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Psychological factors are associated with subjective cognitive complaints 2 months post-stroke

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The aim of this study was to investigate which psychological factors are related to post-stroke subjective cognitive complaints, taking into account the influence of demographic and stroke-related characteristics, cognitive deficits and emotional problems. In this cross-sectional study, 350 patients were assessed at 2 months post-stroke, using the Checklist for Cognitive and Emotional consequences following stroke (CLCE-24) to identify cognitive complaints. Psychological factors were: proactive coping, passive coping, self-efficacy, optimism, pessimism, extraversion, and neuroticism. Associations between CLCE-24 cognition score and psychological factors, emotional problems (depressive symptoms and anxiety), cognitive deficits, and demographic and stroke characteristics were examined using Spearman correlations and multiple regression analyses. Results showed that 2 months post-stroke, 270 patients

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(68.4%) reported at least one cognitive complaint. Age, sex, presence of recurrent stroke(s), comorbidity, cognitive deficits, depressive symptoms, anxiety, and all psychological factors were significantly associated with the CLCE-24 cognition score in bivariate analyses. Multiple regression analysis showed that psychological factors explained 34.7% of the variance of cognitive complaints independently, and 8.5% ($p < .001$) after taking all other factors into account. Of all psychological factors, proactive coping was independently associated with cognitive complaints ($p < .001$), showing that more proactive coping related to less cognitive complaints. Because cognitive complaints are common after stroke and are associated with psychological factors, it is important to focus on these factors in rehabilitation programmes.

Keywords: Stroke; Rehabilitation; Cognitive complaints; Psychological factors.

INTRODUCTION

Cognitive impairment is common in up to 50% of stroke patients, in both the subacute and chronic phase (Duits, Munnecom, van Heugten, & van Oostenbrugge, 2008). It is a significant factor in long-term disability, contributing to reduced functional outcome for at least five years post-stroke (Barker-Collo, Feigin, Parag, Lawes, & Senior, 2010). To date, most studies investigating post-stroke cognition have focused on objective assessment using neuropsychological tests, whereas from patients' perspectives their experience of cognitive dysfunction in everyday life matters most (Pollock, St George, Fenton, & Firkins, 2014). Furthermore, cognitive complaints have been shown to influence quality of life in healthy elderly (van Rijsbergen, Mark, de Kort, & Sitskoorn, 2014) and subarachnoid haemorrhage patients (Passier et al., 2012; Visser-Meily, Rhebergen, Rinkel, van Zandvoort, & Post, 2009). A systematic review, published recently by van Rijsbergen et al. (2014), shows a prevalence of subjective cognitive complaints, assessed between 1 month and 54 months after stroke, varying between 28.6% and 90.2%. According to this review, there are inconsistent results about the association between objective cognitive impairment and subjective cognitive complaints. Some studies found that patients with subjective cognitive complaints also had poorer objective cognitive performance, whereas other studies did not observe such a relationship (van Rijsbergen et al., 2014). Hence, the presence and nature of this relationship is still a matter of debate and there is a need for more insight into the factors associated with cognitive complaints in stroke patients.

Neither demographic characteristics nor stroke-related factors seem to be related to cognitive complaints after stroke, whereas the relationship between cognitive complaints and depressive symptoms is reported frequently

(van Rijsbergen et al., 2014). However, only two studies performed multivariate analyses (Lamb, Anderson, Saling, & Dewey, 2013; Xiong et al., 2011), showing that more depressive symptoms were independently significantly associated with (more) cognitive complaints. Nevertheless, much variance is still unexplained.

