PREMORBID PERSONALITY AND DEPRESSION

FOLLOWING STROKE

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ABSTRACT

Background: Depressive disorders and depressive symptoms occur commonly following stroke and the relationship between post-stroke depression and stroke characteristics has been widely studied. However, the role of individual differences, including pre-morbid personality, in the development of post-stroke depression has received relatively little attention. Accordingly, we undertook a cross-sectional study to investigate the relationship between premorbid personality and other individual differences, and depression following acute stroke.

Method: We studied 61 consecutive patients admitted to a dedicated stroke inpatient unit. DSM-IV depressive diagnoses were ascertained using the Composite International Diagnostic Interview (CIDI-A) and depressive symptoms were ascertained on the Hamilton Depression Rating Scale (HAM-D) and the Center for Epidemiologic Studies Depression Scale (CES-D). Informant-rated NEO PI-R personality scores were obtained on the full 240-item NEO PI-R. Adaptive function was measured on the Modified Barthel Index (MBI) and the Instrumental Activities of Daily Living scale (IADL). Cognitive function was assessed on the Mini-Mental State Examination (MMSE).

Results: An increased risk of post-stroke depression was conferred by both premorbid neuroticism (OR 3.69; 95% CI 1.25-10.92) and a past history of mental disorder (OR 10.26; 95% CI 3.02-34.86). There was no significant relationship demonstrated between lesion location and post-stroke depression.
Conclusions: Informant-rated pre-morbid neuroticism and a past history of mental disorder were found to be important predictors of depression following stroke. Stroke side was not significantly related to risk of depressive symptoms following stroke.
BACKGROUND

Stroke is a well-recognised cause of physical disability, with one in three stroke survivors enduring paralysis and physical impairments and almost two in three requiring assistance with mobility (Australian Heart Foundation, 1999). Less well recognized is the significant incidence of comorbid psychiatric symptoms and disorders that may accompany stroke. Depressive disorders occur frequently following stroke with prevalence estimates ranging from one in five to approximately one half of all stroke patients (Kotila et al., 1998). Nevertheless, depressive disorders commonly remain undetected or are regarded as understandable reactions to a catastrophic life event (Robinson & Price, 1982; Finkelstein et al., 1987). In recent years a number of studies have examined the aetiology, clinical course and treatment of post-stroke depression (Gall, 2001). The evidence from these studies suggests that post-stroke depression is a heterogeneous group of disorders of multifactorial aetiology and differing clinical presentations (Andersen et al., 1995; Burvill et al., 1997).

A number of predictors for post-stroke depression have been identified. These include factors related to the stroke itself and its sequelae, as well as risk factors for Major Depression in general. Greater cognitive impairment and physical disability following stroke have generally been shown to predict post-stroke depression (Bacher et al., 1990; Downhill & Robinson, 1994). However, findings with respect to lesion location have been contradictory. Early findings by Robinson and colleagues, which demonstrated post-stroke depression occurred more commonly in patients with left-sided lesions (Robinson et al., 1984), have not been replicated by later studies (Singh
et al., 2000). A number of studies have shown that post-stroke depression shares risk factors in common with Major Depression occurring in other circumstances, including female gender and past personal and family history of depression (Gall, 2001).

Whilst premorbid neuroticism is a risk factor for Major Depression (Hirschfeld et al., 1989; Widiger et al., 1999), the relationship between premorbid personality and post-stroke depression has received little attention. Two studies of a single post-stroke cohort, which used a subset of the Eysenck Personality Inventory to assess premorbid personality, have suggested that premorbid neuroticism predicts post-stroke depression (Morris et al., 1992; Morris & Robinson, 1995). However, to our knowledge, this work has not yet been replicated.

The present study was undertaken to investigate the relationship between premorbid personality and other clinical factors and the prevalence of depression in the acute post-stroke period. It sought to determine whether the previous work that demonstrated a significant positive association between premorbid personality and post-stroke depression could be replicated.
METHOD

Participants

Using a cross-sectional design, we recruited a cohort of patients admitted consecutively to the Stroke Unit, Royal Brisbane & Women’s Hospital (RBWH) between 15 June 2001 and 17 June 2002. Exclusion criteria included severe hearing or visual impairment, severe aphasia, severe cognitive impairment (MMSE score less than 12), illiteracy and inability to speak English. The RBWH research ethics committee approved the study and each stroke patient and informant who participated gave written informed consent.

