

Neurocognitive Correlates and Psychological Group Treatments for Pathological Mental Fatigue

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Föreliggande avhandling grundar sig på följande artiklar:

- I. Glavå, G., Skau, S., Lövdén, M., & Johansson, B. (2025). Differences in Frontal Cortical Brain Function Between Individuals Suffering from Pathological Mental Fatigue Following Acquired Brain Injury and Healthy Individuals. *Accepted for Publication in Behavioural Brain Research.*
- II. Glavå, G., Rönnbäck, L., & Johansson, B. (2025). A New Mindfulness and Psycho-Educative Program for Treatment of Brain Fatigue, Evaluated after an Acquired Brain Injury and Multiple Sclerosis. *Health Psychology and Behavioral Medicine.* <https://doi.org/10.1080/21642850.2025.2502039>
- III. Glavå, G., & Johansson, B. (2025). Mindfulness-Based Stress Reduction as Perceived by Individuals with Pathological Mental Fatigue after an Acquired Brain Injury. *Scientific Reports.* <https://doi.org/10.1038/s41598-025-90452-y>



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Abstract

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Pathological mental fatigue (PMF) is associated with many injuries and diseases in the brain, and is estimated to affect tens of millions of people worldwide every year. But despite its prevalence, knowledge remains limited as to the neurocognition of PMF and treatment options for alleviating it. Therefore, the aim of this doctoral thesis was to investigate neurocognitive correlates of PMF and evaluate psychological group treatments for alleviating it. In Study I, we wanted to investigate whether and how neurocognitive function differed between healthy individuals and individuals affected by PMF. The PMF group exhibited higher global efficiency and lower modularity during both resting state and the cognitive tasks Digit Symbol Coding and Symbol Search. Additionally, the groups differed in peak oxygenated hemoglobin levels during the BASE task, with the PMF group showing lower oxygenation. In addition, the results in Study I indicated that the PMF group was slower on Digit Symbol Coding, Symbol Search and Stroop compared to the control group. The psychological group treatment Mindfulness-Based Stress Reduction (MBSR) has been shown to alleviate PMF, but knowledge has been lacking as to why patients are helped by it. In Study III we sought to provide further knowledge regarding the effects of MBSR on PMF after acquired brain injury by interviewing individuals with PMF who had undergone MBSR treatment. Similarly, in Study II, we evaluated the novel treatment program Brain Fatigue and Mindfulness (BF-M) by interviewing participants with PMF after acquired brain injury or multiple sclerosis. Studies II and III provide insights into how participants experienced the programs as a place where they could meet people with PMF and exchange experiences, learn more about PMF, and gain tools and strategies for coping with PMF in everyday life. Study II also used a randomized design to examine the relationship between measures of PMF and anxiety before and after the intervention. Results indicated reduced PMF and anxiety associated with BF-M participation. Overall, this thesis has enhanced the understanding of the neurocognitive correlates and psychological treatment of PMF. With three small-scale feasibility studies, we have indicated that those who are affected by PMF may exhibit different neurocognitive functioning compared to healthy individuals (Study I) and that PMF may be alleviated through psychological group treatment (Studies II and III). The results presented in the thesis can be used to further develop the knowledge of how to identify and treat PMF.

Keywords: pathological mental fatigue, acquired brain injury, traumatic brain injury, multiple sclerosis, neuroimaging, functional Near Infrared Spectroscopy, psychological group treatment, mindfulness, mindfulness-based stress reduction