STUDIES ON COGNITIVE PERFORMANCE IN BURNOUT

Arno van Dam

Illustratie omslag: Collage 'Burn-out', Arno van Dam

Burn-out is voor de patiënten die er aan lijden een boze droom. Hun wereld is op een onbegrijpelijke manier veranderd. De manen van Murakami's *1Q84*, verwijzen naar deze veranderde werkelijkheid. De mannen die de wereld met zich mee zeulen zijn een beeld van Atlas uit het Museo Archeologico Nazionale di Napoli en levende standbeelden van 'Living Sculptures' beeldtheater uit Nijmegen. Deze mannen dragen de last van de wereld op hun schouders en bouwen aan hun torens van Babel (Pieter Brueghel de Oude en Maarten van Valckenborch). Verwarrende gebouwen die nooit afkomen. Ze staan in brand. De mannen zijn bezig met hun last en hebben geen oog voor de vrouwen die op hen wachten: de Venus van Botticelli; Uma Thurman als de Venus van Botticelli in Terry Gilliams film *The Adventures of Baron Munchausen* (1988); de Aphrodite van Ippolito Buzzi uit het Museo Nazionale Romano; de Capuese Aphrodite en de Aphrodite Kallipygos uit het Museo Archeologico Nazionale di Napoli; en verschillende door Paul Delvaux geschilderde vrouwen. Een engel (Highgate Cemetery, Londen) kijkt weemoedig naar het tafereel en twee vrouwen (Cimetière du Père Lachaise, Parijs) rouwen om al het zinloze verlies aan levenskracht. Voor taken die door mensen aan anderen worden gedelegeerd gebruiken Blanchard, Oncken en Burrows (2007) als metafoor aapjes die van de ene schouder naar de andere overspringen. De apen op de omslag laten niet met zich sollen. Ze zijn grimmig en opstandig. Enkelen zijn dood. Een geleerde (professor Otto Lidenbrock, ontleend aan Paul Delvaux en Edouard Riou) loopt enigszins vervreemd en in zichzelf gekeerd door het landschap.

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Promotor:	Prof. dr. E.S. Becker
Copromotoren:	Dr. G.P.J. Keijsers Dr. P.A.T.M. Eling
Manuscriptcommissie:	Prof. dr. M.A.J. Kompier (voorzitter) Prof. dr. W.B. Schaufeli (Universiteit Utrecht) Dr. D. van der Linden (Erasmus Universiteit Rotterdam)

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Voor Mischa en Caro

De zon was door de mist heen gekomen, de weilanden glinsterden in het herfstige licht, zonder het blikkeren en grommen van de auto's op de Rijksweg, vijfhonderd meter verderop. Maar ze hadden een flinke wind tegen en hij bleef afgeleid door allerlei niet ter zake doende gedachten.
'Waar denk je aan?' vroeg ze.
Hij schrok op. 'Aan het Bureau', zei hij schuldig.
'Kun je nou niet eens een keertje niet aan het Bureau denken?'
'Ik zal mijn best doen.'
'Altijd maar dat Bureau. Ik krijg er nog wat van.'
'Maar ik denk niet aan bepaalde dingen', verontschuldigde hij zich. 'Het is meer een algemeen gevoel'.
'Alsof dat minder erg zou zijn', zei ze ontevreden. 'Als je thuis bent, zou het Bureau helemaal niet moeten bestaan.'
'Nee', gaf hij toe.

J.J. Voskuil, *Het Bureau*. Deel 3, *Plankton* (1997), blz. 250

Hij stond met hoofdpijn op. Lopend naar het Bureau, in het donker, trachtte hij zich te herinneren wat hij de vorige avond gedaan had, maar hij voelde zich te beroerd om zich daar lang mee bezig te houden. Hij huiverde en zocht wegkruipend in zijn jas bescherming tegen de wind, vaststellend dat de pijn in zijn borst er niet beter op werd. Zonder om zich heen te zien liep hij de bekende weg, de gracht langs, bij de zijstraten werktuigelijk inhoudend voor het verkeer, als een blind paard. Hij schoof zijn bordje in en klom langzaam de trappen op, af en toe even stilstaand om adem te halen. Behalve dat hij hoofdpijn had, was hij ook misselijk en toen hij eindelijk achter zijn bureau zat, was hij uitgeput.

J.J. Voskuil, *Het Bureau*. Deel 6, *Afgang* (2000), blz. 28-29

Contents

1	General introduction	1
2	Dimensions in appraising fating in relation to performance	9
3	Fatigue and appraisal of fatigue are not specific in burnout	23
4	Do burnout patients prefer low-effort performance strategies?	33
5	Testing whether reduced cognitive performance in burnout can be reversed by a motivational intervention	47
6	Burnout patients primed with success did not perform better on a cognitive task than burnout patients primed with failure.	63
7	Impaired cognitive performance and responsiveness to reward in burnout: Two years later.	77
8	Summary and general discussion	91
	References	101
	Nederlandse samenvatting	115
	Dankwoord	123
	Publications	127
	Curriculum vitae	131

1 General introduction

Introduction

When we started this project, there were practically no studies on objective cognitive performance in burnout patients. Fortunately, the topic drew the attention of several researchers in the field and in 2005 the first studies were published that used cognitive tasks rather than patients' self-evaluations as a measure of cognitive performance (Sandström, Rhodin, Lundberg, Olsson & Nyberg, 2005; Van der Linden, Keijsers, Eling & Van Schaijk, 2005). These studies found that burnout patients performed worse on cognitive tasks than healthy controls.

The investigations described in this thesis are an attempt to add to the scarce body of knowledge that has been collected on this topic. We investigated whether the cognitive impairments, often reported by burnout patients (i.e. Schaufeli & Enzmann, 1998), could be objectively established and whether treatment could normalize their cognitive functioning. Closely related to these practical issues, we were interested in the processes that may underlie these impairments. Is there a process that is distinctive for burnout and that accounts for specific psychopathological characteristics such as fatigue, detachment and reduced cognitive performance? Several studies have shown that fatigued individuals generally are reluctant to expend effort and switch to performance strategies that make lesser demands on working memory (Matthews, Davies, Westerman & Stammers, 2000). Since fatigue is a major symptom of burnout, reduced cognitive performance in burnout may be due to the same processes as observed in fatigued healthy individuals. However, the connection between fatigue and reduced cognitive performance may also arise from specific cognitive impairments. The studies described in this thesis aim to offer more insight into the relationship between cognitive performance and fatigue in burnout. Further insight into the specific psychopathological processes in burnout related to performance is important because this insight may eventually lead to improvements in the treatment of burnout patients and their reintegration back into the workplace.

In this chapter the concept of burnout and its relation to (cognitive) performance is introduced and the outline of the thesis is described.

Burnout: a Clinical Syndrome

Burnout is a stress-related syndrome characterized by exhaustion, occupational detachment, and reduced personal accomplishment. It is generally believed that burnout results from prolonged periods (years) of stress and from an inability to reach personal goals. Burnout patients frequently report reduced job satisfaction, physical complaints (especially fatigue) and impaired cognitive performance (Maslach, Schaufeli & Leiter, 2001; Schaufeli & Enzmann, 1998; Schmidt, Neubach & Heuer, 2007; Taris, 2006).

The percentage of employees in the Netherlands with burnout symptoms remained virtually constant between 1997 and 2007 ranging between 8 and 10 per cent of the working population (Schaufeli, 2007). However beginning in 2007, there seems to be an increase in the number of employees with burnout symptoms. In 2010, the percentage of employees with burnout symptoms was 13% according to the Centraal Bureau voor de Statistiek (CBS: 2012). Employees with a higher education level and older than 25 years reported higher levels of burnout symptoms (CBS, 2012). An estimated 4% of the general Dutch population meets the definition of clinical burnout (an elevated level of exhaustion and an elevated level of cynicism and/or an elevated level of reduced personal accomplishment as well) (Bakker, Schaufeli & Dierendonck, 2000).

Burnout is not included in the current versions of the DSM-IV and ICD-10 classification systems. Since burnout may have a chronic course and as many people seek treatment for this syndrome, it is not surprising that psychiatrists and clinical psychologists have a keen interest in methods to diagnose burnout. Using the DSM-IV, burnout can be classified as an undifferentiated somatoform disorder with medically unexplained persistent (> 6 months) fatigue as the predominant symptom along with restraints on daily functioning (Hoogduin, Schaap & Methorst, 2001). The reported fatigue must be attributed to work-related factors by the patient. In the ICD-10, burnout is mentioned but no diagnostic criteria are displayed. The diagnosis of neurasthenia with the addition that it is work-related is therefore better suited to classify burnout (Hoogduin et al., 2001). The diagnostic criteria of neurasthenia include persistent fatigue and at least two of the following symptoms: muscle pain or joint pain, dizziness, tension headaches, insomnia, difficulty relaxing, stomach or intestinal problems and increased irritability. Hoogduin et al. (2001) also add that those afflicted must experience cynicism or a feeling of mental numbness and/or that their performance level has decreased. In addition, the duration of symptoms must be longer than one year and related to working conditions and may not be due to an anxiety disorder or major depression.

Burnout symptoms and depressive symptoms seem to be interrelated to a certain degree (Schaufeli & Enzmann, 1998), but several studies found that the phenomenological overlap between burnout and major depressive disorder appeared to be rather small

(Glass & McKnight, 1996; Leiter & Durup, 1994; Schaufeli et al., 2001; Toker, Shirom, Shapire, Berliner & Melamed, 2005). Burnout patients are passive and indecisive because fatigue discourages them from expending effort, whereas depressed patients avoid effort because they do not feel like it. Burnout patients usually experience stronger emotions than depressed patients such as anger. Furthermore, they report difficulties falling asleep as opposed to waking up early like depressed patients. Burnout patients also do not report irrational guilt, suicidality, and weight loss as in depressive patients (Hoogduin et al., 2001).

Burnout patients can be distinguished from patients with an adjustment disorder because burnout is the result of a long process. The diagnosis of adjustment disorder can only be made when symptoms develop within three months in response to an identifiable stressor.

The definition of burnout is very similar to that of chronic fatigue syndrome with regard to fatigue and restraints on daily functioning. Burnout, however, can be distinguished from chronic fatigue syndrome by the attribution of fatigue to work instead of somatic factors (Hoogduin et al., 2001; Huibers et al., 2003).

Burnout and Performance

Reduced job-performance is an important consequence of burnout, both from the perspective of the patient and the employer. From the patient's perspective, reduced performance may result in an inability to fulfil the demands of one's job which may in turn result in stress, diminished self-esteem, depressed mood, and possibly more fatigue. From the perspective of an employer, reduced performance may result in reduced production or a decrease in the quality of the delivered work.

Reduced perceived job-competence is one of the main features of the burnout syndrome, but surprisingly little research has investigated the relationship between severity of burnout (including perceived job-competence) and actual job-performance. Moreover, most studies on the burnout-performance relationship are based on self-report data. These subjective judgments may not necessarily reflect objective performance. Taris (2006) reviewed the literature on burnout and objective performance and concluded that severity of burnout and level of performance appear to be related, but that firm conclusions are difficult to draw due to conceptual and methodological limitations of studies. One of the methodological problems mentioned by Taris (2006) is that the measures of objective job-performance in most studies were not optimal. For example, ratings of one's performance by a supervisor or by colleagues were used, which are subjective to some extent (Bakker, Demerouti & Verbeke, 2004). Another problem mentioned by Taris is that the measures of performance used in many studies may also be influenced by factors other than reduced performance. For instance, measures such as

the number of admissions of psychiatric patients to a hospital by members of an assertive outreach team (Priebe et al., 2004) or the death rate among patients of particular hospital units (Keijsers, Schaufeli, LeBlanc, Zwerts & Miranda, 1995) may depend on other factors than reduced performance of the employees alone, for instance the availability of hospitals in the region. Taris suggests that theoretical assumptions concerning the relationship between burnout level and job-performance should be specified more clearly in future research.

Cognitive Performance in Burnout

Theoretically a specific feature relevant for the relationship between burnout and job-performance may be a cognitive impairment that is associated with burnout. Since 2005 several studies on objective cognitive performance in burnout have been published using neuropsychological tests to measure cognitive performance (Öhman, Nordin, Bergdahl, Slunga Birgander,& Stigsdotter Neely, 2007; Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012; Österberg, Karlson & Hansen, 2009; Sandström et al., 2005; Sandström et al., 2011; Van der Linden et al., 2005). The results of these studies show that burnout patients perform poorer on cognitive tasks than healthy controls. The cognitive impairments observed in burnout patients seem to especially affect the more complex, higher cognitive processes, such as executive functioning rather than the more simple cognitive processes, such as responding to a target. Since executive control is essential for performance on tasks that require planning, control, evaluation, adaptation and problem solving, these impairments may well result in an overall impaired job-performance. Unfortunately these studies on cognitive impairments in burnout also suffer from limitations. Different and sometimes poorly specified diagnostic procedures and instruments have been used to establish clinical burnout. Also, the possible effects of comorbidity such as major depression and anxiety disorders have not always been adequately addressed.

Mechanisms Underlying Reduced Cognitive Performance in Burnout

Cognitive impairments may play a role in the impaired performance of burnout patients. Part of our studies investigated whether this is the case and, if so, whether such impairments can be reduced. A related issue concerns the processes that may underlie reduced cognitive performance in burnout patients. If burnout patients indeed show reduced performance levels on cognitive tasks associated with (effortful) executive functioning, several mechanisms may be invoked to explain these differences.

First, burnout patients may suffer from cognitive impairments due to stress-related physiological changes (Boksem & Tops, 2008; Oosterholt et al., 2012). There is ample evidence that sustained stress mediated by chronically elevated levels of glucocorticoids

can have detrimental effects on neuronal structures involved in cognitive functioning, such as the hippocampus and the prefrontal cortex (Arnsten, 2009; Lupien & Lepage, 2001; Marin et al., 2011; McEwen, 2005). However, with respect to burnout patients in particular, several studies found biochemical differences between burnout patients and healthy controls, whereas other studies did not find such differences (Mommersteeg, Heijnen, Verbraak & Van Doornen, 2006; Österberg, Karlson & Hansen, 2009). Therefore, other explanations have to been taken into account as well.

Second, several authors suggest that individual differences in the appraisal of fatigue may be responsible for reduced performance in individuals that suffer from long-term fatigue (Afari & Buchwald, 2003; Deluca, 2005; Knoop, Prins, Moss-Morris & Bleijenberg, 2010; Prins, Van der Meer & Bleijenberg, 2006). Appraisal in this case refers to an individual's interpretation of stimuli, situations or symptoms. Fatigue, for example, may be appraised by an individual as a signal that an activity is uninteresting or that energy resources are getting depleted (Meijman, 1991). Because fatigue in burnout patients is often associated with an imbalance between effort and rewards (Van Vegchel, De Jonge, Bosma & Schaufeli, 2005), it may be possible that burnout patients do not expect that expending effort on a task will be rewarding and therefore are less inclined to fully participate in a task. Cognitive processes, such as focusing on fatigue and catastrophizing cognitions associated with fatigue are regarded as important factors for developing and maintaining chronic fatigue (Afari & Buchwald, 2003; Deluca, 2005; Knoop et al., 2010; Prins et al., 2006). It may also be possible that these cognitive processes also play a role in burnout and lead to a reduction in the willingness to spend effort at a task.

A third explanation for reduced cognitive performance in burnout may be that burnout patients adapt their performance strategy. In the literature on fatigue in healthy individuals, it has been shown that fatigued individuals adapt their performance strategy in order to regulate the mobilization of mental effort (Hockey, 1997, 2011). Strategic adjustments can be achieved, for instance, by allowing failures for secondary goals. Thus, someone may selectively neglect low-priority task components (e.g., the speed or accuracy of responses) or he or she may neglect subsidiary activities, or shift to simpler response strategies with lesser demands on working memory. Because fatigue is a central characteristic of the burnout syndrome, one may expect that burnout patients will also start to routinely select less demanding performance strategies. Reduced cognitive performance in burnout patients may therefore also result from strategy shifts due to a patient's estimation of reduced availability of resources and consequently exhibit a reduced motivation to invest effort in the task rather than from cognitive impairments alone. Although clinical observations suggest that burnout patients apply different strategies to solve problems compared to healthy controls (Sandström, 2010), to our knowledge no experimental studies have been performed with respect to the adaption

of performance strategies in burnout patients.

A fourth explanation for reduced cognitive performance in burnout patients may be that burnout patients are less motivated to expend effort. In the literature on burnout, motivational problems are regarded as a distinctive feature of the burnout syndrome (Boksem & Tops, 2008; Schaufeli & Taris, 2005). Reduced motivation to spend effort may result in inferior task performance. It appears, however, that the role of motivation is not clear and may be regarded as either a transient attitude or a stable state. Based on Ajzen (1991), motivation is often viewed as an attitude toward a certain task based on the perceived balance of required effort for task performance and the potential rewards of correct task performance. According to this conception, changing the balance between efforts and rewards will increase or decrease the motivation to expend effort and subsequently influence task performance. Several authors suggest that burnout patients may be motivated by changing the effort-reward balance (Halbesleben & Bowler, 2007; Rubino, Luksyte, Jansen Perry & Volpone, 2009). Other authors, however, assume that a reduced motivation can become a more structural state (Boksem & Tops, 2008). They suggest that overriding fatigue for prolonged periods of time comes at a price in the form of stress which can lead to physiological changes in the dopaminergic/motivational system. These physiological changes are believed to be fundamental to disorders that are characterized by long-term fatigue, as in burnout. According to this model, reduced motivation cannot be reversed in the short term by motivational interventions.

In conclusion, there are several processes that may contribute to reduced cognitive performance in burnout. It is not known to what extent the appraisal of fatigue, reduced motivation to expend effort and the strategic adaptation of task performance play a role in performance decrements associated with burnout. The studies described in this thesis are intended to provide additional insight into the role of fatigue appraisal, the adaptation of performance strategies and motivational problems that play a role in reduced cognitive performance in burnout.

Outline of the Thesis

This thesis consists of three parts. The first part (chapter 2 and 3) presents the assessment of fatigue-appraisal in relation to performance and the question of whether fatigue and fatigue-appraisal are specific to burnout. The second part (chapter 4, 5, and 6) consists of three experimental studies, designed to test whether strategic adaptation of task performance and reduced motivation to expend effort play a role in reduced cognitive performance in burnout. The third part (chapter 7) deals with the question of whether reduced cognitive performance in burnout improves in burnout patients who receive psychological treatment.

In chapter two we present the conceptual frameworks concerning the appraisal of

fatigue and its relationship to performance. In the literature, we found several theories about the appraisal of fatigue in relation to performance. We categorized these theories and descriptions and developed two conceptual frameworks that model the fatigue-performance relationship: (1) adaptation-oriented appraisal and (2) emotion-related appraisal. Because it is unclear whether these different ways of fatigue appraisal actually exist as separate dimensions and whether they are related to the perception of levels of fatigue or mood, we investigated whether adaptation-oriented appraisal and emotion-related appraisal exist as separate dimensions in a healthy population.

In chapter three, we describe our study of fatigue-performance appraisal with the primary objective of investigating whether fatigue appraisal may play a role in reduced cognitive performance in burnout. We investigated whether level and appraisal of fatigue differ between burnout patients, healthy participants and patients suffering from anxiety disorders or major depression. Burnout patients, healthy participants, depressed patients, and patients with an anxiety disorder were presented with the set of statements developed and tested in chapter two. Level of fatigue was also assessed in order to examine the association between level of fatigue and appraisal of fatigue. We also presented participants with questionnaires concerning depression and anxiety in order to investigate relationships between level of fatigue, appraisal of fatigue, depression, and anxiety.

In chapter four, we describe our study of whether burnout patients showed a lower cognitive performance level compared to the level of healthy individuals due to the use of low-effort performance strategies. We presented burnout patients and healthy controls with a cognitive task which they could either execute by adopting an effective but high-effort strategy or by applying a less effective low-effort strategy. Several studies have shown that fatigued, healthy individuals prefer less effective trial and error approaches that rely less upon an intensive use of working memory, while non-fatigued healthy individuals prefer more effective strategies, despite the fact that these require more effort in the beginning (Boksem, Meijman & Lorist, 2006; Schellekens et al., 2000; Shingledecker & Holding, 1974). Since burnout patients are more fatigued than healthy controls, we hypothesized that the burnout patients would also be inclined to choose a low-effort strategy more often than the healthy controls.

In chapter five we described our investigations into whether a motivational intervention could reverse reduced cognitive performance in burnout patients. An increase in performance level due to a motivational intervention would indicate that motivation to expend effort should be considered a reversible attitude. An enduring poor performance would be in line with theories that state that chronic biochemical-based changes in motivation underlie reduced cognitive performance in burnout. In our study, we presented burnout patients and healthy controls with a switch task. Subsequently, we provided the

participants with fake positive feedback about their performance and announced that we would financially reward those who performed best in a second block of trials. The second block of trials was presented to examine the effect of this motivational intervention on the level of performance and the motivation to invest effort.

In chapter six we describe our investigation as to whether motivation can be enhanced in an implicit way, using priming. Because cognitions about fatigue and performance may play a role in the appraisal of motivational interventions, we designed our experimental procedure to bypass these cognitions by motivating healthy controls and burnout patients implicitly by priming participants with either success or failure prior to task performance.

In chapter seven we present our investigations as to whether symptoms such as exhaustion and detachment had decreased in burnout patients who had received some form of therapy, over the course of two years if cognitive performance had improved and if responsiveness to motivational interventions had normalized again. We followed burnout patients and healthy controls who participated in our study (chapter five) and repeated these measurements two years later. A summary of the major findings in our studies and a general discussion are presented in chapter eight.

2 Dimensions in Appraising Fatigue in Relation to Performance

Van Dam, A., Keijsers, G. P. J., Eling, P. A. T. M., & Becker, E. S. (2011). *Psychology, 2,* 889-895.

Abstract

Studies on the relation between fatigue and performance often fail to find a strong and direct link, implying that multiple factors may be involved. A literature search on the fatigue-performance relationship suggests that two different conceptual frameworks are employed concerning the appraisal of fatigue in relation to performance: an adaptation-oriented framework and an emotion-related framework. In this study we investigated whether adaptation-oriented appraisal and emotion-related appraisal exist as separate dimensions in a healthy population. A list of statements derived from these frameworks was presented to 127 healthy individuals. A principal component analysis revealed a six-factor solution and a three-factor solution of fatigue appraisal, closely related to the conceptual frameworks. These findings are in line with our impressions from the literature that fatigue can be appraised in an adaptation-oriented way and in an emotion-related way. In addition, we found a third factor: "social rejection because of fatigue". We investigated whether the different appraisal dimensions were related to general level of fatigue, anxiety and depression. Only emotion-related appraisal and general level of fatigue were related. Worrying and focusing on fatigue is apparently related to the experience of fatigue whereas attributing fatigue to the unrewarding properties of a task is not. Knowledge about the appraisal-dimensions underlying the fatigue-performance relationship may contribute to a better understanding of individual differences in fatigue effects on performance.

Introduction

Fatigue is generally related to the time spent on a task and to the demands of that task. This task-induced fatigue may result in performance decrements, but the relation is in no way straightforward. A large variation is observed among individuals with respect to the influence of fatigue on performance (Boksem, Meijman & Lorist, 2006), even more so in individuals suffering from disorders that are characterized by long-term fatigue

(DeLuca, 2005). Some studies show reduced cognitive performance in fatigue-related syndromes (Van der Linden, Keijsers, Eling & Van Schaijk, 2005; Thomas & Smith, 2009), while others do not (Short, McCabe & Tooley, 2002).

It is not clear which factors underlie these large inter-individual differences (Huibers et al., 2004; Nijrolder, Van der Horst & Van der Windt, 2008). Several authors suggest that individual differences in appraisal of fatigue may be responsible (Afari & Buchwald, 2003; Knoop, Prins, Moss-Morris & Bleijenberg, 2010; Prins, Van der Meer & Bleijenberg, 2006). Appraisal refers to the interpretation of stimuli, situations or symptoms. Fatigue, for example, may be appraised by an individual as a signal that an activity is uninteresting or as a signal that energy resources are getting depleted (Meijman, 1991). Insight in the underlying dimensions in fatigue-appraisal may provide clues for a better understanding of the complex relation between fatigue and performance.

We performed a search in the PsychInfo and Medline databases using combinations of the following keywords: fatigue, performance, cognition and appraisal, looking for conceptual frameworks concerning the appraisal of fatigue and its relationship with performance. We found several theories and elaborated notions about the appraisal of fatigue in relation to performance. Some were conceptually closely related to each other whereas others were very different. We categorized the theories and descriptions based on their conceptual differences and similarities, resulting in two conceptual frameworks regarding the fatigue-performance relationship.

Adaptation-Oriented Appraisal

In the fields of performance psychology and occupational psychology, fatigue is often regarded as the result of an adaptive mental process that protects individuals from spending effort on unrewarding activities. This idea has been elaborated by authors such as Meijman (1991) and Boksem and Tops (2008), and forms an important assumption in rather comparable theories such as the effort-reward imbalance theory (Bellingrath, Weigl & Kudielka, 2009; Siegrist, 2002), lack of reciprocity theory (Buunk & Schaufeli, 1993; Väänänen, Buunk, Kivimäki, Vahtera & Koskenvuo, 2008), and conservation of resources theory (Alvaro et al., 2010; Hobfoll & Shirom, 1993). According to these theories, individuals make cost-benefit analyses of goal-directed behaviour to determine whether spending effort is rewarding in terms of, for example, controllability, chances of success, and attractiveness of the rewards (Boksem & Tops, 2008; Dijksterhuis, 2004; Eccles & Wigfield, 2002; Locke & Latham, 2002; Matthews, Davies, Westerman & Stammers, 2000). If the likelihood that spending effort will be rewarding is experienced as small, individuals will (sub) consciously tend to evaluate the goal-directed behaviour as negative. They will experience fatigue and aversion to spend further effort and they will consequently reduce their efforts (Boksem & Tops, 2008; Van Vegchel, De

Jonge, Bosma & Schaufeli, 2005). These theories are supported by findings from many studies (see for a review: Van Vegchel et al., 2005) showing that individuals, who perceive an imbalance in efforts and rewards, experience more fatigue than individuals without experiencing such an imbalance. Moreover, experimental studies show that changing the effort-reward balance by offering individuals a reward, can counteract fatigue (Boksem et al., 2006). Although fatigue may act as a signal to reduce effort-expenditure, individuals can ignore and override this fatigue for several reasons, for example when they expect rewards in the long term, or when they are overcommitted to their job. Overriding this fatigue may be adaptive in emergency situations, but overriding it for prolonged periods of time may lead to relatively permanent stress, strain, illness and fatigue (Boksem & Tops, 2008).

Emotion-Related Appraisal

The second major framework on the appraisal of fatigue in relation to performance can usually be found in the areas of clinical and medical psychology. Here, emotion-related cognitive processes, such as focusing on symptoms and worry, are regarded as important factors for developing and maintaining chronic fatigue. Several studies have shown that anxiety-related appraisal plays a role in the perception of fatigue, affecting performance, especially in chronic fatigue syndrome (CFS) (Afari & Buchwald, 2003; Knoop et al., 2010).

First, focusing on bodily sensations plays a role in the perception of fatigue in CFS. CFS patients are focused on bodily sensations such as drowsiness and concentration problems. They therefore perceive their fatigue as more intense than others do (Afari & Buchwald, 2003; Knoop et al., 2010; Vercoulen et al., 1998). Moreover, an enhanced focus on bodily sensations requires attentional resources and thus negatively affects cognitive performance (Van der Werf, De Vree, Van der Meer & Bleijenberg, 2002).

Second, fatigued individuals may perceive their fatigue as a depletion of resources, restraining them to engage in activity any longer. This kind of fatigue appraisal, often found in patients suffering from the burnout syndrome (Schaufeli & Enzmann, 1998) or CFS (Afari & Buchwald, 2003), arouses feelings of helplessness (McMullen & Krantz, 1988) and reduced self-efficacy (Findley, Kerns, Weinberg & Rosenberg, 1998; Knoop et al., 2010).

Third, there appears to be a relation between worry, fatigue, and performance in chronic fatigue related syndromes (Sarason, Sarason & Pierce, 1990). A worry-related cognitive phenomenon is catastrophizing which is known to influence fatigue and performance in CFS. Several authors described that CFS patients are convinced that spending effort will have adverse effects on their health and are therefore reluctant to do so (Afari & Buchwald, 2003; Knoop et al., 2010; Prins et al., 2006).

Fourth, fatigue also seems to be related to social anxiety. Surawy, Hackman, Hawton, and Sharpe (1995) argued that fatigued individuals believe that fatigue and the accompanying reduced performance lead to rejection by others. This belief prompts them to sustain high levels of effort and hence to perpetuate fatigue.

Remarkably, we found no studies which incorporated both frameworks. Apparently, there is little exchange of ideas about the appraisal of fatigue and performance between the different fields of fatigue research. Although there may be differences between the populations studied in the two conceptual frameworks, there are also similarities, since both frameworks are applied to populations suffering from long-term fatigue and fatigue-related disabilities. It is unclear whether these different ways of fatigue appraisal actually exist as separate dimensions and whether they are directly related to general levels of fatigue or mood.

In this study we have tried to combine both frameworks and investigated whether adaptation-oriented appraisal and emotion-related appraisal exist as separate dimensions in a healthy population.

Methods

Participants

The municipal health department of Woensdrecht, a city in the Netherlands, asked 500 randomly selected inhabitants to complete a health inventory. Along with this health inventory questionnaire, they also sent our list of statements.

Hundred-thirty-eight completed forms were returned (27.6%). We excluded eleven participants who reported that they suffered from a mental disorder. The age of the 127 participants varied between 16 and 91 years with a mean of 48.6 and *SD* of 16.3; 64% of the participants were female. Level of education was as follows: 46.5% had a low level of education, 31.5% a medium level, and 22.0% a high level of education (See Table 1).

