

Subjective Attributes of Depression, Part 1: The Subjective Disability Depression Questionnaire, a New Measure for assessing Reactive Depression Following Stroke

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Abstract

This study aimed to assess the psychometric characteristics of the Subjective Disability Depression Questionnaire (SDDQ) as a measure of the influences of self-perceived disability on depression. **Method:** Twenty-seven stroke patients and partners, and a comparison group of 28 amputees and partners from a rehabilitation centre completed the Hospital Anxiety and Depression Scale, General Health Questionnaire-28, and Emotional and Social Dysfunction Questionnaire. **Results:** The SDDQ was found to have a nine-factor structure that explained 88.09% of the variance in depression. The construct validity and high split-half reliability and internal consistency provided satisfactory test characteristics. **Conclusions:** The present study presents initial evidence that the SDDQ is a reliable and valid measure of the impact of self-perceived disability on depression, and suggests it will be useful in providing a focus for individually tailored psychological therapies.

Key words: *Amputation; Depression; Questionnaire; Stroke; Validation*

Introduction

Depression is the most common mood disorder to follow stroke (Starkstein & Robinson, 1989), with major depression affecting around a quarter to a third of patients (Beekman et al., 1998; Ebrahim, Barer, & Nouri, 1987; Hackett, Yapa, Parag, & Anderson, 2005; Pohjasvaara et al., 1998). Elucidating the predisposing psychological factors for depression is particularly important given findings that this mood disorder is associated with negative consequences including poor recovery and

increased risk of mortality in stroke patients (Morris, Robinson, Andrzejewski, Samuels, & Price, 1993; Sinyor et al., 1986).

There are two pathways by which depression can occur in these patients. Depression may be seen as a direct organic consequence of brain damage, for example, disruption to neurotransmitter systems (Bryer et al., 1992) or it may be seen as primarily associated with a psychological reaction to the many disabilities associated with stroke (Gainotti, Azzoni, & Marra, 1999). While post stroke depression (PSD) is often treated using antidepressants, there are few psychological therapies for the treatment of post stroke depression (PSD). This may be due, in part, to a lack of understanding of the predisposing psychological factors.

While many studies of PSD have attempted to correlate measures of handicap with depression, not all studies have found a relationship between these factors (Robinson & Price, 1982; Wade, Legh-Smith, & Hewer, 1987). One explanation for such findings is that rather than the measured level of handicap according to an observer, it is the meaning that the patients attribute to their own particular disabilities that is the important factor in predicting depression. While there exist self-report instruments that measure subjective perceptions of various outcomes after stroke (Andrewes, Hordern, & Kaye, 1998; Andrewes et al., 2003; Duncan et al., 1999; Trigg & Wood, 2000), no scale obtains a quantitative measure of how much each of these perceived disabilities have influenced depression post stroke. Such a measure would seem to be an essential starting point for any attempt at

therapy. Thus the present paper describes the development of a new questionnaire designed to measure the psychological influence of the self-perceived disabilities on PSD. Given previously found associations between cognitive impairment and depression in stroke patients (House, Dennis, Warlow, Hawton, & Molyneux, 1990; Kauhanen et al., 1999; Nys et al., 2005) we were particularly interested in the influence of brain damage, thus we chose a comparison group of amputees, as these patients have similar rates of depression to stroke patients (Darnall et al., 2005; Kashani, Frank, Kashani, Wonderlich, & Reid, 1983; Rybarczyk, Nyenhuis, Nicholas, Cash, & Kaiser, 1995; Rybarczyk et al., 1992; Singh, Hunter, & Philip, 2007), and also similar physical and social disabilities, but fewer cognitive impairments.

