Psychology and Health
May 2007; 22(4): 387–411

Routledge
Taylor & Francis Group

Effects of a short self-management intervention for patients with asthma and diabetes: Evaluating health-related quality of life using then-test methodology

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(Received 12 January 2005; in final form 25 April 2006)

Abstract
Despite intensive outpatient care and optimized medical treatment, some patients with chronic illnesses experience prolonged difficulties in the self-management of their illness and fail to attain optimal disease control. The present study describes the effects of an intervention programme aimed at improving self-management and quality of life among patients with asthma and diabetes. The intervention was based on insights from self-regulation theory and proactive coping theory. Patients with asthma ($N = 70$) and diabetes ($N = 55$) were randomly assigned to an intervention group or control group (standard care). In addition to a conventional pre-test–post-test–follow-up design, the then-test methodology was employed to examine the effects on quality of life. The present study showed no intervention effects on self-efficacy, self-care activities or proactive coping. The same was true for quality of life when measured with the conventional design. However, positive intervention effects for asthma patients were found on global quality of life and physical health when measured with the then-test procedure. These results accentuate the value of including then-tests when measuring intervention outcomes. Additional subgroup analyses showed that patients who scored relatively high on

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ISSN 0887-0446 print/ISSN 1476-8321 online
DOI: 10.1080/14768320600843226

optimism at baseline, benefited more from the intervention than did patients who scored relatively low on optimism.

Keywords: *Self-management intervention, Then-test methodology, Proactive coping, Self-regulation*

Introduction

Despite intensive outpatient care and optimized medical treatment, some patients with chronic illnesses such as diabetes and asthma, experience prolonged difficulties in the self-management of their illness (Gonder-Frederick, Cox, & Ritterband, 2002; Lehrer, Feldman, Giardino, Song, & Schmaling, 2002). This may result in poor medical outcomes and illness-related distress. Self-management of chronic illness includes monitoring and managing of symptoms, adhering to treatment regimens maintaining a healthy life style and managing the impact of the illness on daily functioning, emotions and social relationships. Central to self-management is that patients, not their physicians, are primarily responsible for managing their disease (Bodenheimer, Lorig, Holman & Grumbach, 2002). As self-management does not only require knowledge and skills, but also considerable effort and discipline, many patients find it hard to attain optimal disease control. The critical role of the physician or other health care provider is to facilitate and support adequate self-management. Failure to do so may compromise successful self-management in patients.

The current article describes the effects of an intervention programme aimed at improving self-management and quality of life of patients with diabetes and asthma who experience difficulties in managing their illness. A starting point in the development of our programme was that most patients have sufficient knowledge about self-management behaviours, but nevertheless fail to perform these behaviours and integrate them into their daily life (DeRidder & Schreurs, 2001; Glasgow & Eakin, 1998; Kotses, Stout, McConnaughy, Winder & Creer, 1999; Schreurs, Colland, Kuijer, DeRidder & VanElderen, 2003). Various studies have shown that interventions with the chronically ill are successful at promoting intentions to perform self-management behaviours, but are less effective with regard to patients actually acting upon these intentions (Caplin & Creer, 2001; Hampson, Glasgow & Strycker, 2000). Effect studies of interventions for patients with asthma and diabetes show that providing information is necessary, but not sufficient in changing behaviours and that behavioural techniques are needed (Brown, 1999; Devine, 1996; Gibson et al., 2000).

The current intervention programme used insights from self-regulation theory (Baumeister, Heatherton & Tice, 1994; Carver & Scheier, 1998) and proactive coping theory (Aspinwall, 1997; Aspinwall & Taylor, 1997) to help patients convert their good intentions into actual behaviours. Self-regulation is the process through which people control and direct their actions in order to meet their goals. Failures in self-regulation may occur because different goals are in conflict

(Baumeister et al., 1994). In patients with a chronic illness, goals related to self-management may interfere with the pursuit of life goals and integrating both types of goals may be a major challenge. Successful self-regulation further depends on appropriate goal setting. Many failures in self-regulation occur because goals are unrealistic, overly rigid, or focused too much on the long term (Baumeister et al., 1994). The current programme is aimed to assist patients in formulating appropriate self-management goals and integrating these goals into their daily life. Although appropriate goal setting is a pre-requisite for successful self-regulation, it is not sufficient. Recent experiments have shown that health-related goal-directed behaviour is enhanced when goal setting is accompanied by specific planning of behaviour (Gollwitzer, 1999; Sheeran, Milne, Webb & Gollwitzer, 2005). Proactive coping theory provides a useful framework to model these planning tasks.

Proactive coping refers to efforts undertaken before a potentially stressful event occurs in order to prevent it from happening or to modify its impact and consists of five stages (Aspinwall, 1997; Aspinwall & Taylor, 1997). The first stage, resource accumulation, refers to time, money, skills and other individual resources. In the second stage, the environment is screened for potential dangers. Then, the potential stressors are appraised for what they are and what they may become (stage 3), and preliminary coping takes place (stage 4). Finally, feedback is elicited and used (stage 5) (Aspinwall & Taylor, 1997). Based on these five stages, we developed a step-wise action plan for patients in which they first set an individual goal and then proceed through the five stages of proactive coping (for a more detailed discussion of the intervention see Schreurs et al., 2003). Proactive coping is particularly relevant for the chronically ill, because it helps in initiating self-management behaviours at an early stage, before symptoms or other signs of poor self-management occur and interfere with daily life and life goals.

By and large, most self-management interventions have been developed for one specific chronic illness. An exception is a self-management programme developed by Lorig and colleagues (Bodenheimer et al., 2002; Lorig et al., 1999) aimed at heterogeneous groups of chronically ill patients. We chose for an approach in between, that is, an intervention that follows a general model centred around four themes, but is delivered to homogenous groups of patients with asthma and diabetes, respectively. Although asthma and diabetes differ on a number of characteristics, they have in common that both require similar self-management tasks such as following a medical regimen on a daily basis, self-monitoring of symptoms, taking action in response to changing symptoms and maintaining a healthy life style. In addition, a number of studies have shown that different types of chronic illnesses present similar psychological demands such as maintaining an emotional balance and a satisfactory self-image (e.g., Bensing, Schreurs, DeRidder & Hulsman, 2002; DeRidder, Schreurs & Bensing, 1998; Moos & Schaefer, 1984). The advantage of delivering the intervention in homogenous rather than heterogeneous groups is that it is possible to tailor the specific content of the sessions to the characteristics of the illness.

