross-sectional survey

Matthew James Fraser, Stephen J Leslie, Trish Gorely, Emma Foster, Ronie Walters

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Cardiovascular diseases (CVD) have been shown to be the greatest cause of death worldwide and rates continue to increase. It is recommended that CVD patients attend cardiac rehabilitation (CR) following a cardiac event to reduce mortality, improve recovery and positively influence behaviour around CVD risk factors. Despite the recognised benefits and international recommendations for exercise-based CR, uptake and attendance remain suboptimal. A greater understanding of CR barriers and facilitators is required, not least to inform service development. Through understanding current cardiac patients' attitudes and opinions around CR and physical activity (PA) could inform patient-led improvements. Moreover, through understanding aspects of CR and PA that participants like/dislike could provide healthcare providers and policy makers with information around what elements to target in the future.

AIM

To investigate participants' attitudes and opinions around CR and PA.

METHODS

This study employed a cross-sectional survey design on 567 cardiac patients. Cardiac patients who were referred for standard CR classes at a hospital in the Scottish Highlands, from May 2016 to May 2017 were sampled. As part of a larger survey, the current study analysed the free-text responses to 5 open-ended

questions included within the wider survey. Questions were related to the participants' experience of CR, reasons for non-attendance, ideas to increase attendance and their opinions on PA. Qualitative data were analysed using a 6-step, reflexive thematic analysis.

RESULTS

Two main topic areas were explored: "Cardiac rehabilitation experience" and "physical activity". Self-efficacy was increased as a result of attending CR due to exercising with similar individuals and the safe environment offered. Barriers ranged from age and health to distance and starting times of the classes which increased travel time and costs. Moreover, responses demonstrated a lack of information and communication around the classes. Respondents highlighted that the provision of more classes and classes being held out with working hours, in addition to a greater variety would increase attendance. In terms of PA, respondents viewed this as different to the CR experience. Responses demonstrated increased freedom when conducting PA with regards to the location, time and type of exercise conducted.

CONCLUSION

Changes to the structure of CR may prove important in creating long term behaviour change after completing the rehabilitation programme.

Key Words: Cardiovascular disease; Cardiac rehabilitation; Physical activity; Barriers; Facilitators; Patient experience

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Core Tip: The exercise component of cardiac rehabilitation (CR) is considered key to the success of the programme. However, attendance of CR is sub-optimal. The current study examines cardiac patients' opinions and attitudes around several key elements of CR. Participants provided several ideas going forward to get more patients taking part in CR, which at the moment is a real issue. Experiences around physical activity were also explored, and it was found that patients viewed this as contrasting to CR.

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INTRODUCTION

Cardiovascular diseases (CVDs) are now the greatest cause of death worldwide[1]. In the United Kingdom there are currently 7.4 million people living with a specific heart or circulatory disease, accounting for 27% of all United Kingdom annual deaths[2]. Cardiac rehabilitation (CR) can aid recovery and help manage the long-term impact of CVD[3]. The exercise component of CR (exCR) is considered a priority and key to the success of the programme[4]. In the United Kingdom it is estimated that 100000 patients attend exCR, approximately 50% of eligible participants[2]. Developing new methods to increase attendance at exCR is deemed paramount[5]. Such methods could include telehealth, remote monitoring, or a hybrid approach, to increase accessibility and participation[6].

Research has explored factors that prevent and promote patient attendance. Previous systematic reviews have shown that women, older patients, the unemployed and those with comorbidities and depression are less likely to take up the opportunity to conduct exCR[7,8]. In contrast patients who are more affluent, have higher levels of education and who do not smoke are more likely to attend[7,8]. There is also evidence that geographical location may influence uptake but not drop out[8]. Castellanos *et al*[9] found that rural participants or those who live further from CR classes attended fewer sessions in comparison to those in urban areas. This was due to transport, distance and cost related factors. It appears that those with most to gain are the least likely to attend the sessions. Medical staff referral is also a key factor in CR participation and therefore barriers can exist based on general practitioners' (GP) or cardiologists' preconceptions of CR[10].

Reasons that prevent patients regularly attending exCR interventions are not fully understood, however, a large percentage that start do not finish[9,11,12]. The National Audit of Cardiac Rehabilitation[13] found that 77% of patients complete the full CR programme in the United States. However, Ritchey *et al*[14] found only 26.9% of patients above 65 years old in America completed the full

programme. The low rates of uptake and completion are a concern given the known benefits of CR. There is a need to better understand patients' experiences of CR and the influences on attendance and completion.

This study reports on the experiences of CR patients living in the Scottish Highlands. The aim of the present study was to explore participants' experience of CR and their attitudes, opinions, and perceptions of physical activity (PA) by answering the following research questions.