Method

Participants

There were a total of 104 participants. The sample included 27 stroke patients (11 inpatients, 16 outpatients; 18 males, 9 females) with a mean age of 51 years ($SD=16.83$), and 25 partners of stroke patients. The comparison group was comprised of 28 amputee patients (11 inpatients, 17 outpatients; 23 males, 5 females) with a mean age of 66 years ($SD=18.59$) and 24 partners of amputee patients. All participants gave voluntary consent to participate in the study. The stroke patient group was significantly younger than the amputee group ($t(1, 53)=3.13, p=.01$), and the stroke group had less males and more females than the amputee group, which was also significant ($\chi^2(1)=13.25, p=.01$). However there were no significant differences between the groups for mean education level or months since stroke or amputation. Patients were excluded if:

- The time since amputation or stroke was greater than seven years (three exclusions) as research suggests that depression rates decline to normal population levels with increasing time since amputation.
- They were non-English speaking (three exclusions).
- They had comprehension difficulties (two exclusions).
- They had unilateral neglect (one exclusion).

The amputations included left transfemoral (above knee, $n=2$), right transfemoral ($n=4$), right knee disarticulation (through knee, $n=1$), left transtibial (below knee, $n=3$), right transtibial ($n=7$), bilateral transtibial ($n=3$), left transtibial (below knee, $n=3$), right transtibial ($n=3$), left transmetatarsal (partial foot, $n=1$), right

transmetatarsal ($n=1$). The stroke lateralities were left hemisphere ($n=8$), right hemisphere ($n=18$), and unknown ($n=1$). Stroke lesion locations included parietal ($n=5$), basal ganglia ($n=3$), occipital ($n=3$), fronto-temporal ($n=2$), fronto-parietal ($n=2$), medulla ($n=2$), pons ($n=1$), thalamus ($n=1$), internal capsule ($n=1$), unspecified ($n=7$). The types of stroke were ischaemic ($n=10$), haemorrhagic ($n=16$), and aneurysm ($n=1$). Causes of stroke were vascular ($n=24$), trauma ($n=3$), osteosarcoma ($n=1$).

For the stroke patients the primary arterial involvement was the middle cerebral artery. Because we wanted to obtain a representative sample, we did not exclude participants with a hemorrhagic or aneurysmal stroke, despite the fact that such patients may have a different clinical course and outcome from ischemic stroke.

Materials

Screening measures Patients were excluded if they had moderate to severe comprehension difficulties, but not if they had expressive difficulties. Thus only the *Receptive* scale, not the full version of the Sheffield Screening Test for Acquired Language Disorders (SST; Syder, Body, Parker, & Boddy, 1993) (SST) was used, with the cut-off 6/7 indicating difficulties with comprehension (Blake, McKinney, Treece, Lee, & Lincoln, 2002). Patients were screened for visual neglect using a line bisection task (Schenkenberg, Bradford, & Ajax, 1980) to eliminate bias when responding on the visual analogue scales used in this study. A keyword task requiring patients to explain the meanings of 21 of the most difficult words sampled from questionnaires used in the study was also used to exclude patients who could not comprehend the language used in the measures. Two patients were excluded due to failure on the SST, and three patients were excluded due to failure to comprehend the English keywords.

The Subjective Disability Depression Questionnaire (SDDQ) A review of the stroke literature and existing self-report measures (Andrewes et al., 1998; Andrewes et al., 2003; Duncan et al., 1999; Trigg & Wood, 2000) indicated a range of areas as possible contributors to post-stroke depression, including impaired communication (House, 1987; Kauhanen et al., 1999), impaired cognition (House et al., 1990; Kauhanen et al., 1999), physical disability (Dennis, O'Rourke, Lewis, Sharpe, & Warlow, 2000; Ebrahim et al., 1987; Sinyor et al., 1986), emotional dysfunction (Andersen, 1997), future concerns (Hafsteinsdottir & Grypdonck, 1997), financial concerns (Widar, Ahlstrom, & Ek, 2004), social functioning (Feibel & Springer, 1982), change in life roles (Feibel & Springer, 1982), and relationships (Schulz, Tompkins, &

Rau; van Heugten, Visser-Meily, Post, & Linderman, 2006). Based on the available literature, all possible domains have been included, with no omissions, thus these areas were developed into nine scales. Each scale item begins with the stem "Please rate how much your ..." and ends with "...has made you feel depressed since your stroke". Participants respond by placing a vertical line on a 10cm visual analogue scale ranging from "Not at all depressed" to "Extremely depressed". All questionnaire items and an item analysis are shown in Appendix A.

