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REVIEW PAPER

Self-efficacy and its influence on recovery of patients with stroke: a systematic review

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Abstract

Aims. To provide an overview of the literature focusing on the influence of self-efficacy and self-efficacy enhancing interventions on mobility, activities of daily living, depression and quality of life of patients with stroke.

Background. There is growing evidence for the importance of self-efficacy in the care of people with enduring illness. Therefore, it is important to describe the association of self-efficacy and patient outcomes and the evidence for the effects of self-efficacy interventions for stroke patients.

Data sources. Studies were retrieved from a systematic search of published studies over the period of 1996–2009, indexed in the Cumulative Index to Nursing and Allied Health Literature, Medline, Psychinfo and Embase and focusing on stroke, the influence of self-efficacy and self-efficacy enhancing interventions.

Methods. A systematic review was carried out. Studies were critically appraised and important characteristics and outcomes were extracted and summarized.

Results. Seventeen articles were included in the review. Self-efficacy was positively associated with mobility, activities of daily living and quality of life and negatively associated with depression. Four self-efficacy interventions were identified. The evidence for the effects of these interventions was inconclusive.

Conclusions. Patients with high self-efficacy are functioning better in daily activities than patients with low self-efficacy. The evidence concerning the determinants influencing self-efficacy and the self-efficacy interventions makes clear how nurses can develop and tailor self-efficacy interventions for the clinical practice of people with stroke. Therefore, it is necessary to further emphasize the role of self-efficacy in the care for stroke patients in the nursing curriculum.

Keywords: depression, nursing, quality of life, self-efficacy, stroke rehabiliation, systematic review

Introduction

Stroke is the leading cause of adult disability and the second leading cause of death in the developed countries (Rosamond *et al.* 2007). Approximately 41,000 Dutch individuals are affected by stroke each year (Bots *et al.* 2006) and it is estimated that the incidence of stroke in the Dutch population will increase by 17% from 2010 to 2020 (Struijs *et al.*

2005). Stroke has an immense impact on physical, psychological and social functioning (O'Connell *et al.* 2001). Most people with stroke are confronted with limitations in physical, psychological and social functioning. Loss of mobility is a serious impairment as patients experience isolation due to loss of work and free-time activities, which may increase the risk of poststroke depression and further worsening of the functional status and quality of life (Burton 2000, O'Connell *et al.* 2001).

One of the most common psychological impairment caused by stroke is depression. The prevalence of depression after stroke, also referred to as Post Stroke Depression (PSD), ranges 5–61% with the pooled average of 33%, and is associated with poor rehabilitation outcome, which impedes the recovery process of stroke patients (Whyte & Mulsant 2002). Depression after stroke is explained by some as a reaction to physical impairments caused by the stroke (Robinson *et al.* 1984, Starkstein *et al.* 1991, Beblo *et al.* 1999) and by others as a biological cause due to the location of the lesion in the brain (Robinson *et al.* 1984). Still others consider it to be a combination of both (Whyte & Mulsant 2002). Important consequences of PSD are lower functional status, slower functional recovery, higher morbidity, less participation in social activities, lower quality of life, longer stay in the hospital and higher mortality. These patients also have more cognitive and communicative problems, which also negatively influence other consequences of stroke (Hackett *et al.* 2005, Turner-Stokes *et al.* 2002).

Health-related quality of life (HRQL) concerns the ability to engage in activities, satisfaction derived from these, physical and emotional status and well-being of the individual (Post *et al.* 1999). Stroke survivors reported a relatively low overall quality of life (Kim *et al.* 1999). Another study showed that patients experienced low overall HRQL, despite the fact that they had reached the functional status they had prior to the stroke, indicating that patients were not able to cope with the psychosocial consequences of the stroke, despite the fact that they may have recovered physically (Hafsteinsdóttir *et al.* 2007).

The use of self-efficacy can help patients to gain more control over important aspects of their disease (Jones 2006). There is growing evidence that self-efficacy-enhancing interventions have a substantial influence on improving the management of a long-term disease, including stroke (Marks *et al.* 2005, Jones 2006).

Self-efficacy

Self-efficacy is used by Bandura (1994) as a core concept of his social-cognitive theory. The concept self-efficacy is described as the confidence in one's ability to perform a task or specific behaviour (Bandura 1994). A high sense of self-efficacy leads to desired outcomes, such as improved health (Marks *et al.* 2005). Self-efficacy is a situation- and task-related, behaviour specific concept, which can be developed by four main sources of influence. The strongest way of influencing self-efficacy is mastery experience through successful performance of a task. The second source is vicarious experience where the individual is observing others performing the task (modelling), the third source is verbal (social) persuasion or encouragement by professionals or family, and the fourth source is physiological state, where the interpretation of physiological signs, such as anxiety, stress, arousal and mood states, also provide information about efficacy beliefs (Bandura 1994). Self-efficacy enhancing interventions may have a positive influence on the mobility, ADL, depression and HRQL of people with a stroke, and nurses can play an important role in these interventions (Marks *et al.* 2005, Jones 2006). When providing self-efficacy enhancing interventions, the use of all four sources of self-efficacy is the most effective (Robinson-Smith 2003).

Nursing role

Nurses need to pay attention not only to the physical recovery after stroke, but also to the psychological and social recovery (Burton 2000, O'Connell *et al.* 2001). Various authors have described the nurses' role in the rehabilitation of patients with stroke. Pryor and Smith (2002) describe the domains of 'Observation, assessment and interpretation' and 'Administering and monitoring therapeutic interventions' as important domains in the role of nurses in rehabilitation of patients (Pryor & Smith 2002). To clarify the role of nursing, other authors have described nurses as the provider of care, provider of advice and information, facilitator of personal recovery, creator of an environment for rehabilitation and manager of multidisciplinary provision, as essential aspects of rehabilitation nursing (Burton 2000, O'Connor 2000, Kvigne *et al.* 2005). Despite this, studies have shown that nurses spend a limited amount of time providing therapeutic interventions for patients with stroke and those found to be alone and inactive for more than 60% of the time (Bernhardt *et al.* 2004, 2007). This is interesting in light of the fact that in rehabilitation nurses have the responsibilities to assist and train patients in mobility, ADL and to provide therapeutic interventions to prevent depression and improve HRQL. In rehabilitation nurses aim to help patients to learn and to regain control over impairments and health and to improve their future perspectives (Marks *et al.* 2005). Self-efficacy, the

confidence in one's ability and competencies, has influence on the patients' capability to learn (Marks *et al.* 2005).

Self-efficacy has not been integrated into the role of nurses caring for patients with stroke. Generally, nurses do not apply self-efficacy interventions or provide psychological care to patients with stroke and are primarily focused on physical (functional) and practical care (Kvigne *et al.* 2005). To provide stroke patients with high quality of care, nurses need to know if self-efficacy is associated with improved mobility and ADL, depression and HRQL of patients with stroke and what the effects of the various self-efficacy interventions are on these patient outcomes.

The review

Aim

The aim of this systematic review is to provide an overview of the literature focusing on the influence of self-efficacy on the various clinical outcomes after stroke and the effects of self-efficacy enhancing interventions for mobility, ADL, depression and health-related quality of life (HRQL) of patients with stroke. The systematic review is focused on two questions:

1. What is the association between self-efficacy and mobility, ADL, depression and HRQL of patients with a stroke?
2. Which self-efficacy enhancing interventions influence mobility, ADL, depression and HRQL of patients with a stroke?