Table 1 — Socio-Demographic Features of the Participants (N = 127)

Gender	Male	46 (36%)
Age	15-25	10 (8%)
	25-35	13 (10%)
	35-45	32 (25%)
	45-55	27 (21%)
	55-65	24 (19%)
	65-75	12 (9%)
	75-85	7 (6%)
	85-95	2 (2%)
Education	Low	59 (46.5%)
	Middle	40 (31.5%)
	High	28 (22.0%)

Rating Scale Fatigue-Performance Appraisal

In order to collect statements on the relation between fatigue and performance we examined fatigue inventories in the scientific literature (Ahsberg, Gamberale & Kjellberg, 1997; Chalder et al., 1993; Hann, Denniston & Baker, 2000; Mendoza et al., 1999; Smets, Garssen, Bonke & DeHaes, 1995; Vercoulen et al., 1994). The collected inventories from the literature mainly focus on various symptoms of fatigue like reduced concentration and passivity, and they do not explore the appraisal of fatigue in relation to performance. Appraisals such as an individual's view that fatigue is a result of boring activities, or a depletion of resources are not part of existing fatigue inventories (see for a review: Christodoulou, 2005). Several fatigue inventories such as the Fatigue Catatrophizing Scale (Jacobsen, Azzarello & Hann, 1999), the Illness Management Questionnaire (Ray, Weir, Stewart, Miller & Hyde, 1993), and the Fatigue Quality List (Gielissen et al., 2007) are related to appraisal of fatigue, but were unsuitable for the present study because they are developed for somatic patients and mainly focus on medical attributions of fatigue, or they were unrelated to performance issues.

Because we were interested in the appraisal of fatigue in relation to performance, we developed a set of statements based on adaptation-oriented and emotion-related ways of appraising fatigue and performance and we asked respondents to indicate to what degree they agreed with each statement. For the adaptation-oriented appraisal statements, we constructed two clusters of five items each, comprising items on fatigue and reduced performance as a result of motivational problems because the task is per-

ceived as uninteresting (cluster 1), or because the task has no personal relevance (cluster 2). For the set of emotion-related appraisal statements, we constructed four clusters of five items, aiming to tap the following: focusing on fatigue, catastrophizing, resource depletion, and social exclusion because of fatigue. In order to minimize the likelihood of clustering of items on grammatical aspects instead of content, the items were stated as much as possible in a similar way: the 30 items were formulated in a "when … then" structure. For example: "When I am not able to concentrate, (then) it means that I am not interested". The 30 items were presented on paper in random order. Respondents were asked to rate their agreement on a 7-point Likert scale ranging from "strongly disagree" (score = 1) to "strongly agree" (score = 7).

Before mailing the set of statements along with the health inventory questionnaire, we first tested the statements in a pilot study on 15 participants in order to check whether the items were formulated in a clear way. The 15 participants were healthy individuals working for a mental health institution. On basis of their comments, we replaced three ambiguous items by better alternatives. See Appendix 1 for the list of statements.

Measures

General fatigue was assessed with the Dutch version (Vercoulen, Alberts & Bleijenberg, 1999) of the Checklist Individual Strength (CIS; Vercoulen et al., 1994). The 20 items measure subjective feelings of fatigue and physical fitness, activity level, motivation, and concentration during the previous 14 days. Reliability and validity of the CIS are good, Cronbach's alpha for the CIS is .90 (Vercoulen et al., 1994).

Depression was measured with the depression subscale of the Dutch adaptation (Arrindell & Ettema, 1986) of the Symptom Checklist (SCL-90; Derogatis, 1977). The 16 items measure the level of depressive symptoms during the past seven days. The reliability and validity of the SCL-90 are good, Cronbach's alphas for the depression subscale of the SCL-90 range from .88 to .99 (Arrindell & Ettema, 1986).

Level of anxiety symptoms was measured with the anxiety subscale of the Dutch adaptation of the Symptom Checklist. The 10 items measure general anxiety symptoms during the past seven days. Cronbach's alphas for the anxiety subscale of the SCL-90 range from .87 to .92 (Arrindell & Ettema, 1986).

Results

The scores on the 30 statements were subjected to a principal component analysis (PCA), using varimax rotation. The Kaiser-Mayer-Oklin (KMO) measure showed proper sampling adequacy (KMO > .79 exceeded the recommended value of .6, which is considered as good). The KMO for one of the items of the catastrophizing cluster was smaller

than .5 and therefore the item was excluded from further analyses. For the remaining items, KMO ranged between .55 and .90, passing the acceptable limit of .5. Bartlett's test of sphericity reached statistical significance ($p < .001$), supporting the factorability of the correlation matrix. PCA revealed eight factors with eigenvalues exceeding 1. Inspection of the screeplot revealed breaks after the third and the sixth factor.

It was decided to first perform a PCA forcing six factors. The six-factor solution explained a total of 63.7% of the variance, with Factors 1 to 6 contributing as follows to the explained variance: 27.5%, 12.2%, 8.4%, 6.2%, 5.2% and 4.4%. Inspection of the items loading on the six factors revealed the following content of the factors; see appendix 2 for details.

Factor 1: Six items from the "uninteresting" and "no personal relevance clusters" loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .87). A high score on Factor 1 indicates that respondents relate reduced cognitive performance, such as concentration problems, to activities which they consider as unimportant or unrewarding and are therefore unwilling to spend effort. We referred to this factor as: "reduced cognitive performance due to motivational problems".

Factor 2: All five items from the "resource depletion cluster" loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .82). A high score on Factor 2 indicates that fatigue is related to energy depletion and that respondents believe that fatigue will lead to reduced cognitive performance. We referred to this factor as: "resource depletion".

Factor 3: All five items from the "social rejection cluster" loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .84). A high score on Factor 3 indicates that respondents believe that fatigue will lead to social rejection. We referred to this factor as: "social rejection because of fatigue".

Factor 4: Four items from the "focusing on fatigue cluster" and one from the "catastrophizing cluster" loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .84). A high score on Factor 4 indicates that respondents view performance decrements, such as concentration problems, as signs of fatigue. We referred to this factor as: "focusing on fatigue".

Factor 5: Four items from the "uninteresting" and "no personal relevance clusters" loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .84). A high score on Factor 5 indicates that respondents relate fatigue to activities which they consider as unimportant or unrewarding and are therefore unwilling to spend effort. We referred to this factor as: "fatigue due to motivational problems".

Factor 6: Three items from the catastrophizing cluster and one from the focusing on fatigue cluster loaded on this factor (internal consistency reliability is moderate, Cronbach's alpha is .67). A high score on Factor 6 indicates that a respondent believes

that spending effort while fatigued is harmful to one's health. We referred to this factor as: "catastrophizing".

Because the screeplot also allowed a three factor solution, we investigated whether a reduction to three factors would lead to a meaningful alternative solution. The three-factor solution explained a total of 48.3% of the variance with Factor 1 contributing 27.8% of the variance, Factor 2 contributing 12.2 percent of the variance, and Factor 3 contributing 8.4% of the variance. Inspection of the item loadings revealed the following, see appendix 2 for details.

Factor 1: All 10 items of the adaptation-oriented framework loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .89). A high score on Factor 1 indicates that respondents relate fatigue and reduced cognitive performance, such as concentration problems, to activities which they consider as unimportant or unrewarding and which they therefore are unwilling to spend effort on. We referred to this factor as "adaptation-oriented appraisal".

Factor 2: Four items from the "catastrophizing cluster", five items from the "resource-depletion cluster" and four items from the "focusing on fatigue cluster" loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .85). A high score on Factor 2 indicates that respondents relate fatigue to energy depletion, that the respondents believe that spending effort is harmful to their health, and that they are focused on signs of fatigue. We referred to this factor as "emotion-related appraisal".

Factor 3: five items from the "social exclusion cluster" and one item of the focusing on fatigue cluster loaded on this factor (internal consistency reliability is high, Cronbach's alpha is .83). A high score on Factor 3 indicates that respondents believe that fatigue will lead to social rejection and that they are focused on signs of fatigue. We referred to this factor as "social rejection". Interestingly, the three factor solution reflected the two conceptual frameworks: adaptation-oriented appraisal and emotion-related appraisal, with an additional third factor: social rejection.

We calculated correlations between the factor scores of both solutions and the scores on the CIS, the anxiety subscale and the depression subscale of the SCL-90. Only the correlation between Factor 2 of the three-factor solution and the CIS reached statistical significance, $r = .30$, $p < .001$. Focusing on fatigue was the only emotion-related factor of the six-factor solution that was related to the CIS, $r = .25$, $p < .05$. Correlations between the CIS, the anxiety subscale and the depression subscale of the SCL-90 revealed that general fatigue correlated with anxiety, $r = .29$, $p < .001$.

Discussion

In the literature on fatigue and performance, we observed two conceptual frameworks on the cognitive appraisal of this relation: an adaptation-oriented framework, which

concerns the regulation of effort-expenditure, and an emotion-related framework, which concerns the regulation of emotion. Remarkably, we found no studies which incorporated both frameworks. In this study we tried to combine both frameworks and investigated whether adaptation-oriented appraisal and emotion-related appraisal exist as separate dimensions in a healthy population. We presented respondents with a set of statements about possible relations between fatigue and performance based on the two frameworks. A principal component analysis revealed six factors, with each factor corresponding to a specific aspect of the two frameworks. A three-factor solution revealed adaptation-oriented appraisal, emotion-related appraisal, and social rejection as separate factors. Although the six-factor solution explained more variance than the three-factor solution and offers a more differentiated view on fatigue-performance appraisal, we think that the three-factor solution is more appropriate for the discussion of our study as the purpose of our study was to investigate whether the frameworks on fatigue-performance appraisal found in the literature, could be distinguished in a healthy population.

The findings of our study are in line with our impressions from the literature that fatigue can be appraised in an adaptation-oriented way and in an emotion-related way. Moreover, although much of the literature on appraisal of fatigue, especially emotion-related appraisal, concerns patients suffering from long-term fatigue, adaptation-oriented appraisal and an emotion-related appraisal of fatigue and performance can apparently also be found in a healthy population.

Apart from the two frameworks derived from the literature, we found a third factor: "social rejection". Social rejection may have emerged as a separate factor because fear of social rejection is associated by individuals with the consequences of fatigue, such as reduced performance, and not to appraisal of fatigue (Prins et al., 2004). Furthermore, "fear for social rejection" is likely to lead to an increase in effort expenditure (Surawy et al., 1995), whereas emotion-related appraisal and adaptation-oriented appraisal lead to a decrease in effort-expenditure when fatigued.

Emotion-related appraisal was related to general level of fatigue. It is not surprising that this was the only relation between the appraisal dimensions and general level of fatigue, anxiety and depression, because general cognitions about the appraisal of fatigue are not necessarily related to current levels of fatigue or mood in a healthy population with relative low scores on these measures.

An explanation for the observed relation between focusing on fatigue and fatigue is in line with several studies that showed that focusing on signs of fatigue is related to level of fatigue (Knoop et al., 2010). Individuals who are inclined to interpret reduced performance as signs of fatigue, apparently perceive more fatigue than individuals who are not.

General level of anxiety and general level of fatigue appeared to be related, which is in line with studies that showed that neuroticism is a predictor of elevated levels of fatigue (Harvey, Wessely, Kuh & Hotopf, 2009).

In summary, the results of our study suggest that adaptation-oriented and emotion-related appraisal can be distinguished as separate dimensions of fatigue-appraisal in a healthy population with normal levels of fatigue. Emotion-related appraisal is related to general level of fatigue, whereas adaptation-oriented appraisal is not. Worrying and focusing on fatigue is apparently related to the experience of fatigue whereas attributing fatigue to the unrewarding properties of a task is not.

Our finding that general level of fatigue is related to emotion-related appraisal and not to adaptation-oriented appraisal may explain why the emotion-related framework is mainly studied in the fields of clinical and medical psychology and the adaptation-oriented framework is mainly studied in the fields of occupational and performance psychology.

It would be interesting to know whether the two conceptual frameworks on fatigue and performance can also be distinguished in a population of patients suffering from long term fatigue and whether they report more emotion related appraisal than adaptation related performance. Gielissen et al. (2007) showed that CFS patients perceived fatigue as more negative compared to healthy controls. It is not known, however, to what degree fatigue is also appraised as adaptive by individuals suffering from long-term fatigue. We are preparing a paper on a study with the measures applied in the present study in a population of patients suffering from burnout as well as patients suffering from depression and anxiety disorders.

The present study has a number of limitations. The response to the set of statements was only 28 percent. We have no indications however, how the limited response may have affected our results. What we can say is that the group of participants that did respond did not differ from the whole sample on demographic variables. Further, self-report measurement of appraisals, the way we applied it in the present study, implies that implicit aspects of fatigue-performance appraisals were not taken into account. An interesting line of research (e.g., Dijksterhuis, 2004) shows, however, that people have incomplete access to their appraisals. Finally, one should keep in mind that in the present study appraisals about performance were measured and not performance itself. Appraisal or perception of performance may be quite different from actual performance (see e.g. Metzger & Denney, 2002).

Despite these limitations, we think that the present study shows that adaptation-oriented appraisal, emotion-related appraisal and “fear of social exclusion because of fatigue” can be distinguished as separate dimensions in a healthy population. This finding may be useful for researchers studying fatigue in for example the working situation

or in clinical syndromes.

Knowledge about the appraisal-dimensions underlying the fatigue-performance relationship may contribute to a better understanding of individual differences in fatigue effects on performance. Longitudinal research in populations suffering from fatigue and in healthy individuals may shed more light on the relevance of individual differences in appraisal of fatigue for performance.

Appendix 1 – Statements on the appraisal of fatigue in relation to performance (English translation).

1 When I am getting tired, it means I don't enjoy what I am doing at that moment.
2 When I am getting tired, it means that I do not consider what I am doing at that moment as important
3 If you are frequently tired, you do not matter anymore.
4 When I am doing something and I have problems concentrating it means I don't feel like doing what I'm doing.
5 When I have to do something boring, I get tired quickly.
6 When I am tired and I keep on making an effort, it only gets worse.
7 When I get tired, I cannot focus on what I am doing.
8 When I am tired, I am not able to concentrate anymore.
9 When I have to do something which I do not consider as meaningful, I get easily tired.
10 When I am tired, I am not able to take part in a conversation anymore
11 When I get trouble concentrating it means that what I am doing at the moment is not interesting.
12 If you are frequently tired, people will consider you as troublesome.
13 When I have trouble concentrating it means what I am doing at that moment I do not consider as important.
14 When I cannot concentrate during a conversation it means that the conversation is actually not enjoyable.
15 If you are frequently tired, people will not take you seriously anymore.
16 Making an effort is harmful when you are exhausted.
17 When I cannot concentrate, it means that what I am doing is not important to me.
18 When I am tired, I feel I run out of steam and cannot go on.
19 If you are frequently tired, you don't mean anything according to others/others think you don't mean anything.
20 When I forget something easily it means that I am tired.
21 When I cannot keep my attention during a conversation it means that it actually isn't an important conversation to me.
22 If you are often tired, people do not take you seriously.
23 When a certain word doesn't come to my mind it means I am tired.
24 When I have difficulty concentrating it means that I am tired.
25 When I am tired, I am not capable to do anything.

26 I always pay attention to whether I am tired or not.
27 I have to take a rest when I am tired, otherwise I become ill.
28 When I have difficulty expressing myself properly it means that I am tired.
29 When I cannot concentrate during a conversation it means that I am not well.

Appendix 2 — Distribution of Items over the Clusters and Dimensions of Fatigue-Performance Appraisal

A priori clusters	*Items*
Adaptation-oriented framework	
Not interesting	1, 4, 5, 11, 14
No relevance	2, 9, 13, 17, 21
Emotion-related framework	
Focusing on fatigue	20, 23, 24, 26, 28
Resource depletion	7, 8, 10, 18, 25
Catastrophizing	6, 16, 27, 29
Social rejection	3, 12, 15, 19, 22
Three factor solution	
1) Adaptation-oriented appraisal	1, 2, 4, 5, 9, 11, 13, 14, 17, 21
2) Emotion-related appraisal	6, 7, 8, 10, 16, 18, 23, 24, 25, 26, 27, 28, 29
3) Social rejection	3, 12, 15, 19, 20, 22
Six factor solution	
1) Reduced cognitive performance due to motivational problems	4, 11, 13, 14, 17, 21
2) Resource depletion	7, 8, 10, 18, 25
3) Social rejection because of fatigue	3, 12, 15, 19, 22
4) Focusing on fatigue	20, 23, 24, 28, 29
5) Fatigue due to motivational problems	1, 2, 5, 9
6) Catastrophizing	6, 16, 26, 27

3 Level and Appraisal of Fatigue Are not Specific in Burnout

Van Dam, A., Keijsers, G. P. J., Verbraak, M. J. P. M., Eling, P. A. T. M., & Becker, E. S. *Submitted for publication.*

Abstract

Fatigue is a main feature of the burnout syndrome. In the present study we investigated whether fatigue is experienced differently in burnout patients than in patients suffering from anxiety disorders or major depression. We presented 73 burnout patients, 67 depressed patients, 57 patients with an anxiety disorder, and 127 healthy participants with a rating scale containing statements about the fatigue-performance relationship and we assessed the level of fatigue, depression, and anxiety. The level of fatigue reported by burnout patients, although significantly higher than that of healthy participants, did not differ from that of the other patient groups. The appraisal of fatigue also did not differ among the patient groups.

Thus, the level of fatigue and the appraisal of fatigue may be less relevant to the understanding of the specific pathological processes associated with burnout than is often presumed.

Introduction

Burnout is a stress-related syndrome characterized by exhaustion, occupational detachment, and reduced personal accomplishment (Maslach, Schaufeli & Leiter 2001; Schaufeli & Enzmann, 1998). Burnout patients report many symptoms such as reduced job satisfaction, physical complaints, fatigue, sleep disturbances and impaired cognitive performance (Maslach et al., 2001; Schaufeli & Enzmann, 1998; Schmidt, Neubach & Heuer, 2007; Taris, 2006). Exhaustion, the feeling of depletion due to effort spent at work (Maslach, Jackson & Leiter, 1996; Schaufeli & Enzman, 1998), is generally regarded as the most distinctive feature of the burnout syndrome (Bekker, Croon & Bressers, 2005; Brenninkmeijer & van Yperen, 2003; Kristensen, Borritz, Villadsen & Christensen, 2005; Shirom, 2003) and appears to overlap considerably with the concept of fatigue (Huibers et al., 2003; Leone, Huibers, Knottnerus & Kant, 2007; Schaufeli & Taris, 2005).

Fatigue, however, is also a common complaint in other psychiatric disorders such as major depression and to some degree part of the burden of symptoms (Harvey, Wessely, Kuh & Hotopf, 2009; Van der Linden et al., 1999). Fatigue is a characteristic symptom of

a major depressive disorder as defined by the DSM-IV-TR (APA, 2000) and studies have demonstrated that depressed individuals do indeed report elevated levels of fatigue (Bitsika, Sharpley & Bell, 2009; Leone, 2010). Although fatigue is not generally recognised as a symptom of anxiety disorders (APA, 2000), several studies indicate that anxiety is related to elevated levels of fatigue as well (Bitsika et al., 2009; Kaiya, Sugaya, Iwasa & Tochigi, 2008; Lerdal et al., 2010). The observation that fatigue is a symptom of burnout, major depression and anxiety disorders raises the question of whether the level and appraisal of fatigue is experienced differently by individuals suffering with burnout than by those exhibiting anxiety disorders and major depression.

In the fields of performance psychology and occupational psychology, in which burnout is most often studied, fatigue is frequently regarded as the result of an adaptive mental process that protects an individual from investing too much effort on unrewarding activities (Meijman, 1991; Boksem and Tops, 2008). According to this view, individuals make cost-benefit analyses of goal-directed behaviour to determine whether expending effort is rewarding in terms of controllability, chances of success, and the attractiveness of the rewards (Boksem & Tops, 2008). If the likelihood that spending effort will be rewarding is experienced as low, individuals will (sub)consciously tend to evaluate the goal-directed behaviour as negative. They will experience fatigue and aversion to expend further effort and as a result of these signals reduce their efforts (Boksem & Tops, 2008; Van Vegchel, de Jonge, Bosma & Schaufeli, 2005). We refer to this kind of fatigue appraisal as 'adaptation-oriented appraisal'.

A second major explanatory framework for the appraisal of fatigue in relation to performance can be found in the areas of clinical and medical psychology. Here, emotion-related cognitive processes, such as focusing on fatigue and catastrophizing cognitions about fatigue are regarded as important factors for developing and maintaining chronic fatigue (Afari & Buchwald, 2003; Knoop, Prins, Moss-Morris & Bleijenberg, 2010; Maher-Edwards, Fernie, Murphy, Wells & Spada, 2011; Vercoulen et al., 1998). For example the idea that spending effort will have adverse effects on health may lead to a reduction in activity in patients with long-term fatigue (Knoop et al., 2010; Prins, Van der Meer & Bleijenberg, 2006). According to this model, fatigued individuals may perceive their fatigue as a depletion of resources motivating them not to engage in the activity any longer. This kind of fatigue appraisal is often found in patients suffering from the burnout syndrome (Schaufeli & Enzmann, 1998) or chronic fatigue syndrome (Afari & Buchwald, 2003) and arouses feelings of helplessness (McMullen & Krantz, 1988) and reduced self-efficacy (Findley, Kerns, Weinberg & Rosenberg, 1998; Knoop et al., 2010). Patients who focus on signs of fatigue also perceive their fatigue as more intense than others (Knoop et al, 2010; Vercoulen et al., 1998)

Van Dam, Keijsers, Eling & Becker (2011a) presented healthy participants with a set

of statements based on adaptation-oriented and emotion-related views of appraising fatigue and performance and showed that both frameworks are separate dimensions in fatigue-performance appraisal. In addition, they found a third factor, 'fear of social rejection because of fatigue'. Fear of social rejection because of fatigue has been described by Surawy, Hackman, Hawton and Sharpe (1995), who concluded that fatigued individuals believe that fatigue and the accompanying reduced performance lead to rejection by others. This belief prompts them to sustain high levels of effort and hence to perpetuate fatigue.

Because fatigue is a distinctive feature of burnout, we expected that the level of fatigue would be relatively high compared to the level of fatigue in other patient groups. We also expected that burnout patients would report higher levels of adaptation-oriented appraisal compared to healthy participants and to other patients groups, because fatigue in burnout patients is often associated with an effort-reward imbalance (Bellingrath, Weigl & Kudielka, 2008; Boksem & Tops, 2008; Hyvonen, Feldt, Tolvanen & Kinnunen, 2010; Schulz et al., 2010). Since emotion-related appraisal is associated with disorders characterized by long term fatigue (Afari & Buchwald, 2003; Knoop et al., 2010; Vercoulen et al., 1998), we expected emotion-related appraisal to also be elevated in burnout patients compared to healthy participants and to other patient groups.

In order to investigate whether the level and the appraisal of fatigue are different in burnout patients compared to healthy participants and to patients suffering from anxiety disorders or major depression, we presented burnout patients, healthy participants, depressed patients, and patients with an anxiety disorder with a fatigue questionnaire that assessed level of fatigue (CIS; Vercoulen et al., 1994) and a rating scale comprised of statements about the fatigue-performance relationship (Van Dam et al., 2011a) to evaluate the severity of fatigue and the appraisal of fatigue. We also presented participants with questionnaires concerning depression and anxiety in order to investigate relationship between level of fatigue, appraisal of fatigue, depression, and anxiety.

Methods

Participants

For this study, three patient groups were recruited from the HSK-group, a large mental health institute in the Netherlands. Diagnoses were established using the Dutch adaptation (Overbeek, Schruers & Griez, 1999) of the Mini International Neuropsychiatric Interview (Sheehan et al., 1998) and a semi-structured interview checking ICD-10 criteria for work-related neurasthenia (World Health Organization, 1994). Depressed patients had to meet the DSM-IV (American Psychiatric Association, 2000) criteria for major depressive disorder with a current depressive episode as a primary diagnosis. Of the 67 patients that met these criteria, 13 patients also met the criteria of simple phobia as a

secondary diagnosis. Patients that met the DSM-IV criteria of one of the anxiety disorders as the primary diagnosis formed the second group. Of the 57 patients that met these criteria, 3 patients also met the criteria of adaptation disorder as a secondary diagnosis. The third group consisted of patients suffering from burnout. The diagnosis was established as follows: patients had to meet: (1) the validated cut-off points (Brenninkmeijer & van Yperen, 2003) for severe burnout of the Dutch version of the Maslach Burnout Inventory General Survey see Measurements section): exhaustion ≥ 2.20 and either cynicism ≥ 2.00 or personal accomplishment ≤ 3.67, (2) the cut-off point for prolonged fatigue (Bültman et al., 2000) of the checklist individual strength (≥ 76); see Measurements section), (3) the criteria for the proposed psychiatric equivalents of clinical burnout, namely the ICD-10 (World Health Organisation, 1994) criteria for work related neurasthenia (Schaufeli & Enzmann, 1998; Schaufeli, Bakker, Hoogduin, Schaap & Kladler (2001), and (4) the DSM-IV (American Psychiatric Association, 2000) criteria for unspecified somatoform disorder with prolonged fatigue as the main symptom (Hoogduin, Schaap & Methorst, 2001). Of the 73 patients that met these criteria, 3 patients also met the criteria of simple phobia as a secondary diagnosis and 1 patient met the criteria of a panic disorder as secondary diagnosis. Patients were asked to complete our form prior to the first therapy session. If patients wanted to participate, they signed an informed consent form. In case participants had questions, they could phone the researcher.

Healthy participants were inhabitants of the city of Woensdrecht. The municipal health department of Woensdrecht asked 500 randomly selected inhabitants to complete a health inventory. Along with this health inventory questionnaire, they also included our questionnaires and a list of statements (see measures section below). One hundred-thirty-eight completed forms were returned (27.6 %). We excluded eleven participants who reported that they suffered from a mental disorder.

Measures

The level of fatigue was assessed with the Dutch version (Vercoulen, Alberts & Bleijenberg, 1999) of the Checklist Individual Strength (CIS; Vercoulen et al., 1994). The 20 checklist items measured subjective feelings of fatigue and physical fitness, activity level, motivation, and concentration during the previous 14 days. Reliability and validity of the CIS are high, Cronbach's alpha for the CIS is .90 (Vercoulen et al., 1994).

Appraisal of fatigue and performance was measured with a list of statements on the fatigue-performance relationship (Van Dam et al., 2011a). The 29 items measured adaptation-oriented appraisal (10 items) and emotion-related appraisal (13 items) concerning the fatigue-performance relationship and fear of social rejection due to fatigue (6 items). Respondents rated their level of agreement with the statements on a 7-point Lik-

ert scale. The scores of the items were added to obtain the individuals' score on that particular scale.

Level of depressive symptoms was measured with the 16-item depression subscale of the Dutch adaptation (Arrindell & Ettema, 2005) of the Symptom Checklist (SCL-90; Derogatis, 1977). The reliability and validity of the SCL-90 are high, Cronbach's alpha of Depression subscale ranges from .88 to .94 (Arrindell & Ettema, 1986).

The level of anxiety was measured with the anxiety subscale of the Dutch adaptation (Arrindell & Ettema, 2005) of the Symptom Checklist (SCL-90; Derogatis, 1977). The 10 items measure general anxiety. The reliability and validity of the SCL-90 are high, Cronbach's alpha's for the Anxiety subscale of the SCL-90 range from .87 to .92 (Arrindell & Ettema, 2005).

Results

Characteristics of the participating groups are presented in Table 1 (p 28). Analyses of the characteristics of the groups showed that the groups differed from each other on gender (chi-square = 16.8, $p < .05$), age ($F = 9.4$, $p < .001$) and level of education (chi-square = 56.3, $p < .001$). In order to rule out the possible effects of gender, age and education, these demographic variables were used as covariates in subsequent analyses.

With regard to symptom severity, we conducted a between-groups multivariate MANCOVA with fatigue (CIS), anxiety and depression (SCL-90), as dependent variables. Group [Burnout, Depressed, Anxiety, Healthy] served as the independent variable. There was a significant difference between the groups on the combined variables, F (9, 936) = 49.3, $p < .001$, $\eta^2 = .3$). When the results were considered separately for the dependent variables, using a Bonferroni adjusted alpha level of .017, all variables reached statistical significance: fatigue, F (3, 312) = 107.4, $p < .001$, $\eta^2 = .5$, anxiety F (3, 312) = 117.8, $p < .001$, $\eta^2 = .5$, and depression, F (3, 312) = 127.0, $p < .001$, $\eta^2 = .6$. Post-hoc comparisons using the Bonferroni test indicated that the three patient groups differed significantly from the control group for fatigue, $p < .001$, and the depressed group differed from the anxiety group regarding fatigue, $p < .05$. The burnout group, however, did not differ from the other patient groups regarding fatigue, $ps > .5$. An ANCOVA with the patient groups as a between subjects variable and the CIS-score as a dependent variable showed no significant differences between the patient groups regarding level of fatigue, $p > .1$, $\eta^2 = .04$. The same pattern occurred for the four subscales (subjective feelings of fatigue and physical fitness, activity level, motivation, concentration) of the CIS. With regard to anxiety and depression, all groups differed significantly from each other, all $ps < .05$ (see Table 1).

Table 1 — Demographic Characteristics and Average Scores on Checklist Individual Strength, Symptom checklist-90 and Statements about Fatigue and Performance for Burnout Patients, Patients Diagnosed with Depression, Patients Diagnosed with an Anxiety Disorder and Healthy Participants.