The aims of the present study are twofold. The first aim is to examine the effects of the intervention programme on quality of life, self-care activities, self-efficacy in managing the disease and proactive coping. The latter two variables are considered process variables. That is, the effects on quality of life and self-care activities are expected to occur as a result of increased self-efficacy and proactive coping. The assessment of aspects of quality of life with a pre-test–post-test–follow-up design (as is done in the present study) is based on the assumption that people have stable internalized standards of measurement. This assumption has been challenged by a number of authors, who have suggested that internal standards may change over time as a result of, for example, a training or intervention, or a medical treatment (e.g., Schwartz & Sprangers, 1999; Sprangers et al., 1999; Wilson, 1999). This phenomenon has been labelled ''response shift''. Such a shift in internal standards may compromise comparisons between pre-test and post-test and pre-test and follow-up, respectively, since a treatment-induced response shift will not occur among participants in the no-treatment condition. The most frequently used approach to correct for response shift is to extend the conventional pre-test–post-test design with a retrospective pre-test or so-called ''then-test''. At post-test, participants are asked to provide a renewed judgement of their baseline level of functioning (Schwartz & Sprangers, 1999). As the post-test and then-test are administered at the same time, they are presumed to be completed with the same internal standard. The same procedure can be used at follow-up. Most studies that included a then-test were performed in the educational training area and generally showed that the conventional pre-test minus post-test comparisons showed no effect or minimal effects, while then-test minus post-test differences indicated positive treatment effects (e.g., Hoogstraten, 1985; Levinson, Gordon & Skeff, 1990). More recently the then-test approach has been used to assess changes in aspects of health-related quality of life in chronically ill patients (e.g., Ahmed, Mayo, Wood-Dauphinee, Hanley & Cohen, 2004; Schwartz, Sprangers, Carey & Reed, 2004; Sprangers et al., 1999). The present study includes the then-test measurements of quality of life in addition to conventional measures of quality of life to examine intervention effects.

The second aim of the study is to examine which patients benefited most from the intervention. Apart from possible different effects for asthma and diabetes patients, several variables may moderate the intervention effects. A process evaluation of this intervention showed that older and lower educated patients were more positive about the content of the intervention than the younger and higher educated patients (Schreurs et al., 2003). This study examines whether this more positive evaluation was translated into stronger effects on quality of life, self-efficacy and proactive coping as well. Furthermore, the moderating effect of an individual difference variable, dispositional optimism, is explored. Ample research has shown that optimists, as compared with pessimists are more likely to persist in their pursuit of goals when faced with difficulties (Carver & Scheier, 1998). In addition, according to Wrosch and Scheier (2003), optimists take more advantage of the opportunities of development that are presented to them than do

pessimists. This suggests that optimists might benefit more from a self-management intervention than pessimists. Finally, the impact of gender differences and differences in disease duration will be explored.

Method

Procedure

All patients were recruited via the outpatient department of various hospitals in The Netherlands and were invited to participate in the study by their physician (lung specialist or internist) or their nurse practitioner (asthma or diabetes nurse) if they met the following criteria: (a) a medial diagnosis of asthma or insulin dependent type I or type II diabetes that was poorly controlled (i.e. poorly controlled moderate–severe asthma, moderate asthma or moderate–mild asthma according to the classification of the American Thoracic Society, 1987, as judged by the lung specialist, or glycosylated haemoglobin (HbA1c) > 8%, respectively), (b) a minimum disease duration of 1 year, (c) age between 18 and 65 years, and (d) a recently experienced failure in self-management (i.e. exacerbations of symptoms and/or difficulties in following the medical regimen or recommended self-care activities that resulted in repeated non-scheduled visits to the outpatient clinic, emergency visits or hospital readmission within the past 6 months). Patients whose condition was too serious (i.e. severe persistent asthma according to the American Thoracic Society, 1987, that was very poorly controlled according to the lung specialist, and patients with very poorly controlled diabetes suffering from a number of late complications as judged by the internist) were excluded because the present intervention was deemed unsuitable to meet their needs. These patients need longer, more intensive and individualized care. For the same reason, patients with psychiatric problems (according to patient files) were excluded from the study.

Over a period of 18 months, a total of 70 patients with asthma and 55 patients with diabetes were referred to the programme. They were interviewed at the hospital (demographic and disease-related information) and were given a baseline questionnaire to complete at home. Patients were randomly allocated to the experimental group (intervention and standard care) and control group (standard care only). Standard care for asthma patients typically consisted of one scheduled visit to the lung specialist every 6 months and when needed a referral to the asthma nurse. Standard care for diabetes patients consisted of one (or more when needed) scheduled visit to the internist every year and two (or more when needed) visits to the diabetes nurse every year. Of the 125 patients who were interviewed, 104 patients (62 asthma, 42 diabetes) returned baseline questionnaires. Two weeks after baseline (T1), patients in the experimental group started with the intervention. Two weeks (post-test; T2) and 6 months (follow-up; T3) after the intervention, they received questionnaires to complete at home. Patients in the control group completed questionnaires at the same time intervals.

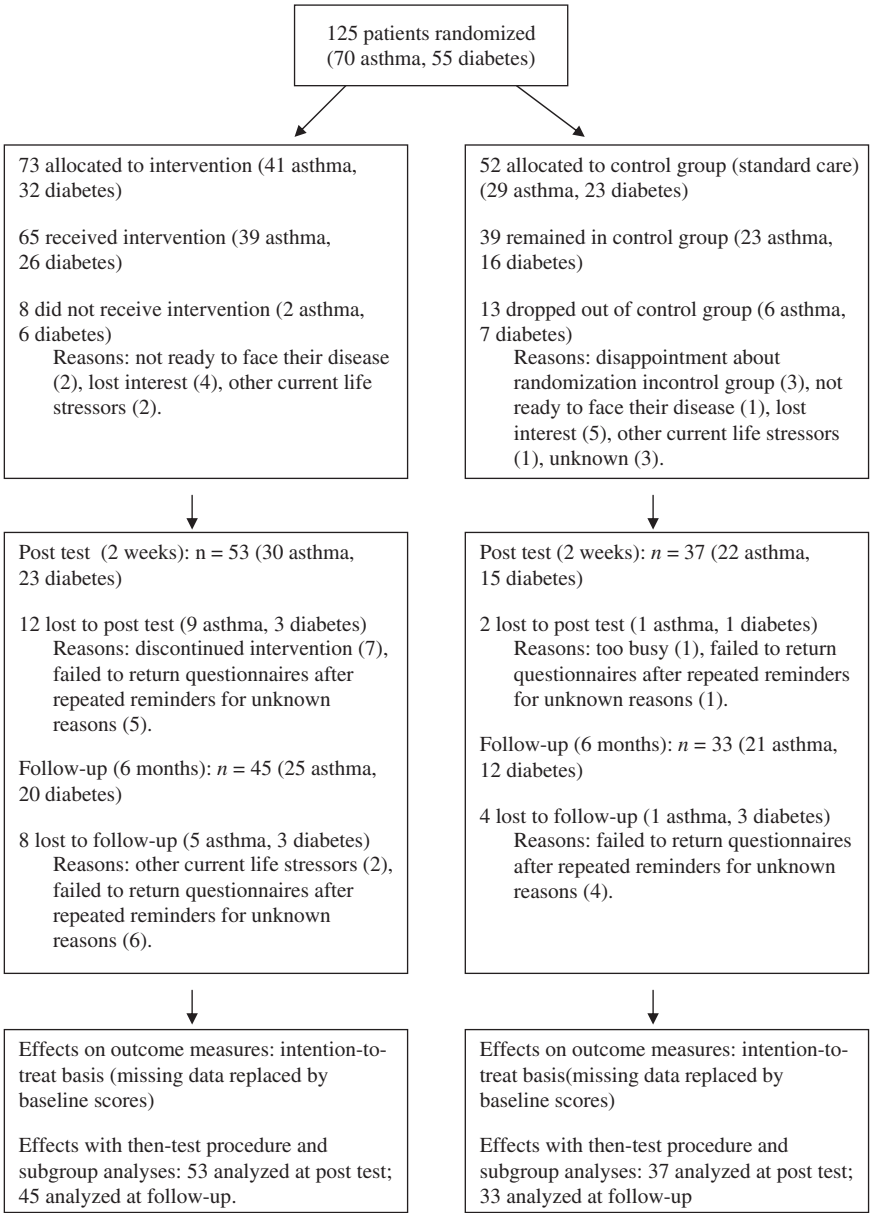

Figure 1. Flow diagram of participants through each stage of the study.