Design

This systematic review was conducted following the method described by Grimshaw *et al.* (2003) and following the PRISMA statement for reporting systematic reviews (Moher *et al.* 2009).

Search methods

The following databases were searched for relevant studies: Medline, Cinahl, PsycINFO and Embase. In cases where the key word was a MeSH term, the MeSH term was used as follows: stroke (MeSH term) in combination with self-efficacy (MeSH term) OR social cognitive theory AND self-management AND enhancement OR encouragement. Also, the reference lists of the selected studies were hand searched to identify additional references.

Inclusion criteria

- Types of participants: adults with stroke in all phases after stroke and all settings.
- Types of outcome measures: mobility, ADL, depression and HRQL.
- Types of associations: studies measuring associations, correlations or regression between self-efficacy and mobility, ADL, depression and HRQL.
- Types of interventions: self-efficacy interventions for stroke patients and feasible and suitable for nursing practice and congruent with the definition of the Nursing Intervention Classification: 'a nursing intervention is any treatment based upon clinical judgement and knowledge that a nurse performs to enhance patient outcomes' (McCloskey & Bulechek 1998).
- Publication year: articles were sought for the period January 1996 to March 2009 because it was assumed that little relevant research would be found before 1996 on the social cognitive theory in health care.
- Types of studies: studies were included which measured the association between self-efficacy and various outcomes and measured the effects of self-efficacy-enhancing interventions and therefore the studies included generally had one of the following designs: randomized controlled design (RCT), correlation design, cross-sectional design or descriptive design.
- Language: articles published in English were selected.
- Methodological Quality: Only studies with sufficient methodological quality were included.

Selection process

The articles were screened by two of the authors (CK and TBH), both of whom are nurses with academic background (MSc and PhD) and long experience with stroke patients. First, the titles and then the abstracts were screened and at last the full-text article was read and screened to check if it met the inclusion criteria. In case of discrepancies, consensus was reached between the two reviewers by discussion.

Search outcome

The initial search outcome generated 768 titles, which were screened on title and abstract. The remaining 61 articles were read full text and assessed for eligibility. After excluding duplicate articles, 17 articles were included in the review (Figure 1).

Quality appraisal

The methodological quality of the selected studies was evaluated independently by the two authors (CK and TBH). Observational studies were evaluated with the STROBE

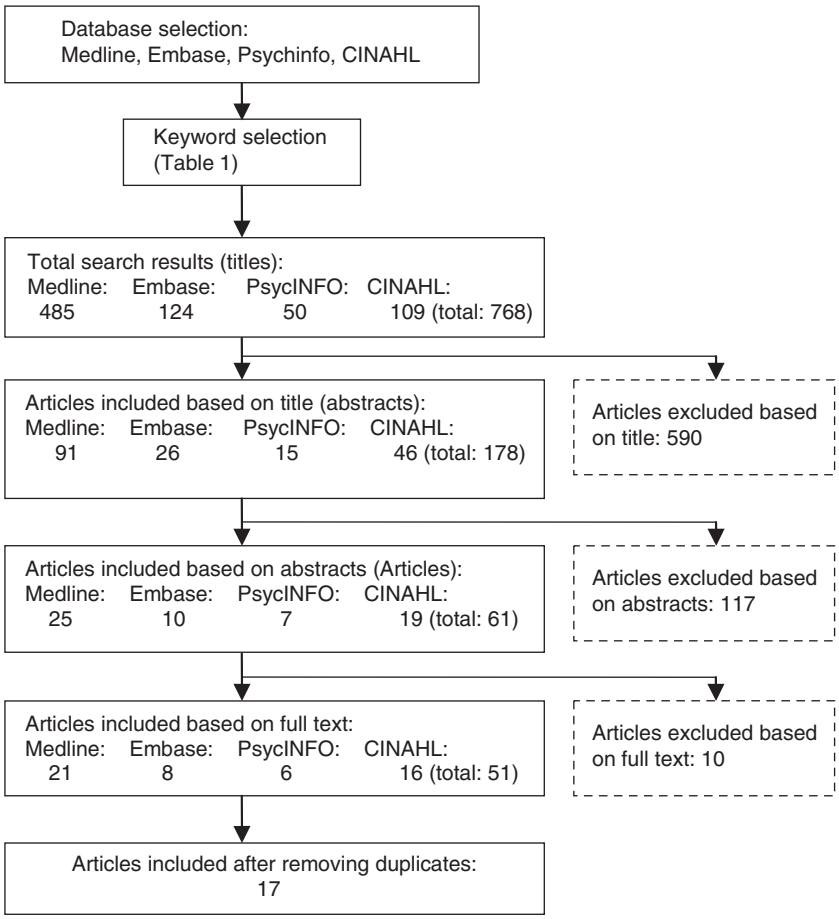

Figure 1 The screening process.

criteria (von Elm *et al.* 2007) and RCTs were evaluated with the CONSORT criteria (Moher *et al.* 2001) (Table 1).

Data abstraction

The following characteristics were registered on a data extraction form: Author and year, study design, sample, setting/phase, objective, intervention, outcome measures and results. The final dataset was analysed in relation to a) the association between self-efficacy and mobility, ADL, depression and HRQL and b) the effectiveness of self-efficacy enhancing interventions on mobility, ADL and depression. The results section is limited to self-efficacy and mobility, ADL, depression and HRQL (Tables 2 and 3).

Synthesis

The studies included differed markedly with regard to methodology, outcome measures, patient characteristics and methodological quality. Also, the phase after stroke and setting of the study differed. Of the 17 articles included, four studies were randomized clinical trials (RCT), describing self-efficacy enhancing interventions (Glass *et al.* 2004, Salbach *et al.* 2005, Hoffmann *et al.* 2007, Kendall *et al.* 2007), with a quality score varying from 14 to 21 of the 25 scores (Moher *et al.* 2009). The remaining 13 studies were descriptive studies with a quality score varying from 14 to 20 of possible 22 scores (von Elm *et al.* 2007) (Table 1). These studies described the association of self-efficacy with patient outcomes (Robinson-Smith *et al.* 2000, Hellström *et al.* 2003, Rosén *et al.* 2004, Belgen *et al.* 2006, Gillen 2006, LeBrasseur *et al.* 2006, Michael *et al.* 2006 Salbach *et al.* 2006, Svendsen & Teasdale 2006, Pang *et al.* 2007, Aben *et al.* 2008, Andersson *et al.* 2008, Pang & Eng 2008). Resulting from the methodological differences between the studies, it was not possible to conduct meta-analyses pooling the results, and therefore the findings are reported in a narrative way.

