Burnout and Performance in Organizations: An Investigation of the Interplay of Individual and Job Characteristics

by

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SUMMARY

This dissertation examined under which conditions stressful working conditions relate to emotional exhaustion and how emotional exhaustion affects individual performance. Emotional exhaustion, which refers to a depletion of emotional resources, is considered to be the core component of burnout. Burnout has become an important issue for individuals at work and their organizations. Therefore, interest in this concept from researchers and practitioners has increased dramatically over the past twenty years. Despite knowing that stressful job conditions are potential antecedents of emotional exhaustion, we know much less about factors that can alter this relationship as well as about consequences of emotional exhaustion. This dissertation addressed this gap in three empirical studies, which are summarized below. The first study tested whether matching and non-matching resources buffer detrimental effects of job demands on emotional exhaustion. The second study examined whether a person characteristic (overcommitment) aggravates effects of stressful working conditions on emotional exhaustion and job performance. The third study investigated if emotional exhaustion relates to cognitive performance and job performance.

Study 1 investigated whether interaction effects between job demands and resources on emotional exhaustion are more likely if these three concepts’ dimensions match (emotional, cognitive or physical). I tested the Demand-Induced Strain Compensation (DISC) model’s proposition that matching resources are more likely to buffer job demands’ detrimental effects on job strain, such as emotional exhaustion, than non-matching resources. I retrieved data from 177 school teachers; a subsample was re-examined after a time lag of about 21 months (N= 56).

Unlike previous DISC studies, I tested the interaction between demands and resources with at least two demands per dimension, increasing the reliability of my findings. Focusing on the dimensions of demands and resources and their match introduces a new theoretical approach to
research on teacher burnout. The present study contributes to the literature by testing the DISC model with a longitudinal design in a sample of German school teachers, including a statistical test of the triple-match hypothesis. Linear regression analyses revealed concurrent and lagged main and interaction effects of emotional and cognitive job demands and resources on emotional exhaustion. In large parts, job demands were positively and resources were negatively related to emotional exhaustion. Moreover, resources buffered detrimental effects of job demands. Results mainly supported the propositions of the DISC model which provides a valuable theoretical framework for the study of interaction effects in occupational health psychology and, in particular, for interventions to reduce job strain in teachers. Because reducing job demands is not always feasible, I propose that interventions should also target improving teachers’ resources (e.g., emotional support) in order to reduce emotional exhaustion among teachers. Such interventions would likely benefit from considering the dimension of working conditions and outcomes by focusing on matching concepts.

Study 2 focused on the often neglected interaction hypothesis of the model of Effort-Reward Imbalance with its two components effort-reward imbalance (ERI) and overcommitment (OC), which proposes that OC potentiates the detrimental relationships between ERI and the outcomes, here emotional exhaustion and job performance. ERI represents an imbalance between work-related costs (in the model termed efforts) and occupational gains (in the model termed rewards). Overcommitted employees are characterized by a motivational pattern of excessive work-related commitment and a high need for approval. They have difficulties to withdraw from work and are disproportionally irritable. I applied multilevel modeling based on data from 152 employees nested in 20 teams from a German manufacturing company. As predicted, results showed that ERI was positively related to emotional exhaustion and negatively related to supervisor-rated job performance while OC was unrelated to emotional exhaustion and job
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performance. Thereby, Study 2 extends the scope of the ERI model by being the first study that relates ERI to supervisor-rated job performance as an organizational outcome. Importantly, testing the interaction hypothesis by taking OC into account as a moderator, results showed that OC significantly aggravated the associations between ERI and emotional exhaustion as well as between ERI and job performance. Especially for overly committed employees, balanced working conditions appear to be important to prevent emotional exhaustion and to avoid performance decrements. Therefore, it seems crucial to identify these employees and take special care of them, for example, by offering trainings to alter their work-related attitudes of approval and commitment.

Study 3 investigated how emotional exhaustion, as a state of depleted resources and compromised executive control, relates to cognitive performance, job performance, and health. Theoretically, I assumed that executive control deficits impair cognitive performance. I further assumed that exhausted employees are less likely to invest their remaining resources and thus show lower job performance. Because emotional exhaustion evolves gradually, I focused on working and apparently healthy teachers reporting various levels of exhaustion. Unlike most previous studies, I applied a longitudinal design, which offers more insight into the direction of effects. The combination of longitudinal data, multiple-source data, and the assessment of various individual performance facets collected in a non-clinical sample make a novel study that contributes to the literature of burnout and cognitive performance. As hypothesized, cross-sectional linear regression analyses of 100 teachers showed that emotional exhaustion was significantly negatively related to cognitive performance, indicated by self- and peer-rated cognitive impairments as well as performance decrements in a neuropsychological learning and memory test (all p < .05). Longitudinal linear regression analyses confirmed this for self- and peer-rated cognitive impairments by trend (p < .10). In these longitudinal linear regression
analyses, work-related exhaustion also significantly predicted self-rated physical health. However, emotional exhaustion did not affect self-rated job performance, which might be explained with the compensatory control model. In tests of reversed causation, none of the outcome variables at Time 1 predicted change in emotional exhaustion at Time 2. This speaks against cognitive impairments serving as a vulnerability factor for exhaustion. In sum, findings contribute to the understanding of the burnout syndrome. Results underpin the negative consequences of emotional exhaustion for cognitive performance and health that are relevant for individuals and organizations alike.

To sum up, this dissertation extended research on work-related emotional exhaustion and individual performance. More specifically, interaction hypotheses were tested within a recently developed and an established theoretical job strain model—the DISC model and the ERI model, respectively. Additional variables were integrated in the models, such as conflicts with colleagues and emotional support in the DISC model or job performance in the ERI model, and thus extended their scopes. Moreover, consequences of emotional exhaustion for cognitive performance were examined. Methodologically, longitudinal and multilevel study designs as well as supervisor- and peer-ratings as well as laboratory test data add to the current state of research. Taken together, results presented in this work showed that protective resources and vulnerability factors moderate relationships between stressful working conditions and emotional exhaustion and should be taken into account when thinking about workplace interventions. Finally, this work underpins the relevance of emotional exhaustion for individual functioning with the finding that emotional exhaustion can impair cognitive performance and health.
Chapter 1: General Introduction

GENERAL INTRODUCTION

Over the past twenty years, practitioners’, academics’ and recently also a wider public’s interest in burnout has increased dramatically. Not surprisingly, because prevalence indicates that burnout has become an important issue for individuals in organizations. For instance, in The Netherlands it is estimated that 4 to 7% of the working population suffer from severe or clinical burnout. In some occupations, such as teachers and physicians, rates are even higher, amounting to about 10%. Additional 16% are believed to be at risk for burnout (Schaufeli, 2003). German health insurance data report a rapidly growing incidence rate. Within the last six years, burnout incidences have risen by 44% per year and thus nine-folded between 2004 and 2010 (Meyer, Stallauke, & Weirauch, 2011). In the year 2010, about 100,000 burnout cases were recorded among 34 million statutory health insured employees in Germany. The sickness absences caused by psychological disorders, including burnout, are by far the longest — on average 23.4 days per case. For comparison, the second longest absences are caused by cardiovascular diseases (18.4 days per case) and the general average over all causes is 11.6 days per case (Meyer et al., 2011).

In other countries, burnout-related absences tend to last for relatively long periods as well. For instance, Finnish men with severe burnout had 55 sickness absence days over the 2-year period compared with men without burnout when sociodemographic factors were adjusted for (Ahola, Honkonen, Virtanen, Koskinen, Kivimäki, & Lönnqvist, 2008). Burnout does not only cause sickness absences, but was also found to incur serious health consequences. For example, burnout was found to increase the risk for cardiovascular and mental disorders, musculoskeletal pain, diabetes, common cold, diseases of the respiratory system and even mortality (Ahola, Vääänänen, Koskinen, Kouvon, & Shirom, 2010; Melamed, 2009; Melamed, Shirom, Toker, Berliner, & Shapira, 2006). The associated costs of work-related psychological disorders, including burnout, are drastic for society and organizations alike. In Germany, work-related psychological disorders
are estimated to cause annual direct and indirect costs of seven billions (Bödeker & Friedrichs, 2011).

Introduction of Burnout and Definition of Emotional Exhaustion

The goal of this dissertation is to extend research on burnout, especially on emotional exhaustion, the core component of burnout, by examining specific constellations of job characteristics as exhaustion’s work-related antecedents, the impact of individual characteristics and widely unattended consequences of emotional exhaustion.

The concept of burnout emerged about 35 years ago. The initial articles were written by Freudenberger (1974), a psychiatrist working in a health care agency, and by Maslach (1976), a social psychologist studying emotions in the workplace. Freudenberger initially described burnout as a state of exhaustion that is characterized by a gradual depletion of energy and loss of motivation and commitment, accompanied by a wide array of mental and physical symptoms. Quite similarly, Maslach’s early descriptions use the terms gradual exhaustion, cynicism, and loss of accomplishment. Probably the most often cited definition of burnout comes from Maslach and Jackson (1986, p. 1) who defined burnout as “a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who do ‘people work’ of some kind”. Because, most research focused on people-oriented, human service occupations, the first publications on work-related burnout were concerned with professionals such as teachers, social workers, nurses, and police officers. However, since the publication of the MBI-General Survey (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996), which allows burnout to be studied independently from its specific job context, the number of studies in occupations outside the human services and education has increased. The concept of burnout was broadened and defined as a crisis in one’s relationship with work in general and not necessarily as a crisis in one’s relationship with people at work. To date evidence clearly shows
that burnout is not a typical helper syndrome that exclusively occurs in the human services and education (cf. Schaufeli, 2003; for extensive reviews of the history, definitions, models, prevalence, etiology, and empirical evidence on the burnout concept see Maslach, Schaufeli, & Leiter, 2001; Schaufeli & Buunk, 2003; Shirom, 2003). Despite all the important findings that advanced our knowledge on the burnout syndrome, the main features of one of the first descriptions of the burnout process can still be considered to be true: “The first stage involves an imbalance between resources and demands (stress). The second stage is the immediate, short-term emotional tension, fatigue, and exhaustion (strain). The third stage consists of a number of changes in attitude and behavior” (Cherniss, 1980, p. 17). These three stages will also become apparent throughout this dissertation. I will consider how job characteristics (demands and resources) affect exhaustion and how behavior (performance) changes in response to exhaustion.

In this dissertation, burnout is defined as a stress syndrome rather than a mental disorder (Paine, 1982). Burnout as a clinically diagnosed mental disorder represents a severe form and eventually the final state of a burnout process, during which the syndrome’s components may have affected each other. In working populations, burnout should rather be defined as a stress syndrome that reflects a state of unwell-being which still allows the employee to do her or his job, although possibly less efficient, needing more effort, or resulting in lower performance. Burnout, as a type of work-related strain, is the result of an accumulation of work-related stress (Shirom, 2009).

