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Depression among Chinese stroke survivors six months after discharge from a rehabilitation hospital

ABSTRACT

Aims. The primary aim was to examine the prevalence of post-stroke depression in Chinese stroke survivors six months after discharge from a rehabilitation hospital. A second aim was to determine if six-month post-stroke depression was associated with psychological, social and physical outcomes and demographic variables.

Background. There has been increasing recognition of the influence of depression on post-stroke recovery. While some previous studies report associations between depression and social, psychological, physical and clinical outcomes, few studies had sufficient sample sizes for regression analysis thereby limiting the clinical applicability of their findings.

Design. A cross-sectional design was used.

Methods. Data were collected from 124 male and 86 female stroke survivors (mean age 71.7, SD 10.2 years). The Geriatric Depression Scale was used to measure depression, the State Self-esteem Scale to measure state self-esteem, the London Handicap Scale to measure participation restriction, the Social Support Questionnaire to measure satisfaction with social support and the Modified Barthel Index to measure functional ability.

Results. Forty-two survivors (20.5%) reported mild and 33 (16.1%) reported severe, depression. The presence of depression was associated with low levels of state self-esteem, social support satisfaction and functional ability. Logistic regression analysis revealed that

these variables were statistically significant in predicting the probability of having depression ($p < 0.05$).

Conclusions. Analyses in the present study revealed distinct patterns of correlates of depression and the results were in agreement with prior studies that depression has a consistent positive association with physical disability, living arrangements and social support and no significant association with the different types of brain lesion.

Relevance to clinical practice There is a need, routinely, to assess stroke survivors for depression and, where necessary, to intervene with the aim of enhancing psychological and social well-being.

Key words: Depression, Stroke, Stroke rehabilitation, nurses, nursing older people

INTRODUCTION

Depression affects health and well-being and is a disabling condition that warrants serious attention (Lopez & Mathers 2006). Although depression after stroke is common, it is often not treated, with approximately half of survivors remaining depressed at one year (Wade *et al*. 1987). A recent study conducted by Paul (2006) assessed depression in 289 participants (mean age=73 years) using the Irritability, Depression and Anxiety scale. The investigators identified depression in 17% of the group. While some reports suggest the prevalence of post-stroke depression following stroke is common (Whyte & Mulsant 2002), a review of 14 studies by Whyte and Mulsant (2002) indicated that the prevalence of major depression at one to two months post-stroke ranged from 9- 37%. A wider range of 17-69% prevalence of depression following stroke has been reported among stroke survivors in Hong Kong (Tang *et al*. 2002, Tang *et al*. 2003, Tang *et al*. 2004a, Tang *et al*. 2004b, Fung *et al*. 2006, Lui *et al*. 2006, Sit *et al*. 2007, Tang *et al*. 2007). These differences in prevalence may be explained by the use of different assessment tools or different inclusion criteria. Most of the above studies assessed only first-stroke survivors (Tang *et al*. 2002, Tang *et al*. 2003, Tang *et al*. 2004b, Tang *et al*. 2004c, Tang *et al*. 2007, Sit *et al*., 2007), while others assessed first and/or recurrent stroke survivors (Fung *et al*. 2006, Tang *et al*. 2004a, Tang *et al*. 2005, Tang *et al*. 2006). Lui *et al*.'s (2006) study comprised older stroke survivors recruited from two stroke clubs in the community with an unknown history of previous strokes. Several limitations are

apparent in these studies, including relatively small sample sizes ranging from 45-189 (Tang *et al*. 2003; Tang *et al*. 2005) and the exclusion of survivors with, for example, a history of dementia and physical frailty (Tang *et al*. 2002), thus restricting the generalisability of the findings.

