ARTICLE *Multiple Sclerosis* 2007; **13**: 393–401

Coping and quality of life in one hundred and thirty five subjects with multiple sclerosis

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Introduction and objective The aim of this study was to compare coping strategies and quality of life (QoL) in multiple sclerosis (MS), as they relate to the course of the disease (relapsing-remitting (RR), secondary progressive (SP), primary progressive (PP)), while taking depression and anxiety into account.
Methods A total of 135 MS subjects were seen for a semi-structured interview in order to collect socio-demographic and clinical information, after which there was an assessment of their mental and cognitive states (Mini International Neuropsychiatric Interview (MINI), Montgomery and Asberg Depression Rating Scale (MADRS), Depressive Mood Scale (EHD), Hamilton Anxiety (HAMA), Frontal Assessment Battery (FAB)). All subjects then completed three self-report questionnaires; two about coping strategies (Ways of Coping Checklist (WCC), Coping with Health, Injuries and Problems Scale (CHIP)) and one about QoL (SEP59).
Results The mental health (depression and anxiety) and the psychological and social dimensions of QoL were relatively unaffected. However, after controlling for age and disability, the disease course had a strong effect on both mental health and QoL, with the poorest condition for SPMS and the best condition for PPMS. The SPMS patients tend to use emotional coping strategies extensively, while the PPMS patients use more instrumental strategies.
Discussion Our study clearly demonstrated that psychological and social well-being were substantially affected by the disease course. These results encourage us to develop interventions focused on coping strategies and which are better adapted to individual patients. *Multiple Sclerosis* 2007; **13**: 393–401. http://msj.sagepub.com

Key words: anxiety; coping strategies; depression; multiple sclerosis; quality of life

Introduction

Multiple sclerosis (MS) is a disabling disease, which usually affects young people and influences both their quality of life (QoL) and mental health (depression and anxiety).

Depression

Depression is a major symptom over the course of MS and can appear early in the disease. The prevalence of depression was higher (26%) in MS than in other non-neurological diseases [1], varying from 16 to 41% [2,3]. Depression was correlated in half of the studies with cognitive impairment [4–7], in young as well as old patients [8]. However, depression was not correlated to disease duration [9], or to functional impairment [10]. Depression was more frequent in the secondary progressive (SP) course of MS, than in both the remitting-relapsing (RR) and the primary progressive (PP) courses [11,12].

These various results show how difficult it is to compare different studies. In fact, the type of disease course, the stage of the disease, and also the tools used to assess depression, vary greatly from one study to another.

The etiopathology of depression in MS continues to be discussed. On the one hand, we find

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Received 1 March 2006; accepted 20 June 2006

 10.1177/1352458506071170

proponents of neurological causes, and on the other hand, those who assume that depression is related to psychological factors. Actually, it seems more reasonable to adopt an intermediate point of view, with the likelihood of an interaction between neurological and psychological factors.

Anxiety

Some studies revealed a high rate (34%) of anxiety prevalence [13], with high levels early in the course of the disease [14]. When associated with depression, anxiety increases the risk of suicide. Anxiety was viewed as a disabling symptom in 37% of the cases [15,16].

Coping strategies

The coping strategies people use are assumed to have a significant effect on psychological well-being and QoL. The concept of coping, proposed by Lazarus in the 1960s, was defined as 'the overall cognitive and behavioural efforts to master, reduce or tolerate inside or outside demands which threaten or surpass personal resources' [17]. Therefore, this concept includes behavioural as well as cognitive strategies, used to cope with or to counteract a difficult situation. Two coping strategies have been identified: problem-focused coping, which implies the efforts made by the subject to overcome his difficulty, and emotion-focused strategies, which are associated with emotional regulation. Interestingly, some studies attempted to identify adaptive and non-adaptive coping strategies in MS. Aikens *et al*. [18], found a positive relationship between problem-focused strategies and QoL. However, others found no relationship between these factors [19]. Strategies, such as avoidance, wishful thinking and self-accusation, were linked to low scores in the QoL scales [18,20–22]. McCabe and McKern [22], observed that all coping strategies were an important predictor of QoL in MS, and that 'wishful thinking' was the strongest predictor for poor QoL.