What are the barriers and facilitators to PA and CR attendance and programme completion?

What are the patients' views around deliverable service modifications with a view to improving attendance and completion?

MATERIALS AND METHODS

Design

The data employed in this study was from a larger cross-sectional survey[15]. Cardiac patients who were referred for standard CR classes at a hospital in the North of Scotland from May 2016 to May 2017 were sampled. Participants were excluded from taking part in the study if they had been previously referred, did not live in the catchment area, were < 18 years old, had a non-cardiac or unclear diagnosis or if CR, PA or completing the questionnaire was considered inappropriate for the specific patient. The full methods for this study are reported in Foster *et al*[15].

Procedures

Ethical approval was obtained from the Bromley Research Ethics Committee (study reference number 17/LO/1389, project number 231385). Identified participants were sent a "study pack" consisting of a cover letter, participant information sheet, consent form and questionnaire. A reminder was sent to the participants 2-3 wk later for those that had not responded. The current study analysed the free-text responses to 5 open-ended questions included within the wider survey. Participants were invited to respond to the following open-ended questions on their experience of CR and PA: (1) Did you find the CR classes useful? Please tell us why? (2) We would like to improve attendance at the CR classes- is there anything you think we could do to help you, or others attend? (3) If you did not attend any CR classes could you please tell us your reasons for not attending? (4) How important do you think being physically active is to your health and recovery? And (5) If there is anything else you would like to tell us then please use the space below to do so (*e.g.*, what do you think the local government/community or NHS could do to help improve the amount of activity you do or make it easier for you to be active?).

Analysis

A thematic analysis following the 6-step method of Braun and Clarke[16] was used to analyse the data. The themes are provided below in the results section, along with quotations from the respondents. The respondents' gender, age and attendance of classes is also provided.

RESULTS

Overall characteristics of patients

A total of 567 participants were invited to take part in the study, 293 (52%) returned a response. 76.7% of respondents were male, and the average age of the participants was 68.4 ± 10.4 years (range 33-90)[15]. In total 279 participants responded to at least one open-ended question of these 70 (25.1%) responded to 1 question, 88 (31.5%) responded to 2 questions, 104 (37.3%) responded to 3 questions and 17 (6.1%) responded to all 4 questions). Participants had a range of heart conditions (NSTEMI, STEMI, stable/unstable angina, heart failure, valve stenosis/regurg, arrhythmia, aortic aneurysm/dissection, type 2 myocardial infarction and valve/angina coronary artery disease) and had on average 2.59 comorbidities. In terms of smoking status, 139 participants were ex-smokers, 112 had never smoked, 24 currently smoked, 4 did not answer. PA levels were wide-ranging, 132 participants conducted "high" levels, 81 conducted "moderate" levels, 58 conducted "low" levels of PA and 8 did not respond. The table below breaks down the responses to the different questions (Table 1).

Responses were explored under two broad topic areas: "Cardiac rehabilitation experience" and "Physical activity". The two topic areas were made up of several sub-themes and codes, and a hierarchy tree diagram was created to display these (Figure 1)[17].

Main topic: CR experience

A wide range of themes were explored within the main topic of "cardiac rehabilitation experience". These were grouped in-to three sub-themes: "Barriers and reasons for non-attendance", "benefits" and "solutions and ideas to increase attendance". Table 2 displays the topic along with the sub-themes, elements, and exemplar quotes. For a detailed explanation of each element see the codebook (Appendix

Table 1 Response rate to questions

Question	Response rate
1	162 (55.2%)
2	130 (44.3%)
3	98 (33.4%)
4	236 (80.5%)

1).

Barriers and reasons for non-attendance

This sub-theme was related to barriers to attending CR classes. These included the type of activity conducted at the classes and physical limitations of respondents due to health conditions. Moreover, the location of the classes was highlighted as an issue especially for those in rural areas where this increases travel time considerably. With regards to timing, the duration and the time the classes were held at, meant those who work during the day could not attend. Whilst some responses reflect the desire to take responsibility for their own rehabilitation, for some it appears that the group exercise environment is not appealing. With respondents citing barriers such as not feeling comfortable in the group environment and in some cases feeling embarrassed. Finally, many respondents noted that poor communication in terms of a lack of advertising or information being available to patients around where or when the classes were to take place was a barrier. Within barriers around communication, respondents also highlighted on several occasions that the follow-up time was lengthy and deemed unacceptable.

Striving for independence

Several respondents highlighted that they chose not to attend CR and felt that they wanted to take responsibility for their own rehabilitation. Reasons included already being active enough, personal preference, feelings that they should take responsibility for their own wellbeing and living in a remote area.