Depression after stroke is postulated to result either from the direct biological effect of brain infarction or a reaction to the significant losses associated with the stroke (Kelly-Hayes *et al*. 1998). However, the evidence for neuro-anatomical determinants of post-stroke depression is conflicting (Gainotti & Marra 2002, Bhogal *et al.* 2004, Aben *et al*. 2006). Mast (2004) used a structural-equation modelling approach to examine depressive symptoms among a group of 176 geriatric stroke survivors and 400 general-medical-geriatric survivors and found that stroke survivors were more likely to exhibit greater social withdrawal and less agitation than general-medical survivors, suggesting the etiological contribution of cerebrovascular disease to late-life depression. An earlier systematic review on lesion location and depression after stroke indicated that there was no evidence that the location of the lesion was a factor in the risk of depression (Carson *et al*. 2000).

While there is some evidence of an association between depression and social, psychological, physical and clinical outcomes, many studies have focussed on limited numbers of outcomes & associations. Stewart *et al*. (2001) found a significant correlation between depression as measured by Geriatric Depression Scale (GDS) and participation

restriction as measured by the London Handicap Scale in a sample of 20 stroke survivors with a history of stroke from 3-20 years. In a Swedish population-based cohort with first-ever stroke evaluated at one year, functional outcome as measured by the Modified Rankin Scale appeared to be the best predictor of depression (Appelros & Viitanen 2004). Another study that more comprehensively addressed post-stroke outcomes was of 95 Chinese stroke survivors followed up six months after admission to a rehabilitation setting. A higher level of depression at six months was significantly associated with being a homemaker, having more depression at baseline, a higher level of functional disability, less social companionship and poorer informational support at six months. These five variables account for 55% of the variance of depression (Sit *et al* 2007). However, studies of associations with post-stroke depression to date suffer several methodological problems. The data were collected from different time points from acute post stroke period to many months after stroke. For studies using regression analysis, the events per variable ratio were sometimes insufficient. No pre-analysis screening procedures to test the assumptions of linearity and normality were reported in some studies, thus limiting the clinical applicability of findings.

Thus far, few studies have been published regarding the factors predicting depression in the longer-term post-stroke using logistic regression analysis. Appelros and Viitanen used the GDS to screen 253 stroke survivors for depression. Functional outcome as measured by the Modified Rankin Scale and lacunar infarction were predictors of depression one year after the

stroke event (Appelros & Viitanen 2004). The model had low predictability and accounted for only 24% of variance in outcome (Appelros & Viitanen 2004). In a prospective cohort study of 165 first-ever stroke survivors admitted for rehabilitation, depression was measured using the Center for Epidemiologic Studies Depression Scale. At three-years post-stroke, the presence of depression was predicted by one year instrumental activities of daily living (e.g. housekeeping, food preparation, use of transportation and shopping) and fatigue (van de Port *et al*. 2007).

The primary aim of this study was to examine the prevalence of post-stroke depression in Chinese stroke survivors six months after discharge from a rehabilitation hospital. A secondary aim was to determine if six-month post-stroke depression was associated with psychological, social and physical outcomes and demographic variables.

METHODS

Study design

This study used a cross-sectional design. Data about psychological (post-stroke depression, state self-esteem), social (participation restriction, social support) and physical outcomes (functional ability) were collected from 210 stroke survivors at six months following their discharge from one of the two rehabilitation hospitals in Hong Kong.

Setting and sample

To examine the influence of number of stroke episodes on post-stroke outcome the study included survivors with a first-ever stroke as well as those with a history of previous stroke. Stroke types were classified according to the results of neuroimaging. The inclusion criteria were that stroke survivors had a score of 18 out of a possible 30 for the Mini Mental State Exam (MMSE), were a resident of Hong Kong and could communicate and were able to understand Cantonese. The cut off point of MMSE is based on the education level, so as the majority of stroke patients in Hong Kong have been educated to lower than ninth grade, the cut-off is 18 (Crum *et al*. 1993). Originally, these acute stroke survivors had transferred for rehabilitation from acute hospitals in one geographical region. The average length of stay in the rehabilitation hospitals ranged from two to three weeks and the rehabilitation programme comprised medical and nursing care, physiotherapy and occupational therapy. Data collection took place six months after their discharge in either the survivor's home or other discharge destination such as a residential care facility. Sample size was calculated with a power analysis. A sample size of 200 was needed for multiple regression analysis with twelve independent, socio-demographic and disease-specific variables and an anticipated medium effect size with a power of 80% and $p< 0.05$ (Cohen 1992). The samples were obtained from convenient samples.