Figure 1 presents a flow diagram of the number of participants in each stage of the study (c.f. Moher, Schulz & Altman, 2001).

Participants

Demographic and disease-related characteristics of patients who completed baseline measurements are presented in Table I. Compared to patients with

Table I Demographic and disease variables at baseline.

	Asthma				Diabetes			
	Exp. group ($n=39$)		Control group ($n=23$)		Exp. group ($n=26$)		Control group ($n=16$)	
Age	41.72	(12.14)	46.35	(12.42)	44.58	(11.64)	37.81	(10.99)
Gender								
Male	14	36%	5	22%	14	54%	9	56%
Female	25	64%	18	78%	12	46%	7	44%
Marital status								
Partner	32	82%	16	70%	21	81%	11	69%
No partner	7	18%	7	30%	5	19%	5	31%
Level of education[1]	4.59	(1.48)	4.43	(1.27)	3.65	(1.23)	4.19	(1.60)
Employment status								
Paid job > 20 h wk	19	49%	11	48%	18	69%	9	56%
Paid job < 20 h wk	8	21%	7	30%	3	12%	4	25%
No paid job	12	30%	5	22%	5	19%	3	19%
Disease duration	21.98	(16.96)	20.92	(18.98)	11.98	(10.66)	13.44	(8.84)
No of visits to physician (past 6 months)								
No visit	1	2%	0	0%	0	0%	2	13%
1 Visit	14	36%	6	26%	6	23%	1	6%
2 Visits	12	31%	9	39%	13	50%	9	56%
3 Visits or more	12	31%	8	35%	7	27%	4	25%
No of visits to specialist nurse (past 6 months)								
No visit	28	72%	16	70%	2	8%	3	19%
1 Visit	6	15%	5	22%	15	58%	4	25%
2 Visits	5	13%	2	8%	5	19%	5	31%
3 Visits or more	0	0%	0	0%	4	15%	4	25%
Severity asthma								
Moderate–mild	10	25.6%	4	17.4%				
Moderate	22	56.4%	13	56.5%				
Moderate–severe	7	18.0%	6	26.1%				
HbA1c					9.19	(1.04)	9.28	(0.98)

Note: Mean (SD) or number of cases (%) are presented. [1]Level of education was measured on a 6-point scale (1 = lowest level, 6 = highest level).

diabetes, patients with asthma were more often female, Chi^2 $(1, N = 104) = 6.05$, $p < 0.05$, were higher educated, $t(102) = 2.42$, $p < 0.05$, had been diagnosed with their condition longer ago, $t(102) = 3.02$, $p < 0.01$, and visited a nurse practitioner less often, $t(102) = 5.60$, $p < 0.001$. The latter can be explained by the fact that in The Netherlands, patients typically visit an asthma nurse when they first visit the hospital or in an emergency. In contrast, patients with diabetes have regular scheduled visits with a diabetes nurse. Asthma patients in the experimental and control group did not differ from each other on any of the variables. There was a trend for diabetes patients in the experimental group to be older than patients in the control group, $t(40) = 1.87$, $p = 0.07$. No other differences were found in the diabetes group.

As Figure 1 shows, a number of patients dropped out at different stages of the study. A total of 21 patients did not complete baseline measurements. An additional 14 patients were lost to post-test and another 12 patients were lost to follow-up. A comparison of patients who completed the study ($N = 78$) with those who dropped out during the study ($N = 26$) or declined further participation after initial contact ($N = 21$) indicated that those who did not complete the study were younger, $t(123) = 3.56$, $p < 0.01$, and were more often male, Chi^2 $(1, N = 125) = 5.53$, $p < 0.05$. This was true for both asthma patients and diabetes patients. In addition, there was a trend for diabetes patients who did not complete the study to have a higher HbA1c score at baseline (indicates poorer glycemic control) than patients who completed the study, $t(40) = 1.76$, $p = 0.09$. The differences in drop out by age and glycemic control are typical in studies of patients with diabetes (e.g., Williams, McGregor, Zeldman, Freedman & Deci, 2004). In addition, diabetes patients who dropped out visited the diabetes nurse less often in the 6 months preceding the study, $t(53) = 2.05$, $p < 0.05$. No such difference was found for asthma patients.

Patients who dropped out between baseline and follow-up and patients who completed the study were also compared on all baseline measures that were included in the present study (see below for a detailed description of these variables). Compared to asthma patients who completed the study, those who dropped out scored higher on the three disease specific self-efficacy items, $F(3, 57) = 6.38$, $p < 0.01$, univariate $F_s > 4.04$, $p < 0.05$. Compared to diabetes patients who completed the study, those who dropped out scored higher on proactive coping, $t(40) = 2.37$, $p < 0.05$. No other differences were found.

Intervention

The intervention programme has been described in detail in Schreurs et al. (2003) and is summarized below. The programme consisted of five 2-group sessions of 6–8 patients, and was facilitated by nurses specialized in the care of asthma or diabetes. The programme followed a general model for both diseases, but was provided to disease-homogenous groups. The first four sessions were held biweekly and covered the following topics: ''Maintaining a good physical condition'', ''Preventing an exacerbation: Recognition of first symptoms and

taking adequate action'', ''Coping with negative emotions in relation to being chronically ill'' and ''Giving and seeking social support from partner, neighbours, and colleagues''. The specific content of the first two sessions was tailored to the needs of the two diseases. Each session had the same structure and started with a group discussion of homework, followed by an introduction to the theme of the session. Beliefs, emotions, experiences, and barriers with respect to the theme were discussed. Next, participants wrote an individual action plan to attain a goal related to the theme of the session. The individual action plans were then discussed in the group. Finally, participants were asked to act on their plan, to rehearse the desired behaviour and to register goal-attainment during the 2 weeks to follow. Subsequent sessions started with a group discussion of whether or not the action plans had been successful, how a plan could be modified, and how barriers could be overcome. Four weeks after the last session, a fifth session was delivered with the aim of maintaining behavioural change and continuing to overcome barriers.

Measures

Unless indicated otherwise, all measures were assessed at baseline, post-test and follow-up with questionnaires that were given to the participant to complete at home. Mean Cronbach's alpha was computed across the number of measurements and the two disease groups.

