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Defining and quantifying coping strategies after stroke: a review.

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C Donnellan, D Hevey, A Hickey and D O'Neill

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REVIEW

Defining and quantifying coping strategies after stroke: a review

C Donnellan, D Hevey, A Hickey, D O'Neill

J Neurol Neurosurg Psychiatry 2006;**77**:1208–1218. doi: 10.1136/jnnp.2005.085670

The coping strategies that people use after a stroke may influence recovery. Coping measures are generally used to assess the mediating behaviour between a stressor (ie, disease or condition) and the physical or psychological outcome of an individual. This review evaluates measures that quantified coping strategies in studies on psychological adaptation to stroke. The main aspects of the coping measures reviewed were (a) conceptual basis; (b) coping domains assessed; (c) coping strategies used after a stroke; and (d) psychometric properties of coping measures used in studies assessing patients with stroke. Four databases (Medline, CINAHL, PsychINFO and Cochrane Systematic Reviews) were searched to identify studies that used a coping measure in stroke. 14 studies assessed coping strategies in patients after stroke. Ten different coping measures were used, and the studies reviewed had many limitations. Few studies provided definitions of ''coping'' and the psychometric properties of the coping measures were under-reported. The need for future studies to more clearly define the coping process and to present data on the reliability and validity of the measures used is emphasised.

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A stroke is a sudden and often traumatic major life event that usually occurs with minimal warning and, for many, results in life-changing consequences with which affected people must cope. Stroke is the first leading cause of disability in adults in Western countries and more than one third of people who survive a stroke will have severe disability.[1] The increasing size of the older population coupled with the increase in the proportion of people surviving acute stroke means that the number of people learning to cope with stroke-related disability each year is increasing.[2]

Research on the use of disability-specific coping strategies for other conditions has shown better psychosocial adaptation to disability and chronic illness.[3] As neurorehabilitation comprises maximising recovery and adaptation to disability, coping skills may be of importance. Some evidence suggests that coping is likely to predict success in rehabilitation.[4] Rehabilitation after a stroke includes more than functional recovery because, in tandem with physical disability, people often experience a variety of psychological sequelae such as depression, anxiety and emotional lability, which can compromise the rehabilitation process and affect long-term adjustment.[5–7]

Research on stroke is beginning to focus attention on psychological outcomes such as quality of life and subjective well-being[8 9] in addition to survival and functional outcomes. Depression has been most intensively studied,[10–13] and other psychological problems dealt with include fear of loss of control,[14] fears about death and disfigurement, social isolation, helplessness and worry about loss of social roles.[7] A focus on coping with the emotional and cognitive changes after stroke is critical to understanding the rehabilitation process.[15]

Coping has been a major focus of research in psychology for several decades and in particular in the discipline of health psychology.[16] Two of the core theorists in the study of coping, Folkman and Lazarus,[17–20] defined coping as ''the constantly changing cognitive and behavioural efforts to manage the specific external or internal demands that are appraised as taxing or exceeding the resources of the person''. This definition had a profound effect on the conceptualisation of coping[21] and has become widely accepted in the psychological literature.[22] Coping strategies refer to the specific efforts, both behavioural and cognitive, that people use to master, tolerate, reduce or minimise stressful events. Two major categories of coping strategies are widely recognised[16 23 24]: problem-solving strategies (efforts to do something active to alleviate stressful circumstances) and emotion-focused coping strategies (efforts to regulate the emotional consequences of stressful or potentially stressful events). Some authors have argued for a third dimension of avoidance-oriented coping (efforts to avoid a stressful situation by seeking out other people or by engaging in a substitute task).[24–26] The opposite end of the spectrum to avoidance-oriented coping is referred to as active approach-oriented coping.[25–27] A distinction is also made between dispositional and situational approaches to coping. The dispositional approach focuses on relatively stable coping strategies used by people across different stressful situations, whereas the situational approach refers to coping as a dynamic process, showing little consistency both across and within stressful situations.[28]

The Transactional Theory of Stress and Coping, developed by Lazarus and Folkman,[17 18 29 30] is the most widely used framework for evaluating the processes of coping with stressful events.[21 26]

Abbreviation: WCQ, Ways of Coping Questionnaire

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According to this theory, the stressor is initially appraised in terms of personal relevance to the individual and, subsequently, the resources available to deal with the stressor are evaluated. According to de Ridder,[21] the Transactional Theory encouraged the development of instruments in which subjects were asked to reflect on their conscious efforts to cope with adverse conditions. Several self-report measures of coping now exist—for example, the Ways of Coping Questionnaire (WCQ)[31] and the Coping Orientation for Problem Experiences.[25]

Abundant research literature on coping is available in the context of a wide range of illnesses.[32–37] In the context of stroke, some relatively recent attention has been paid to the issue of coping.[38 39] To date, however, research findings have not quantified what consistent coping strategies are commonly adopted in the aftermath of stroke. This paper aims to evaluate measures that quantified coping strategies in studies dealing with psychological adaptation to stroke. This review examines the conceptual basis and the specific domains of the coping measures used to assess coping after stroke. It also evaluates the findings in relation to the pattern(s) of coping strategies used in populations with stroke, with a view to identifying whether there is a ''typical'' profile of coping response in the context of an acute, debilitating condition such as stroke. Psychometric properties of the coping measures will be reviewed with respect to a population affected by stroke, as certain stroke sequelae such as cognitive and language impairments may affect participation in coping assessments or in the process of coping. Identifying adaptive coping strategies that people use after a stroke may facilitate the development of more effective rehabilitation strategies. Coping skills may be considered to be the key psychological resources necessary to rebuild the lives of patients disrupted by the residual deficits of stroke.