	Burnout	Depression	Anxiety disorder	Healthy participants
	(*N*=73)	(*N* = 67)	(*N*=57)	(*N*=127)
Gender: Men (%) *	44 (60.3%)	31 (46.3%)	30 (52.6%)	46 (36.2%)
Age (SD) **	44.5 (8.1)	39.9 (9.5)	40.4 (11.1)	48.6 (16.3)
Educational level (%) **				
Low	5 (6.8%)	10 (14.9%)	15 (26.3%)	59 (46.5%)
Middle	33 (45.2%)	42 (62.7%)	30 (52.6%)	40 (31.5%)
High	35 (47.9%)	15 (22.4%)	12 (21.1%)	28 (22.0%)
Symptom Measures (SD)				
Checklist Individual Strength				
General level of fatigue **	100.5 (20.9)	105.8 (20.2)	93.7 (24.0)	51.3 (24.5)
Symptom checklist 90				
Anxiety **	20.7 (7.0)	25.8 (7.8)	29.1 (9.7)	11.4 (1.2)
Depression **	36.9 (10.3)	51.3 (12.3)	43.3 (13.1)	23.8 (3.0)
Fatigue-performance statements				
Adaptation-oriented appraisal	26.6 (12.3)	29.9 (15.1)	31.0 (13.2)	30.1 (14.7)
Emotion-related appraisal **	54.8 (12.4)	55.0 (13.8)	53.0 (13.2)	45.8 (15.9)
Social rejection **	30.5 (8.7)	33.1 (11.3)	33.5 (10.7)	26.8 (10.2)

Note: * = significant at $p < .05$ ** = significant at $p < .001$

With regard to the appraisal of fatigue, we conducted a between-groups multivariate MANCOVA with adaptation-oriented appraisal, emotion-related appraisal, and social rejection as the dependent variables. Group [Burnout, Depressed, Anxiety, Healthy] was the between subjects variable. There was a significant difference between the groups on the combined variables, F (9, 942) = 6.4, $p < .001$, $\eta^2 = .06$. When the results for the dependent variables were considered separately, using a Bonferroni adjusted alpha level of .017, emotion-related appraisal F (3, 314) = 9.4, $p < .001$, $\eta^2 = .05$, and social rejection F (3, 314) = 8.6, $p < .001$, $\eta^2 = .08$, they reached statistical significance. Post-hoc comparisons using the Bonferroni test indicated that for emotion-related appraisal the three patients groups differed significantly from the control group ($p < .001$, $\eta^2 = .08$), but not from each other (all ps > .1, all η^2s < .02). With regard to social rejection, the depression

and anxiety groups but not the burnout patients ($p < .001$, see Table 1), differed significantly from the healthy participants. We found no differences between the groups for adaptation-oriented appraisal ($p > .1$, $\eta^2 = .02$)

For the patient groups we calculated correlations between the total score on the CIS, the Anxiety subscale and the Depression subscale of the SCL-90 and the three fatigue-appraisal scales. There were no significant correlations with adaptation-oriented appraisal. Emotion-related appraisal turned out to be related to the CIS, $r = .51$, $p < .001$, the Anxiety subscale, $r = .16$, $p < .05$, and the Depression subscale, $r = .26$, $p < .001$ of the SCL-90. Fear of social rejection because of fatigue was related to the CIS, $r = .44$, $p < .001$, the Anxiety subscale, $r = .18$, $p < .05$ and the Depression subscale , $r = .28$, $p < .001$ of the SCL-90.

Discussion

Fatigue is a common symptom in patients suffering from burnout, major depression, or an anxiety disorder. In the current study we investigated whether fatigue is experienced differently in burnout patients than in patients with major depression or anxiety disorders.

As expected, depressed patients were significantly more depressed than burnout patients, patients with an anxiety disorder, or healthy participants. Also, patients with an anxiety disorder reported higher levels of anxiety compared to the other groups. Remarkably however, the level of fatigue reported by burnout patients, although higher in comparison to healthy participants, did not exceed those of the other patients groups. Although burnout patients are generally characterized by high levels of fatigue (Schaufeli & Enzmann, 1998), our results imply that high levels of fatigue apparently are not unique to burnout and are also present at a comparable level in patients with major depression or anxiety disorders. However the burnout patients clearly differed from the patients with major depression and anxiety disorders in showing lower severity levels of depression and anxiety.

In addition to the level of fatigue and central to the present study, we investigated whether burnout patients demonstrate a distinctive way of appraising fatigue compared to patients with major depression and anxiety disorders. We found no differences between the groups with regard to adaptation-oriented appraisal. This finding is remarkable since it is believed by many that an effort-reward imbalance is a predisposing factor for burnout (Bellingrath et al., 2008; Boksem & Tops, 2008; Hyvonen et al., 2010; Schulz et al., 2010). Burnout patients appear not to associate fatigue with unrewarding activities to a higher degree than the other groups. The belief that fatigue and unrewarding activities are associated, is apparently not specific for burnout patients. Our findings do not necessarily rule out the possibility that burnout patients experience an effort-

reward imbalance, but it seems likely that they do not associate unrewarding activities with fatigue and reduced performance any stronger than other individuals. With regard to emotion-related appraisals, the three patient groups differed significantly from the healthy participants, but not from each other. The appraisal of fatigue as a problematic state apparently is not unique to burnout patients, but instead appears to be a common feature in other mental disorders also. Fear of social rejection due to fatigue was not higher in burnout patients compared to the other groups. Emotion-related appraisal and fear of social rejection in the patient groups were both significantly related to level of fatigue (fatigue and worry about fatigue may to some extent overlap). The same relationship was also found in the general population (Van Dam et al., 2011a).

Given these findings, the question arises as to why fatigue is regarded as a primary symptom in burnout patients. It is possible that anxiety symptoms or depressed mood are experienced as more distressing than fatigue and therefore are more in the foreground in patients suffering from depressive disorder or anxiety disorders. The differences in the severity of the symptoms of depression and anxiety experienced by the three patient groups point in this direction. Since the level and the appraisal of fatigue apparently are not unique features of burnout, what then comprises the pathological processes in burnout patients?

Several authors (Boksem & Tops, 2008; Schaufeli & Taris, 2005), argue that burnout patients are not only characterized by high levels of chronic fatigue, but also by a reduced motivation to expend effort. Boksem and Tops (2008) suggest that reduced motivation in burnout patients is a structural condition due to physiological changes in the dopaminergic/motivational system. Their view is supported by studies that indicate the occurrence of physiological deviancies in burnout patients (Mommersteeg, Keijsers, Heijnen, Verbraak & Van Doornen, 2006) and show that motivational problems cannot be reversed by motivational interventions (Van Dam, Keijsers, Eling & Becker, 2011b). Perhaps it is not fatigue, but reduced motivation that is most characteristic of burnout. Motivational problems have also been observed in patients with depression or anxiety disorders (Dickson, 2006; Spielberg, Heller, Silton, Stewart & Miller, 2011), but the motivational problems in burnout may be more specific than in the other patient groups in the sense that they are work-related in burnout patients (Schaufeli & Enzmann, 1998). If so, burnout should primarily be characterized as a motivational disorder, whereas depressive disorder and anxiety disorders are primarily emotional disorders.

In addition to a more central role for a relatively permanent reduced motivation to expend effort, a reduced capacity for cognitive effort may form a second central issue in patients suffering from burnout (Sandström, 2010; Van der Linden et al., 2005; Van Luijtelaar, Verbraak, Van den Bunt, Keijsers & Arns, 2010). This is because complex cognitive tasks require more effort and evoke more aversion and fatigue during task per-

formance (Van Dam et al., 2011b). In a treatment study with a duration of ten weeks it was found that patients with burnout showed specific deficits in the 'updating' function of the executive functions. The treatment resulted in alleviation of burnout- and general health symptoms, but did not lead to improved cognitive test performance (Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012).

Fatigue in burnout may be task specific and may therefore not be assessed adequately by measures of general fatigue. Research on other distinct features of burnout, like motivation and cognitive impairments, is needed.

In contrast with these two explanations, several authors (Hallsten, 1993; Meier, 1984) suggest that burnout should not be considered as a separate entity but should be regarded as a special type of depression. However, this notion seems unlikely in our view, because several studies (Glass & McKnight, 1996; Leiter & Durup, 1994; Schaufeli et al., 2001; Toker, Shirom, Shapire, Berliner & Melamed, 2005) have revealed that the actual phenomenological overlap between burnout and major depressive disorder is rather small.

There are several limitations of the current study that need to be taken in account. First, a measure for exhaustion was not included. The concepts of fatigue and exhaustion overlap considerably (Huibers et al., 2003; Leone et al., 2007). Moreover, anxious and depressed patients also show elevated scores for exhaustion (Hoogduin, Peters van Neijenhof & Van der Staak, 2001). Nevertheless, it cannot be ruled out that burnout patients would have reported higher levels of exhaustion compared to the other patients included in our study.

Secondly, the burnout patients had lower fatigue scores (CIS= 100.5) than those in several other burnout studies, f.i. CIS = 105.6 in the study of Mommersteeg, Heijnen, Verbraak & Van Doornen (2006) and CIS= 113.3 in the study of Van Dam et al. (2011b). Comparison of burnout patients with higher fatigue scores with other patients groups might have led to other results.

A third limitation is that the healthy participants were not assessed with the Mini International Neuropsychiatric Interview (MINI) as were the patient groups. We asked the healthy participants whether they suffered from a mental disorder and excluded those who responded in the affirmative, but applying the MINI would have resulted in more detailed information.

A fourth limitation may be that the groups differed from each other on demographic variables. The effect-seizes of these differences were rather small however and we controlled for them in our subsequent analyses. Moreover the effects of the separate demographic variables in the burnout group did have opposite effects on symptom levels. Therefore we assume that the effect of demographic variables on the group differences was rather small.

Finally, the sample size of our study may have been a limitation. A Larger sample of patients might have resulted in significant differences between the patient groups on the fatigue scale. However, the effect sizes for the between group differences for level of fatigue (but not for level of depression and level of anxiety) were rather small, suggesting that a larger sample size would essentially not have changed the present findings.

In conclusion, the results of this study suggest that the level of fatigue and the appraisal of fatigue in burnout patients do not differ from those reported in patients with major depression or anxiety disorders and may therefore they not be relevant to the understanding of the specific pathological processes associated with burnout. Additional research on other distinct features of burnout, such as impaired cognitive functioning and compromised motivational processes , is needed.

4 Do Burnout Patients Prefer Low-Effort Performance Strategies?

Van Dam, A., Eling, P. A. T. M , Keijsers, G. P. J., & Becker, E. S. *Submitted for publication.*

Abstract

Several studies have shown that fatigued individuals may adapt their task performance strategically. It is not known whether such an adaptation is also applied by burnout patients who suffer from long-term fatigue. Strategic adjustments can be achieved by applying simpler response strategies with lesser demands on working memory. We presented burnout patients and healthy controls with a task they could either execute by adopting an effective but high-effort strategy or by applying a less effective low-effort strategy. Significantly more burnout patients than healthy controls applied a low-effort strategy, even though the majority used a high-effort strategy. The burnout patients that applied a low-effort strategy nevertheless failed to maintain their performance-level and experienced relative much strain. The low-effort strategy therefore does not seem to be an adaptive way of coping with burnout symptoms.

Introduction

Burnout is a stress-related syndrome with exhaustion, occupational detachment, and reduced personal accomplishment as most important features. It is generally believed that burnout results from prolonged periods (years) of stress and from an inability to reach personal goals. Burnout patients frequently report reduced job satisfaction, physical complaints, especially fatigue, and impaired cognitive performance (Maslach, Schaufeli & Leiter 2001; Schaufeli & Enzmann, 1998; Schmidt, Neubach & Heuer, 2007; Taris, 2006). With regard to the latter, it is important to know whether cognitive performance is really impaired in individuals suffering from burnout. Taris (2006) reviewed the literature and concluded that severity of burnout and level of performance appear to be related, but that firm conclusions are difficult to draw due to conceptual and methodological limitations of studies. With regard to cognitive performance in burnout, several studies show that burnout patients perform poorer than healthy controls (Öhman, Nordin, Bergdahl, Slunga Birgander & Stigsdotter Neely, 2007; Österberg, Karlson & Hansen, 2009; Sandström, Rhodin, Lundberg, Olsson & Nyberg, 2005; Sandström et al., 2011; Van

der Linden, Keijsers, Eling & Van Schaijk, 2005). However, these studies also suffer from limitations. Different and sometimes poorly specified methods have been used to establish clinical burnout and the possible effects of comorbidity such as major depression and anxiety disorders have not always been adequately controlled for.

A further issue concerns the processes that may underlie a reduced cognitive performance in burnout patients. Several authors stress that reduced motivation to spend effort is the main cause for the reduced cognitive performance in fatigued individuals and consequently, these individuals adapt their strategies to perform a particular task (Hockey, 1997; Matthews, 2011). An influential model concerning the relationship between fatigue and performance adaptation has been developed by Hockey (1997; 2011). This model describes how individuals, under varying circumstances, make strategic adjustments during task performance and how they regulate the mobilization of mental effort. Performance strategies are based on an individual's estimation of the amount of effort available to perform a task in combination with the relevance, difficulty and duration of the task, as well as the presence of external stressors like noise or distractions, and internal stressors like anxiety or fatigue. If a task requires little effort, strain is low and effort is regulated automatically. If a task requires much effort, an individual has several options to regulate effort expenditure. One option is to invest more effort. However, spending high levels of effort for a prolonged period of time is uncomfortable and aversive (Hockey, 1997, 2011; Meijman & Zijlstra, 2007; Wickens, 1986). Alternatively, an individual may disengage from the pursuit of the original task goals. This may lead to distress when it conflicts with personal standards. Finally, an individual can shift to a lower effort strategy, while keeping up performance levels for primary objectives acceptable by making strategic adjustments to his task performance. Strategic adjustments can be achieved, for instance, by allowing failures for secondary goals. Thus, someone may selectively neglect low-priority task components (e.g., the speed or accuracy of responses) or he may neglect subsidiary activities, or shift to simpler response strategies with lesser demands on working memory.

Because fatigue is a central characteristic of the burnout syndrome, one may expect that burnout patients will also shift to less demanding performance strategies. Reduced cognitive performance in this population may, therefore, result from strategy shifts due to the patients' estimation of reduced availability of resources and consequently a reduced motivation to invest effort in the task, rather than from cognitive impairments alone. Although clinical observations (Sandström, 2010) suggest that burnout patients apply different strategies to solve problems compared to healthy controls, to our knowledge no experimental studies have been conducted so far with respect to adaption of performance strategies in burnout.

Strategy use is usually studied by presenting participants with tasks that can be per-

formed with either an effective but high-effort strategy, or with a less effective and low-effort strategy (Schellekens, Sijtsma, Vegter & Meijman, 2000; Shingledecker & Holding, 1974). Several studies have shown that fatigued, healthy individuals prefer less effective trial and error approaches, relying less on an intensive use of working memory, while non-fatigued healthy individuals, conversely, prefer more effective strategies despite the fact that these require more effort (Boksem, Meijman & Lorist, 2006; Schellekens et al., 2000; Shingledecker & Holding, 1974).

We presented burnout patients and healthy, matched controls with a task they could either execute by adopting an effective but high-effort strategy, or by applying a less effective low-effort strategy. Participants were presented with letters appearing in random order in the centre of a computer screen. They were instructed to press a button as quickly as possible when the target letter W appeared following the letter G. Participants received feedback about their reaction times (RTs) via a red bar at the bottom of the screen: the shorter their RT, the brighter the red bar lit up. The target (G-W) was preceded by a cue which consisted of a letter or a combination of letters. Participants were informed that trials contained cues, discovery of which might shorten their RTs. After performing the task, we asked participants whether they had searched for the cue and, if so, whether they had detected the cue and what they thought the cue was. This inquiry leads to one of the following three outcomes: first, a participant may indicate that he did not search for the cue which implies that he applied a low-effort strategy. Second, a participant may indicate that he searched for the cue (high-effort strategy) and applied it successfully, and third, a participant may indicate that he had searched for it (high-effort strategy), but failed to find it.

We assumed that finding the predictor will enhance detection of the target and therefore result in shorter RTs. Searching the cue, however, is an investment in a secondary task at the cost of the primary task, and therefore will require more effort than not searching and result in longer RTs when the cue remains undetected. Taken together, we expected participants who applied a low-effort strategy to perform better in terms of response latencies and to report less fatigue, effort, and aversion than participants that searched for the cue but failed to detect it. Since burnout patients are more fatigued than healthy controls, we also expected that the burnout patients would be inclined to choose a low-effort strategy more than controls.

Methods

Participants

Burnout patients (N = 40) were recruited from mental health centres in the south-west region of the Netherlands, where they sought treatment for their symptoms. We provided therapists of various mental health organizations with brochures about the research

project and asked them to give these to their patients. When patients agreed to participate, they signed an informed consent form and sent it to the experimenter. Subsequently, we invited the patient for a semi-structured interview. For inclusion, patients had to meet: (1) the validated cut-off points (Brenninkmeijer & van Yperen, 2003) for severe burnout of the Dutch version (Utrecht BurnOut Scale-A, UBOS-A; Schaufeli & Dierendonck, 2000) of the Maslach Burnout Inventory General Survey (Maslach, Jackson & Leiter, 1996): exhaustion ≥ 2.20 and either cynicism ≥ 2.00 or personal accomplishment ≤ 3.67; (2) the cut-off point for prolonged fatigue of the Checklist Individual Strength (CIS; ≥ 76) (Bültman et al., 2000); (3) the criteria for the proposed psychiatric equivalents of clinical burnout, i.e., the ICD-10 (World Health Organisation, 1994) criteria for work-related neurasthenia (Schaufeli & Enzmann, 1998; Schaufeli, Bakker, Hoogduin, Schaap & Kladler (2001); and (4) the DSM-IV-TR (American Psychiatric Association, 2000) criteria for unspecified somatoform disorder with prolonged fatigue as the main symptom (Hoogduin, Schaap & Methorst, 2001). Unspecified somatoform disorder was established using the Dutch translation (Overbeek, Schruers & Griez, 1999) of the Mini International Neuropsychiatric Interview (Sheehan et al., 1998), and work-related neurasthenia with a semi-structured interview checking ICD-10 criteria for work-related neurasthenia (World Health Organisation, 1994). Exclusion criteria were a diagnosis of a concurrent DSM-IV disorder or the use of psychopharmacologic medication. Patients participated in the experiment within two weeks after inclusion. Healthy controls (*N* = 40) were volunteers who did not meet the criteria for any of the DSM-IV disorders and did not currently receive psychotherapeutic or psychopharmacologic treatment. Most volunteers were employees of a mental health institute and were invited by the experimenter to participate because of their match with a burnout patient on gender, age and level of education.

Measurements

Severity of burnout symptoms was assessed with the Dutch adaptation of the Maslach Burnout Inventory General Survey (Maslach, Jackson & Leiter, 1996), referred to as the Utrecht BurnOut Scale-A (UBOS-A; Schaufeli & Dierendonck, 2000), which comprises 15 questions to be answered on a 7-point Likert scale (0 = "never", 6 = "every day") and three subscales: emotional exhaustion, depersonalization, and perceived job competence. High scores on emotional exhaustion and depersonalization and low scores on perceived job competence indicate burnout.

General fatigue was assessed with the Dutch adaptation (Vercoulen, Alberts & Bleijenberg, 1999) of the Checklist Individual Strength (CIS; Vercoulen et al., 1994). The CIS comprises 20 items to be scored on a 7-point Likert scale (1 = "I totally agree ", 7 = " I do not agree at all") measuring the following: subjective feelings of fatigue and physical

fitness, activity level, motivation, and concentration during the previous 14 days.

Level of depression was assessed with the Dutch version (Bouman, Ranchor, Sanderman & Van Sonderen, 1995) of the Center for Epidemiological Studies–depression (CES-D; Radloff, 1977), which measures depressive symptoms (range = 0-60) and comprises 20 items based on the Beck Depression Inventory and the Zung Depression Scale.

Level of general psychopathology was assessed using the 90-item Dutch adaptation (Arrindell & Ettema, 1986) of the Symptom Checklist (SCL-90; Derogatis, 1977) (range = 90-450).

Subjective fatigue during task performance was assessed using the fatigue subscale (F) of the Dutch translation of the short version of the Profile of Mood States (POMS; McNair, Lorr & Doppleman, 1971). The POMS-f consists of six adjectives commonly used to describe momentary fatigue states. Participants rate the extent to which the adjectives apply to them on a 5-point scale (range = 0-24).

Subjective ratings of invested mental effort were collected with the short version of the Rating Scale Mental Effort (RSME; Zijlstra, 1993), which specifically gauges how much effort a participant feels it takes to perform a task. Respondents indicate the amount of effort to perform a task on a continuous line with 0 signifying 'not effortful at all' and 150 denoting 'extremely effortful' (range = 0-150).

Aversion towards task continuation was measured with an 11-point scale (range = 0-10), with 0 meaning 'no aversion at all' and 10 'extremely strong aversion' towards doing the task again (Lorist et al., 2000).

Task

Participants were seated in front of a PC screen on which letters appeared. The 72-pt, light-gray capital letters G, S, R, W, X and T were presented sequentially in the centre of the screen against a black background in random order at 1-sec inter-stimulus intervals and remained visible for 400 ms. They were instructed to press a button as quickly as possible when the target letter W appeared following the letter G. Participants received feedback about their RTs via a red bar at the bottom of the screen: the shorter their RT, the brighter the red bar lit up. The target (G-W) was preceded by a cue which consisted of a letter or combination of letters. The task comprised six blocks of 300 letters, including 35 targets, with different types of cues for each block. Block 0 served as a practice block and featured an easily detectable cue (the letter T preceding G-W). In Block 1, the cue was relatively easy to spot (B preceding G-W), and in Block 2, a small random letter preceded G-W. In Block 3, the cue consisted of a random letter twice in succession and in Block 4, the cue consisted of the letter M followed by a random letter. In Block 5, a comparable cue was used as in Block1: a letter (X) preceding G-W. After each block, participants indicated whether they had searched the cue and wrote down the cue. After the

'practice block' they were informed that the best performing participants, the participants with the shortest RTs, would be offered a financial reward of 20 euros and that the trials contained cues, discovery of which might shorten their RTs. Discovery of the cues was not rewarded however, only short RTs was. Participants received feedback about the cue after practice-block conclusion but not about the other cues in the following blocks. Prior to each block participants rated their aversion to the task on the aversion scale. After each block, participants completed paper versions of the POMS-f and RSME, and indicated whether they searched for and detected the cue and, if so, recorded the cue, which all took less than a minute.

Procedure

To control for daily fluctuations in attention levels, participants were tested between 9 and 11 a.m. The task was run on a 32-bit, 64- MB RAM personal computer with Pentium III processor and a 17-inch screen. Participants completed a number of questionnaires prior to task performance. The blocks were presented in fixed order for all participants. After completing the six blocks, participants were interviewed about how they had experienced the task and their reasons for their strategy of choice in each block. RTs and Errors (not pushing the button at the target or pushing the button on another letter than the target) were calculated in SPSS. The three burnout patients and the three healthy controls with the shortest RTs received a reward of 20 euros.

Statistical analyses

In order to investigate whether burnout patients (BPs) and healthy controls (HCs) differed from each other regarding symptoms, we conducted a one-way between-groups multivariate analysis of variance with emotional exhaustion, depersonalization, perceived job competence (UBOS-A), general level of fatigue (CIS), depressive symptoms (CES-D), and general level of psychopathology (SCL-90) as dependent variables. Group (BPs, HCs) was the independent variable.

For each block we classified the participants on the basis of whether they indicated they had searched for the cue, and if so, whether they had detected the cue. This classification thus resulted in three groups: 'searched and detected' (SD), 'searched and not detected' (SND) and 'not searched' (NS) (see Table 2).

In order to check whether our assumptions about the effect of searching for the cue on RT were correct, we compared the RTs of healthy controls who detected the cue (SD) with those of the healthy controls who searched for the cue but failed to find it (SND) and those who did not search for the cue (NS) for Blocks 0, 3 and 4 (the only blocks with healthy controls who searched for the cue but failed to detect it).

We investigated whether BPs, compared to HCs, chose high-effort(= SD + SND) or

low-effort (= NS) strategies in Block 0 by using a Pearson chi-square test for the three strategies.

In order to investigate whether feedback about the identity of the cue in Block 0 and the announcement of a financial reward for short RTs encouraged participants to optimize their performance, we compared the strategies (High-effort, Low-effort) of BPs and HCs in Block 0 and Block 1 by performing a McNemar symmetry chi-square test.

We analyzed selection of strategies in BPs and HCs in the five blocks in which short RTs were rewarded (Block 1-5) by conducting a Cox Regression Survival Analyses over the five 'rewarded' blocks (Block 1-5) with Group (BPs, HCs) as independent variable and the number of participants applying a high-effort strategy as the dependent variable in order to investigate whether there was a difference in the number of blocks in which a high-effort strategy was applied, between HCs and BPs.

In order to investigate whether strategy selection in BPs may have been the result of strategic adaptation of effort expenditure, we analyzed whether BPs who did not search for the cue had shorter RTs, fewer errors, and lower scores on the AS, POMS-f, and RSME by performing ANOVA's for BPs with Strategy (SD, SND, NS) as independent variable and RT, number of errors, and scores on the AS, POMS-f, and RSME as dependent variables.

Results

With regard to demographic characteristics (Table 1), there were no significant differences between BPs and HCs (p values of performed tests for gender, age and educational level were all higher than .6). With regard to symptoms, the difference between both groups were significant for all dependent variables together, $F(6, 73) = 115.8$, $p < .001$, and for each of the included dependent variables separately, using a Bonferroni adjusted alpha level of .01: exhaustion $F(1, 78) = 544.9$, $p < .001$, depersonalization $F(1, 78) = 154.1$, $p < .001$, perceived job competence $F(1, 78) = 67.3$, $p < .001$, general level of fatigue $F(1, 78) = 478.6$, $p < .001$, depressive symptoms $F(1, 78) = 242.8$, $p < .001$, and general level of psychopathology $F(1, 78) = 165.6$, $p < .001$. BPs reported significantly more burnout symptoms, general fatigue, depressive symptoms, and general psychopathology than HCs.

Table 1 — Characteristics of the Burnout Patients and the Healthy Controls

	Burnout patients (*N* = 40)	Healthy controls (*N* = 40)
Gender: Men	16 (40%)	17 (42.5%)
Age (SD)	44.2 (10.7)	45.4 (12.0)
Educational level		
Low	5 (12.5%)	6 (15%)
Middle	18 (45%)	20 (50%)
High	17 (42.5%)	14 (35%)
Symptom Measures (SD)		
UBOS		
Emotional exhaustion *	4.9 (1.0)	.8 (.5)
Depersonalization *	3.7 (1.3)	.7 (.8)
Perceived job competence *	3.3 (1.0)	4.8 (.7)
CIS*	113.3 (16.5)	35.1 (15.5)
CES-d*	26.9 (9.2)	3.1 (3.0)
SCL-90*	206.7(50.1)	102.4 (10.6)

Note: * = significant at $p < .001$

Mean RT, mean number of errors and mean scores on Aversion Scale (AS), the Profile of Mood States Fatigue (POMS-f) and the Rating Scale Mental Effort (RSME) in each Block for Burnout Patients and Healthy Controls dependent on strategy and detection of the cue are presented in Table 2.

Table 2 — Mean Reaction times (ms), Mean Number of Errors and Mean Scores on Aversion Scale (AS), the Profile of Mood States Fatigue (POMS-f) and the Rating Scale Mental Effort (RSME) in each Block for Burnout Patients and Healthy Controls dependent on Strategy (searched/not searched) and Detection of the Cue Stimulus (detected/not detected) on the 6 Blocks.

	Burnout patients			Healthy controls		
	Searched and detected	Searched and not detected	Not searched	Searched and detected	Searched and not detected	Not searched
Block 0 (practice)	(*N*=11)	(*N*=8)	(*N*=21)	(*N*=18)	(*N*=10)	(*N*=12)
RT	286.1 (77.1)	350.1 (114.2)	383.9 (153.6)	233.8 (63.1)	353.3 (33.5)	289.1 (52.9)
ER	1.6 (2.2)	1.1 (1.4)	4.9 (4.8)	.7 (.8)	1.7 (.9)	1.3 (.9)
AS	1.5 (1.3)	.6 (1.8)	2.3 (2.5)	.6 (.9)	.7 (1.5)	1.9 (1.6)
POMS-f	4.5 (3.8)	5.0 (4.7)	8.0 (6.9)	.1 (.3)	.0 (.0)	.3 (.7)
BSMI	48.6 (21.6)	60.0 (24.3)	73.1 (34.5)	25.42 (20.6)	36.5 (27.9)	40.8 (20.3)
Block 1	(*N*=33)	(*N*=0)	(*N*=7)	(*N*=39)	(*N*=0)	(*N*=1)
RT	275.1 (83.0)		536.3 (202.2)	239.0 (55.7)		333.2
ER	2.5 (3.4)		7.3 (4.5)	1.2 (1.0)		3
AS	1.9 (2.2)		4.0 (3.5)	1.3 (1.6)		2
POMS-f	6.3 (4.9)		11.1 (9.6)	.3 (.5)		1
BSMI	60.8 (31.7)		91.4 (29.8)	32.4 (22.2)		60
Block 2	(*N*=27)	(*N* =3)	(*N*=10)	(*N*=38)	(*N*=0)	(*N*=2)
RT	284.1 (69.6)	444.6 (69.7)	450.1 (171.2)	251.8 (65.2)		307.7 (21.3)
ER	2.5 (3.0)	5.0 (1.7)	7.6 (4.7)	.9 (1.0)		1.5 (.7)
AS	3.3 (2.9)	1.7 (2.9)	4.1 (3.5)	1.1 (1.5)		.5 (.7)
POMS-f	7.6 (5.9)	9.7 (8.0)	13.5 (9.1)	.4 (.6)		.5 (.7)
BSMI	67.9 (29.7)	93.3 (22.5)	106.0 (16.6)	30.2 (19.7)		45.0 (21.2)
Block 3	(*N*=24)	(*N* =5)	(*N*=11)	(*N*=30)	(*N*=7)	(*N*=3)
RT	278.0.2 (68.9)	381.2 (32.9)	458.9 (129.9)	238.1 (31.2)	350.5 (50.0)	289.9 (6.2)
ER	2.8 (2.4)	3.6 (4.0)	9.6 (9.5)	1.4 (1.6)	1.7 (1.3)	1.0 (1.0)
AS	3.8 (2.9)	4.4 (3.0)	4.9 (3.7)	.9 (1.0)	.9 (.9)	1.0 (1.0)
POMS-f	8.3 (5.9)	12.0 (5.3)	14.5 (8.5)	.5 (.6)	.9 (.9)	1.0 (1.0)
BSMI	77.5 (27.0)	87.0 (23.3)	106.4 (18.3)	33.1 (22.9)	54.3 (5.3)	43.3 (15.3)
Block 4	(*N*=9)	(*N* =18)	(*N*=13)	(*N*=21)	(*N*=16)	(*N*=3)
RT	246.8 (46.8)	384.1 (55.2)	442.2 (81.4)	229.7 (72.0)	334.5 (46.2)	300.7 (3.5)
ER	4.4 (2.6)	4.4 (3.1)	12.2 (12.6)	3.3 (3.3)	5.4 (4.1)	3.3 (1.2)
AS	4.3 (.9)	3.7 (3.5)	5.5 (3.6)	1.1 (1.3)	.8 (.8)	1.0 (1.0)
POMS-f	10.1 (5.6)	8.7 (7.1)	15.4 (7.8)	.6 (.7)	.5 (.8)	1.0 (1.0)
BSMI	78.9 (35.4)	89.3 (17.2)	109.6 (21.9)	43.1 (27.1)	41.2 (26.4)	53.3 (20.8)
Block 5	(*N*=27)	(*N* =0)	(*N*=13)	(*N*=37)	(*N*=0)	(*N*=3)
RT	261.4 (67.9)		476.4 (157.4)	219.1 (23.1)		308.4 (22.0)
ER	1.5 (1.5)		14.1 (13.0)	1.0 (1.1)		2.3 (.6)
AS	4.1 (3.2)		5.7 (3.8)	1.2 (1.3)		1.0 (1.0)
POMS-f	10.6 (7.5)		15.3 (8.3)	.6 (.8)		1.3 (1.2)
BSMI	87.6 (33.0)		111.2 (26.2)	33.5 (20.6)		56.7 (23.1)

ANOVAs for the HCs for Blocks 0, 3 and 4 (the only blocks with healthy controls who searched for the cue but failed to detect it) with Group (SD, SND, NS) as independent variable and mean RT as dependent variable revealed significant effects for Group in Block 0, F (2, 39) = 14.8, p < .001, Block 3, F (2, 39) = 31.8, p < .001, and Block 4, F (2, 39) = 13.9, p < .001. Post-hoc comparisons using Dunnets T3 indicated that the three groups differed from each other in the three Blocks. Inspection of the means indicated, as expected, that RTs for the SD group were the shortest, followed by the NS Group, and then the SND Group with the largest RTs (See Table 2), which indicates that detecting the cue leads to shorter RTs and that searching for the cue reduces the effort that can be spent on the primary task, resulting in longer RTs.

