

Subjective Attributes of Depression, Part 2: The Contribution of Self-Perceived Disability to Depression Following Stroke

Lisanne M. Jenkins (lisannej@unimelb.edu.au)

The Department of Psychology, The University of Melbourne, Victoria, Australia. Level 12, Redmond Barry Building, School of Behavioural Science, The University of Melbourne, Parkville, Victoria, Australia, 3010

David G. Andrewes (andrewes@unimelb.edu.au)

The Department of Psychology, The University of Melbourne, Victoria, Australia. Level 12, Redmond Barry Building, School of Behavioural Science, The University of Melbourne, Parkville, Victoria, Australia, 3010

Tom Hale (Tom.Hale@mh.org.au)

The Department of Rehabilitation, The Royal Melbourne Hospital, The Royal Park Campus, Victoria, Australia. P.O. Box 7000, Carlton South, Victoria, Australia, 3053

Nicolene Coetzee (nicoetze@bond.edu.au)

Bond University, Queensland, Australia. Level 1, Humanities and Social Sciences building, Bond University, Queensland, Australia, 4229

Fary Khan (Fary.Khan@mh.org.au)

The Department of Rehabilitation, The Royal Melbourne Hospital, The Royal Park Campus, Victoria, Australia. P.O. Box 7000, Carlton South, Victoria, Australia, 3053

Abstract

This study aimed to evaluate the factors leading to depression following stroke and amputation according to the patients own self-report. **Method:** Twenty-seven stroke patients and partners, and 28 amputees and partners from a rehabilitation centre completed the Subjective Disability Depression Questionnaire (SDDQ), Hospital Anxiety and Depression Scale, General Health Questionnaire-28, and Emotional and Social Dysfunction Questionnaire. **Results:** Stroke patients scored higher than amputee patients on all depression measures. Stepwise regression models using the SDDQ scales to predict a *Combined Depression* score were completed. For the stroke group, the model comprised perceived *Cognitive Difficulties* and *Emotional Dysfunction* ($R^2=.68$). For the amputees, the *Relationships* scale was the only scale to enter the model ($R^2=.41$). **Conclusions:** This study identified factors contributing to depression following stroke and amputation.

Key words: *Affective symptoms; Amputation; Cognition; Family relationships; Stroke*

Introduction

Understanding the psychological factors that predispose individuals to depression is important for the development of psychological treatments aimed at ameliorating depression. This knowledge is especially important in the case of patients with chronic illness or disabilities that influence their mood state. Depression is the most common mood disorder to follow stroke (Starkstein & Robinson, 1989), with major depression

affecting around one quarter to one third of patients (Beekman et al., 1998; Ebrahim, Barer, & Nouri, 1987; Hackett, Yapa, Parag, & Anderson, 2005; Pohjasvaara et al., 1998). The importance of investigating depression in stroke patients is demonstrated by findings that such patients are slower to recover and have an increased risk of mortality (Morris, Robinson, Andrzejewski, Samuels, & Price, 1993; Sinyor et al., 1986). These findings are not obviously related to some intermediate variable such as lesion size (Astrom, Adolfsson, & Asplund, 1993; Herrmann, Black, Lawrence, Szekely, & Szalai, 1998). The present study focused on reactive depression, which is depression that may be associated with disability or changed life circumstances.

The aim was to evaluate the subjective factors that are likely to have caused or increased depressed mood in stroke patients. We used the Subjective Disability Depression Questionnaire (SDDQ; Jenkins, Andrewes, Hale, Khan, & Coetzee, 2009) to evaluate the quantitative contribution of a wide range of subjective disabilities to depression. A comparison was made on this scale with amputee patients in order to gauge whether the extra brain damage suffered by stroke patients influenced the pattern of their rated causes of depression. These amputee patients often experience similar physical and social handicaps to stroke patients, but don't usually experience cognitive difficulties as they have not suffered major brain damage. Thus we hypothesised that stroke patients would rate cognitive

difficulties as contributing more to depression than stroke patients.

Decreased functioning in a range of areas, including social, psychological, and physical domains, has also been found in depressed amputees (Jones, Hall, & Schuld, 1993; Williamson, Schultz, Bridges, & Behan, 1994). Similarly, depression has been associated with physical disability in many studies of stroke patients (Chemerinski, Robinson, Arndt, & Kosier, 2001; Dennis, O'Rourke, Lewis, Sharpe, & Warlow, 2000; Ebrahim et al., 1987; Sinyor et al., 1986), although there are exceptions (Robinson & Price, 1982), however, previous research has found that the degree of assessed physical disability accounts for little of the overall variance in post stroke depression (PSD) (Wade, Legh-Smith, & Hewer, 1987). Depression in stroke patients has also been associated with emotionalism (Calvert, Knapp, & House, 1998; MacHale, O'Rourke, Wardlaw, & Dennis, 1998), stroke severity (Hackett & Anderson, 2005) as well as global cognitive impairment (House, Dennis, Warlow, Hawton, & Molyneux, 1990; Kauhanen et al., 1999; Nys et al., 2005). Given the variety of results from these studies, we employed a multiple regression model to assess the relative contribution of subjective disability in each of the areas to clinical measures of depression.