According to Maslach (1982), burnout is defined by emotional exhaustion, depersonalization and low personal accomplishment. In this dissertation, I focus on emotional exhaustion as the core component of burnout (Lee & Ashforth, 1996). This approach is justified, in large parts, for two reasons. First, although a number of researchers (e.g., Moore, 2000; Shirom, 2003) have called into question Maslach’s (1982) three component conceptualization of
burnout, different conceptualizations of burnout include emotional exhaustion as a primary component of burnout (cf. Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Pines, Aronson, & Kafry, 1981; Shirom, 1989). This suggests that emotional exhaustion is indeed central to the experience of burnout. In line with this, people who describe themselves or others to experience burnout, most often refer to the experience of exhaustion (cf. Maslach et al., 2001). Emotional exhaustion is manifested by both physical fatigue and a sense of feeling psychologically and emotionally "drained". Emotionally exhausted employees typically feel depleted of the energy they once devoted to their work. Second, empirically emotional exhaustion is seen as the burnout component which is most responsive to the demands in the work environment. Indeed, among the three burnout components most consistent results were found for emotional exhaustion (cf. Halbesleben & Bowler, 2007; Maslach et al., 2001). With regards to performance consequences of exhaustion, Taris (2006, p. 331) concluded in his review on burnout and job performance that “future research should concentrate on the relationship between exhaustion and performance; research on the effects of depersonalization and personal accomplishment on performance seems less likely to yield fruit.”

**Emotional Exhaustion: Antecedents, Individual Differences and Consequences**

Thus far, I highlighted the relevance of burnout for individuals and organizations and defined burnout, especially emotional exhaustion. In the following paragraph, I will take one step back and first outline what we know and what we don’t know about the antecedents of job strains, such as emotional exhaustion, and point out where this dissertation adds to the current state of research. Namely, we know quite well that job demands generally harm employees’ well-being. However, we know much less about whether this applies in general and if not which factors alter these relationships. Therefore, I will introduce the research on interaction effects, particularly on the buffer hypothesis. I will outline the idea of match along with the Demand-
Induced Strain Compensation (DISC) model (de Jonge & Dormann, 2003, 2006) to examine the role of specific work-related resources. Next, I will focus on the role of individual differences and introduce the Effort-Reward Imbalance (ERI) model (Siegrist, 1996, 2002) with its person variable overcommitment (OC), which is proposed to be a vulnerability factor for employees experiencing stressful working conditions. In the last part, I will turn to consequences of emotional exhaustion, namely cognitive performance. Despite suggestions that burnout has significant impact on people, their performance, the performance of organizations, and society on the whole (Maslach et al., 2001; Paine, 1982; Schaufeli, 2003), more research is needed on the relationship between burnout and its consequences. Beyond the dramatic numbers of sickness absences and its associated costs mentioned earlier, this part underpins the importance of studying consequences of emotional exhaustion in working, apparently healthy, individuals.

Antecedents of emotional exhaustion. Job features that affect employees’ well-being can be categorized into two broad categories, namely job demands and job resources (Demerouti et al., 2001). Job demands are obligations and stimuli at work that require sustained cognitive, emotional, or physical effort (cf. Jones & Fletcher, 1996). Job resources are theoretically similar to coping options; they can be broadly conceptualized as a kind of energetic reservoir that can be tapped when the individual has to cope with stressful stimuli (cf. Hobfoll, 1989). There is substantial evidence that especially high job demands, but also lacking resources, affect emotional exhaustion (Crawford, LePine, & Rich, 2010; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010). For instance, qualitative and quantitative work overload, role ambiguity, role conflicts, as well as a lack of feedback and autonomy were repeatedly found to be related to emotional exhaustion (Borritz, Bültmann, Rugulies, Christensen, Villadsen, & Kristensen, 2005; Lee & Ashforth, 1996, Maslach & Leiter, 2008; Schaufeli & Bakker, 2004). Further, negative
social exchange relationships (i.e., lack of reciprocity) were found to predict emotional exhaustion (for an overview see Schaufeli, 2003).

**Interaction effects.** The initially mentioned epidemiological data on burnout highlight the importance to accurately identify the etiologic factors related to the development of work-related exhaustion. Knowing these factors and understanding how they act, has the potential of advancing preventive health practices at workplaces. Individual differences and job resources might qualify job demand–strain relationships. Taking these concepts into account potentially specifies descriptions of job demand–strain relationships and uncovers new potential for interventions. It is plausible that job features do not only independently of one another affect employees’ well-being; they can also interact. This line of thinking yielded interaction hypotheses, such as the buffer hypothesis (Cohen & Wills, 1985). Its basic idea is that some job characteristics (i.e., resources) can eliminate the harmful effects of other job characteristics (i.e., demands) that may be impossible or undesirable to eliminate through job redesign. Because job demands often can not be reduced, the idea of increasing job resources or work-related personal resources to combat strain instead, is appealing. Practically, this could provide a basis for training interventions and job redesign to eliminate the demands’ negative effects.

The above mentioned buffer hypothesis was mostly tested within the Job Demand-Control-Support model (Karasek, 1979, Karasek & Theorell, 1990) focusing on the resources job control and social support. Combining the two dimensions of job demands and job control, Karasek (1979) stated that jobs characterized by high demands and low control (“high strain jobs”) bear the highest risk of illness and reduced well-being. By contrast, in jobs characterized by low demands and high control (“low strain jobs”), the occurrence of adverse reactions is rather unlikely. The original Job Demand-Control model was extended by integrating social support at the workplace as a third dimension. According to the buffer hypothesis of the Job Demand-
Control-Support model, social support moderates the negative impact of high strain (i.e., a combination of high demands and low control), thus explicitly predicting a three-way interaction of job characteristics. It is important to note that reduced well-being in “high strain jobs” as predicted by the strain hypothesis can be the result of both additive and multiplicative effects of job demands, job control and social support. However, reviews of existing research on the Job Demand-Control-Support model indicate that main effects, rather than interactions, characterize the evidence (de Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser et al., 2010; van der Doef & Maes, 1999). These studies indicate that we know quite well that demands and resources might in general predict job strain (Crawford et al, 2010), but little support was found thus far for factors that counteract or even aggravate these detrimental effects.

**The match hypothesis and the Demand-Induced Strain Compensation model.** It was suggested that demands, resources, and strains are multidimensional (emotional, cognitive or physical) and that the match of their dimensions would impact how they influence each other (Cohen & Wills, 1985). According to de Jonge and Dormann (2003, 2006), three different types of job demands should be distinguished: (a) emotional demands, which refer primarily to the effort needed to deal with organizationally desired emotions during interpersonal transactions (Morris & Feldman, 1996); (b) cognitive demands, which are primarily associated with the brain processes involved in information processing (Hockey, 2000); and (c) physical demands, which impose primarily on the musculoskeletal system (cf. Hockey, 2000). Similarly, job resources can be of emotional (e.g., sympathy and affection provided), cognitive (e.g., information provided), or physical (e.g., ergonomic aids) nature. Finally, strains may also be of emotional (e.g., emotional exhaustion), cognitive (e.g., low creativity or problems to concentrate), or physical (e.g., back pain) nature (cf. Koslowsky, 1998; Le Blanc, de Jonge, & Schaufeli, 2000).
Based on the idea of multidimensionality it was suggested that job demands and resources do not interact randomly. Two types of match were proposed for the relationships between job demands, job resources, and strains. First, for a buffering effect between resources and demands to occur, the type of resource (e.g., instrumental support as a physical resource) should correspond to the type of demand (e.g., lifting heavy work material as a physical demand; e.g., Cohen & Wills, 1985). Second, Frese (1999) extended the match hypothesis by proposing that demands and resources more likely affect strains if strains belong to the same dimension as their predictors.

Integrating the buffering hypothesis and the two match hypotheses, de Jonge and Dormann (2003, 2006) introduced the DISC model. In the DISC model, the so called compensation principle resembles the buffer hypothesis. The DISC model refers to the match of job demands and job resources as double match of common kind and to the match of job characteristics and job strain as double match of extended kind. Based on the idea of double matches of common and extended kind as well as the multidimensionality of demands, resources, and strains, the triple-match principle was developed (de Jonge & Dormann, 2003, 2006). The triple-match principle theoretically builds on the principle of functional homeostatic regulation transferred to the organizational setting (e.g., Vancouver, 2000). It is assumed that individuals activate functionally corresponding resources to mitigate the effects of specific stressors because matching resources are more likely to be effective. Thus, the triple-match principle proposes that the strongest interaction effects of job demands and resources should be observed if demands, resources as well as strains belong to the same dimension (Study 1 of this dissertation). Therefore, triple match interactions are assumed to be more likely than double match interactions or non-matching interactions. For example, emotional support should be better-suited to buffer the impact of conflicts with customers on emotional exhaustion than for example, a non-matching
resource, such as autonomy, to buffer the impact of role ambiguity on back pain. In a recent review of DISC studies, van den Tooren, de Jonge, and Dormann (2011) found cumulative evidence in support of the triple-match principle.

**Individual differences, the Effort-Reward Imbalance model, and emotional exhaustion.** I now turn from job characteristics (e.g., job resources) that qualify job–demand relationships, to individual characteristics. Research has thus far focused on main effects of individual characteristics on emotional exhaustion. For instance, emotional exhaustion was found to be negatively related to external locus of control and active coping (cf. Schaufeli & Enzmann, 1998) while it was positively related to neuroticism and openness (Burisch, 2002; Kokkinos, 2007; Langelaan, Bakker, van Doornen, & Schaufeli, 2006; Zellars, Perrewé, & Hochwarter, 2000). Research on the moderating role of individual characteristics for the relationship between job demands and emotional exhaustion is still scarce. Although, recent findings highlight the relevance of individual differences in demand–strain relationships (cf. Semmer & Meier, 2009; Suls & Martin, 2005) and thus underpin the importance of considering interaction effects in occupational health psychology. It was shown that associations between demands and strains do not hold for every individual in the same way (Spector, 2003). For instance, studies extended the Job Demand-Control model (Karasek, 1979) predicting burnout, upper respiratory illnesses and immune function by investigating the interplay of job demands, job control and individual characteristics. These studies suggests that individual differences in coping style, explanatory style, proactive personality, and self-efficacy influence the individual’s psychological adjustment to the constraints of a given work environment (Fernet, Guay, & Senécal, 2004; de Rijk, Le Blanc, Schaufeli, & de Jonge, 1998; Salanova, Peiro, & Schaufeli, 2002; Schaubroeck, Jones, & Xie, 2001).
In this dissertation, I focus on a theoretical model that explicitly postulates an interaction of stressful working conditions and personal characteristics on employee’s strain—the ERI model (Siegrist, 1996, 2002). Over the past 15 years, the model received a great amount of attention in occupational health psychology. It builds on the notion of social reciprocity. Social reciprocity refers to a core feature of the work contract, which defines distinct obligations or tasks to be performed in exchange for adequate gains. In the ERI model, costs represent job demands or obligations that are imposed on the employee (e.g., constant time pressure or frequent interruptions). Occupational gains include esteem, job security and salary/career opportunities (Siegrist, 1996, 2002). The main assumption of the ERI model is that a failed reciprocity between high work-related costs and low occupational gains experienced by an individual may cause a state of emotional distress. This in turn can result in a sustained strain reaction and consequently lead to adverse effects on employee health and well-being in the long run (Bosma, Peter, Siegrist, & Marmot, 1998; Kivimäki et al., 2002; Rugulies et al., 2009; Siegrist, 2005; Stansfeld, Bosma, Hemingway, & Marmot, 1998). Evidence has shown that ERI impacts self-rated health and psychological well-being (e.g., depression), health behaviors (e.g., smoking, alcohol consumption), as well as bodily symptoms, and physical diseases (e.g., cardiovascular diseases; for reviews see Siegrist, 2010; Tsutsumi & Kawakami, 2004; (Siegrist, 2005; Tsutsumi & Kawakami, 2004; van Veghel, de Jonge, Bosma, & Schaufeli, 2005). Of specific interest for this dissertation is the proposition that OC further qualifies the detrimental relationships between ERI and personal as well as organizational outcomes (Study 2 of this dissertation). Overcommitment, as the intrinsic component of the ERI model (Siegrist, 1996, 2002), is a motivational pattern of excessive work-related commitment and a high need for approval. Overcommitment puts employees at an increased risk of strain from non-symmetric exchange. Individuals differ
regarding their level of OC and are therefore assumed to react differently to stressful working conditions, such as ERI.

