

Self-efficacy and self-management after stroke: a systematic review

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Abstract**Purpose:**

The purpose of this review is to examine: 1) the influence of self-efficacy on rehabilitation outcomes post stroke, and 2) the evidence to support self-management interventions based on self-efficacy principals for stroke survivors.

Method: Medline, Embase, Psychlit, Web of Science, AMED and Cochrane Databases for systematic reviews databases were searched for relevant articles in English between 2000 and ending in July 2009:. Articles included 1. Primary research testing relationships between self-efficacy and rehabilitation outcomes including those measuring impairment, activity or participation in a stroke population. and 2. Research testing efficacy and effectiveness of self-management interventions designed specifically for a stoke population in which the principle theoretical framework is self-efficacy or a similar control cognition. Methodological quality appraisal and data extraction was carried out by two reviewers.

Results : Of the 104 articles that were identifies by the search, 22 met the criteria to be included in the review. There is evidence that self-efficacy is an important variable associated with various outcomes post stroke. These outcomes include quality of life or perceived health status, depression, ADL, and to a certain extent, physical functioning. Further empirical evidence is needed to extend these findings, and to determine whether self-efficacy has additional predictive value over and beyond objective measures of impairment. There is also emerging evidence of benefits to be gained from programmes that target self management based on self efficacy principles; however the optimal format of delivering these interventions for stroke survivors is not clear.

Conclusions There is a need for researchers, to work together with other stakeholders to develop and test interventions which can support self-management skills and confidence to

make continued progress after stroke. This could help to reduce some of the negative consequences of stroke such as reduced quality of life and social isolation.

Introduction

According to the World Health Organisation the number of stroke events in Europe is likely to increase from 1.1 million per year in 2000 to more than 1.5 million per year in 2025 solely because of the demographic changes relating to an increasing ageing population [1]. A recent large prospective cohort study found that functional level at six months can predict long term survival and the authors suggest that more sustained treatments to decrease levels of dependency are needed [2]. Currently in the UK the main emphasis of care is placed towards the early management of stroke [2], where, during the acute phase, the individual can be subjected to an intense period of medical care and rehabilitation. However authors are now questioning the emphasis on the acute care of stroke and lack of support in the later stages [3]. Reviews of the long term issues relating to living with stroke reveal a complexity of problems faced by individuals; including social isolation, depression, lack of specialist support, reduction in mobility and life roles [4,5].

In contrast to research supporting individuals with other long term conditions, such as self-management programmes, there has been minimal research on such programmes to assist individuals in the longer term post stroke. Self-efficacy and social cognition theory forms the basis of many self-management programmes, and there have been some studies investigating the influence of self-efficacy on quality of life and mood post stroke. This reflects an emerging interest in the relationship between psychological constructs such as self-efficacy and long term outcome post stroke, and whether people with stroke could be supported by self-management programmes based on similar concepts.

It now seems timely to examine this evidence in relation to stroke. The purpose of this review is to examine: 1) the influence of self-efficacy on rehabilitation outcomes post stroke, and 2) the evidence to support self-management interventions based on self-efficacy principals for stroke survivors.

Background

For people with a long term condition including stroke, adjustments such as learning new behaviours and/or modifying one's lifestyle becomes a necessity. However the ease with which such changes occur is multifaceted. The concept of self-management has always existed, whether through self-help groups, family or community support [6]

Notwithstanding the need for society and healthcare to provide the appropriate structures for independent living, there remains the question concerning the individualistic and psychological factors which could mediate successful self-management. Individuals who judge their capabilities to be effective post stroke may employ self-care activities that not only modify and improve on achievements made during rehabilitation, but also help sustain progress and function more consistently [7]. Understanding individualistic factors such as level of confidence and emotional responses of individuals working towards particular goals post stroke, could also help health professionals to appreciate the different responses to rehabilitation [8]

Self-efficacy is one psychological construct that has received great attention in the management of various chronic diseases. Self-efficacy was introduced by Bandura (1977), as a cornerstone of his Social Learning Theory. It has been defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" [9]. Self-efficacy beliefs can determine how people feel, think, motivate themselves and behave with regards to their health. For example, self-efficacy

influences motivation, and indeed health behaviours, by determining the goals people set, how much effort they invest in achieving those goals, and their resilience when faced with difficulties or failure [10].