Stroke patients were examined during the acute phase post stroke, while still inpatients in the Stroke Unit, approximately two weeks after admission to hospital. Two weeks post-stroke was chosen as the time for assessing the presence of depression because of the brief median length of inpatient stay (15 days). Putative predictor variables for depression were assessed. These included informant-rated premorbid personality, past psychiatric history, lesion location, functional disability, cognitive impairment, and socio-demographic factors. The outcome variables were presence of current CIDI/DSM-IV Major Depressive Disorder (MDD) and current depressive symptoms.

Measures

Data on age, gender, marital status, type of accommodation, and education were collected at interview. Type of accommodation was assessed to be own home, aged
persons hostel or nursing home. Education was measured by number of years of primary, secondary and tertiary education undertaken. Past psychiatric history was ascertained by asking participants whether they had ever suffered from depression, anxiety, or “nerves”. A similar question was used to ascertain family psychiatric history.

Data on side of lesion were obtained from a review of clinical findings and neuroimaging studies (mainly CT scans). Cognitive status was rated on the MMSE (Folstein et al., 1975). Basic activities of daily living (ADL) were assessed using the Modified Barthel Index (MBI; Mahoney & Barthel, 1965). The validity of the MBI has been demonstrated in studies of stroke patients; however, it is relatively insensitive to mild levels of disability. Therefore stroke patients’ functional status was further assessed on the Instrumental Activities of Daily Living Scale (IADL; Lawton & Brody, 1969).

To minimize the likelihood that current mood or neurocognitive status might confound self-ratings of premorbid personality function, informant ratings of each patient’s premorbid personality were made by an adult who had known the patient for at least 10 years prior to the stroke on the NEO Personality Inventory-Revised (Costa & McCrae, 1991). The 240-item NEO PI-R measures five factors of adult personality: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness (C). The Five Factor Model of personality, developed in the 1980s, has been shown to have validity between observers and across instruments, and to endure throughout adult life. The NEO PI-R has strong scale reliability, stability, and construct validity in both clinical and research settings, for both self and
informant-rated versions (Piedmont et al., 2000). The stroke patient’s spouse or someone who knew them well was asked to complete the scale based on their recollection of the stroke patient’s usual behaviour at least ten years prior to the stroke.

Depression was assessed in each stroke patient using both categorical and dimensional measures. Categorical diagnoses of DSM-IV Depressive Disorders were obtained using the Composite International Diagnostic Interview, CIDI-Auto version 2.1 (World Health Organization, 1997), which was administered by a trained research assistant. Dimensional depression scores were obtained using the clinician-rated 17-item Hamilton Depression Rating Scale (HAM-D; Hamilton, 1967) and the 20-item self-report Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The validity of the HAM-D has been demonstrated in stroke populations (Andersen et al., 1995); it has a high degree of reliability, and correlates well with other measures of depression. Scores range between 0 and 52, with higher scores representing more severe depression. HAM-D scores of 13 or above are generally thought to be clinically relevant, with scores of 17 or above often associated with the diagnosis of Major Depressive Disorder. The CES-D has been shown to have good psychometric properties in older people and has been validated for use in stroke patients (Parikh et al., 1987; Shinar et al., 1986). Overlap with physical illness has been demonstrated to be minimal (Foelker & Shewchuk, 1992). Scores range between 0 and 60, with higher scores indicating more severe depression. CES-D scores of 16 or above are generally thought to be clinically relevant.
Data analysis

Statistical analyses were undertaken using Stata 8.0 for Windows (Stata Corporation, College Station, TX). Data were checked before being entered on a computer database. Dimensional data were analysed using standard parametric techniques. Ordinal and categorical data were analysed using chi-square analysis. The critical value of alpha was set at 0.05 and all tests were two-tailed.
RESULT

Stroke Population

One hundred and seventy-seven patients with a clinical diagnosis of completed stroke were admitted to the RBWH stroke unit over the period of the study. Of these, 77 were excluded from the study: 14 with severe aphasia, 5 with severe cognitive impairment (MMSE < 12), 4 due to severe hearing or visual impairment, 4 due to non-fluency in English, 10 for lack of capacity to give informed consent, 21 who declined to give consent, and 19 who were too physically ill to participate. This left a total of 100 potential participants for the study, 56.5% of the original total. Of these, 61 had an informant who agreed to complete the NEO PI-R.