**Consequences of emotional exhaustion.** Individuals as well as organizations likely have an interest in the consequences of emotional exhaustion. Thus, research in occupational health psychology should not only examine effects of working conditions on individual well-being and health, but should also examine how working conditions are related to employees’ functioning. Because emotional exhaustion summarizes individuals’ experiences of stressful working conditions, research on the consequences of emotional exhaustion might also reveal consequences of stressful working conditions. Emotional exhaustion may be used as a proxy variable to assess the extent to which individuals have experienced stressful working conditions that have depleted their resources and affected their cognitive functioning.

Van der Linden, Keijsers, Eling, and van Schaijk (2005) suggest that impaired cognitive functioning is due to specific information-processing aspects of burnout, namely, deficits in attention. They state that burnout is particularly accompanied by difficulties in the executive control over attention and memory functions. These executive control deficits, in turn, are likely to compromise cognitive performance, because cognitive performance requires attention, information processing, and encoding and retrieval of information. Accordingly, compromised executive control can lead to several behavioral expressions, such as loss of thought, problem-solving difficulties, and forgetfulness. Affirming these assumptions, initial research found cognitive performance deficits in burnt-out and chronically stressed people in episodic, working, and prospective memory (Öhman, Nordin, Bergdahl, Birgander, & Neely, 2007), cognitive speed (Österberg, Karlson, & Hansen, 2009), nonverbal memory, auditory and visual attention (Sandström, Rhodin, Lundberg, Olsson, & Nyberg, 2005), sustained attention, and response inhibition (van der Linden et al., 2005).
In line with this evidence from laboratory research and the above outlined reasoning, clinical observations and subjective complains also suggest cognitive impairments to be associated with emotional exhaustion (Maslach et al., 2001; Schaufeli & Enzmann, 1998). For instance, burnt-out individuals often complain about reduced problem-solving and learning abilities as well as difficulties in ‘keeping their mind’ on daily tasks (Maslach et al., 2001; Schaufeli & Enzmann, 1998). Individuals suffering from burnout or mental fatigue report cognitive impairments in everyday tasks (e.g., forgetting what one was doing, forgetting what to fetch, forgetting names and appointments; Broadbent, Cooper, FitzGerald, & Parkes, 1982) and problems related to deficiencies in attention, concentration, and memory. In addition, (affective) well-being was correlated with self-reports of cognitive functioning (e.g., number of minor everyday errors; Broadbent et al., 1982), one’s ability to concentrate and one’s decision making skills (e.g., Goldberg, 1972; Wissing & Van Eeden, 2002).

Beyond these subjective reports on cognitive impairments, to date, very little is known about consequences of work-related exhaustion for cognitive performance (cf. Marin et al., 2011). Therefore, it is of interest to study the relationship of exhaustion and cognitive performance. Thereby, it seems valuable to combine subjective experiences of cognitive impairments, peer-ratings there of, and objective data such as neuropsychological test data. Moreover, it is of interest to study these relationships in working, apparently healthy individuals, for a comparison with existing studies that focused on clinical burnout cases. Cognitive performance impairments are certainly an aversive experience for the individuals and their social environment. Unless cognitive impairments become clinically relevant, organizations will likely show a greater interest in deficits in job performance and health impairments that might cause sickness absences, as their impact on organizations productivity is more obvious. Thus, this
dissertation focuses on cognitive performance but also considers job performance and physical health as consequences of emotional exhaustion (Study 3 of this dissertation).

**Research Goals**

The overarching goal of this dissertation is to extend research on the burnout syndrome, more specifically emotional exhaustion, as a type of work-related strain. In addition, this dissertation contributes to the literature by investigating the impact of stressful working conditions and emotional exhaustion on individual performance. The first goal of this dissertation is to identify specific factors that alter the relationship between stressful working conditions and job strain. More specifically, this work focuses on factors that can put individuals at risk for or protect them from detrimental effects of stressful working conditions on emotional exhaustion and job performance (Study 1 and 2). The first study examines if two types of resources buffer the relationships between matching and non-matching job demands on emotional exhaustion. Under the assumption that matching resources are more likely to act as a buffer, especially if the dimensions of both demands and strains match with the dimension of the resource, Study 1 compares different degrees of match. Namely, it tests whether triple-match interactions (i.e., interactions between emotional demands and emotional resources on emotional exhaustion) are more likely than double-match interactions. The second study intents to advance research on personal work-related characteristics that may constitute vulnerability factors. In this study, I propose that the person variable, overcommitment, will moderate the relationships of ERI with emotional exhaustion and job performance. The relationships of ERI with emotional exhaustion and job performance are hypothesized to be more positive, respectively more negative, for highly overcommitted employees.

The second goal of this dissertation is to advance knowledge on the consequences of burnout. Therefore, Study 3 will examine the relationships of emotional exhaustion with multiple
indicators of individual performance. I propose that emotional exhaustion is negatively related to
cognitive performance (self- and peer-rated cognitive impairments in everyday tasks and learning
and memory performance in a neuropsychological test). In addition, Study 3 proposes a negative
association between emotional exhaustion and physical health.

To sum up, this dissertation tests and extends two theoretical frameworks, namely the
DISC model (de Jonge & Dormann, 2003, 2006) and the ERI model (Siegrist, 1996, 2002) with
regards to predictor and outcome variables as well as methodological aspects. In the first study, I
test for the first time the DISC model in a longitudinal study with a number of teacher specific
variables in a sample of experienced teachers. This adds evidence on the direction of effects. It
improves the generalizability of the DISC model, and identifies conditions that increase and
compensate the risk of work-related exhaustion in teachers. Moreover, Study 1 is one of the first
empirical studies that statistically tests the triple-match hypothesis. The second study extends the
scope of the ERI model by testing, for the first time, the ERI model’s predictive value for job
performance. Although the model refers to the work context, previous studies mostly focused on
the prediction of individual health and well-being. Predicting organizational outcomes as well as
individual well-being will extend the model’s scope and thus makes it more interesting for
organizational researchers and practitioners.

To strengthen the generalizability of this dissertation’s findings, I apply different
methodological approaches and retrieve data from three independent samples of different
occupations (teachers and blue- and white-collar company employees). Because teachers show
high burnout rates (Meyer et al., 2011; Rudow, 1999; Schaufeli & Enzmann, 1998; Schmitz,
2004), they make an interesting study population for this dissertation. Blue- and white-collar
company employees were chosen for Study 2, because they provide more variety in job security,
promotion prospects, and salary and are thus better suited to study ERI. The three empirical
studies include two longitudinal studies (Study 1 with a time lag of almost two years and Study 3 with a time lag of about six months) and one cross-sectional study (Study 2). In Study 2, I apply multilevel analyses (hierarchical linear modeling) to account for the dependence of persons in work teams, especially apparent in the team supervisor performance ratings. In addition, this dissertation goes beyond the common use of self-report data, as it includes second source and objective test data: In the second study, I retrieve supervisor-ratings of job performance. The third study includes peer-ratings of participants’ cognitive impairments in everyday tasks as well as objective cognitive test data from a neuropsychological test of learning and memory performance.

Practical Relevance

From a practical point of view, results of this dissertation potentially yield new insights into stressful working conditions as well as work-related protective and vulnerability factors that are potential targets for interventions. For instance, organizational-level interventions might target stressful working conditions such as time pressure or ERI. Individual-level interventions might target risk factors such as OC and resources such as self-efficacy and emotional support, taking into account the match of the concepts’ dimensions.

Studying cognitive impairments in apparently healthy employees, who experience work-related exhaustion to some degree, might yield insights whether the cognitive impairments, associated with burnout, gradually increase with emotional exhaustion or develop in discrete stages. Results may uncover a loss spiral of exhaustion and individual performance that should be targeted with stress-management interventions in its early beginnings. The combination of self-report data on emotional exhaustion and cognitive performance with peer-ratings and neuropsychological test data, might yield qualitative support for self-reports of exhausted employees on cognitive impairments. Finally, if future research affirms cognitive impairments to
be an indicative symptom of burnout, findings of Study 3 might be useful for the development of diagnostic criteria or instruments.

**Dissertation Outline**

This dissertation is composed of three empirical studies that examine how interaction effects relate to emotional exhaustion (Study 1 and 2) and how emotional exhaustion affects different facets of individual performance (Study 3). These three studies are presented in Chapter 2 to 4. They can be read independently as each chapter includes a separate theoretical introduction and discussion. In Chapters 2 to 4, I will refer to “we” instead of “I” to acknowledge that these papers are co-authored upon publication in scientific journals. The references of all chapters can be found at the end of the dissertation.

Study 1 (Chapter 2) investigates how matching and non-matching cognitive and emotional demands and resources are related to emotional exhaustion in teachers. Theoretically, I draw on the DISC model (de Jonge & Dormann, 2003, 2006) that proposes that demands, resources, and strains are multidimensional comprising emotional, cognitive, and physical components. As proposed by the compensation principle, I test if resources compensate detrimental effects of job demands. Second, as proposed by the triple-match principle, I test if interaction effects between job demands and resources are more likely if demands, resources, and outcomes relate to the same dimension – that means if all three components match. I test these hypotheses on data from 177 school teachers and a subsample that was re-examined after a time lag of about 21 months (N= 56).

1 Study 1 is co-authored by Silja Bellingrath and Brigitte M. Kudielka (manuscript submitted for publication at *Applied Psychology: Health and Well-being*).
Study 2 is co-authored by Jana Kühnel and Brigitte M. Kudielka (2012, *International Journal of Stress Management*).
Study 3 is co-authored by Christian Stamov-Roßnagel, Maren Wolfram, Silja Bellingrath, and Brigitte M. Kudielka (in press, *Stress and Health*).
Chapter 1: General Introduction

Study 2 (Chapter 3) investigates if ERI (as a measure of chronic work stress) and OC (as a person variable) are related to self-rated emotional exhaustion (as a personal outcome) as well as supervisor-rated job performance (as an organizational outcome). Second, the study tests the often neglected interaction hypothesis of the ERI model (Siegrist, 1996, 2002) which proposes that OC potentiates the detrimental relationships between ERI and outcomes, here emotional exhaustion and job performance. I test these hypotheses applying multilevel modeling using data from 152 employees nested in 20 teams from a German manufacturing company.

Study 3 (Chapter 4) investigates how emotional exhaustion relates to cognitive performance, job performance, and health. Based on previous research, emotional exhaustion is assumed to go along with executive control deficits (cf. van der Linden et al., 2005). In addition, it draws on the Conservation of Resources theory (Hobfoll, 2001) and further hypothesizes that emotional exhaustion, as a state of depleted resources, negatively affects job performance. Therefore, Study 3 tests if emotional exhaustion is negatively related to cognitive performance and job performance. Finally, I test if emotional exhaustion has negative health consequences. To test these hypotheses, I retrieved self-rated, peer-rated and neuropsychological test data from 100 teachers with a time lag of about six months.