Results

The results are divided into two sections according to the research questions: associations between self-efficacy and clinical outcomes after stroke, such as mobility, ADL,

Table 1 Quality appraisal of the included studies

Studies measuring association between self-efficacy and patient outcomes

STROBE criteria		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total score
1	Aben *et al.* (2008)	√	√	√	√	√	√	√	√			√	√	√	√	√	√		√	√	√	√		18
2	Andersson *et al.* (2008)	√	√	√		√		√	√					√		√	√		√	√	√	√	√	14
3	Belgen *et al.* (2006)	√	√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√	√	√		20
4	Gillen (2006)	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√		19
5	Hellström *et al.* (2003)	√	√	√	√	√	√	√	√			√	√	√	√	√	√		√		√	√	√	19
6	LeBrasseur *et al.* (2006)	√	√	√	√	√	√	√	√			√	√	√	√	√	√		√	√	√	√		18
7	Michael *et al.* (2006)	√	√	√		√	√	√	√	√		√	√	√	√	√	√		√	√	√	√		18
8	Pang *et al.* (2007)	√	√	√	√	√	√	√	√			√	√	√	√	√	√		√	√	√	√	√	19
9	Pang & Eng (2008)	√	√	√		√	√	√	√			√	√	√	√	√		√	√	√	√	√	√	18
10	Robinson-Smith *et al.* (2000)	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	20
11	Rosén *et al.* (2004)	√	√	√			√	√	√		√	√	√	√	√	√	√		√		√		√	16
12	Salbach *et al.* (2006)	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√		19
13	Svendsen & Teasdale (2006)	√	√	√	√	√	√	√	√			√	√		√	√	√		√	√	√	√	√	18

Studies measuring association between self-efficacy and patient outcomes

CONSORT criteria		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Total score
1	Glass *et al.* (2004)	√	√	√	√	√	√		√		√	√	√	√		√	√	√	√			√	√	√	√	√	20
2	Hoffmann *et al.* (2007)	√	√	√	√	√	√	√	√	√		√	√	√		√	√	√			√	√	√				18
3	Kendall *et al.* (2007)	√	√	√	√	√	√		√		√		√	√			√	√	√		√	√	√			√	17
4	Salbach *et al.* (2005)	√	√	√	√	√	√	√	√			√	√	√		√	√	√	√		√		√				17

The STROBE criteria: (1) Title/abstract. Introduction: (2) background, (3) objectives. Methods: (4) study design, (5) setting, (6) inclusion criteria, (7) variables, (8) data sources, (9) bias, (10) study size, (11) quantitative variables, (12) statistical methods. Results: (13) participants, (14) descriptive data, (15) outcome data, (16) main results, (17) other analysis. Discussion: (18) key results, (19) limitations, (20) interpretation and (21) generalizability. Other information: (22) funding (von Elm *et al.* 2007).

The CONSORT criteria: (1) Title/abstracts. Introduction: (2) background and objectives. Methods: (3) trial design, (4) inclusion criteria, (5) Interventions, (6) outcomes, (7) sample size, (8) randomization, (9) allocation concealment, (10) implementation, (11) blinding, (12) statistical methods. Results: (13) participant flow, (14) recruitment, (15) baseline data, (16) numbers analysed, (17) outcomes and estimation, (18) ancillary analyses, (19) harms. Discussion: (20) limitations, (21) generalizability, (22) interpretation. Other information: (23) Registration, (24) protocol, (25) funding (Moher *et al.* 2009).

depression and HRQL, and the effects of self-efficacy enhancing interventions on mobility depression and HRQL in patients after stroke (Tables 2 and 3).

Self-efficacy associated with clinical outcomes

Self-efficacy associated with mobility and ADL

Eight studies measured the association between mobility and ADL and self-care self-efficacy as the confidence in one's ability in self-care: physical tasks (LeBrasseur *et al.* 2006), fall self-efficacy (Hellström *et al.* 2003, Belgen *et al.* 2006, Rosén 2004, Michael *et al.* 2006, Andersson *et al.* 2008, Pang & Eng 2008) and balance self-efficacy (Salbach *et al.* 2006) in patients with stroke. LeBrasseur *et al.* (2006) used the Ewart Self-Efficacy Scale to measure self-perceived ability to perform a number of physical tasks, such as walking and jogging various distances, climbing stairs, lifting objects of different weights. Self-efficacy had a strong association with stair-climbing time, chair-rising and all domains of quality of life as measured with the Sickness Impact Profile-30 (LeBrasseur *et al.* 2006) (Table 1).

Fall self-efficacy was described in relation to ADL tasks (Hellström *et al.* 2003, Belgen *et al.* 2006, Rosén 2004, Michael *et al.* 2006, Andersson *et al.* 2008, Pang & Eng 2008), which included moving in or out of bed, dressing, taking a shower, toileting, walking in the neighbourhood and household, and walking upstairs, without falling. Physical functioning, exercise behaviour and motivation were influenced by fatigue (Michael *et al.* 2006). Fatigue severity was correlated with fall self-efficacy. Patients with elevated fatigue severity had a poorer fall self-efficacy (Michael *et al.* 2006). Low fall self-efficacy was significantly ($P < 0{\cdot}002$) associated with visual impairment, upper motor impairment, lower motor impairment, impaired functional mobility and

Table 2 Characteristics of studies measuring association between self-efficacy and mobility, ADL, depression and HRQL in stroke patients

Author/Year	Design/sample/setting	Objective	Outcomes/instruments	Results
Aben *et al.* (2008)	Cross-sectional design (descriptive study is unnecessary) *N* = 23 Rehabilitation	Explore whether the relations between Memory Self-efficacy and depression, coping and neuroticism as established in healthy people also apply in patients after stroke.	Memory Self-efficacy (MSE): Metamemory-in-adulthood questionnaire Coping: Dutch Utrecht Coping-list Depression: Beck Depression Inventory (BDI)	'Low' Memory Self Efficacy (MSE) had significantly higher scores on depression in comparison with 'High' MSE group (P = 0·033). Patients in the 'Low' MSE group have an average score of 15 on the BDI in comparison to a mean score of 9 in the 'high' MSE group. Neuroticism is higher in a 'low' MSE group in comparison with a 'High' MSE group (P = 0·123), (not significant). An active coping style is not related to a 'High' MSE group (P = 0·440). Patients in the 'Low' MSE group tend to have a higher mean ranking on passive coping style in comparison with patients in the 'High' MSE group (P = 0·155). Higher depression ratings are significantly related to lower MSE (P = 0·01). Lower MSE seems to be related to a higher neuroticism ratings and a more passive coping style score (P = 0·123; P = 0·155, respectively). (P < 0·10).
Andersson *et al.* (2008)	Descriptive study *N* = 219 Rehabilitation	Study the relationship between fear of falling and different functional characteristics of patients after stroke. Investigate what characterized patients who had experienced a fall, but scored high fall-related self-efficacy and those who had not fallen, but scored low fall-related self-efficacy	Motor capacity: Birgitta Lindmark motor assessment scale Functional mobility: Timed Up and Go (TUG) Balance: Berg Balance Scale (BBS) Fear of falling: Fall self-efficacy-Swedish version (FES-S)	Patients with low self-efficacy (SE) were more often aged >75 years, than those with high SE Odds Ratios (OR) 2·4 [95% Confidence Interval (CI): 1·2–4·7], and were more often women OR 2·3 (95% CI: 1·2–4·5), fallers OR 5·1 (95% CI: 2·4–10·6), with visual impairment OR 3·9 (95% CI: 1·9–8·1), cognitive impairment OR 3·2 (95% CI: 1·4–7·1), low mood OR 3·6 (95% CI: 1·8–7·3), motor impairment upper extremity OR 7·2 (95% CI: 3·4–15·2), motor impairment lower extremity OR 8·8 (95% CI: 4·0–19·2), impaired functional mobility OR 28·2 (95% CI: 9·1–87·1), or impaired balance OR 16·4 (95% CI: 5·9–45·6). Earlier falls OR 5·0 (95% CI: 1·6–15·7), and physical function OR 12·9 (95% CI: 2·5–66·3) remained significant. A significantly larger proportion of patients who had fallen, scored low fall-related SE compared with non-fallers (P < 0·001). Patient with fall history but scored high fall-related SE had visual (P = 0·014) and cognitive impairment (P = 0·02), low mood (P = 0·036), motor impairment in upper and lower extremities (P = 0·001). Patients who had not fallen but scored low fall-related SE were older (P = 0·005), more often women (P = 0·001), had visual impairment (P = 0·005), low mood (P = 0·029), motor impairment in upper (P < 0·001) and lower (P = 0·002) extremities, impaired functional mobility (P < 0·001) and impaired balance (P < 0·001).

