

**The Relationship Between Disability and Depression in Multiple Sclerosis:  
The Role of Uncertainty, Coping, and Hope**

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## Abstract

The relationship between disability and depression was studied in 188 patients with clinically definite multiple sclerosis (MS). Patients were administered the Zung Self-Rating Depression Scale, Ways of Coping, Uncertainty of Illness Scale, and Hope Scale during their regular clinic appointments. Their current level of disability was rated by the attending physician using the Expanded Disability Status Scale. Even when the depression measure was corrected for items overlapping with other symptoms or consequences of MS, depression was correlated with disability. Depression was also correlated with an array of psychological variables, including uncertainty concerning one's illness, hope, and the use of various emotion-centered, though not problem-centered coping strategies. Multiple regression analyses revealed that none of these psychological correlates mediated or moderated the relationship between disability and depression. Instead, disability, uncertainty, hope, and emotion-centered coping were significant independent predictors of depression, together accounting for approximately 40% of the variance in patients' self-reported depression. The relationship between disability and depression in MS is usually interpreted as evidence that depression is psychogenic and reactive to the demands and limitations of this disease. The demonstration that this relationship is not diminished when an array of potentially intervening psychological variables are included in the analysis raises questions concerning the validity of this interpretation.

## Introduction

Depression is generally recognized as a common feature accompanying multiple sclerosis, with a lifetime prevalence of approximately 50%.<sup>1</sup> However, the relationship between depression and MS patients' disability status remains the subject of considerable controversy centering primarily on two issues: (a) whether such a relationship indeed exists, and (b) if so, what this relationship implies about the origin of depression in conjunction with multiple sclerosis.

Numerous studies can be found claiming that depression is unrelated to patients' disability status. However, most of these studies suffer from a variety of shortcomings that greatly limit the possibility that a significant relationship would emerge. The most common of these shortcomings include restrictions in the size of the patient sample<sup>2-7</sup> or in the variability of the sample in terms of disability.<sup>6,8-10</sup> When these studies are excluded, the preponderance of evidence indicates a moderate relationship between disability and depression in MS patients<sup>11-19</sup>, although well executed studies posing exceptions<sup>20-21</sup> still need to be acknowledged. In light of these conflicting findings, more investigation of the relationship between disability and depression is warranted.

When this relationship emerges in a study, it is generally interpreted as evidence that the depression occurring in conjunction with MS originates as a secondary reaction to the demands and limitations imposed by this disease. In this view, disability status is thought of as an index of the stressfulness of the disease and depression as an emotional reaction to this psychological burden. Investigators who adopt this view have made efforts to discover the variables that possibly intervene between disability and depression. Most of these efforts derive from a stress and coping model of MS-related depression.<sup>12,16</sup> The instrument commonly used to study

coping in MS patients is the Ways of Coping questionnaire, which distinguishes between problem-focused and emotion-focused coping.<sup>22</sup> Problem-focused coping involves taking direct actions to solve the problem that is the source of distress. Emotion-focused coping involves efforts directed toward managing the negative emotions associated with the stressor. Analyses of MS patients' responses to the Ways of Coping have revealed factors that generally resemble emotion-focused and problem-focused coping-- for example, the distinctions between emotional respite and cognitive reframing,<sup>23</sup> passive avoidance coping and active constructive coping,<sup>24</sup> and escape-avoidance and planful problem-solving.<sup>11,16</sup>

Mohr and his associates examined coping strategies as variables that might intervene in the relationship between disability and depression.<sup>16</sup> Patients classified into a high impairment group (EDSS > 6.5) not only had greater depression scores, but also exhibited less adaptive, emotion-centered and avoidant coping strategies. Likewise, those in a low impairment group (EDSS < 7.0) not only had lower depression, but also used more problem-centered strategies. Interactions between disability and coping were also found, indicating that coping might somehow intervene in the relationship between disability and depression. One possibility considered by Mohr was that coping served as a mediating variable: higher levels of disability reduced the patient's adaptive coping abilities, and it was this reduction in coping which, in turn, led to greater depression. Another possibility is that coping functions as a moderating variable: the relationship between disability and depression might be lower for patients who use more adaptive coping strategies and higher for those who resort to less adaptive strategies. Baron and Kenny have recommended multivariate methods for testing possible mediating and moderating variables interposed between

disability and depression.<sup>25</sup> One goal of the present study was to replicate and extend the study by Mohr using these multivariate procedures.

