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Sandra N. Boersma, Stan Maes, Katherine Joekes and Elise Dusseldorp

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Goal Processes in Relation to Goal Attainment

Predicting Health-related Quality of Life in Myocardial Infarction Patients

SANDRA N. BOERSMA, STAN MAES,
KATHERINE JOEKES, & ELISE
DUSSELDORP
Leiden University, The Netherlands

Abstract

Goal theory suggests that both goal attainment and psychological processes concerning goal pursuit can influence a patient's (health-related) quality of life (HRQL) (e.g. Carver & Scheier, 1999). In the present longitudinal study, 46 MI patients completed questionnaires shortly after hospitalization and four months later, assessing a health, social and individual goal for the coming year, goal conflict, goal self-efficacy, goal attainment and HRQL. The results of a multiple regression analysis suggest that both goal conflict and goal self-efficacy predict goal attainment. Furthermore, goal self-efficacy appeared to be an independent predictor of physical and social HRQL. Goal attainment had a medium effect on social HRQL, but its effect was mediated by goal conflict and goal self-efficacy. A goal theory perspective seems to offer additional insights into HRQL after an MI.

Keywords

- *goal attainment*
- *goal conflict*
- *goal self-efficacy*
- *health-related quality of life*
- *myocardial infarction*

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DUE TO A rising prevalence of acute myocardial infarction (MI) (World Health Organization, 2002) combined with increased survival rates for MI over the last decades (Gheorghiade et al., 1996), an increasing number of patients have to adjust their lives after a life-threatening event and must learn to live with long-term medical regimens. The World Health Organization formulated the aim of cardiac rehabilitation as follows:

> The rehabilitation of the cardiac patient is the sum of activities required to influence favorably the underlying cause of the disease, as well as to ensure the patient the best possible physical, psychological and social conditions, so that they may, by their own efforts, preserve or resume when lost, as normal a place as possible in life in the community. (WHO, 1993, p. 5)

According to this definition, the resumption of a 'normal' life would entail on the one hand prevention of a cardiac reoccurrence, and on the other hand the setting of realistic goals in order to resume (social) activities and to regain an adequate level of health-related quality of life (HRQL) (Swenson & Clinch, 2000). HRQL can be described as the functional effect of an illness and its consequent therapy upon a patient, as perceived by the patient (Schipper, Clinch, & Olweny, 1996). The majority of patients, in time, appear able to adjust after a cardiac event and the diagnosis of their underlying coronary artery disease. There is, however, ample evidence of persistent psychological distress and a lowered HRQL in the long term for about a fifth of the patients (e.g. Lespérance & Frasure-Smith, 2000; Mayou et al., 2000; Mendes de Leon et al., 1998). With regard to interventions aimed at restoring or enhancing patients' HRQL, it is important to gain insight into causal factors that are potentially malleable (in contrast with gender, age or disease characteristics). Stress-coping models (e.g. Lazarus & Folkman, 1984) have been used to describe individual adaptation processes. However, the patient's future life perspective beyond the disease-experience is not included in these models (Maes, Leventhal, & de Ridder, 1996). A theoretical framework that takes into account the patient's personal goals and values could aid the understanding of quality of life outcomes in chronic illness. With respect to secondary prevention or health behavior change, several theories like the health belief model or the theory of planned behavior have been tested extensively (for an overview, see Norman, Abraham, & Connor, 2000). Patients' goals, however, have not been systematically studied within the field of health behavior change and could add a motivational element to the existing attitudinal and behavioral models.

Goal theory could provide a useful theoretical framework for studying (psychological) adaptation after an MI as defined by the WHO (1993). According to this framework, most human behavior is goal-directed. Goals can be defined as 'internal representations of desired states, where states are broadly construed as outcomes, events, or processes' (Austin & Vancouver, 1996, p. 338). Personal goals do not exist in isolation, but are linked to other goals in a hierarchical structure (for a review, see Austin & Vancouver, 1996). At the most abstract level of the goal hierarchy are higher-order goals like 'supporting others' or 'ensuring my safety' that can make life meaningful. As these higher-order goals refer to desired states, they are often impossible to achieve directly or permanently. More concrete goals like 'doing volunteer work at the church over the summer' or 'to lose 10 pounds' can serve as a means for attaining higher-order goals. In the literature, these types of midlevel goals have been referred to as, for example, current concerns (Klinger, 1977), personal strivings (Emmons, 1986) or personal projects (Little, 1983). In contrast with higher-order goals, midlevel goals have a clear end-point of completion, and can usually be achieved within a period of several months. Although different terminologies are being used, authors agree on the fact that individuals pursue multiple midlevel goals simultaneously and that simultaneous pursuit can be harmonious or create conflict (Little & Chambers, 2004). With respect to quality of life outcomes, goal theory suggests that strong emotional reactions signal a potential (threat to) success in the attainment of personal goals (Carver & Scheier, 1998, 1999; Ford, 1992; Ford & Nichols, 1987, 1991). Illustrative is evidence from a meta-analysis suggesting that goal progress is associated with improvements in affect over time (Koestner, Lekes, Powers, & Chicoine, 2002).