Method

Participants

A total of 104 people participated in the present study. 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).

Locations of stroke and levels of amputation are described elsewhere (Jenkins et al, 2009). It must be noted that for many amputees, the reason for

amputation was vascular, thus it remains possible that these patients had some clinically undetected damage to the brain, however we reasoned that any brain damage that was too minor to be detected by the referring neurological rehabilitationist, or by the researcher when screening for cognitive impairment using the Sheffield Screening Test for Acquired Language Disorders (SST; Syder, Body, Parker, & Boddy, 1993), would not be a subjective cause of depression for the patient.

Although we were not interested in differences in objective level of disability, as a manipulation check to ensure that differences between groups were in fact due to differences in perceived and not objective levels of disability, we compared stroke and amputee patients' scores on the Functional Independence Measure (FIM; Granger, Hamilton, Keith, Zielesny, & Sherwin, 1986), which assesses the degree of assistance required to perform basic life activities such as self-care, transfers and locomotion. There were no significant differences between stroke and amputee patients in Total FIM score ($t(53)=.16, p=.87$).

Materials

Screening measures Participants were screened for severe comprehension deficits using the Receptive scale of the SST (Syder et al., 1993), 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.

The SDDQ This is a new questionnaire designed to quantify how much a patient's self-perceived disability in a particular area contributes to their measured depression. The questionnaire is presented elsewhere (Jenkins et al., Part 1), along with preliminary evidence for its acceptable reliability and validity. Briefly, the 9 scales measure self-perceived disability in the areas of Communication, Cognition, Physical function, Emotional dysfunction, Future uncertainty, Finances, Social function, Roles, and Relationships.

Standardized Depression Measures The General Health Questionnaire – 28 item version (GHQ-28; Goldberg & Hillier, 1979), using the cut off score 10/11 advocated by 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 suggested by Bjelland, Dahl, Haug, and Neckelmann (2002) for the Depression scale; the self-rated Helplessness scale 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. This significantly correlated with the self-rated version ($p = .61$, see Jenkins et al., 2009, Table 4 for correlations between all measures).

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

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 favoured over the use of one single depression measure as it allows a sample of a wider range of depressive complaints, and because it showed the highest correlation with the SDDQ Total when compared to the individual depression measures (Jenkins et al., 2009). The SDDQ scales were also transformed using a square root transformation due to positively skewed distributions. Stepwise multiple regression was used to determine which of the SDDQ scales predicted the Combined Depression score for the stroke and amputee patients.

Results

Comparisons of Diagnostic Features

Of the stroke patients, 44.4% were taking antidepressants, compared to 35.7% of amputee patients. There was no significant difference in Combined Depression score between individuals with a self-reported pre-morbid diagnosis of depression ($n=6$) and those without ($n=49$), ($F(1,53)=2.62$, $p=.11$, $\eta^2=.05$). There was no difference in Combined Depression score between patients with different lesion

lateralities, lesion locations, stroke types, stroke causes, amputation levels, or amputation causes. Time since stroke or amputation did not significantly predict Combined Depression score for either stroke ($R^2=.03$, $p=.39$) or amputee ($R^2=.01$, $p=.63$) patients. For the stroke group, there was no significant difference in Combined Depression score between inpatients ($n=10$, $M=1.81$, $SD=.46$) and outpatients ($n=17$, $M=2.35$, $SD=.82$) ($t(25)=-1.92$, $p=.07$). Similarly, for amputee patients there was no significant difference in Combined Depression score between inpatients ($n=11$, $M=1.61$, $SD=.61$) and outpatients ($n=17$, $M=1.63$, $SD=.50$) ($t(26)=.09$, $p=.93$).

Comparison of Depression Frequencies

Frequencies of depression in stroke and amputee groups were calculated using suggested cut-off scores. Using the GHQ-28, the frequency of depression was 33.33% for stroke patients and 3.57% for amputee patients. This difference was significant, ($F(1,53)=9.27$, $p=.00$, $\eta^2=.15$). For the HADS Depression scale the frequency of depression was 33.33% for stroke patients and 10.71% for amputee patients ($F(1,53)=4.30$, $p=.04$, $\eta^2=.08$). Based on the finding of a 33.33% frequency of depression using both the HADS and the GHQ-28, cut-off scores for the ESDQ Helplessness scales were calculated, in the interest of future research. Approximately 33.3% of stroke and amputee patients scored above 1.8 for the self-rated scale and 2.4 for the partner-rated scale.

