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REHABILITATION IN PRACTICE

## Impact of depression following a stroke on the participation component of the International Classification of Functioning, Disability and Health

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### ABSTRACT

**Purpose:** To assess the impact of post-stroke depression on the participation component of the International Classification of Functioning, Disability and Health (ICF).

**Method:** Thirty-five stroke survivors with chronic hemiparesis were divided into two groups: those with and without depression. The Geriatric Depression Scale (GDS) was used for the analysis of depressive symptoms. Participation was analysed using the Stroke Specific Quality of Life scale. The Mann–Whitney test was used to compare the participation scores between the two groups. Spearman’s correlation coefficients were calculated to determine the strength of the association between the assessment tools. Simple linear regression was used to determine the impact of depression on participation. An alpha risk of 0.05 was considered indicative of statistical significance.

**Results:** The group with depression had low participation scores ( $p = 0.04$ ). A statistically significant negative correlation of moderate magnitude was found between depression and participation ( $r = -0.6$ ;  $p = 0.04$ ). The linear regression model demonstrated that depression is a moderate predictor of participation ( $r^2 = 0.51$ ;  $p = 0.001$ ).

**Conclusions:** Depression is a moderate predictor of participation among stroke survivors, explaining 51% of the decline of this aspect. Thus, depression should be diagnosed, monitored and treated to ensure a better prognosis regarding social participation following a stroke.

### ARTICLE HISTORY

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### KEYWORDS

Depression; disability and health; International Classification of Functioning; quality of life; social participation; stroke

### ► IMPLICATIONS FOR REHABILITATION

- Individuals with post-stroke depression experience a lower degree of social participation.
- Depression explains 51% of the decline in participation following a stroke.
- The present findings can serve as a basis to assist healthcare professionals involved in the rehabilitation of stroke survivors and can assist in the establishment of adequate treatment plans in stroke rehabilitation.

## Introduction

The incidence and prevalence of cerebrovascular accident (stroke) are high [1,2] and this condition is recognised as the third major cause of death worldwide.[3] In Brazil, cerebrovascular diseases had the highest specific mortality coefficient in 2008, corresponding to 51.6 cases per 100 000 inhabitants.[4]

Depression is a common occurrence following a stroke [5] and is related to an increase in morbidity and mortality rates, a decline in health-related quality of life and a reduction in functional recovery.[6] However, the depression following a stroke is often under-recognised and under-treated.[5] No previous study has analysed in an isolated fashion the impact of depression of the participation component of the

International Classification of Functioning, Disability and Health (ICF),[3,7] the model of which is based on the biopsychosocial approach, which is used to address the biological, individual and social dimensions of health.

The ICF comprises four components: Body functions and structures, Activities and participation, Environmental factors and Personal factors.[8] Besides the classification system, the ICF has a model for human functioning and disability. In this model, the components are arranged differently: the first component of ICF model is denominated as “Body functions and structures”, which refers to anatomic parts of the body and physiological and/or psychological functions of body systems. The second component of the ICF, which is denominated as “Activity”, represents an individual perspective and regards the

ability to perform activities of daily living in different contexts. The third component of the ICF is denominated as "Participation" and regards the involvement of an individual in different real-life situations in society. Thus, participation represents the social aspect of functioning.[8]

From the clinical standpoint, participation is an important aspect for health professionals to consider. Participation allows an individual to build relationships and develops skills to meet social demands, allowing individuals to find purpose and meaning in life, which has a positive impact on both physical and mental health.[8]

Among the ICF components, participation has been considered the most complex to classify based on existing measures.[9,10] Thus, to classify the participation component, the use of previously developed assessment tools designed to measure health-related quality of life (HRQoL) has been suggested.[9–14] However, while different aspects of participation require a multidimensional evaluation that encompasses HRQoL, it is possible that some of its concepts exhibit constructs that are not evaluated with the use of HRQoL assessment tools, such as depressive symptoms.

As depressive symptoms can lead to a worse functional performance following a stroke,[5,6] it is necessary to evaluate the impact of depression among stroke survivors on the participation component of the ICF. The purpose of the present study is to give scientific credibility to the evaluation process of stroke survivors with hemiparesis and provide important data for the establishment of adequate treatment plans aimed at improving social participation in this population. The hypothesis is that emotional health is a strong predictor of social participation following a stroke.