Table 2 (*Continued*)

Author/Year	Design/sample/setting	Objective	Outcomes/instruments	Results
Belgen *et al.* (2004)	Cross-sectional *N* = 50 Community	Determine the frequency and circumstances of falls of community-dwelling persons with long-term stroke. Determine how well FES-S, TUG, BBS could distinguish between groups of subjects based on their history of falling.	Functional mobility: TUG Balance: BBS Fear of falling: FES-S	Patients with fall history had more fear of falling (relative risk – RR), 2·4 (95% CI: 1·1–4·9), had less falls-related SE (P = 0·04) and more depressive symptoms (P = 0·02) than non-fallers. Patients with multiple fall history had poorer balance (P = 0·04), more fear of falling RR 5·6 (95% CI: 1·3–23), and used greater number of medications (P = 0·04) than non-fallers and 1-time fallers. Strength partially explained balance, mobility and falls-related SE. Balance and falls-related self-efficacy are associated with fall history. FES-S differentiated best patients who had fallen from those who had not, at a threshold score of 17·5 (sensitivity 0·90, specificity: 0·53) and Area Under the Curve (AUC) of 0·72. BBS best differentiated those reporting multiple falls from patients with one or no falls, at a threshold score of 52 (sensitivity 0·91, specificity: 0·42) with AUC of 0·72.
Gillen (2006)	Case study, explorative *N* = 16 Acute stroke	Examine the coping behaviours of stroke survivors who were undergoing inpatient stroke rehabilitation.	Coping: Brief COPE Depression: Center of Epidemiolgic Depression Scale (CES-D) Self-efficacy: Self-Efficacy Scale (SES)	Stroke survivors with higher levels of coping self-efficacy used the strategies of active coping (P < 0·01) and positive reframing (P < 0·05) more frequently. Self-efficacy was positively correlated with frequency of use of the coping strategies active coping [Pearsons correlation (r) = 0·640, P < 0·01] and positive reframing (r = 0·597, P < 0·05). Stroke survivors with depression, used maladaptive coping strategies more frequently than stroke survivors who were not depressed (P < 0·047 and P < 0·001, respectively).
Hellström *et al.* (2003)	Prospective descriptive design *N* = 37 Rehabilitation Interval since stroke of less than 8 weeks	Determine to what extent fall-related self efficacy changes over time, its relationships with functions and activities, and the predictive capacity of self-efficacy. Assessments: admission, discharge and 10 months after stroke.	Fall Self-Efficacy: Falls Efficacy Scale (FES) Balance: BBS Functional independence: Functional Independence Measure (FIM)	Significant improvements found in all measures from admission to discharge, but patients with low fall efficacy at discharge had significantly less improvements than those with high falls efficacy concerning balance (P < 0·01) and locomotion (P < 0·01). At all three assessment times, all concurrent correlations between FES(S) and the other measures related significantly with Spearman rho ranging from 0·53 (P < 0·01) to 0·87 (P < 0·001). Patients with low self-efficacy at discharge showed less improvements than those with high self-efficacy (P < 0·01). FES was a more powerful predictor of ADL than the observer-based measures (P < 0·000). At follow up, the low-SE group showed a decline in motor function and balance, while the high-SE group increased their motor function and balance and the differences between the two increased over time. The model which best predicted the level of ADL at 10 months' poststroke included the variables FES(S) total FES(S)**2 and FIM motor at discharge. This combination explained 77% of the variance of the outcome measure (R^2 = 77·0%).

Table 2 (*Continued*)

Author/Year	Design/sample/setting	Objective	Outcomes/instruments	Results
				FES(S) total accounted for the largest proportion of the variance. FIM mobility at 10 months was best explained by the combination of four predictor variables: FES motor, FES(S)**2, age and FIM mobility. (Beta: constant: 26·61, P = 0·002; FES(S) total = 0·30, P < 0·000; FES(S)**2 = −0·003, P < 0·000; Age = −0·20, P = 0·034; FIM mobility = 0·29. P < 0·008). This model accounted for 84·3% of the explained variance (R^2 = 84·3%). Again the FES(S) showed the highest unique contribution.
LeBrasseur *et al.* (2006)	Cross sectional study N = 31 Community Single ischaemic stroke in past 6–24 months	Examine whether quantitative measures of muscle strength and power in the involved lower extremity predict functional limitations. Evaluate the contributions of behavioural factors to mediating disability and quality of life.	Self-Efficacy: Ewart Self-Efficacy Scale Quality of life (QoL): Sickness Impact Profile (SIP) Disability: Late Life Function and Disability Instrument (LLFDI) Depression: Geriatric Depression Scale (GDS)	Stepwise regression models including impairment and behavioural measures were strong predictors of function, disability and QoL. Self-efficacy, muscle strength and power of the involved extremity were independently associated with function, whereas depression and self-efficacy were strong predictors of disability and QoL. Self-efficacy and gender were associated with habitual gait speed in regression models 1 and 2 (P < 0·05). Self-efficacy was also associated with stair climbing time and this association was stronger in the strength model (R^2 = 0·11) than in the power model (R^2 = 0·07). Self-efficacy also showed strong association with chair rising time and demonstrated strong relationship with this measure in both models (P < 0·001) Concerning the QoL measure, Self-efficacy demonstrated strong association with the limitation dimension (P < 0·001). Self-efficacy was the only variable associated with the instrumental role domain of the QoL measure and explained 63% of the variance in this measure in both models (P < 0·001). Both Self-efficacy and depression were significantly associated with the management role domain and explained similar degrees of vari ability in this measure (R^2 = 0·23, R^2 = 0·24, respectively).
Michael *et al.* (2006)	Correlational, descriptive study N = 53 Community 6 months' poststroke	Identifying relationships among fatigue and mobility deficit severity, fitness, ambulatory activity, social support and fall self-efficacy.	Fatigue: FSS, paired with Visual Analogue Scale (VAS) Balance: BBS Fall self-efficacy: FES	Fatigue showed no relationship to ambulatory activity. Fatigue severity was associated with balance (BBS) (P < 0·01) and fall-efficacy (P < 0·01), but not with cardiovascular fitness variables. Patients with elevated fatigue severity scores had lower social support (P < 0·05) and poorer fall-efficacy scores (P < 0·05) than patient reporting less fatigues.
Pang *et al.* (2007)	Secondary analysis of a clinical	Determine whether balance self-efficacy makes an	Satisfaction of reintegration: Reintegration of	Balance Self efficacy (ABC-score) showed highest correlation with the community reintegration (RNL Index scores) [Pearson correlation coefficient (r) = 0·527, P < 0·001].

