British Journal of Health Psychology (2006), 11, 643–661

The British Psychological Society

www.bpsjournals.co.uk

Predicting self-efficacy using illness perception components: A patient survey

Margaret Lau-Walker
University of Surrey, UK

Objectives. To assess the measures of illness representation components in predicting measures of self-efficacy in patients with coronary heart disease.

Design. A longitudinal design was adopted with predictor variables and dependent variables (general self-efficacy, diet self-efficacy and exercise self-efficacy) measured twice while participants were in hospital and 9 months following discharge. Change scores of the predictor variables can be calculated and dependent variables at baseline can be controlled.

Method. A cohort sample of 300 patients admitted to hospital with coronary heart disease were given the questionnaire measuring their illness perception (illness representation components: identity, consequences, timeline and control/cure and outcome expectation for diet and exercise); self-efficacy (general, diet and exercise self-efficacy measures), demographic and illness characteristics and attendance on a cardiac rehabilitation programme. The patients were asked to complete the questionnaire in hospital before discharge following their cardiac diagnosis, and again, 9 months later, when participants were expected to be functioning independently of any rehabilitation programme.

Results. Demographic and illness characteristics were found to have a more significant relationship with illness representation components than with specific self-efficacy. The relationship between illness representation components and specific self-efficacy changes overtime, *consequence* and *timeline* were significantly related to self-efficacy measures initially; however, *symptom* and *control/cure* were the variables that were significantly related to self-efficacy measures 9 months later. After statistically controlling individuals' baseline self-efficacy measures, demographic and illness characteristic effects, *symptom* and *control/cure* were found to make significant contributions to exercise and diet self-efficacy, respectively, 9 months later.

Conclusion. A significant relationship exists between illness representation and self-efficacy. There is potential to integrate both approaches to the assessment of psychosocial factors to provide effective individualized care in cardiac rehabilitation.

*Correspondence should be addressed to Margaret Lau-Walker, National Heart and Lung Institute, Imperial College, Royal Brompton Campus, Guy Scadding Building, Dovehouse Street, London SW3 6LY, UK (e-mail: m.lau-walker@imperial.ac.uk).

DOI:10.1348/135910705X72802

Research on cardiac rehabilitation (CR) practice suggests that psychological support in CR remains poor and patchy (Bethell, Turner, Flint, & Rose, 2000; Lewin, Ingleton, Newens, & Thomspon, 1998), despite national guideline recommendations emphasizing the importance of effective psychological support through individualize patient care. Such therapeutic provision is expected to enable patients to maintain long-term health behaviour changes (Linden, Stossel, & Maurice, 1996; McGee, 1994) likely to improve the morbidity rates in CR, which have remained little changed for several decades (Bennett & Carroll, 1994; Jolliffe *et al.*, 2004; Jones & West, 1996). The 1995 and 2002 British Association for Cardiac Rehabilitation guidelines (Coats, McGee, Stokes, & Thompson, 1995; SIGN, 2002) offer practitioners two theoretical frameworks:

- the common sense representation of illness model (Leventhal & Cleary, 1980) to explore patient knowledge and understanding of their cardiac event; and
- self-efficacy (Bandura, 1977) to reduce anxiety and increase coping capability following a CR programme.

The guidelines make joint reference to the concepts of illness perception and self-efficacy and, to assist practitioners to address patients' psychological needs more effectively, research in both illness representation and self-efficacy has sought to establish the predictive value of their respective theoretical frameworks with the patients' health outcomes or long-term health behaviour changes. Such predictions are intended to guide practitioners in their attempts to provide psychological support to individual patients by identifying a focus on key factors around which to design individually tailored treatment (Bandura, 1982; Hampson, Glasgow, & Zeiss, 1994; Jeng & Braun, 1997; Petrie & Weinman, 1997; Scharloo *et al.*, 1998).

Illness representation

The self-regulatory model of illness (Leventhal, Nerenz, & Steele, 1984), referred to as the *illness representation model* because its roots are in the empirical data collected from interviewing patients, is the mostly widely used model to explain how people interpret and cope with current and potential health events or threats. Illness representation has been consistently organized into five dimensions (Leventhal *et al.*, 1997):

- Disease identity – signs, symptoms or the label given to an illness reflect and an individual's perception of what the problem is;
- Cause – individuals generate ideas about what caused the problem or how one gets a particular disease;
- Timeline – expectations are held about the duration of the problem and whether it will be acute, chronic, episodic or cyclical in nature;
- Consequences – this dimension reflects how an individual perceives possible consequences of a disease, in terms of short or long-term effects of physical, social, economic and emotional consequences;
- Control/cure – ideas about what the patients themselves, or others, can do to influence the course of an illness determine perceptions of whether it can be cured or controlled.

In Leventhal's model, patients' previous experience with illness is organized in a complex memory structure that is used to cluster and organize illness knowledge.

As a self-regulating model, it describes three recurring stages. In the first stage, patients actively process their cognitive representations of the health threat and the emotional reactions to it. In the second stage, the representations formed steer the development of action plans for coping with the problem and the emotion. In the third stage, appraisal of the coping response determines whether action taken moved the individual closer to or further from the goals specified by the representation. In this way, the three recurring stages guide an individual's coping or adaptive behaviour (Leventhal, 1984).

Self-efficacy

Bandura distinguished between two types of expectations; outcome expectation and self-efficacy. Outcome expectation is the belief that certain behaviours will lead to a particular outcome, and self-efficacy reflects the belief that one can successfully perform these behaviours to produce the outcome (Bandura, 1997). Bandura (1982) identifies self-efficacy expectations as more powerful determinants of behaviour change than either outcome expectancy or past performance. Self-efficacy beliefs determine the initial decision to perform a behaviour, the effort to be expended and persistence in the face of adversity. Hence, a patient may believe that regular exercise will improve his or her future health (high outcome expectancy), but may still dismiss this strategy because they have a low efficacy expectancy (having never regularly exercised, the patient will not see themselves being able to start regular exercise now, and will not believe themselves able to sustain it). Strecher, DeVellis, Becker, and Rosenstock (1986) suggest that outcome expectation predicts an individual's intention to perform a behaviour while efficacy expectation predicts actual performance. Similarly, Schwarzer and Fuchs (1995) suggest that positive outcome expectations encourage the decision to change behaviour, after which outcome expectation may be dispensable because a new problem arises; namely, the actual performance of the behaviour and its maintenance.