Standardized Depression Measures The General Health Questionnaire – 28 item version (GHQ-28) (Goldberg & Hillier, 1979), using the cut off score 10/11 (Collin, Tinson, & Lincoln, 1987) and the conventional GHQ scoring format (Goldberg & Hillier, 1979); the Hospital Anxiety and Depression Scale (HADS) (Snaith & Zigmond, 1994) using the cut-off score of 7/8 (Bjelland, Dahl, Haug, & Neckelmann, 2002) for the *Depression* scale; the self-rated *Helplessness* scale (Cronbach $\alpha = .92$) of the Emotional and Social Dysfunction Questionnaire (ESDQ) (Andrewes et al., 2003), which measures depression and anxiety in brain-damaged patients, and includes a strong element of despair for the future (Andrewes et al., 2003). Partners of patients were given the partner-rated *Helplessness* scale of the ESDQ.

Procedure

Participants completed the questionnaires while they were either inpatients on the ward, or after their outpatient appointments. The questionnaires were read to all participants but the researcher was careful to allow the patients to respond independently. Patients were asked if a "person who knows you well" (usually a spouse) would be able to complete a questionnaire. When the partner was not present, the patient was given a stamped, self-addressed envelope containing a consent form and questionnaire to pass on to their partner. Two partners of stroke patients and four partners of amputee patients failed to return the questionnaires by mail. Three stroke patients and two amputee patients could not participate because of lack of time due to a prior appointment. Five stroke patients and two amputee patients declined to participate. This project was carried out according to the National Statement on Ethical Conduct in Research Involving Humans (June 1999). All patients gave consent according to the Hospitals ethic committee requirements.

Statistical Analyses

Linear regressions were performed separately for stroke and amputee patients to check whether time since stroke

or amputation predicted depression. Neither regression was significant. Due to positively skewed distributions, the GHQ-28 *Severe Depression* scale and *Total* score, the HADS *Depression* scale, and the ESDQ self and partner-rated *Helplessness* scales were transformed using a square-root transformation, which has been recommended for use to allow parametric analysis of visual analogue data (McCormack, Horne, & Sheather, 1988; Snedecor & Cochran, 1980). A *Combined Depression* score was calculated by summing the z scores of these measures. This combined score was calculated to gain a broader and more comprehensive assessment of depressed mood.

Principal components analysis was the chosen method over factor analysis, as although both methods produce similar representations of the data when communalities are high (as was the case in this study), components analysis is argued to be more stable (Velicer & Jackson, 1990). Oblique rotation (direct oblimin) was performed as theoretically it was thought that some of the scales would be correlated. A combined analysis of the groups was conducted as this allowed for a broader spectrum of responses to be included and has the advantages of generalising the use of this measure to other patients with chronic illness.

Results

Response Frequency for the SDDQ

If a patient reported no difficulty in the area measured by a scale, they scored a zero for that scale. Table 1 shows the frequencies of all non-zero responses for the various scales of the SDDQ, e.g. 13 stroke patients reported experiencing communication problems.

Table 1: Frequency of Non-zero Responses to the Different Scales of the SDDQ

Scale	Stroke	Amputee
Communication	13	4
Cognition	16	9
Physical function	27	27
Emotional dysfunction	17	10
Future uncertainty	18	9
Finances	13	9
Social function	13	12
Roles	14	13
Relationships	7	10

Construct Validity

A principal components analysis with varimax rotation was performed on the SDDQ responses of the 55 patients. Groups were combined for this analysis to obtain a larger sample and to allow broader spectrum of responses on the SDDQ. A nine-factor solution appeared to be most interpretable on this analysis which accounted for 88.09% of the variance. The nine factors and their respective eigenvalues are shown in Table 2.

Table 2: Rotated matrix for the eigenvalues for the nine components of the SDDQ.