In addition to coping strategies, we examined two other psychological constructs (hope and uncertainty concerning ones illness) as possible variables intervening in the relationship between disability and depression. Patients often characterize their experience in relation to MS as a struggle to maintain a sense of hope, and the variable course of this illness contributes to a substantial amount of uncertainty among MS patients. However, there have been few investigations of either construct in conjunction with MS. Two studies have shown depression in MS patients to be related to hopelessness<sup>26</sup> or diminished optimism.<sup>27</sup> A relationship between uncertainty of illness and the use of emotion-centered coping was demonstrated in a combined sample of patients with MS and spinal cord injuries.<sup>28</sup> We recently reported that uncertainty played a pivotal role accounting for the heightened levels of depression in MS patients who were currently experiencing an exacerbation in their illness.<sup>29</sup> The role of hope and uncertainty in mediating or moderating the relationship between disability and depression has not been previously examined.

## Method

### Subjects

Patients attending regularly scheduled appointments in a MS clinic at the University of Kansas Medical Center were asked to participate in the study. Patients were recruited consecutively provided they appeared to have sufficient mental ability to complete the questionnaires. Four patients refused the request to participate, five did not provide useable data, and 14 failed to return the battery of questionnaires. The present sample consisted of 188 patients who met Poser et al.'s<sup>30</sup> criteria for

clinically definite MS. The battery required approximately one hour to complete, and most of these patients completed it by the end of their clinic appointment. Fifty-two return envelopes were distributed to individuals who could not complete the battery during their appointment, and 39 (75%) of these patients returned the battery by mail.

During the course of the clinic visit, the attending physician (SGL) recorded each patient's current level of disability using the Expanded Disability Status Scale (EDSS),<sup>31</sup> the subtype of MS, the patient's age at first diagnosis, length of illness, and current medications relating to MS.

The participants were 144 females and 44 males (77% vs 23%) who ranged in age from 17 to 72 ( $M = 44.0$ ). Only 5% of the sample identified themselves as minorities, with 7 (4%) being African-American and 2 (1%) being Hispanic. Three percent of the subjects had not completed high school, 24% had completed high school, 39% had completed some college credit, 18% had completed a 4-year college degree, and 16% had undertaken graduate work or completed an advanced degree. Forty-six percent were currently employed or self-employed, 38% were unemployed, and 15% were retired. Seventy percent of the subjects were married, 17% divorced or separated, 3% widowed, and 10% single.

The age when the patient was diagnosed with MS ranged from 14 to 65 ( $M = 35.7$ ), and the length of illness ranged from 1 to 38 years ( $M = 8.3$ ). Scores on the EDSS ranged from 1.0 to 9.0 ( $M = 4.0$ ). The number of patients classified into each of the major subtypes of MS were as follows: 118 (67%) relapsing-remitting; 36 (21%) primary progressive; 22 (13%) secondary progressive. Eighty-five percent of the patients were taking one or more MS-related medications, including the following: antidepressant (40%), anti-fatigue (24%); anti-spasmodics (52%), beta-interferon (26%), and copaxone (15%).

