The influence of psychological factors on health-related quality of life after stroke: a systematic review

The influence of psychological factors on Health-Related Quality of Life after stroke: a systematic review

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Background and purpose **Many stroke patients experience problems with health-related quality of life, but much of the variance of health-related quality of life after stroke remains unexplained. Health-related quality of life may be influenced by psychological factors, as these factors reflect the way people approach situations and react to stressful situations. The aim of this study was to systematically examine the relationship between psychological factors and health-related quality of life after stroke.**

Summary of review **A systematic literature search was conducted in online databases PubMed, Embase, PsycINFO, and CINAHL in November 2011. A total of nine studies were included. Personality (i.e. problems of temperament and personality functions and neuroticism) was moderately negatively associated with health-related quality of life (r = 0·26–0·49). Coping (i.e. situational and personal adaptation), internal locus of control, self-worth (i.e. self-esteem and self-efficacy), and hope and optimism were moderately positively associated with health-related quality of life (r = 0·026–0·81). No evidence was found for an association between extraversion and health-related quality of life.**

Conclusions **There is still a paucity of studies on psychological determinants of poststroke health-related quality of life. The reviewed studies supported the importance of psychological factors, but further research is needed to supplement the available evidence and to examine how psychological factors can be modified to improve health-related quality of life, and at what moment after the stroke these interventions should be given.**

Key words: psychological factors, quality of life, stroke, systematic review

Introduction

Stroke is a leading cause of mortality and disability in the Western world and is associated with physical, psychological, and social consequences (1–3). Major improvements in acute stroke care have resulted in more people surviving after stroke, but many of them have to cope with the consequences (4,5), experiencing long-term difficulties in terms of social reintegration (4), life satisfaction (6), physical functioning (7), and emotional functioning, including depression and anxiety (8).

The growing number of chronic stroke patients has led to growing interest in the consequences of stroke for health-related quality of life (HRQoL) (3,9–11). HRQoL refers to 'how health impacts on an individual's ability to function and his or her perceived well-being in physical, mental and social domains of life' (12). HRQoL can be seen as an overarching multidimensional construct, comprising different domains of one's life, such as physical, functional, psychological, and social health (9).

The most commonly investigated determinants of poststroke HRQoL are demographic factors, stroke-related factors, and physical impairments. However, they leave much of the variance of HRQoL unexplained (13,14). Psychological factors may influence functioning and HRQoL (3), because these factors reflect the way people approach situations and react to stressful situations (15,16). Psychological factors are part of the contextual factors (personal and environmental factors) defined by the International Classification of Disability, Functioning and Health (ICF) (17).

The importance of psychological factors for HRQoL has already been demonstrated in other chronic conditions (18,19), but an overview of the influence of psychological factors on the HRQoL of stroke patients is still lacking. The only available review (3) describing the determinants of the HRQoL of stroke patients was not systematic and did not focus on psychological factors alone. Consequently, it missed some of the relevant studies (20). Hence, the objective of this study was to systematically examine the relationship between psychological factors and HRQoL poststroke.

Methods

Eligibility criteria

Studies that met the following criteria were included: (1) more than 50% of the study population had suffered a stroke (ischemic or intracerebral hemorrhagic lesion); (2) all patients had to be ≥18 years; (3) the outcome was HRQoL, assessed with a standardized measure; (4) the determinants studied were one or more psychological factors, assessed with a standardized measure. According to the ICF (17), we operationalized psychological factors as 'coping styles, overall behaviour patterns and character style, individual psychological assets and other characteristics, which may play a role in disability at any level, but that are not part of a health condition or health states' (p. 17).

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The review was limited to articles written in English (5) that had been published as original reports (6), with quantitative data (7), in peer-reviewed journals (8); we excluded case reports.

Search strategy and methodological quality assessment

Articles were identified by searching the databases PubMed, Embase, CINAHL, and PsycINFO on November, 3, 2011. No constraint was placed on the year of publication. The search was conducted in triadic terms, combining a 'stroke' domain with a 'psychological factor' determinant and a 'HRQoL' outcome. Appendix S1 provides an overview of the search strategy used in PubMed, compiled together with an information specialist.