Factor	Eigenvalue	% Variance	Cumulative % Variance
Cognition	23.57	45.32	45.32
Relationships	5.37	10.33	55.65
Physical function	4.40	8.46	64.11
Finances	4.19	8.06	72.17
Emotional dysfunction	2.73	5.24	77.41
Roles	1.95	3.74	81.15
Communication	1.37	2.63	83.78
Social function	1.24	2.38	86.17
Future concerns	1.00	1.93	88.09

Concurrent Validity

Pearson’s product-moment correlations were used to examine the relationships between the SDDQ *Total* score and the various depression scales. Table 3 shows that all of the correlations of the SDDQ *Total* score with the depression measures are significant at the Bonferroni adjusted level of $\alpha = .008$, two-tailed. These results offer support for the construct validity of the SDDQ with the standardized psychometric assessments. Also, the *Combined Depression* score showed the highest

correlation with the SDDQ *Total* when compared to the individual depression measures (see Table 3), supporting its use as a dependent variable in a multiple regression analysis, reported in Jenkins, Andrewes, Hale, Khan, and Coetzee (2009).

Split-Half Reliability and Internal Consistency

Split-half reliability was assessed for each scale of the SDQ. Table 4 shows that the Guttman split-half coefficients range from .85 to .96. Internal consistency of the SDDQ scales was assessed and was found to be high. The internal consistency for the entire SDDQ was also high, Cronbachs Alpha = .98. After removal of five items, no further removal of items was able to increase the internal consistency of any of the scales. Although no test-retest reliability was calculated, the high Cronbach alphas meet the standard of .90 for comparing patients over time (Howard & Forehand, 1963, cited in Duncan et al., 1999).

Table 4: Guttman split-half coefficients and internal consistencies (Cronbach α) of the Subjective Disability Depression Questionnaire (SDDQ) scales.

SDDQ scale	Guttman split-half	Cronbach α
Communication	.87	.97
Cognitive	.96	.97
Physical	.93	.95
Emotional	.89	.96
Future	.85	.91
Finances	.97	.96
Social	.96	.96
Roles	.91	.96
Relationships	.95	.99

Table 3: Correlations of the SDDQ total with the combined depression score and the standardised depression measures

Depression scale	SDDQ total	Combined depression	HADS depression	ESDQ patient help	ESDQ partner help	GHQ28 depression
SDDQ total	.72**					
Combined depression	.59**	.74**				
HADS depression	.63**	.83**	.40*			
ESDQ patient help	.46**	.71**	.26	.61**		
ESDQ partner help	.57**	.79**	.60**	.51**	.30	
GHQ28 Depression	.51**	.63**	.58**	.46**	.20	.69**

* $p < .01$, (two-tailed) ** $p < .001$ (two-tailed),

Note: Significant alpha levels are after Bonferroni correction; SDDQ = Subjective Disability Depression Questionnaire; HADS = Hospital Anxiety and Depression Scale; ESDQ = Emotional and Social Dysfunction Questionnaire; GHQ28 = General Health Questionnaire

Discussion

Initial assessments of the psychometric properties of the SDDQ are satisfactory, with the data presented here suggesting that it is a reliable and valid quantitative measure of how different self-perceived disabilities contribute to depression. A principal component analysis found that the SDDQ has a nine factor structure that explains 88.09% of the variance in *Combined Depression* score. Most of this variance was explained by the first few factors, in particular *Cognition*, indicating the importance of the items that assess the influence of perceived difficulties with memory, concentration and planning. The *Future*, *Social* and *Communication* scales contributed the least variance to the model, which is likely due to their shared variance with other scales, however they still each contributed enough unique variance to remain as separate scales in the model. While the sample size for the principal components analysis is small by accepted standards. The approach of increasing sample size by combining the groups for the principal components analysis failed to obviously undermine the psychometric results which included a strong factor structure and encouraging internal consistency values. Thus the results, while requiring a degree of caution in interpretation due to the small sample size, are encouraging and warrant a further examination of this questionnaire as a useful measure of subjective depression.