Generic measures

Quality of life. Health-related quality of life was measured with the SF-12 Short Form Health Survey (Jenkinson et al., 1997; Ware, Kosinski & Keller, 1996) and Cantril's ladder (Cantril, 1965). The SF-12 is a generic health status measure that comprises two components: the Physical Component Summary Score (e.g., ''In general, how would you say your health is at present?'') and the Mental Health Component Summary Score (e.g., ''How much of the time during the past week have you felt downhearted and depressed?''). Items are measured on different rating scales that were all transferred to 5-point scales. The higher the scores on these scales, the better the physical (alpha $= 0.83$) or the mental (alpha $= 0.78$) health.

In addition, patients indicated their quality of life on a ladder from 0 to 10 (Cantril, 1965). They was asked: ''All things considered, where on the ladder do you feel you stand at present?''. A score of 10 represents the best imaginable quality of life and 0 the worst imaginable quality. This global quality of life measure allows respondents to base their judgments on aspects of life that are the most important to them. Cantril's ladder was significantly correlated to both physical health (r ranged from 0.34 to 0.62, $p < 0.001$) and mental health (r ranged from 0.64 to 0.66, $p < 0.001$) and has been used in other studies to measure quality of life (e.g., Hagedoorn, Buunk, Kuijer, Wobbes & Sanderman, 2000).

The then-test (or retrospective pre-test) procedure. This method was used to detect response shift effects in the quality of life (Schwartz & Sprangers, 1999;

Sprangers et al., 1999). At post-test and follow-up, patients were asked to provide renewed judgements about their baseline level of functioning. This was done for both Cantril's ladder (''All things considered, where on the ladder would you say you stood when you filled out this questionnaire for the first time?'') and the SF-12 (e.g., ''In general, how would you say your health was when you filled out this questionnaire for the first time?''). For the SF-12, mean Cronbach's alpha was 0.88 for the physical component and 0.85 for the mental component. Thus, at post-test and follow-up, patients completed the SF-12 and Cantril's ladder twice: once to provide conventional post-test and follow-up measurements and once to provide renewed judgements about their baseline functioning (then-test procedure).

Self-efficacy beliefs regarding self-management. Self-efficacy was measured with two subscales adapted from Lorig et al. (1996; Kuijer & De Ridder, 2003). All items began with ''How confident are you that you can. . .'' and were rated on a 7-point scale (1 = not at all confident, 7 = totally confident). The subscale self-efficacy in performing behaviour to control the illness consists of six items, for example, ''Do an aerobic exercise such as walking, swimming, or cycling three to four times each week?'' (alpha = 0.68). The subscale self-efficacy to achieve desired health outcomes was measured with nine items, for example, ''. . . reduce your physical discomfort or pain'' (alpha = 0.93).

Proactive coping. This was measured with the Proactive Coping Subscale of the Proactive Coping Inventory (Greenglass, Schwarzer & Taubert, 1999) and consists of 14 items. Items are measured on a 4-point scale (1 = not at all true, 4 = completely true). Sample items are ''I am a 'take charge' person'' and ''After attaining a goal, I look for another, more challenging one'' (alpha = 0.84).

Dispositional optimism. This was measured with the Life Orientation Test (LOT) at baseline (Scheier & Carver, 1985). The LOT comprises of 8 items (e.g., ''In uncertain times, I usually expect the best'') that are rated on a 5-point scale (1 = strongly disagree, 5 = strongly agree) (alpha = 0.78).

Disease specific measures

Self-care activities. Diabetes self-care was measured with 4 items of the Summary of Diabetes Self-Care Activities questionnaire (SDSCA: Toobert & Glasgow, 1994). This questionnaire consists of 4 subscales (diet, exercise, glucose testing and medication taking). One item of each scale was chosen. The items assessed on how many of the previous 7 days patients (1) participated in at least 20 min of exercise, (2) followed their recommended diet, (3) took the recommended number of insulin injections, and (4) tested their blood glucose level. All items were scored on an 8-point scale ranging from 0 to 7 days. Two items from the SDSCA questionnaire were adapted for asthma patients. It was asked on how many of the previous 7 days patients (1) participated in at least

20 min of exercise, and (2) followed the recommended regimen in taking their preventer medication.

Self-efficacy beliefs. Disease-specific items regarding self-efficacy in disease management were added to the Lorig et al. (1996) self-efficacy scale. Based on the SDSCA (Toobert & Glasgow, 1994), diabetes patients were asked how confident they were so that they would be able to (1) regularly test their blood glucose levels, (2) take the recommended number of insulin injections, (3) follow their recommended diet, and (4) regularly control their feet according to diabetes regulations. Items were rated on a 7-point scale, ranging from (1) not at all confident to (7) totally confident.

Asthma patients were asked how confident they were to be able to (1) take their medication according to prescription, (2) clear their living environment from things that trigger their asthma, (3) convince other people to take their asthma into account (e.g., when cigarette smoke is a trigger, arrange that smokers refrain from smoking in their vicinity).

The items measuring disease-specific self-care activities and self-efficacy were not combined to form scales, because the individual items were not intended to reflect a single underlying construct. For example, increases in one type of behaviour (e.g., following recommended diet) were not necessarily expected to covary with increases in other types of behaviour (e.g., regular exercise).

Analyses

First, a series of 2(Disease: asthma *versus* diabetes) × 2(Group: experimental *versus* control) × 3(Time: T1, T2, T3)-repeated measures analyses of variance, with the first two factors between subjects and the third factor within subjects, were conducted to evaluate the intervention effects on the generic outcome variables. The analyses were conducted on an intention-to-treat basis (i.e. missing data were replaced with baseline scores). As this is a conservative procedure, the data were analyzed for a second time including only participants with complete data sets. The results in both sets of analyses were identical and only the results conducted on an intention-to-treat basis are presented in the text. Subscales underlying one construct (e.g., the two subscales of health-related quality of life) were examined in one multivariate analysis.

Second, 2(Disease) × 2(Group) × 2(Time: then-test *versus* post-test or follow-up)-repeated measures analyses of variance were conducted to examine the intervention effects on quality of life with the then-test procedure. That is, then-test scores measured at post-test were compared with conventional post-test scores, and then-test scores measured at follow-up were compared with conventional follow-up scores, respectively. The analyses were restricted to participants who completed post-test and follow-up data.

In addition to levels of significance, effect sizes (Cohen's d) were calculated for significant intervention effects (Cohen, 1988; Dunlap, Cortina, Vaslow, & Burke, 1996). Effect sizes refer to the size of a change and are independent

of sample size. According to Cohen (1988), an effect size of 0.20 should be defined as small, 0.50 as medium and 0.80 as large. The Bonferoni–Holm procedure is used to correct for multiple comparisons when post-hoc comparisons are made. If significant intervention effects are found on the outcome variables, a series of regression analyses following Baron and Kenny (1986) will be conducted to examine whether the effects on the quality of life and self-care activities occurred as a result of increased self-efficacy and proactive coping.