After duplicates had been removed, all articles were evaluated based on title and abstract. The remaining articles were then read in full and critically evaluated based on the inclusion and exclusion criteria. Both steps were conducted independently by two authors (M. L. M., C. S.). In the case of disagreement between the two authors, a third author (J. M. A. V-M.) was consulted for a final judgment. With regard to the selection of articles based on title and abstract, Cohen's kappa was used to calculate concurrence between both authors (M. L. M., C. S.). The reference lists of the selected articles were also examined to find relevant articles to complement the database search.

The methodological quality of all selected studies was assessed independently by M. L. M. and C. S. The level of agreement between their ratings was calculated using the intraclass correlation coefficient (ICC). Methodological quality was scored using an 8-point checklist, ranging from (1) lowest quality to (8) highest quality (18).

Data extraction and analysis

Correlation coefficients and standardized β coefficients were the most frequently reported statistics in the selected articles. We considered correlation coefficients to be weak if they were below 0·3, moderate between 0·3 and 0·5, and strong above 0·5 (21). The unique proportion of the variance explained by psychological factors (change in R^2) was reported if available.

Psychological factors were classified as consistent determinants if all, or nearly all, bivariate associations reported were statistically significant, and if the majority of these bivariate associations were moderate or strong. Factors were classified as inconsistent if only some of the bivariate associations were statistically significant, or if most of the significant bivariate associations were weak. Factors were considered unrelated to HRQoL if all, or nearly all, bivariate associations were nonsignificant. The results of multivariate regression analyses were used to examine the robustness of the bivariate associations.

Results

Search results and quality assessment

The search strategy yielded 1955 articles (Fig. 1). After 561 duplicates had been removed, a further 1353 articles were removed after screening titles and abstracts. After the remaining 41 articles had been read in full, 32 more articles were removed. Agreement between the two authors about the selection of titles and abstracts was good (Cohen's kappa = 0·74). The screening of reference lists of included articles produced no additional articles, leaving a total of nine articles for inclusion in the review.

The characteristics of the nine articles are presented in Table 1. All nine articles had been written after 2000 and six of them since 2006. Only two studies had used longitudinal analyses, while six had longitudinal designs. Agreement between the two authors on methodological quality was sufficient (ICC = 0·66). On an 8-point scale the average methodological quality score was 5·3 (range 3–7). Most studies attained a methodological quality score of between 4 and 6 (Appendix S2).

Psychological factors

A total of six psychological factors were measured: personality, coping, internal locus of control, self-worth, hope, and optimism. The different instruments used to measure these psychological factors are presented in Table 2 and the data extraction is presented in Table 3. Three articles subdivided HRQoL into mental HRQoL and physical HRQoL. The relationships between psychological factors and these subdomains are presented in the text, but not in Table 3.

Personality

Experiencing problems of temperament and personality functions, an ICF category that was not further specified, was moderately associated with lower HRQoL at six-weeks, three-months, and one-year poststroke. In the regression analysis, problems of temperament and personality functions were most strongly associated with lower HRQoL at one-year poststroke (11).

Neuroticism was moderately associated with lower HRQoL at discharge and five-months after discharge, but not at two-months and 9–12 months after discharge (22). Furthermore, neuroticism one-week before discharge from the hospital was associated with lower mental HRQoL (β = –0·27), but not with physical HRQoL one-year after discharge (23). In addition, extraversion was not associated with mental and physical HRQoL (23).

Coping

Situational adaptation was not related to HRQoL at discharge and two-months after discharge, but was moderately to strongly related to higher HRQoL at five-months and 9–12 months after discharge (22). In contrast to these cross-sectional data, three regression analyses found no relationship between situational adaptation at discharge and HRQoL 9–12 months after discharge (24).

Personal adaptation was weakly to moderately related to higher HRQoL at all time points, except at discharge. Personal adaptation at discharge was related to higher HRQoL 9–12 months after discharge in all three regression analyses.

Religious and spiritual coping 2·5 years poststroke was not associated with overall HRQoL, but was moderately associated with higher mental HRQoL ($r = .43$) (25).