Measures

Depression: the GDS is a 30-item scale with yes/no answers, with a score of 11 indicating mild depression and a score of 17 signifying severe depression (Yesavage 1988). The GDS can reliably screen for symptoms in stroke populations according to the American Heart Association (Kelly-Hayes *et al*. 1998). The scale is used extensively as a clinical screening tool and research instrument in Western and Chinese stroke populations and has good psychometric properties (Tang *et al*. 2004a, b, c). The Chinese (Cantonese) back-translated version of the GDS was validated and the alpha coefficient for the Chinese GDS was high at 0.89 and the test-retest reliability coefficient was 0.85 (Chan 1996). Correlational analysis revealed the Chinese GDS has excellent convergent validity when assessed against the London Handicap Scale in a sample of 265 stroke survivors (Chau *et al*. 2006). In the current study the Cronbach alpha for the GDS was 0.91.

State Self-esteem: the State Self-esteem Scale (SSES) comprises 20 items (Heatherton & Polivy 1991). Participants rate whether each item is true of themselves 'right now', using a five-point Likert scale with 1 = not at all and 5 = extremely, yielding a total possible score of 20-100, with high scores indicating higher levels of state self-esteem. The SSES has a high internal consistency with a Cronbach's α of 0.92 in Heatherton & Polivy's study and in a Hong Kong study of stroke survivors, the α for the Chinese SSES was 0.85 (Chang 1999). In this study the Cronbach alpha for the SSES was 0.88.

Participation restriction: the London Handicap Scale (LHS), used to measure restriction in

participation, is a six-item tool and for each of the six dimensions of handicap respondents rate the extent (0 = extreme disability and 5 = no disability) to which their level of health inhibits them from performing the activity: getting around, looking after yourself, work and leisure, getting on with people, awareness of your surroundings, affording the things you need (Harwood *et al*. 1994). High scores on the LHS indicate low participation restriction. The LHS was translated into Chinese and Lo *et al*.'s (2007) study found a significantly positive correlation between the mean ratings of the translated version of LHS scores between Hong Kong and the UK subjects (r=0.87, p=0.001). In this study the Cronbach alpha was 0.74.

Social support: the Social Support Questionnaire (SSQ6) was used to determine the quantity of support each patient had as well as their satisfaction with the support provided (Sarason *et al*. 1987). Respondents indicate from 0-9 the number of support persons they have for the six situations (number score) and rate their overall satisfaction with the support provided, using a 6-point Likert scale (satisfaction score), higher SSQ6 satisfaction scores being indicative of more satisfaction with social support received. The alpha coefficient for the Chinese version of the satisfaction with social support (SSQ6) was 0.92 (Chang 1999). In this study the Cronbach alpha for the satisfaction with social support (SSQ6) was 0.93.

Functional ability: the Modified Barthel Index (BI) (Granger *et al*. 1979) is designed to assess the degree of independence a patient has in performing the various self-care and mobility

activities of daily living (ADL) tasks (Graham 2005). It comprises 15 items rated on three-point scale: 'Can do by myself', 'Can do with help of someone else' and 'Cannot do at all' with predetermined scores according to which of the three ratings is selected, with 0 for the 'Cannot do at all' rating. The total possible score ranges from 0 (total dependence) to 100 (total independence). A systematic review conducted by Geyh *et al*. (2004) indicates that the BI scale was applied in 51% of the strokes randomised controlled trials. In this study the Cronbach alpha for the BI was 0.94. Demographic information including age, gender, marital state, educational level, occupation, religion, type and number of strokes and living arrangement were also collected.