Previous studies have excluded patients with a previous diagnosis of depression, have thus been unable to generalize their results to these patient groups. However, in the present study, we made no such exclusions as we set out to assess patients that were generally representative of those that had undergone rehabilitation in an Australian setting. Therefore this study provides a useful guide for a larger multi-centre study with improved statistical power.

Finally, these results provide preliminary support for the use of the SDDQ to identify areas that require psychological support in the individual patient. Research into psychological therapies for depression following stroke is in its infancy with initial attempts having mixed but generally disappointing results (Kneebone & Dunmore, 2000; Lincoln, Flannaghan, Sutcliffe, & Rother, 1997). The SDDQ may be usefully employed in such studies where the aim is to change attitudes and improve coping in the various areas covered by this questionnaire.

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Appendix A

Subjective Disability Depression Questionnaire

At the beginning of each scale, there is a question "Please rate how much difficulty you have had withsince your stroke". Participants respond on a 10cm visual analogue scale ranging from "Not at all difficult" to "Extremely difficult". Participants who report no difficulty with that area score a zero for that scale, and move on to the next scale. This allows for the faster completion of the questionnaire, which may take from anywhere between five minutes and half an hour for a stroke patient to complete.

Each scale item begins with the prefix "Please rate how much your ..." and ends with the suffix "...has made you feel depressed since your stroke". The amputee version of the questionnaire is appropriately re-worded.

Scale / Item	Cronbach α
Communication Scale	.93
difficulty understanding others	.89
speech difficulties	.89
Cognition Scale	.96
difficulty remembering appointments	.86
trouble remembering what you wanted to do next	.80
trouble remembering where you have put something	.95
trouble concentrating on what people say	.91
trouble concentrating when there is a lot of background noise	.84
trouble concentrating when reading a book or newspaper	.82
difficulty getting things done	.88
difficulty following instructions	.89
trouble planning the day	.75
Physical scale	.95
difficulty using your hands, legs or other body parts	.82
difficulty getting around	.78
difficulty in doing some everyday tasks e.g. eating or using phone	.78
failure to sometimes reach the toilet in time	.71
loss of balance while standing or walking	.84
dependence on medication or medical treatment	.87
pain you often suffered from a part of your body	.87
being unable to do your favourite exercise	.75
Emotional dysfunction	.96
difficulty in controlling your emotions	.89
your expression of emotions that are not appropriate	.95
difficulty expressing your true emotions to others	.93
difficulty understanding other people's emotions	.85
sometimes crying even though you're not sad	.87

Scale / Item	Cronbach α
Future concerns	.88
worries about your family's future	.84
worries that you won't get to live at home again	.78
fear of dying	.84
Finances	.96
worries about being unable to have a job	.81
worries about being unable to financially support self or others	.92
worries about the costs of hospital stays and/or medication	.88
worries about how you are going to afford to live	.93
partner or family member quitting their job to care for you	.80
worries that you are a financial burden to your family	.88
Social	.95
feelings you have nobody to count on for emotional support	.90
worries that it upsets family/friends to visit you	.92
being unable to meet up with people	.91
worries that your partner/family sometimes get impatient with you	.89
partner/family's lack of time to go out or meet up with people	.86
Roles	.94
inability to help others in need	.79
worries that you are a burden to others	.84
feelings you can't perform your role as a friend/family member	.91
inability to do your favourite hobby	.84
loss of independence	.86
Relationships	.99
worries that your partner/family/friends are not very helpful	.95
worries that others don't understand your problems	.98
worries your relationships with others have changed	.98
feelings that you are not loved by your partner/family/friends	.98
feelings that you took your relationships for granted before	.97

Additional questions included in the SDDQ: Questions about personal or family psychiatric history: diagnosis by a doctor (Yes/No), what medication or treatments were received (open-ended), and were you/they hospitalized? (Yes/No). Questions about drug use: alcohol, cannabis, other (Yes/No), if yes "How big of a problem do you consider this substance use to be?" (10cm visual analogue scale), and frequency of substance use (few times a day to once a month).