In the final chapter (Chapter 5), I summarize and integrate the results of the three empirical studies and point out how they contribute to different fields of work and organizational psychology. I discuss theoretical as well as practical implications arising from the findings and derive some general conclusions that can be drawn from the studies.
STUDY 1*:
THE INTERPLAY OF MATCHING AND NON-MATCHING JOB DEMANDS AND RESOURCES ON EMOTIONAL EXHAUSTION AMONG TEACHERS

Summary

We investigated how matching and non-matching emotional and cognitive demands and resources are related to emotional exhaustion in teachers. Theoretically, we draw on the Demand-Induced Strain Compensation (DISC) model that proposes that resources and strains are multidimensional comprising emotional, cognitive and physical components. We first tested if resources compensate aversive effects of demands. Second, we tested if, as proposed by the triple-match principle, interaction effects between job demands and resources are most likely if demands, resources and outcomes relate to the same dimension—that means if all three components match. We retrieved data from 177 school teachers; a subsample was re-examined after a time lag of about 21 months (N= 56). Linear regression analyses reveal concurrent and lagged main and interaction effects of teacher specific emotional and cognitive job demands and resources on emotional exhaustion. Results support the compensation principle and triple-match principle. Therefore, the DISC model seems to provide a valuable framework for the study of interaction effects in job stress research and, in particular, for interventions to reduce job strain in teachers.

*This Chapter is a previous version of an article that is conditionally accepted for publication in Applied Psychology: Health and Well-Being.
Introduction

In occupational health research two kinds of job-related variables are significantly related to strain-outcomes like burnout, namely job demands and job resources (Frese & Zapf, 1994; Schaufeli & Bakker, 2004). Job demands are obligations and stimuli at work that require sustained cognitive, emotional or physical effort (cf. Jones & Fletcher, 1996). Job resources are theoretically similar to coping options; they can be broadly conceptualized as a kind of energetic reservoir that can be tapped when the individual has to cope with stressful stimuli (cf. Hobfoll, 1989). It has been hypothesized that the impact of job demands on job strains depends on the availability of an individual’s resources, because resources can buffer the potential detrimental impact of demands (cf. Cohen & Wills, 1985; van den Tooren, de Jonge, & Dormann, 2011). Daniels and de Jonge (2010), however, recently concluded that empirical evidence regarding the interaction between job demands and job resources on strain-variables has been mixed at best.

With the current study, we contribute to research on interaction effects in the work stressor-strain literature. We test whether matching and non-matching cognitive and emotional job resources buffer the relationship between emotional and cognitive job demands on the one hand and emotional exhaustion on the other (i.e., a type of emotional job strain). The present investigation is theoretically guided by the Demand-Induced Strain Compensation (DISC) model (de Jonge & Dormann 2003; 2006). According to the DISC model, demands, resources and strains do not interact randomly. Rather, the DISC model assumes that job demands, resources and strains are multidimensional and can be classified as either emotional, cognitive or physical. Further, buffering effects are assumed to occur more likely if the type of resource (e.g., emotional support) corresponds to the type of demand (e.g., conflicts with customers), reflecting the match hypothesis (e.g., Cohen & Wills, 1985). Extending this idea of match, de Jonge and Dormann (2003, 2006) developed the triple-match principle (TMP) within the framework of the DISC
model. That is, the relationship between resources, job demands and job strains should be strongest when all three factors (demands, resources and strains) belong to a common dimension (i.e., emotional, cognitive, physical). For example, emotional support should be well-suited to buffer the impact of conflicts with customers on emotional exhaustion. Based on the DISC model, we investigate the interplay between emotional and cognitive matching and non-matching demands and resources on concurrently and lagged assessed emotional exhaustion among teachers. Unlike previous DISC studies, we test the interaction between demands and resources with at least two demands per dimension, increasing the reliability of our findings. Focusing on the dimensions of demands and resources and their match introduces a new theoretical approach to research on teacher burnout. Simultaneously, this study for the first time tests the DISC model in a sample of experienced teachers that have been exposed to job-specific demands for many years. Thus, the present study potentially adds to the generalizability of the DISC model across different occupations. So far, the DISC model has mostly been tested using cross-sectional designs (for exceptions see de Jonge & Dormann, 2006; Chrisopoulos, Dollard, Winefield, & Dormann, 2010; van den Tooren, de Jonge, Vlerick, Daniels, & Van de Ven, 2011). Until now, only one study statistically tested the triple-match principle (van den Tooren, de Jonge, & Dormann, 2011). The present study thus contributes to the literature by testing the DISC model with a longitudinal design in a sample of German school teachers, including a statistical test of the triple-match hypothesis. Moreover, the presently chosen time interval of 2 years was previously shown to be most appropriate to demonstrate effects of job conditions on employee strain (Dormann & Zapf, 2002).
The Compensation Principle and the Match Principle Within the DISC Model

The compensation principle basically reflects the buffer hypothesis. That is, high resources are proposed to compensate (buffer) the detrimental effects of job demands on strain outcomes. The compensation principle does not include the dimensionality of variables. It generally assumes any resource to have compensating potential on the detrimental effects of any demand on any strain. The DISC model differentiates between three types of matches. Within the framework of the DISC model, a double-match of common kind refers to the match between the type of demands and the type of resources (e.g., emotional demands and emotional resources), whereas a double-match of extended kind refers to a match between specific types of strain and either specific types of demands or resources (e.g., emotional demands and emotional strain; cf. Frese, 1999). The triple-match principle proposes that the strongest interaction effects between job demands and resources on strains should be observed when demands, resources as well as strains relate to the same dimension (de Jonge & Dormann, 2003, 2006). That is, resources should be most effective at buffering consequences of matching job demands when the outcome is likewise of the same kind. Consequently, the DISC model proposes double-match (and, of course, non-match interactions) to be less likely than triple-match interactions. In a recent review of DISC studies, van den Tooren, de Jonge, & Dormann (2011) found cumulative evidence in support of the triple-match principle.

Demands, Resources and Strains in the Teaching Profession

We are particularly interested in the triple-match interaction of job demands, resources and strain along the emotional dimension because emotions are a central aspect of human service work (Zapf, Vogt, Seifert, Mertini, & Isic, 1999). More specifically, because emotional demands are of particular importance in service jobs it has been postulated that the strongest triple-match
interactions should occur for the emotional triad of demands, resources and strains (de Jonge & Dormann, 2003).

Teachers provide an excellent sample to study the interaction between emotional demands, resources and strains. It is widely recognized that teaching is potentially a highly stressful occupation (e.g., Santavirta, Solovieva, & Theorell, 2007). For example, in a comparison of different occupations teachers reported especially high levels of emotional exhaustion (Schaufeli & Enzmann, 1998). Therefore, we investigate moderated relationships between demands and emotional exhaustion, the core component of burnout (Lee & Ashforth, 1996; Shirom, 1989), among teachers. Emotional exhaustion is considered a highly relevant work-related consequence that potentially develops due to chronic stress in the teaching profession (Greenglass & Burke, 2003; Maslach & Leiter, 1999).

Emotional demands might be especially critical for the development of emotional exhaustion in teachers. For instance, teachers are often confronted with emotional demands that arise from social interactions at work. Among human service workers, verbal abuse and negative social interactions with customers and co-workers have been found to be important causes of psychological strain (e.g., emotional exhaustion; see Ben-Zur & Yagil, 2005; Dormann & Zapf, 2004; Grandey, Kern, & Frone, 2007). For teachers, parents’ criticism and conflicts with colleagues represent relevant operationalizations of verbal abuse and negative social interactions with customers and co-workers and thus represent important emotional job demands for teachers. Additionally, we include emotional dissonance as an emotional demand that is anchored in the social environment (Zapf et al., 1999) and thus relevant for teachers. Emotional dissonance occurs when an employee is required to express emotions which are not genuinely felt in the particular situation (Zapf, 2002). Teachers are likely to experience emotional dissonance in their interactions with students, colleagues and parents (cf. Näring, Briët, & Brouwers, 2006).
Emotional dissonance has also been shown to be one of the most relevant antecedents of strain in a variety of studies within the human service sector (Bono & Vey, 2005; Morris & Feldman, 1996; Zapf, 2002).

In addition to emotional demands we focus on cognitive demands, which have been shown to represent major job demands in the teaching occupation as well. We include time pressure (Hakanen, Bakker, & Schaufeli, 2006; Kokkinos, 2007) and classroom disruptions (Burke, Greenglass, & Schwarzer, 1996; Hakanen et al., 2006; Kühnel & Sonnentag, 2010). Including this second (cognitive) dimension allows us to set up double-match interactions (see above).

Finally, we focus on two resources that have been identified as effective means to reduce emotional exhaustion in teachers: (1) the emotional resource emotional support (e.g., Burke et al., 1996; Greenglass, Fiksenbaum, & Burke, 1996; Viswesvaran, Sanchez, & Fisher, 1999), and (2) the cognitive resource teacher self-efficacy (e.g., Brouwers & Tomic, 2000; Schwarzer, Schmitz, & Tang, 2000).

**Study Outline and Hypothesis**

To sum up, in this study we investigate if three emotional demands (parents’ criticism, conflicts with colleagues and emotional dissonance) and two cognitive demands (time pressure and classroom disruptions) interact with an emotional resource (emotional support) and a cognitive resource (teacher self-efficacy) in predicting emotional strain (emotional exhaustion). Each demand is proposed to interact with each resource. This results in a total of ten interactions. In order to test concurrent as well as lagged effects of the proposed relationships, we assessed emotional exhaustion at two measurement occasions, with a time interval of two years.

We focus on the compensation principle and the triple-match principle of the DISC model (see above). Main effects of job demands and resources on emotional exhaustion will be tested in
the course of testing the proposed interaction hypotheses. Based on the theoretical assumptions of the DISC model we propose two hypotheses:

**Hypothesis 1.** Resources moderate the relationship between job demands and emotional exhaustion at Time 1 (1A) and at Time 2 (1B), such that the availability of resources mitigates the positive relationships between job demands and emotional exhaustion at both measurement occasions.

**Hypothesis 2.** Triple-match interactions (i.e., interactions between emotional demands and emotional resources on emotional exhaustion) are more likely than double-match interactions.

**Method**

**Sample and Procedure**

After signing a letter of informed consent, 190 teachers provided data for our study. Due to incomplete data we had to exclude 13 cases resulting in a sample size of 177 teachers. Excluded cases did not differ significantly from included cases in any study variable. The average age in our sample was 46.1 years ($SD = 9.5$), ranging from 25 to 64 years. Women made up 67% of participants. Data on the population of German teachers from the German Federal Statistical Office (Statistisches Bundesamt, Fachserie 11, Reihe 1, 2004/05) suggest representativeness of our sample regarding age (47.1 years, 26-65) and gender (67.7%).

About two years later, a subsample of 56 participants volunteered to answer a brief survey which included the assessment of emotional exhaustion. The time lag between the two measurement occasions was about 21 months ($M = 633$ days; $SD = 108$). Subjects that participated only at Time 1 ($N = 121$) did not differ significantly from subjects participating twice ($N = 56$) in any of the study variables except age (the former sample was on average four years older than the latter; $F = 7.19$, $p = .008$).
Measures

Emotional job demands. We assessed three emotional job demands, namely, parents’ criticism, conflicts with colleagues and emotional dissonance. We measured parents’ criticism and conflicts with colleagues with the teacher-specific measure FASS developed by Krause and colleagues (Kaempf & Krause, 2004). Participants answered the items along a 5-point scale ranging from 1 (does not apply at all) to 5 (applies completely). Parents’ criticism was assessed with a three item scale. A sample item is “Parents of the pupils criticize the teachers’ work.” Conflicts with colleagues were assessed with a four item scale. A sample item is “There are disagreements among groups of teachers.” We assessed the emotional job demand emotional dissonance with the five item scale of the Frankfurt Emotion Work Scales (Zapf et al., 1999). A sample item is “How often do you have to show emotions that do not correspond to your true feelings?” Participants answered the items with a 5-point scale ranging from 1 (never/rarely) to 5 (very often/several times per hour).