Health benefits

On the whole responses were positive in relation to the outcomes of exCR. Respondents cited both physical and mental health benefits. Physical health benefits included improved fitness and weight loss. Mental health benefits included being able to learn coping strategies and relaxing. Additionally, with reference to the sub-theme of "peer support" respondents noted that being monitored and being able to ask staff questions improved psychological aspects of health. Respondents also noted that following the education element of CR they now knew significantly more about their condition and the best ways to manage it. There were some respondents however that noted they felt no benefits from attending the exCR classes to their health.

Peer support

Respondents highlighted that the social element of CR was important to them. A frequently cited area was in relation to exercising and meeting people with a similar condition. The ability to interact and communicate with like-minded/bodied people came across as one of the most important aspects of attending the group-based CR programme.

Healthcare provider support

Within the element of "benefits" there were several links with reference to the environment and atmosphere created by staff and other attendees. Moreover, being able to gain knowledge and understanding around PA and their condition was important, in addition to feeling free to ask questions helped regain confidence and understanding around their condition. However, it should be noted though that not all respondents felt this way, with some reporting in some instances that they felt out of place. Respondents indicated that staff play a significant role in the exCR experience and in some instances are crucial in promoting uptake, attendance, and completion of these programmes. Generally, most participant responses highlighted that they deemed the support offered from the staff as essential, encouraging, and supportive. Specific types of staff mentioned were physiotherapists, nurses, cardiologists, and gym instructors.

Being in safe hands

Responses consistently referred to increased levels of confidence within a range of contexts but primarily the increased belief that the respondents could exercise without fear. This code was related to

Table 2 Topic: Cardiac rehabilitation experience

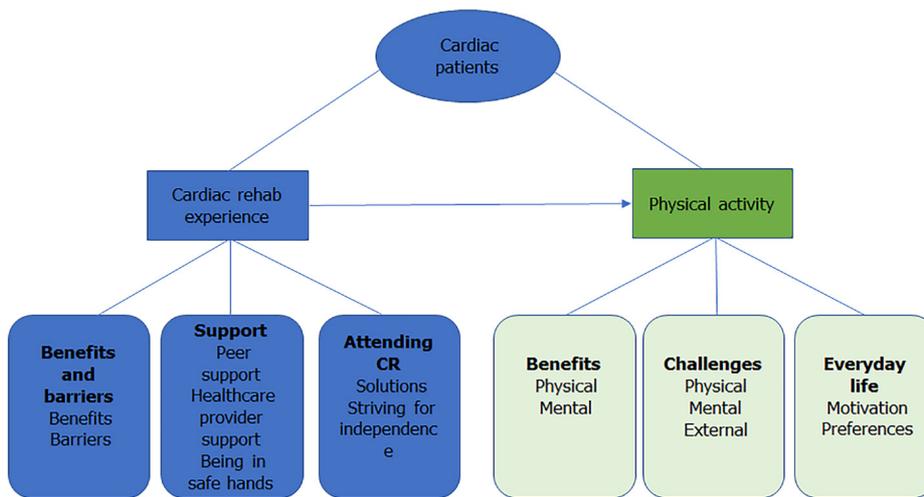
Sub-theme	Element	Description	Example quotes
Barriers and reasons for non-attendance	Barriers to attending regular cardiac rehabilitation	Barriers to attending class. Includes aspects such as the type of activity, distance and timing of the classes as well as lack of information on when the classes are or failure to be referred.	Participant 74: <i>"Inconvenience, chest pains, shortness of breath when doing physical work."</i> (Male, 60-79, no classes). Participant 318: <i>"I found the traveling, 1 hour each way too much."</i> (Male, 80+, some classes). Participant 135: <i>"No classes out with working hours."</i> (Male, 60-79, 9 classes). Participant 259: <i>"It was difficult to get information as to where and when these classes were."</i> (Male, 60-79, some classes). Participant 354: <i>"6 months wait to be contacted regarding rehab is not good enough. We don't all live in large towns or cities."</i> (Male, 40-59, no classes). P243: <i>"It is difficult in rural areas to travel to venue far away."</i> (Male, 60-79, all classes)
	Striving for independence	Wanting to take responsibility for own health, feeling the need to figure it out independently.	Participant 360: <i>"Living in a relatively remote place I feel it is particularly incumbent on me to take responsibility for my own rehabilitation - and I feel that this should be an underlying principle. This would mean that resources could then be focussed on those who, for whatever reasons, cannot do this themselves."</i> (Male, 60-79, no classes). Participant 542: <i>"I had already started my own rehabilitation exercises at local gym."</i> (Male, 60-79, some classes).
Benefits	Peer support	Being amongst other people who have shared experiences. This is not always perceived as a good thing.	Participant 575: <i>"Good to be able to talk to people with similar problems as me. Made me realise I was getting better and helped me regain some confidence."</i> (Female, 60-79, some classes). Participant 282: <i>"Mixed with others and talked about how others coped."</i> (Male, 40-59, all classes). Participant 441: <i>"Just felt embarrassed and out of place."</i> (Male, 40-59, some classes). Participant 48: <i>"Assumed it would involve group activity. I'm not very good with group activity."</i> (Male, 60-79, no classes).
	Healthcare provider support	Being supported by knowledgeable staff.	Participant 33: <i>"They were carried out locally with excellent physiotherapist who carefully provided and monitored exercise which suited each individual member of small group. Relaxed atmosphere, advice and encouragement. Benefit felt."</i> (Female, 60-79, all classes) Participant 52: <i>"The pace and programme were tailored to my needs. The physios were superb - always supportive and encouraging. Meeting with and talking to, others in a similar situation was reassuring. It was great to see my heart-rate recovery time improving as the weeks went by. The post-exercise discussions and presentations were very helpful."</i> (Male, 60-79, all classes).
	Being in safe hands	Being cradled gently in safe hands. Being supported and encouraged to take the steps necessary to return to physical activity. This leads to increasing confidence and motivation.	Participant 430: <i>"To be able to exercise in an Hospital where I can feel safe. If anything happens to me I know that I have the full benefits to immediate health care that isn't available in the local communities."</i> (Male, 40-59, all classes). Participant 473: <i>"I could exercise under supervision which took away anxiety about how much to do, how much to push myself. I could ask questions, no questions too small or silly, provided reassurance and enabled me to do exercise at home without having to worry."</i> (Female, 40-59, some classes). Participant 327: <i>"After my cardiac event I felt some apprehension to participating in physical activity, but after attending a session, I felt more confident."</i> (Male, 60-79, all classes). Participant 367: <i>"I felt motivated and encouraged to carry on with exercises at home."</i> (Female, 60-79, all classes).
	Health benefits	Benefits and outcomes gained through attending classes. Includes both physical and mental benefits as well as increased knowledge of their condition.	Participant 146: <i>"They restored my fitness following surgery. They were convenient and well run."</i> (Male, 60-79, all classes). Participant 449: <i>"Controlled and supervised exercise giving much benefit to wellbeing and fitness."</i> (Male, 60-79, all classes). Participant 599: <i>"They helped me to understand that exercise helps not hinders recovery."</i> (Male, 60-79, all classes).