A Pearson chi-square test (χ^2 = 4.2, p <.05) with Strategy (High= SD + SND, Low = NS) and Group (BPs, HCs) revealed that more BPs applied a low-effort-strategy in Block 0 compared to HCs. McNemar symmetry chi-square test for strategy in Blocks 0 and 1 revealed that more HCs (p < .001) and BPs (p < .001) applied a high effort strategy in Block 1 compared to block 0, which suggest that feedback about the cue in Block 0 and the reward motivated relative more BPs and HCs to search for the cue in Block 1 compared to Block 0.

The association between Group [BPs, HCs] and Strategy [SD +SND, NS] was significant (χ^2 = 7.8, p < .01). Next, we conducted a Cox regression survival analysis The effect of Group [BPs, HCs] was significant, *Wald* (1) =6.0, p < .05, with an odds ratio of 4.8 (95% CI 1.4-16.9), which means that not trying to detect the cue is far more likely for BPs than for HCs. Table 2 shows that for HCs the number of participants who tried to detect the cue declined over Blocks 1-5 from 39, 38, 37, 37 to 37 and for BPs from 33, 30, 29, 27, to 27.

ANOVAs for Block 2, Block 3 and Block 4 (the only blocks with burnout patients who searched for the cue but failed to detect it) with Group (SD, SND, NS) as independent variable and mean RT as dependent variable revealed a significant effect for Group in Block 2, F (2, 39) = 11.0, p < .001, Block 3, F (2, 39) = 16.8, p < .001, and Block 4, F (2, 39) = 25.8, p < .001. Post hoc comparisons using Dunnets T3 indicated that the SD group differed from the other groups, but that the SND group and the NS group did not differ from each other. Inspection of the means indicated that RTs for the SD group were shorter than the RTs in the NS Group and the SND Group (See Table 2).

With regard to errors, ANOVAs for Blocks 2, 3, and 4 with Strategy (SD, SND, NS) as independent variable and mean number of errors as dependent variable revealed significant effects for Group in Block 2, F (2, 39) = 8.2, p < .001, in Block 3, F (2, 39) = 6.1, p < .01, and in Block 4, F (2, 39) = 4.7, p < .05 for BPs. Post-hoc comparisons using the Bonferroni test indicated that in all the blocks the SD group had significantly fewer errors than the NS group. There were no differences in error for the healthy control group

(all *p*s > .2).

With regard to subjective feelings during task performance, we conducted separate MANOVAs for BPs and HCs with Strategy (SD, SND, NS) as between subjects variable, and the scores on the AS, POMS-f, and RSME as dependent variables for Blocks 3 and 4. In both blocks there were no significant (*p*s > .15*)* differences on the subjective measures for the HC groups. Subjective feelings were significantly (*p*s < .05*)* different in both blocks for the BP groups. Post-hoc comparisons using the Bonferroni test indicated that in all the blocks the SD group experienced significantly less fatigue (POMS-f) and effort (RSME) than the NS group.

Discussion

We investigated whether burnout patients adapt task performance strategically to reduce task demands. We presented burnout patients and healthy controls with a task they could execute either by adopting an effective but high-effort strategy or by applying a less effective low-effort strategy. The high-effort strategy comprised the performance of a secondary task, namely the search for a cue that shows that the target stimulus of the primary task is about to appear. Applying the high-effort strategy involved a risk, however. In case the cue is found, performance on the primary task improved, but in case the cue was not found, the performance on the primary task might deteriorate, because the investment in the secondary might reduce the effort spent on the primary task.

As expected, significantly more burnout patients than healthy controls applied a low-effort strategy. Feedback on the cue in the practice block and the announcement of a financial reward for good performance on the task induced significantly more healthy controls and burnout patients to apply a high-effort strategy. Almost all healthy controls, 98%, and 83% of the burnout patients applied a high-effort strategy in Block 1. We assume that the feedback about the cue in Block 0 was the most important factor in contributing to the increase in participants choosing the high-effort strategy. Detecting the cues in Blocks 0 and 1 comprised a relatively simple task and because participants received feedback about the 'simple to detect' cue in Block 0, the feasibility of finding the cue in Block 1 may have seemed large. This assumption is supported by our finding that all the participants who searched for the cue in Block 1 actually detected it. In the course of the five blocks, significant more burnout patients than healthy controls abandoned the high-effort strategy. In Block 5, 93% of the healthy controls still applied a high-effort strategy compared to 67% of the burnout patients.

An important question is whether the choice of a subgroup of the burnout patients for a low-effort strategy is an adaptive strategy. This does not seem to be the case. Unlike healthy controls who chose a low-effort strategy, burnout patients who applied a low-effort strategy failed to maintain their performance-level. They had longer RTs and

more errors than those burnout patients who searched for the cue but did not find it. They also reported significantly more effort and subjective fatigue than the burnout patients who applied a high-effort strategy. This means that although they chose for a low-effort strategy, their performance level was low and they experienced more strain than burnout patients who chose for a high-effort strategy. These findings differ from those of the healthy controls in the present study and from those of other studies on strategic adaptation in fatigued individuals. Those studies show that fatigued individuals chose low-effort strategies and kept effort-expenditure and strain within limits and maintained performance levels for the primary task (Hockey, 1997; Meijman & Kompier, 1998, Meijman, Mulder, van Dormolen & Cremer 1992; Meijman & Zijlstra, 2007).

It is remarkable that a subgroup of burnout patients chose a low-effort strategy but, nevertheless failed to keep performance level and strain within limits. Maybe they did not feel capable of regulating their performance and effort-expenditure in an adaptive way. Our data show that their symptoms were more severe compared to the burnout patients that chose a high-effort strategy. An analysis of the symptom levels (UBOS, SCL-90, CIS, CES-D) of burnout patients with a high-effort strategy and burnout patients with a low-effort strategy revealed that burnout patients who applied a low-effort strategy reported significantly ($ps < .01$) higher levels (Block 3: 241.4; Block 4: 234.9; Block 5: 234.0) of general psychopathology (SCL-90) than burnout patients with a high-effort strategy (Block 3: 193.5; Block 4: 193.1 Block 5: 193.5). There were no differences on the UBOS, CIS and CES-d (all $ps > .3$) which suggests that a high level of general psychopathology may be more impeding for task performance than fatigue.

Several authors argue that burnout patients are not only characterized by high levels of chronic fatigue, but also by a reduced motivation to spend effort (Boksem & Tops, 2008; Schaufeli & Taris, 2005). Boksem and Tops (2008) suggest that reduced motivation to spend effort in burnout patients is a structural condition due to physiological changes in the dopaminergic/motivational system. Their view is supported by studies that indicate physiological deviancies in burnout patients (Mommersteeg, Keijsers, Heijnen, Verbraak & Van Doornen, 2006) and show that motivational problems cannot simply be reversed by motivational interventions (Van Dam, Keijsers, Eling & Becker, 2011). A reduced motivation to spend effort may therefore be an explanation for our findings. The burnout patients that chose the low-effort strategy were possibly also not motivated to spend effort at the primary task. The long RTs and high number of errors point in this direction. These motivational problems may also have resulted in elevated levels of perceived effort (Hockey, 2011; Kanfer, 2011).

In addition to a more relatively permanent reduced motivation to spend effort, a reduced capacity for cognitive effort may be a second problem in patients suffering from burnout. Because of this reduced capacity for cognitive effort, cognitive tasks require

more effort and evoke more fatigue during task performance (Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012; Sandström, 2010; Van der Linden et al., 2005; Van Luijtelaar, Verbraak, Van den Bunt, Keijsers & Arns, 2010). Consequently, a part of the burnout patients may not feel capable to perform an additional secondary task and therefore choose for the low-effort strategy. This reduced capacity for cognitive effort may also have hindered them to perform adequately on the primary task.

Although significantly more burnout patients chose a low-effort strategy, the majority of the burnout patients applied a high–effort strategy just as the healthy controls did, which suggests that preference for a low-effort strategy is not a distinctive feature of the burnout syndrome, but only for a subgroup of the burnout patients.

Several authors have suggested that burnout patients do not form a homogeneous group and that there may be subtypes (Demerouti, Verbeke & Bakker, 2005; Tops et. al., 2007) or that the symptomatology of burnout may differ in different stages of the disease (Edelwich & Brodsky, 1980; Golembiewski & Munzenrider, 1988; Golembiewski & Boss, 1991). Whatever the case, it is important in future research to find out whether there is indeed a subgroup of burnout patients with long-lasting impaired cognitive functioning and a reduced capacity to become motivated for spending mental effort.

The present study has a number of limitations. First of all, the participants indicated at the end of a block whether they had searched for the cue or not. In case they did and also detected the cue, we do not know when they detected it and, therefore, do not know for how many targets they could benefit from this knowledge. Secondly we do not know for sure that if a participant indicated that he did not search for the cue, he actually did not do so. We have some indications however, that the participants actually did what they indicated to us. Because cue 4 was rather difficult to detect and cue 5 rather easy, it is unlikely that participants who searched for the cues did find cue 4 and not 5. It would have been suspicious if a participant indicated that he did not search for cue 4, but searched and detected cue 5. None of the participants that indicated that they did not search in Block 4, did find the cue in Block 5 and all the participants that searched but did not find the difficult cue in Block 4, detected the easy cue in Block 5, which indicates that they really searched for the cue in Block 4.

Finally, several studies have shown that individuals may differ in response strategy; they may have a preference for speed or for accuracy (Boksem et al., 2006), which may influence their performance. In our study, we told participants that short RTs were rewarded and provided them with feedback about their RTs. We therefore assume that all participants regarded speed as a priority. Moreover, a review by Matthews, Davies, Westerman & Stammers (2000) showed that there is no consistent evidence that personality (extraversion, neuroticism) or mental state (fatigue, anxiety) is associated with preference for speed or accuracy. Several authors (Rangel, Gerralda, Levin & Roberts,

2000; White & Schweitzer, 2000) have found that patients suffering from chronic fatigue syndrome are more concerned over failure and mistakes than healthy controls. Therefore it cannot be ruled out that burnout patients may also have a preference for accuracy which may result in a preference to take enough time to prevent making errors. In our study the burnout patients, especially those who chose a low-effort strategy, made more mistakes and had slower response latencies also. Therefore, we think that these possible inter-individual differences did not affect our results.

Strengths of our study are the relatively large number of participants and the thorough assessment of participants, because of which we could rule out the comorbidity of other psychiatric disorders, such as depression and anxiety disorders.

In conclusion, most burnout patients applied a high-effort strategy just like healthy controls. Nevertheless, significantly more burnout patients applied a low-effort strategy. But this strategy, does not seem to be an adaptive way of coping with fatigue, but is possibly the result of a reduced motivation to spend effort and/or the result of cognitive impairments.

5 Testing whether Reduced Cognitive Performance in Burnout can be Reversed by a Motivational Intervention

Van Dam, A., Keijsers, G. P. J., Eling, P. A. T. M., & Becker, E. S. (2011). *Work & Stress, 25,* 257-271.

Abstract

It has been suggested that the motivation to spend effort is decreased in burnout patients, resulting in reduced cognitive performance. A question that remains is whether this decreased motivation can be reversed by motivational interventions. We investigated this by examining the effect of a motivational intervention on cognitive performance. We presented 40 burnout patients in The Netherlands and 40 matched healthy controls with a complex attention task.

As expected, in a first block of trials the performance of the burnout patients was poorer than that of healthy controls. Subsequently, we provided the participants with fake positive feedback about their performance and announced that we would financially reward those who performed best in a subsequent block of trials. Contrary to the healthy controls, the burnout patients did not improve their performance and experienced more aversion to spend effort. The study demonstrated that impaired cognitive performance in burnout patients could not be reversed by motivational interventions, which is in line with contemporary theories on burnout that state that physiological changes in burnout may underlie a relatively long-term decrease in motivation. The implication of these results is that in practice employers and therapists might need to accept that there could be a reduction in cognitive performance in employees with burnout.

Introduction

Burnout is a stress-related syndrome with exhaustion, occupational detachment, and reduced personal accomplishment as most important features. It is generally believed that burnout results from prolonged periods (years) of stress and from an inability to reach personal goals. Burnout patients frequently report reduced job satisfaction, physical complaints, especially fatigue, and impaired cognitive performance (Maslach, Schau-

feli & Leiter 2001; Schaufeli & Enzmann, 1998; Schmidt, Neubach & Heuer, 2007; Taris, 2006). With regard to the latter, it is important to know whether cognitive performance is really impaired in individuals suffering from burnout. Regrettably, there is little information available on the objective cognitive performance of individuals suffering from burnout (Schaufeli & Enzmann, 1998; Taris, 2006). Taris (2006) reviewed the literature and concluded that severity of burnout and level of

performance appear to be related, but that firm conclusions are difficult to draw due to conceptual and methodological limitations of studies. With regard to cognitive performance in burnout, a search in the PsychInfo data base (up to October 2009) resulted in only three studies that used cognitive tasks to measure objective cognitive performance in burnout patients. These studies show that burnout patients perform poorer than healthy controls on attention and memory tasks (Öhman, Nordin, Bergdahl, Slunga Birgander & Stigsdotter Neely, 2007; Sandström, Rhodin Nyström, Lundberg, Olsson & Nyberg, 2005; Van der Linden, Keijsers, Eling & Van Schaijk, 2005). However, these studies also suffer from limitations. Different and poorly specified methods were used to establish clinical burnout and the possible effects of comorbidity such as major depression and anxiety disorders were insufficiently controlled for. A further issue concerns the processes that may underlie a reduced cognitive performance in burnout patients. Several authors (Boksem & Tops, 2008; Schaufeli & Taris, 2005) suggest that the motivation to spend effort is relatively permanently decreased in burnout. This reduced motivation to spend effort may lead to reduced cognitive performance.

The notion that motivation to spend effort is reduced in burnout patients is plausible. According to the effort-reward imbalance theory of Siegrist (1996, 2002), prolonged periods of high effort and low reward can lead to sustained strain reactions. In order to prevent this strain, an individual may reduce his effort to accomplish a particular task when the perceived reward is low. These assumptions are in line with contemporary motivation theories which state that an individual makes conscious and subconscious cost-benefit analyses of goal-directed behaviour to determine whether it is rewarding in terms of, for example, controllability, chances of success, and attractiveness of the rewards (Ajzen, 1991; Dijksterhuis, 2004; Wilson, 2002). If the likelihood that effort will be rewarded is experienced as small, an individual will (sub) consciously tend to evaluate the goal directed behaviour as negative. Individuals will start to experience fatigue and aversion to spend further effort and subsequently reduce their effort (Boksem & Tops, 2008; Schönpflug & Batman, 1989;Van Vegchel, De Jonge, Bosma & Schaufeli, 2005). Because burnout patients report prolonged periods of not reaching personal goals despite spending lots of effort (De Jonge, Bosma, Peter & Siegrist, 2000; Schaufeli & Enzmann, 1998), it can be expected that they experience strain as well as a decreased motivation.

A question that remains is whether this decreased motivation can be reversed by motivational interventions. Some authors suggest that motivational interventions in burnout may increase performance (Halbesleben & Bowler, 2007; Rubino, Luksyte, Jansen Perry & Volpone, 2009) whereas other authors suggest that this reduced motivation cannot be reversed in the short term by motivational interventions because burnout patients suffer from biochemical changes, due to prolonged periods of stress, that affect performance (Boksem & Tops, 2008; Frankenhaeuser, 1986; Sandström et al., 2005; Van der Linden et al., 2005). This theory has been elaborated by Boksem and Tops (2008) who argue that physiological changes due to overriding fatigue for prolonged periods of time may be fundamental to disorders that are characterized by long-term fatigue, like burnout. They suggest that burnout patients are no longer responsive to rewards due to physiological changes in the dopaminergic/motivational system. In this study we investigated the effect of a motivational intervention on cognitive performance, self-reported aversion, fatigue, and effort.

A procedure for increasing motivation, commonly used in performance studies, is knowledge of results. Feedback concerning the level of performance attained counters the belief that task accomplishment is out of reach and subsequently increases motivation, even if the feedback is false (Cervone, 1989; Davies & Parasuraman, 1982; Kluger & DeNisi, 1996; Matthews, Davies, Westerman & Stammers, 2000; Warm, 1993). In many studies financial incentives have also proved to be effective in increasing motivation (Boksem, Meijman & Lorist, 2006;

Matthews et al., 2000), provided that subjects expect that they can attain performance goals. Boksem et al. (2006), for example, showed that fatigued individuals improve their performance on an attention task after they had been told that a good performance would be rewarded financially.

On the basis of previous research (Öhman et al., 2007; Sandström et al., 2005; Van der Linden et al., 2005) we expected that the performance of burnout patients would be poorer than healthy controls on a sustained attention task. Because mental fatigue seems to affect performance especially on complex tasks rather than on simple tasks (Holding, 1983; Matthews et al., 2000), we presented participants with a complex task. The task, based on the switch task of Rogers and Monsell (1995), involves the use of higher control processes necessary for the planning and preparation of future actions. Participants had to alternate between two tasks on every second trial, meaning that on alternate trials one activated cognitive task set had to be inhibited and the other one had to be activated. We adapted the original task (Rogers & Monsell, 1995) by making the inter-stimulus interval (ISI) dependent on the performance level during the task: it was reduced after a series of correct responses and increased following errors. Thus, participants were able to determine themselves how much effort they wanted to spend on the

task. The effort needed is to a large extent determined by the amount of time available to prepare the response. A short preparation time requires more effort. We started with a relatively long ISI in order to provide both groups ample time to perform well. We expected that both healthy controls and burnout patients would be able to decrease their ISI. Following a first block of trials, we attempted to enhance motivation by providing positive feedback and by promising a financial reward. We then presented a second block of trials to examine the effect of this motivational intervention on the level of performance and the motivation to invest effort, as expressed in a reduction of the ISI during the task. Aversion to task performance was measured before the task, and level of fatigue and perceived effort to perform the task were measured after the task.

In line with the effort-reward imbalance theory (Siegrist, 2002), it is expected that healthy controls will benefit from increasing perceived rewards by increasing their performance. For burnout patients we expect an increase in aversion to task performance and an enduring poor performance, in line with theories that state that chronic biochemical-based changes in motivation underlie reduced cognitive performance in burnout, whereas an increase in performance and a decrease in aversion would be indicative of a reversible motivation.

Methods

Participants

Burnout patients (*N*=40) were recruited from mental health centres in the southwestregion of the Netherlands, where they sought treatment for their symptoms. We provided therapists of various mental health organizations with brochures about the research project and asked them to give these to their patients. When patients wanted to participate, they signed an informed consent form and sent it to the experimenter. Subsequently, we invited the patient for a semi-structured interview. For inclusion, patients had to meet: (1) the validated cut-off points (Brenninkmeijer & Van Yperen, 2003) for severe burnout of the Dutch version (Utrecht BurnOut Scale-A, UBOS-A; Schaufeli & Dierendonck, 2000) of the Maslach Burnout Inventory General Survey (Maslach, Jackson & Leiter, 1996): exhaustion] 2.20 and either cynicism] 2.00 or personal accomplishment 5 3.67; (2) the cut-off point for prolonged fatigue of the Checklist Individual Strength (CIS; ; ≥ 76) (Bültman et al., 2000); (3) the criteria for the proposed psychiatric equivalents of clinical burnout, namely the ICD-10 (World Health Organization, 1994) criteria for work-related neurasthenia (Schaufeli & Enzmann, 1998; Schaufeli, Bakker, Hoogduin, Schaap & Kladler (2001); and (4) the DSM-IV (American Psychiatric Association, 2000) criteria for unspecified somatoform disorder with prolonged fatigue as the main symptom (Hoogduin, Schaap & Methorst, 2001). Unspecified somatoform disorder was established with the Dutch translation (Overbeek, Schruers & Griez, 1999) of the Mini Inter-

national Neuropsychiatric Interview (Sheehan et al., 1998), and work-related neurasthenia with a semi-structured interview checking ICD-10 criteria for work-related neurasthenia (World Health Organization, 1994). Exclusion criteria were a diagnosis of a concurrent DSM-IV disorder or the use of psychopharmacologic medication. Patients participated in the experiment within two weeks after inclusion. Healthy controls (*N*=40) were volunteers who did not meet the criteria for any of the DSM-IV (American Psychiatric Association, 2000) disorders and did not currently receive psychotherapeutic or psychopharmacologic treatment. Most volunteers were employees of a mental health institute and were invited by the experimenter to participate because of their match with a burnout patient on gender, age, and level of education.

Measurements

Severity of burnout symptoms was assessed with the UBOS-A, which comprises the following scales (range = 0-6): emotional exhaustion, depersonalization, and perceived job competence, with high scores on emotional exhaustion and depersonalization and low scores on perceived job competence indicating burnout.

General fatigue was assessed with the Dutch version (Vercoulen, Alberts & Bleijenberg, 1999) of the (CIS; Vercoulen et al., 1994). Its 20 items measure subjective feelings of fatigue and physical fitness, activity level, motivation, and concentration during the previous 14 days (range = 20-140).

Level of depression was assessed with the Dutch version (Bouman, Ranchor, Sanderman & Van Sonderen, 1995) of the Center for Epidemiological Studies-depression (CES-D; Radloff, 1977), which measures depressive symptoms (range = 0-60) and comprises 20 items based on the Beck Depression Inventory and the Zung Depression Scale.

Level of general psychopathology was assessed using the 90-item Dutch adaptation (Arrindell & Ettema, 1986) of the Symptom Checklist (SCL-90; Derogatis, 1977). (Range = 90 - 450).

Subjective fatigue was assessed using the fatigue subscale (F) of the Dutch translation of the short version of the Profile of Mood States (POMS; McNair, Lorr & Doppleman, 1971). The POMS-f consists of six adjectives commonly used to describe momentary fatigue states. Participants rate the extent to which the adjectives apply to them on a 5-point scale. (Range = 0 - 24).

Subjective ratings of invested mental effort were measured with the short version of the Rating Scale Mental Effort (RSME; Zijlstra, 1993), which specifically gauges how much effort a participant feels it takes to perform the task at hand. Respondents indicate the amount of effort on a continuous line with 0 signifying ‘‘not effortful at all’’ and 150 denoting ‘‘extremely effortful’’ (Range= 0-150).

Aversion towards task continuation was measured with an 11-point scale (range=0-

10), with 0 meaning ‘‘no aversion at all’’ and 10 ‘‘extremely strong aversion’’ to doing the task again (Lorist et al., 2000).

Task

In the current version of the switch task, letters appeared successively in a clockwise fashion in each corner of a screen, starting in the upper left square. The letters were randomly chosen from the set: A, B, E, G, O, and S. The colour of the letters was randomly chosen from the set green or red. If a green letter appeared in the upper half of the screen, participants had to push the left button on a button box as fast as possible; in case of a red letter, they had to push the right button. If the letter was in the lower half of the screen, participants had to push the left button as fast as possible when the letter was a vowel, and the right button if it was a consonant. Thus, subjects were asked to switch tasks every second trial.

The task started with an ISI of 1500 ms, which is ample time for healthy controls to respond adequately without much effort (Lorist et al., 2000; Nieuwenhuis & Monsell, 2002; Rogers & Monsell, 1995). Four correct responses in succession resulted in a reduction of the ISI by 50 ms, leading to an acceleration of the letters appearing on the screen. When participants made two or more errors in a set of four responses, the ISI was increased by 20 ms. Accordingly, the speed of the task was adapted to the level of performance.

Test procedure

To control for daily fluctuations in attention levels, participants were tested between 10 and 11 am. The switch task consisted of a practice block of 64 stimuli which took approximately 3 minutes and two experimental blocks of 300 stimuli that took approximately 10 minutes per experimental block. The task was run on a 32-bit, 64- MB RAM personal computer with Pentium III processor and a 17-inch screen. The 72 pt letters were presented against a black background. Following instructions, participants conducted a practice block. After the practice block, they were asked to rate their level of aversion to the task on the aversion scale, which took a few seconds. After the first experimental block, participants rated their fatigue scores on the POMS-f and their effort score on the RSME; this took less than half a minute.

Subsequently, the experimenter told the participants (regardless of their performance) that they had performed well, that the three participants who outperformed the others in the next block would get a financial reward of 20 euros, and that on the basis of their first block performance (speed of letters appearing on the screen) they had a good chance of getting the reward. They then rated their level of aversion on the aversion scale again and started with the second experimental block. The break between the

blocks lasted less than two minutes. After the second block, participants completed the POMS-f and the RSME for the second time. This took less than half a minute.

Results

Characteristics of the burnout patients and healthy controls are presented in Table 1.

Table 1 — Characteristics of the Burnout Patients and the Healthy Controls

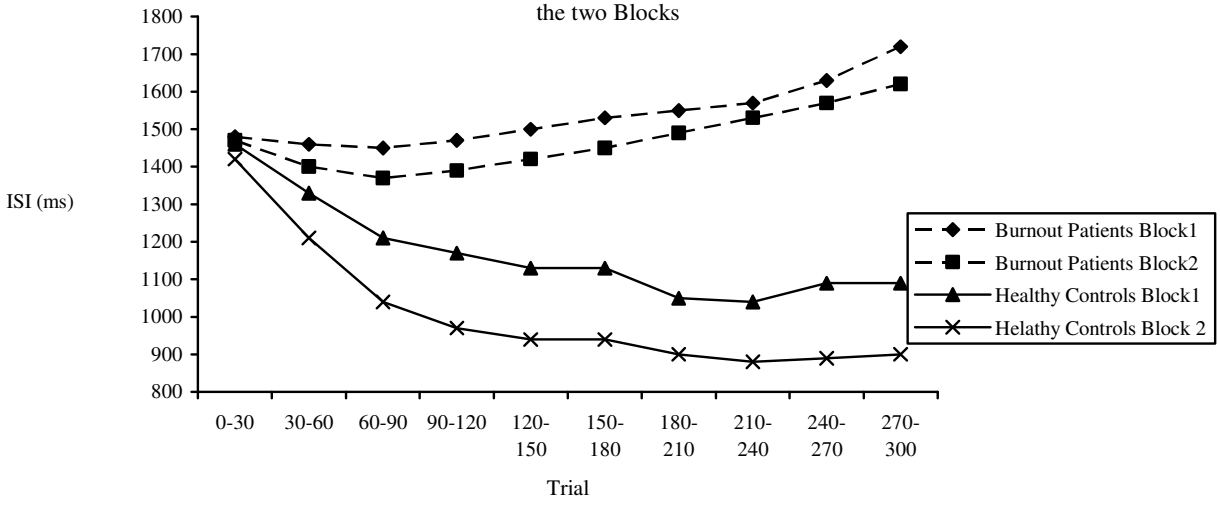
	Burnout patients (N = 40)	Healthy controls (N = 40)
Gender: Men	16 (40%)	17 (42.5%)
Age (SD)	44.2 (10.7)	45.4 (12.0)
Educational level		
Low	5 (12.5%)	6 (15%)
Middle	18 (45%)	20 (50%)
High	17 (42.5%)	14 (35%)
Symptom Measures (SD)		
UBOS		
Emotional exhaustion *	4.9 (1.0)	.8 (.5)
Depersonalization *	3.7 (1.3)	.7 (.8)
Perceived job competence *	3.3 (1.0)	4.8 (.7)
CIS *	113.3 (16.5)	35.1 (15.5)
CES-D *	26.9 (9.2)	3.1 (3.0)
SCL-90 *	206.7(50.1)	102.4 (10.6)

Note: UBOS = Utrecht BurnOut Scale; CIS = Checklist Individual Strength; CES-D = Center for Epidemiological Studies - Depression; SCL-90 = Symptom Checklist-90. * significant at $p < .001$

With regard to demographic characteristics, there were no significant differences between burnout patients and healthy controls (p-values of performed tests for gender, age and educational level were all larger than .64). With regard to symptoms, we conducted a one-way between-groups multivariate analysis of variance with emotional exhaustion, depersonalization, perceived job competence (UBOS-A), general level of fatigue (CIS), depressive symptoms (CES-D), and general level of psychopathology (SCL-90) as dependent variables. Group [BPs, HCs] was the independent variable. The results for the separate variables all reached statistical significance using a Bonferroni adjusted alpha level of .01: exhaustion $F(1, 78) = 544.9$, $p < .001$, depersonalization $F(1, 78) = 154.1$, $p < .001$, perceived job competence $F(1, 78) = 67.3$, $p < .001$, general level of fatigue $F(1, 78) = 478.6$, $p < .001$, depressive symptoms $F(1, 78) = 242.8$, $p < .001$, and

general level of psychopathology $F(1, 78) = 165.6$, $p < .001$. Burnout patients reported significantly more burnout symptoms, general fatigue, depressive symptoms and general psychopathology than healthy controls.

