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REVIEW ARTICLE (META-ANALYSIS)

# Effect of Psychological Interventions on Depressive Symptoms in Long-Term Rehabilitation After an Acquired Brain Injury: A Systematic Review and Meta-Analysis

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**Abstract**

**Objective:** To summarize empirical studies on the effectiveness of psychological interventions in long-term rehabilitation after an acquired brain injury (ABI) in reducing depressive symptoms.

**Data Sources:** A systematic literature search was conducted on MEDLINE, PsycINFO, Embase, and CINAHL to identify articles published between January 1990 and October 2011. Search terms included the 3 concepts (1) "brain injur*" or "stroke," (2) "psychotherap*" or "therapy" or "intervention" or "rehabilitation," and (3) "depress*."

**Study Selection:** Studies evaluating psychological interventions in patients after ABI were included. Time since injury was on average more than 1 year. Trials reported data on validated depression questionnaires before and after the psychological intervention.

**Data Extraction:** Two independent reviewers extracted information from the sample, the intervention, and the outcome of the included studies and calculated effect sizes (ESs) from depression questionnaires. Thirteen studies were included in a pre-post analysis. Seven studies were eligible for a meta-analysis of ESs in active interventions and control conditions.

**Data Synthesis:** Pre-post ESs were significant in 4 of 13 studies. The overall ES of .69 (95% confidence interval [CI], .29−1.09) suggests a medium effectiveness of psychological interventions on depressive symptoms compared with control conditions. Moderator analysis of the number of sessions and adequate randomization procedure did not show significant ES differences between strata. Studies with adequate randomization did not, however, suggest the effectiveness of psychological interventions on depressive symptoms after ABI.

**Conclusions:** Psychological interventions are a promising treatment option for depressive symptoms in long-term rehabilitation after ABI. Since only a few adequately randomized controlled trials (RCTs) exist, more RCTs are required to confirm this initial finding.

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Acquired brain injury (ABI) is a major cause of disability in adulthood. Every year, almost 800,000 people in the United States sustain a stroke,[1] and an estimated 1.7 million people are affected by a traumatic brain injury (TBI).[2] Direct and indirect costs for ABI are assumed to approach $100 billion per year.[1,3]

ABI initially limits motor, cognitive, and emotional functioning but early multidisciplinary specialist rehabilitation can improve functioning substantially.[4] In addition, early multidisciplinary intensive rehabilitation has the potential for cost savings.[4]

After early rehabilitation, however, persistent disabilities with far-reaching consequences in employment and social functioning should be expected.[5-8] These consequences become clear during the long-term course of rehabilitation. They have a negative impact on quality of life and lead to a change in self and identity.[9,10] Patients affected by ABI often struggle with the process of adjustment to the new life situation. Six months after the injury, approximately one third of all patients develop clinically relevant depressive symptoms.[11,12] There is a strong need for an adequate treatment of depressive symptoms after ABI at this time point.

In a systematic review, Geurtsen et al[13] focused on long-term rehabilitation. The authors concluded that comprehensive rehabilitation programs seem to be effective in decreasing psychosocial

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problems and increasing community integration and employment.[13] Whereas these authors examined comprehensive rehabilitation programs in a long-term rehabilitation process, a systematic review investigating psychological interventions for depressive symptoms during the same period of rehabilitation is still lacking.

So far, there is little empirical evidence for the treatment of depressive symptoms after ABI. The effectiveness of the treatment for depressive symptoms after ABI has been systematically investigated.[14,15] Hackett et al[14] found no evidence that psychotherapy is effective for the treatment of depression after ABI. Fann et al[15] concluded that cognitive behavioral therapy (CBT) seems to be effective for depression after ABI. The authors were cautious in drawing conclusions because of the few studies that were found. Furthermore, the treatment of depressive symptoms was not the main focus in most studies.[15] Consequently, these findings do not allow clear recommendations for clinical practice.