Solutions and ideas to increase attendance	Time and duration	Participant 149: "Understanding of illness explained well and why the exercises and diet helped recovery taking into account my Parkinson's disease." (Male, 60-79, all classes).
		P49: "Did not feel any significant difference to my condition - but I'm sure they are beneficial." (Male, 60-79, all classes).
		P50: "I only attended one session, because I was getting reasonable exercise at home and thought there would be others who would benefit more than me." (Male, 60-79, some classes).
		Participant 599: "The classes I attended were on the afternoon, which was not a problem for me, but could be for those still in employment. It may help to hold some classes in the evening." (Male, 60-79, all classes).
		Participant 5: "Would have liked a class every day or every other day instead of once a week." (Male, 40-59, all classes).
		Participant 466: "Would have liked longer than 8 weeks cardiac rehab." (Female, 60-79, all classes).
		P67: "Make it sooner after the OP/procedure." (Male, 60-79, all classes).
	Class Structure	Participant 116: "Not really, I would like to have been worked harder; however, as the classes have to satisfy different age groups and conditions, it would be difficult." (Male, 60-79, some classes).
		Participant 325: "Give more interest, doing the same exercises every week is boring - virtually no equipment is used." (Male, 60-79, some classes).
		P6: "As far as I know I attended all my classes, there was talk of more advanced classes, but I haven't heard any more news. I would like to attend more classes if there are any." (Male, 40-59, all classes).
		P101: "I do find any gym based exercise very boring, perhaps any walking activities could be explored? A booklet on country walks suitable for people with heart problems, local community green gyms etc. Any outdoor activity organised in the Summer months to bring local communities together." (Male, 60-79).
		P44: "Have more experts to give talks on cardiac problems and how to avoid another event. This may include food, exercise, medical advice etc." (Male, 60-79, all classes).
	Location	P141: "Make them more reliable in my part of the world (Highlands - Caithness)." (Male, 60-79, some classes).
		P133: "Include them at the local gym so that people could attend whenever they wanted to. (Cost may be prohibitive though)." (Male, 60-79, all classes).
		P227: "Make the classes available in all medical centres." (Female, 60-79, some classes)
		P430: "Help with travel arrangements and travel expenses out with Inverness for people not on benefits. Possible age-related groups and group buddies." (Male, 40-59, all classes).
		P41: "Information on local support groups that are available. Discounted fees on joining local sports centres." (Male, 60-79, some classes).

safety and reassurance, in that feeling safe to exercise increased feelings of confidence and motivation. Respondents believed that the environment the classes were conducted in allowed them to work harder than they typically would. The role staff play in monitoring, encouraging, and supporting was deemed vital in creating feelings of safety. By monitoring the type of exercise and intensity, respondents noted that they could 'push themselves harder' with the confidence that if an adverse event occurred, the correct procedures were in place. Moreover, many respondents expressed increased confidence in their ability to do everyday tasks again, regaining their independence and thus increasing their motivation to keep exercising.

