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Short communication

The influence of early depressive symptoms, social support and decreasing self-efficacy on depression 6 months post-stroke

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ABSTRACT

Background: Post-stroke depression (PSD) is the most frequent mental disorder after stroke, affecting about 30% of stroke survivors. Despite extensive research, little is known about the influence of general self-efficacy (GSE) on PSD. We investigated the effect of GSE on depression six months post-stroke while controlling for established risk factors.
Methods: Eighty-eight patients from two rehabilitation centers with first-ever ischemic stroke were assessed around 8 weeks and 6 months after stroke. Baseline assessment included demographic variables, GSE scale, physical disability (Barthel-Index), stroke severity (modified NIH Scale), pre-stroke mental illness, cognitive status (Mini-Mental-State-Test), social support (F-SozU Questionnaire) and depressiveness (Geriatric Depression Scale, GDS). Follow-up assessment included DSM-IV depression, GDS and GSE. The influence of each risk factor on PSD was analyzed by binary hierarchical regression.
Results: Baseline depressiveness (OR=1.41, $p < .01$) and social support (OR=.95, $p=.03$) predicted PSD. Decreasing GSE was associated with high baseline GSE ($r=.51$, $p < .01$) and influenced later PSD (OR=1.39, $p < .01$).
Limitations: Patients' range of impairment may have been limited as sufficient speech comprehension and capacity for interview participation were required. Causal relationship between decreasing GSE and increasing GDS cannot be assumed based on correlations.
Discussion: Decreasing GSE was linked to PSD, especially in patients with high baseline GSE. This effect may be due to dissatisfaction with recovery following high expectations. Early depressive symptoms and low social support predicted PSD. Early screening for depressive symptoms and focusing on self-efficacy might help to prevent later depression.

1. Introduction

Depression is the most frequent mental disorder after stroke, affecting about 30% of patients. Despite well-known association of post-stroke depression (PSD) with poorer functional outcome, reduced quality of life (QoL) and increased mortality, its pathogenesis is poorly understood (Kutlubaev and Hackett, 2014).

Recent systematic reviews identified five frequently investigated and consistently found risk factors for PSD (Ayerbe et al., 2013; Kutlubaev and Hackett, 2014): Higher functional impairment as measured by activities of daily living (ADL) and a more severe stroke represent the best-known risk factors for PSD. A personal history of pre-stroke depression and more severe cognitive impairment were associated with PSD in the majority of studies. Finally, high social support exerts protective influence, yet harmonization of results is hampered by differences in conceptualization. While often measured by observable variables (e.g. number of received supporting acts or demographic variables), growing evidence suggests stronger links between *perceived* social support and PSD (Northcott et al., 2015) with increasing relevance when patients face the challenge of social (re-)integration (Werheid, 2015).

Considering early detection during the critical two-year period, depressive symptoms shortly after stroke were consistently linked to later PSD, but scarcely investigated (Kutlubaev and Hackett, 2014). We found depressive symptoms to be the most relevant predictor for PSD six months later, even when controlling for well-known factors like physical disability or cognitive impairment (Lewin et al., 2015).

Self-efficacy, as the belief to exert control over one's own functioning was initially conceptualized as task-specific, but later broadened to general self-efficacy (GSE), describing the stable

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sense of one's personal competence to deal with new and stressful situations (Luszczynska et al., 2005). Studies showed GSE to facilitate coping with chronic conditions like pain or disability (Luszczynska et al., 2009) and lead to less anxiety and depression after cancer surgery or coronary heart disease (Luszczynska et al., 2005).

Stroke research mainly focused on task-specific self-efficacy (e.g. balance or memory) showing associations with lower depression during recovery (Korpershoek et al., 2011). However, GSE was found to have a stronger association with depression shortly after stroke than task-specific self-efficacy, indicating that coping after stroke may require a broader sense of efficacy (Lewin et al., 2013). To our knowledge, no previous study has examined the predictive value of GSE on depression six months after stroke.

The purpose of this study was to examine the independent influence of GSE on depression six months later while controlling for established risk factors. We assumed high GSE to unfold protective influence on later PSD and to remain relatively stable between assessments.

2. Method

Eighty-eight patients from our ongoing rehabilitation-based longitudinal Berlin PSD study were recruited from two inpatient rehabilitation centers (Brandenburg Klinik Bernau, Segeberger Kliniken). Inclusion criteria were: 1) first-ever ischemic stroke (≥ 4 weeks prior to baseline assessment), 2) formal education of ≥ 8 years, 3) sufficient comprehension (i.e. Token test > 12; fluent in German), 4) age of ≥ 40 years and 5) to maximize internal validity, less than 12 weeks deviation from planned 6 months interval of follow-up assessment. On average, patients were assessed 7.8 weeks (baseline), and 6.1 months (follow-up) after stroke, with a mean of 5.2 weeks of inpatient rehabilitation. At baseline, 12.5% of patients used antidepressants, 19.2% at follow-up (33.3% of patients with DSM-IV depression, 13.0% without). Lesion location was left in 35.5% of patients (47.4% right, 14.5% both, 2.6% missing).