Participant Characteristics

Sociodemographic and clinical descriptive data for the stroke patients are shown in Table 1. The enrolled patients did not differ significantly from those patients excluded from the study on age (F[1,175]=2.246, p=0.136) or gender (χ²=2.485, df=1, p=0.154). One patient lived in a hostel and the remainder lived at home. The guidelines for admission to the stroke unit excluded patients resident in a nursing home at the time of the stroke. Of the 29 (47.5%) patients who reported a past history of depression, anxiety or “nerves”, 13 had consulted a doctor for their psychiatric
problem and, of these, 11 had required treatment. Ten received medication, one received psychotherapy, and one was hospitalized.

Informants were most commonly the adult child (55.7%) or spouse (34.4%) of the stroke patient. In most cases (93.4%), informants saw the patients at least weekly.

Measures of Depression

Assessment of stroke patients was undertaken quite early in the acute post-stroke period (mean of 14.4 days [SD=9.8]). Dimensional measures of depression were obtained from the self-rated CES-D and the clinician-rated HAM-D (Table 1). Using a score of 16 or above on the CES-D to indicate clinically significant depression, a total of 17 patients (32.8%) scored above the cut-off. Similarly, using a score of 13 or above on the HAM-D, 20 (39.3%) were rated as suffering from clinically significant depression. These cutting points were chosen on the basis of existing work on depression following stroke (Parikh et al., 1988; Andersen et al., 1994). Scores of 18 or more on the HAM-D are commonly found in patients with Major Depressive Disorder (Bech, 1993). Ten patients (16.4%) scored 18 or more on the HAM-D.

Seven patients (11.5%) were accorded a diagnosis of current DSM-IV Major Depressive Disorder on the basis of the CIDI-A structured clinical interview. As expected, both CES-D (F[1,59]=23.687, p=0.000) and HAM-D scores (F[1,59]=10.211, p=0.002) were found to be strongly associated with a diagnosis of
Major Depression. A further 10 stroke patients reported current depressed mood for two weeks or more in the absence of Major Depression.

Functional Ability Following Stroke

Measures of cognitive and physical impairment are shown in Table 1. Cognitive ability measured by MMSE varied considerably and there was also a marked degree of variation in functional ability shown by both MBI and IADL scores, with results indicating participants ranged from being independent in daily activities to suffering from marked disability and requiring substantial assistance with mobility, feeding and other aspects of self-care.

Personality Data

Table 2 shows the informant-rated personality data for the stroke patients. Overall, the patient group was rated higher on the factors of Agreeableness and Conscientiousness and lower on Extraversion and Openness, findings not unexpected in a predominantly elderly population (McCrae & Costa, 1999). As a whole, the patient group was rated lowest on the Neuroticism factor, though results varied widely.

Personality and Measures of Depression.
The strong association demonstrated between dimensional measures of depression and
diagnoses of Major Depression supported the validity of the CES-D and HAM-D
scores. Using a bivariate analysis, neuroticism on the NEO PI-R was found to be
significantly correlated with patients’ scores on both CES-D ($r_p=0.422, p=0.001$) and
HAM-D ($r_p=0.383, p=0.002$). In addition, a significant negative correlation between
CES-D score and NEO PI-R agreeableness was observed ($r_p=-0.263, p=0.041$).
There were no other significant associations between NEO PI-R personality factors
and dimensional scores of depression (see Table 3).

Personality and Other Risk Factors for Depression.

Multiple regression analyses were conducted to examine possible factors influencing
the two measures of depression. Age, gender, stroke side, past personal or family
history of depression, anxiety or nerves, and measures of cognitive and physical
function were considered to be potential influences on risk of depression. NEO
neuroticism and agreeableness score were also included on the basis of results of the
correlational analysis.

