

Title: The influence of non-modifiable illness perceptions on attendance at cardiac rehabilitation

Authors: Blair J¹, Angus NJ¹, Lauder WJ¹, Atherton I¹, Evans J², Leslie SJ^{1,3}

Affiliations:

¹School of Nursing and Midwifery, University of Stirling, Highland Campus, Centre for Health Science, Old Perth Road, Inverness, UK. IV2 3JH.

²School of Nursing, Midwifery and Health, University of Stirling, Stirling, Scotland, UK. FK9 4LA.

³Cardiac Unit, Raigmore Hospital, Old Perth Road, Inverness, UK. IV2 3UJ.

Corresponding author:

Julie Blair, Research Fellow, University of Stirling, Highland Campus, Centre for Health Sciences, Old Perth Road, Inverness. IV2 3JH.

Email: Julie.blair@stir.ac.uk

Telephone: +44 1463 255642

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Abstract

Background

Despite the established benefits of cardiac rehabilitation (CR) attendance rates remain variable. Physical barriers to attendance have been extensively investigated but relatively less is known about the relationship between attendance at CR and psychosocial variables such as illness perceptions and social isolation.

Aim

To examine the influence of socio-demographic factors, illness perceptions and social isolation on patient attendance at cardiac rehabilitation.

Methods

All individuals offered CR over a two year period were invited to take part in a postal survey. The survey collected socio-demographic data and included completion of the Friendship Scale, to assess social isolation, and the Brief Illness Perceptions Questionnaire. Parametric and non-parametric statistical tests were used as appropriate.

Results

128 (47%) questionnaires were returned. Non-attendees reported higher total illness perception scores and those who attributed their illness to non-modifiable factors were significantly less likely to attend CR ($p = 0.042$). Attendees reported lower levels of social isolation however this finding was not statistically significant. No differences were found between attendees and non-attendees in terms of their age, gender, educational status or proximity to cardiac rehabilitation centre.

Conclusion

Psychosocial barriers, specifically illness perceptions and attributions, were found to be significant with patients who did not attend CR reporting more negative illness perceptions. Distance to CR was not a significant factor influencing attendance. Early screening of perceived causal attributions may help to identify those who would benefit from early and targeted intervention to increase participation in CR. Future prospective studies would permit testing of screening approaches and early interventions.

Key words: cardiac rehabilitation; illness perceptions; illness attributions; barriers

Introduction

Cardiac rehabilitation (CR) is offered to patients following a cardiac event or coronary intervention with the aim of aiding recovery and preventing further cardiac illness¹.

Attendance at CR is associated with lower blood pressure and cholesterol, improved functional capacity and exercise tolerance, and reduced morbidity and mortality^{2, 3}. CR is best achieved by providing a comprehensive programme commencing immediately after a cardiac event or intervention through to maintaining a healthier lifestyle in the long term.

Comprehensive CR includes education, psychosocial support and supervised exercise classes^{4,5}. CR programme design is a critical factor in improving participant outcomes with individualised and supervised exercise guidance resulting in better outcomes compared to more traditional standardised approaches⁶.

Despite the established benefits of CR, attendance rates remain poor in many areas. CR uptake rates are between 35-80% of those eligible⁷⁻⁹ demonstrating that high uptake is achievable but low levels are still prevalent. Factors commonly associated with non-attendance include increasing distance from the location of CR provision, increasing age, female gender, belonging to an ethnic minority, presence of angina, low physical activity levels and early return to work following a cardiac event^{3, 10}.

Barriers to attendance can be categorised as physical (e.g. distance from hospital, timing of classes, physical disability) or psychosocial. Physical barriers have been extensively investigated^{2, 9, 11} but relatively less is known about the relationship between attendance at CR and psychosocial variables such as illness perceptions, social isolation and loneliness. Illness perceptions represent an individual's beliefs about their illness and are known to influence coping and response to health threats¹². Perceptions are often linked to health behaviours¹³. For example, a strong belief that illness can be cured or controlled is typically associated with perceptions of short illness duration and relatively minor consequences. Due to advanced therapies and shortened hospital stays (associated with lower morbidity and mortality), the potentially negative psychosocial impact of a cardiac event may be less. In this respect, educating those with negative illness perceptions has the potential to influence attendance at CR. Illness perceptions have been used to explain health behaviours in a

number of long term conditions¹⁴⁻¹⁶ with negative illness perceptions affecting a persons' action following a diagnosis, such as attending rehabilitation sessions.