METHODS

Search strategy

A review was conducted of standardised measures of coping used in studies of patients with stroke. A computer search was performed on databases: Medline (1966–February 2006), PsychINFO (1887–February 2006), CINAHL (1967–February 2006) and the Cochrane Systematic Reviews (1993–February 2006). The following keywords were used: ''stroke'' *or* ''cerebrovascular accident'' *and* ''coping'' *or* ''adaptation, psychological'' *or* ''adaptive behaviours'' *or* ''reintegration'' *or* ''psychological adjustment''. Selected articles were obtained and reference lists in articles were reviewed by the main author to identify additional citations.

Inclusion criteria

Articles were included in the review if they fulfilled the following criteria:

a. They published peer-reviewed research.
b. They used standardised questionnaires and measures in cross-sectional, longitudinal and intervention studies.
c. The sample population comprised or included patients with stroke.
d. Data from an instrument quantifying coping were reported.

ANALYSIS OF PSYCHOMETRIC CRITERIA

Reliability

Two types of reliability were examined in this review: internal consistency and test–retest. Internal consistency is the most common estimate of reliability reported, estimated using Cronbach's α, which should not fall below 0.7 for research purposes.[40] Although establishing test–retest reliability in the context of research on coping strategies is problematic, because of the inherent potential for variability in coping responses over time, we assessed for the presence (or absence) of data on test–retest reliability: if present, a correlation of $\geqslant 0.7$ was considered of value.[40]

Validity

We reported evidence of construct validity, the extent to which a measure is related to other measures in ways that are consistent with the hypothesised direction.[41] Several different specific categories used to classify types of validity information—for example, correlations with specified variables, correlations with unspecified variables, correlations with other measures, inter-correlations among parts of a measure, comparison of scores between two or more groups and any type of factor analysis—were used as guidelines to report validity of the coping measures in this review.

RESULTS

Overview

Of 102 studies identified, 14 studies met the inclusion criteria. Table 1 presents a summary of the studies reviewed. Seven studies were cross-sectional in design,[42–48] five were longitudinal studies[39 49–52] and two were intervention studies.[53 54] The sample type and size varied in different studies. Six studies conducted research on a population with stroke alongside other patient groups.[42–44 51–53] The remaining eight studies examined coping only in patients with stroke. Seven studies were primarily descriptions of the profiles of coping strategies, and a further three examined the stability of this profile over time.[39 49 50] Five of the studies examined the association of various factors (emotionalism, nursing follow-up, depression, training of patient and anxiety) with coping behaviour and two investigated coping as a predictor of outcome. Most of the studies had modest sample sizes, ranging from 30 to 76 participants. The timing of assessment of coping after stroke also varied, ranging from 1 week to 3 years. The mean age (average of reported means) was 65 (SD 8.6) years, with two means identified as outliers (38.6 and 78.1). The sample populations in studies in which mean ages were outliers were not constituted entirely of a population with stroke.[42 51]

Conceptual basis

Five studies defined the term ''coping''[39 42 45 48 50] and four made reference to a coping theory or model.[39 42 45 48] The only consistent definition of coping used in three of the studies[42 45 50] was that by Lazarus and Folkman.[17 18 20] Two other studies[39 48] used definitions that have some resemblance to the Lazarus and Folkman definition. Of the studies that used a model of coping, three[42 45 48] used the Transactional Theory of Stress and Coping[17 18 20] and one[39] used the Moos and Tsu[55] model of the crisis of physical illness.

Coping measures and domains

Ten different coping measures were identified in the 14 studies reviewed, with some measures used in more than one study—for example, the WCQ.[31]Table 2 presents an overview of the measures used, including the coping domains assessed by each of the coping measures, and the psychometric properties of each measure provided in the studies reviewed. The WCQ was the most commonly used of the coping measures and was used in five studies. The full 66-item WCQ,[31] however, was used in only one study,[45] with modified versions of the scale used in the remaining three studies reviewed.[39 48 50] The next most used coping measure in the studies was the Freiburg Questionnaire on Coping with Illness,[37] represented in three of the studies.[43 44 49] The Freiburg Questionnaire on Coping with Illness is an instru-

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Table 1 Quantitative studies (n = 14) assessing coping in patients with stroke