## Methods

### Study design

An observational, analytical, cross-sectional study was conducted. Individuals with chronic hemiparesis stemming from a stroke were recruited from the physical therapy outpatient clinic of University Nove de Julho, Brazil. Two groups were formed (those with and without depressive symptoms) to analyse the relationship and correlation between depression and participation. The groups were similar with regard to age and functional level – evaluated using the Functional Independence Measure (FIM), due to the fact that these aspects could be considered confounding variables.

### Eligibility criteria

The inclusion criteria were a clinical diagnosis of primary or recurring stroke more than six months earlier,

weakness and/or spasticity in the affected half of the body, age between 50 and 65, FIM score higher than 108 points.[15] Individuals with clinical conditions other than hemiparesis stemming from a stroke, those with motor aphasia and those with impaired cognition, which was screened using the Mini Mental Health Examination and the cut-off points described by Bertolucci,[16] were excluded from the study. Individuals with any other diagnosed chronic or neurological disease were also excluded from the study.

### Ethical aspects

This study was conducted in accordance with the principles of the Declaration of Helsinki and the regulating guidelines for studies involving human subjects stipulated by the National Health Board of the Brazilian Health Ministry established in December 2012. All participants signed a statement of informed consent and were ensured the possibility of dropping out of the study at any time with no negative consequences. This study received approval from the institutional review board of University Nove de Julho (São Paulo, Brazil) under process number 488.668/13.

### Assessment tools and procedures

The identification of the items of the Stroke Specific Quality of Life scale (SS-QOL) that address the ICF participation component was based on a study by Silva et al.,[13] who found that 26 of the 49 SS-QOL items evaluated participation, spanning eight subscales (family roles, language, mobility, self-care, social roles, thinking, upper extremity function and work/productivity). Five response options are offered for each item, with item scores ranging from 1 to 5. Thus, the minimum overall score for the questionnaire is 26 (lowest social participation) and the maximum score is 130 (highest social participation).[13] In a preliminary study, the 26 SS-QOL items that addressed participation exhibited satisfactory measure properties.[17]

The Geriatric Depression Scale (GDS) is a self-rated depression screening instrument which consists of 15 items answered using a yes/no response. The GDS is used to screen depressive symptoms and mood disorders among older adults. In the present study, the short 15-item version of the scale was used, which has adequate reliability and validity for the Brazilian population.[18] A score higher than 5 points is positive for depression and a score higher than 11 points denotes severe depression.[19]

Due to the socio-cultural characteristics of the sample, the decision was made to administer the questionnaires

in interview format. The items were always read in the same order. The questionnaires were administered by examiners who were duly trained using a theoretical approach to the assessment tools to standardise the administration of the questionnaires prior to their normal physical therapy activities. The order of administration of the questionnaires was determined randomly by a blinded choice made by each participant. During the interview, the volunteer also answered a questionnaire addressing age, sex, schooling, time elapsed since the stroke, type of stroke and other questions related to functional level – evaluated using the Functional Independence Measure, which has adequate validity for the Brazilian population.[20]

### Statistical analysis

To determine the sample size, the correlation evaluated between depression (GDS) and participation (SS-QOL) determined in the pilot study involving the first 10 individuals was used, considering  $\alpha = 0.05$  and  $\beta = 0.2$  (80% power) and assuming  $r = 0.70$  (result of pilot study), as shown in the equation below:

$$n = 4 + \left\{ \frac{(1.96 + 0.84)}{0.5 \times \ln(1 + r)/(1 - r)} \right\}^2$$

in which 1.96 corresponds to the Z of  $\alpha/2$  ( $\alpha = 0.05$ ) and 0.84 corresponds to the Z of the  $\beta$  error ( $\beta = 0.2$ ),  $\ln =$  natural logarithm, and  $r =$  correlation based on  $r$  among scores in pilot study.

Thus, a total of 15 individuals were determined for each group (with and without depression). Descriptive statistics (mean and standard deviation for quantitative variables and frequency for categorical variables) were performed for the characterisation of the sample and determination of the distribution of the scores.

Nonparametric variables were expressed as median and interquartile range.