Internal locus of control

Internal locus of control was moderately to strongly associated with higher HRQoL 12 and 18 months poststroke ($r = 0·32$). Internal locus of control was also associated with higher physical

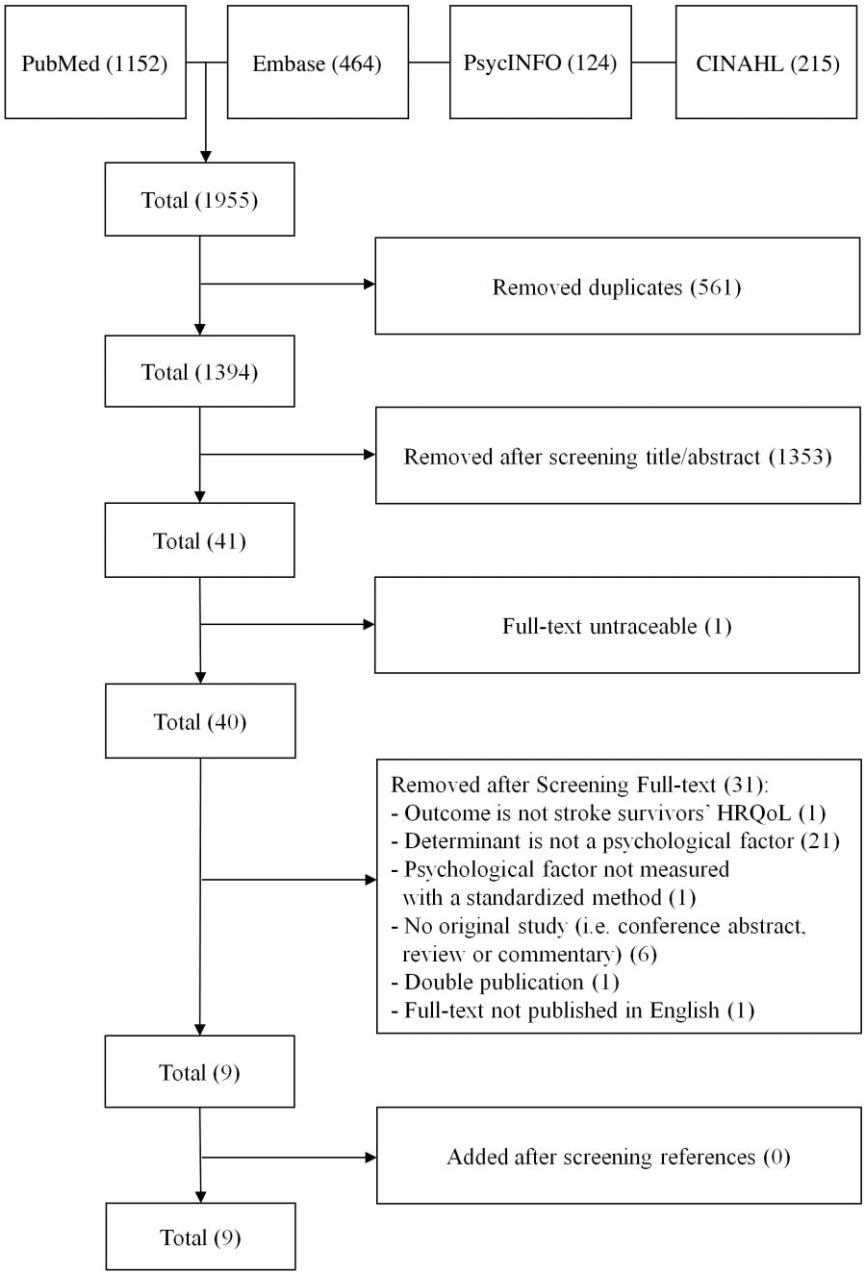

Fig. 1 Search and selection of eligible articles. HRQoL, healh-related quality of life.

HRQoL ($r = 0{\cdot}27$) (10). Multivariate regression analyses showed similar results for HRQoL (Table 3) and physical HRQoL ($\beta = 0{\cdot}16$ and $\beta = 0{\cdot}18$) (10).

Self-worth

Self-esteem was strongly associated with higher HRQoL (Table 3) and physical HRQoL 12 and 18 months poststroke ($r = 0{\cdot}45$ and $r = 0{\cdot}47$, respectively) (10). The multivariate regression analyses revealed inconsistent results. For physical HRQoL, a significant relationship with self-esteem was found at 12 months ($\beta = 0{\cdot}23$), but not at 14 and 18 months poststroke (10).

Physical self-efficacy was associated with higher HRQoL 17 months poststroke (26). Self-care self-efficacy was strongly associated with higher HRQoL at one-month and six-months poststroke. However, these associations were not significant in the multivariate regression analyses (27).

Hope

Hope was strongly associated with higher HRQoL at a mean of 2·5 years poststroke. This relationship was still significant in a multivariate regression analysis with control variables (20).