Concrete or midlevel goals seem a suitable and useful framework for studying the objectives of health behavior change, the resumption of (social) activities and the enhancement of HRQL in MI patients. A disturbance in the attainment of higher-order or life goals has already been shown to be related to quality of life outcomes in cardiac patients on a waiting list for angioplasty (Echteld, van Elderen, & van der Kamp, 2001) or to be predictive of HRQL and depression four months after an MI (Boersma, Maes, & van Elderen, 2005). Additional, albeit sparse, data that are available on attainment of more concrete midlevel goals in chronic patient groups are also suggestive of positive effects on some outcomes. Kuijer and de Ridder (2003) found, in a sample of patients with asthma, diabetes and heart failure, that a discrepancy between importance and attainability of a fixed set of illness-related goals was cross-sectionally related to lower psychological well-being but not to physical health. In women with primary fibromyalgia syndrome (Affleck et al., 1998), attainment of a health-fitness and a social-interpersonal goal appeared to be related to daily mood changes. Not only was a hindrance in daily progress toward health-fitness goals related to a decline in positive mood, but greater progress in goal attainment predicted improvements in positive mood, independently of symptoms. Oldridge, Guyatt, Crowe, Feeny and Jones (1999) asked MI patients to identify a specific activity goal that, if attained, would represent successful recovery for them. After eight weeks and after 12 months, attainment of the self-chosen goal showed no relation with HRQL but was significantly associated with higher levels of well-being.

As the available empirical evidence is suggestive of a positive relationship between the attainment of personal goals and quality of life outcomes in chronic patients, the question arises regarding what factors influence goal attainment. Strecher et al. (1995) argued, for example, that in contrast to research conducted in organizational and laboratory settings, not much is known about the utility of goal setting, the underlying mechanisms and the effective strategies for goal setting with respect to health behavior change. With respect to (successful) goal pursuit, a number of psychological processes have been formulated that are held responsible for the initiation, direction, as well as persistence of behavior (Ford, 1992; Karoly, 1993). According to Ford's (1992) motivational systems theory, directive functions (like the importance of the goal, conflict with other goals and commitment to a goal) pertain to the goal-setting process. Regulatory functions (like evaluation of the goal, evaluation of the means being used and capability beliefs) are especially relevant once a goal is set and barriers might present themselves during the pursuit of a goal. Conflict among personal strivings has shown to cause negative emotions and psychosomatic complaints over time in a student sample (Emmons & King, 1988). In a community sample of adults suffering from pain, goal conflict (as well as self-criticism, negative and positive arousal concerning goal pursuit) added to the prediction of anxiety, but less so of depression, after controlling for pain-related variables (Karoly & Ruehlman, 1996). Self-efficacy expectations with respect to goal pursuit are likely to be related to goal attainment because they influence the amount of effort that will be expended and persistence in the face of obstacles (Bandura, 1977, 1982, 1986). The positive influence of a strong sense of (physical) self-efficacy on the process of recovery from an MI has already been established (e.g. Ewart, 1992). Specific self-efficacy beliefs for self-management behaviors have furthermore been shown to be related to psychological well-being in chronic patients (e.g. Eiser, Riazi, Eiser, Hammersley, & Tooke, 2001). For MI patients who are encouraged to adopt a variety of health behaviors as well as to set realistic goals with respect to the reuptake of (social) activities, goal conflict and goal self-efficacy seem likely factors to influence actual goal attainment as well as HRQL over the course of a few months.

Research questions

This longitudinal study has two main research questions. First, it explores whether conflict and self-efficacy with respect to the pursuit of three midlevel goals—one health goal, one goal regarding social activities and one individual goal—shortly after an MI can predict goal attainment four months later. Second, it investigates whether the attainment of health, social and individual midlevel goals as well as

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goal-conflict and goal-self-efficacy are related to (domains of) HRQL four months after MI, after controlling for baseline scores of HRQL. Besides these two main research questions, the role of possible mediating effects between goal attainment, goal conflict and goal self-efficacy in their relationships with the different HRQL outcomes (Sheldon & Elliot, 1999) are explored. Specifically, an effect of goal attainment on HRQL is likely to be mediated by the two psychological processes concerning their pursuit. In addition, according to Ford (1992), goal-conflict expectations are a directive function of goal pursuit and salient when a goal is set, while goal-efficacy expectations are part of the regulatory function, and refer to evaluations of how the process of goal pursuit is likely to go. In line with this thinking, goal self-efficacy is expected to mediate an effect of goal conflict on goal attainment or HRQL.