Procedure

Approval was obtained from the Ethics Committee of the Chinese University of Hong Kong and the local cluster hospital ethics committees. All survivors meeting the inclusion criteria were asked to participate following an explanation of the purpose, their rights and freedom to withdraw from the study. If they agreed to participate they were asked to sign the consent form. All survivors agreeing to participate in the study were interviewed by research nurses. All questionnaire data were collected using a demographic form and self-report scales by interview. Interview approach was used to help ensure consistency of data collection and to overcome some of the difficulties faced by those patients who were illiterate. The interview took about 45 minutes. To establish the equivalence reliability by data collectors, pilot studies

were conducted and three stroke patients who met the inclusion criteria were recruited with three research nurses asked to participate in the interviewing process. The Pearson's correlation coefficient inter-rater reliability data obtained during the interview were compared and calculated as percentage agreement between them. The measurements of interrater reliability (r = 0.97) verified the consistency of ratings.

Data analysis

The variables were summarised using descriptive statistics. All the dependent and independent variables were examined for normal distribution. The Lilliefors test indicated that most of the normally distributed null hypotheses would be rejected with p values of less than 0.05. Thus Spearman's rank correlation tests were used to determine if there were significant correlations between the dependent and independent variables and scatterplots were used to assess the shape of the distribution and to check for linearity prior to the analysis. Multiple logistic regression was used to estimate the probability of having depression (non-depressed vs mild to severe depression) using the independent variables of: functional ability, participation restriction, state self-esteem, social support and demographic variables including age, gender, education level (less than primary, primary, secondary/tertiary), marital status (single, married, divorced, widowed), religion (yes, no), living arrangement (home, residential care) and type (ischaemic, haemorrhagic, non-specific) and number of strokes. Linear regression analysis was performed to determine the strength of

associations with those variables found to have significant correlations with depression. Mann-Witney U-tests and chi-square tests were used to explore differences between groups for interval and nominal level data. The data were analysed using SPSS version 15.0 (SPSS Inc., Chicago, IL, USA); $p < 0.05$.

RESULTS

Sample characteristics

Of the 210 survivors recruited, most of whom were male (59.0%), married (68.1%), had received primary or less than primary school education (75.2%) and had a right hemisphere lesion (41.9%). Their ages ranged from 45-91 years (mean 71.7, SD 10.2). Of the 210 survivors studied, 173 (82.4%) remained living in their own home at six months and 37 (17.6%) lived in a residential care facility.

Psychological, social and physical outcomes in stroke survivors at six months

Forty-two (20.5%) survivors were reported to be mildly depressed (GDS score 11-16) and 33 (16.1%) severely depressed (GDS score 17-30). The state self-esteem score for 26 (12.8%) survivors was 60 or below (out of a possible of 100), a level indicated to be very low (Heatherton & Polivy 2001). The mean social support satisfaction score was 31.2 (SD 6.4) out of a possible score of 36, indicating that survivors were generally satisfied with the social support being offered. The number of social support persons ranged from 1-13. The mean BI score was 87.7. For 23 (11%) survivors the BI was 60 or below, indicating that they were

markedly dependent in self-care and mobility (Carod-Artal *et al*. 2000). Eighty-two (39.0%) survivors were independent in Activities of Daily Living (ADLs) with BI =100. A significant proportion (142, 67.9%) of survivors needed to use aids such as a wheelchair, frame, or Quad and stick, whether they resided at home or at a residential care facility. The LHS item related to economic self-sufficiency had the lowest mean score of 2.8 (SD 1.6) out of a possible score of 5 indicating that they were generally not able to afford the things that they need. Another item related to work or leisure also had a relatively lower mean score of 3.0 (SD 1.6), indicating that stroke had an impact on social participation and social functioning.

Associations between psychological, social, physical outcomes and demographic variables

Age was significantly correlated with functional ability (r_s = -0.21, p=0.003) and participation restriction (r_s = -0.15, p=0.029). The number of strokes was significantly and negatively correlated with both functional ability (r_s = -0.24, p=0.001) and participation restriction (r_s = -0.20, p=0.003). At six months, 37 (17.6%) survivors were living in residential care facilities. This group had a significantly lower level of functional ability and state self-esteem, a higher level of participation restriction, were more depressed and less satisfied with the social support received (Table I).