We found significant independent associations between CES-D score and NEO
neuroticism score and a past personal history of mental disorder (Table 4). However,
there was no significant association between CES-D and side of the stroke lesion,
post-stroke cognitive performance, post-stroke physical functioning, gender, family
history of mental disorder, or NEO agreeableness scores.
Similarly, HAM-D score was predicted by NEO neuroticism score and past history of mental disorder, but not by any of the other variables included in the regression analysis (Table 4).

Risk of Depression Conferred by Neuroticism and a History of Mental Disorder.

Using cut-off scores of ≥16 on the CES-D (Parikh et al., 1988) and ≥13 on the HAM-D (Andersen et al., 1994) to define depression potentially requiring treatment, odds ratios were calculated for premorbid neuroticism and a past history of mental disorder. Patients with a past history of mental disorder were significantly more likely to cross thresholds for depression, measured by both CES-D (OR=8.62 [95% CI: 2.40-30.92], p=0.001) and HAM-D (OR=10.26[95% CI: 3.02-34.86], p=0.000).

A raw score on the neuroticism subscale of ≥82 was used to define individuals high in neuroticism according to NEO PI-R normative data (Costa & McCrae, 1991). We found that high neuroticism was a significant predictor of depression as defined by both CES-D≥16 (OR=5.784[95% CI: 1.742-19.211], p=0.004) and HAM-D≥13 (OR=3.692[95% CI: 1.248-10.920], p=0.018).
DISCUSSION

The current study identified a high prevalence of clinically significant depression, in keeping with results of previous studies of the acute post-stroke period (Fedoroff et al., 1991; Downhill & Robinson, 1994). Seven patients (11.5%) suffered from Major Depression, a rate comparable to other studies of post-stroke depression in acute hospital settings (Herrmann & Wallesch, 1993; Paradiso & Robinson, 1999), and approximately ten times the point prevalence of 1.0% for Major Depressive Disorder found in the Australian population aged 70 and over (Henderson et al., 1993).

In the current study, both self-rated depression and clinician-rated depression were strongly associated with informant-rated neuroticism measured by the NEO PI-R. This association is consistent with the results of the studies by Morris and colleagues (Morris et al. 1992; Morris & Robinson, 1995). The present study demonstrated that high neuroticism conferred a 3- to 5-fold greater risk of post-stroke depression. A past history of depression has been shown previously to be a risk factor for post-stroke depression (Andersen et al., 1995). The current study found that a past history of depression, anxiety, or “nerves” conferred at least an eight-fold risk of post-stroke depression, consistent with other research (Ng et al., 1995).

No significant associations were found between dimensional scores of depression and other characteristics of the patient population that were examined, including age, gender, family history of anxiety or depression, side of stroke lesion, and physical and cognitive functioning. Previous studies suggested that stroke-related variables are risk factors for post-stroke depression (Gall, 2001). In contrast, our findings suggest that
individual premorbid differences, rather than stroke characteristics, are more important predictors of depressive symptoms in stroke patients.

However, the current study has a number of limitations and these should be considered when interpreting the findings. Firstly, the sample size was relatively small, limiting the power of the study. Secondly, there were a large number of stroke patients excluded from the study and this may have affected the findings in unpredictable ways. Thirdly, the participants were drawn from admissions to an acute stroke unit in a large tertiary referral hospital. It is possible that the patient population differed clinically from inpatient populations of general hospitals without a specialized stroke unit. Finally, reports by persons who knew the stroke patient well for ten years or more prior to the index stroke were used to gain data on premorbid personality. Although this approach reduces the risk of confounding current status with premorbid status that might occur with self-ratings of premorbid personality in stroke patients, this approach is not without its own challenges. Informants may idealize the stroke patient who is undergoing a major life event and it is possible that the patient’s current behaviour and mood state might influence the recollections of the informant.