Figure 1: ISIs (Inter-Stimulus-Interval) over 300 Trials for the Burnout Patients and Healthy Controls on the two Blocks



The ISIs for the two groups in the two blocks are presented in figure 1. We conducted a repeated measures ANOVA with Group (BPs, HCs) as the between subjects variable, Block (Block 1, Block 2) as within-variable and mean ISI (see Table 3) as the dependent variable. There was a significant effect for Group, $F(1, 78) = 18.83$, $p < .001$, Block, $F(1, 78) = 24.35$, $p < .001$ and their interaction, $F(1, 78) = 4.41$, $p < .05$. Burnout patients had larger ISIs than healthy controls. Additional repeated measures ANOVAs for burnout patients and healthy controls separately, revealed that the ISI of healthy controls decreased in the second block, $F(1, 39) = 50.46$, $p < .001$ whereas, there was no change in ISI for the burnout patients.

Mean reaction times, number of errors and number of non-responses on repetition trials and switch trials for burnout patients and healthy controls in the two blocks are presented in Table 2. We calculated the switch costs for both blocks by subtracting the scores on the repetition trials from the corresponding values on the switch trials.

Table 2 — Mean and SDs of Reaction Times (RT), Number of Errors (ER) and Number of Non-responses on Repetition Trials and Switch Trials for Burnout Patients and Healthy Controls on the two Blocks.

	Burnout patients (N = 40)			Healthy controls (N = 40)		
	RT (ms)	ER	NR	RT (ms)	ER	NR
Block 1						
Repetition Trial	720 (215)	33 (30)	17 (13)	609 (90)	25 (10)	12 (7)
Switch Trial	913 (281)	32 (18)	32 (17)	832 (219)	25 (9)	27 (9)
Switch cost	194 (103)	.6 (8)	15 (10)	222 (171)	.2 (7)	15 (9)
Block 2						
Repetition Trial	671 (212)	27 (29)	19 (15)	538 (68)	21 (6)	10 (5)
Switch Trial	807 (232)	31 (28)	32 (20)	668 (105)	25 (7)	22 (5)
Switch cost	136 (89)	4 (11)	13 (11)	130 (61)	4 (7)	12 (6)

We conducted repeated measures ANOVAs for RT, error and non-response with Group (BPs, HCs) as the between subjects variable and Block (Block 1, Block 2) and Trial type (repetition, switch) as within-variables.

Regarding RT, there was a significant effect for Group, F (1, 78) = 8.9, p < .01. The results showed that RT was different in the two blocks, F (1, 78) = 55.4, p < .001, and for the two trial types, F (1, 78) = 263.7, p < .001. There was a significant Block x Trial type effect, F (1, 78) = 27.5, p < .001. Inspection of Table 2 indicates that RTs were shorter for healthy controls than for burnout patients, RTs were shorter in repetition trials than in switch trials, RTs were shorter in the second block, and RTs decreased stronger for switch trials in the second block than for repetition trials. These results are in line with our findings concerning the ISI.

Regarding number of errors, group differences approached statistical significance, F (1, 78) = 3.0, p < .09. and the number of errors differed between repetition trials and switch trials, F (1, 78) = 9.7, p < .01. Further, there was a significant Block x Trial type interaction, F (1, 78) = 11.6, p < .001. Inspection of Table 2 indicates that fewer errors were made in the repetition trials than in the switch trials and that the number of errors decreased stronger in repetition trials than in switch trials.

Regarding number of non-responses, there was a significant effect for Group (BPs, HCs), F (1, 78) = 9.5, p < .01. The number of non-responses differed between repetition trials and switch trials, F (1, 78) = 239.2, p < .001. Further, there was a significant Group

(BPs, HCs) x Block (Block 1, Block 2) interaction, F (1, 78) = 4.9, p < .05 and a significant Block (Block 1, Block 2) x Trial type (repetition, switch) interaction, F (1, 78) = 6.1, p < .05. Inspection of Table 2 indicates that healthy controls had fewer non-responses than burnout patients and that there were fewer non-responses for repetition trials than for switch trials. In healthy controls the number of non-responses decreased in the second block, t (39) = 5.0, p < .001, whereas the burnout patients made a similar amount of non-responses as in the first block. The number of non-responses seems to decrease mainly in the switch trials, t (39) = 1.9, p = .06. Because the Group x Trial type interaction was not significant, we can conclude that switch-costs did not differ between healthy controls and burnout patients.

We calculated the mean ISI, RT and number of errors over the two blocks and correlated them with each other. There was a significant correlation between ISI and RT, r = .56, p < .001 and between ISI and mean number of errors, r = .75, p < .001.

To investigate if there was a difference in fatigue, aversion, and perceived effort during the task, we conducted three 2 x 2 repeated measures ANOVA's with Group (BPs, HCs) as the between subjects variable, Block (Block 1, Block 2) as within-subjects variable and the scores on respectively the POMS-f, RSME and aversion scale as dependent variables. Scores on the POMS-f, RSME and aversion scale are presented in Table 3.

Table 3 — Mean Scores on the Profile of Mood States-fatigue (POMS-f), Rating Scale Mental Effort (RSME), aversion scale and mean ISIs (ms) on the two blocks for Burnout Patients and Healthy Controls. Means and SDs.

	Burnout patients (N = 40)	Healthy controls (N = 40)
Profile of Mood Scales-fatigue		
Block 1 (SD)	12.08 (8.3)	1.13 (1.7)
Block 2 (SD)	12.50 (8.1)	1.30 (1.9)
Rating Scale Mental Effort		
Block 1 (SD)	112.50 (25.2)	66.13 (29.8)
Block 2 (SD)	108.13 (25.9)	65.28 (29.6)
Aversion scale		
Block 1 (SD)	3.78 (3.2)	1.83 (1.9)
Block 2 (SD)	5.13 (3.4)	1.88 (2.3)
ISI		
Block 1 (SD)	1536.1 (534.4)	1170.3 (265.2)
Block 2 (SD)	1470.9 (619.3)	1008.2 (179.7)

With respect to subjective fatigue during the task, there was again a significant effect for Group, F (1, 78) = 71.31, p < .001. Burnout patients reported more fatigue during the experiment than healthy controls (Table 2). There was no effect for Block, and the Group x Block interaction was also not significant.

With respect to reported effort during the task, there was a significant effect for Group, F (1, 78) = 54.43, p < .001. There was no effect for Block, nor an interaction with Block. Burnout patients reported more effort during the experiment than healthy controls (Table 3). With respect to aversion scores during the task, there were significant effects for Group, F (1, 78) = 20.22, p < .001, and for Block, F (1, 78) = 12.69, p < .01, and their interaction, F (1, 78) = 10.94, p < .01. Additional repeated measures ANOVAs for burnout patients and healthy controls separately, revealed that burnout patients reported more aversion in Block 2 than in Block 1, F (1, 39) = 13.6, p < .001, whereas there was no increase in aversion scores for healthy controls (Table 3).

Because we expected task-performance to be related to aversion to task performance, experienced fatigue and effort, we calculated correlations using Pearson product-moment coefficient between the mean ISI, RT and the scores on the POMS-f, RSME and the aversion-scale for both groups in both blocks. In the burnout group, there were significant correlations between: ISI and fatigue, r = .44, p < .01, RT and aversion, r = .36, p < .05 and RT and fatigue, r = .36, p < .05 in Block 1 and in Block 2, ISI correlated with fatigue, r = .34, p < .05, RT with fatigue, r = .37, p < .05 and with aversion, r = .41, p < .01. For healthy controls there was a significant correlation between ISI and aversion, r =.58, p < .001 and RT and aversion, r = .45, p < .01 in Block 1. In Block 2 only ISI correlated with aversion, r = .45, p < .01. Other correlations between behavioural measures and subjective measures failed to reach the .05 level of statistical significance. Finally, we correlated the subjective measures averaged over blocks and groups. The subjective measures correlated highly with each other: Aversion and POMS-f, r =.78, p < .001, Aversion and RSME, r =.68, p < .001 and POMS-f and RSME, r =.80, p < .001.

Discussion

The aim of this study was to gain more insight into whether a motivational intervention could reverse reduced cognitive performance in burnout. We adapted the switch task of Rogers and Monsell (1995) in such a way that level of difficulty (stimulus pace) was adapted to the level of performance during the task, enabling us to study a participant's willingness to invest effort to perform well. More effort would lead to fewer errors which in turn would lead to shorter ISIs. We expected that the performance of burnout patients would be poorer on this task than that of healthy controls because of reduced motivation due to an effort-reward imbalance.

Further, we assumed that fake positive feedback and the announcement of a financial reward would result in an enhanced performance if it was the case that motivation is reversible. If performance was not affected by a motivational intervention, this would be indicative of a more permanent motivational impairment.

As expected, burnout patients performed less well in the first block (in terms of ISIs, RTs and non-responses) than healthy controls. Moreover, they reported more fatigue, effort, and aversion to the task than healthy controls.

In the second block, task performance improved for the healthy controls, which indicates that the motivational interventions were effective in changing the balance between perceived effort and rewards. The relatively poor performance of burnout patients apparently could not be reversed by the motivational intervention, which is indicative of a more permanent inability to respond to rewards.

Analyses of RTs and errors (see Table 2) agree with our findings for the ISI. Burnout patients showed longer RTs, made more errors and had more non-responses than healthy controls. These findings are in line with Lorist et al. (2000), who demonstrated that fatigue affects the adequacy of the task-preparation process, resulting in larger RTs and in an increase of errors. Both groups had shorter RTs in the second block, but in contrast to the healthy controls the number of non-responses was not reduced in the burnout patients. This finding is in line with Van der Linden et al. (2005), who found that burnout patients experience more difficulties in voluntary control over attention, which is associated with lapses in attention (Arnsten, 1998). Although burnout patients had longer RTs than healthy controls, switch costs did not differ between the groups. This is in line with Lorist et al. (2000), who found that switch costs were independent of fatigue.

Because the ISI in our study decreased or increased depending on whether a participant responded correctly or incorrectly, the ISI correlated, as expected, highly with the number of errors. If the ISI becomes short, the risk of an error increases. This dependency on ISI makes it difficult to compare our data directly with other studies using a switch paradigm with a fixed ISI.

Aversion, fatigue and perceived effort appeared to be highly related. This is not surprising considering current theories on mental effort and fatigue that define aversion to task performance as characteristic of fatigue and state that fatigue increases the amount of perceived effort to perform a task (Boksem & Tops, 2008; Meijman & Zijlstra, 2007).

Reported fatigue and effort in both groups remained unchanged in Block 2 as compared to Block 1. It is difficult to tell whether the comparable fatigue and effort scores between Blocks 1 and 2 in both burnout patients and healthy controls actually resulted from our manipulation or rather were unaffected by it. Unlike healthy controls, the burnout patients experienced an increasing aversion to task performance during the

experiment. Because of this increase in aversion they probably perceived their costs of spending effort as higher than in the first block. The effort-reward balance in burnout patients is therefore influenced not only by increased perceived rewards, but also by increased perceived costs, which may have led to enduring impaired motivation in the second block. Our finding that despite increased expectancy of rewards, aversion to task performance increased and task performance remained poor in burnout patients is in line with Boksem and Tops (2008), who stated that the burnout syndrome may be the result of biochemical changes that may result in a more permanent decrease in motivation to spend effort and therefore a reduced responsiveness to rewards. An explanation of why some authors (Halbesleben & Bowler, 2007; Rubino et al., 2009) suggest that motivational interventions may lead to increased performance in burnout may be that the participants in their studies had relatively mild burnout symptoms (Halbesleben & Bowler, 2007) compared to the burnout patients in our study.

Boksem and Tops (2008) suggest that the effort-reward imbalance and stress-related cognitive impairments may be related to different stages of the burnout syndrome. An effort-reward imbalance may lead to stress, fatigue, and aversion to spend effort. At this stage individuals may suffer from (mild) burnout symptoms and still be responsive to motivational interventions, but when fatigue and aversion are overruled for reasons within or beyond an individual's control, this may lead to more permanent biochemical-based changes in motivation which cannot be reversed by motivational interventions.

The mechanisms through which fatigue takes on a more chronic form are poorly understood and it appears to be difficult to establish biochemical differences between burnout patients and healthy controls (Mommersteeg, Heijnen, Verbraak & Van Doornen, 2006). But, because we found no support for a primary, reversible motivational origin of reduced cognitive performance in burnout, our findings appear to be more in line with such a biochemical explanation for cognitive impairments in burnout (Boksem & Tops, 2008; Sandström et al., 2005; Van der Linden et al., 2005).

Limitations

Several possible limitations of our study need to be addressed. First of all, our motivational feedback may have had differential effects on burnout patients and healthy controls. Several studies have shown that social comparison seems to act differently in burnout patients and healthy controls and may play a role in the course of burnout (Brenninkmeijer, 2002; Buunk, Zurriaga & Peiro, 2009). Burnout patients, more than healthy controls, may have perceived the motivational intervention as a threat instead of an opportunity for success. Previous research, however, showed positive effects of success feedback on the performance of anxious participants (Eysenck, 1981; Weiner &

Schneider, 1971), indicating that success feedback changes cognitive appraisal of task performance of participants who experience test anxiety (Matthews et al., 2000). We therefore assume that this intervention was also effective in our samples, but we did not actually ask the participants if they indeed felt encouraged by the possibility of a reward for performing better, and we can therefore not rule out the possibility that the motivational feedback affected burnout patients in a different from healthy controls.

Several studies have shown that individuals may differ in response strategy; they may have a preference for speed or for accuracy (Boksem et al., 2006), which may influence their performance. Although a review by Matthews et al. (2000) showed that there is no consistent evidence that personality (extraversion, neuroticism) or mental state (fatigue, anxiety) is associated with preference for speed or accuracy, several authors (Rangel, Gerralda, Levin & Roberts, 2000; White & Schweitzer, 2000) have found that patients suffering from chronic fatigue syndrome are more concerned over failure and mistakes than healthy controls. Therefore it cannot be ruled out that burnout patients may also have a preference for accuracy which may result in a preference to take enough time to prevent making errors. In contrast to participants with a preference for speed, correct responding would decrease the allowed maximum response time and hence increase the risk of errors; this is in addition to the concern over mistakes and aversion, resulting in a relative poor performance.

Another possible limitation is that feedback and information about the reward were always presented before Block 2, as a result of which improved performance might be interpreted as a learning effect. However, this explanation is not likely, because task performance stabilized in healthy controls in the second half of Block 1.

Strengths of the study

The burnout patients in this study also reported depressive symptoms. This is not surprising because the presence of fatigue symptoms is frequently associated with depressed mood. Burnout symptoms and depressive symptoms seem to be related to a certain degree (Schaufeli & Enzmann, 1998), but the phenomenological overlap between burnout and major depressive disorder is small (Glass & McKnight, 1996; Leiter & Durup, 1994; Schaufeli et al., 2001; Toker, Shirom, Shapire, Berliner & Melamed, 2005). In contrast to previous studies of Öhman et al. (2007), Sandström et al. (2005) and Van der Linden et al. (2005), we applied DSM-IV criteria to exclude patients suffering from mood disorders from the study using suitable semi-structured diagnostic interviews. Reduced cognitive performance in burnout patients in our study, therefore, cannot simply be attributed to the presence of a mood disorder. Besides the careful selection of participants, another strong feature of this study is the relatively large number of participants.

Implications for practice

The results of this study may have implications for clinical practice and job reintegration. First of all patients, employers and therapists have to realize that employees with burnout may suffer from cognitive impairments, which cannot simply be reversed by increasing motivation. Instead, acceptance of temporarily reduced cognitive performance might be warranted in order to avoid frustration and reduce stress and hence regain a healthy psychobiological balance.

Conclusions

This study confirmed that burnout is associated with reduced levels of cognitive functioning on complex tasks, and that motivational interventions fail to enhance performance in burnout patients to normal levels.

6 Burnout Patients Primed with Success did not Perform Better on a Cognitive Task than Burnout Patients primed with Failure

Van Dam, A., Keijsers, G. P. J., Verbraak, M. J. P. M., Eling, P. A. T. M., & Becker, E. S. (2012). *Psychology, 3,* 583-589.

Abstract

Burnout patients perform poorer on cognitive tasks than healthy controls. A possible explanation for this decreased performance is a relatively permanent reduced motivation to expend effort. In a previous study, we failed to enhance the performance of burnout patients using a monetary incentive and positive feedback. In an attempt to bypass cognitions about fatigue and performance, we tried to motivate healthy controls and burnout patients implicitly by priming participants with either success or failure prior to task performance. As expected, healthy controls primed with success outperformed healthy controls primed with failure. However, no differential priming effect was observed in burnout patients. This suggests that success priming fails to enhance performance in subjects with burnout.

Introduction

Burnout is a stress-related syndrome characterized by exhaustion, occupational detachment, and reduced personal accomplishment. Burnout results from prolonged periods of stress and from an inability to achieve personal goals. Burnout patients frequently report reduced job satisfaction, physical complaints, especially fatigue, and impaired cognitive performance (Maslach, Schaufeli & Leiter 2001; Schaufeli & Enzmann, 1998; Schmidt, Neubach & Heuer, 2007; Taris, 2006).

Several studies have shown that burnout patients perform poorer on cognitive tasks than healthy controls (Sandström, Rhodin, Lundberg, Olsson & Nyberg, 2005; Van Dam, Keijsers, Eling & Becker, 2011; Van der Linden, Keijsers, Eling & Van Schaijk, 2005). Many authors regard a reduction in motivation to expend effort as the underlying mech-

anism for decreased performance in burnout (Boksem & Tops, 2008; Schaufeli & Taris, 2005; Van Dam et al., 2011). An important question is whether this decreased motivation can be reversed by a motivational intervention. Some authors suggest that motivational interventions may increase performance to normal levels (Halbesleben & Bowler, 2007; Rubino, Luksyte, Jansen Perry & Volpone, 2009). Other authors, however, suggest that reduced motivation cannot readily be reversed by motivational interventions, because burnout patients suffer from biochemical changes due to prolonged periods of stress that affect performance over longer periods (months, years) of time (Boksem & Tops, 2008; Frankenhaeuser, 1986; Mommersteeg, Keijsers, Heijnen, Verbraak & Van Doornen, 2006; Sandström et al., 2005; Van der Linden et al., 2005). Boksem and Tops (2008) argue that physiological changes in the dopaminergic/motivational system, (due to systematic neglect of signs of fatigue for prolonged periods of time), may be fundamental to long-term fatigue syndromes such as burnout. This theory is supported by a study by Van Dam et al. (2011) in which they failed to motivate burnout patients by providing fake positive feedback about their performance and by announcing a financial reward for the best performing participants.

The findings of Van Dam et al. (2011), however, fail to explain why burnout patients could not be motivated to increase their performance. One possibility is that performance was already as high as possible. Another possibility is that positive feedback and financial rewards did not successfully counteract the patient's belief that their performance cannot be improved. Many authors (Afari & Buchwald, 2003; Knoop, Prins, Moss-Morris & Bleijenberg, 2010) argue that cognitions play a major role in the perpetuation of symptoms in fatigue-related syndromes. Many individuals suffering from long-term fatigue believe that they have no control over their fatigue symptoms (Findley, Kerns, Weinberg & Rosenberg, 1998; Knoop et al., 2010) and may perceive a good performance as unattainable, and therefore do not try to improve their performance despite an announced financial reward. It is theoretically and clinically important to find out whether reduced performance of burnout patients can be improved by the proper means. Therefore, we decided to examine the possibility of motivating patients implicitly using subliminal priming (Bargh, 2005; Dijksterhuis, Aarts & Smith, 2005), thus bypassing cognitions about fatigue and performance. Several studies (Aarts, Custers & Veldkamp, 2008; Chartrand & Bargh, 2002) have shown that motivation can be primed and that individuals primed with achievement-related stimuli perform at a higher level on subsequent tasks compared to non-primed individuals. A procedure for successfully priming subsequent behaviour is the 'scrambled sentence task' developed by Srull and Wyer (1979; for a review, see Bargh & Chartrand, 2000). The task is presented as a verbal ability task and is based upon sets of four words in random order. Participants are asked to construe grammatically correct sentences using three of the four words. For each set, only a

single grammatically correct solution is possible. Without informing the participants, a proportion of these correct sentences refer to a specific behaviour, mood, or attitude which (unknowingly to the participant) becomes activated or 'primed'. In our study, we used sentences that primed for success, for instance: 'John is winning' or for failure, for instance 'John gives up'.

We hypothesized that, if we primed healthy controls with either failure or success, and if we subsequently presented them with a complex cognitive task, those primed with success would outperform those primed with failure. With regard to burnout patients, we also expected that those, primed with success, would perform better than those primed with failure if cognitions about the fatigue-performance relationship played a role in reduced cognitive performance.

Methods

Participants

Burnout patients (N = 63) were recruited from institutions for mental health where they were being treated for their symptoms. The diagnosis of burnout was established by the mental health institutions using the following criteria. Patients had to meet: (1) the validated cut-off points (Brenninkmeijer & van Yperen, 2003) for severe burnout on the Dutch version of the Maslach Burnout Inventory General Survey (see Measurements section for a description of the instruments): exhaustion ≥ 2.20 and either cynicism ≥ 2.00 or personal accomplishment ≤ 3.67, (2) the cut-off point for prolonged fatigue (Bültman et al., 2000) on the checklist individual strength (≥ 76), (3) the criteria for the proposed psychiatric equivalents of clinical burnout, namely the ICD-10 (World Health Organisation, 1994) criteria for work related neurasthenia (Schaufeli, Bakker, Hoogduin, Schaap & Kladler, 2001; Schaufeli & Enzmann, 1998), and (4) the DSM-IV (American Psychiatric Association, 2000) criteria for unspecified somatoform disorder with prolonged fatigue as the main symptom (Hoogduin, Schaap & Methorst, 2001). Both diagnoses were established by using the Dutch adaptation (Overbeek, Schruers & Griez, 1999) of the Mini International Neuropsychiatric Interview (Sheehan et al., 1998) and a semi-structured interview checking ICD-10 criteria for work-related neurasthenia. Of the 61 patients meeting these criteria, 12 patients also met the criteria of simple phobia as a secondary diagnosis. They were equally divided over the prime-conditions. Patients diagnosed with burnout were sent a brochure about the research project and were offered additional information by telephone, whenever they wanted to. When patients decided to participate, they signed an informed consent form and returned it to the experimenter.

Healthy controls (N = 40) were volunteers and did not meet the criteria for any of the DSM-IV disorders or currently receive psychotherapeutic or psychopharmacologic

treatment. They were employees (secretaries, cooks, cleaners and nurses) of a mental health institute or members of a sport club. Both groups were equally divided over the prime conditions. The healthy controls received 5 euros for participation and the burn-out patients received a book on occupational stress.

Measurements

Severity of burnout symptoms was assessed with the Dutch adaptation of the Maslach Burnout Inventory General Survey (Maslach, Jackson & Leiter, 1996), referred to as the Utrecht BurnOut Scale-A (UBOS-A; Schaufeli & Dierendonck, 2000). The UBOS-A comprises the following scales: emotional exhaustion, depersonalization, and perceived job competence with high scores on emotional exhaustion and depersonalization and low scores on perceived job competence indicating burnout.

General fatigue was assessed with the Dutch adaptation (Vercoulen, Alberts & Bleijenberg, 1999) of the Checklist Individual Strength (CIS; Vercoulen et al., 1994). Its 20 items assess subjective feelings of fatigue and physical fitness, activity level, motivation, and concentration during the previous 14 days.

Participants were asked to rate their mood by placing a mark on a Visual Analogue Scale of 10 cm, with on the lefts side the word 'sad' and on the right side the word 'cheerful'. The distance between the left endpoint and the mark was used as a measure of mood.

Subjective assessment of acute fatigue was measured with the mental-fatigue scale (mf) of the short version of the Rating Scale Mental Effort (RSME; Zijlstra, 1993), which specifically measures how fatigued a participant is feeling as a result of performing the task at hand. The level of fatigue is indicated on a continuous line with 0 signifying 'not fatigued at all' and 150 denoting 'extremely fatigued'

The Rating Scale Expectancy of Performance (RSEP) was specifically developed for this study to assess the participants' expectations about their performance level for the Scrambled Sentence Task (SST) and the cognitive switch task (see Task section below). Participants were asked to place a mark on a line of 10 cm, with on the lefts side 'poor' and on the right side 'good'. The distance between the left endpoint and the mark was used as a measure of performance expectancy.

The Subjective Effort Scale (SES) was specifically developed for this study to measure to what extent participants had tried to perform well at the SST and the switch task (see Task section below). Participants were asked to rate on a five-point Likert scale to what extent they had tried to perform well at the SST and the switch task (see Task section below).

Tasks

The Scrambled Sentence Task (SST) is an adaptation of the SST developed by Srull and Wyer (1979). The task was presented to participants as a verbal ability task and comprised 25 lines of 4 words placed in random order (for example: 'John, winning, chair, is'). Participants were asked to construe grammatically correct sentences of three words out of 4 words. Only one grammatically correct solution was possible. For 16 lines the correct solution was related to either success (for example: 'John is winning') or failure (for example: 'John gives up'), the other nine lines comprised neutral words only to disguise the purpose of the task.

Because mental fatigue seems to affect performance on complex tasks more than on simple tasks (Holding, 1983; Matthews, Davies, Westerman & Stammers., 2000), we presented participants with a complex task. The task, based on the switch task of Rogers and Monsell (1995), involves the use of higher control processes necessary for the planning and preparation of future actions. This switch task paradigm has been used frequently in studies on cognitive performance in healthy controls as well as in burnout patients (Matthews et al., 2000; Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012; Van Dam et al., 2011).

Using the current version of the switch-task, 300 letters appeared successively in a clockwise fashion in each corner of a screen, starting in the upper left square. The letters were randomly chosen from the set: A, B, E, G, O, and S. The colour of the letters was randomly chosen from the set green or red. If a green letter appeared in the upper half of the screen, participants had to push the left button on a button box as fast as possible; in case of a red letter, they had to push the right button. If the letter was in the lower half of the screen, participants had to push the left button as fast as possible when the letter was a vowel, and the right button if it was a consonant. Thus, subjects were asked to switch tasks every second trial.

The task started with an Inter-Stimulus-Interval (ISI) of 1500 ms, which is ample time for healthy controls to respond adequately without much effort (Lorist et al., 2000; Nieuwenhuis & Monsell, 2002; Rogers & Monsell, 1995). Four correct responses in succession resulted in a reduction of the ISI by 50 ms, leading to an acceleration of the letters appearing on the screen. When participants made two or more errors in a set of four responses, the ISI was increased by 20 ms. Accordingly, the speed of the task was adapted to the level of performance. The speed (ISI) of the letters appearing on the screen at the end of the task (Mean of last 30 ISIs) was used as a measure for performance.

In order to check whether the prime was effective during the cognitive task, we used an adaptation of a task employed by Kruglanski and colleagues (Richter & Kruglanski, 1998) to measure the implicit activation of success and failure. After performing the

cognitive task, participants were presented with an employment advertisement (Employment Advertisement Task; EAT) describing a commercial job. Subsequently, they were presented with a photograph of a young man and were asked to rate the likelihood that the man will be admitted to the job by placing a mark on a Visual Analogue Scale of 10 cm, with printed on the lefts side ' very unlikely' and on the right side 'highly likely'. We hypothesized that if the prime was still active, healthy controls primed with success would rate the chances of success as higher than healthy controls primed with failure.

Procedures

Prior to participation, diagnoses were established as described in the participant section. Participants were tested in a quiet room during the day. They completed a short biographical questionnaire and rated their scores on the mood rating scale and the RSME-mf, which took about 2 minutes. Subsequently, the experimenter asked them to complete the SST presented to them as a verbal ability task. This took approximately 7 minutes to complete. Participants were randomly assigned to the success or failure condition in advance. Next they received instructions for the switch task and completed the RSEP (the mood rating scale) and the RSME-mf for the second time, which took less than a minute. Subsequently they performed the switch task which took about 10 minutes. The task was run on a 32-bit, 64- MB RAM personal computer with Pentium III processor and a 17-inch screen. Afterwards, participants again rated the mood rating scale and the RSME-mf.

Participants were presented with the EAT. After rating the job candidate's chances for success, they were asked to rate the extent that they had tried to perform well on the SST and the switch task and they were asked to describe what they thought the purpose of the experiment was in order to check if they discovered the particular content of the SST.

Next, participants completed the CIS and the UBOS. We asked them to complete these questionnaires at the end of the experiment so that they could not serve as a prime for the tasks. Finally participants were debriefed about the purpose of the tasks and procedures. It is well-known that priming-effects are short lived (Bargh, 2005) and we did not expect effects after the experiment. But in case of potential negative effects, participants were given the phone number and e-mail address of the researcher if they had any questions about the experiment. None of the participants contacted us after the experiment. Approval for the study was obtained from the Ethical Committee (ECG) of the Faculty of Social Sciences of Radboud University Nijmegen in the Netherlands.

Results

Characteristics of the burnout patients and healthy controls in the different conditions

are presented in Table 1.

Table 1 — Characteristics of the Burnout Patients and Healthy Controls primed with Failure or with Success.

	Burnout patients		Healthy controls	
	Success Prime (*N* =31)	Failure Prime (*N* =30)	Success Prime (*N* =35)	Failure Prime (*N* =32)
Gender: Men	19 (61.3%)	18 (60.0%)	19 (54.35%)	12 (37.5%)
Age (Mean SD)**	44.9 (8.6)	44.4 (8.7)	36.4 (11.0)	36.0 (12.2)
Educational level				
Low	3 (9.7%)	3 (10%)	5 (14.3%)	1 (3.1%)
Middle	9 (29%)	12 (40%)	9 (25.7%)	12 (37.5%)
High	19 (61.2%)	15 (50%)	21 (60%)	19 (59.4%)
Symptom Measures (Mean SD)				
Utrecht BurnOut Scale-A				
Emotional exhaustion*	3.3 (1.5)	3.6 (1.3)	1.9 (1.3)	1.8 (1.3)
Depersonalization**	2.7 (1.3)	2.7 (1.3)	1.5 (1.2)	1.3 (1.0)
Perceived Job Competence*	3.9 (1.0)	3.9 (.9)	4.3 (.8)	4.3 (.6)
Checklist Individual Strength **	82.0 (22.4)	89.3 (25.2)	63.7 (17.9)	67.6 (12.9)

Note: * = significant for group (burnout patient/healthy control) at p <0.05,
** = significant for group (burnout patient/healthy control) at p <0.001

With regard to gender and education, there were no significant differences between burnout patients and healthy controls or between the conditions, but there was a significant difference in age between burnout patients healthy controls, $F(1, 124) = 21.5$, $p < .001$. Inspection of the means showed that burnout patients were older ($M = 44.6$, $SD = 8.6$) than healthy controls ($M = 36.2$, $SD = 11.5$). We correlated Age with Performance; the correlation was not significant in HCs ($p > .1$) but was significant in BPs ($r = .30$, $p < .05$). In order to correct for potential age effects, Age was used as a covariate in subsequent analyses. With regard to symptoms, we conducted a two-way between-groups multivariate ANCOVA with emotional exhaustion, depersonalization, perceived job competence (UBOS-A), and general level of fatigue (CIS) as dependent variables. Group [BPs, HCs] and Condition [Success, Failure] were the independent variables. There was a significant effect for Group, $F(4, 102) = 13.7$, $p < .001$ and the results for the separate dependent variables also reached statistical significance: exhaustion, $F(1, 105) = 31.1$, $p < .001$, depersonalization $F(1, 105) = 23.2$, $p < .001$, perceived job competence, $F(1, 105) = 6.6$, $p < .05$, general level of fatigue, $F(1, 105) = 24.0$, $p < .001$. Burnout patients reported significantly more burnout symptoms and fatigue than healthy controls. There were

no differences between the conditions and there were no interaction effects between Group and Condition.