Bandura identifies four sources of information: performance feedback, modelling and comparison with others attainments, verbal persuasion and feedback from autonomic arousal from personal experience. Bandura identifies performance feedback as the most important one, leading him to emphasize and prioritize therapeutic interventions that change performance directly and provide experiences of mastery, as these will have the strongest effects on efficacy expectations and therefore on subsequent behaviour.

Bandura (1997) argues that self-efficacy is situation related and that the context, in which mastery experiences occur, as well as the individual's attribution of success to chance or skill, determines the extent to which these experiences of mastery influence the level of self-efficacy. Some researchers have argued that this generalized expectation can be carried into new situations and influence the individual's expectations of mastery in new situations (Chen, Gully, Whiteman, & Kilcullen, 2000; Gardner & Pierce, 1998). However, even the supporters of the general self-efficacy concept accept that behaviour-specific efficacy beliefs are frequently more powerful determinants of behaviour (Sherer & Maddux, 1982).

The concepts of illness representation (Leventhal *et al.*, 1984; Petrie & Weinman, 1997) and self-efficacy (Bandura, 1977, 1997) figure prominently in research surrounding the development of individualized care, and each has a significant and separate body of research evidence for their application to health and illness behaviours. In both theories, a patient's beliefs are formed before their experience of their illness and both reflect the individual's unique perspective. A recent review of the relationship between the two independent concepts of illness representation and self-efficacy, based on their sources of information, components/dimensions and therapeutic use, suggests that there could be a theoretically logical chronological sequence suggesting that components of illness representation can predict self-efficacy (Lau-Walker, in press).

Initial interpretation of illness (illness representation) has been shown to have a predictive value in terms of short-term patient responses (Cooper, Lloyd, Weinman, & Jackson, 1999; Petrie, Cameron, Ellis, Buick, & Weinman, 2002; Petrie, Weinman, Sharpe, & Buckley, 1996; Wyer *et al.*, 2001). However, it has been suggested that the illness representation model tends to predict the intention to change health behaviours as research findings are predominantly based on cross-sectional data (Norman & Conner, 1996; Scharloo *et al.*, 1999). Research using the self-efficacy framework has been shown to be predictive of long-term behaviour change (Bandura, 1977, 1997; Schwarzer & Fuchs, 1995), focusing on the maintenance of health behaviour changes such as cessation of smoking or the maintenance of exercise regimes (Holman & Lorig, 1992; McAuley, 1992; Schwarzer, 1994). Illness representations tend to be obtained from general perspectives described as environmental stimulus, perceptual stimulus and social communication (Leventhal *et al.*, 1984) whereas Bandura emphasized the most powerful way to promote self-efficacy was situation-specific performance feedback. It could be argued that an individual's general interpretation of their illness might influence their confidence in building on their specific skills or abilities on the health behaviour changes. However, it could be also argued that it is the other way round; that individuals' self-efficacy influences how they interpret their illness. Indeed, the relationship between illness representation components and self-efficacy could be related, with specific illness components that are more influential for the individual's confidence in their ability to make and sustain health behaviour changes. The present longitudinal study sets out to examine the relationship directly, the influence of cardiac patients' interpretation of their illness (by measuring their illness representation components and outcome expectations), on their confidence in their ability to manage generally (general self-efficacy) and with specific life-style changes (diet self-efficacy and exercise self-efficacy).

Method

Participants

Participants in the study were patients with a confirmed diagnosis of a heart attack (myocardial infarction) or angina, admitted to one of two local hospitals in the south of England over a period of 11 months. Apart from the cardiac diagnosis, the inclusion criteria required patients to be over 18 and able to complete the survey questionnaire unaided. We issued 300 questionnaire packs directly to patients by clinical staff and 253 were returned completed, a response rate of 84% for Time 1 (T1). The only recorded reasons for not participating were that patients had eyesight problems and could not fill in the questionnaires, or were too confused at the time of their hospital visit. Of the original 253 participants, 194 (77%) went on to complete the follow-up questionnaire 9 months later for the longitudinal study, Time 2 (T2). Of the 54 non-returners at T2, five had died, four had moved, there was no information for the remaining 45. Five returners were removed from the sample because they confirmed changes in diagnosis that no longer fitted the study.

Procedure

The initial questionnaire packs were administered while the subjects were in-patients and before attendance on an organized rehabilitation programme. The follow-up packs were administered 9 months after the patients had completed and returned the initial questionnaire, when they were likely to be managing on their own, away from any active rehabilitation programme. In the follow-up phase, the questionnaire packs were administered by post, with a 4-week postal reminder to non-respondents. Both of the questionnaire packs and the research protocol were granted full ethical approval by the local research ethics committees.

Measures

There were four pre-validated instruments and two created specifically for the study. The four pre-validated questionnaires have had considerable application in recent research and have a proven reliability and validity. They are briefly described below.

Independence variables

Illness perception questionnaire

The Illness Perception Questionnaire (IPQ) by Weinman *et al.* (1996) was devised to measure the components of illness representation, based on Leventhal *et al.*'s cognitive model of illness perceptions. It contains five scales: *identity* (10 items), *timeline* (3 items), *consequences* (7 items) and *control/cure* (6 items). The one exception to this is the *cause* scale where each item represents a specific causal belief. As this data cannot be analysed as continuous data, it was not included as an independent variable in the study. The scales were calculated using the mean score of the actual values of the items for each of the illness perceptions components. For the present study, each scale obtained an adequate internal consistency using the Cronbach alpha reliability coefficient test in the current study (identity, $\alpha = .78$; timeline, $\alpha = .75$; consequence, $\alpha = .72$; and control/cure, is marginally adequate $\alpha = .59$).

Diet and exercise outcome expectation scales

Two scales have been designed for this study to measure diet outcome expectation (DOES) and exercise outcome expectation (EOES). Three items were designed for each of the DOES and EOES scales to assess patient's beliefs about the contribution that maintaining a healthy diet and maintaining regular exercise regime will have on recovery or prevention of further heart problems, respectively. These items reflected factors identified in the literature review on life-style changes in diet and exercise in cardiac rehabilitation, using Bandura's expectancy theory, and reviewed with a group of health care and psychology experts. The overall DOES and EOES scores were calculated by mean scores of the actual values of the three items of each of the scales. The scales were tested for internal consistency and obtained $\alpha = .72$ for outcome expectation of diet and $\alpha = .84$ for outcome expectation of exercise in a pilot study, and in the study itself, both scales reported a similar consistency. Finally, because outcome expectation has been defined as a belief that certain behaviours would lead to a particular outcome, outcome expectation has been placed alongside the illness perception components as a predictor of self-efficacy. For example, if *diet* is believed to be the cause of the cardiac event, then a positive outcome expectation is that a belief of maintaining a healthy diet would lead to early recovery.

