

ORIGINAL REPORT

COPING STYLES WITHIN THE FAMILY SYSTEM IN THE CHRONIC PHASE FOLLOWING ACQUIRED BRAIN INJURY: ITS RELATION TO FAMILIES' AND PATIENTS' FUNCTIONING

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Objective: To investigate how the functioning of family members and the coping styles they use are related to the psychosocial functioning both of the family members and of the person who has sustained a brain injury.

Design: Cross-sectional study.

Subjects: Primary caregivers ($n=61$) and other family members ($n=15$) of 61 patients with brain injury.

Methods: Primary caregivers completed the Utrecht Coping List, the Life Satisfaction Questionnaire 9, and the Caregiver Strain Index. All family members completed the Family Assessment Device. Data for the patients were collected retrospectively.

Results: Primary caregivers who had a preference for passive coping styles reported that they experienced a lower level of family functioning, a lower quality of life, and a higher strain. Neither the coping styles nor the psychosocial outcomes of the primary caregivers were significantly associated with patients' self-reported quality of life. Furthermore, there was no correlation between the level of family functioning and a patient's quality of life.

Conclusion: Coping styles of caregivers are important determinants for their own psychosocial functioning, but not for patients' psychosocial functioning, although causality cannot be inferred. To enhance caregivers' psychosocial functioning, rehabilitation should focus on changing their coping styles into ones that are less passive. Furthermore, distinct or additional interventions may be needed to change the patient's coping style.

Key words: psychological adaptation; brain injuries; quality of life; rehabilitation; family.

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INTRODUCTION

The difficulties in functioning experienced by patients with acquired brain injury are documented extensively in the literature.

Physical, psychological, social, emotional, behavioural and cognitive problems have often been reported (1, 2). Over the last few decades, the focus of research has included the impact of brain injury on the functioning of the primary caregivers of the patient. Not only the patients' lives, but also those of the caregivers, change dramatically and often permanently because of the patients' brain injury. Studies have reported general psychosocial consequences and increased emotional problems, such as depression, anxiety, marital problems, financial problems, low quality of life, and high levels of strain (3–6).

In recent years, many studies have investigated factors that are related to the patients' and caregivers' ability to make adequate adjustments to the new reality following brain injury. Demographics and injury-related variables, such as age, education, and injury severity, have been reported to be associated with patient outcome (7–9). There is growing interest among researchers to identify contextual factors, i.e. personal and environmental factors, which are associated with or can predict psychosocial outcome (10). This is relevant for clinical practice, because these factors may be influenced through rehabilitation.

One personal factor that has been noted to play an important role in the adaptation process of patients after brain injury is the way patients cope with the negative effects of the trauma (11–13). Studies have indicated that differences in patients' coping styles (e.g. problem-focused vs emotion-focused) are significantly correlated with patient outcome (8, 11, 14, 15). Emotion-focused coping styles (e.g. avoidance, emotional pre-occupation, distraction) have been associated with higher levels of anxiety, depression, and psychosocial dysfunction, as well as with lower levels of self-esteem and productivity status in the post-acute and chronic phase after brain injury (8, 11, 13). Problem-focused coping styles, e.g. actively working on the problem and using humour and enjoyable activities to manage stress, are most often used by persons with high education (16), and have been associated with higher self-esteem in these later phases (11). However, in the acute phase following brain injury, problem-focused coping styles are shown to be maladaptive, indicated by positive correlations with both depression and anxiety (12). It has been suggested that emotion-focused coping styles in the acute phase and problem-focused coping styles in later phases are most adaptive (12).

Factors that have been suggested to be associated with the adaptation process of family members are: patients' characteristics (17, 18), caregivers' demographic characteristics (17, 18), psychological factors (4, 19–22), disharmony in the family (20), social support (17, 18), and financial resources (4). Of these factors, passive coping style of the caregivers has been shown to be the most important predictor for quality of life in the long term, using a prospective design (6). However, the evidence for this is limited.

In addition, relatively little information is available about the effect of caregivers' coping styles on the psychosocial outcomes of the patients. It has been reported that patients whose caregivers were inclined to use passive emotion-focused coping styles, were more restricted in their participation in society (23). Moreover, it has been shown that there is a close correlation between family functioning and the patient's psychosocial outcome (24).

The objectives of the present study were therefore to investigate the association between primary caregivers' coping styles and their psychosocial functioning, and the correlation between primary caregivers' coping styles, primary caregivers' psychosocial functioning, and family functioning, and the patients' self-reported quality of life. Before examining these objectives, we investigated whether primary caregivers' use of coping styles differ from those of the normal population. First, we hypothesized that the use of problem-focused coping styles by caregivers in the chronic phase following the patient's brain injury would be associated with better caregivers' psychosocial functioning. Secondly, we hypothesized that greater use of problem-focused coping styles by the caregivers, better caregivers' psychosocial functioning, and better family functioning, would be associated with a higher level of quality of life for the patient.