Table 2 (*Continued*)

Author/Year	Design/sample/setting	Objective	Outcomes/instruments	Results
	intervention trial *N* = 63 Community	independent contribution in explaining satisfaction with community reintegration in ambulatory, older adults with long-term stroke.	Normal Living Index (RNL Index) Upper extremity motor: Fugl-Meyer Assessment Walking endurance: 6-Minute Walk and Talk (6-MWT) Balance Self-Efficacy: ABC	Balance self-efficacy is an independent predictor of satisfaction with community reintegration in older adults with long-term stroke, accounting for 65% of the variance (95% CI. 0·040–0·287, $P = 0·01$) as shown in multiple regression analysis and after adjusting for age, gender, upper extremity impairment, walking endurance, balance and depression. The addition of balance self-efficacy significantly improved the model prediction ($P = 0·001$) with a total of 49·2% of the variance in the RNL Index scores predicted by the final regression model ($P < 0·001$). Improving balance self-efficacy may be instrumental in enhancing community reintegration.
Pang & Eng (2008)	Cross-sectional correlational study *N* = 39 Community (>1 year poststroke)	Examine the contributions of fall-related self-efficacy to performance in balance, mobility and falls in stroke survivors with low bone mass.	Balance: BBS Mobility: TUG, 6 MWT, Stair Climbing time Fall self-efficacy: ABC	Better fall self-efficacy (ABC scores) was significantly related to better balance, faster TUG, stair climbing and 6MWT distance (all: $P < 0·001$). According to multiple regression analysis, where age, gender, habitual activity level and paretic leg muscle strength and Fall Self-efficacy (ABC score) were entered into the model, showed the ABC scores to account for 32.4% of the variance ($P = 0·001$). Multiple regression analyses showed that after adjusting for basic demographics, fall-related self-efficacy (ABC-score) was independently associated with balance mobility performance ($P < 0·001$) and that a total of 49·4% of the variance in balance/mobility performance can be explained by this final model ($P < 0·001$). According to the standardized regression co-efficients, ABC score had the highest association with balance/mobility performance ($P < 0·001$). Falls self-efficacy (ABC-score), but not balance or mobility performance, was a significant determinant of fallers. Those with an ABC score > 80 were significantly less likely to fall when compared with those with an ABC score ≤80 (adjusted OR: 0·18; 95% CI: 0·04–0·97, $P = 0·04$) after accounting for age, gender and physical activity level.
Robinson-Smith *et al.* (2000)	Longitudinal, descriptive correlational study *N* = 77 (1 month) *N* = 63 (6 months) Rehabilitation	To determine the relationship of self-care self-efficacy to functional independence, quality of life, and depression after stroke.	Self-care self-efficacy: Strategies Used by People to Promote Health (SUPPH) Quality of life: QLI-Stroke Version Depression: CES-D	Self-care self-efficacy increased after stroke and was strongly correlated with QoL measures and depression at 1 and 6 months after stroke and all correlations robust [Pearson Correlation (r) ranging from 0·41 to 0·81]. Higher self-efficacy (SUPPH-score) was associated with lower depression at 1 and 6 months ($r = 0·61$, 0·67, respectively). At 1 month, self-care self-efficacy accounted for 51% of the variance in depression and coping ($P < 0·001$) and coping accounted for 52% of the variance in QoL ($P < 0·001$).

Table 2 (*Continued*)

Author/Year	Design/sample/setting	Objective	Outcomes/instruments	Results
				At 6 months, 20% of the variability in QoL was explained by functional independence ($P < 0{\cdot}01$) and coping increased the variability in QoL to 47% ($P < 0{\cdot}001$). Significant differences in self-care self-efficacy, quality of life and depression were found between 1 and 6 months. Scores on the SUPPH and QLI increased ($P = 0{\cdot}047$, $P = 0{\cdot}004$, respectively) at 6 months indicating improved self-care self-efficacy and quality of life, whereas scores on the CES-D decreased ($P = 0{\cdot}001$) indicating lower depression.
Rosén *et al.* (2004)	Correlational, descriptive study $N = 31$ Community and day rehabilitation	Evaluate the relationship between fall self-efficacy and observer-assessed balance and also between the fall self-efficacy and gait velocity.	Balance: BDL Balance Scale (BDL BS) Fall self-efficacy: FES Walking speed: Timed Walking Test	The self confidence in task performance without falling [FES(S)] was significantly correlated with balance (BDL BS) ($P = 0{\cdot}008$), self-selected gait velocity ($P = 0{\cdot}003$) and for maximum gait velocity ($P = 0{\cdot}002$). Perceived self-confidence in instrumental activities of daily living measured by the IADL tasks were significantly correlated with observed assessed balance (BDL BS) ($r = 0{\cdot}54$, 95% CI 0·23–0·75, $P = 0{\cdot}003$), self selected gait speed ($r = 0{\cdot}68$, 95% CI 0·43–0·83, $P = 0{\cdot}001$) and maximum gait speed ($r = 0{\cdot}68$, 95% CI 0·43–0·84, $P = 0{\cdot}001$). The results indicate that the use of the FES(S) can be recommended in patients with stroke and balance to map out the dimension of self-confidence in balance problems.
Salbach *et al.* (2006)	Secondary analysis of a two-centre, observer blinded, randomized, controlled trial. $N = 91$ Community Within 1 year poststroke	To estimate the level of balance self-efficacy among community-dwelling subjects with stroke and to determine the relative importance of balance self-efficacy compared with functional walking capacity in predicting physical function and perceived health status.	Balance Self-Efficacy: ABC Depression: GDS Balance control: BBS Functional status: Barthel Index (BI)	Average balance self-efficacy was 59 out of 100 points on the ABC scale (95% CI, 55–64). Balance self-efficacy was not significantly associated with age, edu cational level, monthly income or the number of comorbid conditions. Average balance self-efficacy was significantly higher for men than for women (mean difference, 13 points; 95% CI, 4–21). Balance self-efficacy (decreasing) was significantly associated with depression (increasing) (Spearman $P = -0{\cdot}39$, 95% CI $-0{\cdot}55$ to $-0{\cdot}19$), independence in walking (decreasing) (Spearman $P = 0{\cdot}48$, 95% CI 0·30–0·63) and with increasing level of support from assistive devices (Spearman $P = -0{\cdot}34$, 95% CI $-0{\cdot}51$ to $-0{\cdot}14$). Balance self-efficacy was associated with balance (Spearman $P = 0{\cdot}44$. 95% CI $-0{\cdot}25$ to 0·59), walking capacity measured as 5-m walk, maximum pace ($P = 0{\cdot}49$, 95% CI 0·31–0·63) and 5-m walk, comfortable pace ($P = 0{\cdot}46$, 95% CI 0·28–0·61), ADL performance (BI-score) ($P = 0{\cdot}43$, 95% CI 0·24–0·59), physical function (SF-PF scale) ($P = 0{\cdot}59$, 95% CI 0·44–0·71), physical health (SF-36 PCS (Spearman $P = 0{\cdot}36$, 95% CI 0·16–0·53) and perceived health status (EQ VAS) ($P = 0{\cdot}52$, 95% CI 0·35–0·66). These relations were upheld at the postintervention (P-range, 0·44–0·69, $P < 0{\cdot}001$) and 6-month evaluations (P-range, 0·44–0·63, $P < 0{\cdot}001$).