Additionally, certain coping styles can be strongly predictive of depression [23], with higher scores of depression for MS subjects using emotion-focused coping strategies.

It seems that the unpredictability of the disease could have a significant effect on the strategies used. Kroencke and Denney [24] observed that people with a relapsing course used more emotional strategies, especially 'avoidant' ones, than people with a progressive course. Warren *et al*. [25] made similar observations.

Quality of life

Quality of life (QoL) has been extensively evaluated in MS. On the one hand, McCabe and McKern [22] showed that both objective and subjective QoL in MS subjects were significantly lower for all dimensions (physical and psychosocial) than in healthy subjects. Similar results were published by Nicholl *et al*. [26]. On the other hand, Pittock *et al*. [27], observed that 77% of MS subjects were globally satisfied with their QoL despite their physical disability.

The clinical course of the disease has been shown to influence QoL. For instance, Janardhan and Bakshi [28] compared RRMS and SPMS forms, and they observed that the QoL of SPMS subjects was significantly more impaired.

The relationship between disease duration and the QoL of MS is controversial. Myers *et al*. [29], suggested that the QoL of MS subjects improved over the course of the disease, while others found the opposite results [6,30]. Dilorenzo *et al*. [31], specified that the age of the MS patients did not affect their QoL.

Depression and anxiety have been shown to negatively influence the QoL of MS patients [28,32,33]. In addition, cognitive dysfunction was found to be one of the main predictors of poor QoL [34].

The aim of the present study was to compare coping strategies and QoL according to the disease courses (RR, SP, PP), while taking depression and anxiety into account. We assumed that coping strategies as well as QoL would differ as a function of the course of the disease. We hypothesized that the QoL of subjects using mostly emotional coping strategies would be poorer than that in subjects using essentially problem-focused coping strategies. We also advanced the hypothesis that the more depressed and anxious the subjects were, the more they would use emotional strategies and present a poorer QoL.

Materials and methods

Subjects

Between September 2004 and July 2005, 135 definite MS cases, identified with the Poser criteria [35], between 18 and 75 years of age, were included in the study. All patients were treated in the Department of Neurology of the Pietié-Salpêtrière Hospital. Exclusion criteria consisted of a cognitive deficit assessed by the French translation of MMSE <24 [36], or a mental disease, except for depression and/or anxiety. All subjects gave their written, informed consent.

Assessments

The 135 MS subjects were interviewed by a psychologist in order to collect their sociodemographic and medical data. Over the course of the interview, he checked for the presence of a mental disorder with the Mini International Neuropsychiatric Interview (MINI) [37]. The MINI quickly assesses the presence of mental diseases according to the first axis of the DSM-IV-TR [38]. Then, depression, anxiety, emotional dimensions and cognitive functions were evaluated with the Montgomery and Asberg Depression Rating Scale (MADRS), Depressive Mood Scale (EHD), Hamilton Anxiety (HAMA) and Frontal Assessment Battery (FAB) clinical scales. The MADRS [39], is a well-known measure for the severity of depression. The EHD [40], is a French instrument that evaluates different emotional patterns: irritability, anhedonia, hypo- versus hyper-expressiveness, sadness and hyperesthesia. Two main factors have been identified: affective blunting (combining anhedonia and hypo-expressiveness) and loss of control (combining irritability and hyper-expressiveness). This scale has been used with different neurological disorders [41–43]. The HAMA [44,45], has been used to evaluate the level of anxiety in subjects. This scale gives three scores for anxiety: a psychic anxiety score, a somatic anxiety score and a global score, which is the addition of the first two scores. It appears relevant to distinguish somatic and psychic anxiety in subjects suffering from neurological diseases. The FAB proved to be easy to administer at bedside and sensitive to frontal lobe dysfunction. It has been validated in several groups of French patients with frontal lobe dysfunction – subcortical and cortical [46]. After the clinical interview, each subject was asked to complete three self-report questionnaires. Two questionnaires assessed coping strategies: The Ways of Coping Checklist (WCC) [47,48], and the Coping with Health, Injuries and Problems scale, (CHIP) [49], and one questionnaire for the QoL (SEP 59) [50]. The WCC assesses two coping strategies: problem-focused and emotion-focused coping. It has been widely used in literature. The patient has to think about a stressful situation met in the previous months, and choose the strategies he used to cope with it. The CHIP has the advantage of being specific to subjects suffering from somatic diseases. The patient is asked to choose which strategies he used to cope with his disease. The CHIP identifies four strategies: diversion (eg, to dream of agreeable things), palliative (eg, to spare his energy), instrumental (eg, to look for efficient treatments), and emotional coping (eg, to feel frustrated). The SEP 59 is an instrument inspired by the generic self-report questionnaire of QoL, the SF 36, but it is adapted to MS.