Taken in conjunction with the literature, the findings of the current study have a number of implications for the assessment and management of post-stroke depression. Firstly, depression in the acute period following stroke is common and the findings of the present study suggest that the CES-D would be a practical instrument to use for screening stroke patients in the acute hospital setting. Identification of patients
suffering from depression following stroke enables clinicians to initiate prompt treatment, thereby potentially improving the course of the depressive disorder and reducing its impact upon post-stroke rehabilitation. Citalopram and nortriptyline have been demonstrated to significantly improve the course of post-stroke depression (Lipsey et al., 1984; Andersen et al., 1993). A Cochrane review of antidepressant treatment for depression in medical illness, including the latter two studies of stroke patients, reported that approximately 4 patients would need to be treated with antidepressants to produce one recovery which would not have occurred without treatment (NNT 4.2, 95% CI 3.2-6.4; Gill & Hatcher, 2003). Secondly, a past history of mental disorder is strongly associated with post-stroke depression. Staff should determine whether stroke patients have a past psychiatric history. The literature suggests that questioning either the patient or a family member provides sufficient detail for the purpose of screening (Eastwood et al., 1989; Ng et al., 1995). Thirdly, the current study supports previous work identifying neuroticism as a risk factor for post-stroke depression. Asking about a patient’s personality style should assist in screening for those at risk of developing depression; an informant could be asked to comment on whether the stroke patient is a worrier or prone to “nerves”. Finally, the current study raises questions about other risk factors for post-stroke depression. The absence of any significant relationship between gender or stroke location and depression found in the current study and in other research suggests that these factors might not be useful markers for depression in this particular group of patients.
Conclusions

Informant-rated neuroticism and a past history of mental disorder are important predictors of depression following stroke. In this study, stroke side was not related to risk of depressive symptoms following stroke.
ACKNOWLEDGMENTS

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CONFLICT OF INTEREST DECLARATION

1. Source of financial support: Queensland Health contract HOM99/00-08

2. Sponsor’s role in the research: The sponsor has played no role in the scientific conduct of this project or the preparation of this paper.

3. Information about any financial relationship between any author and any organization with a vested interest in the conduct and reporting of the study: The authors do not have any financial relationships with any organizations with a vested interest in the conduct and reporting of the study that is reported in this paper.
DESCRIPTION OF THE AUTHORS’ ROLES

David Storor designed the project, collected data, undertook data analyses, and wrote the paper.

Gerard Byrne formulated the research question, designed the project, obtained funding, supervised data collection, undertook data analyses, and edited the paper.
Table 1. Patient sociodemographic and clinical data (N=61 unless specified)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Mean (SD)</th>
<th>N (%)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td>71.9 (13.6)</td>
<td></td>
<td>38-92</td>
</tr>
<tr>
<td>Education (years)</td>
<td></td>
<td>9.6 (1.89)</td>
<td></td>
<td>6-15</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>36 (59%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>25 (41%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>29 (47.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>24 (39.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Separated</td>
<td>6 (9.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>2 (3.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past psychiatric history</td>
<td>Yes</td>
<td>29 (47.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>32 (52.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family psychiatric history</td>
<td>Yes</td>
<td></td>
<td>15 (24.6%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>36 (75.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke side</td>
<td>Left</td>
<td>30 (49.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>31 (50.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CES-D</td>
<td></td>
<td>14.0(11.4)</td>
<td></td>
<td>0-37</td>
</tr>
<tr>
<td>HAM-D</td>
<td></td>
<td>11.2(7.3)</td>
<td></td>
<td>0-30</td>
</tr>
<tr>
<td>MMSE (N=58)</td>
<td></td>
<td>25.2(4.4)</td>
<td></td>
<td>15-30</td>
</tr>
<tr>
<td>MBI</td>
<td></td>
<td>77.8(24.5)</td>
<td></td>
<td>22-100</td>
</tr>
<tr>
<td>IADL</td>
<td></td>
<td>15.0 (6.0)</td>
<td></td>
<td>12-36</td>
</tr>
</tbody>
</table>

CES-D: Center for Epidemiologic Studies Depression Scale. HAM-D: Hamilton Depression Rating Scale. MMSE: Mini-Mental State Examination. MBI: Modified Barthel Index. IADL: Instrumental Activities of Daily Living.
Table 2. Informant-Rated Personality Data (NEO PI-R)*

<table>
<thead>
<tr>
<th>NEO Factor</th>
<th>Mean (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>83.2 (21.6)</td>
<td>45-127</td>
</tr>
<tr>
<td>Extraversion</td>
<td>98.9 (17.3)</td>
<td>66-141</td>
</tr>
<tr>
<td>Openness</td>
<td>88.5 (15.3)</td>
<td>58-133</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>118.2 (22.9)</td>
<td>62-164</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>117.2 (24.8)</td>
<td>49-171</td>
</tr>
</tbody>
</table>

*Raw Scores on NEO PI-R; N=61
Table 3. Correlation between NEO PI-R domain scores & depression scores ($r_p$).