METHODS

Participants

To recruit participants for the present study, we approached those family members who were living in the same household as the patients who had been enrolled in a previous study by Wolters et al. (9). The patients in the original study had been referred to an outpatient cognitive rehabilitation programme. The inclusion criteria for the rehabilitation programme were: acquired brain injury confirmed by neurological and/or neuro-imaging data; a minimum age of 17 years; presence of cognitive, behavioural and/or emotional symptoms that interfered with the demands of daily life; and sufficient command of the Dutch language. Additional inclusion criteria for participation in that study were: completion of the Utrecht Coping List at the start of rehabilitation as part of routine clinical care; a period of at least 6 months between the brain injury and the start of rehabilitation; and at least 5 months between the start of rehabilitation and the moment when the questionnaires were sent out (to ensure sufficient treatment duration) (for the exclusion criteria of the programme, see Wolters et al. (9)). The patients who were eligible had been contacted by post, and were sent several questionnaires. On average, participating patients were 2.8 years (SD 4.6) post-injury (9).

In the present study, the following inclusion criteria for family members were applied: they had to be living in the same household as the patient; the minimum age for inclusion was 14 years (i.e. the lowest limit of the questionnaires); and they had to have a sufficient

command of the Dutch language. The primary caregiver is the family member who knows the person with brain injury very well, and has the most frequent contact with the patient, hereafter called "caregiver". Other family members living in the same household, i.e. secondary, tertiary, and quaternary caregivers, will be referred to as "other family members". The Research Committee of Rehabilitation Centre Blixembosch approved the present study. All participating family members signed informed consent.

Measures

Utrecht Coping List. The Utrecht Coping List (UCL) is a self-report questionnaire used to measure coping styles. The items are answered on a 4-choice scale (1 = seldom/never, 2 = occasionally, 3 = frequently, 4 = very often). The present study focused on the active problem-focused coping scale and the passive emotion-focused coping scale, since these differentiate both focus (emotion vs problem) and approach (active vs passive). The active problem-solving scale represents active coping and is measured with 7 items (e.g. tackling a problem at once, seeing problems as a challenge and remaining calm in difficult situations). The passive reactions scale represents passive coping and is also measured with 7 items (e.g. isolating oneself from others, worrying about the past and taking refuge in fantasies) (23, 25). The active problem-solving scale and the passive scale show fairly good internal consistency (Cronbach's alpha 0.78 and 0.74, respectively) in the general Dutch population. The re-test reliability of both scales is reasonably high, with a Cronbach's alpha of 0.62 for the active problem-solving scale and 0.74 for the passive scale (25). In addition, it has well-documented validity in a wide variety of patient populations and adequate factorial structure (25). Normative data was obtained from the UCL manual (25).

Family Assessment Device. The McMaster Family Assessment Device (FAD) is a 60-item self-report questionnaire that assesses 7 dimensions of family functioning (26), including a General Functioning (GF) scale that represents all dimensions of family functioning. In the current study, this 12-item scale was used. Likert items with 4 answer choices each (1 = totally not agree, 2 = not agree, 3 = agree, 4 = totally agree) are used. The 12 item scores were added and divided by 12 to compute a mean score of general family functioning ("FAD-GF score"). A FAD-GF score higher than 2 is defined as unhealthy family functioning (26). The Dutch translation of the FAD has a good internal consistency. Cronbach's alpha of the FAD-GF varies from 0.82 to 0.92 (27). Construct validity of this scale has been supported (28).

Life Satisfaction Questionnaire 9. The Life Satisfaction Questionnaire 9 (LiSat-9) is a generic self-report instrument for measuring the quality of life (29). Total score range is between 9 and 54. A mean score of the generic measure of quality of life ("LiSat-9 score") is computed by adding all 9 item scores and dividing them by 9 (30). A mean score of 1–4 constitutes dissatisfaction with life and a score of 5 or 6 indicates satisfaction (for a more detailed description, see Wolters et al. (9)).

Caregiver Strain Index. The Caregiver Strain Index (CSI) is a brief self-report questionnaire that measures perceived strain. It consists of 13 dichotomous (yes, no) items. The following domains are covered: Employment, Financial, Physical, Social and Time. A total score of 7 or more indicates a high level of strain ("CSI score"). The internal consistency is good (Cronbach's alpha 0.86). Face validity and construct validity have been supported (31).

Stroke-Adapted Sickness Impact Profile 30. The Stroke-Adapted Sickness Impact Profile 30 (SA-SIP30) is a self-report disease-specific questionnaire that measures patients' quality of life, and it is the adapted version of the Sickness Impact Profile (SIP) (32). The SA-SIP30 uses 30 items of the original 136 items, and is therefore less fatiguing for the patient and more practical. Scores are calculated as a percentage of maximal dysfunction ranging from 0 to 100 ("SA-SIP30 score"). Higher scores, therefore, indicate lower disease-specific quality of life (33) (for a more detailed description, see Wolters et al. (9)).