Statistical analysis

Comparisons among the MS types were performed using the analysis of variance model. We also used an ANOVA in order to assess the effect of different factors (sociodemographic and medical) on coping strategies and QoL.

The correlations between sociodemographic variables, medical variables, coping and QoL were performed using the Pearson correlation coefficient. The χ^2 of Pearson was used to compare the proportion in terms of percentage of the sociodemographic as well as the clinical data. The significant level used for each of these measures was set at $P < 0.05$. The Statistica software Release 5.1, 1997 version, was used to perform the analysis.

Results

The demographic and clinical data are displayed in Table 1.

Demographic data

As is the case with most studies of MS, females were more numerous than males in our sample (66 and 33%). However, no significant difference was observed between the clinical courses of the disease in regard to gender ($P = 0.16$).

The mean age of the patients was 44 ($\pm$11.8). PPMS patients were the oldest and RRMS patients the youngest. As for marital status, ethnic group or level of education, no significant differences were

Table 1 Demographic and clinical data

	All patients ($n = 135$) mean (SD)	RRMS ($n = 53$) mean (SD)	SPMS ($n = 53$) mean (SD)	PPMS ($n = 29$) mean (SD)	P values ANOVA
Age	44.3 (11.8)	36.9 (9.9)	46 (9.2)	54.9 (9.6)	<0.001
Disease duration	8.7 (6.8)	5.9 (5.4)	12.6 (7.1)	6.7 (5.4)	<0.001
Age at disease onset	32.8 (10.5)	28.7 (8.6)	30 (7.9)	44.2 (9)	<0.001
Last relapse	0.9 (2.5)	0.2 (0.7)	1.9 (3.6)	–	0.004
EDSS	3.8 (2.6)	1.8 (2.1)	5.4 (1.5)	4.6 (2.3)	<0.001

observed in regard to the course of the disease ($P=0.98$). As expected, a greater proportion of SPMS subjects were considered to be disabled, and more RRMS were able to work full time ($P=0.01$).

Clinical data

A total of 41% of the patients had RRMS, 38% SPMS, and 21% had PPMS. The progression of the disease seemed to be faster PPMS than in RRMS ($P<0.001$). Globally, almost half of the sample (47%) underwent a slow progression, 35% a moderate progression, and 18% a severe progression.

Some 78 patients (58%) received a corticoid treatment during the past six months, 30 (22%) were treated by IV methylprednisolone and cyclophosphamide, five (4%) by interferon beta, 19 (14%) by IV methylprednisolone and interferons, and three (2%) received no treatment at all. No significant difference between the clinical courses was observed in relation to the type of treatment ($P=0.09$).

A total of 130 patients (96%) were outpatients and were hospitalized for the day in order to receive their treatment. Five patients (4%) were inpatients. The other patients clinical data are displayed in Table 1.

Depression and anxiety

A total of 50% of the patients had no antecedents of depression or anxiety, 31% had experienced major depression, 4% anxiety disorders, and 15% both depression and anxiety. No significant differences were observed with regard to their clinical courses. However, the RRMS and SPMS patients tended to have more history of major depression (12 and 11%, respectively), than the PPMS patients (7%). Some 56% of the patients were receiving psychotropic treatments (29% for depression, 5% for anxiety and 10% for both). More RRMS and SPMS patients (10 and 12%, respectively) had treatment for a depressive state than the PPMS patients (7%).