The construct of self-efficacy appears to provide resonance with many aspects of sustaining progress and coping with setbacks post stroke, and thus it could be important to understand how and where stroke-specific self-efficacy beliefs may originate. The information and feedback that an individual obtains from the performance of a task are referred to as sources of self-efficacy. There are four main sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion and physiological feedback [11]. **Mastery experiences** include positive experiences in a task or skill. As experiences of success improve self-efficacy, breaking the task into smaller achievable components may build up and accumulate confidence [12]. For people with stroke, confidence could be gained following accomplishment of a small personal goal through independent effort (13). Mastery experiences are the most reliable source of efficacy information (14) and have been targeted in stroke rehabilitation through a variety of methods [15-17]. **Vicarious experience** is gained through the comparison and modelling of others, as it can be beneficial to observe someone perceived to be similar (model) successfully performing a task e.g. learning from other people's experiences of the recovery period post stroke. Seeing others' achievements, especially for individuals who are uncertain of their capabilities to perform certain tasks, may help the observers believe that they also possess capabilities to perform the same tasks [11,18]. **Verbal persuasion** serves to increase an individual's belief about their personal level of skill through the use of persuasion and verification from a significant other (stroke professional or key family member). However verbal persuasion needs to be directed in such a way that it enables the individual to interpret the experience of performing the skills as a success [11]. **Physiological feedback** is where the efficacy beliefs are formed from feedback

produced by an individual's own physiological state. Self-efficacy may be increased by the interpretation of individual's physical and emotional feelings as positive, rather than negative. e.g. walking unaided post stroke without feeling unsteady [11.19].

Stroke rehabilitation could provide the opportunity to address a combination of these four sources of self-efficacy. However, if there are multiple components to each task, e.g. walking, individuals are likely to have a number of distinct, interrelated self-efficacy beliefs [20]. Practice to ensure transference of beliefs regarding capability to different situations and settings therefore requires a dynamic cognitive process [20]. Nonetheless there may be limited scope for individuals to practice their own personal tasks in the acute care setting and receive sustained support to build self-efficacy and functional performance beyond the initial few weeks of rehabilitation.

For two decades now, there has been growing interest in fostering the means by which individuals with long term conditions can participate effectively in managing their condition [21]. Self-management programmes are distinct from simple patient education or skills training, in that they are designed to encourage people with chronic diseases to take an active part in the management of their own condition [22]. Whilst early programmes often lacked an explicit theoretical basis, self-management programmes, such as the Chronic Disease Self-Management Program (CDSMP) developed by Lorig at Stanford University, California, are based on theoretical models of behaviour, and incorporate self-efficacy principles [23].

Empirically, the impact of self-management education interventions for individuals with long term conditions has been questioned, finding that their effectiveness may have been overstated and benefits gained are generally short-term [24]. A recent paper highlighted

methodological weaknesses of some SMPs, questionable significance of improvements and sustainability of outcomes, and lack of evidence to suggest that lay-led SMPs generate better outcomes than professionally-led interventions [25]. The evidence base to support the use of stroke-self-management programmes is now emerging, but many of the methodological issues inherent in delivery of a complex intervention are evident. A review of the current literature on self-efficacy and self-management is now required. The importance of this review is twofold:

- 1) To inform professionals working in stroke about the influence of self-efficacy in relation to other rehabilitation outcomes and individuals performance during therapy
- 2) To summarise the development and efficacy of self-management programmes developed for stroke survivors and to inform future studies

This paper will present the findings of a systematic review of research on self-efficacy and self-management post stroke. Specifically this review attempts to answer two questions.

1. What is the influence (if any) of self-efficacy on rehabilitation outcomes post stroke
2. What is the evidence to support self-management interventions based on self-efficacy principals for stroke survivors

Method

Search Strategy

The following databases were searched for relevant articles in English between 2000 and ending in July 2009: Medline, Embase, Psychlit, Web of Science, AMED, Cochrane Databases for systematic reviews. The key words Stroke, self-management, and/or self-care, and self-efficacy were linked by the Boolean operator 'AND'. These key words were also combined with 'outcome', and 'rehabilitation'. References from all appropriate journals and individual

articles were also checked and potential relevant articles were retrieved. Articles included;

1. Primary research testing relationships between SELF-EFFICACY AND REHABILITATION OUTCOMES including those measuring impairment, activity or participation in a stroke population.

2. Research testing efficacy and effectiveness of SELF-MANAGEMENT PROGRAMMES designed specifically for a stroke population in which the principle theoretical framework is self-efficacy or a similar control cognition.

Selection Criteria

Studies published in peer reviewed journals, with a primary population of stroke, were included if they were interventional or observational studies, using quantitative measures and presented findings relevant to study questions. We also included studies that reported specific measurements of self-efficacy used in a stroke population. No restrictions were placed on age of study population or rehabilitation setting (home, rehabilitation centre, acute hospital).