A theoretical model, proposed by Niederehe (1998), considers personality factors and/or other general cognitive traits and beliefs are potential contributors to subjective cognitive complaints. From a cognitive psychology perspective, memory self-reports are based in the domain of cognitive skills known as metamemory (Niederehe, 1998). Metamemory involves knowledge about memory in general, monitoring and awareness of one's own memorial activity, and selection and use of mnemonic strategies. Niederehe stated that psychological factors, like personality characteristics, can affect the ability to judge one's own metamemory. This may explain why people with cognitive deficits who are able to compensate for their deficits may report no complaints, whereas other people with cognitive deficits may experience complaints because of a lack of this compensation mechanism. On the contrary, people without cognitive deficits may experience cognitive complaints. According to Stulemeijer et al., this results from the fact that subtle cognitive changes might force patients, with good functional outcome, to use additional cognitive resources in order to perform within normal limits, which may lead to the experience of cognitive failure and, as such, give rise to cognitive complaints (Stulemeijer, Vos, Bleijenbergh, & van der Werf, 2007). As shown in the healthy elderly population, psychological factors such as coping styles and premorbid personality characteristics (e.g., neuroticism, extraversion) seem to make some individuals more prone to experiencing cognitive complaints than others (Hanninen et al., 1994; Slavin et al., 2010), and are therefore of growing interest. In multiple sclerosis and chronic pain patients, associations were found between cognitive complaints and dysfunctional coping styles (Roth, Geisser, Theisen-Goodvich, & Dixon, 2005; van der Hiele, Spliethoff-Kamminga, Ruimschotel, Middelkoop, & Visser, 2012). In epilepsy patients, neuroticism showed a significant relationship to the amount of cognitive complaints (Uijl et al., 2006). Only one study investigated the influence of psychological factors in stroke patients, showing that high neuroticism and low memory self-efficacy were associated with more subjective cognitive complaints (Aben et al., 2011). However, only bivariate analyses were performed, so that the degree to which psychological factors relate to cognitive complaints in addition to other factors such as, for example, cognitive functioning and mood is still unclear.

Knowledge of the factors underlying cognitive complaints in stroke patients may have important consequences for stroke care, ultimately resulting in better personalised rehabilitation programmes. Therefore, the aim of this study was (1) to examine the influence of psychological factors on

subjective cognitive complaints in a large sample of stroke patients, concentrating on proactive coping, passive coping, self-efficacy, optimism, pessimism, extraversion, and neuroticism, and (2) to examine the influence of these factors, after taking several demographic and stroke-related characteristics, cognitive deficits and emotional problems into account.

METHODS

Design and procedure

The current cross-sectional study is part of the prospective longitudinal Restore4Stroke cohort study, in which stroke patients are followed for 2 years (van Mierlo et al., 2014). Patients were recruited from stroke units in six participating hospitals in The Netherlands between March 2011 and March 2013. The present study reports data from stroke onset and 2 months post-stroke. The first assessment (T1) consisted of demographic and stroke-related factors, assessed by a trial nurse at the participating hospitals four days post-stroke. After 2 months (T2) patients were asked to complete the self-report scales of depression, anxiety and psychological factors. Furthermore, assessments of cognitive complaints and cognitive functioning were conducted by a trained research assistant at T2. The Restore4Stroke cohort study was approved by the Medical Ethics Committees of all participating hospitals and informed consent was obtained from all included patients.

Subjects

Patients were eligible for this study if they had a clinically confirmed diagnosis of stroke (ischaemic or haemorrhagic) and had suffered their stroke in the last 7 days. All patients had to be at least 18 years old. Patients were excluded if they (1) had a serious other condition whereby an interference with the study outcomes was expected (e.g., neuromuscular disease); (2) were already dependent regarding activities of daily living before their stroke as defined by a Barthel Index score of 17 or lower; (3) had insufficient command of the Dutch language to understand and complete the questionnaires; or (4) were already suffering from cognitive decline as defined by a score of 1 or higher on the Heteroanamnesis List Cognition (Meijer, van Limbeek, & de Haan, 2006) before their stroke.