The experience of social isolation is also known to influence health and well-being¹⁷. Loneliness has been described as a natural response of an individual to certain situations and not a form of weakness¹⁸. Previous research suggests that it is individual feelings of isolation rather than the number of contacts or friends a person has that influences perceived social isolation¹⁹. This may also be a factor in determining health behaviour, such as the likelihood of attendance at cardiac rehabilitation.

Aim

The aim of this study was to examine the influence of socio-demographic factors, illness perceptions and social isolation on patient attendance at cardiac rehabilitation. We aimed to determine if there were novel specific patient factors that influenced attendance and thereby inform subsequent service redesign in order to maximize attendance at CR.

Methods

Setting

The study setting was a regional NHS cardiac rehabilitation centre (Highland Heartbeat Centre) in the north of Scotland.

Respondents and study protocol

All individuals who had been invited to attend hospital based CR, between August 2007 and August 2009, were identified from cardiac centre and hospital records and were sent a postal questionnaire during October 2010. A single reminder was sent to all non-responders after 3 weeks to encourage optimal completion and return rates. Completed questionnaires were accepted until the end of November 2010.

Responders were defined as those who returned the questionnaire and comprised of attendees and non-attendees at CR. Together these made up the total sample. Attendees were defined as patients who had attended one or more CR session. Non-attendees were defined as those who had only attended an initial consultation, or who had been referred and never attended.

Questionnaire design

The questionnaire included a bespoke socio-demographic questionnaire and the previously validated BIPQ²⁰ and Friendship Scale²¹. To limit the influence of co-morbidities on patient response, the questionnaire was clear to direct thoughts and views to the cardiac care of the patient. This was also outlined within the patient information sheet provided.

Brief Illness Perceptions Questionnaire (BIPQ)

The BIPQ is a 9 item questionnaire, which assesses patients' illness beliefs (Appendix 1)²⁰. Items 1-8 of the BIPQ each assess one dimension of illness perception using a 0 – 10 response scale. Item 9 of the BIPQ asks respondents to state in rank order the three most important factors they believe to have caused their illness (causal factors). The overall score for items 1-8 gives a score range of 0-80. A higher score indicates increasingly negative illness perceptions, e.g. more negative perceptions in terms of illness being treatable, greater levels of concern and general effect of illness on life. The BIPQ has demonstrated good test-re-test reliability and concurrent validity in previous research²¹.

Friendship Scale (FS)

The Friendship Scale is a 6-item scale which assesses relationships with others, being isolated, sharing, getting in touch, feelings of being separate and being alone (Appendix 2). It has three items assessing loneliness, and three assessing the importance of social contacts²¹. Items are scored 0-4, with a score range of 0-24. The distribution of scores is used to define social isolation; 0-11 (very socially isolated); 12-15 (isolated or with low level of support); 16-18 (some social isolation or some social support); 19-21 (socially connected); 22-24 (very or highly socially connected). The expected distribution of scores in a normal population is skewed towards socially connected individuals. Expected proportions of isolated people in a normal population are 7% with 93% being socially connected or with some level of social support¹⁸. Previous use of the Friendship Scale has demonstrated good internal reliability (Cronbach's alpha 0.83)²². For the purposes of the present study Friendship Scale scores were categorised as socially isolated (score of 0-15) or socially connected (score of 16-24).

Linked administrative data

Basic demographic data including age and gender were available for respondents and non-respondents. Approximate distance to CR was calculated using postcode data provided by responders or obtained via patient records. This permitted comparison of the groups to address any concerns regarding reporting bias.

Data handling and statistical analysis

Following completion and return of the questionnaires, data were entered into SPSS software (version 17.0) for statistical analysis. For the purposes of comparison, 'attendees' were defined as individuals who had attended one or more rehabilitation sessions, and 'non-attendees' as those who had been invited to attend but did not. Attendees and non-attendees were compared in respect to socio-demographic factors, BIPQ and Friendship Scale scores. Both parametric and non-parametric tests were used where appropriate. Ranked causal factors obtained from item 9 of the BIPQ were categorised as 'modifiable' (e.g. diet, weight, lifestyle, smoking, physical inactivity, excessive alcohol and stress) or 'non-modifiable' (e.g. genetic factors, age, gender and ethnicity) using the British Association of Cardiac Prevention and Rehabilitation classification²³. Attendees and non-attendees were further categorised by first ranked causal factor into those who considered modifiable or non-modifiable factors to be most influential in the aetiology of their illness. Binary logistic regression was used to

examine whether an individual's view of the aetiology of their disease (modifiable / non-modifiable cause) influenced the likelihood of their attendance at CR. A range of variables which might be expected to influence attendance based on previous research findings were controlled for (age, gender, distance from CR, education, marital status).