All participants performed faultlessly on the SST. When asked at the end of the experiment what the participants thought that the purpose of the experiment was, only one participant (healthy control primed with success) correctly noted the purpose of the experiment.

The scores on the Mood Rating Scale, RSME-mf, RSEP, SES and EAT and level of performance on the switch task for the two groups and the two conditions are presented in Table 2.

Table 2 — Scores on Rating Scales During the Experiment and Performance of the Burnout Patients and Healthy Controls primed with Failure or with Success.

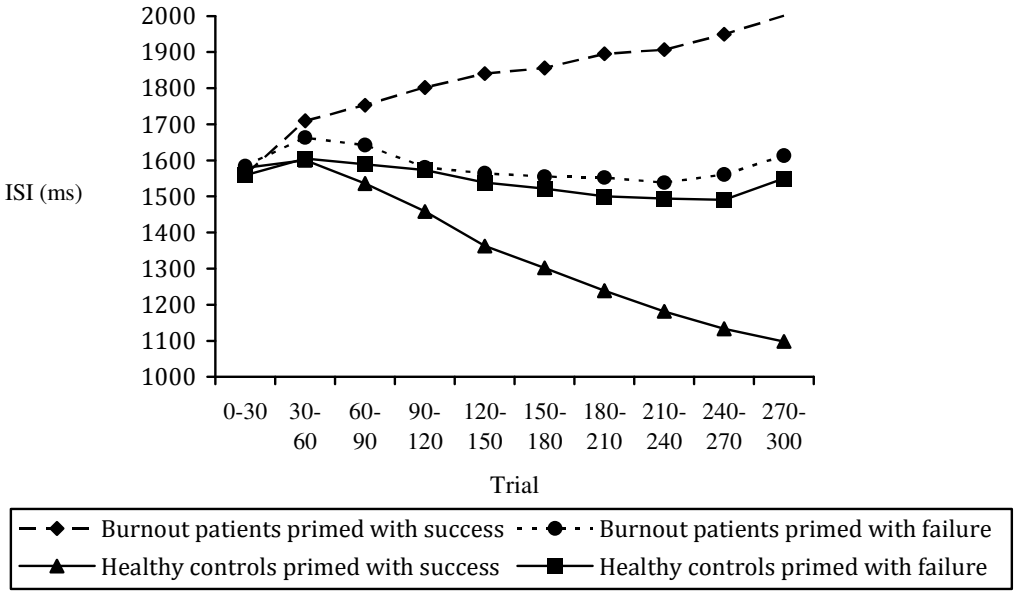
	Burnout patients		Healthy controls	
	Success prime (*N* =31)	Failure Prime (*N* =30)	Success prime (*N* =35)	Failure Prime (*N* =32)
Mood Rating Scale T1	62.8 (19.2)	62.7 (17.4)	67.7 (19.6)	71.0 (15.0)
Mood Rating Scale T2	62.4 (17.9)	62.7 (17.8)	63.8 (17.6)	70.1 (14.8)
Mood Rating Scale T3	56.9 (23.5)	57.2 (20.1)	59.6 (20.2)	62.7 (15.9)
RSME-mf T1 **	54.7 (32.3)	55.6 (28.4)	39.3 (29.0)	33.9 (26.1)
RSME-mf T2 **	54.9 (34.7)	56.4 (30.2)	41.7 (28.8)	32.4 (23.4)
RSME-mf T3 **	59.2 (37.9)	65.9 (33.7)	45.4 (27.6)	40.2 (25.0)
Performance (Mean ISI (ms) on last 30 trials) * #	1983 (1011)	1653 (951)	1090 (267)	1612 (836)
Rating Scale Expectancy of Performance (RSEP)	54.0 (19.4)	55.8 (20.1)	48.9 (14.3)	54.9 (15.9)
Employment Advertisement Task (EAT) #	50.9 (24.8)	61.0 (18.9)	70.8 (14.0)	59.0 (19.2)
Subjective Effort Scale (SES) on SST	4.2 (1.1)	4.4 (.9)	4.3 (.7)	4.3 (.9)
Subjective Effort Scale (SES) on Switch task	4.2 (.9)	4.3 (.8)	4.1 (.6)	4.1 (.8)

Note: * = significant for Group (burnout patient/healthy controls) at $p < .05$.
** = significant for Group (burnout patient/healthy control) at $p < .001$.
# = significant interaction effect for Group(burnout patient/healthy control) and Condition (Success, Failure) at $p < .05$.

The course of the ISI for burnout patients and healthy controls primed with success or

failure is presented in figure 1. With regard to performance, we conducted a two-way between-groups univariate ANCOVA with Group [BPs, HCs] and Condition [Success, Failure] as the independent variables, ISI as dependent variable and Age as covariate.

Figure 1: ISI (Inter-Stimulus-Interval) over 300 Trials for the Burnout Patients and Healthy Controls primed with Success or with Failure



There was a significant effect for Group, F (1, 123) = 4.1, p < .05, η^2= .03. The performance of healthy controls was better (M = 1339, SD = 659) than the performance of burnout patients (M = 1821, SD = 988). We also found a significant Group x Condition interaction, F (1, 123) = 9.3, p < .01, η^2= .07, which indicates that burnout patients and healthy controls reacted differently to the prime-condition. There was also a significant effect of Age, F (1, 123) = 7.8, p < .01, η^2= .06. When Age was not used as a covariate, we found the same results with somewhat larger effect sizes (Group, F (1, 123) = 10.6, p < .001, η^2= .08, Group x Condition interaction, F (1, 123) = 8.9, p < .01, η^2= .07). Separate ANCOVAs for burnout patients and healthy controls with Condition [Success, Failure] as the independent variable, and ISI as dependent variable revealed that healthy controls primed with success performed better than healthy controls primed with failure, F (1, 64) = 12.8, p < .001, η^2= .17 on the cognitive switch task and that there was no difference between the burnout patients in the two conditions. Separate ANCOVAs for the success condition and the failure condition with Group [BPs, HCs] as the independent variable and ISI as dependent variable revealed that success primes resulted in a better performance in healthy controls in comparison to burnout patients, F (1, 63) = 14.7, p <.001, η^2= .19. There was no difference between the groups in the failure condition.

We conducted two-way repeated measures ANCOVAs with Group [BPs, HCs] and Condition [Success, Failure] as the between subjects variable and Time (T1, T2, T3) as within-variable for the mood rating scales and the RSME-mf separately. No significant effects were found for the various scores on the mood rating scale. For the RSME-mf there was a significant effect for Group, F (1, 123) = 20.8, p < .001, η^2= .14. As expected, burnout patients reported more mental fatigue than healthy controls.

With regard to RSEP, SES and EAT, we conducted two-way between-groups univariate ANCOVAs , with RSEP, TPWS and EAT scores as dependent variables. Group [BPs, HCs] and Condition [Success, Failure] were the independent variables.

With regard to the EAT there was a significant effect for Group, F (1, 123) = 5.7, p < .05, η^2= .04, and a significant Group x Condition effect, F (1, 123) = 9.9, p < .01, η^2= .08. Inspections of the means showed that healthy controls (M = 65.2, SD = 17.6) estimated the chances of success larger for the job candidate than the burnout patients (M = 55.9, SD = 22.5). Separate ANCOVAs for burnout patients and healthy controls with Condition [Success, Failure] as the independent variable, and EAT as dependent variable revealed that healthy controls primed with success estimated the chances of success larger for the job candidate than the than healthy controls primed with failure, F (1, 64) = 8.1, p < .01, η^2= .11. There was a trend between the burnout patients in the two conditions, F (1, 64) = 3.1, p = .08, η^2= .05. We found no significant effects for RSEP and SES.

Discussion

Motivational interventions do not appear to be effective in improving performance in burnout patients (Van Dam et al., 2011). It is not clear, however, whether the performance in burnout patients already tends to be as high as possible or whether burnout patients do not believe that their performance can be improved despite positive feedback and financial rewards. In order to bypass cognitions about fatigue, we investigated the possibility that motivation can be enhanced in an implicit way, using subliminal priming. We primed burnout patients and healthy control with success or failure. After priming, the participants were presented with a complex cognitive task that has been used in previous studies to measure cognitive performance in fatigued individuals (Lorist et al., 2000; Van Dam et al., 2011).

As expected, burnout patients reported more burnout symptoms and fatigue than healthy controls. With regard to task performance, burnout patients reported that they tried to perform well at the cognitive task just like the healthy controls (SES), but they showed poorer performance than the healthy controls, and experienced more fatigue during the task. These findings are in line with studies that show that cognitive performance in burnout is reduced and that mental effort leads to enhanced fatigue increase (Sandström et al., 2005; Van der Linden et al., 2005; Van Dam et al., 2011).

Healthy controls primed with success outperformed healthy controls primed with failure on the cognitive task. Apparently the prime was effective in increasing motivation in healthy controls. EAT findings suggest that prime effects were still present in healthy controls at the end of the experiment. However, burnout patients primed with success did not perform better than burnout patients primed with failure or healthy controls primed with failure. Burnout patients were not positively affected by the success primes to perform well. This finding is in line with the theory of Boksem and Tops (2008) that burnout patients are not responsive to motivational interventions anymore .

However, an alternative explanation is possible as well. The primes we used in the SST may have also invited the participants to compare themselves with others. Brenninckmeijer et al. (2000) found that comparison with successful others leads to a negative affect in burnout. The effect of the primes might have been different if we had used words like 'I' or 'You' in combination with success or failure-related words. We found no differences in reported mood between groups and conditions however, which suggests that the formulation of the SST did not affect our results.

The mean performance of burnout patients primed with success was inferior (although not significantly), compared to that of burnout patients primed with failure. The large variance suggests that success primes may even lead to reduced performance in some of the burnout patients. The finding that primes can elicit behaviour in the opposite direction than would have been expected has been observed before and seems to occur when primed behaviour is by participants perceived as out of reach (Dijksterhuis et al., 1998; Hart & Albarracin, 2009). This may also have been the case in our study because several studies suggest that burnout patients may react differently to success than healthy controls because they perceive success as unattainable (Brenninckmeijer, Van Yperen & Buunk, 2001; Brenninckmeijer, 2002).

Although burnout patients primed with success did not improve performance, they reported similar levels of expected success on the task (RSEP) and similar levels of subjective effort spent at the task (SES) as the control participants. Apparently the prime did not influence the subjective expectations for successful performance, nor the perceived amounts of effort spent on the task or mood during the task. This finding is in line with many studies on priming that show that priming influences behaviour, but does not necessarily lead to a change in feelings or cognitions (Bargh, 2005), although some studies demonstrated that achievement priming can trigger higher expectations of task outcomes (Custers, Aarts, Oikawa & Elliot, 2009). Nevertheless, we conclude that differences in performance between the two groups cannot be explained by differences in success expectation and perceived effort.

A limitation of our study is that we did not use a neutral priming condition. Therefore, we cannot determine to what extent priming effects can be attributed to priming

for success, failure or both. Several studies have determined that success-related priming can increase motivation for task performance (Ciani & Sheldon, 2010; Custers et al, 2009; Custers & Aarts, 2005; Lowery, Eisenberger, Hardin & Sinclair, 2007), and that failure-related priming can decrease motivation for task performance (Bry, Follenfant & Meyer, 2008; Ciani & Sheldon, 2010; Legal & Meyer, 2007). A comparison with the performance (ISI) of unprimed burnout patients (M = 1716, SD =888) and healthy controls (M = 1089, SD =351) from an earlier study (Van Dam et al., 2011) in which the same cognitive task was used, suggests that the strongest prime effect in healthy controls in this study was the failure prime and the strongest effect in burnout patients, although in the opposite direction, was the success prime. As many studies (Johnson, Benas & Gibb, 2011; Stieger & Burger, 2010) have demonstrated, psychological disorders are associated with specific implicit cognitions. An explanation for this finding may be that burnout patients exhibit implicit associations with failure as suggested by Brenninckmeijer et al. (2000) and healthy controls exhibit implicit associations with success. This is in line with many studies that show a positive self-judgment bias in healthy individuals (Dunn, Stefanovitch, Buchan, Lawrence & Dalgleish, 2009; Schmidt & Mast, 2010). It is possible that the implicit cognitions that are already active cannot be activated to a much larger extent in contrast to cognitions that are not activated yet.

A second limitation that cannot be ruled out is that the score on the EAT is also influenced by the level of performance on the switch task. Success on the switch task may have served as a prime for the EAT. We assume that this effect is small, however, because participants did not receive feedback about their performance on the switch task and therefore unable to determine how well they performed.

A third limitation is that participants performed the switch task only once. Therefore we cannot establish differential, within-subjects-effects of the priming procedure, we can only determine whether there was a difference between the experimental groups.

A fourth limitation may be that the burnout patients in our study were somewhat older than the healthy controls. Although statistically significant, the difference was relatively small. Moreover, the burnout patients performed less well than healthy controls, and this effect is still significant if age is taken into account. We therefore assume that the age difference between the groups did not substantially affect our results.

A fifth limitation may be that healthy controls and burnout patients received a different kind of reward for participating in the experiment. Because the reward was related to participation and not to performance, we assume that this difference did not affect our results.

In conclusion, this study showed that success primes did not increase performance in burnout, which supports theories that state that burnout patients are not responsive to motivational interventions. Moreover this study indicates that the non-

responsiveness of burnout patients to motivational interventions is not a mere consequence of cognitions about fatigue and performance but seems to stem from a more structural condition.

7 Impaired Cognitive Performance and Responsiveness to Reward in Burnout Patients: Two years later

Van Dam, A., Keijsers, G. P. J., Eling, P. A. T. M., & Becker, E. S. *Work & Stress, 26,* 333-346.

Abstract

Relatively little is known about the course of symptoms in patients suffering from burnout and even less about the status of cognitive functioning. We followed 40 burnout patients and 40 healthy controls who had participated in a previous study on the effect of motivational interventions on cognitive performance and repeated these measurements two years later. The burnout patients, who received psychological treatment showed substantial improvement regarding burnout symptoms and cognitive performance in the course of two years. The pre-post effect size for symptom reduction was large. Importantly, cognitive performance and responsiveness to motivational interventions improved to normal levels. Patients no longer fulfilled the criteria for burnout or any other psychiatric disorder. Despite these improvements, burnout patients still experienced more exhaustion, general fatigue, depressive symptoms, and general distress in comparison to healthy controls and compared to normed groups. The same pattern was observed with regard to cognitive performance: performance improved but remained below normal levels. Perceived job competence, involvement in work and responsiveness to rewards had returned to normal levels again. Results show that recovery of burnout is possible but symptoms may persist long-term (two years).

Introduction

Burnout is a stress-related syndrome with prominent diagnostic features of exhaustion, occupational detachment, and reduced personal accomplishment. It is generally assumed that burnout results from prolonged periods (years) of stress and from an inability to reach personal goals. Burnout patients frequently report reduced job satisfaction, physical complaints, especially fatigue, and impaired cognitive performance (Maslach, Schaufeli & Leiter 2001; Schaufeli & Enzmann, 1998; Schmidt, Neubach & Heuer, 2007; Taris, 2006). Several studies have shown that burnout patients perform poorer on cognitive tasks compared to healthy controls (Sandström, Rhodin, Lundberg, Olsson &

Nyberg, 2005; Van der Linden, Keijsers, Eling & Van Schaijk, 2005; Van Dam, Keijsers, Eling & Becker, 2011).

Relatively little is known about the course of symptoms and impaired cognitive performance in patients suffering from burnout. Several studies investigating the natural course of burnout found that recovery of burnout symptoms is rather poor, when no specific treatment programs are offered (Janssen, 2004; Leone, 2008). For example, Janssen and Nijhuis (2004) showed that increased exhaustion in fatigued employees remains relatively stable over the course of one year, and Leone et al. (2006) found that 57 % of severely fatigued employees on sick leave were still severely fatigued four years after baseline measurement. In contrast, a review of twenty-five studies on the effects of psychological treatments for burnout patients showed a significant reduction of burnout symptoms after one to six months of psychological treatment (Awa, Plaumann & Walter, 2010). Nevertheless, even with the support of psychological treatment, symptoms continue to persist (Blonk, Brenninkmeijer, Lagerveld & Houtman, 2006; Oosterholt, van der Linden, Maes, Verbraak & Kompier, 2012; Sonnenschein et al, 2008; Stenlund et al., 2009).

To date, there is only one study (Oosterholt et al., 2012) that has specifically investigated the course of impaired cognitive functioning in patients suffering from burnout. In this study, Oosterholt et al., (2012) concluded that ten weeks of psychological treatment resulted in reduced burnout symptoms and an increased level of improved general health, but cognitive impairments did not diminish however. It is surprising that impaired cognitive functioning in burnout patients has not been studied more extensively. From an employer's perspective, cognitive performance is perhaps most critically associated with an employee's ability to meet the demands of the job (Schaufeli & Enzmann, 1998; Taris, 2006). Furthermore, with respect to work reintegration, it is highly relevant to know whether impaired cognitive performance, often observed in burnout patients, improves over time.

In an effort to investigate the course of impaired cognitive performance in burnout patients, we studied burnout patients, initially recruited for a study on the effect of a motivational intervention on cognitive performance for approximately two years (Van Dam et al., 2011). In the study by Van Dam et al., participants had been asked to perform a complex cognitive task. The task was based on the switch task of Rogers and Monsell (1995) and was specifically designed to recruit higher-order control processes necessary for the planning and preparation of future actions. Participants were instructed to alternate between two tasks on every second trial. On alternate trials one activated cognitive task set had to be inhibited and the other one had to be activated. We adapted the original task by making the inter-stimulus interval (ISI) dependent on the performance level during the task: ISI was reduced after a series of correct responses and increased

following errors. Thus, participants were able to determine how much effort they wanted to spend on the task.

The aim of our earlier study was to investigate whether performance of burnout patients on a complex cognitive task was impaired and to examine whether a motivational intervention could reverse impaired cognitive performance in burnout. Several authors (Boksem & Tops, 2008; Schaufeli & Taris, 2005) have suggested that the motivation to spend effort is permanently decreased in burnout. Reduced motivation to devote effort may lead to impaired cognitive performance. It was hypothesized that fake positive feedback and the announcement of a financial reward would result in enhanced performance if reduced motivation is indeed changeable. Therefore, the study aim was to enhance motivation by providing positive feedback and by promising a financial reward after a first block of trials. Subsequently, a second block of trials was presented to examine the impact of this motivational intervention on the level of performance and the motivation to invest effort, measured by a reduction of the ISI during the task. Aversion to task performance was measured before the task, and level of fatigue and perceived effort to perform the task were measured after the task.

Burnout patients appeared to perform below healthy controls and reported more fatigue, more effort, and more aversion to the task. Healthy controls increased their performance in the second block, while the burnout patients failed to improve their performance and experienced more aversion having to spend effort compared to healthy controls. Thus, impaired cognitive performance in burnout patients could not be reversed with the aid of motivational interventions, which is in line with recent theories on burnout which state that physiological changes may produce a relatively enduring decrease in motivation (Boksem & Tops, 2008; Schaufeli & Taris, 2005 ; Van Dam et al., 2011). Although cognitive performance is highly relevant for professional performance, it is not known whether burnout patients who have received psychological treatment are more responsive to motivational interventions and improve their overall cognitive performance.

The present study, investigated whether symptoms such as exhaustion and detachment had decreased in burnout patients over two years, and whether cognitive performance had improved along with responsiveness to motivational interventions. Patients in the present study all received some form of psychological treatment. Although all treatments were based on cognitive behaviour therapy, the treatments were not administered using a specific treatment manual. The major aim of this study was not to evaluate whether (a specific) treatment was beneficial, but whether burnout patients improved their cognitive functioning and responded differently to motivational stimulation after two years

Methods

Participants

Forty burnout patients and 40 healthy controls recruited from a previous study (Van Dam et al., 2011) and who had agreed to participate in a second assessment, were followed for a two-year duration. The average interval between the first (T1) and the second measurement (T2) was 20.1 months (*SD* = 4.2) for burnout patients and 22.3 months (*SD* = 3.1) for healthy controls. Thirty-four (85%) burnout patients and 32 (80%) healthy controls agreed to participate again. Participants not included in T2 were due to several reasons which included: two could not be tracked anymore, two were reluctant to take a leave from work, one refused due to sickness, and one was living abroad. Of the healthy controls, three could not be traced, and five were unwilling to take a leave from work to participate.

All burnout patients had received psychological treatment in the form of cognitive behavioural therapy. The average number of treatment sessions was 22.3 (*SD* =19.3). None of the participants used psychopharmacological medication on T1. On T2, half of the participating burnout patients used psychopharmacological medication. On T2, 29 (85%) of the burnout patients did not meet criteria for any psychiatric disorder anymore, 3 patients (9%) still met the criteria for burnout, and two patients (6%) were diagnosed with a major depressive disorder (see the procedure section for diagnostic assessment). All healthy controls remained free of psychiatric disorders on T2. Regarding work situation, 25 (74%) burnout patients had (at least partially) returned to work again compared to T1 when all burnout patients were on sick leave.

Measurements

Severity of burnout symptoms was assessed with the Dutch version of the Maslach Burnout Inventory General Survey (Maslach, Jackson & Leiter, 1996), referred to as the Utrecht BurnOut Scale-A (UBOS-A; Schaufeli & Dierendonck, 2000), which is comprised of 15 questions answered on a 7-point Likert scale (0 = “never”, 6 = “every day”) measuring three dimensions: a. emotional exhaustion, b. depersonalization, and c. perceived job competence. High scores on emotional exhaustion and depersonalization and low scores on perceived job competence is an index for burnout.

General fatigue was assessed with the Dutch version (Vercoulen, Alberts & Bleijenberg, 1999) of the Checklist Individual Strength (CIS; Vercoulen et al., 1994). The CIS is comprised of 20 items scored on a 7-point Likert scale (1 = “I totally agree”, 7 = “ I do not agree at all”) and measures the following dimensions: a. subjective feelings of fatigue and physical fitness, b. activity level, c. motivation, and d. concentration during the previous 14 days.

Level of depression was assessed with the Dutch version (Bouman, Ranchor, Sander-

man & Van Sonderen, 1995) of the Center for Epidemiological Studies–Depression (CES-D; Radloff, 1977), which measures level of depressive symptoms (range = 0-60) and is comprised of 20 items, based on the Beck Depression Inventory and the Zung Depression Scale.

Level of general psychopathology was assessed using the 90-item Dutch version (Arrindell & Ettema, 2005) of the Symptom Checklist (SCL-90; Derogatis, 1977). The total scores range from 90 to 450 with higher scores indicating more distress.

Subjective fatigue was assessed using the fatigue subscale (F) of the Dutch translation of the short version of the Profile of Mood States (POMS; McNair, Lorr & Doppleman, 1971). The POMS-f consists of six adjectives commonly used to describe transitory fatigue states. Participants rate the extent to which the adjectives apply to themselves on a 5-point scale (0 = "not at all", 4 = "very much"). Range = 0-24.

Subjective ratings of invested mental effort during the experimental task (see below) were measured with the short version of the Rating Scale Mental Effort (RSME; Zijlstra, 1993). The RSME assesses how much effort a participant feels it takes to perform the task at hand. Respondents indicate the amount of effort on a continuous line with 0 indicating 'not effortful at all' and 150 denoting 'extremely effortful'.

Aversion towards task continuation was measured with an 11-point scale (range = 0-10), with 0 meaning 'no aversion at all' and 10 'extremely strong aversion' to doing the task again (Lorist et al., 2000).

Experimental Task

Cognitive performance was measured with the same switch task utilized in the earlier study (Van Dam et al., 2011). The task was presented on a 32-bit, 64-MB RAM personal computer with Pentium III processor and a 17-inch screen. Letters (72 pt) were presented against a black background, successively in a clockwise fashion in each corner of the screen, starting in the upper left square. The letters were randomly chosen from the set: A, B, E, G, O and S. The colour of the letters was randomly chosen from the set green or red. If a green letter appeared in the upper half of the screen, participants had to push the left button on a button box as fast as possible; in case of a red letter, they had to push the right button. If the letter was in the lower half of the screen, participants had to push the left button as fast as possible when the letter was a vowel, and the right button if it was a consonant.

The switch task consisted of a practice block of 64 trials which took approximately 3 minutes and 2 experimental blocks of 300 trials that took approximately 10 minutes per experimental block.

In the beginning of each block, stimuli appeared with an ISI of 1500 ms, which is ample time for healthy controls to respond adequately with limited effort (Lorist et al.,

2000; Nieuwenhuis & Monsell, 2002; Rogers & Monsell, 1995). Four consecutive correct responses resulted in shorter ISI by 50 ms. When participants made two or more errors in a sequence of four responses, the ISI was increased by 20 ms, accordingly the speed of the task was adapted to the level of performance.

Procedure

Participants provided informed consent for the previous study (Van Dam et al., 2011) in which they also agreed to be contacted again for a second measurement after two years. After two years they were invited for a semi-structured interview using the Dutch version (Overbeek, Schruers & Griez, 1999) of the Mini International Neuropsychiatric Interview (Sheehan et al., 1998), and a semi-structured interview checking ICD-10 work-related neurasthenia with criteria for work-related neurasthenia (World Health Organisation, 1994) with the purpose of detecting possible psychopathology. The diagnosis of burnout was established when patients met the following criteria: (1) the validated cut-off points (Brenninkmeijer & van Yperen, 2003) for severe burnout on the Dutch version (Utrecht BurnOut Scale-A, UBOS-A; Schaufeli & Dierendonck, 2000) of the Maslach Burnout Inventory General Survey (Maslach, Jackson & Leiter, 1996): exhaustion ≥ 2.20 and either cynicism ≥ 2.00 or personal accomplishment ≤ 3.67; (2) the cut-off point for prolonged fatigue of the Checklist Individual Strength (CIS; ≥ 76) (Bültman et al., 2000); (3) the criteria for the proposed psychiatric equivalents of clinical burnout, namely the ICD-10 (World Health Organisation, 1994) criteria for work-related neurasthenia (Schaufeli & Enzmann, 1998; Schaufeli, Bakker, Hoogduin, Schaap & Kladler (2001); and (4) the DSM-IV (American Psychiatric Association, 2000) criteria for unspecified somatoform disorder with prolonged fatigue as the main symptom (Hoogduin, Schaap & Methorst, 2001).

Participants were required to complete the task within two weeks after the interview. To control for daily fluctuations in attention levels, participants were tested between 10 and 11 am. Following task instructions, participants conducted a practice block. After the practice block, they were asked to rate their level of aversion to the task on the aversion scale, which took a few seconds. After the first experimental block, participants rated their fatigue (POMS-f) and effort (RSME) levels; this took less than half a minute. Subsequently, the experimenter told the participants (regardless of their performance) that they had performed well, that the three participants, who outperformed the others in the next block, would get a financial reward of 20 euros, and that on the basis of their first block performance (speed of letters appearing on the screen) they had a good chance of getting the reward. The participants then rated their level of aversion on the aversion scale again and started with the second experimental block. The break between the blocks lasted less than 2 minutes. After the second block, participants com-

pleted the POMS-f and the RSME for the second time. This took less than half a minute.

Results

Characteristics of the burnout patients (BP) and healthy controls (HC) on T1 and T2 are presented in Table 1.

Table 1 — Characteristics of the Burnout Patients and the Healthy Controls at T1 and T2

	Burnout patient		Healthy controls	
	T1 (*N* = 40)	T2 (*N* = 34)	T1 (*N* = 40)	T2 (*N* = 32)
Gender: Men	16 (40%)	12 (35.5%)	17 (42.5%)	16 (48.5%)
Age (SD)	44.2 (10.7)	46.6 (10.4)	45.4 (12.0)	46.3 (12.5)
Educational level				
Low	5 (12.5%)	3 (8.8%)	6 (15%)	6 (18.2%)
Middle	18 (45%)	17 (50%)	20 (50%)	16 (48.5%)
High	17 (42.5%)	14 (35%)	14 (41.2%)	11 (33.3%)
Symptom Measures (SD)				
UBOS				
Emotional exhaustion**##	4.9 (1.0)	2.2 (1.2)	.8 (.5)	.8 (.5)
Depersonalization **	3.7 (1.3)	1.2 (.6)	.7 (.8)	.9(.7)
Perceived job competence **	3.3 (1.0)	4.5 (.8)	4.8 (.7)	4.7 (.4)
CIS ** ##	113.3 (16.5)	64.6 (26.7)	35.1 (15.5)	33.8 (7.8)
CES-D ** ##	26.9 (9.2)	8.4 (5.0)	3.1 (3.0)	4.2 (4.1)
SCL-90 ** #	206.7(50.1)	125.6 (26.6)	102.4 (10.6)	107.8 (22.4)

Note: UBOS = Utrecht BurnOut Scale; CIS = Checklist Individual Strength; CES-D = Center for Epidemiological Studies – depression; SCL-90 = Symptom Checklist
* = Significant at $p < .05$ at T1 ** = Significant at $p < .001$ at T1
# = Significant at $p < .05$ at T2 ## = Significant at $p < .001$ at T2

Demographic characteristics revealed no significant differences between T1 and T2 for neither the BPs, nor the HCs (p values >.6 for tests of gender, age and educational level).