Third, hierarchical regression analyses were employed to examine whether the intervention was more effective for some patients than for others. Optimism, age, gender, level of education and disease duration were examined as possible moderators. Regression analyses for the outcome variables were conducted at post-test and follow-up. In the first step of the analyses, the dependent variable at baseline was entered, followed by Disease (control variable; step 2), Group (step 3), moderator variable (step 4) and interaction between moderator and Group (step 5). In all regression analyses, predictors involved in interaction terms were centred in order to avoid high inter-correlations between predictors and interaction terms (West, Aiken & Krull, 1996). Group was recoded as -1 (control group) and 1 (experimental group). Gender was recoded as -1 (male) and 1 (female). Simple slope analyses were conducted for patients in the experimental group and in the control group.

Results

Intervention effects on outcome measures

Means and standard deviations of the outcome measures are presented in Table II. No significant Time × Group, or Time × Group × Disease interactions were found in the repeated (M)ANOVAs with the generic outcome variables (intention-to-treat basis), all Fs < 2.18, *ns*. In the multivariate analyses (i.e. health-related quality of life subscales, self-efficacy subscales), univariate statistics were examined as well but no interactions involving Group and Time were significant. This means that no intervention effects were found on the generic outcome variables. This was true for both asthma patients and diabetes patients. Some other effects were found, however. A significant effect for Time was found in the analysis with proactive coping as the dependent variable, $F(2, 97) = 9.76$, $p < 0.001$. This effect was qualified by an interaction between Time and Disease, $F(2, 97) = 6.09$, $p < 0.01$. For patients with asthma, proactive coping increased between T1 and T2, $t(60) = 4.91$, $p < 0.001$. Proactive coping did not change between T2 and T3, $t(60) = 0.43$, *ns*. For diabetes patients, no changes over time occurred, ts < 1.11, *ns*. The analysis with health-related quality of life showed a multivariate main effect for Disease that almost reached statistical significance, $F(2, 98) = 2.75$, $p = 0.07$. On an average, diabetes patients reported better physical health than did asthma patients, $F(1, 99) = 4.87$,

Table II Means and standard deviations for the study variables at baseline, post-test, and follow-up.

		Asthma						Diabetes					
		Baseline		Post-test		Follow-up		Baseline		Post-test		Follow-up	
Health-related quality of life (generic)													
Physical health	E	3.31	(0.70)	3.42	(0.94)	3.39	(0.82)	3.78	(1.06)	3.87	(0.95)	3.80	(0.98)
	C	3.26	(0.74)	3.14	(1.10)	3.34	(1.10)	3.65	(1.14)	3.52	(0.97)	3.52	(1.09)
Mental health	E	3.38	(0.86)	3.65	(0.88)	3.66	(0.76)	3.90	(0.74)	3.91	(0.77)	3.76	(0.94)
	C	3.47	(0.88)	3.50	(0.83)	3.59	(0.87)	3.78	(0.85)	3.76	(0.82)	3.85	(0.59)
Global quality of life	E	6.47	(1.48)	6.97	(1.51)	6.89	(1.31)	7.31	(1.29)	7.12	(1.42)	6.84	(1.80)
	C	5.87	(2.16)	6.09	(2.21)	6.35	(1.70)	6.87	(1.36)	6.94	(1.49)	6.80	(1.26)
Self-efficacy (generic)													
SE behaviour	E	5.60	(0.85)	5.76	(0.74)	5.51	(0.96)	5.74	(0.94)	5.88	(0.68)	5.72	(0.81)
	C	5.18	(1.13)	5.22	(1.24)	5.35	(1.23)	5.27	(0.92)	5.45	(0.82)	5.51	(0.79)
SE outcomes	E	5.29	(1.13)	5.35	(1.04)	5.29	(1.12)	5.53	(1.08)	5.56	(0.82)	5.51	(0.98)
	C	4.99	(1.51)	5.15	(1.44)	4.99	(1.34)	5.13	(1.13)	5.25	(1.03)	5.35	(1.11)
Proactive coping (generic)	E	2.35	(0.41)	2.64	(0.51)	2.60	(0.49)	2.54	(0.56)	2.54	(0.48)	2.68	(0.58)
	C	2.36	(0.62)	2.66	(0.57)	2.69	(0.52)	2.58	(0.29)	2.59	(0.41)	2.63	(0.50)
Self-efficacy (disease specific)[1,2]													
Item 1	E	6.65	(0.72)	6.54	(0.80)	6.78	(0.58)	5.88	(1.24)	5.60	(1.47)	5.56	(1.36)
	C	6.23	(0.92)	6.50	(0.96)	6.64	(0.72)	6.38	(0.89)	6.12	(1.59)	6.50	(0.63)
Item 2	E	5.97	(1.36)	6.00	(1.29)	6.00	(1.49)	6.72	(0.54)	6.84	(0.47)	6.92	(0.28)
	C	5.95	(1.25)	6.00	(1.11)	5.86	(1.55)	6.94	(0.25)	6.94	(0.25)	6.81	(0.40)
Item 3	E	5.00	(1.72)	4.92	(1.77)	5.03	(1.79)	5.08	(1.47)	5.40	(1.19)	5.24	(1.23)
	C	4.77	(1.80)	5.23	(1.48)	4.86	(1.75)	5.81	(1.28)	5.75	(1.00)	5.94	(1.18)
Item 4	E							5.88	(1.20)	5.84	(1.31)	5.84	(1.11)
	C							5.50	(1.55)	5.13	(1.71)	5.56	(1.55)
Self-care activities (disease specific)													
Exercise	E	4.44	(2.02)	4.22	(1.61)	4.25	(2.06)	3.74	(2.40)	4.52	(1.95)	3.87	(2.22)
	C	3.22	(2.33)	3.91	(2.09)	3.39	(2.52)	2.87	(1.89)	2.87	(1.92)	3.13	(1.92)
Medication[3]	E	6.61	(1.10)	6.36	(1.38)	6.56	(0.91)	6.83	(0.49)	6.70	(0.88)	6.96	(0.21)
	C	6.26	(1.21)	5.91	(1.81)	6.13	(1.63)	6.73	(0.80)	7.00	(0.00)	6.73	(1.10)
Diet								4.78	(1.62)	4.91	(1.98)	4.78	(1.54)
								4.87	(2.26)	4.53	(2.39)	5.20	(1.86)
Blood glucose level								4.57	(2.57)	4.48	(2.41)	4.52	(2.45)
								5.47	(2.53)	5.27	(2.55)	5.80	(1.97)

Note: E = Experimental group, C = Control group. [1]Asthma self-efficacy items are (1) medication, (2) avoid triggers, (3) communication with others. [2]Diabetes items are (1) test blood glucose levels, (2) insulin injections, (3) diet, (4) food control. [3]Preventer medication (asthma), insulin injections (diabetes). Missing data at post-test and follow-up due to dropout from the study were replaced with baseline scores (intention-to-treat principle).

$p < 0.05$. There was a trend for diabetes patients to report a better mental health compared to asthma patients as well, $F(1, 99) = 3.72$, $p = 0.06$.