The mean scores of the MADRS, the EHD and the HAMA scales are displayed in Table 2. The mean score of the MADRS was 10.6 (± 7) for all patients, which corresponds to a mild depression. The psychic anxiety scores were higher for the three groups of subjects than the somatic anxiety score, which was very low.

The clinical course of the disease had a significant effect on the MADRS scores. The SPMS patients were the most depressed and those enduring a PPMS the least depressed. Nine patients with an SPMS and three with an RRMS had a MADRS score superior to 20 points (which is the cut-off for depression in neurological patients), while it was not the case for any PPMS patients. The same pattern was observed for irritability, sadness and the global loss of control factor of the EHD scale, which were higher in the SPMS patients and lower in the PPMS patients. As expected, SPMS patients were sadder than the other patients. No PPMS patient presented any hyperesthesia. The loss of control dimension was significantly higher in the SPMS than in the PPMS group, while no difference was observed between the SPMS and RRMS patients.

Gender difference had no effect on depression, but we observed a significant difference concerning expressiveness and blunted affect. Indeed, females were significantly more expressive ($P=0.04$), and less emotionally blunted ($P=0.04$) than males. The other clinical variables (EDSS, PI, disease duration) had no effect on depression or mood. In our patients, we did not observe any effect of the interferon treatment or the corticoid therapy.

The younger subjects appeared to be more depressed ($P=0.03$), and presented more loss of control ($P=0.009$). Widowed patients were also more depressed ($P=0.03$), and more emotionally blunted ($P=0.002$). Even when controlling for age

Table 2 Scores of depression, mood and anxiety

	All patients ($n=135$) mean (SD)	RRMS ($n=53$) mean (SD)	SPMS ($n=53$) mean (SD)	PPMS ($n=29$) mean (SD)	*P* values ANOVA
MADRS	10.6 (6.9)	9.5 (6)	14.2 (7.4)	6.3 (4)	<0.001
EHD					
Irritability	6 (3.8)	5.9 (4.1)	6.9 (3.9)	4.5 (2.7)	0.04
Anhedonia	0.6 (1.1)	0.6 (1.2)	0.7 (1.2)	0.2 (0.6)	0.18
Expressiveness	0.4 (1.6)	0.4 (2.1)	0.5 (1.4)	0.1 (0.4)	0.55
Sadness	1.7 (2)	1.3 (1.9)	2.5 (2.2)	0.8 (1.4)	<0.001
Hyperesthesia	0.4 (1)	0.5 (1.2)	0.4 (1.0)	0.0 (0.0)	0.07
Blunted affect (EHD)	0.7 (4.2)	0.8 (1.8)	0.8 (1.3)	0.3 (0.7)	0.18
Loss of control (EHD)	6.6 (0.4)	6.4 (4.2)	7.6 (4.1)	5 (3.9)	0.01
Psychic anxiety (HAMA)	6.6 (4.2)	6.6 (4)	7.7 (4.6)	4.2 (2.8)	0.007
Somatic anxiety (HAMA)	1.4 (1.7)	1.4 (1.6)	1.6 (2)	0.9 (1.5)	0.40
Total anxiety (HAMA)	9.3 (4.8)	9.6 (4.6)	10.7 (4.9)	6 (3.6)	0.001

and marital status, the effect of the disease course was maintained for depression.

Concerning anxiety, the ANOVA analysis showed a significant effect of the disease course on psychic (and total) anxiety. Once again, the SPMS group had substantially higher scores than the PPMS group. The difference between the SPMS and RRMS subjects was not significant.

Neither gender nor clinical variables (EDSS, PI, disease duration, time of the last relapse) had any effect on anxiety. We also observed that neither interferon nor corticoid treatments had any effect on anxiety.

Coping

Scores for the WCC and the CHIP are shown in Table 3.

An effect of the disease course on emotion-focused coping of the WCC ($P < 0.001$) was observed. The patients with an SPMS used more emotional strategies than patients with a PPMS. No other differences were observed with the WCC.