Dependent variables

Generalized Self-Efficacy Scale

The Generalized Self-Efficacy Scale (GSES) by Sherer and Maddux (1982) was devised to assess the strength of an individual's belief in their ability to respond to novel or difficult situations, and to deal with obstacles or setbacks. The scale scores are calculated using the mean scores of the actual values of the 17 items (reversing scores where appropriate). This validated questionnaire obtained a Cronbach α reliability coefficient of .86 (Sherer & Maddux, 1982) and the internal consistency for GSE in the current study was adequate with $\alpha = .68$.

Cardiac diet and exercise self-efficacy instruments

The cardiac diet self-efficacy instrument (CDSEI) and the cardiac exercise self-efficacy instrument (CESEI), both by Hickey *et al.* (1992), were devised to measure a patient's belief in their ability to cope with their behaviour changes in diet or exercises after a cardiac event. The overall CDSE and CESE scale scores were calculated by mean scores of the actual values of the 16 items of each of the scales. These instruments were found to have high internal consistency with α coefficients of .9 (Hickey *et al.*, 1992) and for the current study $\alpha = .93$.

Results

Analysis of baseline cross-sectional data

Demographic and illness characteristics and their effects

A summary is set out in Table 1 below of the characteristics of the participants in the survey at T1, and Table 2 shows their effects on illness perception and self-efficacy. As the demographic and illness characteristics analysis had been subjected to multiple comparisons, the significant level of the p value was set at $p < .01$ for the t tests. Only the significant results ($p < .01$) are reported in Table 2.

Female patients identified more symptoms than males. Patients with a first time heart problem tended to have a higher sense of control, identified fewer symptoms and viewed their cardiac condition to be short term. Patients who lived on their own tended not to believe that exercise was important for their cardiac recovery. Employment status was also seen to have a significant impact on the patient's general outlook. Patients in employment tended to have a higher sense of control, believed that maintaining an exercise regime and healthy diet was important for cardiac recovery and were more confident about making changes in their life-style.

Relationship between illness representation and self-efficacy at T1

Three standard multiple regressions were used to examine the baseline data and their influence on GSE (Table 3), DCSEI (Table 4) and ECSEI (Table 5). The predictor variables: illness perception components, DOES and exercise outcome expectation. The demographic and illness characteristic variables were also entered into the equation as controls.

The data collected immediately after cardiac diagnosis (T1) suggests the existence of significant relationships between specific illness representation components and outcome expectation, with self-efficacy – whether general or specific. The data shows that firstly, consequence, exercise outcome expectation and diet outcome expectation are significantly associated with general self-efficacy (Table 3); secondly, timeline,

Table 1. Summary of sample demographic and illness characteristics of the survey ($N = 253$)

Demographic/illness characteristics variables	Frequencies (%)
Gender	
Male	195 (78.6%)
Female	53 (21.4%)
Age	*M* (*SD*) = 65.3 (10.8); range = 43–93
< 65	109 (43.1%)
> 65	144 (56.9%)
Living arrangement	
Live on your own	40 (16.1%)
Not on your own	209 (83.9%)
Employment status	
Employed	94 (37.8%)
Not employed	155 (62.2%)
Diagnosis of cardiac illness	
Angina	112 (50.2%)
Myocardial infarction	111 (49.8%)
History of heart problems	
First time heart problem	151 (60.9)
Has previous heart problems	97 (39.1%)
Route of admission	
Emergency admission	136 (55.3%)
Routine admission	110 (44.7%)

gender and exercise outcome expectations, are significantly associated with diet self-efficacy (Table 4); and finally, exercise outcome expectation, timeline, diet outcome expectation and control/cure are significantly associated with exercise self-efficacy (Table 5).

The three multiple regression analyses use cross-sectional data, and therefore the direction of the relationship cannot be established. It is interesting to note that timeline made a highly significant contribution to both diet and exercise self-efficacy, while consequences made a highly significant contribution to general self-efficacy.

Analysis of longitudinal follow-up data

T1 and T2 data

The chi-squared tests indicated that there were no significant differences in the demographic and illness characteristics in T2 participants and T2 non-participants.

Analysis of participants' perceptions change overtime

A paired *t* test was conducted to compare the participants' T1 and T2 scores. A list of the mean and standard deviations for each of the measures are summarized in Table 6.

In the follow-up phase (T2), patients scored both 'identity' and 'consequences' significantly lower with medium effect ($\eta^2 = .05$ and .06, respectively). Overall, patients reported fewer symptoms from their cardiac condition and indicated that the illness effect on their lives was less serious 9 months after the initial diagnosis (T1). It is useful to note that patients tended to have a higher exercise self-efficacy ($p = .04$),

Table 2. Summary of the effects of demographic and illness characteristics on illness perception and self-efficacy variables. Only significant results are shown (*p* value for *t* tests is set at $p < .01$) as follows

