Journal of Behavioral Medicine, Vol. 22, No. 4, 1999

Optimism and Adaptation to Multiple Sclerosis: What Does Optimism Mean?

Marijda Fournier,[1,2] Denise de Ridder,[1] and Jozien Bensing[1]

Accepted for publication: February 8, 1999

The aim of the present study was to determine the meaning of optimism by explicating the dimensions underlying the notion and their links to adjusting to MS. Seventy-three patients responded to optimism questionnaires (i.e., the LOT, Generalized Self-Efficacy Scale) and outcome questionnaires. In confirmatory factor analyses, the underlying dimensions of optimism were specified. Explanatory structural equation modeling was used to examine the relation of the dimensions of optimism to coping (CISS), depression (BDI), and impaired mobility range (SIP). Optimism was found to consist of three dimensions, namely, outcome expectancies, efficacy expectancies, and unrealistic thinking. Outcome and efficacy expectancies explained depression via emotion-oriented coping but did not explain impaired mobility range either directly or indirectly. Unrealistic thinking directly explained impaired mobility range. The present study can be seen as a first step in explicating the role of optimism in the management of chronic disease.

KEY WORDS: optimism; multiple sclerosis; adaptation.

INTRODUCTION

Multiple sclerosis (MS) is a serious autoimmune disease characterized by its unpredictable and variable course. MS produces varying degrees of neurological symptoms, cognitive problems, fatigue, and pain (Paty and Poser, 1984; Sibley, 1990). Given only limited possibilities for influencing the course and

[1] Department of Health Psychology, Utrecht University, P.O. Box 80140, 3508 TC Utrecht, The Netherlands.
[2] To whom correspondence should be addressed. e-mail: M.Fournier@fss.uu.nl.

0160-7715/99/0800-0303$16.00/0

symptoms of MS (Scheinberg, 1994), patients must learn to live with the uncertainty of the disease's progression, their symptoms, and the psychosocial consequences (Eklund and MacDonald, 1991). Activities of daily living are disrupted, including interpersonal, vocational, sexual, and family functioning (Eklund and MacDonald, 1991; Murray, 1995). The repeatedly adjustments, the inability to walk, the fatigue, and the uncertainty about the future are the most frustrating aspects of the disease (Buelow, 1991; Murray, 1995). Although some patients successfully manage these problems, satisfactory adaptation is not reserved for all patients, as can be seen from the prevalence of depression, which ranges from 27 to 54% (Minden and Schiffer, 1990). Although several studies have shown a significant relation between physical symptoms and adaptation (Rudick *et al.*, 1992; Zeldow and Pavlou, 1984), physical symptoms alone do not explain differences in psychological functioning (McIvor *et al.*, 1984; Walsh and Walsh, 1987). Adapting to MS also depends on coping skills (Aikens *et al.*, 1997; Brooks and Matson, 1982; Buelow, 1991; Eklund and MacDonald, 1991; Warren *et al.*, 1991), appraisal of one's symptoms (Wineman *et al.*, 1994), and the personal and social resources available to the patient (Shnek *et al.*, 1995; Stuifbergen and Rogers, 1997; Wassem, 1992; for review, see Murray, 1995).

The personal resource of optimism has been shown to play both a direct role and an indirect role (via coping by means of engagement) in the adaptation to such acute medical stressors as coronary bypass graft surgery (Fitzgerald *et al.*, 1993; Scheier *et al.*, 1989), early breast cancer surgery (Carver *et al.*, 1994, 1993), and rheumatoid arthritis (Brenner *et al.*, 1994; Holman and Lorig, 1992), in the sense of improved well-being and fewer physical symptoms. Although the definition of optimism seems quite obvious, examination of the literature reveals several different definitions: dispositional optimism (Scheier and Carver, 1985), generalized self-efficacy (Schwarzer, 1993; Bandura, 1988), optimistic explanatory style (Seligman, 1991), unrealistic optimism (Weinstein, 1980; Taylor, 1989), and defensive pessimism (Cantor and Norem, 1989). The purpose of the present study is to determine the relations between these definitions of optimism, along with their relation to the adaptation of patients with MS.

As can be seen, moreover, the definitions of optimism pertain to different aspects of optimism. Dispositional optimism is "the tendency to believe that one will generally experience good outcomes in life" (Scheier and Carver, 1985) and is based on the behavioral self-regulation theory of Carver and Scheier (1981). Generalized self-efficacy is "global confidence in one's coping ability across a wide range of demanding situations" (Schwarzer, 1994) and is based on the social learning theory of Bandura (1986). Optimistic explanatory style, the reverse of the depressive attributional style, pertains to one's tendency habitually to explain uncontrollable negative events by causes that are unstable, specific, and external and to explain positive events by causes that are permanent, general, and internal (Seligman, 1991; Peterson and De Avila, 1995). Unrealis-

tic optimism pertains to "the underestimation of the likelihood of experiencing negative events and the belief that positive events are more likely to happen to the self than to others" (Weinstein, 1980), and Taylor (1989) considers unrealistic optimism to be a kind of positive illusion. Defensive pessimism pertains to "a cognitive strategy that involves setting low expectations and ruminating about or 'playing through' possible outcomes, even if the problems in the past have always been managed" (Cantor and Norem, 1989; Norem and Crandall, 1991). Although defensive pessimists tend to have low expectations and moderate levels of anxiety prior to a stressful event, they nevertheless confront the situation and prepare extensively for possible negative events, which is in contrast to a pessimistic tendency to withdraw and avoid negative events. Optimists have positive expectations but the same coping manner as defensive pessimists (Showers and Ruben, 1990).

Some specific claims about the associations between the definitions of optimism have been made in the research literature. Schwarzer (1994) distinguishes functional versus defensive optimism and suggests that the two can be expected to negatively relate. Dispositional optimism, optimistic explanatory style, and generalized self-efficacy are classified as functional optimism because of their relations to effective health behaviors. Unrealistic optimism is classified as defensive optimism because of its presumably undermining effects on taking precautions, counteracting effective health behaviors. Both Schwarzer (1994) and Carver and Scheier (1981, 1994) distinguish outcome versus efficacy expectancies, while Wallston (1994) distinguishes cautious optimism (comparable to defensive pessimism) versus cockeyed optimism (comparable to unrealistic optimism).

Evidence in favor of one set of relations over another does not exist because, in most studies, only two definitions of optimism have been employed (i.e., Hjelle *et al.*, 1996; Hull and Mendolia, 1991; Hummer *et al.*, 1992; Peterson and De Avila, 1995; Scheier and Carver, 1992; Schiaffino and Revenson, 1992; Schwarzer, 1993; Shnek *et al.*, 1995). The purpose of the present study is therefore to determine whether the five definitions of optimism identified in the literature represent a single underlying dimension, namely, optimism, or whether they represent an assembly of distinct dimensions of the same notion. The results are further validated by exploring the role of optimism in relation to coping, depression, and impairment in physical mobility among MS patients.

METHOD

Participants

Of the 100 MS patients recruited via a patients' organization, 75 patients responded to the questionnaires mailed to them. Patients who did not answer

three or more of the questionnaires were excluded from the analyses, which produced a total of 73 patients (17 male and 56 female). The mean age of the patients was 45.0 years (SD = 9.9 years). Most of the patients had a partner (75%) and children (63%). The educational levels varied with no specific level overrepresented. Of the 73 patients, 19% had a job. The reason mentioned by most of the participants for not working was being unable to work, and they received disability insurance. The mean time since diagnosis was 9.3 years (SD = 6.5 years; range = 1–38 years). Of the 73 patients, 31% experienced fluctuating or worsening symptoms in the month prior to the research and 69% experienced no changes in their MS symptoms in the month prior. By means of a self-report checklist, patients reported their actual complaints. In general, the present sample could be identified as moderately invalid: 84% of the total sample reported fatigue; 77% reported limited walking ability, and 16% was paralyzed; 53% reported sensitivity problems; 38% reported incontinence, and 40% bowel problems; 33% reported concentration problems, and 30% reported memory problems; 18% reported speech problems; and 22 and 30%, respectively, reported ambiguous symptoms, indicating dizziness and sleep problems. The occurrence of more than 6 of these 11 symptoms was reported in 16% of the patients, which could suggest that these patients were in an active phase of MS while completing the questionnaires.