The age of the patients, their age at disease onset, the date of the last relapse, the progression index and the EDSS score did not influence coping strategies. However, the use of instrumental strategies tended to decrease with the duration of the disease ($P < 0.001$). Gender also had a substantial influence on emotional coping strategies ($P < 0.01$), as well as on diversion ($P < 0.01$) and palliative strategies ($P < 0.005$). Indeed, females tended to use significantly more emotional strategies than males ($P = 0.01$). Since this variable had a significant effect on emotion-focused strategies (WCC), we controlled it when comparing the three disease courses, but the effect of the disease course on emotion-focused coping remained significant ($P = 0.001$). Females used more diversion ($P = 0.005$) and palliative ($P < 0.005$) strategies than males.

We also analysed the effects of both depression and anxiety on coping strategies. Depression appeared to have a significant effect on emotional coping strategies when measured with the WCC ($P = 0.002$), or with the CHIP ($P = 0.001$), as well as on palliative ($P = 0.001$) and instrumental ($P = 0.01$) strategies using the CHIP. Again, taking into account the effect of depression on emotional strategies (WCC), we proceeded to enter this variable as covariate in an analysis of variance to verify if the effect of the disease course on emotional coping (WCC) persisted or not. It did not ($P = 0.17$), and this showed the strong effect of depression on emotion-focused coping.

The analysis of correlations showed a significant positive correlation between emotional strategies (WCC and CHIP) and depression scores ($P = 0.004$ and 0.001), and also between palliative strategies (CHIP) and depression ($P = 0.005$). On the contrary, diversion strategies were negatively correlated to depression ($P = 0.025$).

These results suggested that only diversion strategies protect the subject against depression, and that some emotional strategies could potentially threaten mental health. No significant relationship was observed between the emotional dimensions of mood and coping strategies.

Psychic anxiety had a significant effect on emotional coping strategies (WCC: $P = 0.005$; CHIP: $P < 0.001$), which suggests that the more anxious the patient was, the more he tended to use emotional strategies. Our correlation analysis confirmed these results.

The correlation scores showed that the less cognitively impaired the patient was (FAB), the less he tended to use any coping strategies.

Finally, we must note that the SPMS patients used more emotional coping strategies, and this was the only significant difference between disease courses and coping strategies.

Quality of life

Table 4 presents the QoL variables.

In our population, QoL appeared to be affected only by physical factors and not by psychosocial factors.

For the clinical course, as expected, significant differences were observed concerning both physical

Table 3 Scores of coping

	All patients ($n = 135$) mean (SD)	RRMS ($n = 53$) mean (SD)	SPMS ($n = 53$) mean (SD)	PPMS ($n = 29$) mean (SD)	*P* values ANOVA
Problem focused coping (WCC)	36.9 (6.8)	36.8 (6.8)	36.3 (7.2)	37.9 (6.5)	0.59
Emotion focused coping (WCC)	40.6 (9.4)	40.4 (8.6)	43.5 (9.7)	35.6 (8.5)	0.001
Diversion strategies(CHIP)	27 (5.7)	27.2 (5.4)	27.8 (5.9)	25.5 (5.7)	0.24
Palliative strategies (CHIP)	25.6 (5.6)	25.9 (6.1)	25.8 (5.5)	24.9 (5.2)	0.72
Instrumental strategies (CHIP)	29.7 (5.2)	30.1 (5.1)	28.8 (5.9)	30.8 (3.9)	0.22
Emotional strategies (CHIP)	25.5 (7.1)	25.3 (7)	26.4 (7.7)	24.2 (6.3)	0.40

Table 4 Scores of QOL (SEP59)

