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How optimism contributes to the adaptation of chronic illness. A prospective study into the enduring effects of optimism on adaptation moderated by the controllability of chronic illness

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ABSTRACT

The aim of this study was to investigate the impact of optimistic beliefs on coping and adaptation over 6 and 12 months of chronic illness, and whether the adaptiveness of optimistic beliefs was moderated by the controllability of disease. In addition, we examined whether coping strategies contribute to the stability of optimistic beliefs, and thus indirectly to their adaptiveness. Three chronic diseases differing in controllability were included: type 1 diabetes (*n*=90), rheumatoid arthritis (*n*=89) and multiple sclerosis (*n*=90). Path models were used to examine the relationship of three optimistic beliefs (outcome expectancies, efficacy expectancies, unrealistic thinking) with coping, anxiety, depression and physical functioning. Results show that coping contributes to the stability of outcome and efficacy expectancies which, in turn, contribute to mental health by using more task oriented and less emotion oriented coping. The controllability of disease moderated the effectiveness of efficacy expectancies and unrealistic thinking, as both optimistic beliefs are specifically beneficial when patients suffer from a chronic disease that is to a considerable extent controllable.

1. INTRODUCTION

As increasing numbers of individuals suffer from chronic disease, many research efforts are directed towards understanding successful adaptation to disease. During years of chronic disease, some patients adapt successfully whereas others experience anxiety, depression and limitations in physical functioning (e.g. Antonak; Komaroff and Penninx). Since failing adaptation cannot be fully explained by (increasing) disease severity (e.g. Rudick, Miller, Clough, & Farmer, 1992), there is a need to evaluate the impact of psychological characteristics including optimism. A growing number of studies demonstrate that optimism is a relevant predictor of psychological and physical functioning in patients suffering from rheumatoid arthritis (Brenner, Melamed, & Panush, 1994), multiple sclerosis (Barnwell & Kavanagh, 1997), breast cancer (Carver et al., 1993), diabetes mellitus (Kavanagh, Gooley & Wilson, 1993), and HIV infection (Taylor, Kemeny, Aspinwall, Schneider, Rodriguez, & Herbert, 1992). It has been shown that optimistic patients employ more problem-focused coping strategies and more effective ways of emotional regulation, both of which are factors that contribute to better functioning (Carver and Taylor). However, the issue of how optimism may affect adaptation to chronic disease over a longer period of time is still a matter of debate. To improve insight in the mechanisms that determine the impact of optimism on adaptation (anxiety, depression and physical functioning), we investigated the role of optimism in adaptation over a one year period with a particular interest in the stability of optimism and its relation to coping.

Controllability of disease is expected to moderate the adaptiveness of optimism on coping and adaptation, which will be clarified in the following.

1.1. Optimistic beliefs

Optimism has been differently defined in the literature. Research showed that optimism is represented by three basic beliefs, namely positive outcome expectancies, positive efficacy expectancies, and positive unrealistic thinking (Fournier; Fournier and Schwarzer).

Positive outcome expectancies, "the tendency to believe that one will generally experience good outcomes in life (Scheier & Carver, 1985) represent expectancies generalised across a variety of situations. Positive outcome expectancies are a key component in the theory of behavioural self-regulation (Carver & Scheier, 1998), which explains the degree of engagement in obtaining desired (or alternative) outcomes. Patients with positive outcome expectancies display engagement in dealing with their health, even when they are confronted with uncontrollable or unattainable aspects of their health. In that case, patients remain mentally engaged and turn to new realistic attainable goals by focusing on specific, proximal problems (Folkman & Moskowitz, 2000).

Positive efficacy expectancies are "the global confidence in one's coping ability across a wide range of demanding situations" (Schwarzer, 1994), representing the belief that one is capable of exercising control over events that affect one's life (Bandura, 1988). Positive efficacy expectancies are a key component in social cognitive theory (Bandura, 1988), which explains behavioural persistence and effectiveness. As a consequence, patients with positive efficacy expectancies will handle their disease more competently resulting in emotional and behavioural adaptation (Maddux & Lewis, 1995). It is expected that positive efficacy expectancies are particularly adaptive in controllable chronic disease where skill is required (see Clarke, Hill, Lovegrove, Williams, & Machperson, 2000), but maladaptive in uncontrollable chronic disease. Previous research showed that control expectancies are stress inducing where circumstances are uncontrollable (Affleck, Tennen, Pfeiffer, & Fifeld, 1987).

Positive unrealistic thinking is "the strategy to cognitively distort reality by the belief that pleasant events are more likely to happen to the self than to others, and the belief that negative events are less likely" (Weinstein, 1980). Positive unrealistic thinking is a key component in the theory of cognitive adaptation (Taylor, 1989). It explains how patients are buffered against the assimilation of negative information into their expectancies and beliefs. Positive unrealistic thinking helps patients to accentuate the positive elements of their disease and play down the negative ones, which prevents anxiety, depression and physical apathy. However, positive unrealistic thinking involves an illusion of invulnerability, which can hinder the practice of appropriate health behaviours and undermine one's health where it depends on health behaviours (Weinstein, 1980).

1.2. Stability of optimism and its long-term adaptativeness for chronic disease

The impact of optimistic beliefs on emotional and behavioural adaptation over time is, to a substantial degree, dependent on the stability of optimism. When patients become more pessimistic during disease course, adaptation will be threatened. However, the theory states that optimistic beliefs are generally stable and will decrease only when confronted with repetitive major stressors (Bandura; Carver and Janoff). Notwithstanding this, it may be possible that optimistic beliefs are maintained by means of coping strategies employed to deal with disease-related stressors (Folkman & Moskowitz, 2000) and thereby prevent a reduction of optimistic beliefs. This would mean that not only optimism contributes to coping but also that coping contributes to staying optimistic.