Procedure

The current study is a continuation of the study conducted previously by Wolters et al. (9). Patients who had been enrolled in the previous study were approached by post once again. They were asked to indicate if they were living with one or more family members, and if so, to indicate whether the family members were interested in participating in the study. Family members who responded positively to the invitation were sent the questionnaires and an informed consent form. The caregiver, i.e. the person from each family who is self-designated as the significant other (typically parent or spouse), completed the UCL, the LiSat-9, the FAD-GF and the CSI. Between zero and 3 other family members within the same household completed the FAD-GF. We also used the data of the UCL, the LiSat-9 and the SA-SIP30, which were completed by the patients in the study by Wolters et al. (9).

Statistical analyses

Before answering the main research questions, we carried out 4 one-sample *t*-tests to investigate the score differences on the active problem-solving coping scale and the passive coping scale between the men in the study and the men in the standardization sample, as well as between the women in the study and the women in the standardization sample (25). To answer the first research question, we established the potential association between caregivers' coping styles and their own psychosocial outcomes. Three linear regression analyses were performed, with the dependent variables CSI score, LiSat-9 score, and FAD-GF score, all completed by the caregiver. The caregivers' scores on the active problem-solving scale and the passive scale of the UCL were included as the independent variables in each model. Caregiver's educational attainment was included as covariate.

To answer the second research question, we investigated the correlation between caregivers' coping styles, caregivers' psychosocial outcomes, and family functioning, and the patients' quality of life by using two linear regression analyses. More specifically, the independent variables were the caregivers' scores on the active problem-solving scale and the passive scale of the UCL, the LiSat-9 score, and the CSI score, as well as the mean score of all family members on the FAD-GF. Covariates were patients' scores on the active problem-solving scale and the passive scale of the UCL, which were collected from the previous study by Wolters et al. (9). Dependent variables were the LiSat-9 and the SA-SIP30 scores of the patient, also collected from the study by Wolters et al. (9).

Level of education (LE) was assessed according to a formal schooling system often used in the Netherlands (34). Patients were grouped according to the following criteria: those with primary education (LE low), those with junior vocational training (LE average), and those with senior vocational training or academic training (LE high); these groups correspond to 8.6 ± 1.9 , 11.4 ± 2.5 , 15.2 ± 3.3 years of full-time education, respectively (34). Level of education was dummy coded with 2 dummies (LE low and LE high), with LE average as reference category. Scores on the questionnaires were entered as continuous variables.

The independent variables were entered together in all models (through forced entry). The assumptions of regression analysis (homoscedasticity, normal distribution of the residuals, absence of multicollinearity and absence of "influential cases") were tested for each model. Homoscedasticity was evaluated by visual inspection of plots of the residuals on the predicted values, and by Levene's tests. The normal distribution of the residuals was investigated by visual inspection of the normal probability plots and by checking the Kolmogorov-Smirnov test for normal distributions. The occurrence of multicollinearity was checked by calculating the variance inflation factors (VIFs), which should not exceed 10. Cook's distances were calculated to identify possible influential cases. Statistical analyses were performed with SPSS 18.0 for Mac OS X.

RESULTS

Questionnaires were sent to 110 patients who had participated in the previous study by Wolters et al. (9). Eleven patients

were living alone and 4 patients had moved, therefore they were excluded from the study. The final sample comprised 61 families (i.e. response rate 64%). Reasons given by the family members to decline participation were: work- or study-related factors that prevented participation, or they found participation too confronting. The total group consisted of 76 family members. Sixty-one participants were caregivers, of whom most were partners ($n=57$), but also 2 parents and 2 siblings designated themselves as the significant other. The 15 other family members came from 9 different families. In addition, most family members were women (57%) and had an average level of educational attainment (51%). The mean age of caregivers was more than twice as high as that of other family members (mean = 50 years, range = 19–76 years, vs mean = 23 years, range = 14–55 years, respectively) (Table I).