Ethical considerations

Approval was granted by the North of Scotland Research Ethics Committee (NOSREC 10/S0801/40). All participants agreed for their information to be held and used in research projects approved by the Local and National Research Ethics Committee, on the basis that any identifying details be removed. The investigation conforms with the principles outlined in the Declaration of Helsinki.

Results

Demographics

277 questionnaires were sent to patients on the CR database (the study population) and 128 were returned, a response rate of 47.4%. The sample of responders (n=128) consisted of 87 CR attendees and 39 non-attendees. 2 questionnaires were excluded due to incomplete data giving a total sample size of n=126. Linked administrative data allowed comparison of those who returned questionnaires with those who did not and this confirmed the representativeness of the sample in respect to the total study population.

Table 1 identifies the demographics of all patients on the CR database and is divided into those who returned questionnaires (responders), and those who did not (non-responders). No differences in age or gender (Table 1) were observed between responders and non-responders. Table 2 illustrates the characteristics of the study sample and instrument scores and is split into attendee and non-attendee to demonstrate any differences between the two groups. No statistically significant difference was found with regard to gender, mean age, distance from CR or marital status between attendees and non-attendees.

Brief Illness Perceptions Questionnaire Score

The BIPQ demonstrated good internal reliability (Cronbach's alpha 0.81).

Questions 1- 8

Individuals who did not attend CR reported significantly higher total illness perception scores than those who did ($p = 0.04$) (Table 2).

Question 9

Individuals who did not attend CR were more likely to attribute the primary cause of their illness to a non-modifiable risk factor than attendees (Table 2). Logistic regression demonstrated that patients who attributed their illness to non-modifiable factors were significantly less likely to attend CR (Odds Ratio 2.64, CI 1.18-5.92, $p=0.018$). When controlling for socio-demographic factors the Odds Ratio increased (Odds Ratio 3.44, CI 1.34 – 8.83, $p = 0.010$). Table 3 shows the regression models developed to examine the influence of illness attributions on attendance. The first model shows the main effect, that non-attenders were more likely to have attributed their condition to non-modifiable factors. The Nagelkerke r^2 for model 1 indicates that 7% of the observed variation in attendance / non-attendance can be explained by modifiable / non-modifiable illness perception. The second model controls

for the influence of age, gender, distance from CR, marital status and Friendship Scale score. The odds ratio in model 2 increases slightly compared to model 1, demonstrating non-modifiable causal factors increase the likelihood of non-attendance at CR.

Table 4 provides a detailed summary of the modifiable and non-modifiable factors given by each patient group as the primary cause of their illness.

Friendship Scale Score

Friendship scale scores were lower in attendees than non-attendees, indicating a higher level of social isolation in those who do not attend, although this difference was not statistically significant (Table 2).

Discussion

This study found that patients who did not attend CR reported higher illness perceptions, as measured by the BIPQ, and were significantly less likely to attribute the cause of their illness to modifiable factors. In contrast to other studies, the physical barrier of distance from CR did not appear to influence attendance.

Illness Perceptions and causal factors

The finding that patients who did not attend CR reported higher illness perceptions, as measured by the BIPQ, and were significantly less likely to attribute the cause of their illness to modifiable factors is of interest. The categorisation of risk factors identified by question 9 of the BIPQ into modifiable/ non-modifiable is a novel concept and proved effective in this analysis. Addressing patients' illness perceptions has been shown to improve recovery²² and patient outcomes and to reduce illness related anxiety following myocardial infarction²³. In the current study non-attendees had significantly higher (negative) illness perceptions than attendees, suggesting they perceived their cardiac condition to be more threatening with a considerable effect on their life. It might be expected that such patients would be more likely to access help in the form of cardiac rehabilitation but the opposite was true given that those with higher illness perceptions were more likely to be non-attendees. If an individual does not perceive treatment as potentially beneficial this may render CR less useful or desirable for them.

Patients with negative illness perceptions are known to have a slower recovery and increased levels of disability independent of the severity of their condition²⁴. There are also well established correlations between illness perceptions and health outcomes, including fatigue and health-related quality of life²⁵ which are of known relevance to cardiac populations. There is currently no evidence based intervention to address negative illness perceptions in this patient group.