Measures of Optimism

Dispositional Optimism. This was measured with the Life Orientation Test (LOT) (Scheier and Carver, 1985), which consists of eight items plus four filler items. Of the eight items, four are stated positively and four are stated negatively. The subjects are asked to indicate their agreement with the items on a 5-point Likert scale ranging from strongly disagree (0) to strongly agree (4). In line with Marshall *et al.* (1992), who showed that the items from the LOT represent more or less two independent dimensions, separate scores were calculated for dispositional optimism and pessimism. Principal-component analyses with varimax rotation indeed revealed such a component structure (eigenvalues, 2.45 and 2.44; explained variance, 61.1%), although one positively stated item (item 11) loaded on both components. The LOT has been shown to be internally consistent for both populations with and without disease and appeared to have predictive and discriminant validity (Scheier *et al.*, 1994). Cronbach's α for the present sample was found to be .80 for the total scale; Cronbach's α's for the optimism and pessimism scales separately were .72 and .77, respectively.

Generalized Self-Efficacy. This was measured with the Generalized Self-Efficacy Scale (Schwarzer and Jerusalem, 1989), which contains 10 items. A higher total score reflects an optimistic appraisal of one's capabilities and more

confidence in one's coping capacity. Research has shown the Generalized Self-Efficacy Scale to be an internally consistent and valid instrument (Schwarzer, 1993). Cronbach's α in the present study was .87.

Explanatory Style. This was measured with the Forced-Choice Attributional Style Questionnaire (Forced-Choice ASQ), consisting of 48 items (Reivich and Seligman, 1991). The scale contains 24 positive and 24 negative events and must be answered by choosing the most likely cause from two fixed alternatives. The scores are derived by assigning a value of 1 to the internal, stable, and global responses (optimistic explanatory style) and a value of 0 to the external, unstable, and specific responses (pessimistic explanatory style) (Reivich, 1995). Three items (Nos. 12, 37, and 42) were changed because their content refers to being healthy, which is simply not applicable in cases of MS. For example, item 12, "You were extremely healthy all year," was replaced by "You were free of complaint all year." The Forced-Choice ASQ was not used in the analyses, due to the low internal consistency of the scores for both optimism and pessimism; Cronbach's α's were .43 and .18 for the two dimensions. The internal consistency for the underlying dimensions (internal/external, permanent/unstable, global/specific) was even worse. A possible explanation for these outcomes is the answering format, as the fixed alternatives often did not characterize one's interpretation of the situation, which was reflected in the high nonresponse (n = 63). Reivich (1995) found similar reactions in healthy respondents.

Unrealistic Optimism. This was measured using Comparative Risk Judgement Rating Forms (Weinstein, 1980; Otten, 1995). In response to 20 items concerning several illness-specific situations, patients are asked to judge their chances of experiencing them compared to the average person of the same age, gender, and form of illness. The possible response options ranged from −4 to 4. Unrealistic optimism on the group level was determined by applying Student's t test to determine whether the group means for the positive and negative events differed significantly from zero and, thus, showed patients to believe that they were more likely to experience positive events and less likely to experience negative events when compared to their peers (Weinstein, 1980). In line with Hoorens (1996), separate scores were calculated for the positive and negative events. The comparative estimates were confirmed to be valid for revealing biases, as can be seen when gay men were asked about AIDS (Taylor *et al.*, 1991; Weinstein and Klein, 1996). Cronbach's α's for the present sample were found to be internally consistent with .79 and .80, respectively.

Defensive Pessimism. This was measured using a revised version of the Optimism-Pessimism Prescreening Questionnaire (OPPQ) (Cantor and Norem, 1989; Norem and Crandall, 1991). The original instrument was created for academic performance situations and therefore revised to measure rumination about the chronic illness and its consequences, on the one hand, and recognition that one can attempt to deal with the illness, on the other hand. After correcting for

low (negative) item–total correlations (which depress Cronbach's α), five of the seven items were selected for analysis and found to have a Cronbach's α of .65.

A General Positive Outlook on Life. This was measured using the Optimism & Pessimism Scale (O&P scale) (Dember *et al.*, 1989), which consists of 36 items (18 positive and 18 negative). The 20 filler items included in the original instrument were omitted in the present study to reduce the time demands for subjects. The patients are asked to indicate their agreement with the items on a 4-point scale. The third rating category was mistakenly formulated as "slightly agree" rather than "disagree." The other formulations were "strongly agree" (1), "agree" (2), and "strongly disagree" (4). The O&P scale measures several content areas relevant to optimism, including the general outlook on people, the world, and the future; expectations regarding one's own personal situation; processing of current information; and current behavioral choices. The O&P scale can be seen as a comprehensive measure of optimism although this is not as yet theoretically founded. The scale has been shown to be internally consistent and valid in several studies (Hummer *et al.*, 1992; Dember *et al.*, 1989). In the present study, Cronbach's α's for optimism and pessimism were found to be .82 and .87, respectively.

Measures of Adaptation

The following instruments were used to measure affect, coping, depression, and psychophysiosoc ial functioning and thereby explore the relation between optimism and adaptation to Multiple Sclerosis.

Positive and Negative Affect. These were measured with the Positive and Negative Affectivity Scale (Watson *et al.*, 1988), which consists of 10 positive and 10 negative words measuring one's general feelings. The scale has been shown to be internally consistent and valid (Watson *et al.*, 1988). In the present study, both positive affectivity and negative affectivity proved to be internally consistent, with Cronbach's α's of .76 and .86, respectively.

Task-Oriented Coping, Emotion-Oriented Coping, and Avoidance-Oriented Coping. These were measured with the Coping Inventory for Stressful Situations (CISS; Endler and Parker, 1994), which consists of 48 items. Coping by altering the situation is reflected by higher scores for task-oriented coping, coping by regulating emotional distress is reflected by higher scores for emotion-oriented coping, and coping by seeking other people's company or distraction is reflected by higher scores for avoidance-oriented coping. The CISS proved to be reliable and valid in healthy populations (Cook and Heppner, 1997; Endler and Parker, 1994), as well as in the medically ill (Smári and Valtýsdóttir, 1997). In the present study, Cronbach's α's were .88, .90, and .87, respectively.

Depressive Symptoms. These were measured with the Beck Depression Inventory (BDI; Beck *et al.*, 1979; Bouman *et al.*, 1985), which consists of 21 items. The BDI proved to be internally consistent and valid in the medically ill, even though the overlap in somatic symptoms warrants caution (Beck *et al.*, 1988). A modified version has recently been formulated to reduce the potential influence of MS symptoms on depression screening (Mohr *et al.*, 1997). As the reliability and correlations with the optimism instruments did not differ for the original BDI and the revised version in the present study, the original BDI was used in the analyses. Cronbach's α was .87. Scores lower than 9 are viewed as normal, scores between 10 and 20 are associated with mild levels of depression, scores between 20 and 30 reflect moderate depression, and scores above 30 reflect severe depression (Kendall *et al.*, 1987).

Psychological, Physical, and Social Functioning. This was measured by the 68-item version of the Sickness Impact Profile (SIP; de Bruin *et al.*, 1994). The SIP contains six scales measuring impairment in somatic autonomy, mobility control, psychological autonomy and communication, social behavior, emotional stability, and mobility range. A higher score means greater impairment. The SIP proved to be internally consistent and valid (Post *et al.*, 1996). Cronbach's α's were .88, .81, .83, .78, .67, and .81, respectively. Given the small sample size, only the scale measuring impairment in mobility range was used in the analyses. This scale indicates the influence of health status on a number of daily tasks (de Bruin *et al.*, 1994).

Analyses

The aim of the present study was to answer the following questions: What is the dimensional structure of optimism? and In the case of a more dimensional structure of optimism, are the dimensions differentially related to the elements of adaptation? Expectations with regard to optimism and adaptation were derived from the model of Lazarus and Folkman (1984) (see Fig. 1 for the hypothesized adaptation model). Optimism as a coping resource has thought to precede and influence coping, which in turn mediates the stress of the chronic illness (Folkman and Lazarus, 1984; Moos and Schaefer, 1982). In the present study, it is hypothesized that optimism will be related directly and indirectly, via coping, to less depression and less impairment of physical mobility.