In the present study, it is expected that optimistic beliefs are stable over an extended period of time and that their stability is maintained by two supplementary coping strategies, namely task-oriented coping (problem solving) and emotion-oriented coping (emotional ventilation, self-criticism, acknowledging emotions). Thus, while optimism may contribute to coping, it is also possible that coping contributes to optimism.

Second, as optimistic beliefs are likely to be stable, it is expected that the impact of optimistic beliefs on adaptation will remain intact over an extended period of time. More particularly, we hypothesise that optimistic beliefs influence anxiety, depression and physical functioning, mediated by task and emotion-oriented coping over 6 months and 12 months of chronic disease.

1.3. Controllability of chronic disease

Controllability of disease is expected to moderate the impact of optimistic beliefs on coping and adaptation. Controllability can be defined as the actual or perceived ability to determine outcomes of an event (Eitel, Hatchett, Friend, Griffin, & Wadhwa, 1995). In the present study, the extent of controllability of disease was determined by using the medical knowledge on the self-care options of disease, and by measuring the perceived health locus of control (Felton, Revenson, & Hinrichsen, 1984). By examining the optimistic beliefs in a largely controllable, a partly controllable and a largely uncontrollable chronic disease, it is possible to determine whether the impact of optimistic beliefs on coping and adaptation depends on the controllability of chronic disease.

A largely controllable disease is type 1 diabetes mellitus (IDDM), which is characterised by a dysfunctional metabolism system with fatal consequences if untreated. To survive, patients have to monitor and adjust their blood glucose level by means of daily insulin injections and life style monitoring (Cox, Gonder-Frederick, & Saunders, 1991). Although the symptoms are quite responsive to monitoring, the long-range effects of disease progression are largely unpredictable (Felton et al., 1984). A partly controllable disease, rheumatoid arthritis (RA), is characterised by a progressive and unpredictable course, with intermittent periods of disease flare and remission. By adjusting rest, exercise and medication to the changing disease activity, patients can partly alleviate their pain, the extent of joint destruction and physical functioning (Lorig, Seleznick, Lubeck, Ung, Chastain, & Holman, 1989). In contrast to IDDM patients, self-care is less compelling and less effective for RA patients. As a largely uncontrollable disease, multiple sclerosis (MS) is characterised by an unpredictable and variable course, with varying types of neurological symptoms, fatigue, cognitive deficits, and pain (Paty & Poser, 1984). The lack of any cure or treatment, and the unpredictability of exacerbation and remission means that MS patients have to adapt to the uncontrollability and to accept the consequences of their increasing disability on their social and vocational life (Antonak & Livneh, 1995). MS patients have a few options through which they can regulate their disease, for example, stress management, exercise, and self-actualisation (Stuifbergen, 1995.). However, these self-care options only have a limited influence on disease related factors and quality of life (Stuifbergen, 1995).

On the basis of theoretical differences in the role of optimistic beliefs combined with the differences in controllability of these three diseases, we expect positive efficacy expectancies to be more adaptive in IDDM and less adaptive in MS. Positive efficacy expectancies help patients to handle those conditions where skill is required (IDDM), while these expectancies will frustrate patients in circumstances where skills are ineffective (MS). Furthermore, we expect positive unrealistic thinking to be more adaptive in MS and less adaptive in IDDM. Positive unrealistic thinking helps patients to deal with uncontrollable conditions (MS) as it causes some kind of unawareness which protects patients against despondency, while this unawareness may hinder those patients that need to control their disease by means of attention (IDDM). Positive outcome expectancies are expected to be similarly adaptive in all three diseases.

1.4. Research questions

Preceding the main research questions, we first addressed the question: Are optimistic beliefs stable over 12 months of disease and do coping strategies contribute to the stability of optimistic beliefs? Then, the following research questions will be addressed: Do optimistic beliefs predict a decrease in anxiety and depression and an increase in physical functioning mediated by coping strategies after 6 months, and after 12 months? Does disease controllability moderate the impact of optimism on coping strategies, anxiety, depression and physical functioning? In order to investigate these questions, the three optimistic beliefs and their impact on coping, anxiety, depression and physical functioning are studied in a prospective design by means of path models.

2. METHOD

2.1. Procedure

Patients were approached via their physician at the outpatient department of five hospitals in the Netherlands. They were eligible for inclusion in the study if they met the following criteria: (1) diagnosis according to the criteria for classification (type 1 diabetes: ECDCD, 1997); (MS: Poser et al., 1983); (RA: ACR-1987-criteria, Arnett et al., 1988); (2) age between 18 and 65 at the time of the interview; (3) diagnosed at least 1 year prior to the study. Patients were excluded where they met the following criteria:

(1) severe disability due to disease [IDDM: retinopathy, neuropathy, renal disease and macrovascular disease; RA: class IV functional status of the ACR-1991 (Hochberg, Chang, Dwosh, Lindsey, Pincus, & Wolfe, 1992); MS: Expanded Disability Status Scale (EDSS) 7.0 and higher]; (2) significant comorbidity (such as asthma, heart disease, cancer); (3) receiving psychotherapy, psychosocial counselling or using psychotropic medication at the start of the study.

Inclusion and exclusion criteria were chosen in order to make the phase of adaptation for the three diseases as comparable as possible. Patients in their first year of diagnosis were excluded because during that year, patients are confronted with different adaptive tasks: IDDM patients experience the 'honeymoon' period with temporary recuperation of the metabolism system (Heinze & Thon, 1983), RA patients grapple with the severe physical effects (Shaul, 1995), while MS patients generally experience temporary relief followed by an emotional collapse (Antonak & Livneh, 1995). One year post diagnosis, patients are aware of the irreversibility of their disease and the fact that they have to carry on with their life regardless of the changes in their circumstances.