Study reference	Study aim	Coping definition	Coping measure	Study population (a) Sample size (b) Age in years and sex (c) Time of assessment	Findings
Time of assessment <6 months after stroke					
Eccles *et al*[46]	To explore psychological characteristics of patients with stroke with emotionalism	ND	MASS[46]	(a) n = 65 patients with stroke (b) Mean age = 71.8; 29 male, 36 female (c) 1 month after stroke	Association between emotionalism and the strategies helplessness/hopelessness and anxiety preoccupation
Wahl *et al*[51]	To explore changes between predictors (ie, sociodemographics, subjective health, social support, anxiety and coping) and outcome measures (ie, subjective well-being and autonomy) before and after rehabilitation treatment	ND	Trier Scales on coping with illness[56]	(a) Patient sample n = 34 (stroke), 44 (fractures), 22 (other) (b) Mean age = 78.1 (c) Between 1 and 3 months	No findings specific to patients with stroke
Fitchett *et al*[52]	To investigate the relationship between religion and health outcomes in patients undergoing medical rehabilitation	Positive religious coping provides a sense of meaning that may aid in coping with stressful life events or on a cognitive level, religious beliefs may provide a sense of self-efficacy in the face of stress or a way to positively reframe negative events. Negative religious coping interprets a stressful event as a sign of abandonment or punishment by God	Brief RCOPE[57]	(a) Patient sample n = 114 (17% stroke, 49% hip and knee joint replacement, 17% amputation, 17% other) (b) Mean age = 65.2 (c) Admission, discharge and 4 months follow-up	No findings specific to patients with stroke
King *et al*[39]	To describe the natural history of adaptation to stroke and to identify survivor and care giver predictors of depressive symptoms	The coping process, initiated to restore equilibrium (adaptation), includes cognitive appraisal of the importance of the illness, identification of adaptive tasks and coping skills	WCQ[31]	(a) n = 53 patients with stroke (b) Mean age = 58.4; 17 male, 36 female (c) Before discharge, 6–10 weeks, 1 and 2 years after discharge from acute rehabilitation	Less frequent use of finding meaning and more frequent use of avoidance coping correlated with greater depressive symptoms before discharge. Most coping process variables did not change markedly over time
Easton *et al*[53]	To examine effects of nursing follow-up on coping strategies used by patients undergoing rehabilitation after discharge	Efforts to master conditions of harm, threat or challenge when a routine or automatic response is not readily available	Jalowiec Coping Scale[58]	(a) n = 46 (stroke), 33 (orthopaedic) and 21 (other) (b) Mean age = 69 (c) At discharge and at 4 months after discharge from rehabilitation	No findings specific to patients with stroke
Rochette and Desrosiers[50]	To explore type of coping strategies used after stroke; to verify if coping strategies change over time, and are related to age, sex, actualisation of potential, handicap level and depression	Ongoing cognitive and behavioural efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person	WCQ[31]	(a) n = 76 patients with stroke (b) Mean age = 68.3 (c) 2 weeks and 6 months after discharge from rehabilitation	Problem solving and magical thinking were most used and escape avoidance was least used. Women used more coping strategies and obtained higher scores on the magical thinking subscale. Positive-reappraisal strategies were related to handicap level whereas the magical-thinking and escape-avoidance strategies were related to depression levels

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Table 1 Continued

Study reference	Study aim	Coping definition	Coping measure	Study population (a) Sample size (b) Age in years and sex (c) Time of assessment	Findings
Sinyor *et al*[47]	To examine relationships between depression after stroke, functional status and rehabilitation outcome	ND	Coping Scale (COPE)[59]	(a) n = 64 patients with stroke (30 depressed, 34 non-depressed) (b) Mean age = 68.8 (depressed group), 65.7 (non-depressed group); male 53% (depressed), 68% (non-depressed) (c) Mean days after stroke = 58.6 (depressed group), 55.5 (non-depressed group)	Patients who were depressed used less behavioural action and rational cognition strategies
Time of assessment ⩾6 months after stroke					
Herrmann *et al*[49]	To describe determining factors of coping strategies and possible related factors in patients with aphasia and their relatives in the first year after stroke	On the basis of results, defined coping as not a form of behaviour specific to the actual situation, but reflects pre-morbidly acquired attitudes and modes of behaviour (trait rather than state factors)	FQCI[37]	(a) n = 58 patients with stroke (b) Age<75, median = 64 (c) 1 week, 1, 6 and 12 months after stroke	6 months after stroke, active and problem-oriented styles of coping dominated in aphasic and non-aphasic patients 12 months after stroke, active, problem-oriented strategies continued to dominate the coping styles of non-aphasic patients, whereas the strategy ''distraction and self reorganisation'' dominated as a coping style by aphasic patients
Johnson and Pearson[54]	To measure effects of a structured educational course on stroke survivors' response to living with their stroke-related disabilities and how it can contribute to the rehabilitation process of stroke survivors who have returned to living in the community	ND	WCQ-CVA[54]	(a) n = 41 community-dwelling stroke survivors (b) Treatment group (mean age = 64.2; 8 male, 13 female) control group (mean age = 63.9; 10 male, 10 female) (c) Between 6 months and 3 years after stroke	No marked differences before and after intervention in the scores on coping between the treatment and control groups Women, subjects ⩽60 years and with deficits in the left hemisphere had higher coping scores
Finset and Andersson[42]	To investigate coping strategies in patients with acquired brain injuries	The person's cognitive and behavioural efforts to manage (reduce, minimise, master or tolerate) the internal and external demands of the person–environment transaction that is appraised as taxing or exceeding the resources of the person (Transactional Theory of Stress and Coping)	COPE Questionnaire[25]	(a) Patient sample n = 30 (CVA), 27 (TBI) and 13 (HBI) comparison group n = 71 students (b) Mean age = 38.6 (patient group), 25.2 (student group) (c) Mean time from injury to participation in study = 12.7 months	Approach-oriented strategies, active coping and positive reinterpretation gained higher scores than strategies expressing avoidance, denial and behavioural disengagement. Association between lack of approach-oriented coping with apathy and avoidant coping was associated with depression
Gillespie[48]	To investigate relationships between after stroke symptoms of anxiety, coping activity and stage of recovery	The function of coping has been taken to be the attenuation of distressing psychological outcomes such as anxiety and depression (Transactional theory of stress and coping)	WCC[60]	(a) n = 44 patients with stroke (b) Mean age = 68.6; male 66% (c) Early group <6.95 months after stroke, late group >6.95 months after stroke	Anxiety was associated with more frequent use of avoidant coping strategies