The important influence of causal attributions (modifiable or non-modifiable) on attendance at CR was a novel finding of this study. Causal factors are thought to be an important determinant of whether a patient seeks further treatment or makes changes to control their illness. It has been argued that knowledge of health risks and benefits creates a necessary precondition for change²⁶. Therefore, if an individual believes that the cause of their illness is something over which they have no influence (non-modifiable) then it is perhaps less likely that they will adopt any form of lifestyle change despite the fact they may also have an unhealthy lifestyle which could be addressed through CR. If there is limited appreciation about how lifestyle affects health there is little reason for people to change detrimental behaviours. In the current study analysis of primary causal attributions clearly suggests that those who attribute their condition to factors out with their control (non-modifiable causes) are considerably less likely to attend CR. Conversely attendees are more likely to attribute their condition to modifiable factors including smoking behaviour, poor diet and inactivity. Patients who perceive a modifiable cause for their illness may be more likely to attend CR as they believe that something can be changed or improved in their lifestyle with personally beneficial consequences.

In a retrospective study design attendance at CR may have modified the reported causal factors thereby accounting for some of the observed differences between groups. Equally this finding may signal the potential value of screening of causal attributions as a means of identifying individuals less likely to attend CR. Although we cannot at this stage claim that the causal component of the BIPQ is predictive of CR attendance, previous studies do support the existence of a relationship between high illness perceptions and non-attendance at CR²⁷⁻²⁹. Earlier screening for perceived non-modifiable causal attributions could therefore provide an opportunity for earlier intervention. Future prospective studies could help illuminate this

aspect further and would allow testing of appropriate screening approaches as well as earlier intervention to further increase participation in CR.

Social Isolation

Social support influences health behaviour but has also been identified as an independent risk factor for cardiac disease³⁰. The proportion of attendees classed as socially isolated or with low levels of social support was less than the predicted population level although this was not statistically significant²¹. This may suggest that attendees feel more connected with their community and potentially more confident to attend the rehabilitation offered to them. It is conceivable however, as this was a retrospective study, that attendees may in fact report feeling more socially connected as a consequence of attending rehabilitation. The proportion of non-attendees in the socially isolated category was higher than the predicted population level at 13.2%, suggesting that a low level of social support may be to some extent predictive of those less likely to attend rehabilitation. It could also be hypothesised that feelings of social isolation are more prevalent in rural populations however this remains largely speculative. We did not find Friendship Scale scores to influence attendance in our study population.

Physical barriers

In contrast to other studies, this study showed that distance to CR did not significantly influence attendance at CR. Somewhat ironically the individual living furthest from the cardiac centre (80 miles) attended CR and the person closest (0.4 miles) was a non-attendee. This may indicate something about the expectations of remotely located individuals in relation to accessing secondary and tertiary health care and may add weight to the arguments in favour of offering technology based solutions such as telehealth and online cardiac rehabilitation as an option for remotely located individuals. There are other, more remote patients in our area including island dwellers who were not invited to participate in cardiac rehabilitation and thus some more remote patients may have been inadvertently excluded by clinical staff and never invited to attend CR. Gender is often cited as a barrier to attendance, with females being commonly less likely to attend, however this was not found to be the case in our study sample.

Limitations

This was a single centre study in a mixed urban and remote population. Although the sample size was larger than many previous studies there is a risk that the results may not be generalisable to a wider population. Nevertheless, the study centre serves a whole population and may be less subject to bias than more specialist cardiac centres which are often located in large urban conurbations. The questionnaire response rate was comparable to other postal surveys at approximately 50% and although this has the potential to affect generalisability the availability and linkage of administrative data on non-responders did not reveal any systematic bias between responders and non-responders in terms of age, gender or attendance at CR. This suggests that our sample was representative of the wider study population.

Conclusions and implications for clinical practice.

In the current study the physical factor of distance to CR was found to be less important than in previous research although psychosocial variables, specifically illness perceptions and causal attributions, were associated with attendance at CR. Findings suggest that patients who do not attend CR may have more negative illness perceptions than those who do. Health care professionals involved in the early stages of CR should be cognisant of this fact and it is recommended that greater attention should be given to the routine assessment of illness perceptions. This would provide an opportunity to reinforce the potentially significant benefits of CR and may encourage attendance in individuals who do not currently participate. Early screening of perceived causal factors (both modifiable and non-modifiable) may help to identify appropriate individuals for targeted intervention. Prospective studies would permit testing of different screening approaches and early interventions to increase participation in CR.