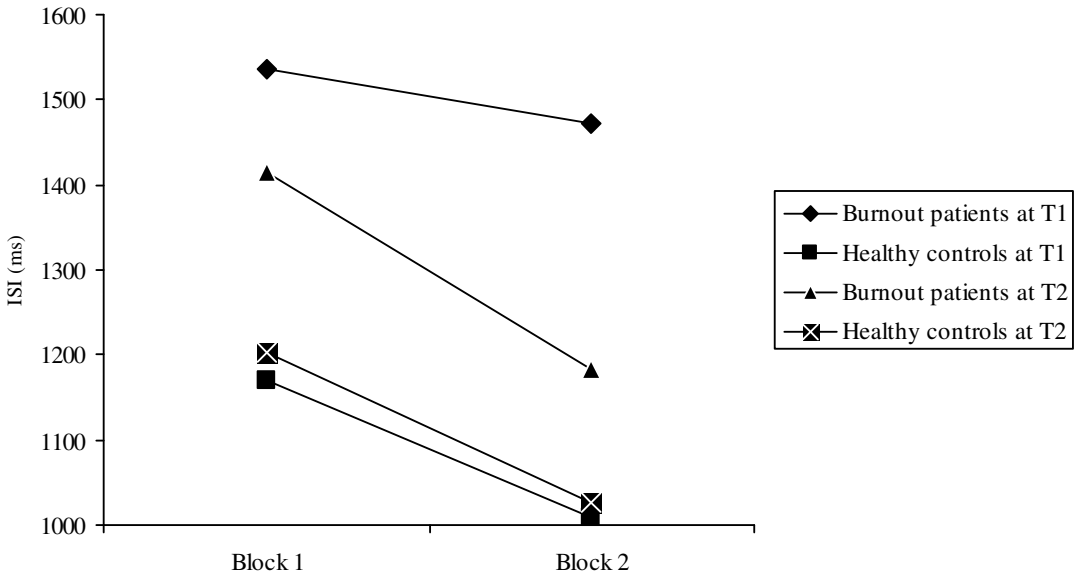
A multivariate repeated measures ANOVA was conducted for an analysis of symptoms with Group (BPs, HCs) and Time (T1, T2) as the independent variables and emotional exhaustion, depersonalization, perceived job competence (UBOS-A), general level of fatigue (CIS), level of depression (CES-D), and general level of psychopathology (SCL-90) as dependent variables. Results showed a significant effect for Group, F (6, 59) = 63.3, $p < .001$, and Time, F (6, 59) = 22.5, $p < .001$, and a significant Time x Group interaction, F (6, 59) = 28.2, $p < .001$, indicating as expected that the course of symptoms was different for BPs than for HCs. Repeated measures ANOVAs for BPs and HCs separately

revealed for all variables (all *p*s < .001) and for their combination, F (6, 28) = 32.5, p < .001, that there were significant changes (reductions) in level of symptoms over time for the BPs only but not for the HCs. The pre-post effect sizes (Cohen's *d*) for symptom reduction for BPs were large (emotional exhaustion: 2.5, depersonalization: 2.4, perceived job competence: 1.3, general level of fatigue: 2.3, level of depression: 2.5, and general level of psychopathology: 2.0.)

An additional MANOVA on T2 revealed a significant overall effect for Group, F (6, 59) = 8.5, p < .001, with significant effects (*p*s < .001) for emotional exhaustion, general level of fatigue , level of depression , and general level of psychopathology, but not for depersonalization and perceived job competence. These findings show that despite the large reduction in symptoms, BPs still reported more emotional exhaustion, general fatigue, depressive symptoms, and general psychopathology on T2 than the HCs. Emotional exhaustion, general level of fatigue, and general level of psychopathology remained high compared to (Dutch) norm scores for healthy subjects. (Arrindell & Ettema, 2005; Bouman et al., 1995; Schaufeli & Dierendonck, 2000; Vercoulen et al., 1999).

The mean ISIs for the two groups in the two blocks of trials on T1 and T2 are presented in Table 2 and Figure 1.

Figure 1: Mean ISIs for Burnout Patients and Healthy Controls on the two Blocks on T1 and T2



In order to investigate whether the impaired cognitive performance of BPs had improved and whether they responded to the motivational intervention, a repeated measures ANOVA was conducted with Time (T1, T2) and Block (Block 1, Block 2) as

within-subjects variables, Group (BP, HC) as the between-subjects variable, and mean ISI per block as the dependent variable. Significant differences emerged for Group, F (1, 64) = 18.5, p < .001, Time, F (1, 64) = 5.8, p < .05, and Block , F (1, 64) = 161.4, p < .001, and also for a significant Time x Group interaction, F (1, 64) = 7.6, p < .01. Significant findings also emerged for Time x Block interaction, F (1, 64) = 5.6, p < .05, and Time x Block x Group interaction, F (1, 64) = 4.0, p < .05. The last interaction (see Figure 1) suggests that the effect of the motivational intervention changed at T2 compared to T1 for one of the groups. An additional repeated measures ANOVA for BPs on T2 confirmed that the ISI decreased in Block 2, F (1, 33) = 43.7, p < .001.

In order to investigate whether the mean ISI of BPs on T2 had decreased to a similar level as that of the HCs, we conducted a repeated measures ANOVA with Group (BPs, HCs) as between subjects variable, Block (Block 1, Block 2) as within-subjects variable and mean ISI on T2 as the dependent variable (see Table 3). Inspection of the means showed that the performance on T2 of BPs was still inferior to that of the HCs, but that both groups improved their performance in the second Block. There was a significant effect for Group, F (1, 64) = 4.9, p < .05, and Block, F (1, 64) = 50.9, p < .001, but there was no significant interaction. These findings indicate that the Mean ISI of BPs and HCs were different but that the decrease of the ISI was similar on Block 2 for both groups, which implies that both groups responded to the motivational intervention. The pre-post effect sizes (Cohen's d) for cognitive performance improvement for BPs was moderate (.60).

Given that cognitive performance is highly relevant for professional productivity, we also compared the symptoms and cognitive performance of the 25 BPs who had returned to work, with those of healthy controls. There was no significant effect for Group (p > .1) which implies that cognitive performance of the 25 BPs was similar to that of the HCs. The performance of the 9 BPs who did not resume work was still significant inferior to that of the HCs, F (1, 39) = 16.8, p < .001. The 25 BPs who resumed work reported significant more (ps < .05) emotional exhaustion, (M = 1.9, SD = 1.0), general level of fatigue (M = 60.8, SD = 25.9), depressive symptoms (M = 7.8, SD =5.1), and general level of psychopathology (M = 122.6, SD = 25.3), but not more (ps > .2) depersonalization (M= 1.1, SD = .5) and perceived job competence (M = 4.6, SD = .8) compared to the HCs. Although these burnout patients reported significant more symptoms than the healthy controls, the mean scores on the symptom measures fell within the range of average scores of the (Dutch) normed groups provided in the manuals of the symptom measures (Arrindell & Ettema, 2005; Bouman et al., 1995; Schaufeli & Dierendonck, 2000; Vercoulen et al., 1999). The 9 BPs who did not resume work reported significant more (ps < .05) emotional exhaustion, (M = 3.1, SD = 1.3), depersonalization (M= 1.5, SD = .8), general level of fatigue (M = 75.1, SD = 27.5), depressive symptoms (M = 9.9, SD =4.5), and gen-

eral level of psychopathology (M = 133.9, SD = 30.0), but not less ($p > .05$) perceived job competence (M = 4.4, SD = .6) compared to the HCs. Emotional exhaustion of the 9 BPs who did not resume to work was still high according to the UBOS manual.

In order to investigate whether the 25 burnout patients who returned to work did not already differ on symptom measures at T1 from the burnout patients who did not return to work, we conducted a MANOVA with Group (HCs, BPs who returned to work, BPs who did not return to work) as independent variable and emotional exhaustion, depersonalization, perceived job competence (UBOS-A), general level of fatigue (CIS), level of depression (CES-D), and general level of psychopathology (SCL-90) as dependent variables. There was a significant effect for Group, $F(12, 134) = 10.2$, $p < .001$. Post hoc comparisons, using Bonferroni's test revealed that on all symptom measures both burnout groups differed from the HCs and that the BPs who returned to work and those who did not return to work did not significantly differ from each other on any of the symptom measures at T1.

Table 2 — Mean Scores and SDs on the POMS-f, RSME, aversion scale and mean ISIs (ms) on the two blocks for Burnout Patients and for Healthy Controls at T1 and T2

	Burnout patients		Healthy controls	
	T1 (*N* = 40)	T2 (*N* = 34)	T1 (*N* = 40)	T2 (*N* = 32)
Profile of mood scales-fatigue				
Block 1 (SD)	12.08 (8.3)	4.2 (6.2)	1.13 (1.7)	.5 (.9)
Block 2 (SD)	12.50 (8.1)	3.9 (6.7)	1.30 (1.9)	.9 (1.4)
Rating Scale Mental Effort				
Block 1 (SD)	112.50 (25.2)	71.8 (33.4)	66.13 (29.8)	45.3 (20.0)
Block 2 (SD)	108.13 (25.9)	74.4 (34.2)	65.28 (29.6)	46.6 (15.8)
Aversion Scale				
Block 1 (SD)	3.78 (3.2)	1.9 (2.6)	1.83 (1.9)	.5 (1.4)
Block 2 (SD)	5.13 (3.4)	2.6 (3.0)	1.88 (2.3)	.4 (1.4)
ISI (ms)				
Block 1 (SD)	1536.1 (534.4)	1413.9 (416.2)	1170.3 (265.2)	1201.9 (253.7)
Block 2 (SD)	1470.9 (619.3)	1183.5 (290.3)	1008.2 (179.7)	1027.2 (167.1)

Scores on the POMS-f, RSME and aversion scale are presented in Table 2. In order to investigate whether subjective feelings during performance were different for BPs and HCs on the two blocks at the two measurement moments, a repeated measures MANOVA was conducted with Time (T1, T2) and Block (Block 1, Block 2) as within-subjects variables, Group (BP, HC) as between-subjects variable, and the scores on the POMS-f, RSME, and aversion scale as dependent variables. Significant effects were found for Group, F (3, 62) = 18.6, $p < .001$, Time, F (3, 62) = 17.4, $p < .001$, and Block, F (3, 62) = 4.0, $p < .05$ indicating that BPs experienced more fatigue, aversion and effort than the HCs, that these feelings had decreased on T2 compared to T1, and that they were stronger in Block 2 than in Block 1 for all participants at T1 and T2. There was also a significant Time x Group interaction, F (3, 62) = 12.9, $p < .001$, a significant Block x Group interaction, F (3, 62) = 4.7, $p < .01$, and a significant Time x Block interaction, F (3, 62) = 3.9, $p < .05$, which indicates that the decreases in fatigue, aversion and effort were stronger in BPs compared to HCs. Analyses for the separate variables indicated that both, POMS-f and RSME, had significantly decreased for BPs (both ps < .001) at T2. For HCs, only RSME decreased significantly, F (2, 30) = 12.3, $p < .001$.

In order to investigate whether the levels of subjective feelings during task performance were still different between BPs and HCs at T2, a repeated measures ANOVA was used to evaluate Block as independent variable and scores on the POMS-f, RSME and aversion scale on T2 as dependent variables. Significant effects were detected for Group, F (3, 62) = 5.7, $p < .01$, Block, F (3, 62) = 3.9, $p < .05$, and Group x Block interaction, F (3, 62) = 5.0, $p < .01$ on the combined variables. Analyses of the separate variables showed they all reached statistical significance (all ps < .005).

Discussion

To examine the course of symptoms, cognitive impairments, and responsiveness to a motivational intervention, we followed burnout patients and healthy controls who participated in a previous study (Van Dam et al., 2011) for nearly two years and asked them to participate in a similar study. All of the burnout patients had received psychological treatment in the form of CBT. The burnout patients reported significantly less burnout symptoms, depression, fatigue, and general level of psychopathology compared to their responses two years, previously. Moreover, 85% of the burnout patients did not fulfil the criteria of burnout anymore or of any other psychiatric disorder, and 74% of the patients returned to work. Nevertheless, after two years the level of symptoms (i.e. exhaustion, general fatigue, depressive symptoms, and general psychopathology) remained higher in burnout patients in comparison to the healthy controls. Symptoms decreased considerably, but did not completely disappear. Only depersonalization and perceived job competence (UBOS) had reached similar levels as those of the healthy controls.

These findings are in line with results obtained by Stenlund et al. (2009), who also reported that psychological treatment in burnout patients led to significant symptom reduction, but did not return to normal levels after 2 years. Interestingly, the symptom levels of the burnout patients who had returned to work (N =25), although higher compared to those the healthy controls in this study, fell within the average range of the normed groups.

The performance of burnout patients on the switch task improved significantly compared to the performance two years ago, but failed to reach the performance level of the healthy controls. The improvement on burnout symptoms parallels the improvement found for cognitive performance which suggests that they may be related, which is in line with other studies that found a relationship between burnout symptoms and cognitive performance (Van der Linden et al., 2005). Indeed, there was a clear correlation between improvement in general psychopathology (SCL-90) and improvement in cognitive performance (r = .42, p < .05). The performance of the burnout patients who had returned to work, was comparable to that of healthy controls. Oosterholt et al., (2012) suggest that one possible explanation for reduced cognitive performance in burnout may be that burnout patients already experienced cognitive deficits before they developed a burnout and that these cognitive deficits may enhance the probability of developing burnout. Our finding that the cognitive performance of the majority of the burnout patients increased to that of the level of the healthy controls in the course of two years suggests that the cognitive impairments are a result of burnout and not a cause.

The central question addressed by Van Dam et al. (2011) was whether impaired cognitive performance could be reversed by a motivational intervention. In this 2011 study, the burnout patients, contrary to the healthy controls, failed to improve their performance following a motivational intervention in the second test block. In the current study, both groups, burnout patients and healthy controls alike, did improve their performance in the second block. Several authors (Boksem & Tops, 2008; Schaufeli & Taris, 2005) suggest that non-responsiveness to rewards is a relative permanent factor in burnout. Contrary to this assertion, the present findings suggest that willingness to enhance performance can be restored to some degree.

Patients in the present study all received psychological treatment. Recovery of burnout without specific psychological treatments is rather poor (Janssen, 2004; Leone, 2008). Therefore, we propose that the cognitive behavioural treatments that the burnout patients received contributed to the improvement. Notably, the effect sizes for symptom reduction were considerable, cognitive performance improved, and responsiveness to motivational interventions was restored. This is especially true for burnout patients who had returned to work. Their symptom level fell within average range of healthy norm groups and their cognitive performance was similar to that of the healthy

controls in this study. Therefore, it is reasonable to speculate this subset of patients were able and willing to resume their jobs as a direct consequence of these improvements.

Approximately 26 % of the burnout patients in our study had not resumed work after their burnout experience. These patients reported experiencing more symptoms than the healthy controls. This finding is consistent with that of Stenlund et al. (2009), who found that one third of the burnout patients who underwent cognitive behavioural treatment, still suffered from severe burnout symptoms after two years. In line with Tops et al. (2007), these findings imply that burnout patients may not constitute a homogeneous group. Several researchers have proposed that high levels of prolonged stress associated with burnout, may lead to permanent brain changes in a subset of burnout patients (Boksem & Tops, 2008, Oosterholt et al, 2012).

Several limitations in the present study warrant mention. First, the response to our invitation to participate in a second measurement two years later was 82.5%. Analyses of differences between participants and non-participants on demographic variables and symptom measures showed no differences between the groups, save that the non-participants in the burnout group had a higher score on exhaustion compared to the participating patients at T1, $p < .05$. It is hard to discern if this impacted our results. In addition, level of exhaustion was not mentioned as a reason not to participate again. Second, the fact that individuals participated in the same experiment for the second time may have influenced the results. Although participants had not been informed afterwards that the feedback was fake in the original study, knowledge of the procedure, learning effects, and the experience of success or failure during the original testing may have affected performance during the second assessment. Nonetheless, performance of healthy controls was highly similar to performance during the original testing, which suggests that there were no repetition or carry-over effects that may complicate the interpretation of our results. A third possible limitation of the present study is that the burnout patients did not all receive the same psychological treatment. Although, all treatments were based on cognitive behaviour therapy, the treatments were provided by several mental health institutions. The major aim of this study, however, was not to evaluate whether (a specific) treatment was beneficial, but whether burnout patients responded differently to a motivating stimulation after two years and this appeared to be the case.

A strength of the current study is the relative long follow-up period. Several authors (Janssen, 2004; Leone, 2008; Sonnenschein et al., 2008) have suggested that recovery of burnout may be a slow process. This may explain the relatively high percentages of recovery of burnout symptoms and work resumption in our study compared to studies with shorter follow-up periods (Oosterholt et al., 2012; Sonnenschein et al., 2008). An-

other strong point is the low attrition rate of participants who participated in the second measurement and the thorough assessment of participants at both measurement times. Emphasis is placed on our ability to demonstrate changes in the clinical status participants.

In conclusion, this study showed that burnout symptoms and cognitive performance had improved in burnout patients after two years, but both of these variables were not restored to normal levels with the exception of depersonalisation, responsiveness to motivational rewards, and perceived job competence. An important consideration for both employers and therapists is that even if burnout patients no longer fulfil the criteria of burnout anymore and are motivated to spend effort again, they may still suffer from elevated levels of fatigue and cognitive impairments.

8 Summary and General Discussion

Summary of the Results

This thesis presents six studies designed to provide insight into the processes associated with reduced cognitive performance in burnout. In chapter 1 we posed the question of whether there is a distinctive psychopathological process in burnout which can account for specific burnout symptoms such as fatigue, detachment and reduced cognitive performance. Chapter 1 also presents several major theoretical notions about the relationship between burnout symptoms and reduced cognitive performance.

One line of reasoning suggests that reduced cognitive performance may result from adaptations in task performance. Fatigue has been found to lead to strategic adaptation of task performance in healthy individuals (Hockey, 1997; Matthews, Davies, Westerman & Stammers, 2000). This strategic adaptation of task performance serves to reduce the amount of effort invested in the task, for example by allowing subsidiary task failures. Because fatigue is a main symptom of burnout, reduced cognitive performance may also be the result of a specific way of coping with fatigue.

According to a second line of reasoning, reduced cognitive performance may result from a decreased motivation to expend effort. Reduced motivation is another main symptom of the burnout syndrome, and may also contribute to reduced cognitive performance in burnout (Schaufeli & Taris, 2005). There are two somewhat different viewpoints on the concept of motivation. Motivation is often regarded as a dynamic attitude toward a certain task, depending on the perceived balance of effort that is required for task performance and the possible rewards of task performance (Ajzen, 1991). Another viewpoint holds that reduced motivation to expend effort may develop into a more structural inability to respond to rewards due to physiological changes in the dopaminergic/motivational system (Boksem & Tops, 2008).

According to the first view on motivation, altering the balance between efforts and rewards will change the motivation to spend effort and subsequently affect actual task performance. According to the second view, motivational interventions will not be effective in increasing task performance.

A third line of reasoning maintains that burnout patients may appraise fatigue in a specific way. Several authors suggested that the appraisal of fatigue may be responsible

for reduced performance in individuals that suffer from long-term fatigue (Afari & Buchwald, 2003; Deluca, 2005; Knoop, Prins, Moss-Morris & Bleijenberg, 2010; Prins, Van der Meer & Bleijenberg, 2006). Insight into the specific psychopathological processes in relation to performance is important because it may lead to insights about the treatment of burnout.

In tune with the third line of reasoning, chapter 2 describes a study on conceptual frameworks that model the appraisal of fatigue and its relationship with performance. We wanted to investigate whether a specific appraisal of fatigue in relation to performance could contribute to reduced cognitive performance in burnout. As a first step, we searched the literature and found a variety of conceptually different approaches related to the appraisal of fatigue. These approaches were categorized into two theoretical frameworks: (1) an adaptation-oriented framework, which concerns the regulation of effort-expenditure (for example: 'when I am getting tired, it means I do not enjoy what I am doing at that moment'), and (2) an emotion-related framework, which concerns the regulation of emotion (for example: "when I am tired and I keep on making an effort, it only gets worse"). Before investigating whether burnout patients appraise their fatigue in a specific way, we wanted to know whether adaptation-oriented appraisal and emotion-related appraisal existed as separate dimensions in a healthy population. A list of statements derived from the various conceptual frameworks was presented to healthy individuals who were asked to rate their agreement. A principal component analysis of the survey data revealed that fatigue can indeed be appraised in an adaptation-oriented way as well as in an emotion-related way. In addition, we found a third factor: "social rejection because of fatigue". Our results showed that only emotion-related appraisal was related to general level of fatigue. There were no significant correlations however, between the three dimensions of fatigue appraisal and anxiety or depression. Worrying and focusing on fatigue is apparently related to the experience of fatigue, whereas attributing fatigue to the unrewarding properties of a task and 'fear for social rejection' are not.

Chapter 3 continues the study in chapter 2 and presents a study aimed at investigating whether fatigue is experienced differently in burnout patients than in healthy controls or in patients suffering from another psychiatric disorder. We presented 73 burnout patients, 57 patients with an anxiety disorder, and 67 depressed patients with the rating scale for the appraisal of fatigue-performance relationship described in chapter 2. We also assessed level of fatigue, level of depression, and severity of anxiety symptoms. Additionally, we compared the findings with those of the 127 healthy controls described in chapter 2. The level of fatigue reported by burnout patients, although significantly higher than that of healthy participants, did not differ from that of the other patient

groups. The appraisal of fatigue also did not differ among the patient groups. Therefore, level of fatigue and appraisal of fatigue may be less central for the understanding of the specific pathological processes associated with burnout as is often assumed.

Chapter 4 reviews the literature with respect to the strategic adaptation of task performance which has been repeatedly demonstrated in fatigued, healthy individuals. Strategic adjustments occurs for instance, when failures for secondary goals are allowed. Thus, someone may selectively neglect low-priority task components (e.g., the speed or accuracy of responses), or neglect subsidiary activities, or shift to simpler response strategies with lesser demands on working memory. There are no previous studies that investigated whether such adaptations are also employed by burnout patients who suffer from long-term fatigue. Should burnout patients employ these strategic adaptations to task performance, it would explain why burnout is accompanied by compromised executive functioning and not with difficulties with more automatic cognitive processes (Van der Linden, Keijsers, Eling & Van Schaijk, 2005; Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012). We presented 40 burnout patients recruited from mental health centers in the southwest region of the Netherlands, and 40 healthy controls with a task they could either execute by adopting an effective, but high-effort strategy or by applying a less effective low-effort strategy. Significantly more burnout patients (33%) compared to healthy controls (8%) employed a low-effort strategy, even though the majority of the burnout patients (67%) employed a high-effort strategy. The burnout patients who had employed a low-effort strategy, failed to maintain their performance-level and experienced relatively high strain. Using low-effort strategies, therefore, does not seem to be an adaptive way of coping with fatigue and does not explain reduced cognitive performance in burnout. Instead, the results of this study are indicative of sustaining, cognitive impairments (in at least a part of the burnout patients) rather than for fatigue-related strategy-shifts of performance.

Chapter 5 cites investigations that suggest that decreased motivation to expend effort may underlie reduced cognitive performance in burnout. An alternative explanation for our findings cited in chapter 4 may be that the burnout patients who employed a low-effort strategy were not motivated to invest more effort in the task. This was investigated in the following way. We examined the effect of a motivational intervention on cognitive performance. We presented 40 burnout patients and 40 matched healthy controls (described in chapter 4) with a complex attention task. As expected, in a first block of trials the performance of the burnout patients was poorer than those of healthy controls. Subsequently, we provided the participants with fake positive feedback about their performance and announced that we would financially reward those who performed best in a subsequent block of trials. Contrary to the healthy controls, the burnout patients did not improve their performance and experienced more aversion to invest fur-

ther effort. The study demonstrated that impaired cognitive performance in burnout patients could not be reversed by our motivational intervention. These findings are consistent with the views of several authors who suggest that the reduced motivation due to chronic stress cannot be reversed in the short term because the inability to respond to rewards has a biochemical basis (Boksem & Tops, 2008; Marin et al., 2011).

In chapter 6 we discuss the results of the study described in chapter 5 in which the findings did not unequivocally explain why burnout patients could not be motivated to increase their performance. One possible explanation is that performance could not be improved due to psychophysiological impairments as suggested by Boksem and Tops (2008). Another possibility could be that positive feedback and financial rewards did not successfully counteract patient's belief that performance cannot be improved. Therefore, we tried to bypass cognitions about performance by motivating healthy controls and burnout patients in an implicit way by priming participants with either success or failure primes prior to task performance. Sixty-three burnout patients and 67 healthy controls were included in the study. As expected, healthy controls primed with success-primes outperformed healthy controls primed with failure-primes. However, burnout patients primed with success-primes did not perform better on the cognitive task than burnout patients primed with failure-primes which indicates that success priming failed to motivate burnout patients to improve their performance. Instead, our results suggest that success primes in our sample led to a further decrease in performance level in some of our burnout patients. Like the study described in chapter 5, the results from this study added support to the findings that it was not possible to enhance the performance level of burnout patients on an attention task with a motivational intervention. Moreover this study showed that this non-responsiveness is not due to cognitions about fatigue and performance, indicating that reduced cognitive performance in burnout may stem from a more structural condition.

In chapter 7 we describe the course of burnout symptoms and cognitive impairments over a period of two years. Relatively little is known about the course of symptoms in patients suffering from burnout. This is especially the case for the long-term course of cognitive functioning. We followed the burnout patients and healthy controls, that had participated in the study described in chapter 5 and repeated the measurements two years later. In the course of two years' time, the burnout patients, who had all received psychological treatment, had improved considerably in terms of burnout symptoms and cognitive performance. The pre-post effect sizes for symptom reduction were large; cognitive performance improved, and responsiveness to motivational interventions had returned to normal. Most patients (85%) did no longer met the criteria of burnout or any other psychiatric disorder. Despite these improvements, the former burnout patients still experienced more exhaustion, more general fatigue, more depres-

sive symptoms, and more general psychopathology in comparison to healthy controls and compared to norm groups. The same pattern was observed for cognitive performance: performance improved, but remained below normal levels compared to healthy controls. Perceived job competence, involvement in work, and responsiveness to rewards seemed to have returned to normal levels again. Our results demonstrate that recovery from burnout is possible, but some remaining symptoms may still be present after two years and for a minority of the burnout patients most symptoms are still present.

Discussion

The studies presented in chapters 4, 5, and 6 of this thesis found that the performance-level of burnout patients on attention tasks was lower than that of the healthy controls. These findings are in line with those of other studies on cognitive performance in burnout patients exhibiting impaired cognitive performance on complex cognitive tasks (Öhman, Nordin, Bergdahl, Slunga Birgander & Stigsdotter Neely, 2007; Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012; Österberg, Karlson & Hansen, 2009; Sandström, Rhodin, Lundberg, Olsson & Nyberg, 2005; Sandström et al., 2011; Van der Linden, Keijsers, Eling & Van Schaijk, 2005). Moreover, the results of the study in chapter 7 indicate that although the severity of these cognitive impairments decreases over time, these impairments may still be present after two years. In addition to investigating the severity and course of impaired cognitive performance in burnout patients by using valid, objective instruments, we were also interested in mechanisms that may underlie these impairments. We investigated whether (1) appraisal of fatigue, (2) strategic adaptation of task-performance, and (3) reduced motivation to expend effort might play a role in the impaired cognitive performance in burnout. Our findings suggest that none of these processes appear to play role in reduced cognitive performance in burnout. What do these findings imply for distinctive psychopathological process in burnout?

In contrast to healthy, fatigued individuals who spend less effort at tasks (Matthews et al., 2000), burnout patients in our studies reported high levels of effort. Although the levels of effort are subjectively reported and possibly influenced by the strain experienced during task performance, they do indicate that the burnout patients did not disengage from the pursuit of task goals. We also observed that the vast majority of burnout patients who were asked to participate in our studies and do their best, agreed to do so, despite their high levels of fatigue. Our conclusion is that in contrast to healthy fatigued individuals, burnout patients do not appear to be particularly reluctant to expend high levels of effort. Our findings concerning strategic adaptation of cognitive tasks point in the same direction: the majority of the burnout patients employed a high-effort strategy.

The combination of the use of high-effort strategies and the non-responsiveness to motivational intervention in burnout patients suggests that burnout patients may be motivated but unable to improve their performance. The low-effort strategies characteristically employed by the burnout patients in our study did not serve to reduce strain. The low-effort strategy employed by the burnout patients therefore does not seem to be an adaptive way of coping with fatigue. Instead, it may be argued that the low-effort strategy employed by some burnout patients may be related to the phenomenon of 'learned helplessness' (Seligman, 1975). Learned helplessness refers to a state in which a person believes he has no control over the situation and, therefore, does not try to cope with the situation any longer and experiences high levels of stress (Sapolsky, 1994). The minority of the burnout patients who employed a low-effort strategy in the study described in chapter 4 showed similar characteristics. They experienced high levels of distress and actually did not seem to try to perform the simple tasks. This state also resembles to some extent the chronic motivational problems of burnout patients as described by Boksem & Tops (2008). Perhaps it is only a minority of the burnout patients that are chronically non-responsive to rewards.

The suggestion that learned helplessness may play a role in reduced cognitive performance in a small number of burnout patients, is also supported by our findings as noted in chapter six. These findings suggest that the strongest prime effects in healthy controls occurred after failure primes and the strongest effects in burnout patients, although in the opposite direction, occurred after success primes. These findings appear in line with the observations of Brenninkmeijer, Van Yperen, and Buunk (2001), suggesting that burnout patients exhibit implicit associations with failure. Healthy controls on the other hand, seem to exhibit implicit associations with success and show a positive self-judgment bias (Dunn, Stefanovitch, Buchan, Lawrence & Dalgleish, 2009; Schmidt & Mast, 2010).