Table II shows that the UCL scores of the caregivers on the active problem-solving scale and the passive scale were average when compared with the standardization group, viz.,

Table I. Injury characteristics of the patient ($n=61$), and demographic characteristics of the patients and family members ($n=76$)

| | Mean (SD) | Range |
|---|-------------|-------------|
| Age, years, mean (SD) [range] | | |
| Patient | 49.5 (11.6) | [18.1–72.0] |
| Caregiver | 50.2 (10.7) | [18.8–76.2] |
| Other family members | 22.9 (9.3) | [13.9–54.5] |
| Time ^a , years, median [range] | 3.5 | [1.0–33.1] |
| Gender, male, n (%) | | |
| Patient | 36 | (59) |
| Caregiver | 25 | (41) |
| Other family members | 8 | (53) |
| LE, n (%) | | |
| Patient | | |
| Low | 19 | (31) |
| Average | 16 | (26) |
| High | 26 | (43) |
| Caregiver | | |
| Low | 10 | (16) |
| Average | 26 | (43) |
| High | 25 | (41) |
| Other family members | | |
| Low | 1 | (7) |
| Average | 13 | (86) |
| High | 1 | (7) |
| Type of injury, n (%) | | |
| CVA | 29 | (48) |
| TBI | 14 | (23) |
| Other | 10 | (16) |
| Multiple | 8 | (13) |
| Side of injury, n (%) | | |
| Left | 18 | (30) |
| Right | 16 | (26) |
| Bilateral | 3 | (5) |
| Unspecified | 24 | (39) |

^aTime between injury and examination for the patients.

LE: level of educational attainment; CVA: cerebrovascular accident; TBI: traumatic brain injury; Other: tumour ($n=5$), hydrocephalus ($n=2$), meningitis ($n=1$), epilepsy ($n=1$), axonal neuropathy ($n=1$); Multiple: more than one diagnosis: stroke and TBI ($n=5$), stroke and epilepsy ($n=1$), encephalitis and epilepsy ($n=1$), stroke and TBI and meningitis and epilepsy ($n=1$). SD: standard deviation.

Table II. Coping and psychosocial outcomes of patients and caregivers (n = 61)

| | Caregivers | | | Patients | | |
|--|------------|--------|----------|-------------|--------|----------|
| | Mean (SD) | Median | Range | Mean (SD) | Median | Range |
| UCL (Active) [7–28] ^a | | | | | | |
| Men | 18.3 (2.8) | 18.0 | 13–23 | 16.2 (4.8)* | 16.0 | 7–26 |
| Women | 18.1 (3.9) | 18.0 | 10–27 | 16.8 (3.4) | 18.0 | 10–22 |
| Standardization group men ^b | 18.3 (3.5) | | | 18.3 (3.5) | | |
| Standardization group women ^b | 19.3 (5.1) | | | 19.3 (5.1) | | |
| UCL (Passive scale) [7–28] ^a | | | | | | |
| Men | 10.5 (3.0) | 9.0 | 7–18 | 14.4 (4.3)* | 13.5 | 7–23 |
| Women | 11.8 (3.4) | 11.0 | 7–19 | 13.3 (3.3)* | 13.0 | 7–22 |
| Standardization group men ^b | 10.7 (2.9) | | | 10.7 (2.9) | | |
| Standardization group women ^b | 10.9 (5.4) | | | 10.9 (5.4) | | |
| CSI [0–13; ≥7] ^c | 5.7 (3.1) | 5.0 | 0.0–12.0 | | | |
| LiSat-9 [1–6; <4.5] ^c | 4.6 (0.7) | 4.8 | 2.7–5.8 | 4.1 (0.7) | 4.2 | 1.9–5.4 |
| FAD-GF ^d [1–4; >2] ^c | 2.0 (0.5) | 1.9 | 1.0–3.3 | | | |
| SA-SIP30 [0–100; >33] ^e | | | | 30.0 (16.5) | 26.7 | 0.0–73.3 |

* $p < 0.05$ compared with the standardization sample; ^aPossible score range; ^bThe standardization group of men consists of men between the ages of 19 and 65 years ($n = 1493$). The standardization group of women consists of women between the ages of 18 and 65 years ($n = 712$) (25); ^cPossible score range; cut-off for unhealthy functioning; ^dResults of all family members are reported; Active: active problem-solving scale.

$t(24) = 0.04$, $p = 0.971$ and $t(24) = -0.30$, $p = 0.766$, respectively, for the men; $t(35) = -1.83$, $p = 0.075$ and $t(35) = 1.55$, $p = 0.131$, respectively, for the women. Although the mean CSI score was just below the cut-off point of 7 (mean 5.7), 24 caregivers (39%) experienced a high level of strain, indicated by a score of 7 or higher on the CSI. In addition, the LiSat-9 showed that caregivers were, on average, satisfied with life, indicated by a mean score of 4.6. However, almost 38% of the caregivers reported low quality of life, indicated by a score of less than 4.5. Finally, the mean FAD-GF score of all family members is equal to the cut-off value of 2. Twenty-four families (39%) experienced unhealthy family functioning, indicated by a score greater than 2 on the FAD-GF. The raw scores on the UCL completed by the patients are also shown in Table II. Although these data are only a subset of the data presented by Wolters et al. (9), the results are similar. In general, patients were more likely to use passive coping and less likely to use problem-solving coping, compared with the standardization sample (25). Patients were, on average, dissatisfied with their lives, indicated by a mean score of 4.1 on the LiSat-9, which is below the cut-off. The mean score on the SA-SIP30 approached the cut-off for unhealthy functioning; 44% of the patients reported many dysfunctions, indicated by a score higher than 33.