Demographic and illness characteristics variables	Illness perception and self-efficacy measures: *N*, *M*, *SD*	*t*	*df*	*p* values	95% CI Lower	95% CI Upper
Gender	Identity	−5.04	240	.0005	−0.50	−0.22
	Male: *N* (189), *M* (1.70), *SD* (0.46)					
	Female: *N* (53), *M* (2.06), *SD* (0.47)					
History of heart problem	Control/cure	3.53	243	.001	0.11	0.39
	No history: *N* (149), *M* (3.72), *SD* (0.53)					
	Has history: *N* (96), *M* (3.47), *SD* (0.57)					
	Timeline	−3.23	242	.001	−0.53	−0.13
	No history: *N* (149), *M* (3.51), *SD* (0.78)					
	Has history: *N* (95), *M* (3.84), *SD* (0.75)					
	Identity	−2.90	241	0.004	−0.30	−0.06
	No history: *N* (148), *M* (1.70), *SD* (0.46)					
	Has history: *N* (95), *M* (1.88), *SD* (0.49)					
Living on their own	Exercise outcome expectation	−3.76	245	.0005	−0.79	−0.25
	Living on your own: *N* (40), *M* (3.42), *SD* (0.88)					
	Not living on your own: *N* (207), *M* (3.94), *SD* (0.79)					
Route of admission	Consequences	3.25	241	.001	0.11	0.44
	Emergency admission: *N* (134), *M* (3.31), *SD* (0.63)					
	Routine admission: *N* (109), *M* (3.03), *SD* (0.66)					
Employment	Control/cure	3.92	244	.0005	0.14	0.42
	Employed: *N* (93), *M* (3.8), *SD* (0.49)					
	Not employed: *N* (153), *M* (3.51), *SD* (0.57)					
	Exercise outcome expectation	3.76	245	.0005	0.19	0.60
	Employed: *N* (93), *M* (4.1), *SD* (0.81)					
	Not employed: *N* (153), *M* (3.7), *SD* (0.8)					
	Diet outcome expectation	2.84	246	.005	0.09	0.49
	Employed: *N* (94), *M* (4.04), *SD* (0.79)					
	Not employed: *N* (154), *M* (3.76), *SD* (0.77)					
	General self-efficacy	2.84	244	.005	0.07	0.37
	Employed: *N* (93), *M* (3.77), *SD* (0.53)					
	Not employed: *N* (153), *M* (3.55), *SD* (0.61)					

Table 3. Results of the multiple regression analysis to predict general self-efficacy from demographics and illness characteristics, illness perception and outcome expectations using Phase 1 data

Independent variables	Standardized coefficients β	*t*	*p*	95% CI Lower	95% CI Upper
Age	−0.042	−0.437	.663	−0.13	0.008
Gender	0.031	0.438	.662	−0.156	0.244
Living arrangement	−0.029	−0.424	.672	−0.264	0.171
Employment	−0.142	−1.522	.129	−0.397	0.051
Diagnosis	0.020	0.273	.785	−0.143	0.189
History of heart disease	−0.089	−1.289	.199	−0.271	0.057
Route of admission	0.044	0.609	.543	−0.117	0.221
Identity	0.003	0.046	.963	−0.177	0.185
Timeline	0.142	1.932	.055	−0.002	0.208
Consequences	−0.215	−2.803	.006*	−0.323	−0.056
Control/cure	0.143	1.714	.088	−0.023	0.322
Diet outcome expectation	−0.183	−1.998	.047*	−0.270	−0.002
Exercise outcome expectation	0.208	2.354	.020*	0.024	0.274

*$p < .05$. Predictive Model: $F(13, 205) = 2.635$, $p < .002$. Adjusting $R^2 = .09$ accounting for 9% of the variance.

indicating slightly increased confidence in their ability to manage exercise in the recovery phase.

Attendance on a cardiac rehabilitation programme

Comparative analysis of patients attending or not attending a CR programme (Table 7) showed that patients who attend a programme had a significantly higher score for

Table 4. Results of the multiple regression analysis to predict diet self-efficacy from demographics and illness characteristics, illness perception and outcome expectations using Phase 1 data

Independent variables	Standardized coefficients β	*t*	*p*	95% CI Lower	95% CI Upper
Age	0.144	1.451	.148	−0.004	0.026
Gender	0.184	2.560	.011*	0.083	0.640
Living arrangement	0.034	0.483	.630	−0.229	0.377
Employment	−0.126	−1.324	.187	−0.522	0.103
Diagnosis	−0.003	−0.044	.838	−0.236	0.226
History of heart disease	−0.002	−0.028	.965	−0.232	0.225
Route of admission	−0.005	−0.069	.945	−0.244	0.227
Identity	−0.104	−1.356	.177	−0.426	0.079
Timeline	0.203	2.697	.008*	0.054	0.346
Consequences	0.038	0.480	.632	−0.141	0.231
Control/cure	0.087	1.014	.321	−0.116	0.363
Diet outcome expectation	−0.104	−1.112	.268	−0.292	0.082
Exercise outcome expectation	0.215	2.375	.018*	0.036	0.383

*$p < .05$. Predictive model: $F(13, 205) = 1.901$, $p < .032$. Adjusted $R^2 = .051$ accounting for 5.1% of the variance.

Table 5. Results of the multiple regression analysis to predict exercise self-efficacy from demographics and illness characteristics, illness perception and outcome expectations using Phase 1 data

Independent variables	Standardized coefficients β	*t*	*p*	95% CI Lower	95% CI Upper
Age	−0.141	−1.526	.129	−0.029	0.004
Gender	−0.045	−0.672	.502	−0.408	0.201
Living arrangement	0.014	0.216	.829	−0.295	0.367
Employment	0.037	0.412	.681	−0.270	0.412
Diagnosis	−0.052	−0.767	.444	−0.351	0.154
History of heart disease	−0.110	−1.682	.094	−0.462	0.037
Route of admission	−0.110	−1.592	.113	−0.465	0.050
Identity	−0.044	−0.616	.539	−0.362	0.190
Timeline	0.247	3.521	.001*	0.125	0.444
Consequences	0.012	0.164	.870	−0.186	0.220
Control/cure	0.160	2.006	.046*	0.005	0.528
Diet outcome expectation	−0.177	−2.022	.045*	−0.413	−0.005
Exercise outcome expectation	0.392	4.645	.0005*	0.257	0.637

*$p < .05$. Predictive model: $F(13, 192) = 5.514$, $p < .0005$. Adjusted $R^2 = .223$ accounting for 22.3% of the variance.

exercise self-efficacy ($p < .0005$) and diet outcome expectation ($p < .0005$) but not with diet self-efficacy, than those who did not attend.

Similar standard multiple regressions conducted with the initial data were repeated with the 9-month follow-up data, with the predictor variables and additional variable attendance of a cardiac rehabilitation programme as a control. In this analysis, attendance of a cardiac rehabilitation programme made a significant contribution ($\beta = 0.176$) to GSE and to CSEI ($\beta = 0.201$).