Cognitive job demands. We assessed two cognitive job demands, namely time pressure and classroom disruptions. Time pressure was assessed with four items of the ISTA developed by Semmer, Zapf, and Dunkel (1999). A sample item is “How often are you pressed for time at work?” We assessed the cognitive job demand classroom disruptions with seven items from the teacher-specific measure FASS developed by Krause and colleagues (Kaempf & Krause, 2004) that showed good reliabilities in other studies (e.g., Kühnel & Sonnentag, 2010). A sample item is “Pupils do not pay attention to the content of lessons and disturb lessons.” Participants answered the items of both measures using a 5-point scale ranging from 1 (does not apply at all) to 5 (applies completely).

Emotional and cognitive resources. We assessed one emotional and one cognitive resource. We measured the cognitive resource teacher self-efficacy with a self-efficacy scale
developed specifically for teachers by Schmitz and Schwarzer (2000). The scale contains 10 items. A sample item is “Even if my lesson is disrupted I am sure to keep the necessary calmness.” We assessed the emotional resource emotional support with the social support questionnaire F-SozU (Fydrich, Sommer, & Brähler, 2002). The scale contains 14 items. A sample item is “When I'm depressed, I know whom I can go to without any reluctance.” Respondents answered the items of both measures on a 5-point scale, ranging from 1 (does not apply at all) to 5 (applies completely).

**Emotional strain.** We assessed emotional strain with the nine item emotional exhaustion scale of the validated German version (Enzmann & Kleiber, 1989; Schwarzer et al., 2000) of the Maslach Burnout Inventory Educators Survey (MBI-ES) (Maslach, Jackson, & Leiter, 1996) at both measurement occasions. A sample item for emotional exhaustion is “I feel burned out from my work.” Participants answered the items with a 7-point scale, ranging from 1 (never) to 7 (daily).

**Control variables.** Consistent with many other work stress studies (e.g., Zapf, Dormann, & Frese, 1996), age and gender were included as control variables as their relation with well-being outcomes is well-established. Negative affectivity has been found to contaminate the relationship between stressors and strain (Burke, Brief, & George, 1993; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Therefore, we entered negative affectivity as a control variable in our cross-sectional analyses (see below). We assessed negative affectivity with the seven item subscale ‘negative affectivity’ of the German version of the Type-D scale DS-14 (Denollet, 2005; Grande, Romppel, Glaesmer, Petrowski, & Herrmann-Lingen, 2010). A sample item is “I often feel unhappy.” The items are ranked on a 5-point scale, and the anchors are false, rather false, neutral, rather true, and true. Because there is some controversy about including negative affectivity as a control variable (e.g., Spector, Zapf, Chen, & Frese, 2000), we re-ran all analyses
without controlling for negative affectivity. The direction, magnitude and significance of all results remained unchanged. Table 2 (Time 1) and Figures 1-3 display results with negative affectivity included as a statistical control.

**Data Analysis**

We used hierarchical multiple linear regression analyses to test whether there were concurrent and lagged relationships between emotional exhaustion on the one hand and job demands (parents’ criticism, conflicts with colleagues, emotional dissonance, time pressure and classroom disruptions), resources (emotional support and teacher self-efficacy) and their interactions on the other. Given the small sample size at T2, we first addressed the basic assumptions for regression analyses. Based on the inspection of residual scatterplots, kurtosis and skewness, Durbin-Watson statistic and Mahalanobis distance we assumed normality, linearity, homoscedasticity and independence of errors. We calculated interaction terms consisting of the five demands and two resources, resulting in seven double-match and three triple-match interactions. An interaction term is always the product of a centered demand variable and a centered resource variable. In the first step of the regression analyses, we entered the control variables (gender, age, and dispositional negative affectivity; Model 1 in Table 2). In the second step (main effects), we entered two predictor variables (one demand and one resource; Models 2a-2j in Table 2). In the third step (interaction effect), we entered the respective multiplicative interaction term (Model 3a-3j in Table 2). We followed the same procedure for the lagged effects (predicting emotional exhaustion at Time 2). In the first step, we entered age and gender as control variables as well as Time 1 emotional exhaustion to control for third variable effects (Zapf et al., 1996).

To test the compensation principle of the DISC model (Hypothesis 1: the availability of resources mitigates the positive relationships between job demands and emotional exhaustion),
we tested each interaction in a separate regression analysis. This was done because we were interested in the absolute variance explained by each interaction term above the main effects of its components. For significant interaction terms, we conducted simple slope tests with the online calculator provided by Preacher, Curran, and Bauer (2006) to test the significance of the slopes. We defined two conditional values of the moderator variables (resources), namely, one standard deviation above and below the mean, representing high and low resources, respectively. We then graphed the interaction according to the method described by Aiken and West (1991).

To test the triple-match hypothesis of the DISC model (Hypothesis 2: triple-match interactions are more likely than double-match interactions), we followed the procedure established by previous research (e.g., Chrisopoulou et al., 2010; de Jonge & Dormann, 2006) and compared the proportion of significant double-match interactions with the proportion of significant triple-match interactions. To statistically compare the occurrence of double-match interactions versus triple-match interactions, we performed Barnard’s exact test to compute the exact p-value (one-tailed) for the difference of the probability of the two types of interactions. Finally, we ran post-hoc analyses of test power (1-ß) with G*Power 3 (Faul, Erdfelder, Buchner, & Lang, 2009).

**Results**

Table 1 displays means, standard deviations, reliability coefficients (Cronbach’s alpha) and intercorrelations of all study variables. A first inspection of the Pearson zero-order correlations indicates that both emotional and cognitive job demands were positively and resources negatively related to emotional exhaustion at both measurement occasions. All measures included in the analyses show very good reliability (i.e., average Cronbach’s alpha = .89; range = .84 to .94).
Concurrent Relationships Between Job Demands, Resources and Their Interaction on Emotional Exhaustion at Time 1

Results of the linear regression analyses of the concurrent relations between job demands, resources and emotional exhaustion are displayed in Table 2 (Time 1).

Results show that all five job demands were significantly positively related to emotional exhaustion (see Models 2a-2j). Demands or resources significantly predict emotional exhaustion if the 95% confidence interval does not include 0. With Hypothesis 1A (Time 1), we proposed that resources moderate the relationships between job demands and emotional exhaustion, such that high resources buffer the positive relationships between job demands and emotional exhaustion. All three triple-match interactions (i.e., the interactions of the emotional demands parent’s criticism, conflicts with colleagues, emotional dissonance and the emotional resource emotional support predicting emotional exhaustion) reached significance ($p < .05$). Each triple-match interaction explained between 1.2% and 3.1% of the variance in emotional exhaustion at Time 1 (see Table 2: Models 3a-3c for Time 1). The six double-match interactions of the demands parent’s criticism, conflicts with colleagues, emotional dissonance, time pressure, classroom disruptions and the resources teacher self-efficacy and emotional support predicting emotional exhaustion reached significance ($p < .05$; see Table 2: Models 3d-3i for Time 1). Only the double-match interaction of classroom disruptions and emotional support did not reach the level of significance (see Table 2: Model 3j for Time 1). The six double-match interactions each explained between 1.2% and 2.3% of the variance in emotional exhaustion at Time 1.
## Table 1

**Means, standard deviations (SD), Cronbach’s alpha (α) and intercorrelations**

<table>
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<td>.01</td>
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<td>-.47***</td>
<td>.67***</td>
<td>.63***</td>
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<td>.38***</td>
<td>-.20**</td>
<td>-.39***</td>
<td>.43***</td>
<td>.41**</td>
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<td>-</td>
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<td>.23**</td>
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*Note.* Gender: 1 = female, 2 = male. Rows and columns 1-11 display means, standard deviations and intercorrelations of variables at Time 1 with N=177. Row and column 12 displays means, standard deviations and intercorrelations at Time 2 with N=56. * p < .05; ** p < .01; *** p < .001.
## Table 2

Hierarchical multiple linear regression analyses predicting emotional exhaustion at Time 1 and Time 2

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Note. B = Unstandardized regression coefficient. SE = Standard Error of B. CI = Confidence Interval. * p < .05; ** p < .01; *** p < .001

TM = triple-match. DMe = double-match of common kind. DMe = double-match of extended kind.
Figures 1 to 3 display the significant interactions between job demands and resources on emotional exhaustion. In each case, job resources buffered the relationship between job demands and emotional exhaustion. In all significant interactions, demands were positively related to emotional exhaustion when resources were low, but relationships between demands and emotional exhaustion were markedly reduced or non-existent when resources were high. More specifically, simple slope tests for *triple-match interactions* indicate that if emotional support was low, all demands slopes were significant (all \( p < .001 \)) (parents’ criticism: \( t = 4.47 \); conflicts with colleagues: \( t = 3.87 \); emotional dissonance: \( t = 5.67 \); see Figure 1). If levels of emotional support were high, the slopes of parents’ criticism and conflicts with colleagues were non-significant (Fig. 1A and 1B), while the strength of the relationship between emotional dissonance and emotional exhaustion was markedly reduced (\( t = 2.85, p < .05 \); Fig. 1C). Results of the simple slope analyses for the *double-match interactions* reveal a similar pattern. If teacher self-efficacy was low, all demands slopes were significant (all \( p < .001 \)) (time pressure: \( t = 4.31 \); classroom disruptions: \( t = 6.40 \); parents’ criticism: \( t = 3.57 \); conflicts with colleagues: \( t = 3.70 \); emotional dissonance: \( t = 6.27 \); see Figures 2 and 3). If teacher self-efficacy was high, slopes of time pressure, parents’ criticism and conflicts with colleagues were non-significant, and slopes of classroom disruptions (\( t = 3.43, p < .01 \); Fig. 2B) and emotional dissonance (\( t = 2.25, p < .05 \); Fig. 3C) were markedly reduced. Simple slope tests also indicated that with low emotional support, but not high emotional support, the positive slope of time pressure was significant (\( t = 4.51, p < .001 \); see Fig. 2C).
Figure 1. A: Triple-match interaction between parents’ criticism and emotional support for emotional exhaustion at Time 1. B: Triple-match interaction between conflicts with colleagues and emotional support for emotional exhaustion at Time 1. C: Triple-match interaction between emotional dissonance and emotional support for emotional exhaustion at Time 1.

Figure 2. A: Double-match interaction of common kind between time pressure and emotional support for emotional exhaustion at Time 1. B: Double-match interaction of common kind between classroom disruptions and emotional support for emotional exhaustion at Time 1. C: Double-match interaction of extended kind between time pressure and emotional support for emotional exhaustion at Time 1.
Lagged Relationships of Time 1 Job Demands, Resources and Their Interaction With Emotional Exhaustion at Time 2

Results of the lagged analyses are displayed in Table 2 (Time 2). These regression results show that after controlling for age, gender and emotional exhaustion at Time 1 demands and resources are not generally related to emotional exhaustion two years later. In Hypothesis 1B, we proposed that resources buffer the positive relationship between job demands and emotional exhaustion at Time 2. In partial support of Hypothesis 1B, the triple-match interaction of conflicts with colleagues and emotional support was significant explaining 3.5% of variance in emotional exhaustion at Time 2 (see Table 2: Model 3b for Time 2). Likewise, the triple-match interaction of emotional dissonance and emotional support explained 3.5% of variance in emotional exhaustion at Time 2 (see Table 2: Model 3c for Time 2). Figure 4 depicts the two significant
triple-match interactions of the lagged analyses. If emotional support was low, the slopes of conflicts with colleagues and emotional dissonance on emotional exhaustion at Time 2 were significant ($t = 2.06, p < .05$ and $t = 2.12, p < .05$, respectively). If emotional support was high, neither conflicts with colleagues nor emotional dissonance were significantly related to emotional exhaustion at Time 2. The triple-match interaction between parents’ criticism and emotional support in prediction of emotional exhaustion was not significant. We also found no significant double-match interaction for emotional exhaustion at Time 2.