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Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

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	Responders n= 128	Non responders n = 149
Age (Mean +/- SD (Range))	65±10 (40-90)	64±11 (24-88)
Male gender n (%)	96 (75)	107 (72)
Attenders n (%)	88 (69)	107 (72)

Table 1 : Responders vs. non-responders

	Attenders n=87 (%)	Non-Attenders n=39 (%)	p value
Age (mean ±SD)	65±10	65±10	0.79
Male Gender	65 (75)	30 (77)	0.79
Distance from CR(mean)(miles)	5.7 ± 9.6	5.8 ± 8.3	0.95
Marriage status:			
Married/cohabiting	65 (74.7)	29 (74.4)	0.96
Other (incl. separated/ divorced/ widowed)	22 (25.3)	10 (25.6)	
Total BIPQ score (mean)	26	32	0.04
Risk Factor classification (primary cause):			
Modifiable	56 (68)	17 (46)	0.03
Non-Modifiable	26 (32)	20 (54)	
Friendship scale score			
Socially isolated/(score 0-15)	5 (5.8)	5 (13.2)	0.07
Socially connected (score 16-24)	82 (94.2)	33 (86.8)	

Table 2: Characteristics of study sample (responders)

Primary Causal Attribution	Model 1 ¹	Model 2 ²
	OR (CI) comparison	OR(CI) comparison
modifiable		
non-modifiable	2.64 (1.18 - 5.92)	2.91 (1.19-7.14)
Nagelkerke r ²	0.07	0.10
p-value	0.018	0.010

¹ main effects

² controlling for age,
gender, distance from CR,
education, marital status,
friendship scale score

Table 3: Regression models indicating influence of causal attribution on attendance at CR

First ranked causal factor	Attendee n=82(%)	Non- attendee n=34(%)
Modifiable		
Hypertension	3 (4)	2 (6)
Hypercholesterolaemia	2 (2)	1 (3)
Smoking	15 (18)	6 (18)
Stress	15 (18)	4 (12)
toxin / medication	1(1)	0 (0)
Diet / lifestyle / lack of exercise	19 (23)	3 (9)
Non-modifiable		
Age	1 (1)	3 (9)
other condition	6 (7)	5 (15)
genetic	19 (23)	12 (35)

Table 4: Summary of causal attributions using British Association of Cardiac Rehabilitation Classification

Appendix

- 1. Items of the Brief Illness Perceptions Questionnaire**
- 2. Items of the Friendship Scale**

The Brief Illness Perceptions Questionnaire

For the following questions, please circle the number that best corresponds to your views:

How much does your illness affect your life?

0 1 2 3 4 5 6 7 8 9 10
No affect at all-----Severely affects your life

How long do you think your illness will continue?

0 1 2 3 4 5 6 7 8 9 10
A very short time-----Forever

How much control do you feel you have over your illness?

0 1 2 3 4 5 6 7 8 9 10
Absolutely no control-----Extreme amount of control

How much do you think your treatment can help your illness?

0 1 2 3 4 5 6 7 8 9 10
Not at all-----Extremely helpful

How much do you experience symptoms from your illness?

0 1 2 3 4 5 6 7 8 9 10
No symptoms at all-----Many severe symptoms

How concerned are you about your illness?

0 1 2 3 4 5 6 7 8 9 10
Not at all concerned-----Extremely concerned

How well do you feel you understand your illness?

0 1 2 3 4 5 6 7 8 9 10
Don't understand at all -----Very Clearly

How much does your illness affect you emotionally? (e.g. does it make you angry/scared/upset?)

0 1 2 3 4 5 6 7 8 9 10
Not at all affected-----Extremely affected

9. Please list in rank-order the 3 most important factors that you believe caused your illness.

The most important causes for me:-

1.

2.

3.

The Friendship Scale

Following your cardiac event.....(please circle appropriate response):

It has been easy to relate to others

Almost always / Most of the time / About half the time / Occasionally/ Not at all

I felt isolated from other people

Almost always / Most of the time / About half the time / Occasionally/ Not at all

I had someone to share my feelings with

Almost always / Most of the time / About half the time / Occasionally/ Not at all

I found it easy to get in touch with others when I needed to

Almost always / Most of the time / About half the time / Occasionally/ Not at all

When I'm with other people I feel separate from them

Almost always / Most of the time / About half the time / Occasionally/ Not at all

I felt alone and friendless

Almost always / Most of the time / About half the time / Occasionally/ Not at all