Effect of caregivers' coping styles on caregivers' quality of life, caregivers' strain and family functioning.

Table III shows that, as predicted, a higher use of passive coping styles was associated with higher FAD-GF scores, lower LiSat-9 scores, and higher CSI scores, that is, more family dysfunction, lower quality of life, and higher levels of strain, respectively. The active problem-solving scale did not reach significance with any of the dependent variables. The linear regression models explained 24% of the variance in family functioning, 36% of the variance in quality of life, and 35% of the variance in strain.

Effect of coping styles and psychosocial outcomes of family members on patients' quality of life.

As shown in Table IV, the caregivers' coping styles, caregivers' psychosocial outcomes, and family functioning, were not significantly associated with patients' quality of life. Only the patients' coping styles were associated with patients' quality of life. Higher use of passive coping styles and lower use of active problem-solving coping styles were related to lower LiSat-9 scores (i.e. a lower generic quality of life). Exclud-

Table III. Multiple linear regression models for the caregivers' psychosocial outcome measures (n = 61)

| Variables | B | β | CI | Significance | R ² |
|------------------------|-------|---------|---------------|-------------------|----------------|
| Model 1. FAD-GF score | | | | | |
| (Constant) | 1.79 | | 0.94–2.63 | <0.001* | |
| Active | -0.03 | -0.20 | -0.07–0.01 | 0.137 | |
| Passive | 0.05 | 0.33 | 0.01–0.08 | 0.009* | |
| LE low | 0.19 | 0.15 | -0.15–0.53 | 0.258 | |
| LE high | 0.27 | 0.28 | 0.01–0.53 | 0.041 | 23.5 |
| Model 2. LiSat-9 score | | | | | |
| (Constant) | 5.78 | | 4.64–6.91 | <0.001* | |
| Active | 0.01 | 0.04 | -0.04–0.06 | 0.736 | |
| Passive | -0.11 | -0.52 | -0.16–(-0.06) | <0.001* | |
| LE low | 0.18 | 0.10 | -0.27–0.63 | 0.421 | |
| LE high | -0.28 | -0.20 | -0.63–0.07 | 0.116 | 36.4 |
| Model 3. CSI score | | | | | |
| (Constant) | -2.20 | | -7.16–2.76 | 0.377 | |
| Active | 0.15 | 0.17 | -0.07–0.37 | 0.172 | |
| Passive | 0.45 | 0.48 | 0.24–0.65 | <0.001* | |
| LE low | -1.13 | -0.14 | -3.11–0.85 | 0.257 | |
| LE high | 0.73 | 0.12 | -0.80–2.26 | 0.344 | 34.8 |

* $p < 0.05$ are shown in bold.

B: unstandardized regression coefficient; β : standardized regression coefficient; CI: 95% confidence interval; Passive: passive scale of UCL; Active: active problem-solving scale of UCL. Coding of the independent variables: LE low: low educational attainment=1, average or high educational attainment=0; LE high: high educational attainment=1, low or average educational attainment=0.

Table IV. Multiple linear regression models for the patients' quality of life measures (n = 61)

| Variables | B | β | CI | Significance | R ² |
|----------------|-------|---------|---------------|-------------------|----------------|
| SA-SIP30 score | | | | | |
| (Constant) | -4.34 | | -62.34-53.66 | 0.881 | |
| C Active | 0.60 | 0.13 | -0.42-1.62 | 0.241 | |
| C Passive | 0.60 | 0.12 | -0.69-1.89 | 0.356 | |
| F FAD-GF | -4.26 | -0.12 | -12.43-3.90 | 0.300 | |
| C CSI | 0.52 | 0.10 | -1.22-2.27 | 0.552 | |
| C LiSat-9 | -1.08 | -0.05 | -9.14-6.98 | 0.790 | |
| P Active | -0.38 | -0.10 | -1.22-0.56 | 0.367 | |
| P Passive | 2.38 | 0.57 | 1.47-3.30 | <0.001* | 49.1 |
| LiSat-9 score | | | | | |
| (Constant) | 3.93 | | 1.30-6.57 | 0.004* | |
| C Active | -0.03 | -0.16 | -0.08-0.01 | 0.150 | |
| C Passive | 0.03 | 0.13 | -0.03-0.09 | 0.315 | |
| F FAD-GF | 0.09 | 0.06 | -0.28-0.46 | 0.622 | |
| C CSI | -0.02 | -0.08 | -0.10-0.06 | 0.620 | |
| C LiSat-9 | 0.19 | 0.18 | -0.17-0.56 | 0.293 | |
| P Active | 0.05 | 0.28 | 0.01-0.09 | 0.013* | |
| P Passive | -0.09 | -0.48 | -0.13-(-0.05) | <0.001* | 48.2 |