Method

Participants

The sample consisted of patients who were admitted to a general hospital in The Netherlands for myocardial infarction, in the period between September 1999 and January 2002. Permission to carry out the study was granted by the Medical Ethics Committee of the hospital. A total of 119 patients were invited to participate in the study. The following exclusion criteria for participation were employed: older than 70 years of age; currently seeing a psychiatrist or psychotherapist; suffering from congestive heart failure; unable to read and write the Dutch language; and angioplasty or coronary artery bypass grafting following their MI. These criteria were employed because we wanted to examine goal attainment and HRQL in response to an 'uncomplicated MI'. The hospital referred MI patients to an outpatient clinic for cardiac rehabilitation, which emphasized physical recondition and lifestyle education. The aim was to include patients in this program at four to six weeks after cardiac event. In practice, due to a backlog, not all participants had been able to start rehabilitation before T2. In total 56 percent of eligible patients agreed to participate in the study ($N = 62$). At the first measurement point, which took place two to five weeks after the MI (T1), complete questionnaires were returned by

93.5 percent of the patients ($n = 58$). The response rate at the follow-up four months later (T2) was 79.3 percent ($n = 46$). Reasons for drop-out at T2 were: one patient had developed comorbidity, and 11 patients had either lost interest in the study, 'were too busy' or 'wanted to leave it all behind'. *T*-tests comparing age, baseline scores of emotional, physical and social HRQL and goal conflict and self-efficacy showed no differences between those who dropped out and those who remained in the study. The study sample ($N = 46$) comprised five women and 41 men, with a mean age of 56.4 years (SD = 8.2). Level of education was distributed as follows: four respondents completed elementary education only; 12 completed lower vocational education; 16 completed medium secondary education or medium vocational education and 14 completed higher secondary education, higher vocational education or university. The large majority of the respondents were married or had a partner: 18 were living together with partner and children; 23 were living with a partner without children; and five patients lived alone.

Procedure

During hospitalization, eligible patients were informed about the study by one of the nurses on the ward and handed an information letter. After signing an informed consent form, the patients who agreed to participate were visited at home by a researcher two to five weeks after the MI. Demographics, medical history and three midlevel goals for the coming year were assessed by means of a structured interview. At the end of the interview patients were handed a pen-and-pencil questionnaire assessing baseline scores of HRQL, goal conflict and goal self-efficacy to be completed within two weeks. A return envelope was supplied. Four months later, a follow-up questionnaire was sent to the patients' home address assessing goal attainment and HRQL.

Measures

Health-related quality of life This construct was measured using a disease-specific questionnaire, the MacNew Heart Disease Health-Related Quality of Life Questionnaire (MacNew) (Hillers et al., 1994; Lim et al., 1993; Valenti, Lim, Heller, & Knapp, 1996), translated and

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validated for a Dutch population (de Gucht, van Elderen, van der Kamp, & Oldridge, 2004). The instrument contains 24 items such as 'How often in the last two weeks have you felt worn out or low in energy?', to which respondents can answer on a seven-point scale ranging from 'constantly' (1) to 'never' (7). Higher scores thus reflect a higher HRQL. Three subscales can be calculated indicating emotional (11 items; range: 11–77), physical (10 items; range: 10–70) and social (seven items; range: 7–49) health-related quality of life. The Cronbach's α for these subscales measured at baseline (T1) were 0.92, 0.88 and 0.78 respectively. Four months after the MI (T2), Cronbach's α's were 0.93, 0.89 and 0.83.

Goal elicitation An elicitation procedure for midlevel goals after an MI was developed based on the assessment of personal projects by Emmons (1989), Karoly and Ruehlman (1995) and Little (1983). During a structured interview, participants were given the following definition of personal projects or midlevel goals:

> short-term goals that could be achieved in a period between a few months and a year . . . they could be goals that you want to achieve, as well as things you want to avoid . . . the important thing is that you think of goals that you personally want to achieve, and not because other people want you to . . . they could be goals that you're already engaged in, or goals that you plan to work on but haven't actually started yet . . .[1]

Patients were supplied with a set of illustrative examples of such midlevel goals. Subsequently, patients were asked to think of possible goals and were instructed to select the most important goal for them personally with respect to two preset domains (health and social) and one open domain. The two preset domains were selected based on the extended guidelines for cardiac rehabilitation as defined by the WHO (1993) in which secondary prevention and the resumption of one's role in the community were emphasized. The open domain was added to avoid confinement of goals to disease-related domains. When a goal was formulated that was too abstract according to the definition given for a personal project or midlevel goal, participants were asked 'how will you carry out this project?'

Similarly, if a goal was formulated that consisted of singular activities or behaviors, patients were asked 'why are you engaged in this behavior?' in order to define the relevant midlevel goal to which this behavior was to contribute.

Goal conflict The expectation that pursuit of each of the three midlevel goals (health, social and open) would give rise to goal conflict was assessed shortly after the MI (T1). Inspired by Karoly and Ruehlman (1995) and based on Ford (1992), goal conflict was assessed with a four-item questionnaire (e.g. 'Pursuing this goal will be at the expense of other important goals I want to achieve'). Respondents could answer on a five-point Likert scale, ranging from 'completely disagree' (1) to 'completely agree' (5), with higher scores reflecting more conflict beliefs per goal. The three separate conflict scores were strongly correlated, suggesting an underlying construct of general goal conflict beliefs. In addition, no differential univariate relationships were found with the different subscales of HRQL. We decided to aggregate the conflict scores with respect to each of the three personal projects, as the use of the three separate conflict scores in our analyses would not add any further insight (see also Sheldon & Elliot, 2000). This aggregated conflict score reflects general conflict beliefs with respect to the attainment of midlevel goals in relevant domains after an MI (range 12–60). Cronbach's α for the 12 aggregated items was 0.87.