Figure 4. A: Triple-match interaction between conflicts with colleagues and emotional support for emotional exhaustion at Time 2. B: Triple-match interaction between emotional dissonance and emotional support for emotional exhaustion at Time 2.

**Double- versus triple-match.** We hypothesized that triple-match interactions were more likely to occur than double-match interactions (Hypothesis 2). The concurrent analyses resulted in 9 out of 10 significant interaction effects. We found that six out of seven (86%) double-match
interactions were significantly related to emotional exhaustion at Time 1. More specifically, four out of five (80%) double-match interactions of extended kind and both (100%) double-match interactions of common kind reached significance. Furthermore, all three (100%) triple-match interactions were significantly related to emotional exhaustion at Time 1. In the lagged analyses, none of the double-match interactions significantly predicted emotional exhaustion at Time 2. However, two out of three (66%) triple-match interactions significantly predicted emotional exhaustion at Time 2. Results of Barnard’s exact test comparing the ratios of significant to non-significant triple-matches (3/0) and double-matches (6/1) reveal that triple-matches were not significantly more likely than double-matches in the concurrent analyses ($p = .42$). However, triple-matches (2/3) were more likely then double-matches (0/7) ($p = .03$) in the lagged analyses. Thus, the results partially support Hypothesis 2. The likelihood of triple-match interactions was higher than the likelihood of double-match interactions in the lagged analyses but not in the concurrent analyses. Post hoc power analyses (one-tailed; $p = .05$; $N = 56$; number of predictors = 6) revealed that the probability to find significant interaction effects in the lagged analyses was $> 99\%$ for large effects ($f^2 = .35$) and $> 80\%$ for middle sized effects ($f^2 = .15$) (Cohen, 1988). Accordingly, the $\beta$-error was satisfactorily low to detect significant interaction effects in the longitudinal analyses.

**Discussion**

We assumed that the availability of resources could counteract the potentially harmful effects of job demands on teachers’ emotional exhaustion. Moreover, in line with the triple match principle of the Demand-Induced Strain Compensation (DISC) model (de Jonge & Dormann, 2003, 2006) we proposed that the triple-match interactions between emotional demands and emotional resources on emotional exhaustion are more likely than double-match interactions between cognitive demands or resources and emotional counterparts.
This study demonstrates that a set of occupation-specific emotional and cognitive demands and resources are related to emotional exhaustion among teachers. The more emotional or cognitive demands teachers experienced the more emotional exhaustion they reported at Time 1. At Time 2, we did not find these relations in general. However, if teachers had little emotional support conflicts with their colleagues and emotional dissonance at Time 1 predicted their increase in emotional exhaustion two years later (see Figure 4). Firstly, this points out the harmful long term potential of these demands if only little resources are available and, secondly, it suggests that resources such as emotional support gain their beneficial long term potential especially in the face of high demands.

Our results are in line with the compensation principle whereby resources buffer the potentially detrimental relationships between job demands and job strain. In our analyses of concurrent effects, six out of seven double-match interactions and all three postulated triple-match interactions showed the predicted pattern. Furthermore, we found two lagged interactions (conflicts with colleagues x emotional support and emotional dissonance x emotional support) that showed the expected buffering effect of resources. Simple slope analyses for the significant interactions confirmed that teachers with high resources experience concurrently and after two years lower levels of emotional exhaustion when faced with high demands relative to their colleagues with low resources. Taken together, the significant interactions support the compensation principle of the DISC model (e.g., van den Tooren, de Jonge, & Dormann, 2011) as well as general assumptions on buffering effects in job stress models (e.g., Karasek, 1979)

With regard to the match hypothesis, we find it noteworthy that in the concurrent analyses, all interactions resulting of matching demands and resources (i.e., double-matches of common kind and triple-matches) reached significance. The only non-significant interaction was one of non-matching demands and resources (i.e., double-match of extended kind). In contrast to
the concurrent analyses, where we also found a large proportion of double-match interactions, the lagged analyses revealed only triple-match interactions to predict emotional exhaustion at Time 2. Thus, only the emotional resource mitigated the effects of emotional demands on emotional exhaustion after two years. This finding speaks in favor of the triple-match principle. To mitigate the concurrent relationships between demands and strains it seems to suffice if either, demands and resources, demands and strains or resources and strains match. However, the positive lagged effects of demands on strains appear to be mitigated by resources only if demands, resources and strains match. It should be noted that the reduced samples size (and therefore a reduced test power) at Time 2 might contribute, at least in part, to these findings. However, double- and triple-match interactions were tested with the same test power. One explanation might be that triple-match interactions yield stronger or more robust effects that can also be revealed in smaller samples. Indeed, among all tested interaction terms we find the triple-match interaction terms to explain the largest amounts of incremental variance ($\Delta R^2 = 3.5\%$; see Table 2).

In sum, results of the present study support the compensation principle and the triple-match principle. In addition to previous studies that focused on health care workers (de Jonge & Dormann, 2006; van den Tooren & de Jonge, 2008), police officers (Chrisopoulos et al., 2010) and computer scientists (Van de Ven, Vlerick, & de Jonge, 2008), we found support for the compensation principle and the triple-match principle in teachers using longitudinal data. We are inclined to conclude that our results contribute to the generalizability of the DISC models principles and that the DISC model offers a promising framework to better understand health and well-being across different occupational groups, including teachers. However, some caution is warranted because a recent study of Belgium teachers in training did not find support for the matching hypothesis (van den Tooren, de Jonge, Vlerick, Daniels, & Van de Ven, 2011). Results of this longitudinal study (1-year time lag) showed that stress-buffering effects of job resources
on the longitudinal relation between job demands and job strain were equally likely to occur in case of a match and a non-match between demand and resource. Van den Tooren et al. (2011) did not particularly test double- versus triple-match interactions. Thus, from the current state of research we cannot yet finally conclude if the DISC model is generally applicable to teachers, in particular teachers in training. In light of these contradictory findings, further evidence on the match principle in teaching is needed.

Limitations

In this study we focused on occupation specific emotional and cognitive demands and resources and emotional strain. Therefore, it was not possible to test the complete DISC model (de Jonge & Dormann, 2003, 2006) which would be comprised of non-, double- and triple-matches across the three postulated domains (emotional, cognitive and physical). In the present analysis, we did not test the physical domain because physical demands, resources and strains do not compose core features for most teachers. Instead, teachers are primarily confronted with psychological (i.e., emotional and cognitive) job demands. Therefore, we focused on emotional and cognitive variables and cross validated results with different demands per dimension. Furthermore, a review of previous research on the DISC model that has primarily been conducted in the human service sector identified emotional resources as an especially important stress buffer if matching resources were not accessible (van den Tooren, de Jonge, & Dormann, 2011). One further important limitation of this study is that results are based on single source data. Thus, common method variance might have inflated the main effects. Although we statistically controlled for negative affectivity in concurrent analyses and partialled out emotional exhaustion at Time 1 in longitudinal analyses as a partial control of this problem (Burke et al., 1993; Podsakoff et al., 2003), the present results should be interpreted in light of this limitation. Future research may benefit from including more objective data on job demands (e.g., classroom
observations). A related issue for main effects is the problem of unmeasured third variables in cross-sectional data that might lead to spurious relations. However, this is much less likely for moderated relationships as in the present cross-sectional interaction analyses. Even though the longitudinal sample is rather small and thus especially reliability of interaction terms might be affected, post-hoc power analyses give some confidence that our sample size might suffice.

A final limitation of this study is that most significant main and interaction effects are of correlational nature at Time 1 and causal inferences for such relationships are therefore not feasible. However, we were also able to identify a two significant lagged triple-match interactions on emotional exhaustion using longitudinal data available for a subsample of participants. Considering that, to date, only very few longitudinal studies (Chrisopoulos et al., 2010; de Jonge & Dormann, 2006; van den Tooren, de Jonge, Vlerick, Daniels, & Van de Ven, 2011) have investigated the DISC model, the present study adds valuable information to the literature. Especially, considering that Dormann and Zapf (2002) showed a time interval of 2 years to be most appropriate to demonstrate effects of job conditions on employee strain.

**Implications for Future Research and Practice**

In this study we investigated two important psychological resources (i.e., emotional support and teacher self-efficacy) that might aid teachers to protect their health and well-being (i.e., reduce emotional exhaustion). Further knowledge is needed regarding other effective resources in the teaching profession, and, in particular, how such resources can be fostered. Our study focused exclusively on teachers’ personal resources. However, organizational resources within a matching domain (e.g., cognitive) might also buffer potentially detrimental effects of job demands. For instance, informational support or decision latitude might buffer complex problem solving or quantitative work overload. Furthermore, it would also be interesting to gain more detailed knowledge on the availability versus the actual use of matching resources in
organizations (van den Tooren & de Jonge, 2010). One might speculate that the mere availability of matching resources let employees appraise a potentially demanding situation already as less stressful (i.e., secondary appraisal; Lazarus & Folkman, 1984).

The results of the current study suggest that reducing parents’ criticism, conflicts with colleagues, emotional dissonance, time pressure and classroom disruptions would improve work conditions in schools. However, because reducing job demands is not always feasible, interventions should also target improving teachers’ resources (e.g., emotional support) in order to reduce emotional exhaustion among teachers. Such interventions would likely benefit from considering the dimension of work conditions and outcomes by focusing on matching factors. For instance, in order to reduce emotional exhaustion one should focus on emotional demands like conflicts with colleagues and on emotional resources like emotional support. Schools might benefit from training conflict management and emotion regulation skills as well as fostering a positive and supportive team climate among the teachers. Efforts to both reduce the demands in the teaching profession as well as increase teachers’ resources to deal with such demands seem particularly important given the high prevalence of emotional exhaustion among teachers in Germany. Schmitz (2004) reports in a review of studies conducted in German speaking countries (Germany, Switzerland, Austria) that about 15 to 28% of teachers are burned out. In conclusion the DISC model with it’s principle of matching domains for demands and resources seems to be a promising approach for predicting as well as counteracting strain among teachers.
STUDY 2*:

INTERACTION EFFECTS OF EFFORT-REWARD IMBALANCE AND OVERCOMMITMENT ON EMOTIONAL EXHAUSTION AND JOB PERFORMANCE

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Summary

The model of Effort-Reward Imbalance with its two components effort-reward imbalance (ERI) and overcommitment (OC) has proven its significance in the area of work stress and occupational health. The two aims of the present study were to study the relationships of the two model components ERI (as a measure of chronic work stress) and OC (as a person variable) with self-rated emotional exhaustion (as a personal outcome) as well as supervisor-rated job performance (as an organizational outcome). Second, we tested the often neglected interaction hypothesis of the model, which proposes that OC potentiates the detrimental relationships between ERI and respective outcome variables. We applied multilevel modeling based on data from 152 employees nested in 20 teams from a German manufacturing company. Our results showed that ERI was positively related to emotional exhaustion and negatively related to supervisor-rated job performance, whereas OC was unrelated to emotional exhaustion and job performance. Testing the interaction hypothesis by taking OC into account as a moderator, our data showed that OC significantly aggravated the associations between ERI and emotional exhaustion, as well as ERI and job performance. We discuss limitations and implications for future research and practice.