	All patients ($n=135$) mean (SD)	RRMS ($n=53$) mean (SD)	SPMS ($n=53$) mean (SD)	PPMS ($n=29$) mean (SD)	*P* values ANOVA
Physical activity	47.8 (30.4)	71.5 (24.3)	29.6 (22.1)	37 (24.4)	<0.001
Physical health limitations	40.6 (38)	37.7 (36.8)	37 (38.2)	51.7 (38.8)	0.19
Mental health limitations	60.4 (42.7)	61.6 (41.4)	46.8 (42.9)	81.1 (36.8)	0.001
Social well-being	67 (23.7)	70.3 (23.1)	59.4 (24.6)	74.6 (19.9)	0.008
Pain	68.9 (31.7)	75.2 (28.5)	59.2 (34.3)	74.5 (29.1)	0.01
Vitality	40.5 (20.8)	43 (22.3)	35.6 (21.2)	44.5 (15.9)	0.09
Emotional well-being	57 (22.92)	56.3 (25.7)	51.8 (21.3)	66.8 (17.3)	0.01
General health	43.7 (20.1)	46.6 (19.5)	40.1 (22.1)	44.8 (17.3)	0.24
Distress	56.8 (28.2)	60.9 (27.5)	46.4 (30.2)	67.1 (19.8)	0.002
Cognitive functions	69.3 (19.6)	73.6 (20.3)	64 (18.6)	70.8 (18.5)	0.03
Sexual functions	59.2 (34)	69.6 (30.2)	51.3 (35.9)	54.4 (33.6)	0.02
Sexual satisfaction	45.3 (36.7)	56.9 (36.4)	40 (35.7)	33.9 (34.2)	0.01
Sphincterian troubles	77.4 (31.4)	88.7 (21.3)	66.2 (36.7)	77.5 (30.3)	0.001
General well-being	61 (19.7)	66.1 (19.7)	53.6 (19.6)	64.8 (16.2)	0.002
Sleep	63.7 (28.3)	67.5 (29.1)	54.5 (26.2)	72.7 (26.5)	0.008
Social support	72 (29)	76.2 (26.3)	65.8 (30.8)	75.2 (29.7)	0.15

and psychosocial dimensions. As for the other clinical and demographic variables, their effect on QoL remained pretty modest. The correlations analysis showed significant relationships between the EDSS score and a large number of QoL dimensions. It is significantly and negatively related to physical activity ($P<0.001$), general health ($P=0.01$), distress ($P=0.01$), cognitive functions ($P=0.02$), and general well-being ($P=0.03$). These results indicate that a high EDSS score was related to a poorer QoL in different physical and psychic aspects. Contrary to our expectations, the others variables were not significantly related to the psychosocial dimensions of QoL.

Cognitive impairment, as measured by the FAB scale, showed a negative impact on mental limitations ($P=0.03$).

Depression was strongly and negatively related to almost all of the QoL dimensions: mental health limitations (-0.50), social well-being (-0.46), energy (-0.50), emotional well-being (-0.70), general health (-0.33), distress (-0.61), cognitive functions (-0.56), sexual functions (-0.56), sexual satisfaction (-0.34), general well-being (-0.65), sleep (-0.46) and social support (-0.48).

As for psychic anxiety, it was negatively related to pain (-0.44), emotional well-being (-0.52), distress (-0.39), cognitive functions (-0.42), general well-being (-0.35), and sleep (-0.31).

As in most published studies, we observed that emotional strategies were linked with poor QoL, especially for psychosocial dimensions. However, we did not observe a significant link between instrumental strategies and psychological or social dimensions of QoL. The correlation measures showed that palliative strategies are related to a decrease of different dimensions of QoL, including psychosocial dimensions.

Discussion

Regarding depression and anxiety scores, both appeared to be moderate in the overall sample. Thus, the psychosocial QoL was relatively well preserved, as observed by Pittock [27], but in contradiction with previous reports [51,52].

However, we must underline the strong effect of disease course on depression, mood, anxiety and QoL. These results confirm the data in the literature [11,12]. Indeed, patients suffering from an SPMS had higher scores of depression and anxiety, a tendency to lose emotional control more easily, and lower scores on all the dimensions of QoL. On the other hand, patients with PPMS had the lowest scores of both depression and anxiety, and the highest scores of QoL. Only the physical dimensions were low, probably due to these patients' more severe disability. For the RRMS group, we observed that their QoL was rather well preserved and that their depression and anxiety scores were moderate. We suggest that the situation of the SPMS subjects was precarious because, after having suffered a varying number of relapses and recoveries during which the patient's life was quite 'normal', the disease was nonetheless progressing. On the opposite side, for the PPMS group, we assume that the patients had to cope with physical impairment from the moment they contracted the disease and, thus, had time to develop efficient ways to cope with their situation.