Goal self-efficacy Self-efficacy with respect to the attainment of each of the three midlevel goals (health, social and open) was assessed shortly after the MI (T1). Based on Karoly and Ruehlman's (1995) Goal Systems Assessment Battery, self-ascribed instrumental capabilities with respect to the attainment of a specific midlevel goal were assessed with a three-item questionnaire (e.g. 'I possess the necessary skills to attain this goal'. Respondents could answer on a five-point Likert scale, ranging from 'completely disagree' (1) to 'completely agree' (5), with higher scores reflecting stronger self-efficacy beliefs. As was noted with respect to goal conflict, the three separate self-efficacy scores were also strongly correlated. This is suggestive of an underlying construct of general goal self-efficacy beliefs. In addition, no differential

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univariate relationships were found with the different subscales of HRQL. Again, we decided to aggregate the scores with respect to each of the three personal projects, since the use of the three separate self-efficacy scores in our analyses would not add any further insight (see also Sheldon & Elliot, 2000). This aggregated self-efficacy score reflects general self-efficacy beliefs with respect to the attainment of mid-level goals in relevant domains after an MI (range 9–45). Cronbach's α for the nine aggregated items was 0.81.

Goal attainment Attainment of the three mid-level goals was assessed four months after the MI (T2). For each of the goals (health, social and open) separately participants could answer on a single-item question to what extent they had attained each goal on a five-point Likert scale, ranging from 'not at all' (1) to 'completely' (5). Sheldon and Elliot (2000) presented evidence indicating that information is not necessarily lost by aggregating scores, and aggregating across goals is common in contemporary goal research. The three attainment scores could thus be conceived of as separate indicators for general goal attainment. We checked the univariate relationships between the three attainment scores and the three subdomains of HRQL. In line with Sheldon and Elliot, no differential relations (e.g. attainment of the health goal would be related to physical HRQL and not to social HRQL) were observed. Consequently, we decided to aggregate the attainment scores for the three midlevel goals (range 3–15), indicating attainment of midlevel goals relevant for patients after an MI.

In addition, demographic and medical variables were obtained from the hospital records.

Data analysis
Most analyses were conducted with the SPSS 10.0 program. The scales to be used for the analyses were first screened for normality. None of the scales violated the assumption of normality. Pearson's correlation coefficients were used to examine the correlations between the variables in the study. Correlations between the independent variables were inspected for multi-collinearity. As the largest squared correlation coefficient was 0.28, this was not the case. After regression analyses, residual scatterplots were

examined with respect to the assumptions of homoscedasticity, normality and linearity. Furthermore, Shapiro-Wilk's tests were performed on the residuals to test for violations of normality. None of the assumptions were violated. The data contained no outliers (Cook's $D < 1.0$). As the presence of missing values on either one of the variables would substantially reduce the final number of cases included in the analyses, missing scores (not limited to a single variable) were substituted with the mean score of the particular variable.

Possible confounders of the relationships between the independent variables and (the different domains of) HRQL could be demographic and medical characteristics (Brezinka, Maes, & Dusseldorp, 2001; Oldridge et al., 1998). We explored possible univariate relationships between age, gender and whether or not patients were living with a partner on the one hand, and the dependent variables in the study (goal attainment and HRQL) on the other hand. Even though older age correlated with higher HRQL scores at baseline, no significant relationships were found between the demographic variables and any of the dependent variables four months after the MI. Demographic characteristics were therefore omitted from further analyses. We investigated possible associations between location of the infarction and the variables in the study. However, no associations were observed. Another medical characteristic that could possibly confound observed relationships is presence of angina pectoris during the time that the dependent variables were assessed. Angina complaints proved to be unrelated to any of the dependent variables in the study and were therefore omitted from further analyses.

To answer the first research question, a multiple regression analysis was performed with both goal conflict and goal self-efficacy at T1 as independent variables and goal attainment at T2 as the dependent variable. To answer the second research question, three separate hierarchical regression analyses were conducted, predicting emotional, physical and social HRQL at T2. Predictors were entered into the equation in a predetermined order as suggested by goal theory. According to Ford (1992), the two goal processes goal conflict and goal self-efficacy are expected to mediate the effect of

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goal attainment on HRQL. In addition, goal self-efficacy beliefs (that have a regulatory function) are expected to mediate the influence of goal conflict beliefs (that have a directive function) on HRQL. In the first step, baseline scores of the specific subscale of HRQL at T1 were controlled for. In the second step, goal attainment (T2) was entered into the equation. In step three, goal conflict (T1) was added, and finally, in step four, goal self-efficacy (T1) was entered into the equation. This order of force-entering variables enabled us to inspect the full model for possible mediator effects (Baron & Kenny, 1986).