In order to determine the dimensional structure of optimism, maximum-likelihood confirmatory factor analysis (LISREL8.12) (Jöreskog and Sörbom, 1993) was applied to the various measures of optimism. The input was the correlation matrix with the means and standard deviations for the various measures. In order to test the assumption of normality, the variables were evaluated in terms

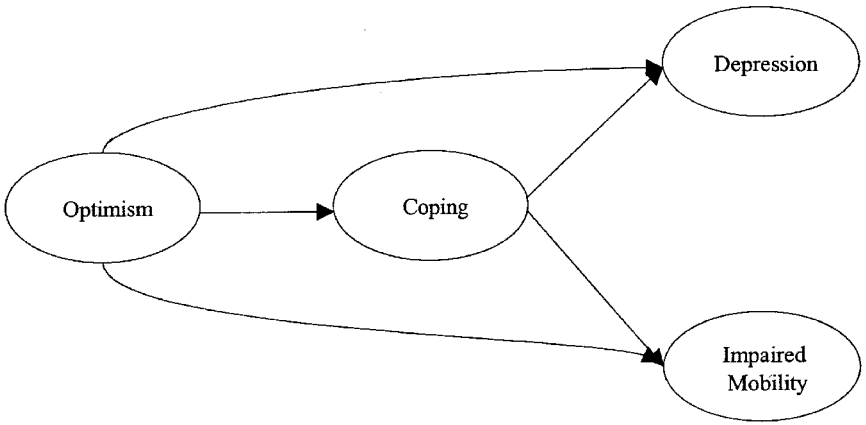

Fig. 1. Hypothesized adaptation model.

of skewness. The skewness of all variables but the BDI was between −1.0 and +1.0, but the distribution of the BDI was not severely skewed (skewness = 1.25, SD = .3). Therefore, all variables proved to have a normal distribution.

Three models were specified. In the first model, optimism is assumed to represent one construct, which means that the different measures of optimism refer to the same phenomenon. In the second model, optimism is assumed to encompass both a functional and a defensive orientation. This is in accordance with the model proposed by Schwarzer (1994) to explain the apparent contradiction between optimism as health effective and optimism as health risk by failing self-protective behavior. In the third model, the underlying structure of optimism is assumed to consist of outcome expectancies, efficacy expectancies, and being unrealistic with respect to one's risks and chances (based on Bandura, 1988; Carver and Scheier, 1994; Wallston, 1994). Bandura (1988) evaluates efficacy expectancies also in terms of its deviation from the realistic situation and, thus, in terms of whether or not the beliefs in one's capabilities are unrealistically exaggerated. Wallston (1994) does the same for outcome expectancies and, thus, in terms of whether the expected favorable outcomes are delusional or realistic. Both Carver and Scheier (1994) and Schwarzer (1994) emphasize the role of outcome and efficacy expectancies in the determination of behavior but disagree on exactly what determines what. In the present study this problem is not discussed.

Finally, the best-fitting model was taken as the starting point for exploring the role of optimism in adapting to MS. Using structural equation modeling (LISREL8.12), the role of optimism in explaining the variance in adaptation was explored. Only latent variables were used in the analyses. Structural equation

modeling has the advantage of adjusting for measurement errors and permits the inclusion of the resultant latent variables of optimism in the adaptation model. Starting with the full model, the nonsignificant paths between the latent variables were stepwise removed to obtain the best-fitting and most parsimonious model. The paths via coping were evaluated first, followed by evaluation of the direct paths between optimism and adaptation. Each model was evaluated by examining the parameter estimates and measures of overall fit provided by LISREL (Jöreskog, 1993).[3]

RESULTS

Level of Optimism

The basic descriptive data, means, and standard deviations for the optimism and adaptation scales are presented in Table 1. In the present sample, 35.6% (n = 26) of the patients reported a mild level of depression, 8.2% (n = 6) reported moderate depression, and 4.1% (n = 3) reported severe depression. More than half of the patients reported few depressive symptoms.

Compared to a healthy population, the present sample is characterized by somewhat less dispositional optimism [mean = 21.8, SD = 4.8 (Scheier and Carver, 1985)] and an equal amount of generalized self-efficacy [norm score z = .064, p = .48 (Schwarzer, 1993)]. Unrealistic optimism is indicated by a group mean that significantly differs from zero (Weinstein, 1980), and the present sample is not significantly unrealistic optimistic with regard to positive events [t = 1.897 (df = 72), p = .062] and was significantly unrealistic optimistic with regard to negative events [t = 7.906 (df = 72), p = .000]. More patients were unrealistically optimistic about negative events (71.2%; n = 52) than about positive events (48.0%; n = 35). As no significant differences were found between the male and the female patients on the several optimism scales, the results were not analyzed separately for males and females.

[3] Several measures indicate the fit of the model, four of which are applied in the present study. (1) *Chi-square* 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) *Critical N* (CN) indicates the minimum sample size for which the value of chi-square would be significant, which is relevant for small sample sizes. The criterion of CN is 200 and above (Bollen and Liang, 1988). (3) *Root mean square of approximation* (RMSEA) indicates the fit of the model taking the parsimony into account; a value of .05 or lower means a close fit, while a value of up to .08 indicates a reasonable fit (Jöreskog and Sörbom, 1993). (4) *Adjusted goodness-of-fit index* (AGFI) measures how much better the model fits compared to no model at all. The AGFI should be above .92. To indicate the best optimism model, we compared the differences in the chi-square values for the models, controlling for degrees of freedom (Browne and Cudeck, 1993).

Table I. Means, Standard Deviations, and Scale Ranges for the Optimism and Adaptation Measures

Instrument	Mean	SD	Scale range
Life Orientation Test	20.3	5.2	0–32
Optimism scale	9.9	2.8	0–16
Pessimism scale	5.6	3.3	0–16
Generalized Self-Efficacy Scale	29.6	4.7	10–40
Unrealistic optimism for positive events	2.2	9.8	–40–40
Unrealistic optimism for negative events	9.1	9.8	–40–40
Defensive pessimism	25.5	9.3	5–55
Optimism & Pessimism scale			
Optimism scale	46.7	7.9	18–72
Pessimism scale	31.8	8.6	18–72
Positive affectivity	33.7	5.7	10–50
Negative affectivity	21.3	7.3	10–50
CISS			
Task-oriented coping	48.4	9.2	16–80
Emotion-oriented coping	32.4	8.9	16–80
Avoidant-oriented coping	36.9	9.0	16–80
Depression, BDI	11.0	8.3	0–63
SIP			
Impairment of Somatic Autonomy	3.1	3.7	0–17
Impairment of Mobility Control	5.9	3.1	0–12
Impairment of Psychological Autonomy/Communication	3.1	2.9	0–11
Impairment of Emotional Stability	1.3	1.4	0–6
Impairment of Social Behavior	6.7	2.9	0–12
Impairment of Mobility Range	3.2	2.7	0–10

Confirmatory Factor Analysis of Optimism

As can be seen from Table II, dispositional optimism and pessimism (LOT) were related to most of the other measures of optimism with the exception of generalized self-efficacy and unrealistic optimism for negative events. The latter scales were barely associated with any of the other scales, which suggests that they may relate to other dimensions of optimism. While the O&P scale (Dember *et al.*, 1989) was related to most of the other optimism scales, it appears that the scale measures several aspects of optimism without distinguishing between them. As the purpose of the present study was to clarify the relations between the various aspects of optimism, the O&P scale was not used in further analyses.

Three models of the dimensional structure of optimism were next tested using LISREL8.12. Based on the literature, whether optimism represents one factor (optimism), two factors (functional and defensive), or three factors (outcome expectancies, efficacy expectancies, and unrealistic thinking) was tested. In Table III, the goodness-of-fit indices for the three alternative models are presented.

Table II. Correlation Matrix for the Optimism Measures ($n = 73$)

	LOT opt.	LOT pess.	General efficacy	Defens. pess.	Unrealistic optimism: Positive	Unrealistic optimism: Negative	O&P optimism
LOT							
Optimism							
Pessimism	−.442***						
Generalized self-efficacy	−.026	−.056					
Defensive pessimism	−.351**	.214	−.106				
Unrealistic optimism							
Positive events	.351**	−.409***	.126	−.200			
Negative events	.063	−.109	−.002	−.103	.221		
O&P-scale							
Optimism	.543***	−.410***	.458***	−.170	.348**	.036	
Pessimism	−.411***	.681***	−.110	.212	−.377***	−.122	−.295*

*$p < .05$.
**$p < .01$.
***$p < .001$.

As can be seen, the one-factor model did not fit the data, which suggests that optimism is not represented by a single underlying construct (see also Fig. 2). The two-factor model yielded satisfactory values of the fit measures, which suggests that optimism may be represented by a functional and defensive orientation (see Fig. 3). In accordance with Schwarzer (1994), dispositional optimism and generalized self-efficacy were classified as functional while unrealistic optimism was classified as defensive. Defensive pessimism (OPPQ-R) was somewhat related to both orientations, because it includes both a realistic (opposite to defensive) orientation and a functional orientation (outcome expectancies). Although the two-factor model seemed suitable, the Generalized Self-Efficacy scale did not account for any variance of the functional orientation ($\lambda = .01$, $t = .10$). This suggests that self-efficacy may constitute a separate element of optimism and that a three-factor model of the dimensional structure of optimism may be more appropriate.