## Measures

In addition to an initial page eliciting demographic and disease-related information, the battery of questionnaires included the following measures:

The Self-Rating Depression Scale (SDS).<sup>32</sup> The SDS is comprised of 20 items reflecting common affective, cognitive-behavioral, and physiological symptoms of depression. Patients rated the frequency with which they had experienced each symptom during the recent past, using a scale from 1 (never or a little of the time) to 4 (most of the time). Several investigators have recommended that, in order to avoid spuriously inflating depression scores in samples of MS patients, depression questionnaires should be corrected for items that overlap with symptoms or other features of MS.<sup>33,34</sup> In the present study, four such items were omitted from the scoring: "I get tired for no reason"; "My mind is as clear as it used to be"; "I find it easy to do the things I used to"; "I still enjoy the things I used to do." The ratings assigned to the remaining 16 items were summed, and this total was prorated to an equivalent score for the full 20-item questionnaire by multiplying by 5/4. These prorated depression scores had an internal consistency (Cronbach's alpha) of .76 and ranged from 31 to 69 ( $M = 46.1$ ;  $S.D. = 7.1$ ). The correlation between the prorated scores and the full scale depression scores was .98. All of the results reported below are based on prorated depression scores.

The Ways of Coping (WOC).<sup>22</sup> This scale consisted of 65 items describing a variety of coping strategies which people use to deal with stressful events. Patients were asked to identify the coping strategies they used to deal with their multiple sclerosis. They responded to each item using a scale from 1 (not used) to 4 (used a great deal). The WOC was scored to yield four measures of emotion-centered coping (emotion-focused coping, emotional respite, passive avoidant coping, and

escape-avoidance) and four measures of problem-centered coping (problem-focused coping, cognitive reframing, active constructive coping, and planful problem solving).

The Hope Scale (HS).<sup>35</sup> This scale consisted of eight items that evaluate the construct of hope and four filler items. Patients rated each item according to how accurately it described them, using a scale from 1 (definitely false) to 8 (definitely true). The hope score was determined by summing the ratings assigned to the eight relevant items.

The Uncertainty of Illness Scale (UIS).<sup>36</sup> The original UIS consisted of 30 items; however three items referring to inpatient care were omitted in an attempt to make the scale more suitable for the outpatient setting of the present study. Patients rated each item on a scale from 1 (strongly disagree) to 5 (strongly agree), and a total score was computed by summing these ratings.

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Insert Table One About Here

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## Results

Table 1 presents the sample mean and standard deviation for disability, depression, and each of the other variables considered in this study. Table 2 presents the correlations between depression and these other variables. Depression was significantly related to patients' education level ( $r = -.23, p = .002$ ), disability scores on the EDSS ( $r = .33, p < .001$ ), uncertainty concerning their illness ( $r = .43, p < .001$ ), level of hope ( $r = -.44, p < .001$ ), and use of emotion-centered coping strategies (emotion-focused coping:  $r = .30, p < .001$ ; emotional respite:  $r = .41, p < .001$ ; passive avoidant coping:  $r = .35, p < .001$ ; escape-avoidance coping:  $r = .47, p < .001$ ). Depression was not significantly related to any of the problem-centered coping strategies. To insure that the correlations between depression and the other



measures were not spuriously inflated by the association with education level, we computed partial correlations with education level controlled. All correlations that were significant in the preceding analysis remained significant when education level was controlled in this manner (Table 2).

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Insert Table Two About Here

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These simple bivariate analyses show that depression scores were related to disability, uncertainty, hope, and emotion-centered forms of coping. However, the question remains as to which of these variables were making unique contributions to the prediction of depression. To determine this, a simultaneous multiple regression analysis was performed in which the four variables were entered as predictors of patients' depression scores. In this analysis, any one of the emotion-centered coping measures could be used, and indeed, we repeated the analysis substituting a different coping variable each time. The outcome was the same regardless of which variable was used. For the sake of brevity, we will confine the remainder of this report to analyses using escape-avoidance scores as the coping measure. This scale was chosen as the representative measure of emotion-centered coping because it is the most highly correlated with depression in this study as well as figuring prominently in other studies of coping with MS.<sup>11,16,37</sup> The choice is an arbitrary one; the outcomes of all the regression analyses reported in this section are the same regardless of which emotion-centered coping measure is used.