The data were submitted to the Shapiro–Wilk normality test. The Mann–Whitney test was used to compare the groups regarding age and functional level as well as the mean participation scores of the groups with and without depression. Spearman's correlation coefficients were calculated to test the strength of the correlation between the assessment tools, which was interpreted as follows: 0.1– 0.3 = weak correlation; 0.4–0.6 = moderate correlation; and 0.7–0.9 = strong correlation.[21] An  $\alpha$  risk of 0.05 was considered for all inferential analyses.

Simple linear regression was used to determine the impact of depression on participation. It was first determined whether the variables met the necessary presuppositions of the construction of a valid regression model. For such, the correlation coefficients between the GDS score and SS-QOL score were analysed in both groups and those  $\geq 0.2$  were incorporated into the model. The GDS was considered the independent variable and the participation score was the dependent variable.

### Results

Fifty-six individuals with chronic hemiparesis were recruited for the present study, 21 of who were excluded (nine for aphasia, eight for cognitive impairment and four for having another adverse health condition beyond hemiparesis). Thus, the final sample was composed of 35 individuals: 18 with depressive symptoms and 17 without depressive symptoms. Table 1 displays the socio-demographic characteristics of the sample and demonstrates that the two groups were similar regarding age ( $p = 0.9$ ) and functional level ( $p = 0.09$ ).

Table 1. Clinical and demographic characteristics of volunteers.

Variable	Presence of depressive symptoms ( $n=18$ )	Absence of depressive symptoms ( $n=17$ )
Males	10 (55%)	7 (41%)
Females	8 (45%)	10 (59%)
Age (years)	53.3 SD 12.0	57.6 SD 14.9
Time elapse since stroke (years)	2.5 SD 2.8	4.8 SD 5.7
Affected side of body		
Right	12 (67%)	6 (36%)
Left	6 (33%)	11 (64%)
Marital status		
Married	12 (67%)	11 (64%)
Single	2 (11%)	4 (24%)
Widowed	2 (11%)	0 (0%)
Divorced	2 (11%)	2 (12%)
Mini Mental State Examination	24 (23/27)	23 (22/28)
FIM	111 (108/113)	114 (111/116)
Participation (SS-QOL)	89 (83/102)	103 (95/115)
GDS score	9 (7/11)	3 (1/4)

Data expressed as frequency, percentage, mean and standard deviation values; FIM: Functional Independence Measure; SS-QOL: Stroke Specific Quality of Life; GDS: Geriatric Depression Scale.

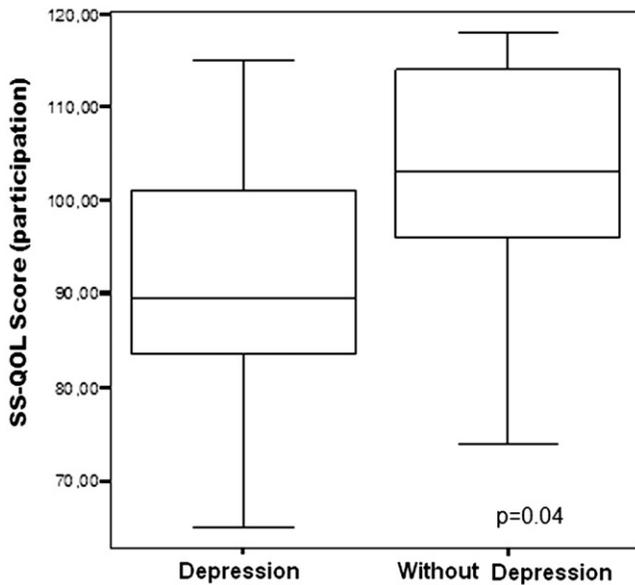


Figure 1. Social participation scores of groups with and without depression.

In the comparison of SS-QOL scores, a statistically significant difference was found between the groups with and without depression ( $p = 0.04$ ). The group with depression had lower participation scores (Figure 1).

A statistically significant negative correlation of moderate magnitude was found between depression and degree of participation ( $r = -0.6$ ;  $p = 0.04$ ) (Figure 2). No significant correlation was found in the group without depression ( $r = -0.1$ ;  $p = 0.6$ ) (Figure 3).