Solutions and ideas to increase attendance

Participants were asked to describe methods to increase attendance of exCR. There were a range of ideas suggested, three main elements were seen within respondents' responses, and these were related to time, structure, and location around CR. Within the element of time, frequent responses were seen around what time classes were held, a want for more classes across the week and an increase to the duration of the overall programme. In terms of structure, respondents highlighted a want for varying intensities, more variety of exercises which can be advanced and more elements to the classes such as education or teaching. Location frequently came up within responses and these were related to



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Figure 1 Hierarchy of the topics, themes, and sub-themes from the qualitative analysis.

reliability of classes and a desire to have the programme conducted at local gyms and more medical centres in the future.

With the primary goal of CR to create long-term health behaviour change particularly with respect to PA the following section outlines participant responses related to PA. The two modes can be considered different due to patients having to take responsibility for planning and conducting their own PA and the locations in which it is conducted unlike exCR. The two main themes are also interconnected in that following completion of the exCR programme it is anticipated that participants will continue with regular PA.

Main topic: Physical activity

Within the main topic of “physical activity” there were similar and contrasting themes to those for “cardiac rehabilitation experience”. The theme of “physical activity” was comprised of three sub-themes: “Benefits of being active”, “challenges to being active” and “reasons for staying physically active”. Table 3 shows this theme along with the sub-themes, elements, and exemplar quotes. For a detailed explanation of each element see the code book in Appendix 1.

Benefits of being active

Perceptions of PA appeared to be different to that of the exercise component of CR. Respondents recognized that they could conduct PA in a range of locations besides indoor environments, they could select when they wanted to conduct PA, there is more variety when conducting PA, and they can conduct PA whilst achieving other goals (*e.g.*, housework). Yet the range of benefits to participating in PA both in terms of psychological and physical benefits were similar to those reported for exCR.

Physical and mental benefits from PA

Respondents identified many benefits to their health from being physically active, including “maintaining weight, improving breathing, managing other diseases and ability to do things you enjoy.” They also cited improvements in their mental health because of being more physically active, including “Improved confidence, wellbeing, stimulated mind, increased optimism and bringing joy and energy to their lives.”

Barriers to physical activity

As within the main topic of “cardiac rehabilitation experience”, barriers to PA were frequently discussed and these were grouped as physical, mental, and external barriers.

Physical

This included health – from other conditions as well as their heart. Respondents also referred to their age as a barrier.

Mental

Mental barriers included a lack of confidence and anxiety about being safe whilst exercising. Respondents also discussed that mental health issues such as anxiety and depression, which may also be linked to their cardiac issue, prevented them from taking part in regular PA.