2.2. Participants

The physicians distributed a leaflet on the study among 155 IDDM patients, 158 RA patients and 155 MS patients. Agreement to participate in the study was given by 104 IDDM patients (response rate is 67%), 95 RA patients (60%) and 98 MS patients (63%) who also gave informed consent. The first measure includes a number of questionnaires and took place in the hospital. The second and third measure, 6 and 12 months later, included questionnaires that were mailed to the patients. In the present study, we will report on patients for whom complete data on the three measures are available: 90 IDDM patients, 89 RA patients and 90 MS patients. More male than female IDDM patients dropped out of the study (P=0.02), and more severely ill RA and MS patients dropped out (P<0.05). There were no further differences with the full samples on demographic and disease characteristics.

As can be seen in Table 1, the male–female proportions were comparable in the IDDM, RA and MS sample, as were the number of patients with a partner. Significantly more IDDM than RA and MS patients had a job, and more MS patients had a job than RA patients. This is likely to be related to differences in educational level, age and disease severity between the samples. IDDM patients were significantly younger and had a better physical state than MS patients, who in turn were younger and were better educated than RA patients. Despite these differences, it appeared that the samples experienced a comparable phase of adaptation, as 80% of the IDDM and RA patients, and 84% of the MS patients indicated that although they realised that they had a chronic disease, their feeling was that their life was continuing (integration phase). This information was gathered by asking patients to give their preference for one or more of five sentences each indicating a different adaptation phase (denial, resistance, grief, acceptance and integration) (Zwanikken, 1997).

[TABLE 1]

2.3. Measures

Controllability, optimistic beliefs, coping and adaptation were assessed with the following questionnaires.

2.3.1. Controllability of disease

By measuring controllability, we were able to ascertain that the three diseases differ significantly with respect to controllability. Controllability of disease was measured by the *Multidimensional Health Locus of Control scale* (MHLC) (Halfens and Wallston) consisting of 18 items measuring Internal Locus of Control, External Locus of Control ascribed to Powerful Others, and to Chance. Participants were asked to indicate their agreement on a six-point Likert scale ranging from strongly agree (1) to strongly disagree (6). A lower score means a greater magnitude of the specified locus of control. In the present study, Cronbach's Alpha's for the Internal scale and Powerful Others scale were above for 0.70 for the three diseases. Cronbach's Alpha for the Chance scale was 0.60 for the IDDM sample, 0.53 for the IDDM sample and 0.58 for the MS sample. The latter reliability scores are borderline but we will still use the Chance scale in our analyses.

2.3.2. Optimistic beliefs

Outcome expectancies were measured by the Revised Version of the Life Orientation Test (LOT-R) (Scheier, Carver, & Bridges, 1994), that consists of six items and four filler items. Participants were asked

to indicate their agreement with the items on a five-point Likert scale ranging from strongly disagree (0) to strongly agree (4). Scheier et al., 1994. showed that the LOT-R measures optimism as one dimension in an internally consistent way. Cronbach's Alpha's in the present study varied from 0.77 (t1), 0.72 (t2) to 0.80 (t3) in the IDDM sample, from 0.55 (t1), 0.63 (t2) to 0.74 (t3) in the RA sample, and from 0.66 (t1), 0.83 (t2) to 0.87 (t3) in the MS sample.

Efficacy expectancies were measured by the Generalized Self-Efficacy Scale (Schwarzer, 1993) consisting of 10 items. A higher score reflects more confidence in one's coping capacity and ability to handle difficult situations. The scale is internally consistent and valid (Schwarzer, 1993). Cronbach Alphas were above 0.84 for each disease on each time point.

Unrealistic thinking was measured using the Comparative Risk Judgement Rating Forms (Weinstein, 1980). Participants were asked to judge their chances of experiencing 13 (non-typical illness-related) situations when compared to the average person of the same age, sex, and with the same kind of disease. Possible responses range from −4 to 4, and were transformed 1–9 in the analyses. Cronbach's Alphas were above 0.71 for each disease on each time point.

2.4. Coping

Task-oriented, emotion-oriented and avoidance coping were measured using the short form of the Coping Inventory for Stressful Situations (Endler and Endler), which consists of 21 items. The short form was developed by eliminating items with the lowest item-total correlations from the CISS in a large normative sample of college students (Endler & Parker, 1999). The CISS has proven to be a psychometrically sound instrument for measuring coping in healthy populations as well as in patient samples (Endler and Sm), and the CISS-21 appears to be valid and reliable in healthy populations (Endler & Parker, 1999). As avoidance coping was not even weakly associated with optimistic beliefs or the outcome measures (with the exception of a small but significant relation with depression at the second time point, r=−0.13; P=0.04), it can not mediate the role of optimistic beliefs (see Baron & Kenny, 1986). As our major focus was on the role of optimistic beliefs, avoidance coping was excluded from the analyses. Cronbach's Alphas were above 0.74 for each disease at each time point.

2.4.1. Adaptation

The Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983), a 14-item self-report scale measured anxiety and depressive symptoms with seven items measuring anxiety and seven items measuring depression. The HADS is relatively free of criterion contamination by somatic items, which was confirmed in RA patients (Pincus, Griffith, Pearce, & Isenberg, 1996). Cronbach's Alphas for the Anxiety and Depression scale were above 0.72 for each disease on each time point, with the exception of a Cronbach's Alpha of 0.60 for RA sample on time 1.