Measures

The presence of subjective cognitive complaints was assessed using the cognitive complaints scale of the Checklist for Cognitive and Emotional consequences following stroke (CLCE-24), which consists of 13 items (e.g., problems with “doing two things at once” or “remembering new

information”) (van Heugten, Rasquin, Winkens, Beusmans, & Verhey, 2007). The interviewer scores a “0” for absence and a “1” for presence of complaints; the sum score indicates the number of experienced complaints. The CLCE-24 is a feasible and valid instrument to use in stroke patients (van Heugten et al., 2007; Passier et al., 2010).

Demographic characteristics included sex, age and level of education. We recorded the patients’ level of education according to a Dutch classification system ranging from 1 = did not finish primary school, to 7 = university education (Verhage, 1964). The hemisphere involved, the type of stroke (ischaemic or haemorrhagic) and history of previous stroke(s) were obtained from medical charts. The severity of the stroke was assessed with the National Institutes of Health Stroke Scale (NIHSS; Brott et al., 1989). Activities of daily living (ADL) were assessed by the Barthel Index (BI; Collin, Wade, Davies, & Horne, 1988). Comorbidity was scored on the Cumulative Illness Rating Scale (CIRS; Linn, Linn, & Gurel, 1968), assessing physical impairment based on the function of 13 organ areas. The degree of severity is measured on a 5-point scale, ranging from “none” to “extremely”. The total comorbidity score is the sum of all 13 items. Cognitive functioning was assessed with the Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005), using total scores. The MoCA is a screening tool for mild cognitive impairment. In 2006, the National Institute of Neurological Disorders and Stroke – Canadian Stroke Network recommended the MoCA for the assessment of post-stroke cognitive impairment (Hachinski et al., 2006). The MoCA seems to be a more sensitive test in detecting mild cognitive impairment (post-stroke) than the Mini-Mental State Examination (Pendlebury, Cuthbertson, Welch, Mehta, & Rothwell, 2010; Pendlebury, Mariz, Bull, Mehta, & Rothwell, 2012).

To study anxiety and depressive symptoms we administered the Hospital Anxiety and Depression Scale (HADS; Spinhoven et al., 1997). Depression and anxiety scores were evaluated separately, using total scores on each subscale.

Proactive coping was measured using the Proactive Coping Competence Inventory (PCI; Bode, Thoolen, & de Ridder, 2008). The PCI consists of 21 items scored on a 4-point scale, with scores of competence ranging from “not at all” to “very”. An example question is “To what extent do you have the capacity to recognise signals that something might go wrong?”. The PCI has shown good psychometric properties (Bode et al., 2008).

Passive coping was measured with the passive reaction pattern subscale of the Utrecht Coping List (UCL-P; Schreurs, van de Willige, Brosschot, Telle-gen, & Graus, 1993). This subscale consists of 7 items, which are scored on a 4-point scale ranging from “seldom” to “very often” (e.g., “taking refuge in fantasies”). The internal consistency of this subscale is moderate and the test-retest reliability is high (Schreurs et al., 1993).

Self-efficacy was measured with the General Self-Efficacy Scale (GSES; Scholz, Dona, Sud, & Schwarzer, 2002). This scale consists of 10 items scored on a 4-point scale, ranging from “not at all true” to “exactly true” (e.g., “I am confident that I could deal efficiently with unexpected events”). Psychometric properties of the GSES are satisfactory to good (Scholz et al., 2002).

Optimism and pessimism were assessed with the Life Orientation Test–Revised (LOT-R; Scheier, Carver, & Bridges, 1994). This test consists of 10 items; 3 items measuring optimism (e.g., “In uncertain times, I usually expect the best”), 3 items measuring pessimism (e.g., “If something can go wrong for me, it will”) and 4 distractor items. Items are scored on a 5-point scale, ranging from 0: “strongly disagree” to 4: “strongly agree”. Internal consistency is sufficient (Cronbach’s alpha coefficient .78) (Scheier et al., 1994).

Extraversion and neuroticism were measured with the Eysenck Personality Questionnaire–Revised Short Scale, consisting of 12 items on extraversion (EPQ-RSS-E) and 12 items on neuroticism (EPQ-RSS-N) (Sanderman, Arrindell, & Ranchor, 1995). The items have dichotomous (yes/no) response options (e.g., “Are you a talkative person?” on the extraversion scale, and “Does your mood often go up and down?” on the neuroticism scale). It has shown good internal consistency, test-retest reliability and concurrent validity (Sato, 2005).