In the simple regression model, only the group with depression exhibited the presuppositions necessary for the construction of a valid regression model. The analysis of the model revealed that depression is a moderate predictor of participation, explaining 51% of the decline in this aspect ( $r^2 = 0.51$ ;  $p = 0.001$ ).

### Discussion

The purpose of the present study was to analyse the impact of post-stroke depression on the participation component of the ICF and contribute toward a better understanding of the emotional and social aspects of individuals with chronic hemiparesis. The analysis of the findings revealed a statistically significant negative correlation of moderate magnitude between depression and social participation. The linear regression model demonstrated that depression explains 51% of the decline in social participation following a stroke.

Depression is characterised by persistent low mood, often with impairment in emotion perception and emotion regulation. The emotion processing has been

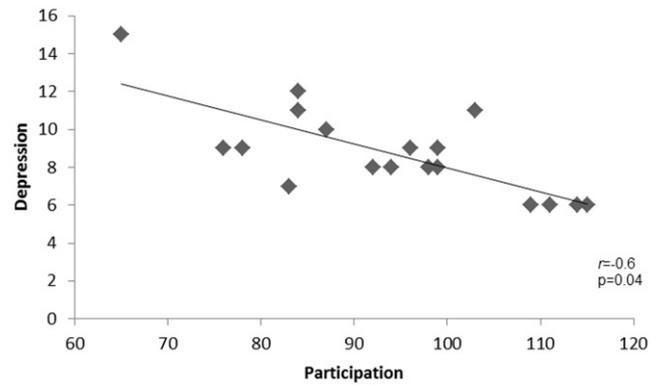


Figure 2. Correlation between depression and social participation.

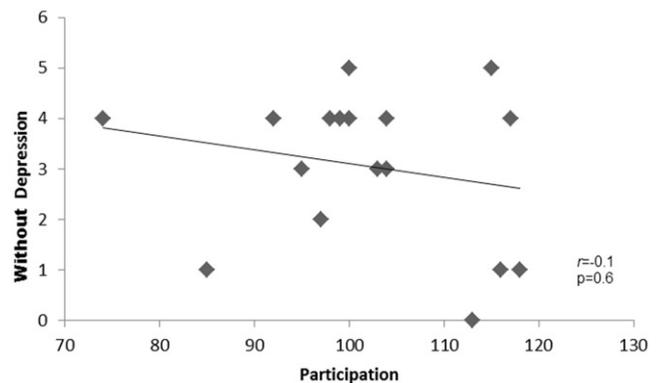


Figure 3. Correlation between absence of depression and social participation.

recognised as a crucial component in social interactions between individuals [22] and the difficulties in emotion processing may have implications for the individual's ability to participate in social situations.[22]

According to the literature, post-stroke participation is influenced by different factors, including functional level and age.[23–26] Thus, an analysis of these factors was performed for the groups with and without depression in the present study, demonstrating that both groups were similar with regard to these aspects and participation scores were lower in the group with depression. Moreover, no association was found between depression and sex or type of stroke. In contrast, the literature reports that men are more prone to depression in the chronic phase following a stroke.[27]

Regarding other clinical and demographic characteristics, the group without depression had a longer mean time elapsed since the occurrence of the stroke in comparison to the group with depression. Although there was no evidence to support the hypothesis that the time between stroke and diagnosis of depression was an important confounder,[28] this finding may be related to the fact that a longer post-stroke period

allows individuals to learn how to cope with their limitations and more easily accept their health condition,[29] which can have a positive impact on emotional wellbeing.

Another characteristic that was more common among the group with depression was that the right side of the body was affected due to the fact that the left hemisphere of the brain had suffered the stroke. Similar findings are described in the literature, associating the left hemisphere with a greater chance of developing depression.[30,31] Some authors are based on the hypothesis that the left dorsolateral prefrontal cortex is hypoactive in depression.[32]

The group with depression had lower participation scores than the group without depression. This finding is in agreement with data described in the literature, which reports a decline in social participation following a stroke.[33] As participation represents the social aspect of human functioning,[8] it is extremely important to determine the factors that may be associated with the decline in participation. In the present study, a statistically significant negative correlation of moderate magnitude was found between depression and social participation. However, the initial hypothesis of the present study that depression would be a strong negative predictor of participation was not confirmed, as the correlation was moderate, with depression explaining 51% of the decline in participation following a stroke. Similar findings are described in the literature relating post-stroke depression to reductions in physical and psychosocial wellbeing.[34] It has also been reported that depression compromises quality of life independently of the degree of motor impairment in individuals following a stroke.[34] Thus, depression should not be overlooked in the evaluation of the participation component of the ICF, as it exerts a negative influence on social participation in this population.