The three-factor model indeed yielded a good fit. Each of the optimism

Table III. Goodness-of-Fit Measures for Three Models of Optimism

	χ^2	df	p value	Critical N	RMSEA	AGFI
Model 1: one latent variable	190.9	11	.00	10.33	.477	−.066
Model 2: two latent variables	7.9	9	.54	198.02	.0	.916
Model 3: three latent variables	3.7	7	.82	363.18	.0	.953

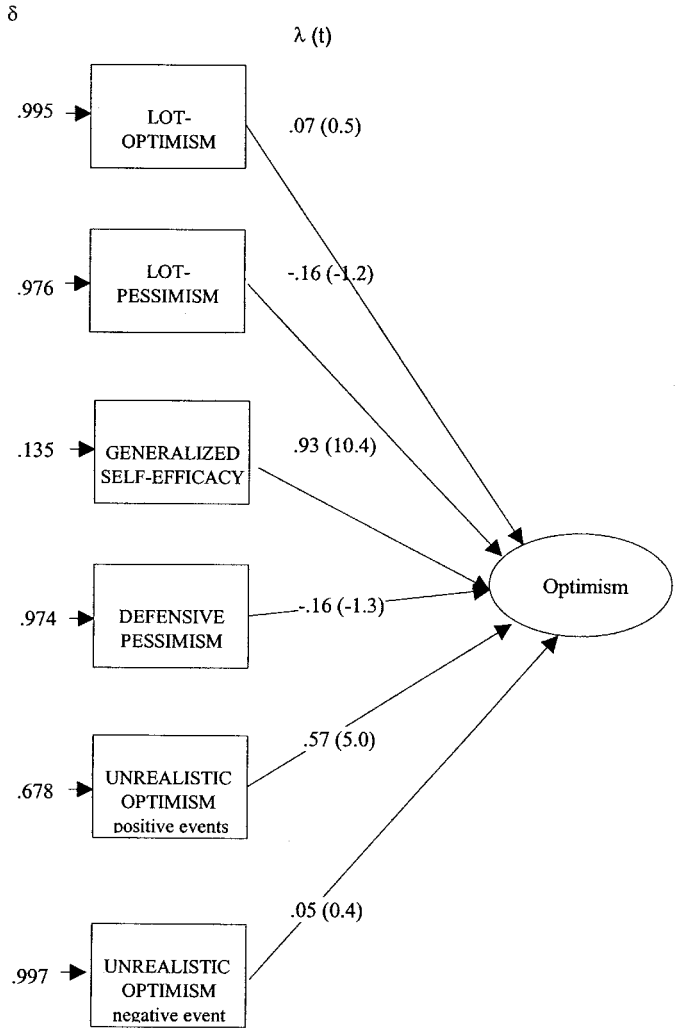

Fig. 2. One-factor model of optimism.

scales explained a component of optimism (see Fig. 4). Defensive pessimism was theoretically related to both outcome expectancy and unrealistic thinking, although in the present study its relation to unrealistic thinking was apparent only when its relation to outcome expectancies was omitted ($\lambda = -.27$, $t = -2.1$). As the model including both relations showed the best fit, it is assumed that defensive pessimism relates to both outcome expectancies and unrealistic thinking.

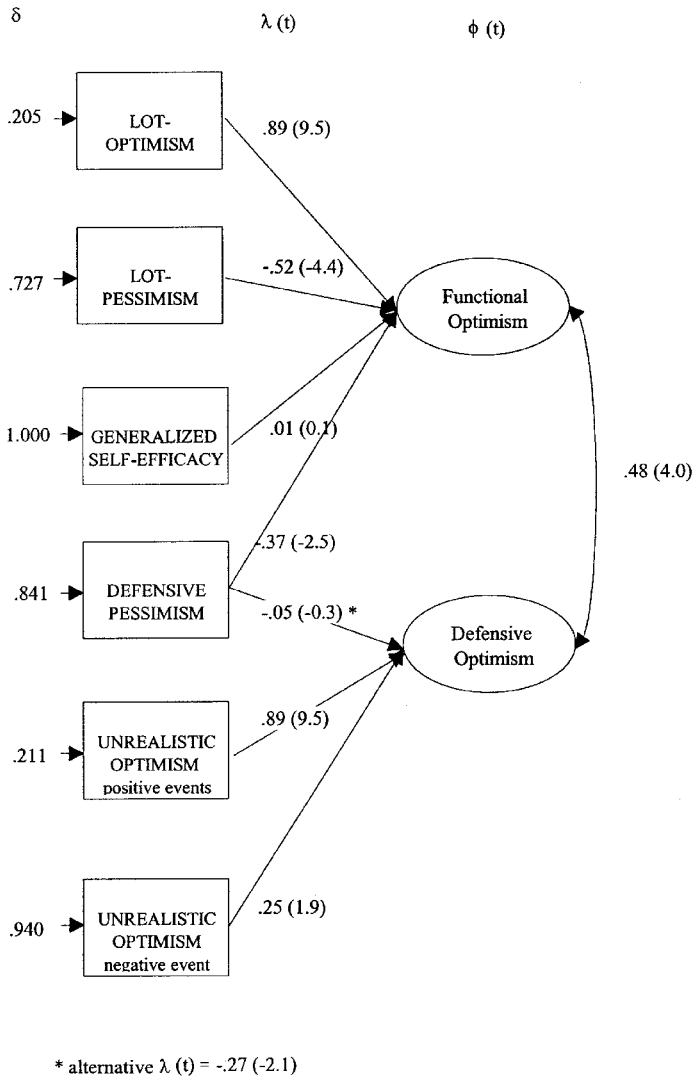

Fig. 3. Two-factor model of optimism.

In conclusion, the model assuming three latent dimensions of optimism showed the best fit. Moving from one to two factors improved the χ^2 value by 183.0 (df = 2, $p < .001$). When moving from two to three factors, the χ^2 value did not improve significantly ($\chi^2 = 4.2$, df = 2, $p = .13$). As the role of generalized self-efficacy was completely absent in the two-factor model, however,

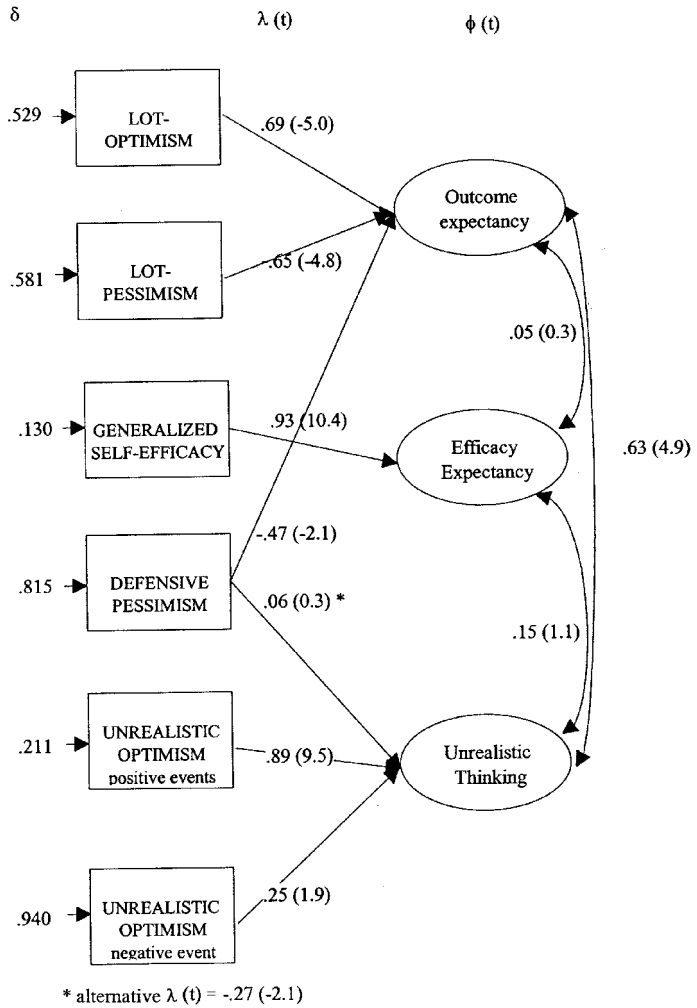

Fig. 4. Three-factor model of optimism.

its inclusion in the three-factor model produced a more complete and better-fitting model of optimism. Optimism thus appears to consist of three dimensions, namely, outcome expectancies, efficacy expectancies, and unrealistic thinking, although outcome expectancies and unrealistic thinking partly overlap ($r^2 = .40$, $t = 3.14$). In the following, the validity of the three-factor model is further examined by exploring the relations of the various dimensions of optimism to the adaptation of patients to MS.