Statistical analyses

Descriptive statistics were used to describe patients’ characteristics. Level of education was dichotomised into low (0–5) and high (6–7) (Passier et al., 2010). Frequencies of the separate items on the CLCE-24 were calculated to explore the profile of complaints.

Bivariate associations of demographic characteristics (age, sex, education), stroke-related factors (hemisphere, type, recurrence, NIHSS, BI), comorbidity (CIRS), cognitive functioning (MoCA total score), emotional problems (HADS-A and HADS-D total scores), and psychological factors (PCI, UCL-P, GSES, LOT-R, EPQ-RSS) with the CLCE-24 cognition score were tested using Spearman correlations. Correlations between psychological factors and HADS were tested as well. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity (correlation coefficient > 0.7) and homoscedasticity. The factors significantly correlating with subjective cognitive complaints ($p < .05$) were used in a hierarchical multiple regression analysis. First, psychological factors were entered as independent variables to study the amount of variance of cognitive complaints explained by the psychological factors alone (step 1). Subsequently, we adjusted for demographic characteristics (step 2), stroke-related factors and comorbidity (step 3), cognitive functioning (step 4) and emotional problems (step 5), at each step entering psychological

factors in the last block in the regression models. Analyses were performed with IBM SPSS Statistics version 21.

RESULTS

Subjects

A total of 395 patients were included in the Restore4Stroke cohort study. The data of 350 patients (88.6%) were available for analysis. Three patients died and 18 refused further participation. Furthermore, 5 patients were excluded from the current study because of their aphasia and in 19 patients it was not possible to conduct the T2 assessment because of their general physical condition.

The characteristics of the 350 patients are displayed in [Table 1](#). At the onset of stroke, mean age was 66.6 years ($SD = 12.4$), 63.7% of the patients were male, and 93.4% suffered an ischaemic stroke. The descriptive statistics of the psychological measures are presented in [Table 2](#).

Cognitive complaints

Two months post-stroke, 270 patients (68.4%) reported at least one cognitive complaint as assessed by the CLCE-24. The proportions of patients with cognitive complaints are shown in [Table 3](#). The most reported cognitive complaints were mental slowness, attention problems and memory problems for new information. The mean number of cognitive complaints per patient was 3.17 ($SD = 2.88$).

Correlations with cognitive complaints

[Table 4](#) shows bivariate and multivariate relationships with the CLCE-24 cognition score. Because of the disproportionate distribution of ischaemic and haemorrhagic strokes, type of stroke was eventually not included in the analyses.

Bivariate analyses showed that female sex, younger age, presence of recurrent stroke(s), more comorbidity (CIRS), poor cognitive functioning (MoCA), more depressive symptoms (HADS-D), more anxiety (HADS-A), less proactive coping (PCI), more passive coping (UCL-P), less self-efficacy (GSES), less optimism (LOT-R), more pessimism (LOT-R), less extraversion (EPQ-RSS-E) and more neuroticism (EPQ-RSS-N) were significantly associated with higher scores on the CLCE-24 cognition domain. No multicollinearity was found between these variables. Bivariate correlations between most psychological factors and total HADS score were moderate (Spearman's $\rho = .622$ for UCL-P, $.533$ for EPQ-RSS-N, $-.405$ for PCI, $-.401$ for LOT-R optimism, $-.354$ for GSES, $.332$ for LOT-R pessimism, and $-.107$ for EPQ-SS-E).