Although the GDS is widely employed for stroke survivors,[18] other scales could offer a broader-scoped evaluation of the emotional wellbeing of stroke survivors. Thus, further studies should be conducted with more than one scale to increase the specificity of the evaluation of depressive symptoms. Moreover, the use of the GDS to stratify the sample and employ the same assessment tool to correlate with the SS-QOL score may have led to an overestimation of the results.

It should also be stressed that the characteristics of the sample and the eligibility criteria may have exerted an influence on the findings, as cognitive changes may constitute a risk factor for the development of depression in stroke survivors. Thus, eliminating individuals with cognitive impairment limits the generalisation of the findings. Moreover, there is a need for longitudinal

studies that can determine cause-and-effect relationships among the variables studied, as the cross-sectional design employed herein only provides associations and cannot determine causality.

Despite the aforementioned limitations, the present findings are of extreme importance to the field of physical therapy and the rehabilitation of stroke survivors with chronic hemiparesis, scientifically demonstrating through a biopsychosocial evaluation that depression is associated with a decline in social participation. Thus, healthcare professionals can gain a better understanding of the functional and emotional aspects of individuals with chronic hemiparesis and the present findings can assist in the establishment of adequate treatment plans for this population.

## Conclusion

Depression is a moderate predictor of participation among stroke survivors, explaining 51% of the decline in this aspect. Thus, depression should be diagnosed, monitored and treated to ensure a better prognosis regarding social participation following a stroke.

## Declaration of interest

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## References

1. Mackay J, Mensah GA. The atlas of heart disease and stroke. Geneva: World Health Organization; 2002.
2. Chong JY, Sacco RL. Epidemiology of stroke in young adults: race/ethnic differences. *J Thromb Thrombolysis*. 2005;20:77–83.
3. Barak S, Duncan PW. Issues in selecting outcome measures to assess functional recovery after stroke. *NeuroRX*. 2006;3:505–524.
4. Departamento de Informática do SUS [Internet]. Caderno de informações: Brasil; 2009 [cited 2011 march 10]. Available from: <http://datasus.saude.gov.br>.
5. Turner-Stokes L, Hassan N. Depression after stroke: a review of the evidence base to inform the development of an integrated care pathway. Part 1: Diagnosis, frequency and impact. *Clin Rehabil*. 2002;16:231–247.
6. Gaete JM, Bogousslavsky J. Post-stroke depression. *Expert Rev Neurother*. 2008;8:75–92.
7. Tempest S, McIntyre A. Using the ICF to clarify team roles and demonstrate clinical reasoning in stroke rehabilitation. *Disabil Rehabil*. 2006;28:663–667.
8. World Health Organization. International Classification of Functioning, Disability and Health. Geneva: World Health Organization; 2001.
9. Jette AM, Haley SM, Kooyoomjian JT. Are the ICF activity and participation dimensions distinct? *J Rehabil Med*. 2003;35:145–149.