Table IV. Correlation Matrix for the Optimism and Adaptation Measures ($n = 73$)[a]

	PA	NA	TCISS	ECISS	ACISS	BDI	IMR
LOT							
Optimism	.23*	−.49***	.12	−.46***	.16	−.53***	−.09
Pessimism	−.13	.41***	−.06	.39***	−.22	.46***	.06
Generalized self-efficacy	.25	−.23*	.11	−.27*	.22	−.12	−.06
Defensive pessimism	−.14	.35**	.02	.30*	.06	.35**	.06
Unrealistic optimism							
Positive events	.25*	−.28*	.17	−.25*	.23	−.47***	−.42***
Negative events	.07	−.15	−.09	−.27*	−.28*	−.40***	.00

[a]PA, positive affectivity scale; NA, negative affectivity scale; TCISS, task-oriented coping (Coping Inventory for Stressful Situations); ECISS, emotion-oriented coping (CISS); ACISS, avoidance coping (CISS); BDI, Beck Depression Inventory; IMR, Impaired Mobility Range (SIP).

*$p < .05$.

**$p < .01$.

***$p < .001$.

Structural Equation Modeling of Optimism and Adaptation to MS

In Table IV, it can be seen that the optimism and pessimism scales relate mainly to negative affectivity (NA), emotion-oriented coping (ECISS), and depression (BDI). The SIP scale measuring impaired mobility range was found to be most strongly associated with optimism, even though it was only with unrealistic optimism for positive events. Given the small sample size in our study and the significant relations of emotion-oriented coping (ECISS), depression (BDI), and impairment in mobility range (SIP) to the measures of optimism, only emotion-oriented coping, depression, and impaired mobility range were included in the structural model. Although negative affectivity was also significantly related to the optimism scales, its inclusion would make the model too complex, decreasing its power.

The structural model showed outcome expectancies, efficacy expectancies, and unrealistic thinking to relate differentially to the latent constructs of emotion-oriented coping, depression, and impaired mobility (see Fig. 5).

Outcome expectancies explained depression directly and indirectly via emotion-oriented coping. Efficacy expectancies explained depression indirectly via emotion oriented coping (but not directly). Both outcome and efficacy expectancies did not explain impaired mobility either directly or indirectly. Unrealistic thinking directly (but not indirectly) explained impaired mobility and depression. The direct relations of outcome expectancies and unrealistic thinking to depression were significant only in the case of omitting the other. Both relations were included in the model, as this model provided a better fit for the data.

As impaired mobility range contains an objective and subjective element,

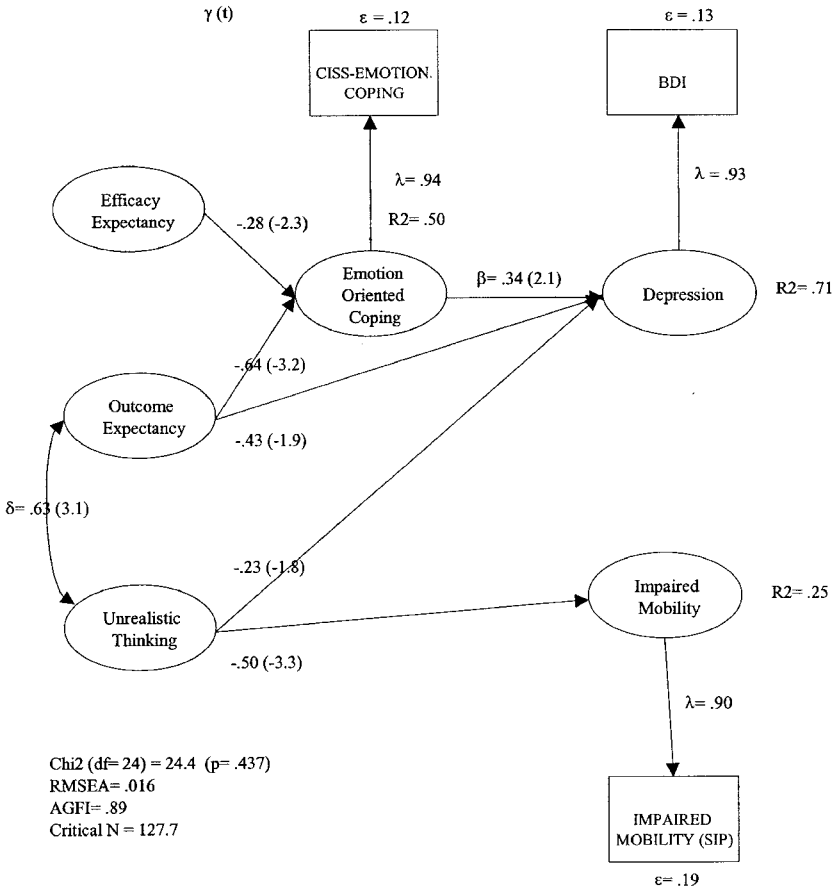

Fig. 5. Model of optimism and adaptation.

we controlled for the objective limited walking ability (dichotomous variable: yes/no) to figure out whether the relation of unrealistic thinking to impaired mobility range was limited by the practical situation. Finding that impaired mobility range was not significantly explained by the objective limited walking ability in addition to unrealistic thinking ($\gamma = -.30$, $t = -.1.15$, χ^2 change $= 1.14$, $p = .8$), the objective limited walking ability was not included in the model.

The preceding model shows different aspects of optimism to play different roles in adaptation to MS. The model fit the data moderately but the relatively low critical N may preclude generalization to large populations ($\chi^2 = 24.4$, df $=$ 24, $p = .437$; RMSEA $= .016$, AGFI $= .89$, CN $= 127.7$).

DISCUSSION

In the present study, a number of theoretically motivated dimensions of optimism were distinguished. The exact structure of the underlying dimensions was then explored, along with how the various dimensions relate to the adaptation of patients to MS.

Optimism appears to consist of three dimensions, namely, outcome expectancies, efficacy expectancies, and unrealistic thinking, with outcome expectancies and unrealistic thinking partly overlapping. These dimensions were differently related to the elements of adaptation, which further validate the three-dimensional model of optimism.

There are, nevertheless, a few caveats associated with this distinction. First, the optimism scales used here reflected largely the same dimensions of the model, which means that the findings of the same distinct components could be spurious. Also, the scales measuring unrealistic optimism for negative events and defensive pessimism were only weakly reflected in the model, pertaining to their rather high measurement errors in the model. Nevertheless, the present model indicates the multifaceted nature of optimism and the fact that the different definitions of optimism encountered in the literature may reflect different phenomena.

Second, the small sample size in the present sample may, in general, lower the power of LISREL analyses. However, the power in the present analyses was sufficient following recommendations (Boomsma, 1983) and using a constricted number of variables. As the distribution satisfied the assumption of normality, it is unlikely that it has threatened the validity of the results. In addition, the present sample may not be representative of the referent population. There was a relatively high proportion of female participants in the present study (3.3 : 1) compared to the more general Dutch MS population (3.0 : 1 to 1.6 : 1) (Zwanikken, 1997); those MS patients who participate in research are more often disabled from work and generally have higher incomes than those who do not participate (Schwartz and Fox, 1995); the recruitment of participants via a patient organization may mean a biased representation of optimism. Nevertheless, the results of the present study applies in any case to a specific part of the MS population.

Third, the proportion of patients with cognitive impairment was relatively low (30%) compared to the reported 40% to 70% in MS patients in general (Rao *et al.*, 1991a; Beatty *et al.*, 1995). The present sample could have a relatively better cognitive state than the general population, or the patients could be unaware of their cognitive deficits (Kaplan, 1984; Peyser *et al.*, 1980). It is assumed that the present findings give an adequate approximation of the actual situation, as Kaplan (1984) found that MS patients are aware of their impaired memory on a daily basis if they are questioned by means of a checklist, the same method as used in the present study.

