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# Rehabilitation for improved cognition in stress-related exhaustion

Cognitive, neural and clinical perspectives

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**Abstract**

Stress-related exhaustion disorder (ED) has been associated with concomitant cognitive impairment, perceived by patients to have large impact on everyday life. However, little is known about how to address cognition in stress rehabilitation and how this could influence stress recovery over time. The aim of this thesis was to evaluate the efficacy of additional cognitive and aerobic training for patients with ED who participated in a multimodal stress rehabilitation program. A further aim was to explore the neural correlates of ED. The main focus of this thesis was on cognitive training, the effects of which were studied from a cognitive, neural, and clinical perspective (Study I-III). The final part of this thesis (Study III) broadened the perspective and investigated the long-term effects of cognitive and aerobic training on cognitive and clinical outcomes.

Study I and II evaluated the effects of process-based cognitive training immediately following the intervention. The results from Study I showed that the generalization of training effects following cognitive training was selective and restricted to tasks similar to those trained. The cognitive training group showed a greater reduction in burnout symptoms, and partial support was given for fewer subjective cognitive complaints compared to stress rehabilitation alone. Study II used functional neuroimaging to explore the neural effects of cognitive training, showing training-related activation increases at high working memory load; however, conclusions were restricted due to the small sample.

Study II additionally explored the neural correlates of ED by investigating within-group associations between burnout level and functional neural response during working memory updating. The results revealed that patients with higher levels of burnout showed greater recruitment of working memory-related regions during task execution, potentially reflecting a compensatory mechanism serving to uphold task performance.

Study III evaluated the clinical utility of addressing cognitive impairments in stress rehabilitation. Here, the effects of cognitive and aerobic training on several ED-related variables were investigated 1 year after the intervention. Cognitive training was associated with a small and lasting improvement in cognitive performance. Aerobic training yielded improvements in episodic memory immediately following the intervention, but no significant difference was found between the aerobic training group and the control group at 1-year follow-up. For psychological health and work ability, no additional benefits were seen for the added interventions relative to stress rehabilitation alone. However, a long-term improvement in burnout symptoms favouring cognitive training was observed when restricting the analysis to only include patients who had completed the intervention. This highlights the importance of supporting patients in adhering to added treatments.

In sum, the papers in this thesis provide initial evidence of neurocognitive plasticity in patients with ED and tentatively suggest that cognitive improvements following cognitive training may translate into alleviated clinical symptoms. These results support the argument that interventions targeting cognitive impairments holds a place in the effective rehabilitation of ED.

**Keywords**

stress rehabilitation, burnout, exhaustion disorder, cognitive training, aerobic training

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