TABLE 1
Characteristics of stroke patients (n = 350) at T1

	n	%
<i>Demographic characteristics</i>		
Sex, number of men	223	63.7
Age in years, mean (SD)	66.6 (12.4)	
Education level (n = 349)		
Low (1–5)	254	72.8
High (6–7)	95	27.2
<i>Stroke characteristics</i>		
Type of stroke (n = 349)		
Ischaemic	326	93.4
Haemorrhagic	23	6.6
Location of stroke (n = 345)		
Left	137	39.7
Right	150	43.5
Vertebrobasilar	58	16.8
Recurrent stroke	45	12.9
NIHSS score, mean (SD)	2.5 (2.9)	
No stroke symptoms (NIHSS 0)	87	24.9
Minor stroke symptoms (NIHSS 1–4)	202	57.7
Moderate stroke symptoms (NIHSS 5–12)	56	16.0
Moderate to severe symptoms (NIHSS > 12)	5	1.5
Barthel Index, mean (SD)	17.1 (4.5)	
ADL independent (BI 19–20)	208	59.4
ADL (BI < 19)	142	40.6
Duration of hospital stay in days, mean (SD)	8.4 (6.3)	
Destination after discharge from hospital		
Home	255	72.9
Rehabilitation centre	49	14.0
Nursing home	46	13.1
Cognition (MoCA at T2), mean (SD) (n = 349)	23.6 (4.0)	
Normal cognition (MoCA 26–30)	113	32.4
Cognitively impaired (MoCA < 26)	236	67.6
<i>Emotional characteristics</i>		
HADS depression, mean (SD) (n = 343)	4.6 (3.9)	
No depressive symptoms (HADS-D 0–7)	269	78.4
Depressive symptoms (HADS-D > 7)	74	21.6
HADS anxiety, mean (SD) (n = 343)	4.7 (3.9)	
No anxiety (HADS-A 0–7)	273	79.6
Anxiety (HADS-A > 7)	70	20.4

T1 = first assessment < 4 days after stroke; NIHSS = National Institutes of Health Stroke Scale; MoCA = Montreal Cognitive Assessment; T2 = assessment 2 months after stroke; HADS = Hospital Anxiety and Depression Scale.

In the multiple regression analysis, psychological factors alone explained 34.7% of the variance in the CLCE-24 cognition score. After stepwise adjustment for significant demographic characteristics,

TABLE 2
Descriptive statistics of the psychological measures

<i>Psychological factor</i>	<i>Measure</i>	<i>Range</i>	<i>N</i>	<i>Mean (SD)</i>
Proactive coping	PCI	1–4	346	3.1 (0.6)
Passive coping	UCL-P	7–28	347	10.6 (2.9)
Self-efficacy	GSES	10–40	346	31.6 (6.4)
Optimism	LOT-R	0–12	347	8.2 (2.1)
Pessimism	LOT-R	0–12	346	4.4 (2.8)
Extraversion	EPQ-RSS-E	0–12	346	7.1 (3.2)
Neuroticism	EPQ-RSS-N	0–12	347	3.7 (3.2)

PCI = Proactive Coping Competence Inventory; UCL-P = passive reaction pattern subscale of the Utrecht Coping List; GSES = General Self-Efficacy Scale; LOT-R = Life Orientation Test-Revised; EPQ-RSS = Eysenck Personality Questionnaire Revised Short Scale.

TABLE 3
Cognitive complaints in stroke patients ($n = 350$), as assessed with the CLCE-24

<i>Cognitive complaints since stroke</i>	<i>n</i>	<i>%</i>
Keeping up; has become slower	181	51.7
Attending to things	148	42.3
Remembering new information	138	39.4
Doing two things at once	135	38.6
Speaking or writing	99	28.3
Taking initiative	84	24.0
Planning and organising things	82	23.4
Perceiving time	60	17.1
Social aspects of language	54	15.4
Remembering old information	52	14.9
Performing daily activities	35	10.0
Attending to a part of the body or space	29	8.3
Orientating to places or persons	12	3.4

CLCE-24 = Checklist for Cognitive and Emotional consequences following stroke.

stroke-related factors, CIRS and MoCA, the explained variance by psychological factors dropped to 22.6%. Adjusting for HADS in the final step caused the largest decrease, from 22.6% to 8.5%. In the final regression model, total explained variance was 52.3% (Table 4). Age, cognition (MoCA), depressive symptoms (HADS-D) and proactive coping (PCI) were independently associated with cognitive complaints ($p < .001$). The presence of depressive symptoms was most strongly related (Beta = 0.380).