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Table 1 Continued

Study reference	Study aim	Coping definition	Coping measure	Study population (a) Sample size (b) Age in years and sex (c) Time of assessment	Findings
Herrmann *et al*[43]	To investigate coping styles in patients with different brain disorders	ND	FQCI[37]	(a) Patient sample n=21 (MBT), 30 (CVA), 58 (TBI) and 54 (PD) (b) Stroke group mean age=59 (c) Stroke group 12 months after stroke	Patients with stroke used fewer active, problem-oriented coping than did patients with other brain disorders
Herrmann *et al*[44]	To investigate coping strategies and psychosocial changes in patients with PD and stroke (CVA) and their relatives	ND	FQCI[37]	(a) Patient sample n=50 (CVA) and 54 (PD) (b) Mean age: CVA=61, PD=64 (c) Mean time (months) after onset of illness: CVA=26, PD=96	Active problem-oriented coping and distraction predominated as coping styles for the stroke group and the degree of motor impairment correlated with a depressive coping style
De Sepulveda and Chang[45]	To examine relationships among social support, appraisals of stroke disability, method of coping with disability in the community and effectiveness of coping strategies	Coping behaviour was defined as constantly changing cognitive and behavioural efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person Transactional theory of stress and coping	WCQ[31]	(a) n=75 community-dwelling stroke survivors (b) Age>62, mean=75 (c) Disabled by stroke within the last 3 years	Emotion-focused coping behaviours were used more often than problem-focused behaviours. Functional disability reduced coping effectiveness

Brief RCOPE, Brief Religious Coping Scale; COPE, Coping Orientation for Problem Experiences; CVA, cerebral vascular accident; FQCI, Freiburg Questionnaire of Coping with Illness; HBI, hypoxic brain injury; MASS, Mental Adjustment to Stroke Scale; MBT, malignant brain tumour; ND, no definition of coping; PD, Parkinson's disease; TBI, traumatic brain injury; WCC, Ways of Coping Checklist; WCQ, Ways of Coping Questionnaire; WCQ-CVA, Ways of Coping—Cardiovascular Accident.

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Table 2 Psychometric characteristics of coping scales used in studies on stroke for assessing coping