Physical functioning was measured by the physical functioning scale (PF) of the Outcome Study 36-Item Short-Form Health Survey (SF-36) (Ware & Sherbourne, 1992). This scale consists of 10 self-report items and is internally consistent and valid (Van der Zee & Sanderman, 1993). A lower score means more limitations in physical activities (including mobility range and activity level). Cronbach's Alphas were above 0.76 for each disease on each time point.

2.4.2. Disease severity

Self-reported disease-specific symptoms checklists measured severity of the illness. In the IDDM-sample, patients were asked to indicate the presence of six diabetes-related symptoms (including unstable blood sugar level, impaired vision, decreased sensitivity of feet/hand) by yes (1) or no (0). The symptoms were significantly related to the present HbA1c or glycosylated hemoglobin (r=0.25; P<0.05; n=69). RA patients were asked to indicate the presence of 16 RA-related symptoms (including stiff joints, pain, fatigue, and noduli) by yes (1) or no (0). The RA symptoms were significantly related to the present erythrocyte sedimentation rate (ESR) (r=0.33; P<0.01; n=89). MS patients were asked to indicate the frequency they experienced 22 neurological related symptoms (including skeletal functions, kinaesthetic and head functions) (Gulick, 1988) from never (0) to always (5). The MS symptoms were significantly related to the present EDSS (Kurtzke, 1983) (r=0.51; P<0.001; n=54). The disease-specific symptom scales were made comparable by multiplying the IDDM score (by 22/6 × 5) and RA score (by 22/16 × 5), making the range of scales commensurate to the MS score.

2.5. Analyses

Initial analyses were conducted to examine the association of demographic characteristics with optimistic beliefs, coping and adaptation at baseline measure. To explore whether optimism and outcome measures change over 12 months, ANOVAs were conducted checking for differences between the three disease samples in changes over 12 months.

By means of a path model, we analysed whether a change in the use of coping strategies really led to a change in optimistic beliefs over 6 months, or whether the reverse relationship was more plausible (Plewis, 1985). For these analyses, the auto-relationships of coping strategies and optimistic beliefs were determined. If the path value from coping (t1) to optimistic beliefs (t2) is significant and the path value from optimistic beliefs (t1) to coping is not significant (t2), then a causal relation is likely from coping to optimism. When path values do not differ significantly from each other, causality is likely to be reciprocal. We finally determined the causality of the relations between coping and optimistic beliefs on the same time point (t2) and vice versa.

Next, adaptation models were analysed to investigate whether the three optimistic beliefs contribute to changes in adaptation over 6 months and over 12 months. The input was the correlation matrix with SDs for the measures. Modifications in the model were based on *t*-values of the parameters and the fit measures (χ^2, St.RMR, AGFI)[1] (Jöreskog & Sörbom, 1996). We did not use latent variables to facilitate the exploration of already complex models.

Adaptation models were based on the coping model of Lazarus and Folkman (1984), assuming that the three optimistic beliefs directly relate to adaptation (anxiety, depression and physical functioning), as well as indirectly through more use of task-oriented coping and less emotion-oriented coping. The impact of relevant disease and demographic characteristics was controlled for. In addition, covariances of residuals of variables at similar positions in the model were estimated. For example, covariances of residuals of the optimism measures were estimated, as were covariances of residuals of anxiety and depression, of depression and physical functioning, and of task-oriented and emotion-oriented coping. Furthermore, covariances of the independent variables at similar positions were also estimated (Jöreskog & Sörbom, 1996).

In accordance with the guidelines for testing models with both mediation and moderation (Baron & Kenny, 1986), two steps were analysed. In the first step, we investigated whether task and emotion-oriented coping mediate the impact of optimism on change in adaptation over 6 and 12 months. In the second step, we investigated whether disease controllability and its interaction with each optimistic belief contributed to the use of coping strategies and to a change in the report of anxiety, depression and physical functioning. To eliminate multicollinearity effects between the optimism variables and the moderator, before analysis, optimism and moderator variables were centred (minus mean), and the interaction variables were formed by multiplying together the two centred predictors (Aiken & West, 1991). Two models were constructed to determine whether the impact of optimistic beliefs on change in adaptation remains similar over 6 and 12 months.

3. RESULTS

3.1. Association of demographic characteristics with optimistic beliefs, coping and adaptation

Being employed is significantly related to more positive outcome expectancies (r=0.16; P<0.05), more positive unrealistic thinking (r=0.21; P<0.001), more task-oriented coping (r=0.18; P<0.01), less depression (r=−0.22; P<0.001) and better physical functioning (r=0.12; P<0.05). Older age is significantly related to less positive outcome expectancies (r=−0.14; P<0.05), less use of task and emotion-oriented coping (r=−0.19 and r=−0.13; P<0.05), more depression (r=0.24; P<0.001) and less physical functioning (r=−0.50; P<0.001). Disease severity is significantly related to all variables in the expected direction. All associations with gender and disease duration were non-significant. We controlled for the impact of being employed, age and disease severity in the path models.

3.2. Change in optimism, coping and adaptation to chronic disease

As presented in Table 2, positive outcome expectancies (LOT-R) and efficacy expectancies remained stable over 12 months while positive unrealistic thinking decreased significantly. There was no significant change in adaptation with the exception of an increase in depression. The use of task-oriented coping

increased in IDDM patients only. There were no further differences between the three diseases in the course of emotion-oriented coping, avoidance coping, anxiety, physical functioning and disease severity.