* $p < 0.05$ are shown in bold.

n = 61; B: unstandardized regression coefficient; β : standardized regression coefficient; CI: 95% confidence interval; F: mean score of all family members; C: caregiver; P: patient; Passive: passive scale of UCL; Active: active problem-solving scale of UCL.

ing the caregivers' scores on the LiSat-9 from the model with patients' scores on the LiSat-9 as dependent variable did not influence the significance levels of the other effect estimates. Higher use of passive coping styles was also associated with higher SA-SIP30 scores (i.e. a lower disease-specific quality of life). The models explained almost 50% of the variance in both quality of life scores. Without the patients' coping styles as independent variables, the models could only explain 16% of the variance in SA-SIP30 and 12% of the variance in LiSat-9 scores. With only the coping styles of the caregivers as the independent variables, the models could explain 11% and 6% of the variance, respectively. Interestingly, in these latter models, patients of caregivers who used more passive coping styles reported lower quality of life, as measured with the SA-SIP30, $t(60) = 2.177$, $p = 0.03$.

DISCUSSION

The goals of this study were to examine the relationship between family coping styles and psychosocial outcomes both of the family members and of the patients. Caregivers who had a preference for passive coping reported lower family functioning, lower quality of life, and higher strain. However, the caregivers' coping styles, the caregivers' psychosocial functioning, and family functioning, were not associated with patients' self-reported quality of life.

In line with our hypothesis, and consistent with previous research (6), this study showed that the caregivers' use of passive coping styles was maladaptive for their psychosocial functioning in the chronic phase post-injury. This negative effect was found with regard to all 3 measures, that is, family functioning, quality of life, and strain, thereby providing

evidence for a strong relationship. The coping styles and educational attainment of the caregivers taken together could explain between 24% and 36% of the variance in strain, family functioning, and quality of life.

Surprisingly, the current study did not reveal an effect of caregivers' use of active problem-focused coping styles on caregivers' psychosocial functioning. One might expect that in the chronic phase following injury, individuals would experience more control over a specific outcome or situation. In these situations, researchers have shown that active problem-focused coping styles are related to better outcomes (35). The conclusion of our study, that this is not the case, is an important avenue to explore clinically.

Another finding of note was that caregivers' coping styles could not be used to predict patient outcomes. This is not in line with the findings of a previous study, in which caregivers' use of passive coping styles was significantly associated with restricted participation in society reported by the patient (23). It should be noted that Van Baalen et al. (23) used the SIP-68, which is also an abbreviated version of the original SIP, but this questionnaire is not specifically designed for patients with brain injury. It should also be noted that Van Baalen et al. (23) did not include patients' coping styles in their analyses. However, in the present study, the patients' coping styles accounted for more than 30% unique variance to the prediction of both disease-specific and generic quality of life. This underlines the importance of including patients' coping styles when predicting patients' outcomes.

The family members reported problems with regard to several domains of functioning. First, almost 40% of the caregivers were dissatisfied with their quality of life and experienced high levels of strain. Also, almost 40% of the families reported unhealthy family functioning. These findings underline the high impact of an adult family member's brain injury on psychosocial outcomes of the family system. In addition, the coping styles of the caregivers were similar to the coping styles in the general population. This is in contrast to the patients' coping styles, which have been shown to deviate from the coping styles in the general population: patients used significantly more passive emotion-focused coping styles and less active problem-focused coping styles in the chronic phase post-injury (9). We might speculate that brain injury primarily affects the patient's coping style and, to a lesser extent, the caregiver's coping style in the chronic phase post-injury. Future research is required in order to evaluate the association between brain injury and coping styles, and the influence of brain injury on coping styles.

This study has a number of limitations. Because of the cross-sectional design, it is not possible to predict the direction of the association observed between the coping characteristics and the psychosocial outcome measures. Does the preference for the identified maladaptive coping style lead individuals to experience poor psychosocial outcomes? Or is it rather that poor psychosocial outcomes elicit the use of maladaptive coping styles? Definite causal relationships should be studied in an experimental, longitudinal research design. We also acknowledge that by including more factors in our

models, e.g. social support (17, 18) and financial resources (4), we might have been able to explain more variance in the outcomes. Also, pre-injury characteristics of functioning of the families that participated were not available. It has been suggested that pre-injury family dysfunction places families at greater risk of long-term disruption (36). Furthermore, we made comparisons between families and patients who have not been recruited at the same time. Although the time-span between the previous study and the present study is relatively short (a maximum of 2 months) this might have influenced our results. Moreover, information about psychosocial outcomes and coping styles were obtained by means of self-reported questionnaires. Typically for self-reported measurements, this type of assessment may not reflect actual use of coping style objectively. However, the questionnaires have all been validated, and to our best knowledge, no superior alternatives exist to measure these variables. Finally, no conclusions can be drawn regarding the way caregivers' coping styles are related to psychosocial outcomes in the acute or post-acute phase after brain injury, in which a great deal of spontaneous recovery is expected. However, the aim of the study was to investigate the association between coping styles and outcomes in the time period in which little or no recovery is expected, i.e. the chronic phase, when patients and their families have to deal with the long-term consequences of the injury.