Coping scale	Coping domains and strategies	Items	Study reference	Reliability: Consistency: Cronbach's α	Reliability: Stability: Test–retest	Validity
Generic coping measures						
WCQ[31]	**Problem focused** Confrontive Seeking social support Planned problem solving **Emotion focused** Self-control Acceptance of responsibility Escape-avoidance behaviour Positive reappraisal	66	De Sepulveda and Chang[45]	0.63 (emotion focused) 0.73 (problem focused)	NDI	Emotion-focused coping correlated with social support ($r=0.20$, $p=0.05$) and with income ($r=0.22$, $p=0.05$)
A shortened version WCQ[31]	Finding meaning Compromising Cautious Active problem solving Seeking social support Avoidance	40	King *et al*[39]	Revised scales ranged from 0.59 (compromising) to 0.72 (avoidance) at T1; 0.60 (active problem solving) to 0.83 (finding meaning) at T4 0.59 (active problem solving), 0.61 (compromising) at T2; and 0.41 (compromising) at T3; 0.62–0.90 for other remaining scales	NDI	Frequency of seeking social support decreased over time, $F(3, 105)=6.0$, $p=0.001$ Predictors of depression at T1 were less frequent use of finding meaning, $r=-0.30$, $p<0.05$ and more frequent use of avoidant coping, $r=0.38$, $p<0.01$
A shortened version WCQ[31]	Magical thinking Distancing Self-controlling Seeking social support Escape avoidance Positive reappraisal Problem solving (confrontive coping excluded)	28	Rochette and Desrosiers[50]	Reported internal consistency 0.61–0.79 for the original scale[18] NDI for this 28-item shortened version	NDI	Sex, correlated with the total coping scale ($r=0.29$, $p=0.01$) and with magical thinking ($r=0.36$, $p=0.002$) Actualisation of potential correlated with total coping scale ($r=0.33$, $p=0.003$); seeking social support ($r=0.31$, $p=0.007$); positive reappraisal ($r=0.50$, $p<0.001$); and problem solving ($r=0.43$, $p<0.001$) Handicap level correlated with positive reappraisal ($r=0.34$, $p=0.003$). Depression correlated with magical thinking ($r=0.33$, $p=0.004$) and escape avoidance ($r=0.45$, $p<0.001$)
Modified version of WCC[60]	Acting and distraction Distancing Problem-solving	28	Gillespie[48]	NDI	NDI	Anxiety correlated with the coping strategy "acting out and distraction" in the >6 months after stroke group ($r=0.46$, $p<0.05$)
FQCI (short version) [37]	Depressive coping Active, problem-oriented coping Distraction and self reorganisation Religious relief/quest for sense Minimisation and wishful thinking	35	Gillespie[49]	NDI	NDI	6 months after stroke, active and problem-oriented styles of coping dominate in aphasic and non-aphasic groups, more pronounced in the non-aphasic group (Mann–Whitney U test; $p=0.014$) Only significant change found between 6 and 12 months was an increase of the distraction and self-reorganisation strategies of the relatives (Wilcoxon matched pairs signed ranks test; $p=0.05$).
		35	Herrmann *et al*[44]	NDI	NDI	Patients with PD exhibited active strategies (median PD 3.2, CVA 2.4, $p<0.05$, U test) and religious relief and quest for sense (median PD 3.0, CVA 2.4; $p<0.01$, U test) more strongly than patients with CVA Degree of motor impairment correlated with a depressive coping style only in patients with CVA ($r=-0.57$, $p<0.001$)
		35	Herrmann *et al*[43]	NDI	NDI	Active problem-oriented coping significantly different between study groups ($X^2=11.5$, $df=3$, $p=0.009$), CVA with lowest values. Significant positive correlation between depressive coping and motor impairment in patients with stroke ($r=0.30$, $p=0.01$)

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Table 2 Continued

Coping scale	Coping domains and strategies	Items	Study reference	Reliability: Consistency: Cronbach's α	Reliability: Stability: Test–retest	Validity
Brief RCOPE[57]	Positive religious coping Negative religious coping	21	Fitchett *et al*[52]	0.89 (positive religious coping) 0.45 (negative religious coping)	Positive and negative religious coping had moderate to high correlations between baseline and the 4-month follow-up (r = 0.82 and 0.66, p<0.001)	Positive (r = 0.28, p<0.01) and negative religious coping (r = −0.22, p ⩽ 0.05) at admission correlated with life satisfaction at follow-up. Positive religious coping correlated with life satisfaction (r = 0.24, p ⩽ 0.05) and negative religious coping correlated with depression (r = 0.21, p ⩽ 0.05) at follow-up. Patients whose mobility control had not changed or had worsened (n = 30) had higher positive religious coping scores than those whose mobility control had improved (means = 18.41 and 14.57, respectively, t (92) = 2.15, p = 0.03)
COPE Question-naire[25]	**Active approach** Active coping Planning Suppression Restraint coping Seeking social support (instrumental and emotional) Positive reinterpretation Acceptance **Avoidance** Focus on emotion Denial Behavioural and mental disengagement	52	Finset and Andersson[42]	The internal reliability of the 12 indexes varied from 0.56 to 0.80, 3 indexes falling below 0.60	NDI	Significant positive relationship between approach sum score and somatic symptoms score of the MADRS (r = 0.26, p<0.05) in a partial correlation with apathy controlled. Avoidance coping correlated with behavioural/affective apathy (r = 0.34, p<0.01) and with all measures of depression including total depression (r = 0.44, p<0.01). A trend for patients with HBI to have higher avoidance coping than patients with CVA, with patients with TBI in between
Modified version of the COPE[59 62]	Worry Suppression Behavioural action Rational cognition Denial Denial	19	Sinyor *et al*[47]	NDI	NDI	Depression was associated with less endorsement of both behavioural action (SDS r = −0.26, p<0.05) and rational cognition (CDI r = 0.27, p<0.05) strategies
The Trier Scales on coping with illness[56]	**Cognitive** Rumination Search for meaning in religion Threat minimisation **Behavioural** Information seeking Search for affiliation	37	Wahl *et al*[51]	0.74 (rumination), 0.76 (search for affiliation), 0.73 (threat minimisation), 0.84 (information seeking) and 0.80 (search for meaning in religion)	NDI	Information seeking correlated with subjective well-being at T1 and T2 (r = 0.83 and 0.85, respectively), with autonomy at T1 and T2 (r = 0.87). Search for affiliation correlated with subjective well-being at T1 and T2 (r = 0.96 and 0.97, respectively) and autonomy at T1 and T2 (r = 0.94 and 0.96, respectively)
Jalowiec Coping Scale[58]	Confrontive Evasive Optimistic Fatalistic Emotive Palliative Supportive Self-reliant	60	Easton *et al*[53]	Coping effectiveness scores at discharge and at 4 months (r = 0.77 and r = 0.93)	NDI	Mean scores for optimistic and fatalistic coping styles were significant (p<0.05) at discharge and for evasive, fatalistic, palliative and supportive coping styles (p<0.05, p<0.01, p<0.001) at 4 months after discharge for experimental group
Stroke-specific coping measures						
WOC-CVA[54]	Distancing Focusing on the positive Seek and use social support	31	Johnson and Pearson[54]	NDI	NDI	No significant difference in the score on coping either before (F = 1.34, p<0.55) or after the treatment intervention (F = 1.19, p<0.73). Ways of coping approached significance before and after treatment (t = −2.05, p<0.055)
MASS[46]	Fighting spirit Hopelessness/helplessness Anxious preoccupation Fatalism Avoidance	40	Eccles *et al*[46]	NDI	NDI	There was an association between the MASS subscales helplessness/hopelessness (F = 11.71, p = 0.001) and anxious preoccupation (F = 8.05, p = 0.006). The associations with fatalism (F = 14.79, p = 0.052) and avoidance (F = 0.06, p = 0.80) were not significant after adjustment for the General Health Questionnaire