In addition to our finding that burnout patients report high levels of effort spent at tasks and they do not seem to adapt their performance strategy in a helpful way as observed in healthy fatigued individuals, we found that the level of fatigue and the appraisal of fatigue in burnout patients did not differ from those reported by patients with major depression or with anxiety disorders. Therefore the level of fatigue and the appraisal of fatigue may also not be central to the understanding of the pathological processes specifically associated with burnout. Instead, all of the results of the studies described in this thesis indicate that reduced cognitive performance in burnout is not a primary consequence of coping with fatigue. Since burnout is regarded as a stress-related syndrome and several studies have shown that that chronic stress may result in impaired cognitive functioning (Marin et al., 2011), it may be that stress-related cognitive impairments are a main symptom of burnout. Trying to maintain the level of performance despite cogni-

tive impairments requires increased levels of effort and will result in an increase in fatigue. Therefore, it may be that reduced cognitive performance is not the result of fatigue but that fatigue is the result of stress-related cognitive impairments.

In conclusion, our findings suggest that impaired cognitive performance in burnout may stem from a structural condition which cannot be easily reversed by changing cognitions, or by coping or by motivational interventions. Our findings seem to support a biochemical explanation for cognitive impairments in burnout as proposed by several authors (Boksem & Tops, 2008; Oosterholt et al., 2012; Österberg et al., 2009; Sandström et al., 2011).

Limitations

Our studies on motivational interventions showed that the motivational interventions we used were not effective in improving cognitive performance. We do not know however, whether motivational interventions other than the ones we used would have been effective or that motivational interventions are not effective at all in improving performance. The same limitation also applies to our studies on performance-strategy and fatigue-appraisal. We are not sure whether another experimental task or another questionnaire would have made a difference.

Our findings suggest that impaired cognitive performance in burnout cannot easily be reversed by changing cognitions, coping or motivational interventions. Therefore our findings may be more in line with a psychophysiological explanation for cognitive impairments in burnout as proposed by several authors (Boksem & Tops, 2008; Oosterholt et al., 2012; Österberg et al., 2009; Sandström et al., 2011). This conclusion is only indirect however, because we did not investigate psychophysiological processes in our studies.

Practical Implications

The results of our studies suggest that burnout patients suffer from severe burnout symptoms and cognitive impairments that cannot be easily reversed by changing cognitions, coping, or motivational interventions. These findings have important implications for reintegration to work and for clinical practice.

With regard to reintegration to work, employers should take into account that the cognitive performance of burned out employees is reduced and that there are presently no known interventions that may help improve the cognitive performance of the employees in the short term. We have no indications that trying to motivate employees to perform better will be effective. Motivational interventions may even have an adverse effect on performance (see chapter 6). Employers could consider temporarily providing these employees with less demanding tasks, requiring less cognitive effort. They could

also facilitate cognitive behaviour therapy for their burned out employees, because our results suggest that cognitive behaviour therapy may reduce burnout symptoms. Our suggestion that fatigue in burnout may result from maintaining high levels of performance despite cognitive impairments may have implications for the psychological treatment of burnout. An important factor in reducing stress could be to help burnout patients adjust their high performance demands to levels that fit their cognitive impairments. A reduction in stress may give biological processes time to normalize. We also suggested that burnout patients may, due to trying to maintain performance levels despite cognitive impairments, feel powerless and that this feeling may be related to the concept of learned helplessness. Therapeutic interventions designed for the alleviation of learned helplessness (Seligman, 2006) may also be effective in burnout patients.

Our finding that burnout symptoms and cognitive performance had improved in burnout patients in the course of two years, but had not completely returned to normal levels may also have implications, especially because depersonalisation and responsiveness to motivational rewards, and perceived job competence seem to have been restored to normal levels. An important implication for employers and therapists to take into account is that, even when burnout patients no longer meet the criteria of burnout and are motivated to expend effort again, they may still suffer from elevated levels of fatigue and cognitive impairments.

Although the majority of the burnout patients we studied recovered to a large extent and returned to work after two years, a minority still suffer from severe symptoms and cognitive impairments and did not return to work. This suggests that burnout can become a chronic condition in this subgroup of burnout patients.

Future Research Directions

Although the studies presented in this thesis provide more insight into the processes related to cognitive performance of burnout patients, they also raised new questions. The suggestion that fatigue in burnout may be the result of continued attempts to maintain acceptable or high performance levels despite cognitive impairments, raises the question whether cognitive impairments form the core symptom of burnout and whether they should be considered a distinctive feature of burnout as compared to other disorders. Additional research on impaired cognitive functioning and on compromised motivational processes, appears warranted.

Another future area of research in burnout patients may be the role of implicit cognitions. Research performed during the previous ten years indicates that many specific implicit cognitions play a role in various psychological disorders (Johnson, Benas & Gibb, 2011; Stieger & Burger, 2010). Our finding (chapter six) suggest that burnout patients may have implicit failure cognitions, remarkably comparable to the concept of learned

helplessness. Knowledge of implicit cognitive processes in burnout may provide clues for treatment and reintegration to work.

Several authors have suggested that burnout patients do not form a homogeneous group and that there are subtypes (Demerouti, Verbeke & Bakker, 2005; Tops et. al., 2007), or that the symptomatology of burnout may be different for different stages of the burnout syndrome (Edelwich & Brodsky, 1980; Golembiewski & Munzenrider, 1988; Golembiewski & Boss, 1991). Tops et al. (2007) distinguish two subtypes of burnout patients on the basis of psychophysiological differences. A group with increased prolactine levels showed high levels of task engagement as opposed to a group with low prolactine levels who showed low task engagement. Our findings, especially in our studies described in chapter 4 and chapter 7, support the idea that there may be subgroups. Perhaps, the differences in task strategy described in chapter 4 are related to psychophysiological differences as observed by Tops et al. (2007).

The existence of subgroups of burnout patients may also explain why 75% of the burnout patients described in chapter 7 recovered from burnout to a large extent and 25% did not improve. Several authors suggest that the high levels of stress associated with burnout, may lead to permanent brain changes (Boksem & Tops, 2008, Oosterholt et al, 2012). Perhaps only a segment of the burnout patients suffer from these changes or there may be different types of physiological changes as reported by tops et al. (2007). Another explanation is that burnout patients who did not recover suffered from a disturbed sleep pattern. Sonnenschein et al. (2008) found that, after a six month period in which burnout patients were treated with cognitive behavioural therapy, full recovery from burnout symptoms and return to work were related to the quality of sleep. Burnout patients who suffered from sleep difficulties exhibited less of a reduction in symptoms and work resumption. Further research is needed to investigate whether different subgroups of burnout patients can be distinguished and whether the subgroups offer a different prognosis toward recovery of burnout symptoms and cognitive impairments.

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Nederlandse Samenvatting

In dit proefschrift zijn zes onderzoeken beschreven die als doel hebben om meer inzicht te krijgen in processen die te maken hebben met afgenomen cognitieve prestaties van burn-out patiënten. In hoofdstuk 1 stelden we de vraag of er in burn-out een specifiek psychopathologisch proces te onderscheiden is, dat specifieke burn-out symptomen zoals vermoeidheid, distantie en afgenomen cognitieve prestaties kan verklaren. Vervolgens hebben we in hoofdstuk 1 een aantal verschillende theoretische opvattingen over de relatie tussen burn-out symptomen en afgenomen cognitieve prestaties beschreven.

Volgens een eerste theoretische opvatting zou het zo kunnen zijn dat de afgenomen cognitieve prestaties van burn-out patiënten het gevolg zijn van aanpassingen in taakuitvoering. Vermoeidheid leidt namelijk bij gezonde mensen tot strategische aanpassing van taakuitvoering (Hockey, 1997; Matthews, Davies, Westerman & Stammers, 2000). Deze strategische aanpassing heeft als doel om de inspanning die aan de taak besteed wordt terug te brengen door middel van bijvoorbeeld het toestaan van fouten bij minder belangrijke onderdelen van de taak. Omdat vermoeidheid een belangrijk burn-out symptoom is, zou dit proces ook een rol kunnen spelen bij burn-out en zouden afgenomen cognitieve prestaties ook weleens het gevolg kunnen zijn van een strategische aanpassing van taakuitvoering.

Volgens een tweede theoretische opvatting zouden afgenomen cognitieve prestaties het gevolg kunnen zijn van een afgenomen motivatie om zich in te spannen. Een afgenomen motivatie om zich in te spannen is een belangrijk kenmerk van burn-out (Schaufeli & Taris, 2005) en zou daarom mogelijk ook kunnen leiden tot minder goede cognitieve prestaties. Er bestaan twee enigszins verschillende benaderingen ten aanzien van het concept motivatie. Motivatie kan worden beschouwd als een dynamische attitude ten opzichte van een taak, afhankelijk van de waargenomen balans tussen kosten en baten van taakuitvoering (Ajzen, 1991). Aan de andere kant kan een afgenomen motivatie om zich in te spannen ook beschouwd worden als een meer structureel onvermogen om op beloningen te reageren vanwege psychofysiologische veranderingen in het dopaminerge/motivatie systeem (Boksem & Tops, 2008). Volgens de eerste benadering zou het veranderen van de balans tussen kosten en baten, de motivatie om zich in te spannen en vervolgens de taakuitvoering kunnen beïnvloeden. Volgens de tweede benadering zullen motiverende interventies niet leiden tot een betere taakuitvoering.

Volgens een derde theoretische opvatting, zouden burn-out patiënten hun vermoeidheid op een specifieke manier kunnen beleven. Verschillende auteurs hebben gesuggereerd dat de specifieke beleving van vermoeidheid van mensen die lijden aan chronische vermoeidheidsklachten zou kunnen leiden tot mindere prestaties (Afari & Buchwald, 2003; Deluca, 2005; Knoop, Prins, Moss-Morris & Bleijenberg, 2010; Prins, Van der Meer & Bleijenberg, 2006). Door bijvoorbeeld sterk de aandacht te richten op vermoeidheidssignalen en te denken dat inspanning tijdens vermoeidheid schadelijks is of te denken dat inspanning weinig zal opleveren, zal de bereidheid om zich in te spannen afnemen. Mogelijk speelt de beleving van vermoeidheid ook een rol bij afgenomen cognitieve prestaties bij burn-out patiënten.

Inzicht in de specifieke psychopathologische processen die gerelateerd zijn aan prestaties, is belangrijk omdat het aanwijzingen kan geven voor de behandeling van burn-out patiënten.

In aansluiting op de derde theoretische opvatting beschrijft hoofdstuk 2 een onderzoek naar conceptuele kaders over de beleving van vermoeidheid in relatie tot taakuitvoering. We wilden onderzoeken of een specifieke beleving van vermoeidheid in relatie tot taakuitvoering, zou kunnen leiden tot afgenomen cognitieve prestaties bij burn-out patiënten. Als eerste stap zochten we in de literatuur naar conceptueel verschillende benaderingen ten aanzien van vermoeidheidsbeleving in relatie tot taakuitvoering. Deze benaderingen konden in twee theoretische kaders onderverdeeld worden: een adaptatie-georiënteerd kader dat de regulering van inspanning betreft (bijvoorbeeld “Als ik moe ben, dan betekent dat, dat ik wat ik aan het doen ben niet leuk vind”) en een emotie-gerelateerd kader dat de regulering van emotie betreft (bijvoorbeeld “Als ik moe ben en ik blijf me inspannen, dan wordt het alleen maar erger”). Voordat we startten met het onderzoek naar de vraag of burn-out patiënten hun vermoeidheid op een specifieke manier beleven, wilden we eerst weten of adaptatie-georiënteerde beleving van vermoeidheid en emotie-gerelateerde beleving van vermoeidheid als afzonderlijke dimensies voorkomen in een gezonde populatie. We vroegen gezonde proefpersonen om op een lijst van stellingen die afgeleid waren van de verschillende conceptuele kaders, aan te geven in hoeverre ze het met de stellingen eens waren. De gemeente Woensdrecht vroeg willekeurig gekozen inwoners een gezondheidsvragenlijst in te vullen. Samen met deze gezondheidsvragenlijst stuurden ze ook onze lijst met stellingen mee. Een principale-componenten-analyse van de scores op deze lijst liet zien dat vermoeidheid op een adaptatie-georiënteerde manier beleefd kan worden en op een emotie-gerelateerde manier. In aanvulling daarop vonden we nog een derde factor, namelijk: angst voor sociale afwijzing vanwege vermoeidheid. Onze bevindingen laten ook zien dat alleen emotie-gerelateerde beleving van vermoeidheid gerelateerd is aan de mate van vermoeidheid. Blijkbaar hangt het zich zorgen maken over vermoeidheid en het focussen op vermoeid-

heidssymptomen samen met de mate van vermoeidheid, terwijl het toeschrijven van vermoeidheid aan demotiverende taken en angst voor sociale afwijzing vanwege vermoeidheid daar niet mee samenhangen. Er waren geen significante correlaties tussen de drie dimensies van vermoeidheidsbeleving en mate van angst of depressie.

Hoofdstuk 3 is een vervolg op hoofdstuk 2 en beschrijft een onderzoek naar de beleving van vermoeidheid bij burn-out patiënten in vergelijking met die van mensen die leiden aan een andere psychische stoornis. We vroegen 73 burn-out patiënten, 57 patienten met een angststoornis en 67 depressieve patiënten onze lijst met stellingen over de relatie tussen vermoeidheid en prestatie (beschreven in hoofdstuk 2) en vragenlijsten over de mate van vermoeidheid, mate van angst en mate van depressie in te vullen. Vervolgens vergeleken we deze gegevens ook met die van de 127 gezonde deelnemers uit hoofdstuk 2. De mate van gerapporteerde vermoeidheid door burn-out patiënten was, alhoewel hoger dan die van de gezonde proefpersonen, niet hoger dan die van de andere patiëntengroepen. De beleving van vermoeidheid verschilde ook niet tussen de patiëntengroepen. Daarom zijn mate van vermoeidheid en beleving van vermoeidheid waarschijnlijk minder essentieel voor het begrijpen van de specifieke psychopathologische processen die betrekking hebben op burn-out dan vaak verondersteld wordt.

Hoofdstuk 4 begint met een beschrijving van de literatuur over strategische adaptatie van taakuitvoering zoals die vaak is aangetoond bij vermoeide gezonde individuen. Strategische aanpassing vindt bijvoorbeeld plaats door minder aandacht te besteden aan secundaire doelen van de taak. Iemand kan bijvoorbeeld selectief bepaalde taakcomponenten met een lage prioriteit negeren (bijvoorbeeld de snelheid of de accuraatheid van de responsen), of overgaan op oplossingsstrategieën die minder beroep doen op het werkgeheugen. Als burn-out patiënten deze strategische aanpassingen van taakuitvoering zouden toepassen, zou dat ook kunnen verklaren waarom burn-out gepaard gaat met beperkingen in de executieve functies en niet met problemen met meer eenvoudige cognitieve processen (Van der Linden, Keijsers, Eling & Van Schaijk, 2005; Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012). We legden 40 burn-out patiënten en 40 gezonde proefpersonen een taak voor die ze konden uitvoeren door het toepassen van een effectieve, maar hoge-inspanning strategie of door het toepassen van een minder effectieve lage-inspanning strategie. Significant meer burn-out patiënten (33%) dan gezonde proefpersonen (8%) maakten gebruik van een lage-inspanning strategie, hoewel de meerderheid van de burn-out patiënten (67%) een hoge-inspanning strategie gebruikte. De burn-out patiënten die een lage-inspanning strategie gebruikten, konden hun prestatieniveau op de primaire taak niet vasthouden en ervoeren veel spanning tijdens de taakuitvoering. Het gebruik van lage-inspanning strategieën bij burn-out patiënten lijkt daarom geen adaptieve manier van omgaan met vermoeidheid te zijn en vormt bovendien geen verklaring voor de afgenomen cognitieve prestaties. Onze resultaten

zijn daarentegen eerder een aanwijzing voor aanhoudende cognitieve beperkingen bij tenminste een deel van de burn-out patiënten dan voor aan vermoeidheid gerelateerde strategiewijzigingen van taakuitvoering.

Hoofdstuk 5 begint met een literatuuroverzicht over motivatieproblemen bij burn-out patiënten. Een alternatieve verklaring voor onze bevindingen in hoofdstuk 4 zou kunnen zijn dat de burn-out patiënten die een lage-inspanning strategie gebruikten, niet gemotiveerd waren om zich in te spannen. We onderzochten dit door het effect van een motiverende interventie op cognitieve prestaties te onderzoeken. De 40 burn-out patienten en de 40 gezonde proefpersonen die ook hadden meegedaan aan het onderzoek in hoofdstuk 4, voerden eerst een complexe aandachtstaak uit. Zoals verwacht was de prestatie van de burn-out patiënten slechter dan die van de gezonde proefpersonen. Vervolgens gaven we de deelnemers positieve feedback over hun prestatie, ongeacht de daadwerkelijke prestatie, en vertelden hen dat degenen die daarna het best op de taak zouden presteren, een financiële beloning zouden krijgen. In tegenstelling tot de prestatie van de gezonde proefpersonen, verbeterde de prestatie van de burn-out patiënten niet en ervoeren zij meer aversie tegen het uitvoeren van de taak. Dit onderzoek laat zien dat afgenomen cognitieve prestaties van burn-out patiënten niet verbeterd konden worden met een motiverende interventie. Deze bevinding sluit aan bij de visie van een aantal auteurs dat een afgenomen motivatie ten gevolge van chronische stress niet op de korte termijn veranderd kan worden omdat het onvermogen om op beloningen te reageren een biochemische basis heeft (Boksem & Tops, 2008; Marin et al., 2011).

In hoofdstuk 6 zijn we verder doorgegaan op de resultaten van het onderzoek in hoofdstuk 5. De resultaten van dat onderzoek verklaren namelijk niet helemaal waarom burn-out patiënten niet gemotiveerd konden worden om hun prestaties te verbeteren. Een mogelijkheid is dat de prestaties van de burn-out patiënten niet verbeterd konden worden vanwege psychofysiologische beperkingen zoals gesuggereerd door Boksem & Tops (2008). Een andere verklaring zou kunnen zijn dat burn-out patiënten er van overtuigd zijn dat hun prestaties niet kunnen verbeteren en dat de positieve feedback en financiële beloning die overtuiging niet konden veranderen. Daarom probeerden we deelnemers te motiveren, maar gedachten over presteren te omzeilen, door hen vlak voor het uitvoeren van de taak impliciet te primen met ofwel ‘mislukking’ of ‘succes’. Aan dit onderzoek deden 63 burn-out patiënten en 67 gezonde controle proefpersonen mee. Zoals verwacht presteerden de gezonde proefpersonen geprimed met succes beter dan de gezonde proefpersonen geprimed met mislukking. De burn-out patiënten geprimed met succes daarentegen presteerden niet beter dan gezonde proefpersonen op de cognitieve taak, wat suggereert dat ook succes primes niet in staat zijn om burn-out patiënten te motiveren om hun prestaties te verbeteren. Onze resultaten suggereren dat de succes-primes bij een deel van de patiënten zelfs tot slechtere prestaties leiden. Dit on-

derzoek liet net als het onderzoek in hoofdstuk 5 zien dat het niet mogelijk was om de prestaties op een aandachtstaak te verbeteren met motiverende interventies. Bovendien liet dit onderzoek zien dat het niet reageren op motiverende interventies, niet enkel het gevolg is van gedachten over vermoeidheid en prestatie. Deze bevindingen suggereren dat een afgenomen cognitieve prestatie bij burn-out patiënten een meer structureel probleem is.

In hoofdstuk 7 beschrijven we de mate van burn-out symptomen en cognitieve beperkingen na een periode van 2 jaar. Er is relatief weinig bekend over het verloop van symptomen in burn-out. Dat geldt zeker voor het lange termijn verloop van het cognitief functioneren. We volgden de burn-out patiënten en gezonde proefpersonen die meegedaan hadden aan het onderzoek in hoofdstuk 5 en herhaalden de metingen 2 jaar later. De burn-out patiënten, die allemaal psychologische behandeling hadden gehad, waren aanzienlijk verbeterd wat betreft burn-out symptomen en cognitief functioneren. De mate van de verbeteringen was groot, het cognitieve functioneren was verbeterd en de burn-out patiënten reageerden net als de gezonde proefpersonen op de motiverende interventies. De meeste patiënten (85%) voldeden niet meer aan de diagnose burn-out of aan die van een andere psychiatrische stoornis. Ondanks deze verbeteringen ervoeren de voormalige burn-out patiënten nog steeds meer uitputting, vermoeidheid, depressieve klachten en algemene psychopathologie dan de gezonde proefpersonen. Ook in vergelijking met normgroepen hadden de voormalige bun-out patiënten nog steeds veel klachten. Hetzelfde patroon zagen we met betrekking tot cognitief functioneren: Het cognitieve functioneren verbeterde maar was nog steeds minder goed dan dat van de gezonde proefpersonen. Het door de persoon zelf ervaren niveau van competentie op het werk, de betrokkenheid bij het werk en de gevoeligheid voor beloningen leek wel weer op een normaal niveau te liggen. Onze resultaten tonen aan dat herstel van burn-out mogelijk is, maar dat er na twee jaar nog steeds restsymptomen aanwezig kunnen zijn en dat voor een kleine minderheid (15%) van de burn-out patiënten de meeste symptomen na 2 jaar nog steeds aanwezig zijn.

Conclusies

De onderzoeken beschreven in de hoofdstukken 4, 5 en 6 laten zien dat de cognitieve prestaties van burn-out patiënten op aandachtstaken slechter zijn dan die van gezonde proefpersonen. Deze bevindingen sluiten aan bij andere onderzoeksbevindingen die aantonen dat burn-out patiënten minder goed presteren op complexe cognitieve taken (Öhman, Nordin, Bergdahl, Slunga Birgander & Stigsdotter Neely, 2007; Oosterholt, Van der Linden, Maes, Verbraak & Kompier, 2012; Österberg, Karlson & Hansen, 2009; Sandström, Rhodin, Lundberg, Olsson & Nyberg, 2005; Sandström et al., 2011; Van der Linden, Keijsers, Eling & Van Schaijk, 2005). Bovendien tonen de bevindingen uit hoofd-

stuk 7 aan dat ondanks dat de ernst van deze cognitieve beperkingen afneemt in de loop van de tijd, er na twee jaar toch nog steeds cognitieve beperkingen kunnen zijn.

Naast dat we met behulp van valide, betrouwbare meetinstrumenten de ernst en het verloop van de cognitieve beperkingen van burn-out patiënten wilden onderzoeken, waren we ook geïnteresseerd in de onderliggende mechanismen die een rol zouden kunnen spelen bij deze cognitieve beperkingen. We onderzochten of (1) de beleving van vermoeidheid, (2) strategische aanpassing van taakuitvoering, en (3) een afgenomen motivatie om zich in te spannen een rol speelden bij de verminderde cognitieve prestaties van burn-out patiënten. Onze bevindingen lieten zien dat geen van deze mechanismen een rol lijkt te spelen bij de cognitieve problemen van burn-out patiënten.

In tegenstelling tot vermoeide gezonde personen die geneigd zijn om zich minder in te spannen. (Matthews et al., 2000), geven burn-out patiënten aan zich juist in sterke mate in te spannen. Hoewel de beleefde inspanning van burn-out patiënten samen kan hangen met stress tijdens het uitvoeren van taken, geeft het ook aan dat de burn-out patiënten zich voor de taak bleven inzetten. Het viel ons ook op dat het overgrote deel van de burn-out patiënten die we benaderden om aan de onderzoeken mee te doen, daartoe bereid waren ondanks hun ernstige vermoeidheidsklachten. Daarom concluderen we dat in tegenstelling tot gezonde vermoeide proefpersonen, burn-out patiënten wel bereid zijn om zich in te spannen. Onze bevindingen met betrekking tot strategische adaptie van taakuitvoering wijzen ook in die richting: de meerderheid van de burn-out patiënten gebruikte namelijk een hoge-inspanning strategie.

De combinatie van een hoge-inspanning strategie en het niet reageren op motiverende interventies duidt er op dat burn-out patiënten waarschijnlijk wel gemotiveerd, maar niet in staat zijn om hun prestatie te verbeteren. De lage-inspanning strategie die door de burn-out patiënten in ons onderzoek werd gebruikt, bleek ook niet te leiden tot spanningsverlaging. Deze lage-inspanning strategie lijkt daarom geen adaptieve manier van omgaan met vermoeidheid te zijn. Het lijkt er meer op dat de lage-inspanning strategie die door een deel van de burn-out patiënten werd toegepast verwant is aan het fenomeen 'aangeleerde hulpeloosheid' (Seligman, 1975). Aangeleerde hulpeloosheid is een toestand waarin iemand er van overtuigd is geen controle meer over de situatie te hebben, er daarom niets meer aan probeert te veranderen en een hoge mate van stress ervaart (Sapolsky, 1994). De burn-out patiënten uit het onderzoek in hoofdstuk 4, die een lage-inspanning strategie gebruikten vertonen vergelijkbare kenmerken: ze ervaren veel stress en proberen ook niet meer de simpele taken uit te voeren. Deze toestand komt in zekere mate ook overeen met de toestand van chronische demotivatie zoals beschreven door Boksem & Tops (2008). Mogelijk is alleen een deel van burn-out patiënten chronisch gedemotiveerd.

Het idee dat aangeleerde hulpeloosheid een rol zou kunnen spelen bij de cognitieve

problemen van een deel van de burn-out patiënten wordt ook ondersteund door onze bevindingen in hoofdstuk 6. Deze bevindingen suggereren dat de sterkste effecten van priming bij gezonde proefpersonen kwamen van de mislukking primes, en bij burn-out patiënten van de succes–primes, maar dan in tegenovergestelde richting. Deze bevindingen sluiten aan bij onderzoek van Brenninkmeijer, Van Yperen, en Buunk (2001), dat suggereert dat burn-out patiënten impliciete associaties hebben met mislukking. Gezonde personen daarentegen lijken impliciete associaties met succes te hebben en een positieve bias ten aanzien van zichzelf (Dunn, Stefanovitch, Buchan, Lawrence & Dalgleish, 2009; Schmidt & Mast, 2010).

Naast onze bevinding dat burn-out patiënten aangeven veel inspanning te leveren en ze hun taakuitvoeringsstrategie niet aanpassen zoals gezonde vermoeide mensen dat doen, zagen we ook dat de mate en de beleving van vermoeidheid van burn-out patiënten niet anders was dan die van patiënten met een depressie of angststoornis. Daarom denken we dat vermoeidheid en ook de beleving van vermoeidheid niet essentieel zijn voor de specifieke pathologische processen in burn-out. Alle onderzoeksresultaten in dit proefschrift suggereren daarentegen dat afgenomen cognitieve prestaties van burn-out patiënten niet het directe gevolg zijn van omgaan met vermoeidheid.

Omdat burn-out wordt beschouwd als een stress-gerelateerd syndroom en verschillende onderzoeken hebben aangetoond dat chronische stress kan resulteren in cognitieve beperkingen (Marin et al., 2011), zou het zo kunnen zijn dat cognitieve beperkingen het belangrijkste kenmerk van burn-out zijn. Het blijven proberen om goed te presteren ondanks deze cognitieve beperkingen zou kunnen leiden tot een toename van vermoeidheid. Mogelijk zijn de afgenomen cognitieve prestaties van burn-out patiënten niet het gevolg van vermoeidheid, maar is vermoeidheid het gevolg van stress-gerelateerde cognitieve beperkingen.

Alle bevindingen tezamen genomen, concluderen we dat de cognitieve beperkingen van burn-out patiënten het gevolg zijn van een meer structurele toestand die niet zomaar veranderd kan worden door cognities, coping of motiverende interventies. Onze bevindingen vormen eerder een ondersteuning voor een psychofysiologische verklaring voor cognitieve beperkingen in burn-out en sluiten aan bij de ideeën hierover van andere wetenschappers op dit onderzoeksterrein (Boksem & Tops, 2008; Oosterholt et al., 2012; Österberg et al., 2009; Sandström et al., 2011).

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Curriculum Vitae

Arno van Dam is in 1991 afgestudeerd aan de Rijksuniversiteit Leiden in de richting klinische psychologie. Na zijn afstuderen heeft hij eerst een half jaar gewerkt als verpleeghulp op een afdeling voor chronisch psychiatrische patiënten bij Psychiatrisch Centrum Sancta Maria te Noordwijkerhout. In 1992 is hij in het kader van de vervangende dienstplicht als psycholoog op de angstpolikliniek van het Johan Weijer Instituut te Amsterdam gaan werken. Hij heeft daar twee-en-een-half jaar gewerkt en is in die tijd begonnen aan zijn opleiding tot gedragstherapeut. Vervolgens heeft hij bij een aantal vrijgevestigde praktijken gewerkt tot hij eind 1994 in dienst kwam bij de RIAGG Westelijk Noord-Brabant. De eerste zeven jaar werkte hij voornamelijk in de sociale psychiatrie en als aandachtsfunctionaris arbeidsgerelateerde problematiek bij de afdeling preventie. Binnen deze laatste functie ontwikkelde hij werkstresstrainingen en een behandelprogramma voor burn-out patiënten. Vanaf 1996 is hij leidinggevende geweest van diverse afdelingen (o.a. psychodiagnostiek, protocollaire behandelingen, deeltijdbehandeling) van RIAGG (en later GGZ) Westelijk Noord-Brabant. In 1999 is hij geregistreerd als gz-psycholoog, in 2001 als psychotherapeut en in 2006 als klinisch psycholoog. Vanaf 2005 is hij erkend supervisor en leertherapeut voor de Vereniging voor Gedragstherapie en Cognitieve Therapie (VGCt).

Van 1998 tot 2005 heeft hij naast zijn werk bij RIAGG Westelijk Noord-Brabant in een maatschap (AM & E Stresspreventie) gewerkt, waar zijn voornaamste taak was om voorlichting over burn-out preventie te geven bij bedrijven en nascholing over diagnostiek en behandeling van burn-out aan huisartsen. Sinds 2008 is hij hoofd van de afdeling wetenschappelijk onderzoek bij GGZ Westelijk Noord-Brabant en sinds 2011 hoofd van het 'voordeurprogramma', een zorgprogramma waarin intake, indicatiestelling, crisisinterventie, preventie, transculturele zorg, psychiatrisch intensieve thuiszorg en de behandeling van een breed scala aan as-I klachten plaatsvindt.

Arno vindt het leuk en uitdagend om in zijn werk een brugfunctie te vervullen tussen behandeling, management en wetenschap. Zijn interessegebieden zijn burn-out, mentale vermoeidheid, de behandeling van mannen met agressieproblematiek, motivatie en de implementatie van evidence-based behandelmethoden in de reguliere GGZ-praktijk.

Arno is getrouwd en woont in Dordrecht met zijn vrouw Ildikó Rijkers, hun zoon Mischa en dochter Caro.