Because of the relatively small sample size (N = 46) for a reliable regression equation with four predictors, the nonparametric bootstrap (Efron & Tibshirani, 1993) was used to test the stability of the estimated regression coefficients. We generated 5000 bootstrap samples with N = 46. A regression analysis on one bootstrap sample results in an estimate of each regression co-efficient. Consequently, 5000 bootstrap analyses result in 5000 estimates of each regression coefficient. From the distribution of the 5000 estimates of a regression coefficient, confidence intervals can be computed. These analyses were performed in S-plus 6.1, using the function *bcanon* (from a separate library 'bootstrap' that can be retrieved at www_stat.stanford.edu/~tibs). This function computes bootstrap confidence intervals using the bias-corrected and accelerated method (see Efron & Tibshirani, 1993, pp. 184–188). Furthermore, an effect size (i.e. the relative change in the variance accounted for; formula 9.2.3, Cohen, 1988, p. 410) was calculated for each predictor entering the regression equation. Effect sizes of .01 are considered as small, of .10 as medium and .33 as large (Cohen, 1988, p. 413).

Results

Midlevel goals after an MI

Table 1 shows the definitions for the three midlevel goals and some examples of the goals formulated by the patients shortly after their MI. All patients were able to formulate an important health goal for the coming year. Three patients were unable to formulate a relevant goal for the coming year within the social domain, while two patients could not formulate a relevant open or individual goal. When patients were assessed four months later, 48.9 percent (n = 22) had attained their health goal, 46.3 percent (n = 19) attained their social goal and 33.3 percent of the patients (n = 15) had achieved their individual goal. However, of the patients that had not fully reached a goal, most had made at least some progress in the attainment of it. Only two patients had not made any advances with respect to their health goal, three had not made advances toward their social goal and three had not made any advances toward their open goal.

Table 1. Definitions of the three mid level goals and examples of formulated goals

Definition of midlevel goal	Examples of midlevel goals
Goal for the coming year with respect to your *health*, e.g. to lose weight, to stop smoking or to get eight hours of sleep	Continue not to smoke Taking a daily walk Lose 10 kilograms Going to cycle twice a week
Goal for the coming year with respect to *social activities*, e.g. to spend more time with my partner, join a club or to regularly invite friends over for dinner	Contributing more to family life Joining the church choir Visiting my brother once a month Working on a good relationship with my daughter-in-law
Individual goal for the coming year, e.g. learning a new language, finding a new job or redecorating the kitchen	Learning how to work a computer Start doing volunteer work Writing a book on music Planning a round-trip to America

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It can be concluded that patients had no diffi-culty formulating midlevel goals on the basis of our elicitation procedure, and that four months later almost all of the patients reported to have made progress toward the attainment of each of the three goals.

Univariate relationships between variables in the study

Means and standard deviations for the variables used in the analyses are displayed in Table 2. HRQL improved from T1 to T2, with emotional HRQL (t (45) = –2.62; p = .012), physical HRQL (t (45) = –3.82; p = .000) and social HRQL (t (45) = –3.96; p = .000) all increasing significantly. The largest improvement was found for physical HRQL. When compared to preliminary norms for coronary heart patients (including coronary artery bypass grafting and angioplasty) (van Elderen, van der Kamp, Maes, Koch, & Dussel-dorp, 2000), patients in the study sample did not score differently on emotional or social HRQL, but had higher levels of physical HRQL (t (45) = –2.25; p = .029) at T1. Pearson correlations were used to test the univariate relationships between the individual variables in this study (Table 2).

Goal self-efficacy relates positively and goal conflict negatively to goal attainment four months later. Goal attainment at T2 is in its turn positively related to emotional and social HRQL at T2, but not to physical HRQL. Furthermore, goal self-efficacy at T1 is positively related to the different dimensions of HRQL at T2. Goal conflict at T1 is negatively related to emotional and social HRQL at T2, and there is a tendency for a negative relationship with physical HRQL (p = .067).

Predicting goal attainment four months after MI

In a multiple regression analysis goal attainment was regressed on goal conflict and goal self-efficacy. Goal self-efficacy and goal conflict shortly after the event successfully explained 22 percent of the variance in goal attainment four months later (F (2, 43) = 7.46; p < .01). Both high goal self-efficacy (β = .32; p < .05) and low goal conflict (β = –.30; p < .05) at T1 predicted a higher level of goal attainment at T2. No medi-ating effect of goal self-efficacy in the relation-ship between goal conflict and goal attainment could be established.

Multivariate relationships with HRQL four months after MI

Three separate hierarchical regression analyses were performed to determine whether goal attainment, goal conflict and goal self-efficacy would improve the prediction of emotional, physical and social HRQL at T2, beyond that afforded by baseline scores of HRQL. Table 3 displays the standardized regression coeffi-cients for the variables upon entry into the equation (β step) as well as the betas for the variables in the final model (β total), change in R^2 after each step, and adjusted R^2 for the full model. The two-tailed p-values of the regres-sion coefficients in Table 3 were determined on the basis of the 95 percent and 99 percent boot-strap confidence intervals using 5000 bootstrap replicates.