<table>
<thead>
<tr>
<th>Measures</th>
<th>N</th>
<th>E</th>
<th>O</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES-D</td>
<td>0.464</td>
<td>-0.007</td>
<td>-0.011</td>
<td>-0.330</td>
<td>-0.191</td>
</tr>
<tr>
<td></td>
<td>p=0.001</td>
<td>p=0.959</td>
<td>p=0.941</td>
<td>p=0.018</td>
<td>p=0.179</td>
</tr>
<tr>
<td>HAM-D</td>
<td>0.382</td>
<td>0.085</td>
<td>0.074</td>
<td>-0.212</td>
<td>-0.184</td>
</tr>
<tr>
<td></td>
<td>p=0.006</td>
<td>p=0.555</td>
<td>p=0.607</td>
<td>p=0.136</td>
<td>p=0.196</td>
</tr>
</tbody>
</table>

N = neuroticism, E = extraversion, O = openness, A = agreeableness, C = conscientiousness.
Table 4: Multiple regression analyses of putative predictors of CES-D & HAM-D score following stroke.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CES-D Beta</th>
<th>t</th>
<th>p value</th>
<th>HAM-D Beta</th>
<th>t</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.221</td>
<td>-1.70</td>
<td>0.097</td>
<td>-0.028</td>
<td>-0.21</td>
<td>0.838</td>
</tr>
<tr>
<td>Gender</td>
<td>0.191</td>
<td>1.66</td>
<td>0.103</td>
<td>0.136</td>
<td>1.15</td>
<td>0.255</td>
</tr>
<tr>
<td>MMSE</td>
<td>-0.255</td>
<td>-2.01</td>
<td>0.051</td>
<td>-0.046</td>
<td>-0.35</td>
<td>0.727</td>
</tr>
<tr>
<td>MBI</td>
<td>-0.053</td>
<td>-0.47</td>
<td>0.638</td>
<td>-0.010</td>
<td>-0.09</td>
<td>0.931</td>
</tr>
<tr>
<td>IADL</td>
<td>0.003</td>
<td>0.03</td>
<td>0.980</td>
<td>0.035</td>
<td>0.29</td>
<td>0.775</td>
</tr>
<tr>
<td>NEO – neuroticism</td>
<td>0.307</td>
<td>2.38</td>
<td></td>
<td>0.292</td>
<td>2.20</td>
<td>0.033</td>
</tr>
<tr>
<td>NEO – agreeableness</td>
<td>-0.034</td>
<td>-0.27</td>
<td>0.786</td>
<td>0.037</td>
<td>0.29</td>
<td>0.774</td>
</tr>
<tr>
<td>Stroke side</td>
<td>-0.183</td>
<td>-1.64</td>
<td>0.108</td>
<td>-0.094</td>
<td>-0.82</td>
<td>0.414</td>
</tr>
<tr>
<td>Past psychiatric history</td>
<td>0.450</td>
<td>4.03</td>
<td>0.000</td>
<td>0.525</td>
<td>4.58</td>
<td>0.000</td>
</tr>
<tr>
<td>Family psychiatric history</td>
<td>-0.009</td>
<td>-0.09</td>
<td>0.930</td>
<td>0.109</td>
<td>0.98</td>
<td>0.333</td>
</tr>
</tbody>
</table>

Dependent variables: CES-D=Center for Epidemiologic Studies Depression Scale, HAM-D=Hamilton Depression Rating Scale, MMSE=Mini-Mental State Examination, MBI=Modified Barthel Index, IADL=Instrumental Activities of Daily Living, NEO = Neuroticism, Extraversion & Openness Personality Inventory.

CES-D: F(10, 46) = 4.35, p = 0.0003. HAM-D: F(10, 46) = 3.89, p = 0.0007.
REFERENCES