Optimism

Optimism was strongly associated with higher HRQoL and was moderately associated with higher physical HRQoL ($r = 0{\cdot}21$ and $r = 0{\cdot}39$) (10). However, only one of the three associations remained significant in the regression analyses, while none of the associations remained significant for physical HRQoL (10).

Table 1 Study characteristics

Author and country of research	Patient group	Participants		Mean age (SD)*	Time of assessment(s) Mean (SD)	HRQoL measure	Psychological measure
		n	Men (%)				
Cross-sectional†							
Algurén *et al.*, Sweden(11)	Hospital	99	45	72 (13·1)	During admission to the hospital, six-weeks, three-months, and one-year poststroke	EuroQol-5D Visual Analogue Scale (EQ-5D VAS)	Temperament and personality item (b126) of the extended version of the ICF Core Set for Stroke
Bluvol & Ford-Gilboe, Canada(20)	Rehabilitation	40	73	69·5 (9·45)	2·5 years (SD 1·66) poststroke	Reintegration to Normal Living Index (RNLI)	Herth Hope Index
Darlington *et al.*, The Netherlands(22)	Hospital, rehabilitation center, and nursing home	80	49	60·9 (16·9)	At discharge (median 5·4 weeks since admission), two-months, five-months, and 9–12 months after discharge	– EuroQoL-5D (EQ-5D) – Medical Outcomes Study 36-item short form health survey (SF-36)	– Assimiltative-Accomodative Coping Scale – Eysenck Personality Questionnaire – Neuroticism subscale
Johnstone *et al.*, United States(25)	Hospital	32	47	NR	29 months (range 4–180) poststroke	SF-36 subscales: – General Health perception – General Mental health	Brief multidimensional Measure of Religiousness/ Spirituality, subscale religious and spiritual coping
LeBrasseur *et al.*, United States(26)	Community dwelling	31	74	66·2 (1·5)	17·5 months (SD 1·2) poststroke	Shortened Version of the Sickness Impact Profile (SIP68)	Ewart Self-Efficacy Scale
Robinson-Smith *et al.*, United States(27)	Rehabilitation	63	55	71 (range 36–92)	One-month and six-months poststroke	Quality of Life Index-Stroke Version (QLI)	Strategies Used by People to Promote Health
Teoh *et al.*, Australia(10)	Community dwelling	135	68	67·5 (14·3)	Inclusion 11·7 months (SD 4.9) poststroke Assessments: at inclusion, 10 weeks and six-months after inclusion	– Assessment of Quality of Life (AQoL) – Satisfaction with Life Scale (SWLS) – Stroke Impact Scale, physical domain (SIS)	– Life Orientation Test Revised – Rosenberg Self-Esteem Scale – Recovery Locus of Control Scale
Longitudinal							
Darlington *et al.*, The Netherlands(24)	Hospital, rehabilitation centre and nursing home	80	49	60·9 (16·9)	At discharge (median 5·4 weeks since admission) and 9–12 months after discharge	EQ-5D	Assimilative-Accomodative Coping Scale
Li *et al.*, China.(23)	Hospital	121	52	60·4 (8·1)	One-week before discharge from hospital (mean 37·9 days poststroke) and one-year after discharge	General Quality of Life Inventory (GQOLI), physical and mental health dimension	Eysenck Personality Questionnaire – Neuroticism and extraversion subscale

*Mean age combined with standard deviation (SD) was considered as preferable. If this is not reported, then the range is given. †The studies of Algurén *et al.*, Darlington *et al.*, Robinson-Smith *et al.* and Teoh *et al.* have a longitudinal design; however, the statistics used in these articles cover only cross-sectional analyses.