Studies were excluded if they had a greater focus on general chronic disease self-management, if self-efficacy had not been defined fully, if the methodology and/or method were poorly described, or if they were principally discussion or theoretical papers.

A total of 104 papers were found from the databases searched. Once duplicates were removed, eligibility was determined from the title and abstract. Full text articles were then retrieved and evaluated for relevance. A total of 22 papers were retained using the above strategies from an initial list of 104 articles. Many of the included studies were exploratory and as such did not meet the criteria for use of a formal rating scale for reviewing quality.

However each article was read by both reviewers and findings summarised using headings used by Bury et al (2005) in the publication 'A rapid review of the current state of knowledge regarding lay-led self-management of chronic illness' [24].

Results:

Question 1. What is the influence (if any) of self-efficacy on rehabilitation outcomes post stroke

In various long term conditions, self-efficacy has been related to numerous outcomes including mood, quality of life, and functional independence [24]. In stroke, research has been limited, but 18 empirical studies that have examined self-efficacy in this population were identified and are summarised in Table 1.

Insert table 1 here

Functional level, falls and self-efficacy

12 studies were found specific to this section. One of the first studies on self-efficacy in stroke was conducted by Robinson-Smith et al [29]. This longitudinal study on 63 individuals found that self-care self-efficacy increased after stroke, and was strongly correlated with quality of life measures and depression at both one and six months post stroke. Although functional status was modestly correlated with quality of life at six months post stroke, the relationship between self-efficacy and functional status was not reported.

Much of the limited empirical studies on the role of self-efficacy post stroke has focused on personal belief in the ability to undertake activities of daily living (ADLs) without losing balance (balance self-efficacy) [30-33] or falling (falls self-efficacy) [34-38]. Falls self-efficacy has been found to improve during inpatient rehabilitation, and improvement linked to both

gains in balance and motor function (39). This small study of 37 elderly individuals with stroke demonstrated that self-efficacy is a stronger predictor than balance capacity of basic ADL performance [39]. Individuals with low self-efficacy at discharge showed less pronounced improvement in motor function and balance ten months after discharge, than those with high self-efficacy at discharge. However, only 37 of the total of 146 patients with confirmed stroke admitted to the rehabilitation to a geriatric rehabilitation department took part in the study. Therefore as the authors acknowledge, the sample may not be representative of the stroke population.

In a separate experimental study, task-oriented interventions targeting either walking or upper extremity (UE) function were provided three times a week for 6 weeks to ninety-one community-dwelling individuals with stroke [40]. The task-oriented walking intervention enhanced balance self-efficacy more than the UE intervention, and depression, age, sex, co morbidity, time post stroke, and functional mobility predicted self-efficacy improvement [40]. However, , because the intervention of interest was walking per se, a measure of walking self-efficacy rather than falling, would have been more appropriate for the purposes of distinguishing the impact of the walking intervention across the groups. Using the same data, the authors further demonstrated that balance self-efficacy was a strong determinant of perceived health status, but not physical function [31]

Using the Falls Efficacy Scale or the Swedish version of the Falls Efficacy Scale, several studies have found that fear of falling is significantly associated with poor physical function and earlier falls [36] fatigue severity [37] and observer-assessed balance ability [38]. The study by Andersson would have been enhanced if they had used objective number of falls rather than self-reported number of earlier falls . The study by Belgen et al also found that people with stroke with a history of falls have fear of falling and decreased falls-related SE (35). Further

studies have demonstrated that balance SE is associated with satisfaction with community reintegration [32] and falls-related self-efficacy was independently associated with falls in stroke survivors with low hip bone mineral density [33].

Predictive value of self-efficacy

Three further studies have examined the predictive value of self-efficacy. For example, Aben and colleagues found that memory self-efficacy was strongly associated with depression, neuroticism and coping post stroke, matching the findings in more general populations [41]. LeBrasseur and colleagues found that self-efficacy, along with muscle power, was a strong predictor of measured functions post stroke and the only predictor to be associated with all dimensions of self-reported disability, as well as to quality of life [42]. However, this study used a self-efficacy measure that has not been previously tested in the stroke population. In a large predictive cohort study of individuals post stroke, perceived behavioural control and self-efficacy was found to be predictive of individual-specific walking limitation and recovery [43]. The authors also hypothesised that interventions focused on changing impairment without also facilitating a change in control beliefs, may ultimately impact on activity limitation in the longer term.