10. Perenboom RJM, Chorus AMJ. Measuring participation according to the International Classification of Functioning, Disability and Health (ICF). *Disabil Rehabil*. 2003;25:577–587.
11. Salter K, Jutai JW, Teasell R, et al. Issues for selection of outcome measures in stroke rehabilitation: ICF participation. *Disabil Rehabil*. 2005;27:507–528.
12. Faria CDCM, Silva SM, Corrêa JCF, et al. Identificação das categorias de participação da CIF em instrumentos de qualidade de vida utilizados em indivíduos acometidos pelo acidente vascular encefálico. *Rev Panam Salud Publica*. 2012;31:338–344.
13. Silva SM, Corrêa FI, Faria CDCM, et al. Comparison of quality-of-life instruments for assessing the participation after stroke based on the International Classification of Functioning, Disability and Health (ICF). *Braz J Phys Ther*. 2013;17:470–478.
14. Silva SM, Corrêa FI, Faria CDC, et al. Evaluation of post-stroke functionality based on the International Classification of Functioning, Disability, and Health: a proposal for use of assessment tools. *J Phys Ther Sci*. 2015;27:1665–1670.
15. Monteiro RB, Laurentino GE, Melo PG, et al. *Cien Saude Colet*. 2013;18:2017–2027.
16. Bertolucci PH, Brucki SM, Campacci SR, et al. O mini-exame do estado mental em uma população geral: impacto da escolaridade. *Arq Neuropsiquiatr*. 1994;52:1–7.
17. Silva SM, Corrêa FI, Faria CDCM, et al. Psychometric properties of the Stroke Specific Quality of Life scale for the assessment of participation in stroke survivors using the rasch model: a preliminary study. *J Phys Ther Sci*. 2015;27:389–392.
18. Almeida OP, Almeida SA. Confiabilidade da versão brasileira da escala de depressão em geriatria versão reduzida. *Arq Neuropsiquiatr*. 1999;57:421–426.
19. Marc LG, Raue PJ, Bruce ML. Screening Performance of the Geriatric Depression Scale (GDS-15) in a diverse elderly home care population. *Am J Geriatr Psych*. 2008;16:914–921.
20. Riberto M, Miyazaki MH, Jucá SSH, et al. Validação da versão brasileira da medida de independência funcional. *Acta Fisiatr*. 2004;11:72–76.
21. Dancey CP, Reidy J. *Estatística sem matemática para psicologia: usando SPSS para Windows*. Porto Alegre: Artmed; 2006.
22. Bornhofen C, McDonald S. Treating deficits in emotion perception following traumatic brain injury. *Neuropsychol Rehabil*. 2008;18:22–44.
23. Hartman-Maeir A, Soroker N, Ring H, et al. Activities, participation and satisfaction one-year post-stroke. *Disabil Rehabil*. 2007;29:559–566.
24. Desrosiers J, Demers L, Robichaud L, et al. Short-term changes in and predictors of participation of older adults after stroke following acute care or rehabilitation. *Neurorehabil Neural Repair*. 2008;22:288–297.
25. Hildebrand M, Brewer M, Wolf T. The impact of mild stroke on participation in physical fitness activities. *Stroke Res Treat*. 2012;2012:6 pp.
26. Van der Zee CH, Visser-Meily JM, Lindeman E, et al. Participation in the chronic phase of stroke. *Top Stroke Rehabil*. 2013;20:52–61.
27. Berg A, Palomaki H, Lehtihalmes M, et al. Poststroke depression: an 18-month followup. *Stroke*. 2003;34:138–143.
28. Carson AJ, MacHale S, Allen K, et al. Depression after stroke and lesion location: a systematic review. *Lancet*. 2000;356:122–126.
29. Falcoz PE, Chocron S, Mercier M, et al. Comparison of the Nottingham Health Profile and the 36-Item Health Survey Questionnaires in the cardiac surgery. *Ann Thoracic Surgery*. 2002;37:1222–1228.
30. Aström M, Adolfsson R, Asplund K. Major depression in stroke patients. A 3-year longitudinal study. *Stroke*. 1993;24:976–982.
31. Ahn DH, Lee YJ, Jeong JH, et al. The effect of post-stroke depression on rehabilitation outcome and the impact of caregiver type as a factor of post-stroke depression. *Ann Rehabil Med*. 2015;39:74–80.
32. Grimm S, Beck J, Schuepbach D, et al. Imbalance between left and right dorsolateral prefrontal cortex in major depression is linked to negative emotional judgment: an fMRI study in severe major depressive disorder. *Biol Psychiatry*. 2008;63:369–376.
33. Blömer AM, van Mierlo ML, Visser-Meily JM, et al. Does the frequency of participation change after stroke and is this change associated with the subjective experience of participation? *Arch Phys Med Rehabil*. 2015;96:456–463.
34. Brookes RL, Willis TA, Patel B, et al. Depressive symptoms as a predictor of quality of life in cerebral small vessel disease, acting independently of disability; a study in both sporadic SVD and CADASIL. *Int J Stroke*. 2013;8:510–517.