This study also has a number of strengths. First, until now no studies have investigated the effect of caregivers' coping styles on patient outcome after controlling for the patients' coping styles. Secondly, this is the first study to investigate the effects of coping styles of caregivers on both patients' and caregivers' psychosocial functioning. Thirdly, we measured several psychosocial outcome characteristics, thus providing a comprehensive overview of the difficulties family members of patients with brain injury encounter in everyday life. Finally, since we included patients and family members who were referred to outpatient cognitive rehabilitation, we might expect these findings to generalize to a patient population living independently, and their families.

The findings of this study have important clinical and research implications. They emphasize the importance of incorporating the family as a system in the rehabilitation process, so that, besides the patient, it also includes the caregiver and other family members within the same household. Examples of special programmes for families are family education and support groups (37). However, these interventions have not yet been shown to influence coping styles (38, 39). Therefore, we emphasize the need for the development of treatments for family systems that incorporate changing coping styles into ones that are less passive, and hence less maladaptive.

In conclusion, this study shows that the coping styles of caregivers are important correlates for their psychosocial functioning. Furthermore, it is clear that the preference of caregivers for a certain coping style does not affect patients' quality of life. Therefore, on the one hand, interventions should be developed that aim to change the coping styles of the primary caregivers into less passive ones in order to enhance their psychosocial functioning. On the other hand, clinicians should realize that

this alone will not improve the patient's quality of life, as this depends on the coping styles of patients themselves and not on those of family members.

REFERENCES

1. Newman S. The social and emotional consequences of head injury and stroke. *Int Rev Appl Psychol* 1984; 33: 427–455.
2. Stratton MC, Gregory RJ. After traumatic brain injury: a discussion of consequences. *Brain Inj* 1994; 8: 631–645.
3. Perlesz A, Kinsella G, Crowe S. Impact of traumatic brain injury on the family: a critical review. *Rehabil Psychol* 1999; 44: 6–35.
4. Carnes SL, Quinn WH. Family adaptation to brain injury: coping and psychological distress. *Fam Syst Health* 2005; 23: 186–203.
5. Blais MC, Boisvert JM. Psychological and marital adjustment in couples following a traumatic brain injury (TBI): a critical review. *Brain Inj* 2005; 19: 1223–1235.
6. Visser-Meily A, Post M, Schepers V, Lindeman E. Spouses' quality of life 1 year after stroke: Prediction at the start of clinical rehabilitation. *Cerebrovasc Dis* 2005; 20: 443–448.
7. Anson K, Ponsford J. Who benefits? Outcome following a coping skills group intervention for traumatically brain injured individuals. *Brain Inj* 2006; 20: 1–13.
8. Dawson DR, Catanzaro AM, Firestone J, Schwartz M, Stuss DT. Changes in coping style following traumatic brain injury and their relationship to productivity status. *Brain Cogn* 2006; 60: 214–216.
9. Wolters G, Stapert S, Brands I, van Heugten C. Coping styles in relation to cognitive rehabilitation and quality of life after brain injury. *Neuropsychol Rehabil* 2010; 20: 587–600.
10. Wade DT. New wine in old bottles: the WHO ICF as an explanatory model of human behaviour. *Clin Rehabil* 2003; 17: 349–354.
11. Anson K, Ponsford J. Coping and emotional adjustment following traumatic brain injury. *J Head Trauma Rehabil* 2006; 21: 248–259.
12. Finset A, Andersson S. Coping strategies in patients with acquired brain injury: relationships between coping, apathy, depression and lesion location. *Brain Inj* 2000; 14: 887–905.
13. Chronister J, Chan F. A stress process model of caregiving for individuals with traumatic brain injury. *Rehabil Psychol* 2006; 51: 190–201.
14. Hepp U, Moergeli H, Buchi S, Wittmann L, Schnyder U. Coping with serious accidental injury: a one-year follow-up study. *Psychother Psychosom* 2005; 74: 379–386.
15. Korte KB, Wegener ST, Chwalisz K. Anosognosia and denial: their relationship to coping and depression in acquired brain injury. *Rehabil Psychol* 2003; 48: 131–136.
16. Wolters G, Stapert S, Brands I, van Heugten C. Coping following acquired brain injury: Predictors and correlates. *J Head Trauma Rehabil* 2010 June 8 [Epub ahead of print].
17. van den Heuvel ETP. Risk factors for burn-out in caregivers of stroke patients, and possibilities for intervention. *Clin Rehabil* 2001; 15: 669–677.
18. Scholte op Reimer WJ, de Haan RJ, Rijnders PT, Limburg M, van den Bos GA. The burden of caregiving in partners of long-term stroke survivors. *Stroke* 1998; 29: 1605–1611.
19. Thompson SC, Bundek NI, Sobolew-Shubin A. The caregivers of stroke patients: An investigation of factors associated with depression. *J Appl Soc Psychol* 1990; 20: 115–129.
20. Chumbler NR, Rittman M, Van Puymbroeck M, Vogel WB, Qin H. The sense of coherence, burden, and depressive symptoms in informal caregivers during the first month after stroke. *Int J Geriatr Psychiatry* 2004; 19: 944–953.
21. Blais MC, Boisvert JM. Psychological adjustment and marital satisfaction following head injury. Which critical personal characteristics should both partners develop? *Brain Inj* 2007; 21: 357–372.