Brief RCOPE, Brief Religious Coping Scale; CDI, Composite Depression Index; COPE, Coping Orientation for Problem Experiences; CVA, cerebral vascular accident; FQCI, Freiburg Questionnaire on Coping with Illness; HBI, hypoxic brain injury; MASS, Mental Adjustment to Stroke Scale; MADRS, Montgomery and Asberg Depression Rating Scale; MBT, malignant brain tumour; NDI, no data identified; PD, Parkinson's disease; SDS, Zung Self-rating Depression Scale; T1, time 1; T2, time 2; T3, time 3; T4, time 4; TBI, traumatic brain injury; WCC, Ways of Coping Checklist; WCQ, Ways of Coping Questionnaire; WOC-CVA, Ways of Coping—Cardiovascular Accident.

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ment widely used in German-speaking countries, in comparison with the internationally used WCQ. Two condition-specific measures of coping were used in two studies. One study[46] used a modified version of the Mental Adjustment to Cancer Scale[61] and titled their version the Mental Adjustment to Stroke Scale. The second condition-specific measure was a revised version of the Ways of Coping—Cancer Scale.[36] This revised version was called the Ways of Coping—Cardiovascular Accident[54] Scale.

Coping strategies used after a stroke

Two studies[42 44] reported greater use of active problem-oriented coping in patients with stroke than in other populations tested, whereas another study[43] reported that patients with stroke used fewer active problem-oriented coping strategies than participants with other brain disorders. Findings on the use of problem-focused as opposed to emotion-focused strategies were conflicting. One study reported greater use of emotion-focused coping behaviours than problem-focused coping,[45] whereas another study reported greater use of problem-focused coping strategies.[50] Avoidance-type coping strategies were the least used in two of the studies.[42 45] The four studies that examined the stability of coping over time found that the coping strategies used did not change markedly at the different time points assessed.[39 49 50 53]

On the Mental Adjustment to Stroke Scale, ''emotionalism'' was found to correlate with helplessness or hopelessness and anxious preoccupation. However, the term ''emotionalism'' was not defined in the study that used this measure.[46] Anxiety was associated with more frequent use of avoidant coping strategies,[48] whereas patients with stroke who were depressed in comparison with patients with stroke who were not depressed used less behavioural action and fewer rational cognition strategies.[47] Depression was associated with avoidant coping[42] and was specifically associated with greater use of escape avoidance and use of magic thinking coping domains.[50] Training of patients had no effect on coping behaviours on the condition-specific Ways of Coping—Cardiovascular Accident Scale.[54] Physical ability was associated with coping effectiveness and coping behaviour in two studies. De Sepulveda and Chang[45] reported that functional disability reduced coping effectiveness and Herrmann *et al*[44] found that the degree of motor impairment correlated with a depressive coping style. Less frequent use of finding meaning and more frequent use of avoidance coping were predictors of depression before discharge from rehabilitation.[39]

Psychometric properties

Table 2 presents the psychometric properties of the coping scales. Internal consistency data were reported for coping subscales in seven studies. Therefore, in seven studies no psychometric data were reported. One study reported internal consistency values for the original WCQ measure and no data were identified for the modified version of the scale that was used.[50] Where reported, Cronbach's α's ranged from 0.41 to 0.90 (table 2). Only one coping measure (The Trier Scales on coping with illness)[56] reported internal consistency reliabilities with Cronbach's α of 0.7 or higher for all subscales. Of note, test–retest reliabilities were identified by one study that reported moderate to high correlations of the Brief Religious Coping Scale's coping strategies over time.[52]

The main type of validity data reported in nine studies was r-specified values, where the coping subscales were correlated with other specified variables. In five of these studies, the r values reported were <0.5, indicating that the strength of correlations between variables was generally weak to moderate. One study reported high correlations between the Trier Scales on coping with illness subscales and other variables, with r values >0.8.[51] The coping domains of information seeking and search for affiliation correlated highly with subjective well-being and autonomy, providing supporting evidence of the validity of this scale. Overall, there was little evidence of construct validity for the coping scales used in the studies reviewed, and the correlations between the subscales of the coping scales and other variables reported were generally weak.