Comparison of Depression Measures

A 2 (Group) x 6 (Scale) MANCOVA using age as a covariate (because the amputee group was significantly older than the stroke group), showed that stroke patients scored higher than amputee patients on all depression scales (Wilks' Lambda=.69, $F(6,47)=3.56$, $p=.01$, $\eta^2=.32$), as shown in Figure 1. There was a significant difference between groups for the GHQ-28 Total score ($F(1,52)=10.07$, $p=.00$, $\eta^2=.18$).

Comparisons of SDDQ Scales

A 2 (Group) x 9 (SDDQ Scale) MANCOVA using age as a covariate found no significant main effect for group (Wilks' Lambda=.76, $F(9,44)=1.59$, $p=.15$, $\eta^2=.25$). Figure 2 shows that the means of all SDDQ scales except *Relationships* were higher for stroke than amputee patients. This difference was significant for the Communication scale ($F(1,52)=4.06$, $p=.05$, $\eta^2=.07$).

Stepwise Regression of the SDDQ

Due to inter-correlations between the scales of the SDDQ, a stepwise multiple regression was used to identify which factors uniquely predicted the Combined Depression score without any confounding contribution that may be due to the general pessimism that might result from depression. Stepwise regressions were performed separately for each group. See Appendix A for correlations between the variables entered into the model (i.e. SDDQ scales).

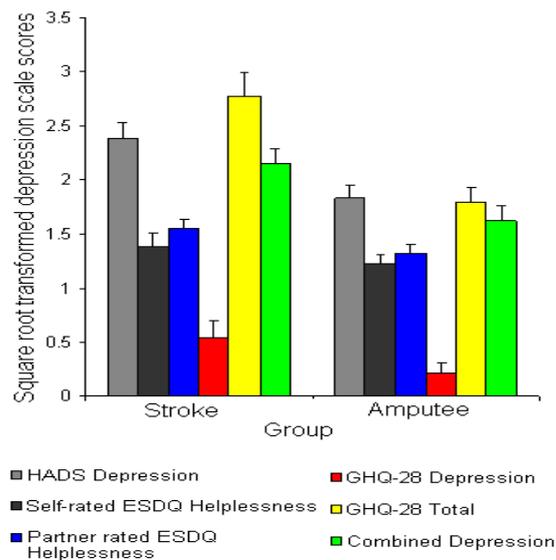


Figure 1: Transformed mean depression scale scores (and standard errors) for the stroke ($n=27$) and amputee Patients ($n=28$), including the square root transformed combined depression score, and the GHQ-28 total score.

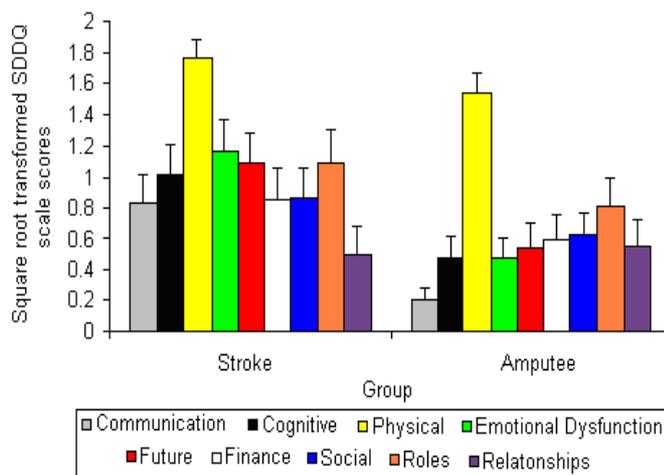


Figure 2. Mean square root transformed SDDQ scale scores (and standard errors) of the stroke ($n=27$) and amputee ($n=28$) patients

For the stroke model, the Cognitive scale was the first variable to enter the model (see Table 1), resulting in an R^2 value of .53. The addition of the Emotional Dysfunction scale increased the R^2 to .68, which was significant ($F(2,24)=25.81, p=.00$). Taken together, the results of this stepwise regression support the proposal that the stroke patients will rate perceived cognitive deficits as contributing more to depression than amputee patients. For the amputee model, the Relationships scale was the only variable to enter the

model (see Table 1). The R^2 value of .38 was significant ($F(1,26)=15.93, p=.00$).

Discussion

Differences in depression were found between the stroke and amputee groups. Stroke patients were found to have a higher frequency of depression, and there were significant differences between groups on the depression measures both overall and for the GHQ-28 Total score. Differences between groups approached significance for the Combined Depression and HADS Depression scales. An explanation as to why there were differences on these depression scales and not the ESDQ Helplessness scales or the GHQ-28 Depression scale may be due to the items of these latter instruments being more focussed on severe depression. Evidence for this argument comes from Figure 1 where it can be seen that these three scales had the lowest scores for both groups. A larger sample containing patients with a broader spectrum of depression severity may be necessary for clearer differences between groups to appear.