The simultaneous regression analysis was significant (adjusted  $R^2 = .44$ ,  $F = 32.44$ ,  $df = 4, 155$ ,  $p < .001$ ). Disability ( $\beta = .26$ ,  $t = 4.3$ ,  $p < .001$ ), uncertainty of illness ( $\beta = .25$ ,  $t = 3.9$ ,  $p < .001$ ), hope ( $\beta = -.33$ ,  $t = 5.3$ ,  $p < .001$ ) and escape-avoidance coping ( $\beta = .25$ ,  $t = 3.7$ ,  $p < .001$ ) were each significant predictors of depression. With

education level statistically controlled through the use of a hierarchical regression analysis, the four predictors still made significant contributions to the prediction of depression (all  $p$ 's < .001).

In regression analyses, moderator variables can be represented as interaction terms computed by multiplying the relevant predictor variables. In accordance with Baron and Kenny,<sup>25</sup> the interaction term is entered after the individual predictors, and the test of the moderator variable is based upon the increase in variance accounted for ( $\Delta R^2$ ) by the interaction term. This increase was not significant in the case of the interaction of disability and uncertainty ( $\Delta R^2 = .00$ ,  $F = 0.02$ ,  $df = 1,165$ ,  $p = .29$ ), the interaction of disability and hope ( $\Delta R^2 = .00$ ,  $F = 0.32$ ,  $df = 1,179$ ,  $p = .57$ ), or the interaction of disability and escape-avoidance coping ( $\Delta R^2 = .00$ ,  $F = 0.05$ ,  $df = 1,178$ ,  $p = .82$ ).

The existence of a moderator variable can also be detected by examining the correlations between the psychological variables and depression for high and low impairment patients. We divided our sample of patients into high and low impairment groups using the same cutoff employed by Mohr et al.<sup>16</sup> The correlations between the psychological variables and depression for each group are presented in Table 3. In the present study, the correlations were very similar for the two impairment groups. Therefore, none of the psychological variables appears to moderate the relationship between disability and depression.

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Insert Table Three About Here

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Alternatively, one or more of the psychological variables might serve as a mediating variable interposed between disability and depression. Baron and Kenny cite three criteria that must be satisfied to demonstrate a mediating variable.<sup>25</sup> Stated

in terms of the present study, (a) disability status must be significantly related to the mediating variable, (b) disability status must be significantly related to depression, and (c) the relationship between disability and depression must decline substantially or become nonsignificant when the mediating variable is included as a predictor. As we have seen, disability is clearly related to depression in the present sample; therefore the second criterion is met. However, with respect to the first criterion, the only psychological variable found to be related to disability was hope ( $r = -.19$ ,  $p = .008$ ). Proceeding to the third criterion, depression was first regressed on disability and then the change in the relationship between disability and depression was examined after the scores for the hope scale were included in the regression analysis. When hope scores were added to the regression analysis, the relationship between disability and depression (i.e.,  $\beta$ ) declined only from .33 to .24 and remained significant ( $t = 3.68$ ,  $p < .001$ ). Therefore, none of the psychological variables functioned as a mediating variable.

### Discussion

The present results differ from those reported by Mohr et al.<sup>16</sup> by failing to depict coping as a variable intervening in the relationship between disability and depression. One of the ways Mohr illustrated the interaction between disability and coping that occurred in their study was by presenting the correlations between coping and depression for high impairment and low impairment patients. Scores for escape-avoidance coping, planful problem solving, and cognitive reframing were more strongly associated with depression for patients in their high impairment group ( $r$ 's = .51, -.38, and -.41, respectively) than for those in their low impairment group ( $r$ 's = .38, -.11, and -.16). In the present study, no such interaction occurred, and the correlations between groups of high and low impairment patients were much more

alike (Table 3). This difference in outcome may be due to the larger sample of patients examined in the present study (N = 188 compared to 99), especially since this allowed a more adequate number of patients to be included in our high impairment group (N = 64 compared to 23).

In the present study we found no evidence of an interaction between disability and any of the psychological variables. Furthermore, disability remained significantly related to depression despite the introduction of these psychological variables in multiple regression analyses. Thus the relationship between disability and depression is neither moderated nor mediated by the additional psychological variables examined in this study. Instead, disability appears to make an independent contribution to the prediction of depression, separate from that contributed by the array of psychological variables investigated here. This conclusion is founded upon patients' subjective ratings of depression which served as the criterion variable in this study. Additional studies are needed to determine whether this same outcome would occur in the case of clinicians' ratings of depression or their diagnoses of depression as a clinical syndrome.