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Chapter 4: Emotional Exhaustion and Cognitive Performance

STUDY 3*:

EMOTIONAL EXHAUSTION AND COGNITIVE PERFORMANCE IN APPARENTLY HEALTHY TEACHERS: A LONGITUDINAL MULTI-SOURCE STUDY

Summary

We investigate how emotional exhaustion, the core component of burnout, relates to cognitive performance, job performance and health. Cognitive performance was assessed by self-rated cognitive stress symptoms, self- and peer-rated cognitive impairments in everyday tasks and a neuropsychological test of learning and memory (LGT-3); job performance and physical health were gauged by self-reports. Cross-sectional linear regression analyses in a sample of 100 teachers confirm that emotional exhaustion is negatively related to cognitive performance as assessed by self- and peer-ratings as well as neuropsychological testing (all $p < .05$). Longitudinal linear regression analyses confirm similar trends ($p < .10$) for self- and peer-rated cognitive performance. Executive control deficits might explain impaired cognitive performance in emotional exhaustion. In longitudinal analyses, emotional exhaustion also significantly predicts physical health. Contrary to our expectations, emotional exhaustion does not affect job performance. The compensatory control approach might offer an explanation for this finding. Testing reversed causation, none of the outcome variables at Time 1 predict emotional exhaustion at Time 2. This speaks against cognitive dysfunctioning serving as vulnerability factor for exhaustion. In sum, results underpin the negative consequences of emotional exhaustion for cognitive performance and health that are relevant for individuals and organizations alike. In this way, findings contribute to the understanding of the burnout syndrome.

Chapter 4: Emotional Exhaustion and Cognitive Performance

Introduction

Burnout is a response to work-related stress and denotes a state of exhaustion. We focus on emotional exhaustion, which is the core component of burnout (cf. Lee & Ashforth, 1996; Maslach et al., 2001; Shirom, 1989). Burnout not only impacts on individual health and performance but also on the performance of organizations (Maslach et al., 2001; Paine, 1982; Schaufeli, 2003). Clinical observations suggest that cognitive impairments are associated with emotional exhaustion (Maslach et al., 2001; Schaufeli & Enzmann, 1998). For instance, individuals with burnout often report reduced problem-solving and learning abilities, and difficulties in ‘keeping their mind’ on daily tasks (Maslach et al., 2001; Schaufeli & Enzmann, 1998) as well as cognitive impairments in everyday tasks (e.g., forgetting names and appointments; Broadbent et al., 1982). Furthermore, empirical research has shown that psychological well-being is correlated with indicators of cognitive functioning (e.g., number of everyday errors; Broadbent et al., 1982), self-reports about one’s ability to concentrate and decision making skills (e.g., Goldberg, 1972; Wissing & Van Eeden, 2002). Beyond these subjective reports, the consequences of work-related exhaustion for cognitive performance remained largely underexplored (cf. Marin et al., 2011).

The goal of our study is to elucidate relationships between emotional exhaustion and multiple indicators of individual performance in teachers. Therefore, we examine how work-related exhaustion relates to concurrent and lagged cognitive performance (assessed by self- and peer-ratings and a neuropsychological test) and job performance. Moreover, we relate emotional exhaustion to physical health after a six-months time lag. Teachers make an interesting study population given their relatively high burnout rates (Rudow, 1999; Schmitz, 2004).
Emotional Exhaustion and Cognitive Functioning

The cognitive problems reported by chronic stress syndrome patients (e.g., burnout) are predominantly memory and attention deficits (Sandström et al., 2005). Prolonged periods of stress have adverse effects on brain circuitry, notably the hippocampus and prefrontal cortex (Arnsten, 2009; Lupien & Lepage, 2001; McEwen, 1998; Radley et al., 2004). Accordingly, cognitive deficits were found in burnt-out and chronically stressed people in episodic, working, and prospective memory (Öhman et al., 2007), cognitive speed (Österberg et al., 2009), nonverbal memory, auditory and visual attention (Sandström et al., 2005), sustained attention, and response inhibition (van der Linden et al., 2005). This evidence suggests that the pattern of cognitive deficits associated with exhaustion indicates executive control deficits. Executive control refers to a set of cognitive processes underlying the regulation and control of thought and behavior (Braver & Barch, 2000; Miyake et al., 2000) and has been ascribed to the function of the prefrontal cortex (Miller & Cohen, 2001). For example, people with impaired executive control may show deficits in working memory (Miyake et al., 2000), mental set switching or maintenance (De Jong, Berendsen, & Cools, 1999), dual task performance (Monsell & Driver, 2000), or response inhibition (Barkley, 1997). Accordingly, compromised executive control can lead to several behavioral expressions, such as loss of thought, problem-solving difficulties, and forgetfulness. To capture these behavioral effects, we examine potential cognitive performance deficits on different levels of specificity.

Outcome Variables and Hypotheses

Previous studies consistently reported impaired cognitive performance in patients with burnout (Österberg et al., 2009; van der Linden et al., 2005) and high work-related stress (Mahoney, Dalby, & King, 1998). Van der Linden et al. (2005) suggest that impaired cognitive performance is due to deficits in attention as one specific information-processing aspect of
burnout. They state that burnout is particularly accompanied by difficulties in the executive control over attention. Since attentional problems often emerge in everyday tasks, we expect emotional exhaustion to be related to cognitive performance as reflected in cognitive stress symptoms (e.g., problems with concentration, thinking clearly, and remembering) and cognitive impairments in everyday tasks. Cognitive stress symptoms capture general problems in concentration and memory across life domains. Cognitive impairments in everyday tasks represent more specific indications of limited everyday memory. More specifically, they reflect a reduced ability to focus on, encode, and retrieve concrete memory contents (Schmidtke, Pohlmann, & Metternich, 2008).

In line with this theoretical reasoning and the empirical evidence, we assume that compromised executive control becomes overt in the cognitive performance of emotionally exhausted teachers. We investigate whether lapses in everyday tasks are not only subjectively experienced by exhausted teachers, but can also be observed by peers (i.e., spouses). Therefore, we hypothesize that emotional exhaustion is negatively related to cognitive performance as reflected in cognitive stress symptoms and self- and peer-rated cognitive impairments in everyday tasks (Hypothesis 1).

Moreover, emotional exhaustion is assumed to be associated with performance decrements in neuropsychological tests. However, evidence is still scarce and results are inconclusive. To gain further insights which cognitive functions might be affected, we examine the relationship between emotional exhaustion and performance in a neuropsychological learning and intermediate memory task. Executive control deficits likely compromise learning and memory performance because they require attention, information processing, as well as encoding and retrieval of information. Thus, we assume that emotional exhaustion is negatively related to
learning and memory performance in a neuropsychological test (LGT-3; Bäumler, 1974; Hypothesis 2).

As executive control deficits encompass problems in attention, memory and response inhibition, they might as well affect job performance. In our study, job performance is reflected in self-reports of work-related task performance, also called in-role behavior. Task performance reflects behaviors that are recognized by formal rewards systems and are part of one’s job description. Thus, it represents an employee’s formally required contribution to organizational performance (Williams & Anderson, 1991). Previous empirical research indeed suggests emotional exhaustion to be negatively related to job performance (e.g., Cropanzano, Rupp, & Byrne, 2003; Halbesleben & Bowler, 2007; Wright & Bonett, 1997; Wright & Cropanzano, 1998). Theoretically the exhaustion–performance link can also be explained by drawing on a resource perspective, in which emotional exhaustion represents a significant depletion of resources (Hobfoll, 2001). The Conservation of Resources theory (Hobfoll, 2001) suggests that exhausted individuals are less likely to invest their limited resources and their job performance might decrease. Against this backdrop, we propose that emotional exhaustion is negatively related to job performance (Hypothesis 3).

Finally, emotional exhaustion, as an indicator of chronic stress and depleted resources, likely has physical health consequences. Previous research has demonstrated that burnout, especially emotional exhaustion, is negatively related to health. For example, burnout was found to increase the risk for cardiovascular and mental disorders, musculoskeletal pain, diabetes, common cold, diseases of the respiratory system and even mortality (Ahola et al., 2010; Melamed, 2009; Melamed et al., 2006). Therefore, we will examine if emotional exhaustion is negatively related to subjective physical health (Hypothesis 4).
The present work contributes to the burnout and performance literature by investigating how emotional exhaustion relates to facets of individual (cognitive) performance. Evidence on associations between exhaustion and cognitive performance is still scarce. This study adds to the understanding of the burnout syndrome and its consequences. In particular, previous studies focused on clinical burnout. However, emotional exhaustion evolves gradually and should be studied at all stages along the continuum. Therefore, we focus on working, apparently healthy, teachers reporting various levels of exhaustion. Unlike most previous studies, we apply a longitudinal design, which offers more insight into the direction of effects. We test for concurrent and lagged effects as well as reversed causation between emotional exhaustion and cognitive performance. Finally, we test for lagged physical health consequences. To the best of our knowledge, no study has simultaneously investigated cross-sectional and longitudinal relationships between emotional exhaustion and self- as well as peer-rated cognitive performance, cognitive performance in a neuropsychological test and self-rated job performance. The combination of longitudinal data, multiple-source data and the assessment of different individual performance facets collected in a non-clinical sample make a novel study that contributes to the literature of burnout and cognitive performance.

Method

Procedure

We recruited working teachers via newspaper advertisements. 100 teachers completed the initial survey, while 95 teachers also underwent the neuropsychological test. We collected peer ratings on cognitive impairments from 88 spouses. After some six months ($M = 5.65; SD = 0.52$), we collected a self-report survey from 87 participants; 13 participants did not respond. At the second wave of data collection, we received peer ratings for 78 participants of the initial sample. The
continued sample did not differ in any of the study variables from the dropped out participants. All variables were assessed at Time 1 and Time 2, except the neuropsychological test (only Time 1). The peer-ratings were always assessed within two weeks after self-ratings and returned via mail.

**Sample**

The initial sample (N = 100) comprised 63% women. Average age was 50 years (SD = 9.1; range: 27-64 years). Average tenure was 20 years (SD = 11.4; range: 3-42 years). Participants worked at least part time, with an average of 25.3 weekly teaching hours (SD = 2.9; range: 13-28 hours). Average level of emotional exhaustion was 3.2 (SD = 1.3; range: 1.2-6.9).

**Measures**

**Emotional exhaustion.** We assessed emotional exhaustion with nine items from the German version (Enzmann & Kleiber, 1989) of the Maslach Burnout Inventory – Educators Survey (MBI-ED; Maslach et al., 1996). A sample item is “I feel emotionally drained from my work.” The items were ranked on a 7-point scale from 1 (never) to 7 (daily).

**Cognitive performance.** Teachers ranked their cognitive stress symptoms on three items of the cognitive stress scale from the Copenhagen Psychosocial Questionnaire (COPSOQ II; Kristensen, Hannerz, Hogh, & Borg, 2005). The items are “How often do you have problems concentrating?”, “How often have you found it difficult to think clearly?” and “How often have you had difficulty with remembering?” Items are ranked on a 5-point scale from 1 (never/hardly ever) to 5 (very often/always).