DISCUSSION

The aim of this paper was to review quantitative coping research in populations of patients with stroke. Overall, a modest number of papers met the search criteria, highlighting the scarcity of quantitative research on the processes of coping and adaptation in the literature on stroke. Although over the past decade psychosocial aspects of recovery in stroke have begun to receive attention, much of the literature continues to focus on physical abilities. Not all studies reviewed had a full complement of patients with stroke, but included other vascular and cerebral diseases, making comparisons between studies complex and reducing the possibility of finding consistencies between studies. A further reason for the small number of studies identified in this review may result from reporting bias, in that only the studies with significant findings could have been published. In addition, given that the median sample size for patients with stroke reported in table 1 is 55, the values reported in the current review may be overestimates of the size of relationships between coping strategies and other variables. Routine reporting of confidence intervals for sample correlations would provide greater insight into the plausible range of correlation values and facilitate more definitive conclusions regarding the strength of the relationship between coping strategies and other variables.

Conceptual basis

This review discussed some of the major conceptual issues that exist in the literature with regard to coping measurement after stroke. These issues include the lack of consistent definitions throughout studies and the deficiency of coping theoretical frameworks. Eight of the studies defined what they meant by the term ''coping'',[39 42 45 48–50 52 53] with a consistent definition used in three of the studies.[42 45 50] The conceptual shortcoming of inconsistent definitions shares some commonality with the general literature on coping. Only a small number of studies outlined a theoretical framework of coping, the one most often used being the Transactional Model.[20] Moos and Tsu's[55] model of coping with physical illness was also identified in the review, but this model is not quoted as often as the Transactional Theory in the general literature. A large number of coping questionnaires, each proposing different dimensions, exists in the general literature on coping. This was reflected in the current review, where 10 different coping measures were used in the 14 studies reviewed. The heterogeneity of coping measures in the studies reviewed creates challenges for detecting trends or drawing conclusions regarding the use of coping strategies after stroke.

The conceptualisation of the structure of coping to date has been complex and varies in terms of measurement in different studies. A helpful development has been the hierarchical conceptualisation of Skinner *et al*,[63] in which the structure of coping spans the conceptual space between instances of coping and adaptive processes. This hierarchy operates (from the bottom up) on four levels: (1) instances of coping (eg, ''I wore my lucky t-shirt the day of the exam''); (2) ways of coping (eg, problem-solving, rumination, venting, escape); (3) dimensions of coping (eg, problem, emotion, avoidance-focused coping); and (4) strategy of adaptation

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(ie, continuing to secure adequate information about the environment or escaping from a potentially dangerous transaction). This conceptualisation of the structure of coping organises the various coping items and domains identified by the various coping measures in the literature. It provides category systems for classifying ways of coping. This type of framework may prove useful when assessing coping with various different measures and should allow researchers on the subject of coping after stroke to come to some general consensus, as the levels within this framework provide a clearer categorisation of strategies.

Coping measures, domains and strategies

Little overlap was observed in the measures used in the studies included in this review, and the coping strategies used by patients with stroke varied across studies. Overall, it was not possible to identify conclusively the specific coping strategies used by people in either the acute phase after stroke (ie, within the first 6 months) or in the longer term (after 6 months). However, some general trends were reported, as were some recurrent findings. The use of approach and active problem-oriented coping strategies were reported more often than were emotion-focused coping strategies. However, the results did not indicate the coping strategies that were more or less effective in terms of outcome of stroke. In the general literature on coping, most negative life events seem to elicit both types of coping strategies, although people with more personal and environmental resources may rely more on approach and active problem-oriented coping and less on avoidance emotional coping.[64] A longstanding issue in the perspective on individual differences is whether avoidant or emotional responses or problem-solving coping methods are superior.[16] Avoidant responses may be more effective for managing short-term threats,[65] but for long-term threats problem-solving coping may manage stress more effectively. It is therefore imperative to examine the coping process over longer durations in patients with stroke to determine the strategies consistently used in the long term. This review suggests that, in fact, strategies do not change over time; with considerable stability in use of coping strategies, longitudinal studies failed to detect significant changes over time ($p<0.05$). However, this apparent lack of change may simply reflect low levels of statistical power. Future research examining the stability of coping strategies over time could use latent growth analysis to explore this issue.