As noted earlier, associations between disability and depression are usually interpreted as evidence supporting a reactive model of depression occurring in conjunction with MS. However, it is difficult to uphold such a model in light of the present finding that none of the psychological variables intervenes in the relationship between disability and depression. Although the alternative view is less commonly presented, it is also possible that disability reflects the extent of neurologic damage and therefore the relationship between disability and depression might be indicative of a more direct, organic origin to depression in MS. Such an assertion requires that there be an association between patients' disability status and damage in those areas

of the central nervous system that could reasonably be linked with depression. Although only modest relationships between disability and total lesion load were initially found,<sup>38,39</sup> refinements in MRI indices that may be more closely aligned with demyelination and axonal degeneration (e.g., T1 hypointense lesions and magnetization transfer ratios) have resulted in stronger correlations with disability.<sup>40,41</sup> Accordingly, the relationship between disability and depression may be more indicative of an organic basis to depression than previously suspected.

Investigators who favor the organic view often cite evidence that patients with MS have greater depression than do patients with peripheral neurological disorders presenting with equal disability.<sup>9,17,42,44</sup> The point of such studies is to demonstrate that disability *per se* is not the trigger for depression. We would add one qualifier to this conclusion. To the extent that disability reflects neurological damage to areas of the central nervous system that may be associated with depression, disability status may approximate the organic basis of such depressions.

Ultimately, few would argue that both organic and reactive models apply to the depression encountered among MS patients. In this vein, it is important to emphasize that both disability and our array of psychological variables made significant independent contributions to the prediction of depression in the present study. Disability may provide at least a rough index of the organic component of depression, and psychological variables such as those investigated here, an index of the reactive component. By itself, disability is only modestly related to depression, accounting for only about 10% of the variance. Increases in disability may prompt clinicians to be somewhat more vigilant regarding depression in their patients. However, attention to psychological factors such as coping, hope, and uncertainty is also clearly warranted.

### References

- 1 Sadovnick AD et al. (1996) Depression and multiple sclerosis. *Neurology* **46**: 628-632.
- 2 Fassbender K et al. (1998) Mood disorder and dysfunction of the hypothalamic-pituitary-adrenal axis in multiple sclerosis. *Arch Neurol* **55**: 66-72.
- 3 Foley FW et al. (1992) A prospective study of depression and immune dysregulation in multiple sclerosis. *Arch Neurol* **49**: 238-244.
- 4 Gilchrist AC, Creed FH. (1994) Depression, cognitive impairment and social stress in multiple sclerosis. *J Psychosom Res* **38**: 193-201.
- 5 Lyon-Caen O, Jouvent R, Hauser S. (1986) Cognitive function in recent onset demyelinating disease. *Arch Neurol* **49**: 1237-1242.
- 6 Möller A et al. (1994) Correlates of cognitive impairment and depressed mood in multiple sclerosis. *Acta Psychiatr Scand* **89**: 117-121.
- 7 Noy S et al. (1995) A new approach to affective symptoms in relapsing-remitting multiple sclerosis. *Compr Psychiatry* **36**: 390-395.
- 8 Roca CA et al. (1999) Cerebrospinal fluid, somatostatin, mood, and cognition in multiple sclerosis. *Biol Psychiatry* **46**: 551-556.
- 9 Ron, MA, Logsdail SJ. (1989) Psychiatric morbidity in multiple sclerosis: a clinical and MRI study. *Psychol Med* **19**: 887-895.
- 10 Vercoulen, JHMM et al. (1996) The measurement of fatigue in patients with multiple sclerosis. *Arch Neurol* **53**: 642-649.

