



Executive function performance is reduced during occupational burnout but can recover to the level of healthy controls



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ABSTRACT

Background: Burnout is a work-related syndrome that comprises physical fatigue, emotional exhaustion and cognitive weariness and is considered to be a risk factor for the development of major depression. While cognitive impairments in major depression persist even after remission of mood symptoms, the role of cognitive impairments in burnout is less clear. The hypothesis tested in the present study submits that executive function performance is reduced during burnout compared to healthy subjects but can recover to normal levels.

Methods: 12 male subjects (mean age 45.8 ± 6.8 years) suffering from occupational burnout took part in the study. They completed questionnaires related to burnout severity and underwent testing of executive functions twice at baseline and at follow-up 12 weeks later. Between baseline and follow-up burnout participants performed regular aerobic exercise training. Executive function performance at baseline and follow-up was compared to 12 matched healthy controls.

Results: Executive functioning was significantly reduced during acute burnout compared to healthy controls. At follow-up, both burnout severity and executive functioning were improved. Changes in burnout severity and executive function performance were not related.

Conclusions: Data suggest that executive function performance is impaired during acute burnout but can recover to the level of healthy controls. This finding is at odds with the finding of persistent deficits in the same tests found in major depression even after remission of depressive mood. Results may indicate that the pathophysiological changes underlying the impaired executive functioning during burnout are less pronounced compared to those in major depression.

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1. Background

Burnout is a syndrome that can occur when individuals are exposed to chronic work related stress that exceeds their ability to cope with or control the demands of their work environment. It is characterized by emotional exhaustion, cynicism, and a feeling of reduced professional efficacy (Maslach et al., 2001). An epidemiologic study in the working population in Finland showed a prevalence of 25% for mild burnout and 2.4% for severe burnout while more severe forms of burnout were associated with higher prevalence of major depression (Ahola et al., 2005). People suffering from burnout are considered at risk for developing a major depression (Burisch, 2010; Glass and Mcknight, 1996). Thus, some researchers view burnout as an initial syndrome in a continuum between

stress-related exhaustion and depressive disorders (Burisch, 2010; Shirom et al., 2006). One area of symptoms that burnout and major depression share is related to cognitive symptoms: While concentration deficits represent a standard operational criterion for the diagnosis of major depression according to DSM-IV criteria (APA, 2000), cognitive weariness is one of the key symptoms of burnout (Shirom, 2003).

In major depression, impairments of cognitive function have been found in a large number of studies for different cognitive domains, including memory (Bearden et al., 2006), attention (Zihl et al., 1998) and executive functions (Reppermund et al., 2009; Stordal et al., 2004). Several studies suggest that in major depression cognitive deficits persist even after remission of depressive mood symptoms (Marcos et al., 1994; Neu et al., 2005; Reppermund et al., 2009). In burnout, the picture is less clear. A number of studies assessed cognitive performance in burnout objectively by using neuropsychological tests for different cognitive domains with mixed results. While some studies reported lower performance on reaction-time tests in people suffering from burnout compared to healthy

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controls (Rydmark et al., 2006; Sandstrom et al., 2011, 2005), no such impairment was found by Osterberg et al. (2009). They observed reduced cognitive speed in burnout as the only impairment in a comprehensive test battery. Findings on reduced performance in short-term memory tasks in burnout were reported by Sandstrom et al. (2011, 2005) while no group differences between burnout and healthy controls were found by Öhman et al. (2007) for this cognitive domain. Working memory impairments in burnout patients on a digit span test were found by Rydmark et al. (2006) while other studies reported normal findings in burnout on similar tests (Öhman et al., 2007; Sandstrom et al., 2011, 2005). In a recent study comparing cognitive function in patients with stress-related exhaustion with that in healthy controls, the most pronounced difference between patients and controls was seen on executive function (Jonsdottir et al., 2013). A more detailed review on the heterogeneous results on impairments of cognitive function in burnout is provided by Osterberg et al. (2012) who assume that methodological issues such as inadequate matching of patients and controls seems to be one important factor for the mixed findings. The authors thus propose a prospective approach following-up burnout patients from shortly after illness onset until recovery, allowing them to serve as their own controls. To date, two such follow-up studies have been performed. Osterberg and colleagues followed up former burnout patients after 1.5 years and found improved cognitive performance on tests of short-term memory and attention (Osterberg et al., 2012). In another follow-up study Oosterholt et al. (2012) investigated burnout patients suffering from “undifferentiated somatoform disorder with the addition of work-related causes”. They found deficits in the “updating function” in an executive function task in burnout patients compared to controls that persisted after psychotherapy over 8–17 weeks despite improved burnout symptoms. To summarize, we note that follow-up studies regarding performance on executive functions and other cognitive domains in burnout are still scarce and interpretation of results is challenging due to inhomogeneity in samples and therapeutic interventions e.g. workplace intervention, psychotherapy, antidepressants, and sleeping pills (Osterberg et al., 2012) and psychotherapy with varying duration and intensity (Oosterholt et al., 2012). To address this issue, we aimed at performing a highly structured follow-up study in a closely defined sample of subjects suffering from acute occupational burnout that are naïve to both drug and psychotherapy. In order to avoid confounding effects of gender, only male subjects were included in the study. To avoid confounding effects of drug and/or psychotherapy, a standardized aerobic exercise training was the only stress coping procedure during study course.