Table 2 (*Continued*)

Author/Year	Design/sample/setting	Objective	Outcomes/instruments	Results
				Balance self-efficacy was a significant predictor of physical function and physical health, explaining 3% and 6% of the variance in scores on the PF scale and the PCS, after adjusting for age, gender, functional walking capacity. Balance self-efficacy was also a significant predictor of perceived health status and explained 19% of the variance in the EQ VAS scores after controlling for age, gender and functional walking capacity [R^2: 0·19, β: 0·35 (95% CI 0·14 to 0·56)]. This group of predictors explained 24% of the variability in the perceived health status at 6 months.
Svendsen & Teasdale (2006)	Retrospectief follow-up. Community	Looking at perceived symptoms of brain injury and impact on significant others, experienced competency, perceived self-efficacy and locus of control, anxiety, depression and quality of life in both the patients and their significant other.	Self-efficacy: Generalized Self-Efficacy Scale (GSES) Locus of Control Depression and anxiety: Hospital Anxiety and Depression Scale (HADS) QoL: World Health Organisation Quality of Life questionnaire (WHO-QoL)	The rehabilitation group experienced higher degrees of internal locus of control (M = 19·1, SD = 3·9) compared to the control group (M = 15·5, SD = 2·9), which represented a medium-sized effect (P = 0·003). The rehabilitation group also rated themselves as having a higher sense of general self-efficacy (M = 30·1, SD = 7·0) compared to the control group (M = 26·4, SD = 5·4). This difference was significant when using a one-tailed t-test (P = 0·044), representing a small-to-medium sized effect (r = 0·25). Anxiety and depression levels (P = 0·026) were significantly lower and QoL (P = 0·002) significantly higher in the rehabilitation group.

Table 3 Characteristics of studies focusing on self-efficacy enhancing interventions

Author/Year	Design/sample/setting	Intervention	Outcome/instruments	Results
Glass *et al.* (2004)	Randomized controlled trial *N* = 291 Community	Psychosocial intervention (PSI): family systems intervention designed to influence social sup port and self-efficacy affects functional outcome in older stroke patients	Mental Status: Mini Mental Status Examination (MMSE) Recovery efficacy (REFFI)	Psychosocial intervention (PSI) showed greater improvement than usual care (not significant). PSI patients had 20% higher odds of being functionally independent at 6 months (OR 1·2, $P = 0·57$, unadjusted). The PSI had 60% higher odds (adjusted) of being functionally independent at 6 months than the control group (not significant) (OR 1·6, $P = 0·31$, adjusted for marital status, received social support, age, age squared, baseline BI, NIH supplemental motor exam, previous stroke, and missing indicator for these variables). No differences between treatment groups on depressive symptoms ($P = 0·75$), received social support ($P = 0·26$), or recovery self-efficacy ($P = 0·97$).
Hoffmann *et al.* (2007)	Randomized controlled trial *N* = 138 Acute	Computer-generated tailored written information	Knowledge: Knowledge of Stroke Questionnaire Self-efficacy: Self-efficacy to Perform Self-Management Behaviours Scale Anxiety/Depression: HADS	Patients in the intervention group were significantly more satisfied with the content ($P = 0·003$) and presentation ($P = 0·001$). Fewer patients in the intervention group desired additional information about stroke at follow-up than patients in the control group (4·5% vs. 32·8%; $P < 0·001$). Anxiety scores changed significantly more in favour of the control group (1·4 difference on the HAD subscale, 95% CI 0·2–2·8, $P = 0·03$). No differences were observed for other outcome measures. Providing stroke patients with computer-generated tailored written information improved satisfaction with the information that was received, but had no effect on self-efficacy, depression or perceived health status.
Kendall *et al.* (2007)	Longitudinal randomized controlled trial *N* = 110 Acute/Rehabilitation Few months poststroke	The Chronic Disease Self-Management Course as a way of promoting progressive psychosocial recovery for stroke patients	Quality of life: SSQOL Self-Efficacy: Self-Efficacy Scale	The self-management intervention applied early following hospital discharge showed sign. Effect on the quality of family roles, self-care, work pro ductivity, and functioning in daily activities. SE showed significant effects on all SSQoL outcomes: language ($P < 0·01$), energy ($P < 0·01$), mobility ($P < 0·01$), mood ($P < 0·001$), vision ($P < 0·05$), fine motor tasks ($P < 0·001$), self-care ($P < 0·001$), thinking ($P < 0·01$), social roles ($P < 0·001$), work productivity ($P < 0·001$), this

Table 3 (*Continued*)

Author/Year	Design/sample/setting	Intervention	Outcome/instruments	Results
				finding confirms the importance of SE in the determination of outcomes following stroke. Although the treatment group displayed a different overall trajectory for the family roles' subscale, fine motor tasks (tasks of daily living such as writing, dressing and opening jars), self-care subscale, and for work productivity, no significant difference was found.
Salbach *et al.* (2005)	Randomized, controlled trial *N* = 91 Community Within 1 year poststroke	Task-oriented walking intervention in improving balance self-efficacy. Participation in 18 training sessions given three times a week for 6 weeks in hospital setting. The walking intervention was a progressive programme of 10 tasks.	Balance Self-Efficacy: ABC Depression: GDS Balance control: BBS	The walking intervention was associated with a significantly greater average proportional change in balance self-efficacy than the upper extremity (UE) intervention (OR 7·6 points, 95% CI 0·6–14·6) or 13·9 proportional change (95% CI 0·1–27·8) on the ABC scale with the overall effect-size of 0·4. Positive treatment effects were observed for 13 of the 16 items on the ABC scale. The largest effects between 25% and 51% of proportional change were observed for seven items, listed here I order of diminishing effect: walk on icy sidewalks, walk in crowded mall, walk up or down stairs, step onto/off escalator holding rail, walk I crowd/bumped, walk up or down ramp, and stand on char and reach. In persons with normal mood or mild depressive symptoms, the walking intervention did not have a strong effect on change in balance self-efficacy and showed average effect of 1·9% (95% CI: −24·1 to 28·0). The walking intervention led to substantial change effect in persons with severe depressive symptoms at baseline and showed an effect of 82·6% (95% CI: 42·8–122·3) of proportional change on the ABC scale. In the walking group, a fair correlation was observed between change in balance self-efficacy and change in functional walking capacity (correlation coefficient = 0·45, 95% CI. 0·16–0·68) and the association was significantly stronger in the walking group than in the UE group ($P < 0·05$). Fair level of correlations was also observed between changes in balance self-efficacy and change in maximum walking speed and in functional mobility.

impaired balance (Andersson *et al.* 2008). These outcomes were found, regardless if a patient had a history of falling or not, according to the nursing documents. Belgen *et al.* (2006) concluded in their study that fall self-efficacy best differentiated patients who had fallen from those who had not. Pang and Eng (2008) showed better fall self-efficacy to be significantly related to a better balance and that patients with a better fall self-efficacy had a faster Timed Up and Go (TUG), faster stair climbing and longer Six Minute Walking Test (SMWT). These findings agree with the study conducted by Hellström *et al.* (2003), who found that the degree of fall self-efficacy was significantly related to mobility, balance and walking capacity. Patients with a high sense of fall self-efficacy had a better outcome in mobility and maintaining balance (Hellström *et al.* 2003). Patients with a higher fall self-efficacy had a better functioning in mobility and ADL, whereas patients with low self-efficacy had a lower functioning in mobility and ADL. This difference increased in time (Hellström *et al.* 2003). Also, the fall self-efficacy predicted the level of mobility (for 30%) and motor impairment (for 67%) 10 months after stroke (Hellström *et al.* 2003).

Patients with a high sense of balance self-efficacy had a better outcome in mobility and maintaining balance (Salbach *et al.* 2006). The change of balance self-efficacy was positively related ($r = 0{\cdot}45$) to the change in functional walking capacity (Salbach *et al.* 2006). Balance self-efficacy was fairly to moderately associated with balance, walking capacity, ADL performance, physical function, physical health and perceived health status with the Sprearman rho correlations ranging from 0·36 to 0·59 ($P < 0{\cdot}001$). Balance self-efficacy at discharge predicted 56% of physical functioning at 6 months after the stroke (Salbach *et al.* 2006) (Table 1).