[TABLE 2]

3.3. Path model of the impact of coping strategies on optimistic beliefs

As presented in Fig. 1, it appears that an increase in positive outcome and efficacy expectancies is significantly predicted by more use of task-oriented coping, with an additional impact of less use of emotion-oriented coping on an increase of positive outcome expectancies. Causality was not reciprocal, as change in coping strategies was not predicted by change in optimistic beliefs. Nevertheless, positive efficacy expectancies led to more use of task-oriented coping when measured at the same time (and not vice versa) and positive outcome expectancies lead to less use of emotion-oriented coping. Thus, it seemed that chronically ill patients who use task-oriented coping and less emotion-oriented coping over 6 months of disease become more optimistic about their outcomes and abilities, which in turn influence the use of coping strategies. Unrealistic thinking is not dependent on the use of coping strategies nor determines their use. The model fits the data satisfactorily (χ^2=30.0; DF=27; *P*=0.313; St. RMR=0.0560; AGFI=0.96).

[FIGURE 1]

3.4. Controllability of chronic disease

IDDM patients perceived a significantly higher level of internal locus of control than RA and MS patients [IDDM: *m*=6.0 (4.7); RA: *m*=21.9 (5.2); MS: *m*=21.7 (5.2), *P*<0.001]. RA patients reported more frequently than IDDM and MS patients that their health is controlled by their doctor [IDDM: *m*=27.0 (4.8); RA: *m*=24.0 (4.9); MS: *m*=27.8 (5.4); *P*<0.001]. MS patients reported more often than RA and IDDM patients that their health depends upon chance factors, and RA patients, in their turn, reported significantly more than IDDM patients that their health depends upon chance factors [IDDM: *m*=25.5 (4.6); RA: *m*=21.8 (4.6); MS: *m*=20.0 (5.1); *P*<0.001]. In these comparisons we controlled for differences in disease severity, age and disease duration, which did not change the findings.

These results indicate that IDDM can be characterised as highly controllable, RA as moderately controllable and MS as least controllable. In the path models, we used one variable for disease controllability based on the Chance LOC as the three samples were significantly different on this scale. Specifically, we indicated 25.5 for most controllable (IDDM), 21.8 for moderate controllable (RA) and 20.0 for least controllable chronic disease (MS).

3.5. Path model of the impact of optimism on adaptation over 6 and 12 months

Since the path model for the impact of optimism on adaptation over 12 months was highly similar to the 6-month path model, the 12-month model will be presented. We will then present the differences with the 6-month model. First, we studied whether coping strategies mediate the impact of the three optimistic beliefs on anxiety, depression and physical functioning controlling for the disease severity. As can be seen in the correlation matrix presented in Table 3, optimism is significantly related to task- and emotion-oriented coping. After controlling for the impact of anxiety, depression and physical functioning at time 1, we found that task- and emotion-oriented coping contributed to changes in anxiety and depression over 12 months, while they did not contribute to changes in physical functioning. Thus, the impact of optimism on mental health but not physical health is mediated by coping strategies (see Fig. 2).

[TABLE 3]

[FIGURE 2]

After controlling for disease severity, age and employment status, we found that positive outcome expectancies contributed to a decrease in anxiety and depression over a period of 12 months by using less emotion-oriented coping (for example less self-criticism), while positive outcome expectancies led also directly to less depression. Efficacy expectancies contributed to a decrease in anxiety and depression by using less emotion-oriented coping and more task-oriented coping. Positive unrealistic thinking did not play a role in the present changes in adaptation. Physical functioning was not influenced by optimistic beliefs or

coping strategies, and was primarily (negatively) determined by disease severity and older age of the participants.

Over a 6-month period (in contrast to a 12-month period), it appeared that positive outcome expectancies were only indirectly related to less depression while positive efficacy expectancies were also directly related to less anxiety. Moreover, it appears that disease severity influences the adaptation process less extensively: greater disease severity led to poorer physical health but not to poorer mental health.

Adding the interaction variables showed that controllability moderates the impact of positive efficacy expectancies on task-oriented coping, and moderates the impact of positive unrealistic thinking on the use of emotion oriented coping. More specifically, IDDM patients with more positive efficacy expectancies use more task-oriented coping than IDDM patients with less positive efficacy expectancies, while in RA and MS, the extent of positive efficacy expectancies are not related to the use of task-oriented coping. Furthermore, compared to RA and MS patients, IDDM patients who think in an unrealistically positive manner use less emotion-oriented coping, with positive consequences for their mental health. The 12-month model fits the data satisfactorily (χ^2=113.4; DF=121; *P*=0.676; St. RMR=0.044; AGFI=0.94), as did the 6-month model (χ^2=127.3; DF=124; *P*=0.402; St. RMR=0.045; AGFI=0.94). See Table 4 for the Gamma-values of the paths in the models.

[TABLE 4]

4. DISCUSSION

To improve insight into the long-term impact of optimistic beliefs on adaptation to chronic disease, we first examined whether optimistic beliefs remain stable over 12 months of chronic disease and whether their stability can be attributed to the use of coping strategies. Then, we investigated whether optimistic beliefs influence anxiety, depression and physical functioning via coping strategies, over an extended period of time (6 and 12 months) of chronic disease. And finally, the moderating effect of disease controllability on the impact of optimistic beliefs on coping and adaptation was determined. Optimistic beliefs included outcome expectancies, efficacy expectancies and unrealistic thinking.