Table 2. Means, standard deviations and intercorrelations for variables in the study (N = 46)

	M	SD	2	3	4	5	6	7	8	9
1. Emotional HRQL T1	57.26	11.79	.69**	.77**	.53**	–.24	.42**	.70**	.55**	.67**
2. Physical HRQL T1	52.05	10.71	–	.67**	.33*	–.13	.29	.40**	.66**	.41**
3. Social HRQL T1	38.36	7.02		–	.29	–.09	.33*	.45**	.41**	.70**
4. Goal self-efficacy T1	36.09	3.63			–	–.35*	.43**	.53**	.51**	.53**
5. Goal conflict T1	24.54	5.66				–	–.41**	–.38**	–.27	–.37*
6. Goal attainment T2	11.27	2.75					–	.30*	.19	.44**
7. Emotional HRQL T2	60.79	11.61						–	.75**	.72**
8. Physical HRQL T2	56.81	9.74							–	.55**
9. Social HRQL T2	41.42	6.39								–

Note: HRQL indicates health-related quality of life
*p < .05; **p < .01 (two-tailed)

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Table 3. Summary of hierarchical regression analyses for variables predicting HRQL four months after MI ($N = 46$)

Variable	*Emotional HRQL*			*Physical HRQL*			*Social HRQL*		
	ΔR^2	β step	β total	ΔR^2	β step	β total	ΔR^2	β step	β total
Step 1	.484**			.439**			.487**		
baseline		.70**	.60**		.66**	.58**		.70**	.59**
Step 2	.000			.000			.050		
goal attainment		.01	–.12		.00	–.18		.24	.05
Step 3	.055*			.041			.056*		
goal conflict		–.26*	–.22		–.22	–.15		–.26*	–.20
Step 4	.022			.086*			.055*		
goal self-efficacy		.19	.19		.34*	.34*		.27*	.27*
Full model	Adj. R^2 = .517			Adj. R^2 = .525			Adj. R^2 = .614		
	$F(4, 41) = 13.07$**			$F(4, 41) = 13.42$**			$F(4, 41) = 18.91$**		

Note: β step is the beta for this variable when it was first entered into the equation; β total is the beta for the variable in the final model including all steps. HRQL indicates health-related quality of life
*$p < .05$; **$p < .01$; the two-tailed *p*-values of regression coefficients are based on bootstrap confidence intervals

This model was successful in explaining 52 percent of the variance in emotional HRQL, 53 percent of the variance in physical HRQL and 61 percent of the variance in social HRQL. Consistent in all three analyses, baseline scores of the specific domain of HRQL were the strongest predictor. For emotional HRQL, in the full model (β total) only baseline scores were predictive. Greater self-efficacy, however, added significantly to the explained variance of both physical and social HRQL, over and above the baseline scores. Next, the model was inspected for possible mediators. A mediator effect of goal self-efficacy in the relationships between goal conflict and the progress in each domain of HRQL could be established if the following conditions were met (Baron & Kenny, 1986): (1) goal conflict is related to goal self-efficacy; (2) goal self-efficacy relates to a specific domain of HRQL; and (3) the significant relationships between goal conflict and a specific domain of HRQL disappear when goal self-efficacy is added as a last step to the regression equation. The three conditions are fulfilled (see the correlation coefficients in Table 2 and the regression coefficients in Table 3) for social HRQL, and it can be concluded that goal conflict is predictive of this outcome, but that the effect is mediated by goal self-efficacy.

Furthermore, in the prediction of social HRQL, Table 3 shows that the beta of goal attainment, although substantial, was not significant according to the bootstrap confidence intervals. However, the corresponding effect size (f^2) was .11, indicating a medium effect of goal attainment in the prediction of social HRQL in addition to baseline scores. In addition, a mediator effect of goal conflict and goal self-efficacy in the relationship between goal attainment and social HRQL was explored. According to Baron and Kenny (1986), the following conditions must hold: (1) goal attainment is related to both goal conflict and goal self-efficacy; (2) goal conflict and goal self-efficacy relate to social HRQL; and (3) the significant relationship between goal attainment and social HRQL disappears when both goal conflict and goal self-efficacy are added to the equation. The three conditions are fulfilled for goal conflict as well as goal self-efficacy (see the correlation coefficients in Table 2 and the regression coefficients in Table 3), so it can be concluded that there is an effect of goal attainment on social HRQL at T2, and that both goal conflict and goal self-efficacy act as mediators in this relationship. Note, as the criterion for an important relationship we use an effect size of higher or equal than .10.

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Discussion

The evidence presented here suggests that a goal theory perspective can be a worthwhile theoretical framework, which adds to the understanding of psychological adaptation after an MI.