Table 3 Topic: Physical activity

Sub-theme	Element	Description	Example quotes
Benefits	Physical	Physical benefits from being active.	Participant 33: <i>“Physical activity can help other/many other illnesses/diseases e.g., diabetes. It can also help you to feel better.”</i> (Female, 60-79, all classes).
			Participant 423: <i>“Keeping my weight at a good level is important and regular walking helps this. Walking helps me keep fit and helps with a good breathing pattern.”</i> (Male, 40-59, all classes).
			Participant 101: <i>“Being physically active not only improves recovery but stimulates the mind, especially when walking outdoors.”</i> (Male, 72, some classes).
			Participant 49: <i>“I am not PA as above - but I always endeavour to be active daily by other means i.e., gardening, walking, household etc., relevant to my age/weather conditions etc.”</i> (Male, 79, all classes).
	Mental	Mental benefits from being active.	Participant 358: <i>“Physical activity has given me a positive outlook for the future.”</i> (Male, 60-79, all classes).
			Participant 90: <i>“Improved confidence and mental wellbeing.”</i> (Male, 60-70, all classes).
Challenges	Physical challenges	Physical health barriers to being active.	Participant 28: <i>“At present I am troubled with retention of fluid which is affecting my breathing. If something could be done about this, I feel I would be able to get back to my golf and fishing.”</i> (Male, 80+, 8 classes).
			Participant 531: <i>“Because of my age and state of health I would find it very difficult to exercise.”</i> (Male, 80+, no classes).
	Mental challenges	Mental barriers to being active.	Participant 87: <i>“I don't go out by myself in case I suffer a bad turn. It's not just a physical barrier with some patients it's a mental barrier that stops them from exercise.”</i> (Male, 60-79, no classes).
			Participant 103: <i>“I have suffered from severe depression my whole life and lately it's been getting worse with everything that's going on so it's a bad place I'm in just now”</i> (Male, 40-59, no classes).
			Participant 450: <i>“To be honest I feel very anxious about strenuous or prolonged exercise: close to paranoia!”</i> (Male, 60-79, no classes).
	External challenges	External barriers to being active.	Participant 61: <i>“Normally in good weather my husband and myself are out walking about 3 d a week but with all the snow and ice we have had we have hardly been out of doors.”</i> (Female, 60-79, no classes).
Participant 278: <i>“I really enjoy lifting weights and as my local gym does not have much I use a private gym. It has all health questions and if you have a health problem (heart attack etc.) you need a doctor's letter which is £30. This could put people off.”</i> (Female, < 39, 8 classes).			
Reasons for staying physically active	Motivation	Motivation for being physically active.	Participant 160: <i>“Would like to keep active for my grandchildren and my great grandchildren and also for my remaining son and family.”</i> (Female, 60-79, 8 classes).
			Participant 115: <i>“Being physically fit, for your age, helps to be mentally fit and become able to participate in family and community events.”</i> (Male, 60-79, 8 classes).
	Preferences	Preferences of types of activity.	Participant 318: <i>“Most of my activity is concerned with work around the home e.g., cutting trees for wood burner, splitting logs for wood burner, digging garden, looking after chicken, mowing grass etc.”</i> (Male, 80+, some classes).
			Participant 258: <i>“I've been involved with physical activity in my work environment all my working life. Most of my hobbies focus around exercise skiing, biking, golf, swimming and walking. Don't like to be unfit.”</i> (Female, 40-59, no classes).

External

External barriers included factors such as where they lived, distance from leisure facilities, the cost of leisure facilities, the need for medical notes to gain access to gyms which cost money and the weather.

Reasons for staying physically active

This sub-theme includes two elements: “Motivation” and “preferences” and discusses instances where respondents suggested why PA is important for their lives and what activities they like to do.

Motivation

This sub-theme related to motives and reasons for being active or becoming more active. When noting elements around their condition and PA, many responses were related to aspirations, plans and goals for their future after overcoming the event and attending CR. Respondents highlighted a want to be able to conduct more regular forms of PA and regain their independence, they had prior to having their cardiac issue. Other responses were in relation to behaviour change and living a more active lifestyle with the aim of prolonging life and living better mentally and physically. Finally, respondents also noted improving their lifestyle so that they can continue to see their family and friends.

Preferences

Respondents described types of activities that they now preferred to participate in. In some instances, as outlined within the 'solutions and ideas to increase attendance' sub-theme, some of these types of PA could be considered within future rehabilitation programmes. Specifically, most participants noted that they prefer to participate in PA outdoors.

DISCUSSION

This study, conducted in cardiac patients in the North of Scotland, demonstrates a range of opinions and attitudes around CR. The two main topics from the data were termed "cardiac rehabilitation experience" and "physical activity". Each topic was made up of several sub-themes and codes. Whilst the two main topics are different, they are connected in that once attending CR programmes, individuals should progress to conducting levels of PA that meet the national guidelines.

Respondents outlined benefits to taking part in exCR, including improved fitness, mood, and mindset. Respondents also noted that following the education element of CR they knew significantly more about managing their condition which may be important in creating long-term behaviour change. Conversely, respondents frequently cited distance and travel as reasons for non-attendance. Other barriers were related to age, health/injury status, accessibility, and timings (classes during working hours). These barriers were similar to those found in previous CR research[18,19]. External barriers included communication around the referral process, specifically a lack of advertising or information availability. Respondents noted not being informed and unacceptable lengths of follow up. Foster *et al* [15] found "perceived need" to be the single most important factor in patient non-attendance to CR where perceived need consisted of patient and healthcare factors. Healthcare factors include lengthy referral process, a lack of contact, information, or knowledge[20]. The current findings are consistent with the quantitative phase of the larger study[15]. In terms of barriers to PA, there was little mention of time, location, or distance. However, the feeling of safety was removed when conducting PA and worry around adverse events was an issue. This, however, is a common misconception and more needs to be done to reassure patients after a cardiac event that PA is safe[21].