The results show those who lived in a residential care facility were more likely to have mild to severe depression (54.1% residential care vs 32.7% home). There were significant differences in the prevalence of mild to severe depression between those who

lived at home and those who lived in a residential care facility ($\chi^2_{(df=1)}$=5.94, p = 0.02) (Table II).

No association between the location of brain lesion (left hemisphere lesion vs right hemisphere lesion vs non-specific) as a result of stroke and post-stroke depression was found ($\chi^2_{(df = 2)}$ = 1.01, p = 0.60). There was also no association between the type of stroke (ischemic stroke vs hemorrhagic stroke vs non-specific) and post-stroke depression ($\chi^2_{(df = 2)}$ = 2.59, p = 0.28).

A logistic regression model to estimate post-stroke depression

Multiple logistic regression was used to estimate the probability of having post-stroke depression (non-depressed versus mildly to severely depressed) at six months using the independent variables of: functional ability, participation restriction, state self-esteem, social support satisfaction and demographic variables including age, gender, education level (less than primary, primary, secondary/tertiary), marital status (single, married, divorced, widowed), religion (yes, no), living arrangement (home, residential care facility), type of stroke (ischaemic, haemorrhagic, non-specific) and number of stroke measured at six months.

Logistic regression analysis revealed that the variables of functional ability, state self-esteem and social support satisfaction were statistically significant predictors of depression ($p < 0.05$). According to the Wald statistic, lower levels of functional ability, state self-esteem and social support satisfaction were associated with an increased likelihood of

having depression, with z = 5.30, 34.12 and 5.51 respectively (Table III). This model accounted for a significant percentage of variance in outcome (Cox & Snell R^2 = 0 .44, Nagelkerke R^2 =0.61). From the classification table (see Table IV), the overall success rate of prediction was 84.7%, with 90.6% and 74.7% of the survivors correctly predicted as non-depressed and as mildly to severely depressed, respectively.

Associations with depression at six months

Linear regression analysis was performed to investigate the associations with depression. No violation of assumptions of multicollinearity, normality and linearity was detected. The results of the regression analysis with all the variables entered at once indicated that the independent variables of state self-esteem, social support satisfaction and functional ability significantly accounted for 64% of the variance in depression (see Table V). Low levels of state self-esteem, social support satisfaction and functional ability were related to higher levels of depression. State self-esteem (β = 0.58) was the most important variable in the explanation of depression, followed by social support satisfaction (β = 0.23). The demographic variables of age, marital status, education level, religious belief, type of stroke, number of stroke and social variable of participation restriction were not associated with depression.

DISCUSSION

This research has revealed the negative psychological consequences of stroke. Forty-two survivors (20.5%) reported mild and 33 (16.1%) reported severe, depression. There were significant differences in the level of depression between those who lived at home and those who lived in a residential care facility ($p=0.003$). The presence of depression was associated with low levels of state self-esteem, social support satisfaction and functional ability.

Prevalence of depression at six months

The McNemar test for correlated samples demonstrated no change in the prevalence of mild to severe depression over six months indicating that the presence of depression was not just a reactive adaptation in the acute phase of the illness. The rate of depression at six months in the present study was much lower than the 48% found in another Hong Kong study (Sit *et al*. 2007). The differences could be attributed to differences in sample composition, as Sit *et al*.'s study recruited participants who had experienced post-stroke functional problems and the mean functional ability scores were much lower than those in the present study. In other studies, similar prevalence rate of post-stroke depression was reported (Chemerinski & Robinson 2000, Whyte & Mulsant 2002).

Correlates of depression at six months

The results of this study concur with other findings that depression has a consistent positive association with physical disability, living arrangement, social support (Hackett & Anderson 2005) and no significant association with the different types of brain lesion (ischaemic,

haemorrhagic) (Gainotti & Marra 2002, Bhogal 2004, Aben *et al*. 2006).