An additional point of interest is the relation between cognitive impairment and one's overestimation of ADL capabilities (Peyser, 1984) and depression (Rao *et al.*, 1991b), which may have led to a bias in the reporting of symptoms. On the other hand, this is argued against by the absence of any relation between cognitive impairment and depression in general (Good *et al.*, 1992; Krupp *et al.*, 1994), and the full awareness of depression and distress when patients are euphoric (Rabins *et al.*, 1986; Surridge, 1969).

Fourth, both optimism and adaptation were measured by self-report, which makes it difficult to determine whether the observed relation between optimism and adaptation is biased by an "optimistic" rose color interpretation of adaptation. The significant relations observed between optimism/pessimism and immunological functioning in other studies (Bandura, 1992; Cohen *et al.*, 1989; Kamen-Siegel *et al.*, 1991), however, suggest that optimism may establish itself independently and objectively. In addition, optimism and adaptation were measured by means of generic instruments, which involves the risk of taking no notice of the specific problems of MS. On the other hand, generic measures are accepted measures for studying adaptation in chronic diseases in many studies.

Despite these critical observations, the present study can be seen as a first step in explaining the meaning of optimism in the management of chronic disease and specifically MS. In the present study, the definition of optimism appears to represent outcome expectancies, efficacy expectancies, and unrealistic thinking, with outcome expectancies and unrealistic thinking partly overlapping. The question is whether this model of optimism is independent of the circumstances.

In line with the literature, outcome and efficacy expectancies were expected to overlap (Carver and Scheier, 1994; Schwarzer, 1994), although the empirical findings tend to be contradictory (i.e., Rabinowitz *et al.*, 1992; Schwarzer, 1993). The present results may be due to the uncontrollability and unpredictability of the illness, creating incongruity between one's expectations with regard to outcome and one's confidence in one's capabilities. The same reasoning may also apply to the independence of unrealistic thinking and efficacy expectancies.

The partial overlap between outcome expectancies and unrealistic thinking is in accordance with our expectations based on a study by Tennen and Affleck (1987), who assumed that expecting positive outcomes for oneself (positive outcome expectancies) combined with an awareness that bad things do happen to people can produce a tendency to view oneself as less likely than others to experience bad events (unrealistic positive thinking). The definition of unrealistic optimism by Taylor (1989) also suggests conceptual overlap between outcome expectancies and unrealistic thinking, by referring to unrealistic (outcome) expectations for the future. Defensive pessimism was found to consist of both negative outcome expectancies and realistic thinking, although the negative outcome expectancies were more central in the model. Unraveling the dimensions of optimism also allows us to understand defensive pessimism better.

In spite of their overlap, outcome expectancies and unrealistic thinking appear to represent different aspects of optimism. Examination of their content may show positive outcome expectancies to be more related to one's hope (Snyder *et al.*, 1991) and unrealistic thinking to be more related to one's risk perception (van der Pligt, 1998; Weinstein and Klein, 1996). In conclusion, it appears that the present model is linked up well with the literature. Nevertheless, a more sophisticated model is needed to take the illness-dependent circumstances into account.

To validate further the three-dimensional model of optimism, the relations of the various dimensions of optimism to emotion-oriented coping, depression, and impaired mobility range were explored and indeed found to be differentially related to the elements of adaptation.

In line with the literature (Buelow, 1991; de Ridder *et al.*, 1999; Shnek *et al.*, 1995), optimism was negatively related to depression in MS. Depending on the dimension of optimism, however, the impact on depression was mediated by emotion-oriented coping in the present study. Outcome expectancies related both directly and indirectly to depression, while efficacy expectancies related only indirectly to depression and unrealistic thinking related only directly to depression.

Given the cross-sectional data, the question of whether emotion-oriented coping mediates the role of outcome and efficacy expectancies in adaptation to MS remains to be answered by longitudinal data. The mediating role of coping was expected, as research shows patients to use emotion-oriented coping most frequently when diagnosed, in cases of high uncertainty with regard to the illness, and when the situation is appraised as dangerous (Eklund and MacDonald, 1991; Murray, 1995; Warren *et al.*, 1991; Wineman *et al.*, 1994). In addition, coping through acceptance and through the inverse of engagement has been shown to mediate the impact of outcome expectancies on depression in diverse populations (i.e., Carver *et al.*, 1993; Scheier *et al.*, 1989). Coping is also assumed to mediate the relation between efficacy expectancies and depression, in the sense that efficacy expectancies encourage the acquisition and practice of useful self-management techniques, which can minimize one's vulnerability to stress and depression (Bandura, 1988; Holman and Lorig, 1992). Useful self-management techniques in cases of MS are, for example, accepting one's disabilities and balancing one's rest and activities, which are reflected not in task-oriented coping but in the absence of emotion-oriented coping.

Unrealistic thinking was found to be directly related to depression in the present study. In keeping with Taylor and Brown (1988), unrealistic positive thinking (or unrealistic optimism) may promote happiness and a positive mood that is not the result of repression or denial (Taylor *et al.*, 1989). In addition, the link between unrealistic thinking and depression may be conceptual in the fact that depressives are supposed to be realistic thinkers. However, realistic

thinking and depression have different implications for behavior. Showers and Ruben (1990) found defensive pessimism (i.e., partly realistic thinking and partly negative outcome expectancies in the present study) to be related to nonavoidant coping and effective preparation for situations, while depression was related to avoidant coping.

Physical health or impaired mobility range was significantly explained by unrealistic thinking but not by outcome or efficacy expectancies in the present study. More specifically, unrealistic positive thinking was related to reports of being able to do more things, which can be explained in two ways. In line with Taylor and Brown (1988), unrealistic positive thinking (or unrealistic optimism) may lead to greater persistence, more action, and less fatalism, which can help patients stay independent and active. Alternatively, unrealistic positive thinking can be dangerous when it interferes with appropriate precautionary behaviors (Weinstein and Klein, 1996). MS symptoms can increase as a result of overactivation and exhaustion, which makes too much activity counterproductive and suggests that unrealistic positive thinking can be both adaptive as well as maladaptive.

In conclusion, our exploration of the role of optimism in adaptation to MS confirmed the existence of a multidimensional structure. Because of the exploratory character, it is too early to give conclusions on the consequences for mental and physical health. Positive outcome expectancies and positive efficacy expectancies appear to produce better mental health, while the role of unrealistic positive thinking remains unclear. The present results can perhaps be generalized to chronic illness in general, as MS is also characterized by the uncertainty and progressive, disabling course that characterizes other chronic diseases (Stuifbergen and Rogers, 1997). Future research is, nevertheless, planned to clarify further the role of optimism in the management of chronic illness.

ACKNOWLEDGMENTS

The authors are grateful to Dr. G. H. Maassen, Department of Methodology and Statistics, Utrecht University, and an expert on LISREL, for his kind help with the analyses.

REFERENCES

Aikens, J. E., Fischer, J. S., Namey, M., and Rudick, R. A. (1997). A replicated prospective investigation of life stress, coping and depressive symptoms in multiple sclerosis. *J. Behav. Med.* 20: 433–445.

Bandura, A. (1986). *Social Foundations of Thought and Action*, Prentice-Hall, Englewood Cliffs, NJ.

Bandura, A. (1988). Self-regulation of motivation and action through goal systems. In Hamilton, V., Bower, G. H., and Frijda, N. H. (eds.), *Cognitive Perspectives on Emotion and Motivation*, Kluwer Academic, Dordrecht, pp. 37–61.

Bandura, A. (1992). Self-efficacy mechanism in psychobiologic functioning. In Schwarzer, R. (ed.), *Self-Efficacy: Thought Control of Action*, Hemisphere, Washington, DC, pp. 355–394.

Beatty, W. W., Paul, R. H., Wilbanks, S. L., Hames, K. A., Blanco, C. R., and Goodkin, D. E. (1995). Identifying multiple sclerosis patients with mild or global cognitive impairment using the Screening Examination for Cognitive Impairment (SEFCI). *Neurology* 45: 718–723.

Beck, A. T., Rush, A. J., Shaw, B. F., and Emery, G. (1979). *Cognitive Therapy of Depression*, Wiley & Sons, New York, pp. 389–399.

Beck, A. T., Steer, R. A., and Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clin. Psychol. Rev.* 8: 77–100.

Bollen, K. A., and Liang, J. (1988). Some properties of Hoelter's CN. *Sociol. Methods Res.* 16: 492–503.

Boomsma, A. (1983). *On the Robustness of LISREL (Maximum Likelihood Estimation) Against Small Sample Size and Non-normality*, Ph.D. dissertation, Groningen.