Combining the findings of this review—that is, that coping strategies adopted by patients in the acute phase after stroke are unlikely to change in the longer term[39 49 54]—with research indicating higher levels of psychological distress in those using less active, problem-oriented coping strategies and more avoidance strategies[42 47 48] suggests that an intervention targeted at coping strategies typically associated with distress may improve patient recovery considerably. The general literature has shown similar findings in a variety of studies on diverse populations where emotion-oriented coping style has been positively linked, for both men and women, with negative health variables such as anxiety, depression and poor recovery from illness.[28] Evidence on coping and recovery of physical function after stroke is generally lacking in the literature. Studies to date have focused on the relationship between physical function and depression.[15 44 66] Further studies assessing depression and physical function should incorporate the coping process to identify if there is an important predictive relationship between variables. Furthermore, nearly half of the studies reviewed were of sample populations with brain disorders other than stroke. In some of these studies, no specific inferences could be made in relation to the type of coping strategies relevant to a population with stroke.

Psychometric properties

In most of the studies reviewed, psychometric properties of the coping measures used were under-reported or were not reported at all.[43 54] The internal consistency reliabilities of the coping subscales, where reported, were generally less than the value considered acceptable (Cronbach's α's$\geqslant$0.7) and test–retest reliability was reported in only one of the studies reviewed.[52] One study reported internal consistency coefficients from the original psychometric data of the coping measure and reported no data on the modified version of the scale used in the researchers' own study.[50] Specific concerns exist in the context of stroke, such as stroke sequelae—for example, cognitive, language or visual deficits—that may affect reliable measurement in a population with stroke. Of note, only one study described a cognitive screening method.[67] Many generic measures of coping may be less applicable in a population coping with health problems. Hence, many researchers who use scales such as the WCC or the WCQ have modified the instruments when studying medical populations by dropping or adding items, or by changing the scoring system.[28] Although these modified scales may remove some of the problems associated with inapplicable items, according to Parker and Endler,[27] new inadequacies are produced. These include difficulty with generalising results from one sample or health problem to another and frequent poor reporting of psychometric data on these modified scales. In terms of validity, only one category was represented in the results—that is, correlations of coping subscales with other specified variables (construct validity). This finding is in keeping with that of Hogan and Agnello.[41] In an investigation on current research practice regarding reporting measurement validity evidence, only 55% of research reports included any type of validity evidence, and on those reporting validity information, most reported correlations with other variables. The Behavioral Subscales of the Trier Scales on coping with illness showed very strong correlations ($r = 0.83–0.97$) with well-being.[46] However, in general, the correlations between coping subscales and other specified variables reported in table 2 are weak (eg, $r = 0.2$) to moderate (eg, $r = 0.5$). These methodological limitations, such as the conceptual issues discussed earlier, are similar to deficiencies identified in the general literature on coping.[21] Researchers in the field of coping have described in detail the conceptual and methodological difficulties regarding the measurement of coping.[21 30 68 69]

Further directions and conclusions

Literature on measuring coping quantitatively in a population with stroke remains scarce, allowing both researchers and clinicians to draw few inferences on the type of coping strategies people actually use in both the acute and chronic stages after stroke. No unique coping strategies are used at different time points across the adaptive recovery period, but coping strategies seem to remain consistent over time. This is supportive of a dispositional approach, which assumes that people bring to a given context a relatively stable coping ''disposition'' that is minimally influenced by situational contingencies.[28] Most coping measures used in the studies reviewed have one or more psychometric limitations—for example, weak correlations with other variables or inadequate psychometric reporting of the measures used in the studies and a failure to account for difficulties with measuring due to stroke sequelae, such as communication difficulties or cognitive impairment.

Considerable potential exists for further investigation on this topic, but it is imperative for authors to state their definition and framework of coping. The limited number of

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Summary points

- A limited number of studies deal with coping as part of the psychological adaptation process after stroke.
- Definitions of coping are heterogeneous and absent in some studies.
- Theoretical frameworks to support operational coping models are lacking.
- Psychometric properties of coping measures are under-reported in relation to both reliability and validity.
- The findings identify the scope for further exploration of the coping process after stroke.

follow-up studies on stroke should encourage more longitudinal studies assessing coping over time, with particular attention to assessment of coping within the initial acute phase of stroke—that is, within the first month—as a marker to determine what people are likely to use in the long term. It remains to be clarified whether maladaptive strategies can be identified by examining associated variables such as quality of life, mood and level of disability—for example, what the patient is able to do for himself or herself outside the clinical setting. Lazarus[70] suggested that within-subject prospective longitudinal research is required to measure coping, as this allows researchers to identify psychological structures such as stable personality dispositions and changes (or processes) in psychological reactions over time and diverse conditions.

From this review, there are no inferences that can be made on the type of coping strategies used in a population with stroke. Further studies are required that consistently use coping measures with similar coping domains to ensure identification of broadly successful and unsuccessful strategies in the context of stroke. Consideration and specification of adaptation models relevant to the adaptation process after stroke will further improve the use of findings from research studies on coping and adaptation after stroke.

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