State self-esteem and depression

State self-esteem was the most important variable in the explanation of depression, followed by social support satisfaction. Together with functional ability significantly accounted for a significant amount of variance (64%) in explaining depression. The results provide further evidence to support a close relationship between self-esteem and levels of depression (MacInnes 2006). Examination of specific items in the SSES in this study indicated that the feelings of unattractiveness and feelings of inferiority were common, especially among those with lower levels of functional ability. Sudden loss of competency was seen as a severe trauma for stroke survivors and the realisation of the loss of control and function resulted in loss of identify or identity confusion (Nilsson 1997, Mukherjee 2006).

Social support and depression

Social support satisfaction was found to be significantly associated with the presence of depression ($p < 0.001$), further supporting its negative association with psychological morbidity (Sit *et al*. 2007). In accordance with previous findings (Hackett & Anderson 2005), there were significant relationships between the levels of social support and the occurrence of depression or depressive symptoms. The SSQ6 measure used in this study comprised primarily of emotional support items (Sarason *et al*. 1987) and an item 'Who can you really count on to care about you, regardless of what is happening to you?' could be regarded as

both emotional and instrumental support (Chang 1999). Although the quantity of social support among the stroke survivors at six months was not high (number of social support persons ranged from 1 to 13), they were generally satisfied with the social support they received. The findings suggests that perceived satisfaction with support appears to benefit stroke survivors' psychological functioning, suggesting that interventions which incorporate the elements of social support enhancement, are likely to reduce psychological mobility following stroke (Bhogal *et al*. 2003).

Functional ability and depression

At six months, functional ability was found to be significantly associated with the presence of depression. The mean BI score indicated that 23 survivors (11%) were markedly dependent in their activities of daily living and 82 (39%) were fully independent. Functional ability has been recognised in previous studies as an important factor that independently predicts psychological outcome (Hackett & Anderson 2005).

Living arrangement and depression

This study has highlighted a link between living arrangements and psychological outcomes. At six months, those who lived in a residential care facility were more likely to have mild to severe depression (54.1% residential care facility versus 32.7% home). Those who lived in a residential care facility also had a significantly lower level of functional ability ($p< 0.001$) and state self-esteem ($p=0.008$) and were less satisfied with the social support received

(p=0.015). Since more physically impaired stroke survivors were discharged to residential care facilities in this study, it might be that their poor functional status was the major factor contributing to poor psychological outcomes. There are other possible explanations for this relationship, such as the lower level of social support received by those living in residential care facilities negatively affecting their psychological outcomes. This could also be related to the stress response to relocation (Hays 2002) to some of these residential care facilities. However, this is supposition and further research is warranted to examine the perceived needs of stroke survivors and their carers with regards to psychological well-being.

Predictive factors of the presence of depression

In this study, logistic regression analysis revealed that state self-esteem, social support satisfaction and functional ability were significantly related to the probability of having depression (non-depressed vs mild to severe depressed) at six months after rehabilitation hospital discharge. This model accounted for a significant percentage of variance in outcome (Nagelkerke R^2 =0.61). The overall success rate of prediction was 84.7% with 90.6% and 74.7% of the survivors correctly predicted for non-depressed and mild to severe depressed.

Previous studies (Appelros & Viitanen 2004, van de Port *et al*. 2007) together with this one have consistently identified physical function as a significant predictor of depression in post-stroke recovery. In this study, incorporating both self-esteem and social support in the predictive model of depression resulted in better predictability as compared with the study of

Appelros and Viitanen (2004). Based on the results of the present study, future trials testing interventions to promote post-stroke recovery will need to involve subgroups of stroke survivors at the highest risk of depression, such as those having lower levels of functional ability, state self-esteem and social support satisfaction.