Shortly after their hospitalization for acute MI, patients were asked to formulate three self-chosen midlevel goals with respect to two fixed domains, health promotion and social activities, and one open domain for the coming year. All patients, perhaps motivated by their physical condition, were able to formulate an important health goal and the large majority of patients also identified a social and an open or individual goal. Four months later, approximately half of the patients had achieved their health or social goal, and a third had achieved their individual goal. These numbers suggest that the timeframe used in the definition of the goals in this study 'between a few months and a year' is realistic with respect to the attainment of midlevel goals after an MI.

With regard to the first research question, our results suggest that the aggregated goal attainment score for the three midlevel goals four months after the MI could be predicted by goal conflict and goal self-efficacy measured shortly after the event. Experiencing less goal conflict and a greater sense of goal self-efficacy was associated with more progress in the attainment of the three goals. This result is in line with the theoretical framework used (Ford, 1992; Ford & Nichols, 1991; Karoly, 1993). Goal conflict, defined by Ford (1992) as a directive function, is likely to exert a negative influence on goal attainment in MI patients by reducing commitment and available resources. Goal self-efficacy, being a regulatory function of goal pursuit (Ford) is likely to be beneficial for actual attainment of midlevel goals after an MI through persistent effort when barriers to goal attainment present themselves.

Our second research question asked whether goal attainment, as well as goal conflict and goal self-efficacy, could predict emotional, social and physical HRQL four months after an MI when controlling for baseline scores. In addition, we were interested in possible mediating effects between the goal variables. The relationships between the aggregated goal attainment scores for the three midlevel goals and the specific domains of HRQL disappeared after controlling for baseline scores of HRQL in the regression analyses. Nevertheless, the beta for goal attainment in the prediction of social HRQL appeared quite substantial, with a medium effect size. The relatively small sample size could have been responsible for its non-significance after correction for baseline scores. Consequently, the attainment of three midlevel goals seems to have a positive effect on social HRQL. Even though a central tenet of goal theory is that the sustainable pursuit of core goals is essential to well-being, and results from a meta-analysis showed that in a student population progress toward goal attainment is related to positive outcomes (Koestner et al., 2002), in the current study no consistent link could be found after correction for baseline scores. It is further possible that the time during which goal progress was measured could also have played a part in this inconsistency. Koestner et al. measured goal progress only two to three days after the initial goal setting. Findings from the current study, which uses a longer time-frame (i.e. a period of four months between goal setting and assessing goal attainment) suggests that it is not so much the actual attainment of goals that matters, but the sustained process of striving toward a goal. Furthermore, the restriction with respect to a health and a social goal domain could have contributed to the lack of a strong aggregated effect of goal attainment on improvement in HRQL. Therefore, we checked the separate relationships between attainment of each of the three midlevel goals and the specific domains of HRQL, but attainment of open goals, for which no restriction was given, was equally not predictive of the outcome measures after correction for baseline scores. Furthermore, people in general do not solely strive toward achieving only one particular goal, but pursue multiple goals in each domain at the same time. It is worth noting that in this study we took a conservative approach by statistically correcting for baseline scores of HRQL and thus examining the change over time in each specific domain of HRQL as an outcome measure. This approach is contrary to most research on relationships between goal attainment and well-being outcomes. Even though we did not find consistent causal relationships

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between goal attainment and the different domains of HRQL in the multivariate regression analyses, goal attainment was univariately correlated to emotional and social HRQL (but not physical HRQL) four months after an MI. This is in line with the findings of a cross-sectional study by Kuijer and de Ridder (2003) that a measure for goal attainment was associated with psychological well-being, but not with physical health.

For social HRQL, a medium effect size was found for goal attainment. Furthermore, both goal conflict and goal self-efficacy appeared to mediate this effect of goal attainment on social HRQL. A mediating effect of self-efficacy is in line with the results of a longitudinal study by Sheldon and Elliot (1999) indicating that effects of goal attainment on well-being are mediated by autonomy, competence and relatedness. Even though the concept of competence was measured in general terms, it resembles the more specific concept of self-efficacy in that they refer both to capability or control beliefs. Similar findings in a sample of chronically ill patients have also been reported by Kuijer and de Ridder (2003), who found that self-efficacy in achieving desired health outcomes mediated a relationship between inability to attain externally set illness-related goals and HRQL.

Goal conflict was predictive of emotional and social HRQL, with this relationship being mediated by goal self-efficacy for social HRQL. This finding is in line with expectations based on Ford's motivational systems theory (1992). In addition, Bandura (1986) postulated that when outcomes are seen as negative, as is likely when conflict expectations are high, self-efficacy beliefs will also be lower.

To estimate the above-mentioned relationships (with regard to the second research question) as well as possible in a relatively small sample, we used a bootstrap technique (see the section on data analysis). One of the main goals of bootstrap theory is to produce good confidence intervals (especially when normal theory assumptions fail). The bootstrap enables us to replicate the regression analyses, and in this way, to produce an empirical distribution for each regression coefficient, from which confidence intervals can be derived.