Table 6. Comparative statistics for Phase 1 and Phase 2 responses for both dependent and independent variables. Paired *t* test

	Phase 1: *M*(*SD*)	Phase 2: *M*(*SD*)	*t*	*df*	Sig. (two-tailed)	95% CI Lower	95% CI Upper
Identity	1.77(0.48)	1.68(0.45)	3.11	188	.002**	0.032	0.143
Timeline	3.63(0.79)	3.60(0.84)	0.58	190	.56	−0.085	0.157
Consequences	3.16(0.66)	3.02(0.67)	3.4	191	.001**	0.060	0.224
Control/cure	3.63(0.59)	3.56(0.62)	1.5	191	.13	−0.019	0.142
Diet outcome expectation	3.87(0.78)	3.81(0.79)	0.94	192	.35	−0.061	0.171
Exercise outcome expectation	3.90(0.79)	3.95(0.84)	−0.82	192	.42	−0.162	0.068
General self-efficacy	3.68(0.58)	3.64(0.54)	1.08	190	.28	−0.027	0.092
Diet self-efficacy	3.58(0.79)	3.65(0.77)	−1.4	186	.16	−0.168	0.028
Exercise self-efficacy	3.01(0.93)	3.13(0.95)	−2.07	172	.04*	−0.251	0.060

*$p < .05$, **$p < .01$.

Table 7. Comparative statistics for patients who had attended CR programmes and those who had not attended a CR programme (independent sample *t* test)

	Attended CR programme			Not attended CR programme						
	N	*M*	*SD*	*N*	*M*	*SD*	*t*	*df*	Sig. (two-tailed)	η^2
Identity	108	1.63	0.42	80	1.75	0.47	−1.79	186	.08	
Timeline	108	3.62	0.85	79	3.58	0.82	0.35	185	.73	
Consequence	108	3.14	0.65	80	2.87	0.66	2.85	186	.005*	.04
Control/cure	108	3.66	0.60	80	3.49	0.61	1.93	186	.06	
Diet outcome expectation	108	4.04	0.66	79	3.57	0.85	4.23	185	.0005**	.09
Exercise outcome expectation	108	4.15	0.75	80	3.78	0.83	3.17	186	.002*	.05
General self-efficacy	108	3.61	0.57	79	3.72	0.49	−1.48	185	.14	
Diet self-efficacy	106	3.63	0.82	79	3.67	0.72	−0.41	183	.68	
Exercise self-efficacy	104	3.39	0.90	76	2.76	0.91	4.63	178	.0005**	.11

$^{*}p < .01$, $^{**}p < .001$.

Hierarchical multiple regression analysis

Hierarchical multiple regression models, employing longitudinal data, were used to assess whether the change in patients' illness perception and outcome expectations would predict their self-efficacy (general, diet and exercise) 9 months after their cardiac diagnosis. The sample size of 194 was sufficient for these models as the power calculation, assuming a medium-size relationship effect between the independent variable and the dependent variables, $\alpha = .05$ and $\beta = 0.20$, required a minimum of 178 participants (Tabachnick & Fidell, 2001).

Each hierarchical multiple regression model contained three steps. In Step 1; each participant's self-efficacy measured at baseline (T1; GSES, DCSEI or ECSEI) was entered as a control because an individual's baseline self-efficacy is likely to influence their subsequent self-efficacy measures 9 months later. In Step 2, firstly, individuals' illness representation components and outcome expectation measures at baseline (T1) were added because individuals' baseline illness beliefs could potentially influence the findings. Secondly, to increase the effect size, only the significant predictors from the demographic and illness characteristic variables from the previous standard multiple regressions were include in the relevant hierarchical multiple regression model; that is, *gender* for diet self-efficacy; and *attendance on a CR programme* for general and exercise self-efficacy. In Step 3, the change scores (calculated by subtracting the T2 measures from the T1 measures) of the illness representation components and outcome expectation measures were entered and assessed for their predictive value.

The first hierarchical multiple regression analysis took general self-efficacy (T2) as the dependent variable, and the results are summarized in Table 8.

The third step of the analysis in this model produced three significant predictors of general self-efficacy (T2): 'EOES (T1)' ($\beta = 0.28$); the change score for exercise outcome expectation ($\beta = 0.25$); and 'DOES (T1)' ($\beta = -0.24$). Each of these variables made a small but statistically significant contribution to general self-efficacy (T2). The findings suggest that general self-efficacy is predicted by the initial and the increase belief in the effectiveness of exercise and the initial lesser belief in the effectiveness of diet.

Table 8. Results of the hierarchical multiple regression with the outcome measure general self-efficacy (T2) at 9 months follow-up

Variables	Step 1 Standardized coefficients β	Step 2 Standardized coefficients β	Step 3 Standardized coefficients β	*t*	Sig.
General self-efficacy	0.72*	0.69*	0.68*	12.60	.0005
Identity		−0.005	0.63	0.9	.37
Timeline		−0.01	−0.01	−0.2	.84
Consequences		−0.01	−0.06	−0.89	.38
Control/cure		0.10	0.09	1.02	.31
Diet outcome expectation		−0.07	−0.24*	−2.30	.02
Exercise outcome expectation		0.04	0.28*	2.6	.01
Attendance CR programme		0.06	0.07	1.23	.22
Identity (change score)			−0.02	−0.27	.79
Timeline (change score)			−0.06	−0.81	.42
Consequences (change score)			−0.07	−1.1	.27
Control/cure (change score)			0.05	0.61	.54
Diet outcome expectation (change score)			−0.09	−1.12	.27
Exercise outcome expectation (change score)			0.25*	2.68	.008
R^2	.522	.535	.578		
R^2 change		.013	.043		
F change		0.707	2.861		
Sig.	.0005	.0005	.0005		

$*p < .05$.

The second hierarchical multiple regression took diet self-efficacy (T2) as the dependent variable, and the results are summarized in Table 9.

The third step analysis in this model produced two significant predictors of diet self-efficacy (T2): control/cure ($\beta = 0.19$); and the change score for control/cure ($\beta = 0.18$). Both of these variables made a small but significant contribution to diet self-efficacy (T2). The findings suggest that diet self-efficacy is predicted by the initial and the increase in the belief that individual's cardiac condition is likely to be controllable/curable.

The third hierarchical multiple regression took exercise self-efficacy (T2) as the dependent variable, and the results are summarized in Table 10.