For each disease, two repeated measures MANOVAs were conducted (dependent variables were the self-care activities and self-efficacy items, respectively) to examine intervention effects on the disease specific measures. No Time × Group interactions were found, all Fs < 1.40, *ns*. Thus, no intervention effects were found with the disease specific measures for self-care activities and self-efficacy items. No other effects were found in these analyses.

Intervention effects with then-test procedure

The fact that intervention effects with the quality of life measures were not found may be due to an intervention-induced response shift in internal standards. We therefore compared then-test scores measured at post-test with conventional post-test scores, and then-test scores measured at follow-up with conventional follow-up scores, respectively, for global quality of life, and health-related quality of life (physical health and mental health). The results are presented in Table III.

A significant effect for Time was found in the analysis of global quality of life comparing then-test and post-test measurement, $F(1, 85) = 10.83$, $p < 0.001$. The interaction between Time, Group and Disease approached statistical significance, $F(1, 85) = 3.40$, $p = 0.07$. No other effects were found. Post-hoc analyses showed that asthma patients in the experimental group reported better quality of life, $t(29) = 3.42$, $p < 0.01$, effect size (ES) = 0.72, at post-test compared to their retrospective pre-test (then-test). No such differences were found for asthma

Table III Means and standard deviations on quality of life with then-test procedure.

		Then-test[1]		Post-test		Then-test[2]		Follow-up	
Asthma									
Global QOL	E	5.97[a]	(2.13)	7.10[b]	(1.42)	5.76[a]	(1.76)	7.28[b]	(1.02)
	C	6.09	(2.20)	6.14	(2.25)	6.05	(1.80)	6.62	(1.56)
Health-related quality of life									
Physical health	E	2.82[a]	(1.11)	3.35[b]	(1.01)	2.85[a]	(1.16)	3.45[b]	(0.94)
	C	3.15	(1.13)	3.14	(1.10)	3.21	(1.12)	3.46	(1.12)
Mental health	E	3.27	(1.09)	3.70	(0.91)	3.37	(0.95)	3.79	(0.74)
	C	3.56	(1.11)	3.56	(0.88)	3.40	(1.12)	3.67	(0.90)
Diabetes									
Global QOL	E	6.78	(1.51)	7.21	(1.13)	6.80	(1.36)	6.85	(1.53)
	C	6.57	(1.50)	7.14	(1.23)	6.17	(1.99)	6.58	(1.16)
Health-related quality of life									
Physical health	E	3.90	(1.13)	3.83	(1.10)	3.60	(1.21)	3.76	(1.04)
	C	3.60	(1.05)	3.64	(1.03)	3.44	(1.38)	3.44	(1.14)
Mental health	E	3.91	(0.95)	3.98	(0.71)	3.87	(0.96)	3.92	(0.89)
	C	3.83	(0.79)	3.87	(0.78)	3.95	(0.61)	3.91	(0.40)

Note: [1]Then-test measured at post-test. [2]Then-test measured at follow-up. At post-test $N = 90$, at follow-up $N = 78$. Means with different superscripts in a row for then-test/post-test comparison or then-test/follow-up comparison differ significantly from each other at least at $p < 0.05$ (Bonferroni–Holm procedure to correct for multiple post-hoc comparisons). QOL = Quality of life.

patients in the control group, and diabetes patients in the experimental group or control group.

Although the multivariate interaction between Time, Group and Disease did not reach statistical significance in the analysis with health-related quality of life as the outcome variable, $F(2, 85) = 2.12$, $p < 0.13$, the interaction was significant at a univariate level for physical health, $F(1, 86) = 4.28$, $p < 0.05$, but not for mental health, $F(1.\ 86) = 1.76$, *ns*. Post-hoc analyses showed that asthma patients in the experimental group reported better physical health, $t(29) = 3.33$, $p < 0.01$, ES = 0.55, at post-test compared to their retrospective pre-test (then-test). No such differences were found for asthma patients in the control group, and diabetes patients in the experimental group or control group. In addition, a multivariate effect for Disease, $F(2, 85) = 3.93$, $p < 0.05$, indicated that, overall, diabetes patients reported better physical health, $F(1, 86) = 7.94$, $p < 0.01$, and mental health, $F(1, 86) = 4.01$, $p < 0.05$, than did asthma patients. No other effects were found.

With respect to comparisons between then-test scores measured at follow-up and follow-up scores, no significant interactions involving Time and Group were found, all $F_s < 2.53$, *ns*. In the analysis with global quality of life, a main effect for Time was found, $F(1, 74) = 9.56$, $p < 0.01$. In the analysis with health-related quality of life, the multivariate main effect for Time approached statistical significance, $F(2, 72) = 2.31$, $p = 0.10$, which in turn was significant for physical health only, $F(1, 73) = 4.54$, $p < 0.05$. Overall, patients scored higher on global quality of life and physical health on their follow-up test compared to their then-test score. Although no significant interactions involving Time and Group were found Table III shows that when the means on global quality of life and physical health for asthma patients on then-test and follow-up are compared with the means on then-test and post-test, a very similar pattern occurs. This suggests that the lack of findings at follow-up may be due to power problems. Indeed, when post-hoc tests were performed it was found that asthma patients in the experimental group reported better quality of life, $t(25) = 4.21$, $p < 0.001$, and physical health, $t(24) = 2.77$, $p < 0.05$, at follow-up compared to their retrospective pre-test. No such differences were found for asthma patients in the control group, or diabetes patients in the experimental or control group. The effect sizes at follow-up were even larger than at post-test, that is, 1.36 for global quality of life, and 0.66 for physical health. This strengthens the assumption that power problems may have caused the null findings with the then-test procedure at follow-up. In sum, with the then-test procedure significant intervention effects on global quality of life and physical health were found for asthma patients at post-test and at follow-up, but not for diabetes patients.

Subgroup analyses

Finally, the possibility that the intervention might be more effective for some patients than for others was explored. We examined the moderator effects of

Table IV Quality of life at post-test and follow-up regressed on baseline quality of life, group and optimism.

	Physical health		Mental health		Global QOL	
	b	R^2 cha	*b*	R^2 cha	*b*	R^2 cha
DV at T2 ($N=90$)						
1 DV at baseline	0.69***	0.47***	0.58***	0.48***	0.46***	0.31***
2 Disease	0.15	0.00	0.04	0.00	0.06	0.00
3 Group (G)	0.08	0.01	0.08	0.01	0.17	0.01
4 Optimism (O)	0.26^{+}	0.03*	0.18	0.02^{+} ($p=0.08$)	0.23	0.01
5 G × O	0.29*	0.03*	0.19^{+}	0.02^{+} ($p=0.06$)	0.55*	0.04*
DV at T3 ($N=78$)						
1 DV at baseline	0.74***	0.44***	0.50***	0.37***	0.31**	0.20***
2 Disease	−0.04	0.00	−0.04	0.00	−0.28	0.02
3 Group (G)	0.05	0.00	0.05	0.01	0.10	0.01
4 Optimism (O)	0.06	0.00	0.22	0.02	0.42	0.03^{+} ($p=0.08$)
5 G × O	0.06	0.00	0.08	0.00	0.43^{+}	0.04^{+} ($p=0.06$)

Notes: ***$p<0.001$, **$p<0.01$, *$p<0.05$, $^{+}p<0.10$. DV = dependent variable.

variables other than disease (asthma *versus* diabetes), that is, an individual difference variable (i.e. optimism), three demographic variables (age, gender, level of education) and disease duration. Disease duration, gender and level of education were confounded with disease type to some extent (see Method). Disease type was therefore controlled for in all analyses. Asthma patients and diabetes patients did not differ with respect to age (see Method), or dispositional optimism, $t(102)=0.54$, *ns*.