The present findings demonstrate that the adaptiveness of optimistic beliefs is, to a considerable extent, dependent on the stability of optimism, and on the effectiveness of coping strategies in dealing with stressors that would otherwise cause a reduction of optimistic beliefs. More specifically, positive outcome and efficacy expectancies were generally stable over 12 months of chronic disease and this stability was the result of using more task-oriented and less emotion-oriented coping, while the reduction of positive unrealistic thinking was not. In turn, chronically ill patients with positive outcome and efficacy expectancies report better mental health over 6 and 12 months of chronic disease by using more task-oriented and less emotion-oriented coping. In contrast, unrealistically positive thinking did not contribute to adapting to chronic disease over an extended period of time. Furthermore, controllability of chronic disease moderated the adaptiveness of positive efficacy expectancies and unrealistic thinking for mental health, which we will discuss in the following.

Before we discuss these findings, we want to point out a number of critical points associated with the study. First, the present sample may not be representative of the referent populations. By excluding the severely impaired, we included only those IDDM, RA and MS patients who were relatively young and who had been ill for a relatively short period. However, the male/female ratio, age and illness duration of each disease sample was largely comparable to moderately impaired patients in other studies (e.g. IDDM: Irvine, Cox & Gonder-Frederick, 1992; RA: Haller, Holzener, Mur & Günther, 1997; MS: Zwanikken, 1997). Therefore, the results of the present study can be applied reliably to those chronically ill who are partly impaired by disease but who are not completely out of action as a result of being ill.

A second limitation lies in the measure of physical functioning. In contrast to Scheier et al. (1989) who found a positive relation between optimism and physical functioning in coronary bypass patients, the present study showed that a change in physical functioning was not influenced by optimistic beliefs. As physical functioning, measured by the SF-36, was determined by basic activities like housecleaning, walking and bathing, this measure may not be sensitive enough to detect small changes in physical activities that could be caused by optimistic beliefs. We assume that a measure of physical functioning which would also account for more deliberately chosen activities, like indulging in a hobby, playing a sport or balancing one's rest and activities, would be more sensitive. Also, it seems likely that when chronically

ill patients have stabilised their physical functioning, as is the case in the present study, changes in physical functioning were primarily medically determined.

Despite these critical points, the present study provides a systematic exploration of the long-term adaptiveness of three optimistic beliefs and the moderating impact of controllability of chronic disease. Positive outcome and efficacy expectancies appear to be consistently adaptive during chronic disease and their stability was maintained by using more task-oriented and less emotion-oriented coping. It is likely that coping strategies enable patients to deal with those stressors that affect optimistic beliefs, but it may be possible that mechanisms other than coping strategies explain the stability of optimism. Empirical research into the underlying factors that contribute to the stability of optimistic beliefs is absent, probably because optimistic beliefs are generally defined as stable personality characteristics. Nevertheless, recent views of personality suggest that both trait and state aspects of personality can be distinguished (Shifren, 1996), and we would recommend research to explain temporary changes in personality characteristics.

In contrast to the stability of positive outcome and efficacy expectancies, we found that positive unrealistic thinking was not restored by the use of coping strategies and decrease over an extended period of chronic disease. Its independence of coping strategies is in line with Peeters, Cammaert, and Czapinski (1997) who noted that positive unrealistic thinking is a survival mechanism or “will to live”, and is therefore an adaptive characteristic in itself. On the other hand, Taylor (1989) proposed that positive unrealistic thinking recovers following adversity by regaining control and shifting the target of control to those aspects of the situation that are still controllable. It is likely that suffering from a chronic disease may restrict control possibilities during the disease course, which may explain a decrease in positive unrealistic thinking.

The adaptiveness of positive efficacy expectancies and unrealistic thinking was found to differentiate with the controllability of chronic disease. Positive efficacy expectancies led to task-oriented coping when patients suffered from a controllable disease, while they were not functional when patients suffered from an uncontrollable chronic disease that may have negative consequences for their mental health. In accordance, several studies found that control beliefs (or efficacy expectancies) lead to more distress when patients are confronted with uncontrollable disease (e.g. Christensen and Eitel), since under these circumstances control over disease becomes a burden (Brownell, 1991).

Furthermore, in contrast to more uncontrollable chronic disease (RA and MS), positive unrealistic thinking led to less use of emotion-oriented coping when chronic disease is largely controllable (IDDM). Since one's expectation of being invulnerable proves to be false in more uncontrollable disease, patients may be overwhelmed by their emotions and may be less inclined to cope with these emotions (Tennen & Affleck, 1987). These findings are in contrast to Taylor et al.'s (1992) statement that positive illusions are especially important when people face severe threats. In the case of largely controllable disease (IDDM), however, unrealistically positive thinking helps patients to adapt to their situation, which is in line with the theory of cognitive adaptation (Taylor, 1989).

The negative relation found between emotion-oriented coping and mental health may also be explained by the specific emotion-oriented coping scale of the CISS, which is confounded with distress and self-deprecation like most measures of emotion-oriented coping (Stanton, Danoff-Burg, Cameron, & Ellis, 1994). However, when unconfounded emotional approach coping (acceptance and dealing with emotions) was measured in healthy individuals, a negative relation also emerged between emotion oriented coping and mental health (Stanton et al., 1994), although this relation was less strong than in our study. Thus, even though the emotion-oriented coping scale of the CISS could be criticized and seems to measure approaching emotions without accepting them (disengagement), it appears to be a sufficiently adequate method of determining the role of optimism in adapting to chronic disease.

The trait measure of coping strategies may explain the relative stability of coping in the present study. A state approach may have been more appropriate, as it might show coping changes in response to particular types of situations over time (Endler & Parker, 1999). Nevertheless, a trait measure of coping makes it possible to examine the way patients cope in general across different types of stressful situations, specific and also not specific to their disease. It thus gives more information about the general way optimistic patients deal with problematic situations.