The third step analysis in this model produced four independent variables as significant predictors of exercise self-efficacy (T2): identity ($\beta = -0.35$); the change score for identity ($\beta = -0.24$); timeline ($\beta = -0.16$); and attendance to CR programme ($\beta = -0.19$). Each of these variables made an individually significant contribution to exercise self-efficacy (T2). The findings suggest that exercise self-efficacy is predicted by the initial belief that the illness is short term or discontinuous, the initial and increased

Table 9. Results of the hierarchical multiple regression with the outcome measure diet self-efficacy (T2) at 9 months follow-up

	Step 1 Standardized coefficients β	Step 2 Standardized coefficients β	Step 3 Standardized coefficients β	*t*	Sig.
Diet self-efficacy	0.62*	0.61*	0.63*	10.75	.0005
Gender		0.05	0.04	0.63	.58
Identity		−0.16*	−0.09	−1.17	.24
Timeline		−0.08	−0.09	−1.13	.26
Consequences		0.10	0.05	0.72	.48
Control/cure*		0.12	0.19*	2.05	.04
Diet outcome expectation		−0.08	−0.15	−1.28	.20
Exercise outcome expectation		−0.01	0.05	0.45	.65
Identity (change score)			−0.004	−0.06	.95
Timeline (change score)			−0.05	−0.62	.53
Consequences (change score)			−0.11	−1.47	.15
Control/cure (change score)			0.18*	2.06	.04
Diet outcome expectation (change score)			−0.02	−0.25	.80
Exercise outcome expectation (change score)			0.05	0.52	.61
R^2	.384	.427	.476		
R^2 change		.042	.050		
F change		1.856	2.697		
Sig.	.0005	.0005	.0005		

$*p < .05$.

belief in the reduction of symptoms for their illness, and finally, by those who have attended a CR programme.

Discussion

The results of this longitudinal patient survey are similar to the findings of previous research focused on either illness representation or self-efficacy. The results also suggest that there is a relationship between the components of both theories and that these relationships change over time. The findings at T1 reflect previous research studies on illness representation components, which show that patients' beliefs about their cardiac condition are influential and have strong associations with patients' behaviour changes in CR (Cooper *et al.*, 1999; Petrie *et al.*, 2002; Wyer *et al.*, 2001). These studies suggest that correcting cardiac misconceptions are likely to reduce anxiety, raise the likelihood of a return to work and attendance on CR programmes. There is, however, limited research on the effects of illness beliefs on diet and exercise risk factor management over time. The current study's findings at T2 indicate that Bandura's self-efficacy theory can add to illness representation research findings and to practitioners' understanding of patient responses to their health condition. It serves as a reminder that promoting a general correction of misconceptions and a positive and realistic view of individual

Table 10. Results of hierarchical multiple regression of the outcome measure exercise self-efficacy (T2) at 9 months follow-up

	Step 1 Standardized coefficients β	Step 2 Standardized coefficients β	Step 3 Standardized coefficients β	*t*	Sig.
Exercise self-efficacy	0.62*	0.55*	0.56*	9.16	.0005
Identity		−0.23*	−0.35*	−4.74	.0005
Timeline		−0.10	−0.16*	−2.23	.03
Consequences		0.04	0.04	0.60	.55
Control/cure		0.06	0.05	0.51	.61
Diet outcome expectation		0.11	0.19	1.74	.08
Exercise outcome expectation		−0.06	−0.13	−1.16	.25
Attendance to CR programme		−0.20*	−0.19*	−3.16	.002
Identity (change score)			−0.24*	−3.56	.0005
Timeline (change score)			−0.06	−0.84	.41
Consequences (change score)			0.01	0.16	.88
Control/cure (change score)			−0.006	0.07	.94
Diet outcome expectation (change score)			0.09	1.02	.31
Exercise outcome expectation (change score)*			−0.04	−0.39	.70
R^2	.386	.515	.567		
R^2 change		.129	.052		
F change		6.236	3.163		
Sig.	.0005	.0005	.0005		

*$p < .05$.

cardiac illness is helpful with immediate health outcomes yet will not necessarily lead to long-term behaviour changes. Correcting misconceptions on diet might lead to a positive DOES but not an increase in diet self-efficacy, while the exercise rehabilitation programme does appear to develop cardiac patients' exercise self-efficacy.

A more precise understanding of the relationship of illness beliefs and an individual's confidence in maintaining long-term life-style changes might help to address the difficulty practitioners have in translating research findings on CR into their own practice (Lau-Walker, 2004; Thompson, 2005). Practitioners need to design interventions that deliver long-term effectiveness as well as positive short-term health outcomes. Not all the key factors identified in the short-term patient responses following cardiac diagnosis remain relevant as influences in the longer term, and interventions that are more complex are required to support patients in their rehabilitation.

Both the illness representation model and self-efficacy theory emphasize that the individual's past experience is particularly important for the patient to construct, and respond to, their illness. Both Bandura (1997) and Leventhal (1984) suggest that the individual's past experiences are important for their interpretation of their health condition and their ability to cope with it. The finding of this study, however, suggest that general past experiences (demographic and illness characteristics) are less directly influential on self-efficacy. Individuals' demographic (gender, employment status, living on their own) and illness (history of cardiac problem, route of admission) characteristics have potentially more influential on patients' perception of the nature of their illness than on their confidence to manage diet or exercise life-style changes. Employment was the only exception, having a significant relationship to general self-efficacy. None of the demographic and illness characteristic variables significantly relates to either of the specific self-efficacies – diet or exercise. This supports Bandura's suggestion that specific past experience, like performance feedback, is the most powerful factor that influences self-efficacy.

The comparative analysis of the T1 and T2 responses show that patients' illness beliefs change significantly over time. Nine months after their initial cardiac event, patients viewed their illness as having fewer symptoms and they experienced fewer consequences. These changes might simply reflect that they have recovered from the acute stage of their cardiac condition or that they were more optimistic about their illness condition 9 months later. The experience patients had in the period between T1 and T2 of the study appears to have promoted an increase in patients' confidence in their ability to maintain regular exercise but not an increase of self-efficacy in other areas. The findings show a slight, but statistically significant, increase in exercise self-efficacy ($p < .04$) but not in general or diet' self-efficacy, which suggest that the CR programmes might have a small positive effect on the patients' confidence to cope with exercise but less so with their dietary changes. The current practice of correcting misconceptions (convincing patient that dietary changes is important), and information giving on diet management in CR programmes may improve individuals' beliefs in the positive outcome of dietary changes (outcome expectation for diet), but does not necessarily lead to an improvement in their confidence to manage dietary changes in the long term (diet self-efficacy). To promote patients' long-term diet changes, it would be helpful to have a more focused understanding of what specific aspect of the patients' belief influences their confidence in maintaining a healthy diet. The design of interventions needs to aim to improve not only the patients' immediate reactions to their health condition, but also develop their longer-term responses to managing change by strengthening their self-efficacy. To this end, understanding what specific aspect of the patients' past experience and which specific illness perception components might influence the patient's self-efficacy is needed.