Differences were found between stroke and amputee groups using the SDDQ. For the stroke patients, perceived cognitive and emotional dysfunction contributed significantly to measure depression ratings. This offers support for previous studies using a correlative approach which have found a relationship between PSD and cognitive deficits (Kauhanen et al., 1999; Nys et al., 2005).

These previous findings, in addition to the present results, offer support for the contention that emotional disturbances such as depression in brain-damaged patients are a reaction to cognitive deficits (Reitan & Wolfson, 1997). The Emotional Dysfunction scale contains questions pertinent to House's definition of emotionalism (House, Dennis, Molyneux, Warlow, & Hawton, 1989) as the tendency of weakly giving way to emotion. Although they are not considered as overlapping conditions, depressed mood often coincides with emotionalism (Calvert et al., 1998; MacHale et al., 1998), which may suggest that some of this reported depression is an emotional reaction to the everyday experience of the effects of emotionalism.

These results provide evidence of the interaction between organic (Allman, 1991) and psychological processes, whereby emotionalism may lead to social avoidance and reduced quality of social interactions, and thereby exacerbate coexistent depression (Calvert et al., 1998). Comments made by the participants of embarrassment associated with reflex crying supported this view that social embarrassment is a key component in understanding this contribution to depression.

The Relationships scale was the only scale to statistically contribute to the multiple regression model for the amputee patients. This scale measures perceived problems with social support. While previous research has found that depression after amputation is influenced by psychosocial factors such as perceived social support (Rybarczyk, Nyenhuis, Nicholas, Cash, & Kaiser, 1995), less satisfaction with social contacts (Williamson

Table 1: Results of the separate stroke and amputee stepwise regressions for combined depression score

Model	Step	R ²	SDDQ scale	Semipartial correlation	Unstandardised beta	Standardised beta	t	p
Amputee	1	.41	Relationships	.62	.37	.62	3.99	<.001
Stroke	1	.53	Cognitive	.73	.56	.73	5.26	<.001
	2	.68	Cognitive	.54	.44	.58	4.68	<.001
			Emotional	.40	.31	.42	3.45	.002

et al., 1994), social discomfort (Rybarczyk et al., 1992), and social isolation (Thompson & Haran, 1984), this is a new finding given the method used here. These results provide evidence for the view that interventions aimed at improving the quality of social relationships after amputation may also help to alleviate depression in these patients (Chwalisz & Vaux, 2000; Jensen et al., 2002). While it remains possible that the amputee patients have some clinically undetected cerebral involvement, there was, however, a clear difference between stroke and amputee patients which is likely to relate to the brain damage suffered by the stroke patients. This difference was found in the stroke patients' greater tendency to report that their depression was attributed to cognitive impairment and the type of emotional incontinence that is often reported by these patients.

Stroke patients experience a wide range of physical deficits that restrict many of their valued life activities (Clarke, Black, Badley, Lawrence, & Williams, 1999), however, like the amputees in this study, previous research has found the degree of physical disability accounts for little of the overall variance in PSD (Wade et al., 1987). Therefore, while physical handicap is a salient and frequently reported reason for depressed mood, it actually contributes less to measured clinical depression, perhaps because other factors are less easily compensated for or coped with. Although the SDDQ alone provides important information when considering the counselling of stroke patients with or without depression, in this study it is the results of the multiple regression analysis which reveals the contribution of factors to clinical depression.

This study provides a useful guide for a larger study with improved statistical power. The findings of this study highlight the need, when counselling depressed stroke patients, to address the patients' own attitude to their cognitive impairment and emotional problems.

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- N.B. Persons wishing for a copy of the Subjective Depression Questionnaire should apply to the communicating author.

Correspondence to: Ass Prof David Andrewes
 Department of Psychology, University of Melbourne,
 Victoria 3010
andrewes@unimelb.edu.au

Appendix A

Total correlations of the scales of the SDDQ

Scale	Communication	Cognitive	Physical	Emotional dysfunction	Future	Finance	Social	Roles
Communication								
Cognitive	.34*							
Physical	.17	.39**						
Emotional dysfunction	.48**	.32*	.42**					
Future	.44*	.32*	.38**	.48**				
Finance	.22	.29*	.24	.46**	.57**			
Social	.16	.37**	.39**	.44**	.55**	.67**		
Roles	.17	.23	.55**	.50**	.33**	.36**	.57**	
Relationships	.14	.28*	.35**	.30**	.58**	.47**	.56**	.37**

* $p < .05$, ** $p < .01$