Baseline assessment included demographic variables, ADL using the Barthel-Index (BI; Barthel and Mahoney, 1965), previous mental illness according to medical records, severity of stroke using the modified NIH Stroke Scale (mNIHSS: Meyer and Lyden, 2009), cognitive impairment using the Mini-Mental-State-Test (MMST; Folstein et al., 1975), self-perceived social support using the 22-item short form of the Social Support Questionaire (F-SozU; Fydrich et al., 1999), depressive symptoms using the 15-item version of the Geriatric Depression Scale (GDS; Yesavage et al., 1983), and perceived self-efficacy using the General Self-Efficacy Scale (GSES; Schwarzer and Jerusalem, 1995). Follow-up assessment included GDS, GSE and the structured clinical interview (SCID I; Wittchen and Fydrich, 1997) to diagnose depression according to DSM-IV criteria.

Binary logistic hierarchical multiple regression analysis was performed to investigate the independent influence of each factor on the occurrence of depression (yes/no) six months post-stroke. The five well-known predictors identified by Kutlubaev and Hackett (2014) and Ayerbe et al. (2013) were entered stepwise in descending order according to their significance. Thereafter, GSE and GDS were entered stepwise. Multicollinearity was assessed investigating tolerance factors (TF) and variance inflation (VIF). Group size requirements were ≤ 25 cases per category of the dependent variable. Significance was set at $p < .05$ for model and parameter testing. Nagelkerke's index was used as coefficient of determination (R^2). Mediation analysis was performed when a significant effect disappeared after adding another predictor to the regression (Eid et al., 2010). Trajectories of GSE and GDS were assessed by calculating the difference scores between baseline and

Table 1
Demographic and clinical characteristics of the study sample (N=88).

Pre-stroke mental illness:	3.4%			
Sex:	54.5%	male		
Baseline assessment	*M*	*SD*	Median	Range
Age	66.35	10.70	65.50	44–90
Years of education	11.39	3.41	10.00	9–18
BI	80.74	22.98	95.00	25–100
mNIHSS	3.86	3.54	3.38	0–17
MMST	27.78	2.68	28.00	17–30
F-SozU	94.99	13.25	98.50	54–110
GSES	31.73	5.68	33.00	17–40
GDS	3.81	3.00	3.53	0–14
Follow-up assessment	*M*	*SD*	Median	Range
GSES	31.72	6.14	33.00	17–40
GDS	3.94	4.08	2.00	0–15

BI: Barthel Index; mNIHSS: modified NIHS Scale; MMST: Mini-Mental Status Test; F-SozU: Social Support Questionaire; GSES: General Self-Efficacy Scale; GDS: Geriatric Depression Scale.

follow up.

3. Results

At follow up, 29.5% of all 88 patients fulfilled the DSM-IV criteria for depression. Demographic and clinical characteristics of the investigated variables are shown in Table 1.

Bivariate correlation analysis showed significant association between DSM-IV depression with perceived social support ($r = -.36$, $p < .01$), GDS ($r = .51$, $p < .01$) and GSE ($r = -.32$, $p < .01$). Requirements for multicollinearity ($.64 < TF > .89$; $1.21 < VIF > 1.56$) and group size were fulfilled. Results of the logistic regression are shown in Table 2. Social support (OR=.95 $p = .03$) and early GDS (OR=1.41 $p < .01$) influenced the risk for later depression. The model explained 43.1% of variance (R^2), global model test was not significant (GOF; $p = .80$).

GSE predicted depression at follow-up ($p = .04$, step 6). This effect disappeared ($p = .52$) when GDS was added to the regression. Testing for mediation, we found significant relationship between GDS and GSE ($r = -.48$, $p < .01$), GDS and follow-up depression ($r = .51$, $p < .01$), and GSE and follow-up depression ($r = -.32$, $p < .01$). Influence of GSE disappeared (OR=.93, $p = .19$) when GDS (OR=1.40, $p < .01$) was added to regression analysis, fully mediating the influence of GSE on follow-up depression.

Decreasing GSE was associated with increasing depressiveness ($r = -.36$, $p < .01$) and follow-up depression ($r = .28$, $p < .01$). Higher decline in GSE was associated with higher baseline GSE ($r = .51$, $p < .01$). Post-hoc analysis (GOF; $p = .09$, $R^2 = .66$) showed social support (OR=.91, $p = .02$) and early depressiveness (OR=1.41, $p = .02$) to predicted later PSD while GSE difference score (OR=1.39, $p < .01$) independently influenced the risk for later PSD.

4. Discussion

The main finding of this study was that early depressive symptoms and perceived social support predicted later PSD. At follow-up, 29.5% of all patients fulfilled the DSM-IV criteria for depression which is in accordance to pooled prevalence rates of comparable longitudinal studies (Kutlubaev and Hackett, 2014). Early depressive symptoms represented the most important predictor for depression six months post-stroke supporting previous