Our finding – that disease duration had no effect on depression – confirmed previous results [53,54] and led to the hypothesis that it may reflect the patient's ability to cope with the disease. This hypothesis is attractive because it suggests that the coping process does not amplify with time,

and that MS patients are already able to cope with their disease at an early stage.

We observed that depression impaired not only the psychological dimensions of QoL, but also its social and physical dimensions. In fact, Lobentanz *et al*. [53], observed that depression was one of the main predictors of QoL in MS.

Regarding coping strategies, the only difference observed between various MS courses was the higher score of emotion-focused coping (WCC) in the SPMS group. We hypothesized that the type of stressor present would induce different coping processes. In fact, in the WCC, the subject responds to a global situation of stress. Quite differently, in the CHIP, the subject responds to the stress induced by the disease. This raises the question of the choice of the questionnaire assessing coping.

In the present study, SPMS subjects had the worst QoL, and they also tended to be more depressed and anxious than the other MS subjects. They also used more emotional coping strategies. We assume that there exists an interactive process, in which the style of coping influences mental health and inversely, that mental health influences coping style.

We observed an effect of disease duration on coping styles. Patients with the longest disease duration used few instrumental strategies. However, the PPMS subjects, who have quite a long duration, although it is not as long as that for SPMS subjects (see Table 1), used mostly instrumental strategies. We can assume that this unexpected result is due to the fact that coping is also influenced by several factors, such as age at onset of the disease.

In the overall sample of MS subjects, emotional strategies were not extensively used, which could be related to the good psychosocial dimensions of the QoL, as observed by Pakenham and McCabe *et al*. [20,21]. However, when considering emotional strategies, we need to be cautious because they concern both positive and negative strategies. Some may be useful at a specific moment of the disease evolution. In our patients, whose disease duration was relatively long (8.7 years), this type of strategy was not adaptive anymore. It would be interesting to design longitudinal studies in order to describe the evolution of coping strategies as a function of the disease's evolution.

We also notice that palliative strategies were negatively correlated to many QoL scores. We might imagine that this type of coping led the subject to be self-centered and too focused on his troubles, which were uncontrollable. Moreover, these strategies may be more adapted at the time when the diagnosis is announced.

The relationship between coping strategies and cognitive functions were analysed. Interestingly enough, there was a correlation between cognitive deficit and coping strategies. This might be due to the fact that cognitive impairment leads to a feeling of vulnerability. Thus, the impaired patients, when feeling more vulnerable, used more coping strategies in order to deal with their difficulties.

We observed that the three factors related to QoL were the EDSS scores, depression and anxiety. They were negatively correlated with the psychosocial factors of QoL. It is quite obvious that depressed and anxious subjects with physical aggravation would have a poor QoL. However, the EDSS scores were similar in SPMS and PPMS subjects, but the QoL was much lower in the SPMS group. Similar to the depression and anxiety scores, the kind of coping strategies used and the age of the patients differed in these two groups, something that could explain the differences. Of course, we cannot dismiss the fact that SP and PPMS patients had been differently affected by the disease (PP patients had predominantly spinal cord pathology), which could also explain the striking difference between these two different courses of MS [54].

Our observations regarding the strong effect of the disease course on the emotional state, coping strategies and QoL, confirm our hypothesis and are clinically relevant. Indeed, since we know that MS most often begins with an RRMS course, we can anticipate the upcoming psychological and social difficulties and propose an adapted accompaniment in the early stages of the disease. Psychological interventions should help the patient develop more efficient coping strategies in each specific situation.

Finally, alongside disease course and EDSS scores, other clinical and sociodemographic factors seemed to have a weak influence on mental health, coping strategies and the QoL of our MS subjects.

Acknowledgements

We thank Dr JC Corvol and Dr C Papeix, as well as the nurses of the 'Fédération des Maladies du Système Nerveux' of the Pitié-Salpétrière Hospital for their assistance during this research. Our special thanks go to Professor C Lubetzki for her assistance and advice concerning the writing of this article.

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