Table 2 Psychological factors and measures

Psychological factor	Subtypes	Psychological measure (ref.)	Number of items	Description variable	Scoring
Personality	Temperament and personality functions	Temperament and personality functions item (b126) of the Extended version of the ICF Core Set for Stroke (11)	1	The extent of a person's problems in temperament and personality functions (11).	5-point scale ranging from 'no problem' (0) to 'complete problem' (4). A higher score indicates more problems.
	Neuroticism	Eysenck Personality Questionnaire – subscale neuroticism (22,23)	12	Emotional instability (28); e.g. Does your mood often go up and down?	Items are scored as 'yes' (1) or 'no' (0). A higher sum score indicates a higher level of neuroticism.
	Extraversion	Eysenck Personality Questionnaire – subscale extraversion (23)	12	The tendency of having thoughts and activities satisfied by things outside the self (28); e.g. Are you a talkative person?	Items are scored as 'yes' (1) or 'no' (0). A higher sum score indicates a higher level of extraversion.
Coping	Situational adaptation	Assimilative – Accommodative Coping Scale (Tenacious Goal Pursuit, TGP) (22,24)	15	Refers to the coping strategy that is aimed at actively adjusting circumstances to personal preferences (24); e.g. When faced with difficulties I usually double my efforts.	5-point scale ranging from 'completely agree' (0) to 'completely disagree' (4). Mean scores are calculated. Higher scores indicate better use of situational adaptation.
	Personal adaptation	Assimilative – Accommodative Coping Scale (Flexible Goal Adjustment) (22,24)	15	Refers to the coping strategy whereby the patient attempts to accept the consequences of the stroke by adjusting personal preferences and goals (24); e.g. I adapt quite easily to changes in plans or circumstances.	5-point scale ranging from 'completely agree' (0) to 'completely disagree' (4). Mean scores are calculated. Higher scores indicate better use of personal adaptation.
	Religious/spiritual coping	Brief multidimensional measure of religiousness/spirituality-subscale religious and spiritual coping (25)	7	The extent in which a Higher power is seen as benevolent and supportive or punishing and abandoning (25); e.g. I look to a higher power for strength, support, and guidance.	6-point and 4-point scales ranging from 'many times a day' (1) to 'never or almost never' (6) and 'strongly agree' (1) to 'strongly disagree' (4). Lower scores are indicative of a higher degree of spiritual coping.
Internal locus of control	Perceived control over the course of recovery	Recovery locus of control scale (10)	9	Measures internal and external control on a single dimension. Internal locus of control is the degree to which an individual believes the occurrence of reinforcements is contingent on his or her own behavior (29); e.g. my own contribution to my recovery doesn't account for much.	5-point response, with five items reflecting internal beliefs and four items reflecting external beliefs. A single sum score is obtained. A high score indicates a strong internal locus of control and a low score a strong external locus of control.
Self-worth	Physical self-efficacy	Ewart self-efficacy scale (26)		Self-perceived confidence to perform a number of physical tasks (26); e.g. climbing stairs	Scores range from 0 to 100. A higher score indicates higher levels of self-efficacy.
	Self-care self-efficacy	Strategies used by people to promote health (27)	36	Confidence in self-care behaviors (27); e.g. I have confidence in finding a way to help me through this time.	5-point scale ranging from 'very little confidence' (1) to 'quite a lot confidence' (5). A higher sum score indicates higher levels of self-care self-efficacy.
	Self-esteem	Rosenberg self-esteem scale (10)	10	An overall evaluation of one's self-worth (10); e.g. on the whole I am satisfied with myself.	4-point scale ranging from 'strongly disagree' (0) to 'strongly agree' (3). A higher sum score indicates higher levels of self-esteem.
Hope		Herth Hope index (20)	12	A multidimensional life force, which is characterized by an expectation of achieving a future good that is realistic and significant to the person (30); e.g. I have a positive outlook toward life.	4-point scale ranging from 'strongly disagree' (1) to 'strongly agree' (4). A higher sum score indicates a higher level of hope.
Optimism		Life orientation test- revised (10)	10 (including four filler items)	This scale measures dispositional optimism, which means that a person has the tendency to expect the occurrence of good outcomes in one's life (31); e.g. in uncertain times, I usually expect the best.	5-point scale ranging from 'strongly disagree' (0) to 'strongly agree' (5). A higher sum score represents higher levels of optimism.

Table 3 Relationship between overall Health-Related Quality of Life (HRQoL) and psychological factors after stroke