In conclusion, the present findings represent the role of optimistic beliefs to adaptation beyond specific chronic disease. The mental health of chronically ill patients who are optimistic about their outcomes improves over time. We found control-related differences for the impact of optimism on coping with chronic disease. Optimism about abilities as well as positive unrealistic thinking are effective when patients

are able to control their disease. Although these findings were based on prospective data, experimental research is planned to further test the differential adaptiveness of optimistic beliefs for chronic diseases.

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[1] Several measures indicate the fit of the model, three of which will be applied in the present study. (1) χ^2 indicates the discrepancy between the covariance matrix predicted by the model and the observed

covariance matrix; a significant discrepancy (*P*-value) results in model rejection. (2) *Standardized Root Mean Square Residual* (St. RMR) is a measure of the average of fitted residuals; where a lower value means a better model fit. (3) *Adjusted Goodness of Fit index* (AGFI) measures how much better the model fits compared to no model at all. The AGFI should be above 0.92.

TABLES AND FIGURES

Table 1
Demographic information of IDDM, RA and MS[a]

Scale	IDDM ($n=90$) (%)	RA ($n=89$) (%)	MS ($n=90$) (%)	F	*P*
Sex (male:female)	39:61	34:66	38:62	0.03	ns
Partner	78	84	82	0.07	ns
High education (university >)	36	20a	42b	5.31	<0.01
Paid employment	82a	35b	58b	24.18	<0.001
Age					
Mean (S.D.)	33.7 (9.5)a	52.0 (9.2)b	44.4 (9.0)bc	89.42	<0.001
Range	18–64	30–65	20–63		
Illness duration					
Mean (S.D.)	11.1 (4.4)a	5.9 (4.2)b	3.6 (3.5)bc	80.88	<0.001
Range	1–17	1–15	1–17		
Disease severity					
Mean (S.D.)	14.9 (16.9)a	29.9 (17.4)b	30.5 (14.9)b	26.08	<0.001
Range	0–73	0–79	0–77		

[a] Values with different letters are significantly different (Scheffé test).

Table 2
Changes in optimistic beliefs, coping, anxiety, depression, physical functioning and disease severity over 6 and 12 months in chronic diseases ($n=269$)[a]

Scale	Time 1		Time 2 (6 months)		Time 3 (12 months)		ANOVA
	m	S.D.	*m*	S.D.	*m*	S.D.	*P* (*F*)
Optimism							
Outcome expectancies	16.7	3.5	16.6	3.8	16.9	3.8	ns
Efficacy expectancies	30.2	4.6	29.5	4.8	29.4	4.9	ns
Unrealistic thinking	76.3a	13.1	73.5b	13.3	72.8b	13.1	<0.001
CISS-21							
Task-oriented coping[b]	20.5	5.0	21.2	5.5	21.0	5.8	ns
Emotion-oriented coping	13.2	4.1	13.3	4.2	12.9	4.3	ns
Avoidance coping	15.6	4.8	15.0	4.9	15.3	4.6	ns
HADS							
Anxiety	5.0	3.4	5.1	3.7	5.1	3.5	ns
Depression	3.2a	2.8	3.7b	3.5	3.6b	3.3	<0.01
Physical functioning	24.0	5.6	23.8	5.7	24.1	5.7	ns
Disease severity	25.1	17.9	24.3	18.5	23.4	18.3	ns

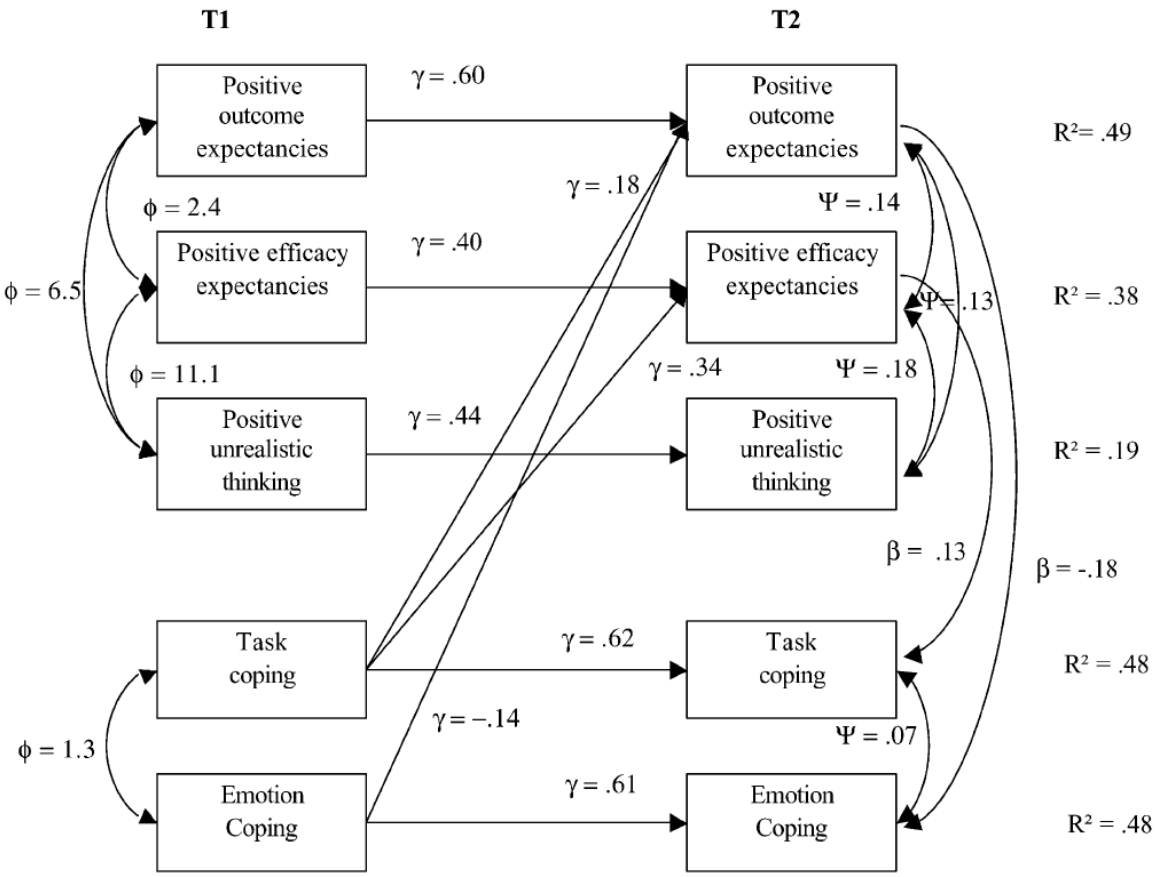
[a] Values with different letters are significantly different (Scheffé test).
[b] Difference between IDDM, RA and MS samples in the development over time (interaction effect).