TABLE 4
Bivariate and multivariate analyses of independent variables and CLCE-24 cognition score two months post-stroke (*n* = 350)

Factors	Measure	Bivariate analysis		Multivariate analysis					
		Spearman's rho	Beta	p-value	Explained variance per step (R square change)				
					Step 1	Step 2	Step 3	Step 4	Step 5
Demographic factors					–	4.0%	4.0%	4.0%	4.0%
Sex (female)		.127*	0.053	.19					
Age		–.132*	–0.281	< .001					
Education (high)		–.085	–						
Stroke-related factors					–	–	7.2%	7.2%	7.2%
Side of stroke (right vs. left + vertebrobasilar)		.028	–						
Severity of stroke	NIHSS	.070	–						
ADL	BI	–.052	–						
Recurrent stroke(s)		.130*	0.094	.017					
Comorbidity	CIRS	.201**	0.059	.18					
Cognition					–	–	–	11.4%	11.4%
Cognitive performance	MoCA	–.235**	–0.262	< .001					

Emotional problems					–	–	–	–	21.2%
Depressive symptoms	HADS-D	.542**	0.380	< .001					
Anxiety	HADS-A	.445**	–0.078	.21					
Psychological factors					34.7%	33.2%	27.4%	22.6%	8.5%
Proactive coping	PCI	–.479**	–0.245	< .001	<i>F</i> 25.6	<i>F</i> change	<i>F</i> change	<i>F</i> change	<i>F</i> change
Passive coping	UCL-P	.453**	0.027	.64		25.4	21.2	19.6	8.3
Self-efficacy	GSES	–.398**	–0.066	.20	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001
Optimism	LOT-R	–.370**	0.005	.91					
Pessimism	LOT-R	.178**	–0.076	.079					
Extraversion	EPQ-RSS-E	–.107*	0.009	.84					
Neuroticism	EPQ-RSS-N	.446**	0.103	.066					
Total explained variance					34.7%	37.2%	38.6%	45.2%	52.3%

CLCE-24 = Checklist for Cognitive and Emotional consequences following stroke; NIHSS = National Institutes of Health Stroke Scale; BI = Barthel Index; CIRS = Cumulative Illness Rating Scale; MoCA = Montreal Cognitive Assessment; HADS = Hospital Anxiety and Depression Scale; PCI = Proactive Coping Competence Inventory; UCL-P = passive reaction pattern subscale of the Utrecht Coping List; GSES = General Self-Efficacy Scale; LOT-R = Life Orientation Test–Revised, EPQ-RSS = Eysenck Personality Questionnaire Revised Short Scale.

* = *p* < .05; ** = *p* < .01.

DISCUSSION

Our study showed that 68.4% of the patients reported at least one cognitive complaint 2 months after stroke. All psychological factors investigated were bivariately related to cognitive complaints, and still explained, in combination with all other variables, a significant proportion of the variance of such complaints. Proactive coping was significantly independently related in the regression analysis, showing that more proactive coping was related to fewer cognitive complaints. Other factors that were significantly independently associated were age, cognition and depressive symptoms, the latter being most strongly related.

The strong relationship between depressive symptoms and cognitive complaints may be explained by the fact that some cognitive complaints, such as attention problems and mental slowness, can be manifestations of depressed mood. The fact that the explained variance by psychological factors dropped from 22.6% to 8.5% after adjusting for emotional problems, shows that they share some variance. This may not be surprising, as psychological factors also influence emotional status, in particular mood (Aben et al., 2002). Consequently, the influence of psychological factors on cognitive complaints is larger than our results may presume, due to their indirect effect.