No significant moderator effects were found with gender, age, level of education, or disease duration as the moderator variables for any of the dependent variables at either post-test or follow-up. With respect to dispositional optimism, no moderator effects were found with the self-efficacy scales or proactive coping as the dependent variables. However, significant interaction effects were found for physical health and global quality of life at post-test (see Table IV). The interaction effect for mental health almost reached statistical significance ($p=0.06$). At follow-up, the interaction effect for global quality of life approached statistical significance ($p=0.06$), whereas the other interactions were no longer significant. Regression slopes for the experimental group and control group were calculated. Simple slope analyses revealed that the association between optimism and change in global quality of life between baseline and post-test was significant for patients in the experimental group (beta = 0.43, $p<0.001$), but not for patients in the control group (beta = −0.11, *ns*). The same was true for change in global quality of life between baseline and follow-up (experimental group: beta = 0.38, $p<0.01$; control group: beta = −0.02, *ns*). In addition, the association between optimism and change in physical health and change in mental health between baseline and post-test was significant in the experimental group (physical health: beta = 0.37, $p<0.001$; mental health: beta = 0.34, $p<0.01$), but not in the control group

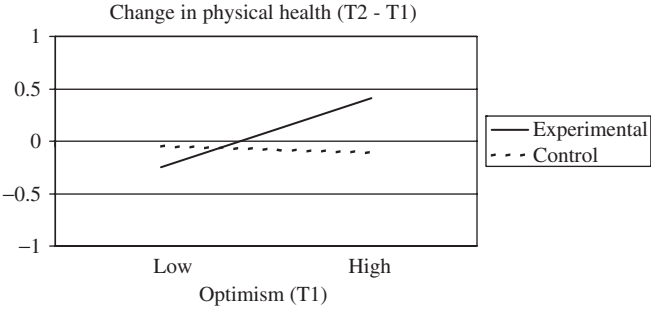

Figure 2. Interactive effect of group and optimism on change in physical health between baseline (T1) and post-test (T2) for the experimental group and the control group.

(physical health: beta = −0.02, *ns*; mental health: beta = −0.06, *ns*). Patients who scored relatively high on optimism at baseline benefited more from the intervention in the short run (i.e. they reported more improvement in physical health, mental health, and global quality of life) than did patients who scored relatively low on optimism at baseline. For patients in the control group, the associations between optimism and changes in outcome variables were close to zero. The regression slopes for change in physical health between baseline and post-test are presented in Figure 2. The regression slopes for mental health and global quality of life are similar.

Discussion

The results of the present study showed no intervention effects of a self-management intervention on self-efficacy, self-care activities, or proactive coping. The same was true for quality of life when measured with a conventional pre-test–post-test–follow-up design. Positive intervention effects were only found on global quality of life and physical health when measured with the then-test procedure. The effects were found for asthma patients, but not for diabetes patients. It should be noted that these intervention effects were mostly tendencies and should thus be interpreted with some caution. Additional subgroup analyses suggest that some patients, that is, those who score relatively high on optimism at baseline, might benefit more from this intervention in terms of quality of life, at least in the short run.

The finding that intervention effects were not found with the conventional measures of quality of life in the present study is not exceptional. Other studies evaluating self-management interventions for patients with asthma or diabetes also often fail to find effects or find only limited effects on quality of life measures (e.g., Abdulwadud, Abramson, Forbes, James & Walters, 1999; Perneger et al., 2002; Steed, Cooke & Newman, 2003). It has been suggested that generic measures, such as the Short Form Health Survey that was used in the present study, are not sensitive enough to detect changes in quality of life. We therefore

included disease specific measures of quality of life as well (not reported), but failed to find intervention effects on these measures as well. As we anticipated difficulty in finding the effects on quality of life as a result of treatment induced changes in internal standards of measurement, we included a then-test procedure. With this then-test procedure, intervention effects were indeed found for asthma patients. That is, asthma patients in the experimental group reported higher global quality of life and physical health at post-test and follow-up compared with their retrospective baseline scores. As expected, this was not found for asthma patients in the control group. Although the magnitudes of these intervention effects all exceeded medium effect sizes according to Cohen (1988), it should be noted that some of the effects at post-test only approached statistical significance, whereas the effects at follow-up did not reach statistical significance. This may be attributable to the small sample size. However, it means that the effects should be interpreted with some caution.

Although all self-report measures are susceptible to confounding effects such as social desirability, cognitive dissonance and recall bias, it has been argued that this is particularly true for then-tests (Sprangers et al., 1999) and it is therefore important to address this issue here. After all, the participants in the experimental group have just completed an intervention and they may be inclined to retrospectively adjust their baseline measurement or report improvement to please the experimenter or justify their own efforts. However, the finding that diabetes patients who participated in the experimental group did not show a response shift argues against this reasoning. Two recent studies that examined memory related recall bias as possible confounders of the then-test procedure concluded that although recall bias may influence the magnitude of response shift to some extent, it is extremely unlikely that it can explain the phenomenon completely (Ahmed et al., 2004; Schwartz et al., 2004). Moreover, it is unlikely that asthma patients in the experimental group would be more prone to memory distortions than diabetes patients in the experimental group. Additionally, a recent study by Pratt, Mcguigan and Katzev (2000) provided important support for the validity of then-test measures. They evaluated a child-abuse prevention programme and showed that retrospective pre-test scores were more highly correlated with objective measures assessed at baseline than were the standard pre-test scores.

The fact that the intervention effects were only found for asthma patients, but not for diabetes patients deserves attention. Although asthma and diabetes have in common that both require similar self-management tasks such as monitoring and managing symptoms on a daily basis, adhering to treatment, and maintaining a healthy lifestyle, the effects of optimal disease control differ per disease in terms of short-term and long-term benefits. For asthma patients, better disease control is noticeable almost immediately in that symptoms lessen and patients actually feel better. For diabetes patients, optimal disease control is aimed at preventing diabetes-related complications in the long run such as neuropathy and heart disease, and short-term benefits are not always noticeable. In fact some short-term effects may be negative, for example, a side effect

of trying to keep blood glucose levels as close to normal as possible is that the chances of hypoglycaemia increase. It is also important to note that asthma patients and diabetes patients differed on a number of demographic characteristics (i.e. gender distribution, level of education and disease duration). Controlling for these variables (not reported) did not change the effects with the then-test procedure.