- 11 Aikens JE, Fischer JS, Namey M, Rudick RA. (1997) A replicated prospective investigation of life stress, coping, and depressive symptoms in multiple sclerosis. *J Behav Med* 20: 433-445.
- 12 Pakenham KI. (1999) Adjustment to multiple sclerosis: Application of a stress and coping model. *Health Psychol* 18: 383-392.
- 13 Bakshi R et al. (2000) Brain MRI lesions and atrophy are related to depression in multiple sclerosis. *Neuroreport* 11: 1153-1158.
- 14 Gil R et al. (1993) Event-related auditory evoked potentials and multiple sclerosis. *Electroencephalogr Clin Neurophysiol* 88: 182-187.
- 15 McIvor GP, Riklan M, 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.
- 16 Mohr DC, Goodkin DE, Gatto N, Van der Wende J. (1997) Depression, coping, and level of neurological impairment in multiple sclerosis. *Mult Scler* 3: 254-258.
- 17 Tedman BM, Young CA, Williams IR. (1997) Assessment of depression in patients with primary motor neuron disease and other neurologically disabling illness. *J Neurol Sci* 152 (Suppl. 1), S75-S79.
- 18 Whitlock FA, Siskind MM. (1980) Depression as a major symptom of multiple sclerosis. *J Neurol Neurosurg Psychiatry* 43: 861-865.
- 19 Zeldow PB, Pavlou M. (1984) Physical disability, life stress, and psychosocial adjustment in multiple sclerosis. *J Nerv Ment Dis* 172: 80-84.
- 20 Minden S, Orav J, Reich P. (1987) Depression in multiple sclerosis. *Gen Hosp Psychiatry* 9: 426-434.

- 21 Huber SJ, Rammohan KW, Bornstein RA, Christy JA. (1993) Depressive symptoms are not influenced by severity of multiple sclerosis. *Neuropsychiatry Neuropsychol Behav Neurology* 6: 177-180.
- 22 Folkman S, Lazarus RS. (1985) If it changes it must be a process: study of emotion and coping during three stages of a college examination. *J Pers Soc Psychol* 48: 150-170.
- 23 Wineman NM, Durand EJ, McCulloch BJ. (1994) Examination of the factor structure of the Ways of Coping Questionnaire with clinical populations. *Nurs Res* 43: 268-273.
- 24 Kroencke DC, Denney DR. (1999) Stress and coping in multiple sclerosis: exacerbation, remission, and chronic subgroups. *Mult Scler* 5: 89-93.
- 25 Baron RM, Kenny DA. (1986) The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 51: 1173-1182.
- 26 Hickey A, Greene SM. (1989) Coping with multiple sclerosis. *Ir J Psychol Med* 6: 118-124.
- 27 Fournier M, de Ridder D, Bensing J. (1999) Optimism and adaptation to multiple sclerosis: what does optimism mean? *J Behav Med* 27: 303-326.
- 28 Wineman NM, Durand EJ, Steiner RP. (1994) A comparative analysis of coping behaviors in persons with multiple sclerosis or a spinal cord injury. *Res Nurs Health* 17: 185-194.



- 29 Kroencke DC, Denney, DR, Lynch SG. (2001) Depression during exacerbations in multiple sclerosis: the importance of uncertainty. *Mult Scler* 7: In press.
- 30 Poser CM et al. (1983) New diagnostic criteria for multiple sclerosis: guidelines for research protocols. *Ann Neurol* 13: 227-231.
- 31 Kurtzke JF. (1983) Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology* 33: 1444-1452.
- 32 Zung WWK. (1965) A self-rating depression scale. *Arch Gen Psychiatry* 12: 64-71.
- 33 Mohr DC et al. (1997) Identification of Beck Depression Inventory items related to multiple sclerosis. *J Behav Med* 20: 407-414.
- 34 Nyenhuis DL et al. (1995) Mood disturbance versus other symptoms of depression in multiple sclerosis. *J Int Neuropsychol Soc* 1: 291-296.
- 34 Snyder CR et al. (1991) The will and the ways: development and validation of an individual-differences measure of hope. *J Pers Soc Psychol* 60: 570-585.
- 36 Mishel MH. (1981) The measurement of uncertainty of illness. *Nurs Res* 30: 258-263.
- 37 Jean VM, Beatty WW, Paul RH, Mullins L. (1997) Coping with general and disease-related stressors by patients with multiple sclerosis: relationships to psychological distress. *Mult Scler* 3: 191-196.
- 38 McFarland HF et al. (1996) MRI studies of multiple sclerosis: implications for the natural history of the disease and for monitoring effectiveness of experimental procedures. *Mult Scler* 2: 198-205.