A significant correlation between cognitive performance and cognitive complaints was found in our study, showing that poor cognitive performance was related to more complaints and vice versa. The validation study of the CLCE-24 (van Heugten et al., 2007) showed a significant relationship as well, based on scores on the Mini-Mental State Examination (MMSE) and CAMCOG (cognitive part of the Cambridge Examination for Mental Disorders of the Elderly). Two other studies using the MMSE also observed a negative correlation between cognitive complaints and cognitive performance (Narasimhalu, Wiryasaputra, Sitoh, & Kandiah, 2013; Xiong et al., 2011). When neuropsychological examination is performed using more comprehensive tests, most studies did not find a significant association (Aben L et al., 2011; Duits et al., 2008; Winkens, Van Heugten, Fasotti, & Wade, 2009). Since MoCA assesses overall cognitive functioning, in comparison to detailed tests in extensive neuropsychological assessments to find even the smallest deficits, we may presume that, in daily practice, problems in overall cognitive functioning will be noticed sooner than small cognitive deficits. As a consequence, cognitive complaints may thus relate better to MoCA scores. The MoCA is a sensitive instrument to detect post-stroke cognitive impairment (Koski, 2013).

Our study showed that younger age is associated with more cognitive complaints. An explanation may be that younger people are expected to perform more challenging tasks in daily life, and experience more demands on their cognitive abilities, compared to older people. Before their stroke, they lived

active lives and are therefore more highly affected by these post-stroke problems.

Strengths and limitations

One of the strengths of this study is the large group of stroke patients included. Furthermore, the influence of a combination of psychological factors on cognitive complaints has been investigated for the first time. Finally, in this study, demographic characteristics, stroke-related factors, cognition, emotional problems and psychological factors have been investigated in a multivariate analysis for their influence on cognitive complaints. This resulted in a more complete overview of the factors that determine cognitive complaints 2 months post-stroke.

However, some limitations should also be mentioned. First, patients with an ischaemic stroke were over-represented in our cohort study. Ninety-three percent of the patients suffered an ischaemic stroke, against 82% in the total stroke population in The Netherlands (Vaartjes et al., 2008). This is probably a result of recruiting patients from general hospitals and not from academic hospitals. Another reason could be that in general, haemorrhagic lesions are more severe, causing patients not to be able to receive information about the study and to agree to participate within one week after the onset of stroke. Second, our results were not compared with a demographically matched control group. Third, the coping style measures used were not specifically designed with respect to coping with subjective cognitive complaints. A stronger relationship between coping and subjective cognitive complaints may have been found if we had used a measure of coping specifically developed with respect to cognitive complaints. However, to our knowledge such a coping style measure does not exist. The development of such a measure might assist further research in this area. Finally, our study had a cross-sectional design, therefore was not able to determine causality between psychological factors and cognitive complaints.

Clinical implications

As stroke patients make less use of proactive coping styles compared to other brain damaged patients (Herrmann et al., 2000), any intervention to support proactive coping is needed. Several interventions, such as problem solving therapy, are aimed at changing maladaptive coping styles. These interventions proved to be effective in patients with traumatic brain injury (Backhaus, Ibarra, Klyce, Trexler, & Malec, 2010), chronic pain (Merlijn et al., 2005) and breast cancer (Hopko et al., 2011), and is currently being investigated in stroke patients (Tielemans et al., 2014). Recognising coping styles and intervening on dysfunctional coping styles may eventually result in better personalised stroke care, hopefully leading to a decrease in cognitive complaints.

Comparable to coping, post-stroke depressed mood can be influenced by therapeutic interventions such as problem solving therapy (Hackett, Anderson, House, & Halteh, 2008). There is some proof that cognitive complaints diminish when mood is improved (Antikainen et al., 2001). Therefore, mood is an important target for intervention in stroke care.

CONCLUSION

Cognitive complaints are common two months after stroke and are associated with psychological factors. Since some psychological factors can be improved by therapeutic interventions, it is important to focus on these factors in stroke care.

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