The outcome of the regression analysis suggests that there is a change in the importance of the relationship between certain illness representation components and specific self-efficacy over time. Soon after the diagnosis (T1), timeline contributes significantly to both diet and exercise self-efficacy, but this is no longer the case 9 months later; whereas, identity and control continue to contribute significantly to the patients' diet and exercise self-efficacy at T1 and T2. Perhaps by learning to deal with their cardiac condition during the rehabilitation period, the management of symptoms and the sense of control are of particular importance in influencing patients' confidence in their ability to manage their life-style changes in diet and exercise. Similarly, consequence was the only illness representation component that was significantly related to general self-efficacy at T1, yet at T2, this was no longer the case; only outcome expectation contributed significantly to general self-efficacy 9 months later. Given that general self-efficacy is described as the ability to cope with new situations (Sherer & Maddux, 1982), general self-efficacy may play an important part in framing the patient's general perspective on their condition and how to cope with it immediately after the initial diagnosis.

Given the range of changes in the relative value of components over time, it is noticeable that not all the key factors identified in patient responses immediately following cardiac diagnosis remain influential in the longer term and more sophisticated interventions are required to provide effective support strategies for patients over time. The survey results suggest that not only the initial scores of certain illness representation components (control/cure with diet self-efficacy, and identity with exercise self-efficacy) but also the change scores of these components have a predictive relationship with specific self-efficacies at 9 months. If practitioners were to focus the design of their interventions on improving these change scores, then the findings suggest that there would be a greater likelihood of improving patients' long-term management of health risk behaviours like exercise and diet, which is a major concern with CR programmes (NHS, 1998).

Treatment and recovery are dynamic rather than static processes and the tracking of the relative significance of factors and their potential changes over time are important, both in theory and in practice. Previous research has suggested that it is important to identify patients' illness perceptions early in the treatment as they have an effect on their recovery (Bennett, Mayfield, Norman, Lowe, & Morgan, 1999; Shaw, 1999). However, this study suggests that it is also necessary to consider the effects of factors in both the short term and the long term. It would appear possible to discriminate between those components (timeline and consequence) that are important to maintain individual's confidence in their ability to manage life-style changes initially, but decline in importance over time, and those components that will remain important throughout the recovery process (identity and control/cure). Hence, practitioners need to differentiate between stimulating a patient's intention to act and sustaining their subsequent actions when developing rehabilitation interventions.

Limitations of the study

The sample is predominately white, reflecting the limited geographic base for the study. The male/female ratio of the participants in the survey is slightly more male dominated and older than most recent national survey statistical studies on coronary heart disease reported in the British Heart Foundation (2002). However, both age and gender were found to have no significant contribution to the final multiple regression analysis. As a natural experiment, patients were exposed to a variety of experiences over the 9-month period. Although the amount of variance explained is modest, each patient's baseline self-efficacy measures and the potential intervening effects from demographic and illness characteristic variables were controlled. The responses from the survey rely on self-reported data, which mean that it is the patients' perceptions or opinions that are being measured rather any actual behaviour or behaviour change. Some caution needs to be exercised, therefore, when interpreting the findings of this study. Finally, the findings of the study can contribute to the design of an assessment tool or a framework for an individualized care approach; however, the clinical significance, rather than the statistical significance, of the outcomes needs to be tested in an experimental intervention study.

Conclusion

The findings of this study support the view that there is a significant relationship between illness perception and self-efficacy, and that certain components of patients' illness perception are linked with their belief in their confidence to cope with two key CHD risk factors – management of diet and exercise. The study's findings indicate that the two key variables – identity and control/cure – predict the patients' confidence in their ability to cope with key risk factor management in CR and are thereby useful for the design of the appropriate individual intervention strategies for cardiac patient. Overall, the study indicates that by integrating the research undertaken on illness representation and self-efficacy, there is potential to create a more comprehensive understanding of the patients' initial reactions to their condition and, in the longer term, to their treatment. This broader framework could create the opportunity to produce more effective individualized care and sustain patients in long-term health behaviour change.

References

Bandura, A. (1977). Self efficacy: Toward a unifying theory of behavioural change. *Psychological review*, *84*, 191–215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *6*(2), 122–147.

Bandura, A. (1997). *Self efficacy – the exercise of control* (Ed.). San Francisco, CA: WH Freeman.

Bennett, P., & Carroll, D. (1994). Review: Cognitive-behavioural interventions in cardiac rehabilitation. *Journal of Psychosomatic Research*, *38*(3), 169–182.

Bennett, P., Mayfield, T., Norman, P., Lowe, R., & Morgan, M. (1999). Affective and social-cognitive predictors of behavioural change following first myocardial infarction. *British Journal of Health Psychology*, *4*(3), 247–256.

Bethell, H., Turner, S., Flint, E. J., & Rose, L. (2000). The BACR database of cardiac rehabilitation units. *Coronary Health Care*, *4*, 92–95.

British Heart Foundation. (2002). *Coronary heart disease statistic: British Heart Foundation database* (2002 ed.). London: Author.

Chen, G., Gully, S. M., Whiteman, J., & Kilcullen, R. N. (2000). Examination of relationships among Trait-like individual differences, state-like individual differences, and learning performance. *Journal of Applied Psychology*, *85*(6), 835–847.

Coats, A., McGee, H., Stokes, H., & Thompson, D. R. (Eds.). (1995). *British Association for Cardiac Rehabilitation (BACR) guidelines for cardiac rehabilitation*. Oxford: Blackwell Science.

Cooper, A., Lloyd, G., Weinman, J., & Jackson, G. (1999). Why patients do not attend cardiac rehabilitation: Role of intentions and illness beliefs. *Heart*, *82*, 234–236.

Gardner, D. G., & Pierce, J. L. (1998). Self-esteem and self-efficacy within the organisational context. *Group and Organisation Management*, *23*, 48–70.

Hampson, S. E., Glasgow, R. E., & Zeiss, A. (1994). Personal models of oestoarthritis and their relation to self-management activities and quality of life. *Journal of Behavioural Medicine*, *17*, 143–158.