- 39 Zhao GJ et al. (1997) Clinical and magnetic resonance imaging changes correlate in a clinical trial monitoring cyclosporine therapy for multiple sclerosis: the MS Study Group. *J Neuroimaging* 7: 1-7.
- 40 Barkhof F. (1999) MRI in multiple sclerosis: correlation with expanded disability status scale (EDSS). *Mult Scler* 5: 283-286.
- 41 Miller DH, Grossman RI, Reingold SC, McFarland HF. (1998) The role of magnetic resonance techniques in understanding and managing multiple sclerosis. *Brain* 121 (Pt 1): 3-24.
- 42 Dalos NP, Rabins PV, Brooks BR, O'Donnell P. (1983) Disease activity and emotional state in multiple sclerosis. *Ann Neurol* 13: 573-577.
- 43 Schiffer RB, Babrigian HM. (1984) Behavioral disorders in multiple sclerosis, temporal lobe epilepsy, and amyotrophic lateral sclerosis: an epidemiologic study. *Arch Neurol* 41: 1067-1069
- 44 SurrIDGE D. (1969). An investigation into some psychiatric aspects of multiple sclerosis. *Br J Psychiatry* 115: 749-764.

Table 1

Descriptive Statistics Pertaining to the Sample (N = 188)

	M	S.D.
<u>Patient and Disease Related Variables</u>		
Age	44.0	10.7
Education	3.2	1.1
MS Age	35.7	9.5
Length of illness	8.3	7.3
Disability (EDSS)	4.0	2.4
<u>Psychological Variables</u>		
Depression	46.1	7.1
Uncertainty	46.6	10.7
Hope	47.3	9.2
Emotion-focused coping	28.6	9.6
Emotional respite	4.6	3.3
Passive avoidant coping	33.1	11.5
Escape-avoidance coping	6.7	4.5
Problem-focused coping	16.7	6.4
Cognitive reframing	10.7	4.7
Active constructive coping	27.5	10.5
Planful problem solving	9.3	4.0

Table 2  
Correlations with Depression

	Depression	
	Unadjusted correlation (r)	Partial correlation
<u>Patient and Disease Related Variables</u>		
Age	.05	.03
Education	-.23 **	
MS Age	-.01	-.04
Length of illness	.11	.09
Disability (EDSS)	.33 ***	.28 **
<u>Psychological Variables</u>		
Uncertainty	.43 ***	.41 ***
Hope	-.44 ***	-.41 ***
Emotion-focused coping	.30 ***	.24 **
Emotional respite	.41 ***	.31 **
Passive avoidant coping	.35 ***	.26 **
Escape-avoidance coping	.47 ***	.40 ***
<i>Problem-focused coping</i>	-.09	-.09
Cognitive reframing	-.13	-.15
Active constructive coping	-.15	-.12
Planful problem solving	-.09	-.04

Note: Partial correlations are computed after controlling for education level;  
\* p < .05 ; \*\* p < .01 ; \*\*\* p < .001

Table 3

Correlations with Depression for High Impairment versus Low Impairment Patients

	Low Impairment N = 124 r	High Impairment N = 64 r
Uncertainty	.46 ***	.39 **
Hope	-.38 ***	-.46 ***
Emotion-focused coping	.28 **	.29 *
Emotional respite	.36 ***	.41 **
Passive avoidant coping	.37 ***	.27 *
Escape-avoidance coping	.47 ***	.47 ***
Problem-focused coping	-.07	-.12
Cognitive reframing	-.12	-.23
Active constructive coping	-.14	-.19
Planful problem solving	-.12	-.20

Note: \* p < .05 ; \*\* p < .01 ; \*\*\* p < .001