Specific measures of self-efficacy

The development of scientifically rigorous measures of self-efficacy for stroke survivors, that can be used in future empirical studies, may facilitate our understanding of the relationships between SE and various outcomes. We were able to find five scales that met this purpose.

The FES [S] [34] a Swedish modified version of the Falls Efficacy Scale, [44] has been developed for use in the stroke population and utilised by several of the studies discussed above [34,35,38] The scale measures perceived confidence in relation to task performance without falling. Although not designed specifically for people with stroke, the Short Self-Efficacy for Exercise (SSEE) scale, demonstrated adequate psychometric properties within the stroke population [45]. However there were some limitations to this study. For example, the response rate was fairly low, and the representativeness of the sample is questionable, as it appears that those who took part seemed to be much more interested in exercise before the stroke, as nearly 50% claim to have exercised more than 4 times a week. Both the original [31,46] and Canadian French version of the Activities-Specific Balance Confidence (ABC) scale [31], a measure of balance self-efficacy, have also demonstrated adequate psychometric properties. It has been noted that in highly functioning stroke survivors the ABC scale is appropriate as it includes more complex activities and may be more suitable for active people after stroke [38]. However, other than the study by Shaughnessy et al [47], all of the studies have utilised relatively small sample sizes for the purpose of psychometric evaluation. Furthermore, none of the scale cover the full range of functional tasks and self-management relevant to stroke. One recently developed measure, the Stroke Self-Efficacy Questionnaire (SSEQ), evaluates self-efficacy judgments in specific domains of functioning relevant to individuals post stroke [8]. However, more data on the psychometric properties of this measure is needed.

Question2. What is the evidence to support self-management interventions for stroke survivors based on self-efficacy principals?

Four papers from the total selected (22) were directly relevant to this review question. The studies included three controlled trials (two randomised, one non-randomised), and one study reporting a series of single case studies. The main findings are shown in table 2

Insert table 2 here

One of the few studies, a randomised controlled trial by Kendall et al (2007) involved 100 people with stroke. The CDSMP (group/lay led) was applied in Australia in an acute stroke setting [16]. The intervention group avoided a decline in function in the first year post stroke, although it failed to impact on self efficacy and other outcomes such as mood and social participation. A non-randomised trial which tested a stroke self-management programme compared with an stroke educational programme showed significant differences on key outcomes over time but no significant between group differences, there was also attrition in both groups and a large number lost at follow-up. This study allowed potential participants to choose their allocation to either the intervention or control arm which could have significantly influenced objectivity of findings [48].

There is some evidence to suggest control cognitions such as self-efficacy and perceived control can predict disability following stroke [42,49]. Johnston et al tested a workbook designed to modify control cognitions and based on a prototype for post myocardial infarction with individuals post stroke [15]. The intervention group showed a significant difference in recovery from disability at six months after discharge from hospital. However there was a large attrition rate from the intervention group which could have biased findings. This study showed no change in the hypothesised mediator perceived control despite previous findings by the authors. Although another measure of 'confidence in recovery' was affected by the intervention, again there was no immediate mediation effect.

The authors suggest a change in confidence may produce more long term value, and could help sustain belief and encourage initiation of more self-management strategies [15].

Considering the criticisms levelled at generic group based programmes, there is may be some scope for developing and testing more individualised self-management interventions for stroke survivors [50].

One intervention used an individualised training programme and workbook based on self-efficacy principles (mastery, vicarious experience and feedback), with content informed by qualitative research [13] and contributions from a group of 10 stroke survivors. Pilot work using a multiple participant single subject design demonstrated significant improvement in self-efficacy (measured by the Stroke Self-efficacy Questionnaire) and personal control (measured by the Recovery Locus of Control Scale) but no significant changes in any other outcome (activity, participation, and mood) [51].

Studies were not selected for this review if they had participants with a mix of chronic diseases however some include a small number of stroke survivors. One example is the Shanghai version of the CDSMP tested in an RCT. The intervention group had significant improvements in weekly exercise, practice of cognitive management, self-efficacy, and health status, compared to control group. However treatment allocation was not concealed at baseline, and large numbers were lost to follow-up in both groups. This study had no long-term follow-up, which is a common criticism of self-management research [52].

Discussion

Although the literature on self-efficacy is by no means extensive, it is clear that self-efficacy is an important variable that is associated with various outcomes post stroke. These

outcomes include quality of life (or perceived health status), depression, ADL, and to a certain extent, physical functioning. Further empirical evidence is needed to extend these findings, and to determine whether self-efficacy has additional predictive value over and beyond objective measures of impairment. Pang and colleagues [32] are taking steps in the right direction, by examining the independent predictive value of SE over and beyond other measures.