Consistent with previous research into CR[15,22], responses demonstrated that being monitored and shown the correct exercise form alongside enhanced understanding of managing their condition could result in increased self-efficacy for conducting PA. The social cognitive theory[23] describes how learning drives human behaviour. Self-efficacy is one of the most powerful predictors of behaviour in health environments[24]. Patient education has also been shown to increase self-efficacy[25]. Such evidence is supported by Frohmader *et al*[26] who found that following interviews, patients' confidence increased to develop lifestyle changes as a result of viewing their own success and positive reinforcement by mentors. The use of telehealth, specifically videoconferencing, may be one method for increasing accessibility to such interviews and overcoming patient barriers to attendance[27]. Thus, focusing on methods to increase patient confidence could increase adherence to CR programmes.

Responses were positive and demonstrate the role that staff play in facilitating attendance to CR through creating safe, enjoyable environments. Participants highlighted that exercising alongside others with similar conditions made them more likely to attend CR and enhanced their levels of enjoyment and support. Moreover, group dynamics such as looking out of place or embarrassment which are often cited as barriers to exercise[28] are potentially removed when exercising with people with a similar health condition. These responses show CR to be more than just an "exercise regime", individuals create friendships and socialise, creating mental and physical benefits. Contrastingly, in some cases group exercise was considered a barrier to attendance and this demonstrates the complexities of trying to increase CR attendance.

The second research question analysed patient feedback to increasing attendance of CR. Numerous studies have developed methods to increase attendance in CR programmes[29,30]. However, few have considered patient generated ideas and whether they will be relevant to patients in rural areas. Karmali *et al*[29] considered the use of structured telephone calls, visits from staff following leaving hospital, the creation of peer support groups, early appointments, motivational letters, and a gender-tailored cardiac programme. The review found that many of these methods were successful in increasing attendance, however many displayed high levels of bias which makes it challenging to generalise. A clear barrier identified within the current research to attending CR classes was related to the organisation or accessibility of the sessions. A lack of classes and no classes out with work hours were frequently cited. One clear method to overcoming these is to provide more classes, especially for rural patients where travel time and distance are typically large. Particularly in the Scottish Highlands, it is likely financial and staffing constraints will mean this is challenging to implement, but possibilities may exist with regards to increase provision through local companies such as Highlife Highland or Argyll Active.

In relation to increasing the number of CR classes, new methods away from centre-based CR have been developed[31]. Further, due to the COVID-19 pandemic changes to where CR is conducted have occurred[32]. Even before the pandemic, many CR services began to implement home-based exCR[33]. Previous research has investigated online home-based exercise and post-exercise telemonitoring.

Anderson *et al* (2017)[33] and Batalik *et al*[27] found such modes to be at least equally as effective as centre-based rehabilitation, increasing access and participation. Such methods of delivery may facilitate attendance for individuals who dislike exercising in groups, in that they attend the group classes without being viewed. However, in rural areas connectivity (Wi-Fi and 4G/5G) may be substandard and considered a barrier to such forms of CR[34].

Other methods to overcome the barriers that were identified within the current study include peer support groups, third sector partnerships and patient travel funds supporting results seen within other similar studies[30]. Currently, if a patient lives more than 30-miles from the clinic or have a co-morbidity they are entitled to travel reimbursement[35], which it appears respondents were unaware of, highlighting the need again for better communication. The distance to the classes may not be solely responsible for non-attendance and perhaps the lack of awareness around funding or alternative methods of travel are a greater issue. The healthcare team and referral staff should make sure on discharge that patients have information about these funds and even provide details of low-cost travel such as dial-a-bus services running in their area.

Many of the ideas to overcome the barriers are related to communication, providing better information and perhaps this comes down to creating more streamlined services or educating staff about their roles, responsibilities, and the importance of CR. Previous research has shown that patients pick up on doctors' perceptions and how their beliefs and values can shape behaviour[10]. Thus, if a GP or doctor does not deem CR to be necessary then it is unlikely that the patient will consider attending. Quirk *et al*[36] note that poor maintenance of PA post CR is common, and that regular attendance of CR does not guarantee regular PA following completion of the CR programme. The patients' responses highlight that greater emphasis should be placed upon strategies to increase self-efficacy and self-regulation.

Physical activity

The responses demonstrated respondents that attended CR now have a good understanding of why they should conduct regular PA, highlighting that the education element of the programme is effective. Respondents recognise exCR and PA as two separate entities, much as exercise and PA are different in definition in the literature[37]. Differences centred on the structured nature of CR. Respondents identified that PA can be conducted at any time and place, whereas exCR classes take place at a set location and time. This gives patients less freedom, restricting the time they can spend doing other activities.