Table 3
Correlation matrix of optimistic beliefs, disease related variables, coping and adaptation ($n = 269$)

	Outcome expect. (T1)	Efficacy expect. (T1)	Unrealistic thinking (T1)	Disease severity (T1)	Control-lability (T1)	Anxiety (T1)	Depression (T1)	Physical functioning (T1)	Task coping (T2)	Emotion coping (T2)
Time 1										
Outcome expectancies										
Efficacy expectancies	0.22 ***									
Unrealistic thinking	0.23 ***	0.19 **								
Disease severity	−0.27 ***	−0.21 ***	−0.26 ***							
Disease controllability	0.01	0.09	0.03	−0.39 ***						
Anxiety	−0.47 ***	−0.30 ***	−0.23 ***	0.30 ***	−0.03					
Depression	−0.50 ***	−0.20 ***	−0.18 **	0.36 ***	−0.14 *	0.53 ***				
Physical functioning	0.20 ***	0.13 *	0.25 ***	−0.59 ***	0.58 ***	−0.15 *	−0.42 ***			
Time 2										
Task-oriented coping	0.08	0.26 ***	0.09	−0.11	0.28 ***	−0.09	−0.17 **	0.28 ***		
Emotion-oriented coping	−0.31 ***	−0.20 ***	−0.16 **	0.12 *	0.06	0.48 ***	0.30 ***	−0.01	0.07	
Anxiety	−0.38 ***	−0.33 ***	−0.24 ***	0.28 ***	0.03	0.72 ***	0.42 ***	−0.13 *	−0.16 **	0.50 ***
Depression	−0.46 ***	−0.17 **	−0.15 *	0.33 ***	−0.17 **	0.48 ***	0.69 ***	−0.33 ***	−0.26 ***	0.43 ***
Physical functioning	0.24 ***	0.16 **	0.24 ***	−0.57 ***	0.55 ***	−0.16 **	−0.46 ***	0.89 ***	0.29 ***	−0.05
Time 3										
Anxiety	−0.34 ***	−0.28 ***	−0.23 ***	0.31 ***	−0.03	0.66 ***	0.45 ***	−0.17 **	−0.16 *	0.46 ***
Depression	−0.45 ***	−0.19 **	−0.18 **	0.39 ***	−0.18 **	0.46 ***	0.68 ***	−0.34 ***	−0.25 ***	0.37 ***
Physical functioning	0.24 ***	0.13 *	0.19 **	−0.58 ***	0.54 ***	−0.13 *	−0.45 ***	0.84 ***	0.28 ***	−0.02

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Fig. 1. Impact of changes in coping strategies on changes in optimistic beliefs.



χ2 (df = 27) = 30.0 (p= .313)
AGFI = .957
St.RMR = .0560

Demonstrated path coefficients are significant at p < .05 and lower.
Reciprocal paths between the dependent variables represent covariances of residuals.

Table 4
Gammas of path model presenting the impact of optimistic beliefs on adaptation to chronic disease after 6 and 12 months ($n = 269$)

	Time 2 (6 months)		Time 2 (6 months)			Time 3 (12 months)		
	Emotion coping γ (P)	Task coping γ (P)	Anxiety γ (P)	Depression γ (P)	Physical functioning γ (P)	Anxiety γ (P)	Depression γ (P)	Physical functioning γ (P)
Time 1								
Outcome expectancies (LOT-R)	−0.28 ***	–	–	–	–		−0.10 *	–
Efficacy expectancies	−0.14 *	0.26 ***	−0.11 *	–	–	–	–	–
Unrealistic thinking	–	–	–	–	–	–	–	–
Disease severity	–	–	–	–	−0.09 *	0.13 **	0.14 **	−0.12 **
Age	–	−0.20 ***	–	0.17 ***	−0.16 ***	–	0.11 *	−0.16 ***
Employment state	–	–	–	–	–	–	–	–
Controllability of disease	–	0 .16 *	–	–	–	–	–	–
Moderators								
Controllability × Outcome expectancies	–	–	–	–	–	–	–	–
Controllability × Efficacy expectancies	–	0.14 *	–	–	–	–	–	–
Controllability × Unrealistic thinking	−0.12 *	–	–	–	–	–	–	–
Baseline adaptation level								
Anxiety			0.59 ***			0.51 ***		
Depression				0.54 ***			0.44 ***	
Physical functioning					0.73 ***			0.67 ***

* $t > 2.00$; ** $t > 2.60$; *** $t > 3.10$.