Some of the current research also suggests benefits to be gained from programmes that target self management based on self efficacy principles; however the optimal format of delivering this intervention in stroke survivors is certainly not yet clear. More empirical research is required to test the feasibility, acceptability and efficacy of self-management programme designed specifically for stroke populations. Questions such as timing post stroke, format e.g. group or individual, delivered by professionals or lay-led have yet to be explored in any detail. However, research in this area is starting to emerge, Battersby and colleagues are currently testing a stroke specific version of the chronic disease self-management programme , in a phase II randomised controlled trial which will determine whether a definite Phase III trial is justified [53].

Limitations of the review

Our review focused on the state of research in stroke and self-efficacy as of now . Many of the studies were exploratory and as such did not meet criteria for using formal rating scales. We used consensus between reviewers to determine eligibility and inclusion of articles. Criteria for inclusion was determined at the outset, and the small pool of suitable articles, meant that an agreement was reached between both reviewers without the need for a third reviewer. This may have led to some selection bias and future reviews could benefit from using a standardised critical appraisal tool such as the CASP for randomised controlled trials

or cohort studies [54], and the application of statistical techniques such as a meta analysis to assess any possible treatment effect. Another concern is that some studies had small heterogeneous samples, and the psychometric properties of instruments used was not always clear, many did not state whether the measure had been validated for use with a stroke population. We excluded papers which did not adequately define self-efficacy, and this may have reduced the impact of some of our findings which may have been strengthened by including research on related constructs such as recovery locus of control and perceived control [55]. In addition, there are programmes which have been used for stroke survivors underpinned by other theories of behaviour change such as Motivational Interviewing [17], and extending the review to include other programmes could have given greater direction for future studies.

Future research

The purpose of this review was to 1) To inform professionals working in stroke about the influence of self-efficacy in relation to other rehabilitation outcomes and individuals performance during therapy and 2) To summarise the development and efficacy of self-management programmes developed for stroke survivors and inform future studies

Although our review showed some evidence about the influence of self-efficacy and outcomes post stroke, it is unlikely that self-efficacy is the only important control cognition. Other cognitions such as locus of control (Social Learning theory); [56] or perceived behavioural control (Theory of planned behaviour); [57] may also provide greater understanding of responses and adaptation post stroke. The causal relationships of control cognitions with mood, quality of life and functional performance post stroke is yet to be fully explained. Nonetheless within stroke rehabilitation a greater understanding of the sources

of self-efficacy such as mastery experiences and the relationship with personal benchmarking post stroke could ensure goal setting is more relevant and meaningful to individuals. In addition the use of self-efficacy measures which can screen levels of perceived confidence in a task could help professionals to gain greater insight into performance and goal attainment during therapy. Given the prevalence of mood disorders and reduced quality of life post stroke, it is vital to gain an understanding of the factors which may contribute to long term outcome, and also may help to define appropriate interventions. We would recommend that more research is carried out on the predictive value of self-efficacy, but larger sample sizes are needed, and outcomes need to be evaluated over the longer term, not just during the initial period of acute care and rehabilitation.

We would also recommend further studies on self-management programmes which utilise self-efficacy as an underlying construct. However, more detail is required about the content of programmes, and how specific behaviours are targeted. We would suggest that researchers need to make a clear distinction between educational programmes and those which aim to facilitate a behaviour change, and to that end the theoretical framework needs to be defined. In addition there should be an increased effort to be inclusive of more individuals post stroke, in order to inform researchers and clinicians about the acceptability and feasibility of such programmes to a wider population of stroke survivors.

Conclusion

In general, our review indicated that there is some evidence of the influence of self-efficacy on outcomes post stroke and some support for stroke specific self-management interventions. These findings are useful, but translating the research into clinical practice

could be a challenge for policy makers and clinicians. Programmes aimed at increasing self-efficacy post stroke could require an individual to experiment with different self-management strategies and take some controlled risks. The practical implications of this approach will require careful thought and planned research. Currently most early stroke rehabilitation is carried out in hospital where risks are understandably kept to a minimum and opportunities for self-practice and experimentation may be severely restricted. In addition, access to ongoing specialist rehabilitation in the community can be severely limited, which may be an environment more suited to facilitating self-management strategies. There is now a need for researchers, to work together with other stakeholders to develop and test interventions which can facilitate support self-efficacy to manage in the longer term posts stroke and reduce some of the negative consequences such as reduced quality of life and social isolation.

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