There were several limitations to this study. The survivors recruited were in rehabilitation hospitals. Those with acute stroke who did not require rehabilitation and those who were unable to participate in active rehabilitation were excluded. Thus the study sample only represented about half of the survivors with acute stroke admitted to the acute hospitals in one geographical region. The linguistic demand of the instruments also excluded those stroke survivors with communication difficulties that bear the greatest burden of the morbidity. The method of recruiting survivors in this study was that of convenience sampling and data were obtained from survivors from two rehabilitation hospitals; generalisation of these findings might thus be limited. The other limitation concerns the use of a self-rating scale to assess depression. The context in which the study was conducted prevented verification of the depression status of the survivors by a contemporary 'gold standard' such as a structured clinical interview conducted by a psychiatrist. The use of a depression rating scale the GDS thus may not be specific enough to diagnose major or minor depression. Further study could incorporate the use of Diagnostic and Statistical Manual of Mental

disorders criteria for diagnosing post-stroke depression (American Psychiatric Association 1994).

RELEVANCE TO CLINICAL PRACTICE

The findings in this study indicate that there is a need to help stroke survivors to improve their psychological wellbeing. Health professionals working with this group should be more sensitive to their emotional needs and should try to explore ways to minimise these negative psychological consequences. All institutions offering services for stroke survivors include acute and rehabilitation settings as well as residential care facilities should be aware of the psychological consequences that may follow after stroke. It should be noted that community support is of great importance as most of the stroke survivors are living in the community. After patient discharge, both stroke survivors and their carers need continuing advice, guidance, information and support.

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Conflict of Interest:

The authors have no financial disclosures and conflict of interest.

Contributions:

Study design: JPCC, AMC, JW

Data dcllection and analysis: JPCC, SKC

Manuscript preparation: JPCC, DRT, AMC, ST

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Table I. Comparison of social status, psychological status and functional ability among those living in a residential care facility or at home.

Variables	Residential care facility (n=37)		Home (n=173)		
	Mean	SD	Mean	SD	*p*
Depression (GDS)	8.63	6.52	12.43	7.49	0.003
Participation restriction (LHS)	21.53	5.08	15.89	4.47	<0.001
State self-esteem (SSES)	79.45	13.61	72.68	15.01	0.008
Social support satisfaction (SSQ6)	31.67	6.13	28.89	7.37	0.015
Functional ability (BI)	91.38	14.03	70.70	21.55	<0.001

Note: All comparisons were tested using Mann–Whitney U tests.

Higher GDS scores were indicative of higher degrees of depression

Higher LHS scores were indicative of lower degrees of participation restriction

Higher SSES scores were indicative of higher level of state self-esteem

Higher SSQ6 scores were indicative of more satisfaction with social support received

Higher BI scores were indicative of less dependent in self-care and mobility

Table II. Comparison of the prevalence of depression according to living arrangement.

Living arrangement	Depression		Total
	None	Mild to severe	
Home	113	55	168
Residential care facility	17	20	37
Total	130	75	205

Total numbers do not equal sample size (n=210) as there are missing data.

Table III. Regression coefficients, Wald statistic, estimated odds ratio and 95% confidence intervals for estimated odds ratio of each of the two predictors predicting depression.

	B	S.E.	Wald	df	Sig.	Odds ratio (Exp(B))	95.0% C.I. for Odds ratio	
							Lower	Upper
Functional ability	-0.03	0.01	5.30	1	0.02	0.97	0.94	1.00
State self-esteem	-0.13	0.02	34.12	1	<0.001	0.88	0.84	0.92
Social support satisfaction	-0.09	0.04	5.51	1	0.019	0.91	0.85	0.99
Constant	15.00	2.19	46.87	1	<0.001	3141981.43		
Nagelkerke R^2= 0.61, Cox & Snell R^2=0 .44								

Table IV. Classification Table [a]

Observed		Predicted		
		Depression		
		None	Mild to severe	Percentage Correct
Depression	None	115	12	90.6
	Mildly to severe	19	56	74.7
	Overall percentage			84.7

[a] The cut value is 0.500

Table V. Linear regression analysis of associations with depression at six months.

	Unstandardized Coefficients		Standardized Coefficients	t	p
	B	Std. Error	Beta		
(Constant)	44.146	1.976		22.336	<0.001
State self-esteem	-0.283	0.026	-0.581	-10.728	<0.001
Social support satisfaction	-0.243	0.056	-0.229	-4.352	<0.001
Functional ability	-0.059	0.017	-0.152	-3.383	0.001