Self-efficacy associated with depression

The association between self-efficacy and depression was measured in four studies (Robinson-Smith *et al.* 2000, Gillen 2006, Salbach *et al.* 2006, Aben *et al.* 2008). Patients with a lower self-care self-efficacy were significantly more depressed, both 1 month and 6 months after the stroke (Robinson-Smith *et al.* 2000). Patients with severe depressive symptoms had a lower balance self-efficacy than the patients with less or no depression (Salbach *et al.* 2006). Self-efficacy was positively associated with more frequent use of active coping strategies and positive reframing, whereas patients with severe depressive symptoms used more ineffective coping strategies (Gillen 2006). Aben *et al.* (2008) studied the association between memory self-efficacy, depression and coping. Patients with a low memory self-efficacy were significantly more depressed than the patients with a high memory self-efficacy (Table 1).

Self-efficacy associated with HRQL

Four studies measured the association between self-efficacy and HRQL (Robinson-Smith *et al.* 2000, LeBrasseur *et al.* 2006, Svendsen & Teasdale 2006, Pang *et al.* 2007). Two studies showed self-efficacy was significantly associated with higher level of quality of life (LeBrasseur *et al.* 2006) (Robinson-Smith *et al.* 2000). At 1 month and 6 months after the stroke, significant associations were found between self-care self-efficacy and Quality of Life (Robinson-Smith *et al.* 2000). A retrospective study, comparing patients following a special rehabilitation programme with patients receiving usual care, showed that at 12–22 years after stroke, the rehabilitation group had significant higher self-efficacy and a higher HRQL as compared to the non-rehabilitation group (Svendsen & Teasdale 2006). Also, balance self-efficacy was independently associated with satisfaction of community reintegration after stroke as a proxy to HRQL. Balance self-efficacy was also independently associated with satisfaction of reintegration (Pang *et al.* 2007) (Table 1).

Self-efficacy interventions and effects on clinical outcome

Four randomized controlled studies measured the effects of self-efficacy interventions on clinical outcomes such as mobility and ADL, depression and lower HRQL after stroke (Glass *et al.* 2004, Salbach *et al.* 2005, Hoffmann *et al.* 2007, Kendall *et al.* 2007) (Table 2).

In the study conducted by Salbach *et al.* (2005), balance self-efficacy was measured by asking patients their confidence to change position, after *practising to change position* (from sit to stand, stairs-up). Ninety-one patients received the 6-week *functional walking-intervention* or the control intervention, exercising upper extremities. After the 6-week walking intervention, statistically significant improvements of 13·9% were found in the balance self-efficacy ($P < 0{\cdot}05$). Balance self-efficacy in the walking-intervention group changed more than in the control group, but the difference was not statistically significant. The walking intervention had more effect on balance self-efficacy when patients had depressive symptoms.

Kendall *et al.* (2007) measured self-efficacy using the Self-Efficacy scale, which assesses the following dimensions of self-efficacy: obtain help and information, communicate with physicians, manage disease, manage symptoms and manage depression. The intervention group received *education, focusing on encouragement* of patients on adopting healthy behaviours, minimizing negative influence of the stroke, managing negative emotional impact and taking an active role to develop a partnership with health professionals Although education had a significant positive effect on

HRQL, this did not have an impact through self-efficacy, and failed to influence outcomes as mood or social participation. Six months after discharge, the patients in the intervention group were able to arrange their return to home more effectively. After 12 months, however, the differences between the groups had disappeared.

Measuring the effects of a *psychosocial intervention*, which aimed to improve functional outcome of patients with stroke at home, Glass *et al.* (2004) randomized participants ($N = 291$) into two groups, one group received the psychosocial programme intervention and the other group received usual care. The psychosocial programme did not enhance self-efficacy and did not lead to improved functional status ($P = 0{\cdot}08$). A limitation of this study, as commented by the authors, was that mainly patients with good functional status, who improved without an intervention, were included in the study and many patients with a worse condition refused participation.

Hoffmann *et al.* (2007) evaluated the effectiveness of providing *computer-generated tailored written information* on the self efficacy, satisfaction with information, depression, or perceived health status. Patients of the intervention group identified which topics they would like to receive information about, the amount of information and the font size of the print. Even though positive effects were found on satisfaction with information, no effects, however, were found on self-efficacy, depression or perceived health status (Table 2).

Discussion

In this review, we provide an overview of the literature focusing on the influence of self-efficacy and self-efficacy enhancing interventions on mobility, ADL, depression and HRQL of stroke patients. The findings show that self-efficacy was positively associated with mobility, ADL and HRQL, and negatively associated with depression. Four self-efficacy enhancing interventions for stroke patients were identified. The evidence for the effects of these interventions was inconclusive.

The main limitation of the review was the heterogeneity of the studies included. The variety of study designs, inclusion criteria and instruments used made it impossible to pool the findings. Despite the fact that the quality appraisal showed that the studies included were all of average quality, the diversity in the designs, instruments and interventions used make it difficult to compare the findings in a meaningful way. Strength of this review is the theoretical base provided by the social cognitive theory of Bandura, which is tested and utilized in the care of patients with enduring diseases. The social cognitive theory and the construct of self-efficacy form the theoretical basis for many chronic disease intervention programmes. The findings of this review provide further evidence regarding the possible effects of the self-efficacy interventions for patients with stroke, adding to the theoretical base of the social cognitive theory of Bandura. Another strength of this review may be considered to be the strict methodology used for the literature search, the selection of studies and the quality appraisal of the studies included.

In this systematic review, a positive association was found between self-efficacy and mobility, ADL, depression and HRQL. Self-efficacy was significantly associated with mobility, balance, motor impairment, walking capacity, stair climbing and chair rising (Hellström *et al.* 2003, Belgen *et al.* 2006, Michael *et al.* 2006, Rosén 2004, Andersson *et al.* 2008, Pang & Eng 2008). Patients with a low self-efficacy were significantly more depressed than the patients with a high self-efficacy. Self-efficacy was also positively associated with a more frequent use of active coping strategies and positive reframing (Robinson-Smith *et al.* 2000, Gillen 2006, Salbach *et al.* 2006, Aben *et al.* 2008) and HRQL (Robinson-Smith *et al.* 2000, LeBrasseur *et al.* 2006, Svendsen & Teasdale 2006, Pang *et al.* 2007). Of the four studies investigating the effects of a self-efficacy enhancing intervention on patient's outcomes after stroke, two studies showed positive effects of self-efficacy enhancing interventions, such as *task-oriented interventions focusing on a 6-week walking group exercise programme* on balance self efficacy (Salbach *et al.* 2005), and *group education intervention* improving functional status and activities of daily living and HRQL (Kendall *et al.* 2007). Interestingly, in the four studies, only one or two sources of Bandura were used to enhance self-efficacy, whereas Bandura (1994) emphasized the importance of using all the four sources to enhance self-efficacy. It is not described why the authors chose one or two sources. In two studies, the only self-efficacy enhancing sources used in the intervention were mastery experience and vicarious experience (Salbach *et al.* 2005, Kendall *et al.* 2007), whereas, the other two studies only used one source: interpretation of physical state in their intervention (Glass *et al.* 2004, Hoffmann *et al.* 2007). This may be the reason why these self-efficacy interventions did not have a significant effect on the outcomes measured. Jones (2006) concluded in her review also a lack of effective interventions to equip stroke patients to deal with their chronic disease.