No intervention effects were found with the self-efficacy measures and the self-care activities. Patients in both groups scored rather high on both generic and specific self-efficacy at baseline, suggesting that there was not much room for improvement in the first place. This might suggest that we selected the ''wrong'' patients, that is, patients who were already successfully managing their disease. This is unlikely, however, since patients were referred to our programme by their physician or specialist nurse who assured us that they had sent us the ''difficult'' patients who did not have optimal disease control. It is possible that patients were overly optimistic about their self-efficacy in managing the disease and controlling disease outcomes to start with. Overestimation is likely to happen when participants lack a clear understanding of the skills and abilities the intervention aims to teach (Pratt et al., 2000), which is precisely the case why patients were referred to this intervention in the first place. If this is correct, it is plausible that treatment-induced shifts in internal standards occurred with these measurements as well. Response shift can occur with all self-report measures (Sprangers et al., 1999). For example, a patient may be very positive about her self-efficacy to manage the disease at baseline. During the intervention, this patient may learn that optimal disease control involves a lot more than she thought it did, thereby shifting her internal standards about what good self-management includes. In addition to then-test measures for quality of life, future research might benefit from including a then-test procedure for constructs such as perceived self-efficacy as well.

With respect to self-care activities, Toobert and Glasgow (1994) reported that compliance to medication prescriptions in diabetes patients as measured with the SDSCA Questionnaire tends to be so high that there is no variance and no room for improvement. This was the case in the present study for both diabetes and asthma patients. In the present study, diabetes patients also scored rather high on following the recommended diet and testing glucose levels (mean of 4.9 out of 7 days). Measures of compliance are often overestimated by patients and this may very well have been the case in the present study as well. Asthma patients and diabetes patients scored lowest at baseline on participation in regular exercise, suggesting at least some room for improvement. A possible explanation for not finding this improvement may be that patients consider regular exercise to be more of a general healthy life style advice, rather than an important self-care activity.

The finding that no intervention effects were found on proactive coping deserves attention too. According to Greenglass and colleagues (Greenglass et al., 1999), individuals who score high on the proactive coping scale set goals for themselves and stick to them. They are ''rich in potential for change, particularly

in ways that would result in improvement of oneself and one's environment'' (Greenglass et al., 1999, p. 5). As goal setting and proactive coping were central elements in our intervention we expected to find improvement on this scale. An important question is whether proactive coping refers to a way of coping that one can learn or that it reflects a trait-like coping style. Greenglass and colleagues (1999) are unclear about this, but the formulation of the items of the scale (e.g., 'I am a 'take charge' person'', and ''I like challenges and beating the odds'') tends to the latter and as such the scale may not have been sensitive enough to detect change as a result of our intervention. A recently developed instrument to measure proactive coping competencies (e.g., respondents are asked to report to what extent they are able to recognize first signals of undesired changes), rather than a proactive coping style or orientation, has been found to be more sensitive to change (Bode, De Ridder & Bensing, 2006) and as such may be a more suitable instrument to assess intervention outcomes on proactive coping in future research.

With respect to additional subgroup analyses we found that, at least in the short run, patients who scored relatively high on dispositional optimism at baseline, benefited more from the intervention (i.e. they reported more improvement in global quality of life, physical and mental health) than did patients who scored relatively low on optimism at baseline. This is in line with Wrosch and Scheier (2003) who stated that optimists take more advantage of opportunities of personal development presented to them than pessimists do. This finding may seem surprising in the light of our argument that patients may have been overly optimistic when estimating their self-efficacy in terms of self-management and that this may have contributed to the null findings in this study. It is important to make a distinction between functional and defensive optimism (Fournier, DeRidder & Bensing, 1999; Schwarzer, 1994). Dispositional optimism (the tendency to believe that one will generally experience good outcomes in life; Scheier & Carver, 1985) has been classified as functional because of its positive associations with a whole range of outcomes such as better coping with stress, and improved adjustment to illness (e.g., Carver et al., 1993). Unrealistic optimism (good things are more likely to happen to me and bad things are more likely to happen to others; Weinstein, 1988) is a major barrier to the adoption of precautions and actions, because the susceptibility to threats is underestimated, which may interfere with appropriate self-care behaviours (Weinstein, 1988; Weinstein & Klein, 1995).

A limitation of the present study was the small sample size. Although we conducted a power analysis before the start of the intervention, we were unable to recruit the required number of patients, particularly diabetes patients, despite considerable effort. This, in combination with drop outs, caused power problems and, as a result, small changes in the outcome variables may have gone unnoticed. The small sample size also made it impossible to study the combined effect of disease and optimism on quality of life. For example, it is possible that the beneficial effect of dispositional optimism applies only to asthma patients. Furthermore, drop out rates were rather high. The latter in combination with the

fact that the views of the medical professionals about failures in self-management were not reflected in patients' estimation of their own self-efficacy regarding self-management, led us to speculate that many patients may not have been motivated or ready to change (Prochaska, DiClemente & Norcross, 1992). Since physicians and specialist nurses referred patients to the programme, it is possible that at least a number of patients participated to please their doctor or nurse. Several studies have shown that individuals who are not ready to change often show the most dropout and the least behaviour change (e.g., Beitman et al., 1994; Scott & Wolfe, 2003). We, perhaps wrongly, assumed that patients would be motivated to change. In future research, motivation for participation should be addressed explicitly before participants are included in an intervention study. Patients who are not motivated to change could benefit from motivational interviewing as a precursor to the actual intervention (Miller & Rollnick, 2002).

To conclude, the present study only found positive effects of a self-management intervention on global quality of life and physical health as measured with the then-test procedure and only for asthma patients. Although these effects must be considered as tendencies, these results do suggest that it might be helpful to include then-tests when measuring intervention outcomes, as the conventional pre-test–post-test–follow-up comparisons failed to detect any improvement. Future studies may be wise to include then-test measures for constructs such as perceived self-efficacy as well, since our data suggest that patients may overestimate their ability to manage their illness at baseline. For proactive coping, a measure that is more sensitive to change should be included to assess intervention outcomes (Bode et al., 2006). Although asthma and diabetes have a number of self-management tasks in common, only asthma patients benefited from the intervention to some extent. Asthma and diabetes differ with respect to the time span after which benefits of improved disease control are noticeable and perhaps a stronger focus on long-term benefits is needed in interventions for diabetes patients. Our results further suggest that some patients, that is, those who score relatively high on optimism, benefit more from the intervention, than others do. Individual differences in responses to interventions have rarely been examined. More insight into moderator effects of individual differences such as optimism is crucial, because it may provide tools to tailor interventions to the needs of the participants.

Acknowledgement

The authors would like to thank Prof. Dr J.W.J. Lammers, lung specialist at University Medical Centre, Utrecht; Dr P.C. Oldenburg, internist at Medical Centre Molendael, Baarn; Dr L.H.M. Rijssenbeek-Nouwens, lung specialist at Asthma Centre Heideheuvel, Hilversum at the time of the study; Dr P.H.Th.J. Slee, internist at St. Antonius Hospital, Nieuwegein; and Dr P.M.J. Zelissen, internist at University Medical Centre, Utrecht, for their significant contribution

to data collection. This research was supported by a grant from The Netherlands Organization for Scientific Research (NWO) (CZ-ZOB) and a grant from the Dutch Asthma Foundation.

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