	Overall HRQoL				
	Time of assessment	HRQoL measure	*r*	b / β / ΔR^2	Reference
Personality					
Temperament and personality functions	Six-weeks poststroke	EQ-5D VAS	–0·323**	b = –17·2***†	(11)
	Three-months poststroke		–0·260*	ns	
	One-year poststroke		–0·485***	b = – 18·6***†	
Neuroticism	At discharge from hospital, rehabilitation center, or nursing home	EQ-5D	nr	β = –0·406**	(22)
	Two-months after discharge		nr	ns	
	Five-months after discharge		nr	β = –0·262*	
	9–12 months after discharge		nr	ns	
Coping					
Situational adaptation (SA)	At discharge from hospital, rehabilitation center, or nursing home	EQ-5D	0·026	β = 0·098	(22)
	Two-months after discharge	EQ-5D	0·231	β = 0·163	
		SF-36	nr	β = 0·255*	
	Five-months after discharge	EQ-5D	0·464***	β = 0·399**	
		SF-36	nr	β = 0·378**	
	9–12 months after discharge	EQ-5D	0·435***	β = 0·443***	
		SF-36	nr	β = 0·453***	
	SA at discharge and HRQoL 9–12 months after discharge (Longitudinal analysed)	EQ-5D	nr	β = 0·068 – 0·074	(24)
Personal adaptation (PA)	At discharge from hospital, rehabilitation center, or nursing home	EQ-5D	0·100	β = 0·077	(22)
	Two-months after discharge	EQ-5D	0·271*	β = 0·196	
		SF-36	nr	β = 0·232	
	Five-months after discharge	EQ-5D	0·279*	β = 0·196	
		SF-36		β = 0·250*	
	9–12 months after discharge	EQ-5D	0·362**	β = 0·316**	
		SF-36	nr	β = 0·382**	
	PA at discharge and HRQoL 9–12 months after discharge (Longitudinal analysed)	EQ-5D	nr	β = 0·116* – 0·126**	(24)
Religious/spiritual coping	Mean 29 months poststroke	SF-36	0·17		(25)
Internal Locus of control	Mean 12 months poststroke	AQoL	0·50***	β = 0·29***	(10)
		SWLS	0·40***	β = 0·16*	
	Mean 14 months post stroke	AQoL	nr	β = 0·18*	
		SWLS	nr	ns	
	Mean 18 months post stroke	AQoL	0·30***	ns	
		SWLS	0·29***	ns	
Self-worth					
Self-esteem	Mean 12 months poststroke	AQoL	0·58***	ns	(10)
		SWLS	0·59***	β = 0·21*	
	Mean 14 months poststroke	AQoL	nr	β = 0·20*	
		SWLS	nr	β = 0·27**	
	Mean 18 months poststroke	AQoL	0·60***	ns	
		SWLS	0·68***	β = 0·41***	
Physical self-efficacy	Mean 17 months poststroke	SIP68	nr	b = –60·70*** ‡/ ΔR2 = 0·21	(26)
Self-care self-efficacy	One-month poststroke	QLI	0·66***	ns	(27)
	Six-months poststroke		0·81***	ns	
Hope	Mean 2.5 years poststroke	RNLI	0·59***	β = 0·351*	(20)
Optimism	Mean 12 months poststroke	AQoL	0·39***	ns	(10)
		SWLS	0·49***	ns	
	Mean 14 months poststroke	AQoL	nr	ns	
		SWLS	nr	ns	
	Mean 18 months poststroke	AQoL	0·53***	β = 0·21**	
		SWLS	0·60***	ns	

*$P < 0·05$, **$P < 0·01$,***$P < 0·001$.

†The given results of the regression analyses of temperament and personality functions were calculated with the Body functions component of the ICF only. The results of the regression analyses in which all three components of the ICF are represented are not significant for six-weeks and three-months poststroke, but are significant at six-months poststroke, b = –16·7***.

‡Higher scores on the SIP68 indicate more health-related quality of life problems.

ns, not significant; nr, not reported; *r*, correlation; b, unstandardized regression coefficient; β, standardized regression coefficient; ΔR^2, explained variance of the determinant; EQ-5D VAS, EuroQol-5D Visual Analogue Scale; SF-36, Medical Outcomes Study 36-item short form health survey; AQoL, Assessment of Quality of Life; SWLS, Satisfaction with Life Scale; SIP68, Shortened Version of the Sickness Impact Profile; QLI, Quality of Life Index-Stroke Version; RNLI, Reintegration to Normal Living Index.

Discussion

The aim of the present review was to systematically examine the relationships between psychological factors and HRQoL poststroke. Negative personality characteristics (i.e. problems of temperament and personality functions and neuroticism) were moderately associated with lower HRQoL. Coping (i.e. situational and personal adaptation, and religious and spiritual coping), internal locus of control, self-worth (i.e. self-esteem and self-efficacy), hope, and optimism were moderately associated with higher HRQoL.