In two qualitative studies, patients have described the following self-efficacy enhancing themes: conducting self-care, recognizing improvements, pushing limits, setting goals, solidarity, recognition and reassurance, which may be important because they are more likely to specify the needs of stroke patients about enhancing self-efficacy in relation to mobility

What is already known about this topic

- There is growing evidence for the importance of self-efficacy in the care of people with enduring illness.
- The use of self-efficacy can help patients to gain more control over important aspects of their disease.
- Nurses in stroke care generally do not use self-efficacy in the daily care of people with stroke.

What this paper adds

- Self-efficacy was positively associated with mobility, ADL and HRQL and negatively associated with depression after stroke.
- Self-efficacy was significantly associated with mobility, balance, motor impairment, walking-capacity, stair climbing and chair rising.
- Self-efficacy enhancing interventions, such as task-oriented walking group exercise programme and group education intervention were found to be effective and improved various patient outcomes.

Implications for practice and/or policy

- Nurses have an important role in the rehabilitation of stroke patients and they need to provide self-efficacy enhancing interventions during daily care.
- Nurses need to emphasize further the role of self-efficacy in the care for patients with stroke in the nursing practice and the nursing curriculum.

and ADL (Hillman & Chapparo 2002, Dixon *et al.* 2007).These studies focused on the four sources of self-efficacy described by Bandura (1994), namely: 'mastery experience', 'verbal persuasion', 'vicarious experience' and 'interpretation of physical state'. *Mastery experience* was expressed as an important source of self-efficacy in both studies. In their qualitative study, Dixon *et al.* (2007) described the experience of patients conducting self-care ADL activities as a form of rehabilitation. Conducting self-care activities in ADL tasks, recognizing own improvements, pushing limits and setting goals were experienced as encouragement of the self-efficacy (Dixon *et al.* 2007). Hillman and Chapparo (2002), also in a qualitative study, explored which aspects of experienced job satisfaction had influence on the self-efficacy of retired men. Work was experienced by these men as an important factor, which enhances self-efficacy (Hillman & Chapparo 2002). The way of fulfilling own values and beliefs after stroke was experienced as having a positive influence on self-efficacy (Hillman & Chapparo 2002). *Vicarious experience* was experienced as a self-efficacy enhancing source in the study conducted by Dixon *et al.* (2007). Patients described this as solidarity and recognition with other patients. Seeing other patients participating in rehabilitation was experienced as stimulating and instructive. It was important for the patients to recognize their own rehabilitation in the others' rehabilitation process (Dixon *et al.* 2007). *Verbal persuasion*, also known as social persuasion, was important as described in the study by Dixon *et al.* (2007). Patients described how they needed reassurances from professionals or family members concerning their progress when they take part in rehabilitation (Dixon *et al.* 2007). This form of support was experienced as enhancing their self-efficacy. Patients described working with professionals as valuable and stimulating for rehabilitation, and the advice of the rehabilitation physician on how to practice and exercise was experienced as a way to promote self-efficacy (Dixon *et al.* 2007). In our recent systematic review, various effective task-oriented interventions are described, which were found to be highly relevant to nursing in all phases after stroke (Rensink *et al.* 2009) and are in line with the evidence showing that stroke patients need more intensive activation and training, starting early after the stroke (Kwakkel 2006). When nurses teach patients simple exercises, such as balance exercises, reaching, sitting up, standing up and walking (Rensink *et al.* 2009) they need to use Bandura's four sources of self-efficacy, as the patient needs to be encouraged to do activities that he/she find difficult to perform and to watch other patients do the exercises; and nurses and family members need to give positive feedback and praise every improvement how minor it may be.

The information concerning the self-efficacy interventions and determinants influencing self-efficacy is also important for the further development of interventions and training programmes, which may improve rehabilitation results of people with stroke. In line with this, Robinson-Smith (2003) described the essence of enhancing self-efficacy after stroke. She used the sources of Bandura to describe how to enhance self-efficacy during daily care. Her findings show that self-efficacy enhancing interventions need to be integrated into the daily nursing care of patients and used in combination with task-oriented interventions in the rehabilitation of patients with stroke. This was also supported by the findings of two qualitative studies (Hillman & Chapparo 2002, Dixon *et al.* 2007).

Practical implications for nursing

The findings of this review provide evidence for the importance of self-efficacy during daily care for patients with

stroke. A high sense of self-efficacy enhances functionality and HRQL, whereby depression decreased. Although no convincing evidence was found regarding the effects of self-efficacy enhancing interventions, the findings of the qualitative studies showed that the interventions lack the use of determinants experienced by the patients as self-efficacy enhancing. Based on this, more interventions tailored to the needs of stroke patients and their daily care are needed. For example, starting by practising simple self-care activities, such as practising arm function while dressing. Activities like this can be extended to other ADL functions and continued with activities of increased complexity, using the four self-efficacy enhancing sources of Bandura. Nurses can use the first source, *mastery experience,* by practising ADL tasks, such as dressing, eating or drinking. Starting with an easy task, which the patient can easily perform will lead to a successful experience and improve the patients' self-efficacy. The second source, *vicarious experience*, is appropriate to facilitate moments that patients eat or drink together; the third source, *verbal persuasion*, to encourage the patient when exercising during daily care; and the last source, *physiological factors,* is appropriate to communicate with the patient concerning signs and symptoms related to the stroke.

Today, no or little attention is given to self-efficacy in the basic and postgraduate education of nurses. Based on the findings of this review and previous studies, it is highly important to educate nurses concerning self-efficacy, the importance of self-efficacy in the care and rehabilitation of patients with stroke and to teach them to apply self-efficacy enhancing intervention in the daily care and training of these patients.

The management of stroke units in hospitals, rehabilitation centres and nursing homes need to facilitate the use of self-efficacy in the daily care of patients with stroke. They need to create time, space and financial support in their policy to make it possible for nurses to offer patients the opportunity to learn about self-efficacy, and to practise and share experiences with other patients. Nurses in advanced nursing practice have an important role in implementing this knowledge into daily practice.

Conclusion

The findings of this systematic review provide evidence for self-efficacy as an important aspect to be considered in the daily care and rehabilitation of patients with stroke. Providing continuous daily care gives nurses excellent opportunity to adopt and use self-efficacy in the care and rehabilitation of patients with stroke in various care facilities such as hospitals, nursing homes, rehabilitation centres and community home care. Self-efficacy is positively associated with mobility and ADL and HRQL, and negatively associated with depression in patients with stroke. A few promising self-efficacy interventions were found, which nurses can apply in the daily care of these patients. Self-efficacy interventions and programmes need to be developed. Further research, however, is needed to investigate the effectiveness of self-efficacy interventions provided by nurses and the stroke patients' experiences of these interventions. Implementing evidence based self-efficacy interventions in the daily care of patients with stroke may be one of the many challenges that nurses face in the future. Evidence-based practice is a challenge that never ends.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

CK, JvdB & TBH were responsible for the study conception and design. CK performed the data collection. CK, JvdB & TBH performed the data analysis. CK, JvdB & TBH were responsible for the drafting of the manuscript. CK, JvdB & TBH made critical revisions to the paper for important intellectual content. CK & TBH provided administrative, technical or material support. JvdB & TBH supervised the study.

Supporting Information Online

There is no Supporting Information associated with this article.

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