Hickey, M., Owen, S., & Froman, R. (1992). Instrument development: Cardiac diet and exercise self-efficacy. *Nursing Research*, *41*(6), 347–351.

Holman, H. R., & Lorig, K. (1992). Perceived self-efficacy in self-management of chronic disease. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action*. Washington, DC: Hemisphere.

Jeng, C., & Braun, L. T. (1997). The influence of self-efficacy on exercise intensity, compliance rate and cardiac rehabilitation outcomes among coronary artery disease patients. *Progress in Cardiovascular Nursing*, *12*(1), 13–24.

Jolliffe, J. A., Rees, K., Taylor, R. S., Thompson, D., Oldridge, N., & Ebrahim, S. (2004). *Exercise-based rehabilitation for coronary heart disease (Cochrane Review)*. *The Cochrane library*, 1 (pp. 1–44). Chichester, UK: Wiley.

Jones, D., & West, R. (1996). Psychological rehabilitation after myocardial infarction: Multi-centre randomised controlled trial. *British Medical Journal*, *313*, 1517–1521.

Lau-Walker, M. (2004). Cardiac rehabilitation: The importance of patients' expectation — a practitioner survey. *Journal of Clinical Nursing*, *13*(2), 1–8.

Lau-Walker, M. (2006). A conceptual care model for individualised care approach in cardiac rehabilitation – combining both illness representation and self-efficacy. *British Journal of Health Psychology*, *11*, 103–117.

Leventhal, H., Benyamini, Y., Brownlee, S., Piefenbach, M., Leventhal, E. A., Patrick-Miller, C., & Robitaille, O. (1997). Illness perceptions: Theoretical formulations. In K. J. Petrie & J. A. Weinman (Eds.), *Perception of health and illness*. Amsterdam: Harwood Academic Publishers.

Leventhal, H., & Cleary, P. (1980). The smoking problem: A review of the research and theory in behaviour risk modification. *Psychological Bulletin*, *88*, 370–405.

Leventhal, H., Nerenz, D. R., & Steele, D. J. (1984). Illness representations and coping with health threats. In A. Baum, S. Taylor, & J. Singer (Eds.), *A handbook of psychology and health: Volume IV: Social psychological aspects of health* (pp. 219–252). Hillsdale, NJ: Erlbaum.

Lewin, R. J., Ingleton, R., Newens, A. J., & Thomspon, D. R. (1998). Adherence to cardiac rehabilitation guidelines: A survey of rehabilitation programmes in the United Kingdom. *British Medical Journal*, *316*, 1354–1355.

Linden, W., Stossel, C., & Maurice, J. (1996). Psychosocial interventions for patients with coronary artery disease: A meta-analysis. *Archive of Internal Medicine*, *156*, 745–752.

McAuley, E. (1992). The role of efficacy cognitions in the prediction of exercise behaviour in middle -aged adults. *Journal of Behavioural Medicine*, *15*(1), 65–88.

McGee, H. (1994). Cardiac rehabilitation: The role of psychological intervention. *Irish Journal of Psychological Medicine*, *11*(4), 151–152.

National Health Service Centre for Reviews and Dissemination. (1998). Cardiac rehabilitation. *Effective Health Care*, *4*(4), 1–11.

Norman, P., & Conner, M. (1996). *Predicting Health Behaviour*. Buckingham: Open University Press.

Petrie, K. J., Cameron, L. D., Ellis, C. J., Buick, D., & Weinman, J. (2002). Changing illness perception after myocardial infarction: An early intervention randomised controlled trail. *Psychosomatic Medicine*, *64*, 580–586.

Petrie, K. J., & Weinman, J. A. (1997). *Perceptions of health and illness* (Eds.). Amsterdam: Harwood Academic Publications.

Petrie, K. J., Weinman, J. A., Sharpe, N., & Buckley, J. (1996). Role of patients' view of their illness in prediction return to work and functioning after myocardial infarction: Longitudinal study. *British Medical Journal*, *312*, 1191–1194.

Scharloo, M., Kaptein, A., Weinman, J., Hazes, J., Breedveld, F., & Rooijmans, H. (1999). Predicting functional status in patients with rheumatiod arthritis. *Journal of Rheumatology*, *26*(8), 1686–1693.

Scharloo, M., Kaptein, A. A., Weinman, J., Hazes, J. M., Williams, L. N. A., Bergman, W., & Rooijmans, H. G. M. (1998). Illness perceptions coping and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease and psoriasis. *Journal of Psychosomatic Research*, *44*(5), 573–585.

Schwarzer, R. (1994). Optimism, Vulnerability, and Self-belief as Health-related cognitions: A systematic overview. *Psychology and Health*, *9*, 161–180.

Schwarzer, R., & Fuchs, R. (1995). Changing risk behaviours and adopting health behaviour: The role of self-efficacy beliefs. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 259–288). New York: Cambridge University Press.

Scottish Intercollegiate Guidelines Network (SIGN). (2002). *Cardiac rehabilitation: A national clinical guideline*, January 2002. SIGN publication no. 57. Edingburgh: SIGN Executive, Royal College of Physicians.

Shaw, C. (1999). A framework for the study of coping, illness behaviour and outcomes. *Journal of Advanced Nursing*, *29*(5), 1246–1255.

Sherer, M., & Maddux, J. E. (1982). The Self-Efficacy Scale: Construction and validation. *Psychological Reports*, *51*, 663–671.

Strecher, V. J., DeVellis, B. M., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behaviour change. *Health Education Quarterly*, *13*(1), 73–91.
Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). New York: Allyn and Bacon.
Thompson, D. R. (2005). Commentary on Lau-Walker 2004 Cardiac rehabilitation: The importance of patients' expectation — a practitioner survey. *Journal of Clinical Nursing*, *13*, 177–184.
Weinman, J., Petrie, K., Moss-Morris, R., & Horne, R. (1996). The Illness Perception Questionnaire: A new measure for assessing the cognitive representation of illness. *Psychology and Health*, *11*, 431–445.
Wyer, S. J., Earll, L., Joseph, S., Harrison, J., Giles, M., & Johnston, M. (2001). Increasing attendance at a cardiac rehabilitation programme: An intervention study using the Theory of Planned Behaviour. *Coronary Health Care*, *5*(3), 154–159.

Received 18 January 2005; revised version received 16 August 2005