The aim of this review is to systematically address the following question: are psychological interventions in long-term rehabilitation after an ABI effective in reducing depressive symptoms? The intention of this study is to extend earlier findings from 2 systematic reviews[14,15] that were based on inconclusive evidence and to aggregate for the first time, to the best of our knowledge, primary studies in a meta-analysis.

## Methods

### Inclusion criteria

The criteria for inclusion were (1) adult patients with a mean age of <70 years who had sustained an ABI; (2) a psychological intervention was on average applied more than 1 year after the incident; (3) the psychological intervention was applied by health care professionals and addressed emotional issues; (4) depressive symptoms were measured on a validated depression questionnaire before and after the psychological intervention, although patients were not necessarily required to have received a diagnosis of depression; and (5) the study was published in a peer-reviewed journal.

### Search strategy

Searches were conducted in MEDLINE, PsycINFO, Embase, and CINAHL between January 1990 and October 2011. Search terms covered 3 primary concepts that were combined with "and": (1) "brain injur*" or "stroke," (2) "psychotherap*" or "therapy" or "intervention" or "rehabilitation," and (3) "depress*." These terms were searched for in the abstract, title, and keywords.

### Study selection

After removal of duplicates the search yielded 2654 studies. These studies were reviewed with regard to abstract and title by the first author (F.S.-L.). As a consequence, a total of 57 studies were identified. Full texts of these studies were retrieved and read by 2 independent reviewers (F.S.-L. and E.F.). Disagreements between reviewers were resolved by discussion. Thirteen studies were included in a narrative review and a description of changes of depressive symptoms over time. Of these 13 studies, 7 were included in a meta-analysis of the effectiveness comparing active interventions and control conditions (see fig 1 for procedure and reasons for exclusion).

*List of abbreviations:*

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| ABI | acquired brain injury |
| CBT | cognitive behavioral therapy |
| CI | confidence interval |
| ES | effect size |
| RCT | randomized controlled trial |
| TBI | traumatic brain injury |

### Effect size calculation and data analysis

#### Pre- and posttreatment comparison

For 13 studies, effect sizes (ESs) were calculated from depression questionnaires or depression subscales using pre-post comparisons of the intervention group. If more than 1 depression questionnaire was used in the study, the more elaborated one was selected for the analysis. Quality characteristics such as sample, setting, intervention, measures, and results were described. Several quality indicators were depicted. The outcome assessment was described based on whether a self-rating questionnaire was used or whether data were collected by an interviewer. Information on dropouts before allocation and during the study was described, as well as whether inclusion criteria were reported.

#### Posttreatment comparison between control and intervention groups (meta-analysis)

Seven studies provided data for a comparison of depression questionnaire data between control and intervention groups posttreatment. One study[16] presented data from 4 groups. That is to say, psychological intervention and control treatment were each applied in a group setting and through the telephone. This study allowed 2 comparisons between an intervention and a control group, one applied in a group setting and one administered through the telephone. Hence, 2 ESs were calculated in this study. In 1 study,[17] data from 3 groups were available. One treatment arm comprised a social group providing social activities and was therefore excluded. The ES was calculated for the comparison between the psychological intervention and the waitlist group. The data included in the analysis were either total scores of depression questionnaires or depression subscales from more comprehensive questionnaires. If a study used more than 1 depression questionnaire, data from the more elaborated one was considered for the analysis.

Controlled studies were described on several additional quality indicators. Randomization was coded as adequate if both generation of allocation sequence (ie, random-number table, computer generated, coin tossing, shuffling dice, drawing lots, or minimization) and concealment of allocation were appropriate. The control group was described as an "active control group," meaning that participants of the control group received some sort of treatment, or an "inactive control group," indicating that patients participating in the control group did not receive relevant treatment. Baseline characteristics of the intervention and control group were coded if equivalent or not. Studies were assessed by 2 independent reviewers (F.S.-L. and J.B.). Disagreements between the reviewers were resolved by discussion.

#### Data analysis

ESs were calculated from mean and pooled SD using Wilson's[18] ES calculator.[19] An ES of ≥.20 to .50 indicates a low effect