22. Minnes P, Graffi S, Nolte ML, Carlson P, Harrick L. Coping and stress in Canadian family caregivers of persons with traumatic brain injuries. *Brain Inj* 2000; 14: 737–748.
23. Van Baalen B, Ribbers GM, Medema-Meulepas D, Pas MS, Odding E, Stam HJ. Being restricted in participation after a traumatic brain injury is negatively associated by passive coping style of the caregiver. *Brain Inj* 2007; 21: 925–931.
24. Gan C, Campbell KA, Gemeinhardt M, McFadden GT. Predictors of family system functioning after brain injury. *Brain Inj* 2006; 20: 587–600.
25. Schreurs PJG, van de Willege G, Brosschot JF, Tellegen B, Graus GM H. [The Utrecht coping list: UCL. Dealing with problems and events]. Utrecht: Swets en Zeitlinger; 1993 (in Dutch).
26. Miller IW, Epstein NB, Bishop DS, Keitner GI. The McMaster Family Assessment Device: reliability and validity. *J Marital Fam Ther* 1985; 11: 345–356.
27. de Wachter D, Vandewalle S, Vansteelandt K, Vanderlinden J, Lange A. [A psychometric exploration of the Dutch version of the Family Assessment Device]. *Directieve Therapie* 2006; 26: 43–57 (in Dutch).
28. Wenniger W, Hageman W, Arrindell WA. Cross-National Validity of Dimensions of Family Functioning – 1st Experiences with the Dutch Version of the McMaster Family Assessment Device (FAD). *Pers Individ Differ* 1993; 14: 769–781.
29. Fugl-Meyer AR, Branholm IB, Fugl-Meyer KS. Happiness and domain specific life satisfaction in adult northern Swedes. *Clin Rehabil* 1991; 5: 25–33.
30. Post MWM, de Witte LP, van Asbeck FWA, van Dijk AJ, Schrijvers AJP. Predictors of health status and life satisfaction in spinal cord injury. *Arch Phys Med Rehabil* 1998; 79: 395–401.
31. Robinson BC. Validation of a Caregiver Strain Index. *J Gerontol* 1983; 38: 344–348.
32. Bergner M, Bobbitt RA, Carter WB, Gilson BS. The Sickness Impact Profile: development and final revision of a health status measure. *Med Care* 1981; 19: 787–805.
33. vanStraten A, deHaan RJ, Limburg M, Schuling J, Bossuyt PM, vandenBos GAM. A stroke-adapted 30-item version of the sickness impact profile to assess quality of life (SA-SIP30). *Stroke* 1997; 28: 2155–2161.
34. De Bie SE. [Standard questions 1987: proposal for uniformization of questions regarding background variables and interviews]. Leiden, The Netherlands: Leiden University Press; 1987 (in Dutch).
35. Lazarus RS, Folkman S. Stress, appraisal, and coping. New York: Springer Pub. Co.; 1985.
36. Wade S, Drotar D, Taylor HG, Stancin T. Assessing the effects of traumatic brain injury on family functioning: conceptual and methodological issues. *J Pediatr Psychol* 1995; 20: 737–752.
37. Consensus conference. Rehabilitation of persons with traumatic brain injury. NIH consensus development panel on rehabilitation of persons with traumatic brain injury. *JAMA* 1999; 282: 974–983.
38. Sinnakaruppan I, Downey B, Morrison S. Head injury and family carers: a pilot study to investigate an innovative community-based educational programme for family carers and patients. *Brain Inj* 2005; 19: 283–308.
39. Acorn S. An education/support program for families of survivors of head injury. *Can J Rehabil* 1993; 7: 149–151.