Limitations of the study

Due to the small sample size, only two of the goal processes were included in this study. In a larger sample of MI patients, it would be interesting to explore, for example, the influence of optimism (Affleck et al., 2001; Schwarzer, 1998), social support and negative or positive arousal (Karoly, 1993) with respect to the pursuit of midlevel goals as these constructs have shown to be related to goal attainment as well as HRQL outcomes. Furthermore, the relationship between goal attainment and (social) HRQL deserves further attention, possibly including a larger sample of cardiac patients and over a longer period of time. In addition, the purpose of this study was to elaborate on existing research by examining separate domains of HRQL instead of using one total score. Therefore, we decided not to include measures of emotional distress like anxiety and depression, because they would overlap with the subscale of emotional HRQL. However, in future research the inclusion of other indicators for emotional functioning like hostility or social inhibition, in addition to HRQL, would be desirable. The fact that participation in the cardiac rehabilitation program was not recorded is a methodological shortcoming. We do not feel, however, that this unduly influences our results. First, the goals and related processes that were the focus of our investigation were assessed before any of the participants entered cardiac rehab (at T1). Once patients did start, the setting of personal goals was not a part of the rehabilitation program, nor was any attention paid to related goal processes. With respect to quality of life, the literature on the effects of cardiac rehabilitation on quality of life is equivocal (Dusseldorp, van Elderen, Maes, Meulman, & Kraaij, 1999) and when positive effects are reported, programs are usually comprehensive and include psychological interventions (Rees, Bennett, West, Davey Smith, & Ebrahim, 2004). Furthermore, to assess the effectiveness of the standard rehabilitation program (with an emphasis on physical recondition and lifestyle education) offered to the participants in our study was not the focus of our investigation. Future research could benefit from building on our findings by incorporating goal-setting strategies in an experimental design within a cardiac rehabilitation program. Finally, in order to gain a clear insight into relations

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between goal processes, goal attainment and HRQL after an MI, the study sample consisted of MI patients who were not currently seeing a psychiatrist or psychotherapist and who did not experience cardiac complications that would require invasive procedures between the two measurements. As a result, these empirical results are by definition limited to MI patients without further psychological or cardiac complications.

Practical implications

Despite the WHO's formulated aim of cardiac rehabilitation in 1993, the content of cardiac rehabilitation programs, if offered at all in addition to standard care, varies significantly. The results of this study suggest that current programs could benefit from using goal setting as a strategy at the start of the intervention. Moreover, cardiac rehabilitation programs should screen for conflict and self-efficacy expectations with respect to personally relevant goals that patients formulate for their recovery. Goal conflict could be diminished by, for example, thoroughly considering the implications and long-term consequences of the formulated goal (Baumeister & Heatherton, 1996). In addition, once goal pursuit has started specific strategies may be used for overcoming conflicting life tasks or personal goals. For instance, strategies such as prioritizing pursuits, alternating the emphasis on different goals and consolidating the pursuit of multiple tasks have previously been formulated (Watson & Tharp, 2002). As was suggested by the results of this study, expected goal conflict can subsequently undermine a sense of self-control, which can hinder the process of goal attainment. Self-efficacy with respect to a specific health goal could be enhanced through modeling of self-management skills, guided mastery practice and informative feedback (Bandura, 1998). Another important issue is that goals for a cardiac rehabilitation program are often set for external reasons or adopted under social pressure. For example, even though an MI patient may severely doubt whether the goal 'to exercise at least half an hour daily' is realistic for him, he might agree because he wants to please his cardiologist (Sheldon & Kasser, 1998). The pursuit of such an externally set goal is likely to give rise to low levels of self-efficacy. In this vein, there is evidence to suggest that intrinsic motivation to adopt a health goal is associated with enhanced goal attainment as well as positive feelings in patients (Williams, Grow, Freedman, Ryan, & Deci, 1996; Williams, Rodin, Ryan, Grolnick, & Deci, 1998).

Note

1. Originally Little and colleagues were interested in personal projects or midlevel goals that people would be engaged in for the next few months. However, later they focused their research on more comprehensive goals that could give an informative picture of the respondents themselves and their current life situation (Little & Chambers, 2004). For the patients in this study, however, the time-frame of 'between a few months and a year' is especially relevant for the attainment of midlevel goals, as it coincides with their rehabilitation after an MI. We decided therefore to stay close to the original definition of a personal project (Little, 1983). Furthermore, the decision to question patients with respect to three domains of midlevel goals was based on other research (Salmela-Aro, 1992) as well as the guidelines for cardiac rehabilitation (WHO, 1993).

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Author biographies

SANDRA N. BOERSMA, PhD, is a lecturer at the Department of Health Psychology, Leiden University. Her research focuses on self-regulation and quality of life in people living with chronic illness.

STAN MAES, PhD, is Professor of Health Psychology at Leiden University. His current work focuses on the application of self-regulation models and interventions in the area of chronic disease.

KATHERINE JOEKES, PhD, carried out her doctoral research at the department of Clinical and Health Psychology, Leiden University, The Netherlands.

ELISE DUSSELDORP, PhD, is Assistant Professor in the Data Theory group, at the Faculty of Social and Behavioral Sciences, Leiden University. Her personl page is: http://www.datatheory.nl/pages/dusseldorp.html