Bouman, T. K., Luteijn, F., Albersnagel, F. A., and van der Ploeg, F. A. E. (1985). Enige ervaringen met de Beck Depression Inventory. *Gedrag* 13: 13–24.

Brenner, G. F., Melamed, B. G., and Panush, R. S. (1994). Optimism and coping as determinants of psychosocial adjustment to rheumatoid arthritis. *J. Clin. Psychol. Med. Set.* 1: 115–134.

Brooks, N. A., and Matson, R. R. (1982). Social-psychological adjustment to multiple sclerosis. *Soc. Sci. Med.* 16: 2129–2135.

Browne, M. W., and Cudeck, R. (1993). Alternative ways of assessing model fit. In Bollen, K. A., and Long, J. S. (eds.), *Testing Structural Equation Models*, Sage, Newbury Park, CA, pp. 136–162.

Buelow, J. M. (1991). A correlational study of disabilities, stressors and coping methods in victims of multiple sclerosis. *J. Neurosci. Nurs.* 23: 247–252.

Cantor, N., and Norem, J. K. (1989). Defensive pessimism and stress and coping. *Soc. Cognit.* 7: 92–112.

Carver, C. S., and Scheier, M. F. (1981). *Attention and Self-Regulation: A Control-Theory Approach to Human Behavior*, Springer-Verlag, New York.

Carver, C. S., and Scheier, M. F. (1994). Optimism and health-related cognitions: What variables actually matter? *Psychol. Health* 9: 191–195.

Carver, C. S., Pozo, C., Harris, S. D., Noriega, V., Scheier, M. F., Robinson, D. S., Ketcham, A. S., Moffat, F. L., and Clark, K. C. (1993). How coping mediates the effect of optimism on distress: A study of women with early breast cancer. *J. Person. Soc. Psychol.* 65: 375–390.

Carver, C. S., Pozo-Kaderman, C., Harris, S. D., Noriega, V., Scheier, M. F., Robinson, D. S., Ketcham, A. S., Moffat, F. L., and Clark, K. C. (1994). Optimism versus pessimism predicts the quality of women's adjustment to early stage breast cancer. *Cancer* 73: 1213–1220.

Cohen, F., Kearny, K. A., Kemeny, M. E., and Zegans, L. S. (1989). Acute stress, chronic stress and immunity and the role of optimism as a moderator. *Psychosom. Med.* 51: 255 (abstracts).

Cook, S. W., and Heppner, P. P. (1997). A psychometric study of three coping measures. *Educ. Psychol. Measure.* 57: 906–923.

Dember, W. N., Martin, S., Hummer, M. K., Howe, S., and Melton, R. (1989). The measurement of optimism and pessimism. *Curr. Psychol. Res. Rev.* 8: 102–119.

de Bruin, A. F., Buys, M., de Witte, L. P., and Diederiks, J. P. M. (1994). The sickness impact profile: SIP68, a short generic version, first evaluation of the reliability and reproducibility. *J. Clin. Epidemiol.* 47: 863–871.

de Ridder, D. T. D., Scheurs, K. M. G., and Bensing, J. (in press). The relative benefits of being optimistic: Optimism as a coping resource in multiple sclerosis and Parkinson's disease. *Brit. J. Health Psychol*.

Eklund, V. A., and MacDonald, M. L. (1991). Descriptions of persons with multiple sclerosis, with an emphasis on what is needed from psychologists. *Prof. Psychol. Res. Pract.* 22: 277–284.

Endler, N. S., and Parker, J. D. A. (1994). Assessment of multidimensional coping: Task, emotion and avoidance strategies. *Psychol. Assess.* 6: 50–60.

Fitzgerald, T. E., Tennen, H., Affleck, G., and Pransky, G. S. (1993). The relative importance of dispositional optimism and control appraisals in quality of life after coronary artery bypass surgery. *J. Behav. Med.* 16: 25–43.

Good, K., Clark, C. M., Oger, J., Paty, D., and Klonoff, H. (1992). Cognitive impairment and depression in mild multiple sclerosis. *J. Nerv. Ment. Dis.* 180: 730–732.

Hjelle, L., Belongia, C., and Nesser, J. (1996). Psychometric properties of the Life Orientation Test and Attributional Style Questionnaire. *Psychol. Reports* 78: 507–515.

Holman, H., and Lorig, K. (1992). Perceived self-efficacy in self-management of chronic disease. In Schwarzer, R. (ed.), *Self-Efficacy: Thought Control of Action*, Hemisphere, Washington, DC, pp. 305–223.

Hoorens, V. (1996). Self-favoring biases for positive and negative characteristics: Independent phenomena? *J. Soc. Clin. Psychol.* 15: 53–67.

Hull, J. G., and Mendolia, M. (1991). Modeling the relations of attribution style, expectancies and depression. *J. Person. Soc. Psychol.* 61: 85–97.

Hummer, M. K., Dember, W. N., Melton, R. S., and Schefft, B. K. (1992). On the partial independence of optimism and pessimism. *Curr. Psychol. Res. Rev.* 11: 37–50.

Jöreskog, K. (1993). Testing structural equation models. In Bollen, K. A., and Long, J. S. (eds.), *Testing Structural Equation Models*, Sage, Newbury Park, CA, pp. 294–316.

Jöreskog, K., and Sörbom, D. (1993). *LISREL8: Structural Equation Modeling with the Simplis Command Language*, Lawrence Erlbaum Associates, Hillsdale, NJ.

Kamen-Siegel, L., Rodin, J., Seligman, M. E. P., and Dwyer, J. (1991). Explanatory style and cell-mediated immunity in elderly men and women. *Health Psychol.* 10: 229–235.

Kaplan, R. (1984). Substantive and methodological issues in a rating of cognitive and psychological function in multiple sclerosis. *Acta Neurol. Scand. Suppl.* 101: 21–28.

Kendall, P. C., Hollon, S. D., Beck, A. T., Hammen, C. L., and Ingram, R. E. (1987). Issues and recommendations regarding use of the Beck Depression Inventory. *Cognit. Ther. Res.* 11: 289–299.

Krupp, L. B., Sliwinski, M., Masur, D. M., Friedberg, F., and Coyle, P. K. (1994). Cognitive functioning and depression in patients with chronic fatigue syndrome and multiple sclerosis. *Arch. Neurol.* 51: 705–710.

Lazarus, R. S., and Folkman, S. (1984). *Stress, Appraisal, and Coping*, Springer, New York.

Marshall, G. N., Wortman, C. B., Kusulas, J. W., Hervig, L. K., and Vickers, R. R. (1992). Distinguishing optimism from pessimism: Relations to fundamental dimensions of mood and personality. *J. Person. Soc. Psychol.* 62: 1067–1074.

McIvor, G. P., Riklan, M., and Reznikoff, M. (1984). Depression in multiple sclerosis as a function of length and severity of illness, age, remissions and perceived social support. *J. Clin. Psychol.* 40: 1028–1033.

Minden, S. L., and Schiffer, R. B. (1990). Affective disorders in multiple sclerosis. *Arch. Neurol.* 47: 98–104.

Mohr, D. C., Goodkin, D. E., Likosky, W., Beutler, L., Gatto, N., and Langan, M. K. (1997). Identification of Beck Depression Inventory items related to multiple sclerosis. *J. Behav. Med.* 20: 407–414.

Moos, R. H., and Schaefer, J. A. (1982). Coping resources and processes: Current concepts and measures. In Goldberger, L., and Breznitz, S. (eds.), *Handbook of Stress: Theoretical and Clinical Aspects*, 2nd ed., Free Press, New York, pp. 234–257.

Murray, T. J. (1995). The psychosocial aspects of multiple sclerosis. *Neurol. Clin.* 13: 197–223.

Norem, J. K., and Crandall, C. S. (1991). Defensive pessimism and repression-sensitization show discriminant validity. Paper presented at the American Psychological Society meeting, Washington, DC, June 14–16.

Otten, W. (1995). *Optimism*, Disseration, Universiteit van Amsterdam, Amsterdam.

Paty, D. W., and Poser, C. M. (1984). Clinical symptoms and signs of multiple sclerosis. In Poser, C. M. (ed.), *The Diagnosis of Multiple Sclerosis*, Thieme-Stratton, New York, pp. 27–43.

Peterson, C., and De Avila, M. E. (1995). Optimistic explanatory style and the perception of health problems. *J. Clin. Psychol.* 51: 128–132.

Peyser, J. M. (1984). Experience in cognitive assessment in MS relevant to developing a simple rating system. *Acta Neurol. Scand. Suppl.* 101: 29–31.