As exCR is typically conducted indoors this presents another way in which the two forms of activity differ. When referring to types of PA, many responses were related to activities conducted outdoors and in natural areas. This perhaps warrants discussion with regards to the locations of where exCR is conducted. Previous research has shown decreased levels of motivation when conducting exercise indoors[38]. Whilst clearly weather is a barrier to implementation, patient responses show that exCR outdoors may increase attendance. Respondents noted that they would like to see more walking and cycling clubs included to increase participation. Specific responses were termed "reasons for staying physically active" and how respondents prefer to conduct PA such as housework or cleaning whereby they can achieve both health and day-to-day goals. Many respondents considered the future, expressing they conducted PA to maintain their health, feel better and external reasons such as to see their grandchildren grow up. There is a myriad of reasons individuals will select to adopt new behaviours. Finding ways to make the exercise element of CR more like PA is a concept that requires attention.

Future research

The current study provides ideas and directions for future research and policies. Further qualitative research in the form of interviews and focus groups should be conducted to gain more in depth understanding of factors associated with non-attendance. It should not only be patients who are sampled however, collecting more data from the referral staff may provide a greater understanding with regards to CR. An evaluation report of referral processes may allow understanding into why so many do not receive adequate communication about CR classes. Following on from this, investigating new methods of referral such as those outlined in the discussion to understand if they improve attendance is warranted. Finally, future research may look to use longitudinal or follow-up study designs to understand how the behaviours of those individuals who both attended CR and those who chose not to attend differed.

Limitations

Whilst the study displays a range of responses with regards to respondents' attitudes and perceptions of both CR and PA, there was a large amount of data brevity or responses due to the format of the questionnaire. This resulted in an inability to probe and ask follow-up questions. Moreover, not all participants replying to the questionnaire was deemed a limitation.

CONCLUSION

The current study provides several suggestions for increasing attendance of CR. Self-efficacy is a large aspect of what CR offers patients and this is built up through effective communication, socialising with similar people and the safe environment that exCR provides. However, before individuals can achieve such benefits, successful methods to get them to attend exCR need to be better investigated. Barriers to exCR range from age and health to the distance and starting times of the classes, resulting in increased travel time and costs. To overcome these barriers respondents outlined a range of ideas such as the provision of more classes held out with working hours, a greater variety of classes and classes conducted in different locations. Finally, financial incentives to help conduct PA from travel reimbursements to reductions at fitness centres were also highlighted. As a result of the findings of the current study, future studies should continue to attempt to develop, test and evaluate methods to increase the uptake and attendance of CR based on the current low statistics of eligible patients' attendance.

ARTICLE HIGHLIGHTS

Research background

Cardiovascular disease remains the largest cause of death globally and rates continue to rise. The exercise component of cardiac rehabilitation (CR) is regarded as an important element of such interventions. Recent statistics have demonstrated that attendance of CR programmes is low, despite continued calls for methods to increase attendance.

Research motivation

Such a study is warranted as low rates of uptake and completion of rehabilitation programmes are a concern. The barriers and facilitators towards CR are still somewhat unknown. Patients should continue to conduct regular exercise and physical activity after completing the rehabilitation programme. Thus, understanding patient perspectives on this area is also necessary. Exploring such topics should allow researchers and health care staff to target specific elements of service delivery to improve attendance in the future.

Research objectives

The aims of the present research study were to identify the barriers and facilitators to CR and physical activity. The study also aimed to explore cardiac patient views around service modification and ideas to increase attendance at such programmes.

Research methods

The data analysed in this study was from a larger cross-sectional survey. Cardiac patients from the North of Scotland, who were referred for standard CR classes at a hospital were sampled. The current study qualitatively analysed the free-text responses to 5 open-ended questions included within a wider survey. A 6-step thematic analysis was used to analyse the data.

Research results

Patient responses were explored under two main topic areas: "Cardiac rehabilitation experience" and "physical activity". Patients described barriers to CR including time of day, location, a lack of communication and group dynamics. Patient generated ideas to increase the uptake of such programmes included more available classes, a greater variety of intensities and types of exercise and a change to the location of classes. Patients highlighted various benefits to both mental and physical health as a result of conducting the classes and physical activity.

Research conclusions

It appears based on the findings of the current study that CR increases patients' self-efficacy through a number of mechanisms. Key barriers to attending CR in this cohort included age and physical health, distance to the classes and the cost of attendance. With regards to these barriers, participants highlighted a range of methods to overcome these including provision of more classes held out with working hours, classes conducted in different locations and the need for a greater variety of exercise classes.

Research perspectives

The study provides several ideas which future research can implement or examine. Future studies should attempt to develop, test, and evaluate methods to increase the uptake and attendance of CR based on the current low statistics of eligible patients' attendance.

FOOTNOTES

Author contributions: Foster E, Gorely T and Leslie S designed the research study; Foster E and Leslie S performed the research; Fraser M, Gorely T and Walters R analysed the data; Fraser M, Gorely T, Walters R and Leslie S wrote the manuscript; All authors have read and approved the final manuscript.

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