The aim of the present study was twofold: First, to investigate cognitive performance during acute burnout and after clinical improvement of burnout severity. Second, to compare cognitive performance during acute burnout and after improvement of burnout severity with the performance of matched healthy controls. The following two hypotheses were formulated: First, following (Jonsdottir et al., 2013; Öhman et al., 2007; Oosterholt et al., 2012; Osterberg et al., 2009; Rydmark et al., 2006; Sandstrom et al., 2011, 2005; Van der Linden et al., 2005) we expected that executive function performance during acute burnout is reduced compared to healthy controls. Second, following (Osterberg et al., 2012) we expected that executive function performance is improved after aerobic exercise training and improvement of burnout severity.

2. Methods

2.1. Study design

All participants underwent a baseline examination: In brief, all participants were assessed for burnout symptoms using standard

questionnaires. Executive function performance was assessed using the ID/ED test of the computerized CANTAB test battery. Subjects with burnout then engaged in a 12 week aerobic exercise training program under supervision of previously trained exercise coaches from the Institute of Exercise and Health Sciences of the University of Basel. Executive function performance and burnout severity were re-assessed at study follow-up after 12 weeks. Data of subjects suffering from burnout were compared with data of healthy controls matched for age, gender, education level and working hours. Healthy subjects were assessed once for cross-sectional comparison.

2.2. Participants and procedures

For recruitment, advertisements were published in local newspapers and posted electronically on websites of public institutions. All participants gave written informed consent after they have received a complete description of the study. The study protocol was approved by the local ethics committee and was performed in accordance with the Declaration of Helsinki. Prior to study enrolment, all candidates were assessed by an experienced rater for the presence of burnout symptoms after prolonged exposure to work related stress with onset of burnout symptoms within 3 months before study participation without prior history of psychiatric illness and no family history of affective disorders. Inclusion criteria comprised a high score on the Maslach Burnout Inventory subscales “Emotional Exhaustion” (≥ 27) or “Depersonalization” (≥ 10) male gender, age between 30 and 65 years, non-smoking and good physical health. Psychiatric disorders were ruled out by a short structured diagnostic interview based on the DSM-IV, Axis I diagnostic criteria and ICD-10 (M.I.N.I.: Ackenheil et al., 1999; Sheehan et al., 1998). We excluded female subjects in order to avoid gender effects as a possible confounder. Only subjects who did not perform regular aerobic exercise in the last two years were included in order to ensure comparable baseline conditions for all participants regarding training status. Recruitment of healthy subjects was performed in the same way as for the burnout participants with healthy being defined as good physical health with absence of burnout and psychiatric disorders. Subjects who met one of the following exclusion criteria were excluded from the study: somatic illness; infectious diseases; neoplasias; psychiatric disorders according to DSM-IV and ICD-10 or a positive family history for affective disorders. Subjects with pharmacologic or psychotherapeutic treatment were also excluded from the study. After thorough examination a total of 12 male participants suffering from burnout syndrome according to Maslach’s concept of occupational burnout (Maslach et al., 2001) and 12 healthy controls matched for age, education level and working hours/week were enrolled in the study. Healthy controls were assessed once at baseline to obtain reference values that were used in cross-sectional comparisons with the data of subjects suffering from burnout at both baseline and follow-up. All participants continued working during the study and concluded the entire study. None of the participants received pharmacotherapy or psychotherapy during the study. Sample characteristics are provided in Table 1.

2.3. Assessment of psychopathology

Burnout severity was assessed with the German versions of the Maslach Burnout Inventory (MBI; Enzmann and Kleiber, 1989) and the Shirom–Melamed Burnout Measure (SMBM) (Melamed et al., 2006). The MBI is a self-rating questionnaire consisting of 22 items assessing the three sub-dimensions of emotional exhaustion (9 items), depersonalization (5 items) and personal accomplishment (8 items). Answers were given on a 7-point frequency rating

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