Peyser, J. M., Edwards, K. R., Poser, C. M., and Filskov, S. B. (1980). Cognitive function in patients with multiple sclerosis. *Arch. Neurol.* 37: 577–579.

Post, M. W. M., Gerritsen, J., van Dijk, A. J., van Asbeck, F. W. A., and Schrijvers, A. J. P. (1996). SIP68 of RAND36: Een vergelijking bij dwarslaesiepatiënten van twee generieke vragenlijsten voor het meten van de gezondheidstoestand. *Tijdschrift Soc. Gezondheidszorg* 74: 204–212.

Rabinowitz, B., Melamed, S., Weisberg, E., Tal, D., and Ribak, J. (1992). Personal determinants of leisure-time exercises activities. *Percept. Motor Skills* 75: 779–784.

Rabins, P. V., Brooks, B. R., O'Donnell, P., Pearlson, G. D., Moberg, P., Jubelt, B., Coyle, P., Dalos, N., and Folstein, M. F. (1986). Structural brain correlates of emotional disorder in multiple sclerosis. *Brain* 109: 585–597.

Rao, S. M., Leo, G. J., Bernardin, L., and Unverzagt, F. (1991a). Cognitive dysfunction in multiple sclerosis. I. Frequency, patterns, and prediction. *Neurology* 41: 685–691.

Rao, S. M., Leo, G. J., Ellington, L., Nauertz, T., Bernardin, L., and Unverzagt, F. (1991b). Cognitive dysfunction in multiple sclerosis. II. Impact on employment and social functioning. *Neurology* 41: 692–696.

Reivich, K. (1995). The measurement of explanatory style. In Buchanan, G. M., and Seligman, M. E. P. (eds.), *Explanatory Style*, Lawrence Erlbaum Associates, Hillsdale, NJ.

Reivich, K. J., and Seligman, M. E. P. (1991). *The Forced-Choice Attributional Style Questionnaire*, Unpublished data, University of Pennsylvania, Philadelphia (from Seligman, 1991).

Rudick, R. A., Miller, D., Clough, J. D., Gragg, L. A., and Farmer, R. G. (1992). Quality of life in multiple sclerosis. *Arch. Neurol.* 49: 1237–1242.

Scheier, M. F., and Carver, C. S. (1985). Optimism, coping and health: Assessment and implications of generalized outcome expectancies. *Health Psychol.* 4: 219–247.

Scheier, M. F., and Carver, C. S. (1992). Effects of optimism on psychological and physical well-being: Theoretical overview and empirical update. *Cognit. Ther. Res.* 16: 201–228.

Scheier, M. F., Matthews, K. A., Owens, J. F., Magovern, G. J., Lefebvre, R. C., Abbott, R. A., and Carver, C. S. (1989). Dispositional optimism and recovery from coronary artery bypass surgery: The beneficial effects on physical and psychological well-being. *J. Person. Soc. Psychol.* 57: 1024–1040.

Scheier, M. F., Carver, C. S., and Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *J. Person. Soc. Psychol.* 67: 1063–1078.

Scheinberg, L. C. (1994). Therapeutic strategies. *Ann. Neurol.* 36: S122.

Schiaffino, K. M., and Revenson, T. A. (1992). The role of perceived self-efficacy, perceived control, and causal attributions in adaptation to rheumatoid arthritis: Distinguishing mediator from moderator effects. *Person. Soc. Psychol. Bull.* 18: 709–718.

Schwarzer, R., and Jerusalem, M. (1989). Erfassung leistungsbezogener und allgemeiner Kontroll- und Kompetenzerwartungen. In Krampen, G. (ed.), *Diagnostik von Attributionen und Kontrollüberzeugungen* , Hogrefe, Göttingen, Germany, pp. 127–133.

Schwarzer, R. (1993). *Measurement of Perceived Self-Efficacy: Psychometric Scales for Cross-Cultural Research*, Freie Universität Berlin, Institut für Psychologic, Berlin.

Schwarzer, R. (1994). Optimism, vulnerability and self-beliefs as health-related cognitions: A systematic overview. *Psychol. Health* 9: 161–180.

Schwartz, C. E., and Fox, B. H. (1995). Who says yes? Identifying selection biases in a psychosocial intervention study of multiple sclerosis. *Soc. Sci. Med.* 40: 359–370.

Seligman, M. E. P. (1991). *Learned Optimism*, A. A. Knopf, New York (*Optimisme kun je leren*, Het spectrum, Utrecht).

Shnek, Z. M., Foley, F. W., LaRocca, N. G., Smith, C. R., and Halper, J. (1995). Psychological predictors of depression in multiple sclerosis. *J. Neuro. Rehab.* 9: 15–23.

Showers, C., and Ruben, C. (1990). Distinguishing defensive pessimism from depression: Negative expectations and positive coping mechanisms. *Cognit. Ther. Res.* 14: 385–399.

Sibley, W. A. (1990). The diagnosis and course of multiple sclerosis. In Rao, S. M. (ed.), *Neurobehavioral Aspects of Multiple Sclerosis*, Oxford University Press, New York, pp. 5–14.

Smári, J., and Valtýsdóttir, H. (1997). Dispositional coping, psychological distress and disease-control in diabetes. *Person. Indiv. Diff.* 22: 151–156.

Snyder, C. R., Irving, L. M., and Anderson, J. R. (1991). Hope and health. In Snyder, C. R., and Forsyth, D. R. (eds.), *Handbook of Social and Clinical Psychology: The Health Perspective*, Pergamon Press, New York, pp. 285–305.

Stuifbergen, A. K., and Rogers, S. (1997). Health promotion: An essential component of rehabilitation for persons with chronic disabling conditions. *Adv. Nurs. Sci.* 19: 1–20.

Surridge, D. (1969). An investigation into some psychiatric aspects of multiple sclerosis. *Br. J. Psychiatry* 115: 749–764.

Taylor, S. E. (1989). *Positive Illusions: Creative Self-Deception and the Healthy Mind*, Basic Books: Harper Collins, New York.

Taylor, S. E., and Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychol. Bull.* 103: 193–210.

Taylor, S. E., Collins, R. L., Skokan, L. A., and Aspinwall, L. G. (1989). Maintaining positive illusions in the face of negative informations: Getting the facts without letting them get to you. *J. Soc. Clin. Psychol.* 8: 114–129.

Taylor, S. E., Kemeny, M. E., Reed, G. M., and Aspinwall, L. G. (1991). Assault on the self: Positive illusions and adjustment to threatening events. In Strauss, J., and Goethals, G. R. (eds.), *The Self: Interdisciplinary Approaches*, Springer-Verlag, New York, pp. 239–254.

Tennen, H., and Affleck, G. (1987). The costs and benefits of optimistic explanations and dispositional optimism. *J. Person.* 55: 377–393.

van der Pligt, J. (1998). Perceived risk and vulnerability as predictors of precautionary behaviour. *Br. J. Health Psychol.* 3: 1–14.

Wallston, K. A. (1994). Cautious optimism vs cockeyed optimism. *Psychol. Health* 9: 201–203.

Walsh, P. A., and Walsh, A. (1987). Self-esteem and disease adaptation among multiple sclerosis patients. *J. Soc. Psychol.* 127: 669–671.

Warren, S., Warren, K. G., and Cockerill, R. (1991). Emotional stress and coping in multiple sclerosis exacerbations. *J. Psychosom. Res.* 35: 37–47.

Wassem, R. (1992). Self-efficacy as a predictor of adjustment to multiple sclerosis. *J. Neurosci. Nurs.* 24: 224–229.

Watson, D., Clark, L. A., and Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *J. Person. Soc. Psychol.* 54: 1063–1070.

Weinstein, N. D. (1980). Unrealistic optimism about future life events. *J. Person. Soc. Psychol.* 39: 806–820.

Weinstein, N. D., and Klein, W. M. (1996). Unrealistic optimism: Present and future. *J. Soc. Clin. Psychol.* 15: 1–8.

Wineman, N. M., Durand, E. J., and Steiner, R. P. (1994). A comparative analysis of coping behaviors in persons with multiple sclerosis or a spinal cord injury. *Res. Nurs. Health* 17: 185–194.

Zeldow, P. B., and Pavlou, M. (1984). Physical disability, life stress and psychosocial adjustment in multiple sclerosis. *J. Nerv. Ment. Dis.* 172: 80–84.

Zwanikken, C. P. (1997). *Multiple sclerose: Epidemiologie en kwaliteit van leven*, Dissertation, Rijksuniversiteit Groningen, Groningen.