Negative determinants

The experience of problems with temperament and personality functions was already associated with lower HRQoL six-weeks poststroke. The negative associations between neuroticism and HRQoL are in accordance with those found in studies among patients with other chronic conditions, such as asthma and head and neck cancer (15,32). Patients with high scores for neuroticism may experience lower HRQoL because they focus more on their symptoms and are likely to report more symptoms (33).

Positive determinants

Positive associations with HRQoL were found for situational and personal adaptation. There are several classification systems for coping. A frequently used classification system divides coping into problem-focused (e.g. actively addressing the problem) and emotion-focused (e.g. accepting situations more easily) coping styles (34). According to this classification, situational and personal adaptation can be classified as problem-focused and emotion-focused coping styles, respectively. Darlington *et al.* (22) expected that in the first months after discharge, higher HRQoL would be related to high levels of problem-focused coping styles, whereas higher HRQoL five-months after discharge would be related to high levels of emotion-focused coping styles. The results in the present study were not entirely in accordance with this expectation. Situational adaptation showed a relationship with HRQoL from five-months after discharge, and personal adaptation already from two-months after discharge. Furthermore, at five-months after discharge, correlations between situational adaptation and HRQoL were somewhat higher than between personal adaptation and HRQoL. Recently, Brands *et al.* (35) suggested that a simultaneous and continuous interaction between both coping styles, that is, pursuing goals and adjusting to the changes where necessary, would be the best combination for the process of adjustment in patients with acquired brain injury. This assumption fits in better with the results reported by Darlington *et al.* (22), so more research is needed to examine which combination of coping styles is the most beneficial, in terms of HRQoL poststroke. It is interesting that coping became more closely related to HRQoL as more time elapsed after the stroke: there was no association between personal adaptation until two-months after discharge and there was no association between situational adaptation and HRQoL until five-months after discharge. This effect was not studied for the other psychological factors. It might be that physical factors play a more prominent role in determining HRQoL in the acute poststroke phase, whereas psychological factors are more important in the chronic phase.

It is important to know which psychological factors can be modified in order to optimize HRQoL poststroke. Personality is presumed to be a constant factor across a person's life span, in contrast to coping (22). In recent years, positive psychology interventions aimed at strengthening psychological resources, for example self-esteem, have attracted increasing interest (36). Our review found associations of self-worth, hope, optimism, and locus of control with HRQoL. Opportunities to modify these factors by means of therapy, and the effects of such interventions on HRQoL, should be further investigated.

Unrelated determinants

No associations were found between extraversion and mental and physical HRQoL. However, this was not examined in bivariate correlational analyses, as was done for the other psychological factors. A positive relationship between extraversion and HRQoL has been found in other patient groups, such as asthma patients (15).

Limitations of the literature

First, the number of included articles and the numbers of patients per article were small; three of the nine studies had fewer than 55 patients (necessary for a correlation of 0.33 or 10% explained variance to become significant). Second, the included articles were heterogeneous in terms of patient groups, time of assessment, and measures used to assess HRQoL. Third, only two of the nine studies had used longitudinal analyses. Finally, the small number of included articles meant that only a small number of psychological factors were measured, with only one or two articles per psychological factor.

Limitations of this review

One limitation with respect to this systematic review is the lack of a generally accepted definition of psychological factors. We operationalized psychological factors using the ICF, similar to the way the psychological–personal perspective of the ICF was captured in a study of spinal cord injury (37).

The second limitation was that depression and anxiety were not captured in the operationalization of psychological factors. These concepts are part of the concept of (mental) HRQoL, so that studying depression and anxiety as determinants of HRQoL would result in strong conceptual overlap between determinants and outcomes.

Further research and clinical implications

More research is needed into psychological characteristics of stroke patients and their impact on HRQoL. Longitudinal studies are particularly needed because they allow causal relationships and effects of time to be identified. It is also important to investigate which psychological factors can be modified by means of therapy, in order to optimize interventions for HRQoL after stroke.

It is important for clinicians to become aware of the relationship between psychological factors, such as personality and coping, and HRQoL poststroke, as this relationship identifies

treatment targets other than the stroke itself or physical functioning, to improve HRQoL. Monitoring neuroticism and problems of temperament and personality in an early stage poststroke may help identify patients at risk for poor long-term adjustment. Additionally, rehabilitation treatment should attempt to strengthen factors such as hope, optimism, self-worth, and personal and situational adaptation coping styles.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. Methodological quality assessment.

Appendix S2. PubMed search strategy.