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2 Gender: t=0.67, ns; tenure: t=0.45, ns; work hours: t=1.81, ns; negative affectivity: t=0.37, ns; emotional exhaustion: t=1.02, ns; cognitive stress symptoms: t=0.43, ns; self-rated cognitive impairments: t=0.35, ns; peer-rated cognitive impairments: t=0.67, ns; learning and memory: t=0.51, ns; job performance: t=1.33, ns; physical health: t=1.04, ns.
We assessed **self- and peer-rated cognitive impairments** with the 22-item Functional Memory Disorder scale (Schmidtke & Metternich, 2009). Cognitive impairments include prospective memory impairments such as forgetting errands on the way to their execution, forgetting appointments, temporary block of overlearned names, words, and PINs, disruption of the coherence of thoughts, and rapid forgetting of contents of conversations. Sample items are „How often do you forget items you needed to buy when shopping?“ and „How often do you fail to find a word?“ Participants rated symptom frequency from 1=never, 2=rarely (about once per month), 3=occasionally (about once weekly) to 4=frequently (several times per week or more). To obtain peer ratings, we rephrased the items: „How often does he/she ...“ Spouses rated symptom frequency from 1=never to 4=frequently (several times per week or more) with the additional response option “unable to rate the behavior” (coded as missings).

The Learning and Memory Test (LGT-3; Bäumler, 1974) was applied to assess cognitive performance in terms of **learning ability and intermediate memory**. The LGT-3 is a timed test with two parts: firstly, participants learn the content of six different domains; secondly, they answer questions about that content. The six domains encompass spatial, verbal, numerical and figural information. Learning takes about 15 minutes, the response part takes some 25 minutes. In the regression analyses, we used t-values of the overall learning and memory score from the standard norm tables.

**Job performance.** Teachers rated their job performance on five items from the in-role behavior scale (Williams & Anderson, 1991). Items reflect job behaviors that are recognized by formal reward systems and are part of one’s job description. Sample items are „I meet the formal performance requirements of my job“ and “I adequately complete assigned duties.” Teachers ranked the items on a 5-point scale from 1 (does not apply at all) to 7 (applies completely).
Physical health. We assessed subjective physical health with the German version of the SF12 (Bullinger & Kirchberger, 1998; Ware, Kosinski, & Keller, 1996). Respondents rated their physical functioning, role limitations due to physical health problems, freedom from bodily pain and general health perception. A physical health summary score can be calculated (mean = 50 ±10 SD) with higher scores reflecting better health.

Control variables. In all analyses, we controlled for gender, tenure and work load (weekly teaching hours), each assessed with one item at Time 1. We additionally controlled for dispositional negative affectivity when analyzing self-reported cognitive performance and job performance at Time 1 because negative affectivity is a potential source of common method bias in associations between self-reported strain variables (Burke et al., 1993; Podsakoff et al., 2003). We assessed negative affectivity with the German 10-item negative affectivity scale (Krohne, Egloff, Kohlmann, & Tausch, 1996) of the PANAS (Watson, Clark, & Tellegen, 1988). Sample items are “distressed” and “irritable”. Participants indicated to what degree they experience such affective states in general. Items were answered on a 5-point Likert scale from 1 (not at all) to 5 (absolutely). In the second step of the longitudinal analyses, we entered the respective outcome variable from Time 1 to control for third variable effects (e.g., negative affectivity; Zapf et al., 1996, p. 148). Therefore, negative affectivity was not entered in the longitudinal analyses. In analyses of learning and memory test performance, we controlled for test-taking motivation to rule out that differences in performance motivation confound the results. We assessed test-taking motivation with the 9-item motivation scale of the Test Attitude Survey (Arvey, Strickland, Drauden, & Martin, 1990). A sample item is “I was extremely motivated to do well on this test.” Items were scaled on 5-point Likert-type scales from 1 (strongly disagree) to 5 (strongly agree).
Data Analysis

We tested for concurrent and lagged effects of emotional exhaustion on the performance measures with cross-sectional and longitudinal linear regression analyses using SPSS 19. The level of significance was set at $p < .05$. In a first step, we entered gender, tenure and work hours. Next, we entered dispositional negative affectivity in the analyses of self-rated cognitive stress symptoms, cognitive impairments and job performance at Time 1. Alternatively, we entered test-taking motivation as second step in the analyses of learning and memory test-performance. In the second step of the longitudinal analyses, we entered the respective outcome variable assessed at Time 1 to control for third-variable effects. In the last step, we entered emotional exhaustion as predictor.

We also tested for reversed causation, that is, whether the performance measures at Time 1 predicted emotional exhaustion at Time 2. In a first step, we entered gender, tenure, work hours and emotional exhaustion at Time 1 as controls. In a second step in separate analyses, we entered the respective Time 1 performance measure as predictor.

Results

Table 1 displays sample sizes, means, standard deviations, Cronbach’s alphas and intercorrelations of all study variables. Results of the cross-sectional and longitudinal linear regression analyses are displayed in Tables 2 and 3, respectively.

Cross-sectional Analyses

emotional exhaustion was significantly related to cognitive stress symptoms ($\beta = .33, p = .001$), self-rated cognitive impairments ($\beta = .22, p = .03$) and peer-rated cognitive impairments ($\beta = .37, p = .001$) as well as learning and memory test-performance ($\beta = -.20, p = .04$; Table 2) while the relationship between emotional exhaustion and job performance was non-significant.
Longitudinal Analyses

Results of longitudinal regression analyses (Table 3) show that, by trend, emotional exhaustion at Time 1 was positively related to cognitive performance at Time 2 after controlling for the respective outcome at Time 1 (cognitive stress symptoms: $\beta = .17, p = .05$; self-rated cognitive impairments: $\beta = .16, p = .06$; peer-rated cognitive impairments: $\beta = .17, p = .06$). Emotional exhaustion at Time 1 was not related to job performance at Time 2. Emotional exhaustion was significantly negatively related to lagged physical health at Time 2 ($\beta = -.22, p = .04$). In tests for reversed causation none of the outcome variables at Time 1 predicted lagged emotional exhaustion at Time 2 (all $\beta < .10$, ns).

Discussion

The purpose of this study was to extend existing knowledge on the consequences of work-related exhaustion. We investigated whether emotional exhaustion, the core component of burnout, affects indicators of cognitive functioning. We proposed that emotional exhaustion would be associated with executive control deficits and that these deficits would compromise different facets of individual performance. In line with this reasoning, we found empirical evidence for decrements in cognitive performance as assessed by self- and peer-ratings as well as a neuropsychological test. Our data showed that the more emotional exhaustion teachers reported the more cognitive stress symptoms and cognitive impairments in everyday tasks they experienced. Beyond self-reports, spouses of more exhausted teachers observed more cognitive impairments in their partners.

If not controlling for the outcome at Time 1, emotional exhaustion was significantly related to cognitive stress symptoms ($\beta = .43, p < .001$), self- and peer-rated cognitive impairments ($\beta = .40, p < .001; \beta = .30, p < .01$, respectively) and job performance ($\beta = -.32, p < .01$). If controlling for negative affectivity in self-rated performance measures, emotional exhaustion was significantly related to cognitive stress symptoms ($\beta = .33, p < .01$) and self-rated cognitive impairments ($\beta = .29, p < .05$), but not job performance ($\beta = -.19, p = .10$).
### Table 1

**Means, standard deviations, Cronbach’s alphas and intercorrelations**

<table>
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<tr>
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<th>N</th>
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<tr>
<td>9. Cognitive Impairments peer-rating</td>
<td>88</td>
<td>1.79</td>
<td>0.50</td>
<td>.93</td>
<td>.18</td>
<td>-.01</td>
<td>-.16</td>
<td>.10</td>
<td>.36***</td>
<td>-.16</td>
<td>.36**</td>
<td>.45***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10. Learning and Memory Test Performance (LGT-3)</td>
<td>95</td>
<td>45.04</td>
<td>11.26</td>
<td>.84</td>
<td>-.16</td>
<td>.06</td>
<td>.01</td>
<td>-.33**</td>
<td>.15</td>
<td>-.01</td>
<td>-.16</td>
<td>-.06</td>
<td>-.13</td>
<td>-.07</td>
<td>-.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11. Job Performance Time 2</td>
<td>87</td>
<td>4.11</td>
<td>0.56</td>
<td>.84</td>
<td>-.16</td>
<td>.06</td>
<td>.01</td>
<td>-.38***</td>
<td>-.34***</td>
<td>.67***</td>
<td>-.18</td>
<td>-.16</td>
<td>-.01</td>
<td>.06</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>N=73</td>
</tr>
<tr>
<td>12. Cognitive Stress Symptoms Time 2</td>
<td>87</td>
<td>2.59</td>
<td>0.73</td>
<td>.81</td>
<td>-.04</td>
<td>.08</td>
<td>-.25*</td>
<td>.36**</td>
<td>.44***</td>
<td>-.34**</td>
<td>.70***</td>
<td>.57***</td>
<td>-.29*</td>
<td>-.07</td>
<td>-.34**</td>
<td>-</td>
<td>N=73</td>
<td></td>
</tr>
<tr>
<td>13. Cognitive Impairments Time 2</td>
<td>87</td>
<td>2.01</td>
<td>0.47</td>
<td>.91</td>
<td>-.01</td>
<td>.05</td>
<td>-.22</td>
<td>.36**</td>
<td>.41***</td>
<td>-.31**</td>
<td>.49***</td>
<td>.73***</td>
<td>.39</td>
<td>.01</td>
<td>-.31**</td>
<td>.71***</td>
<td>-</td>
<td>N=73</td>
</tr>
<tr>
<td>14. Cognitive Impairments peer-rating Time 2</td>
<td>78</td>
<td>1.79</td>
<td>0.50</td>
<td>.95</td>
<td>.27*</td>
<td>.07</td>
<td>-.15</td>
<td>.27</td>
<td>.34**</td>
<td>-.25*</td>
<td>.29**</td>
<td>.34**</td>
<td>.68***</td>
<td>.01</td>
<td>-.08</td>
<td>.29*</td>
<td>.36**</td>
<td>-</td>
</tr>
<tr>
<td>15. Physical Health Time 2</td>
<td>76</td>
<td>47.48</td>
<td>9.02</td>
<td>.09</td>
<td>-.18</td>
<td>.04</td>
<td>-.29*</td>
<td>-.37***</td>
<td>.01</td>
<td>-.02</td>
<td>-.09</td>
<td>.14</td>
<td>-.04</td>
<td>.08</td>
<td>-.16</td>
<td>-.14</td>
<td>-.36**</td>
<td>N=73</td>
</tr>
</tbody>
</table>

*Note. N = sample size. M = mean. SD = standard deviation. α = Cronbach’s alpha. Gender: 1 = female, 2 = male. Rows 1-8 display means, standard deviations and intercorrelations of variables at Time 1 with N=100. From Row 9-14 sample size changes in order to use the maximum sample size possible. * p < .05; ** p < .01; *** p < .001
Table 2

Linear regression analyses predicting job performance, cognitive stress symptoms, self- and peer-rated cognitive impairments, learning and memory test performance at Time 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cognitive Stress Symptoms Time 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Cognitive Impairments self-rating Time 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Cognitive Impairments peer-rating Time 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Learning and Memory Test (LGT-3) Time 1&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Job Performance Time 1&lt;sup&gt;e&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>Gender</td>
<td>.03</td>
<td>.01</td>
<td>-.02</td>
<td>.13</td>
<td>.11</td>
</tr>
<tr>
<td>Tenure</td>
<td>.07</td>
<td>.17</td>
<td>.14</td>
<td>.05</td>
<td>.14</td>
</tr>
<tr>
<td>Work Hours</td>
<td>-.20</td>
<td>-.17</td>
<td>-.14</td>
<td>-.19†</td>
<td>-.18†</td>
</tr>
<tr>
<td>Negative Affectivity</td>
<td>.39***</td>
<td>.23*</td>
<td>.38***</td>
<td>.27*</td>
<td>-.43***</td>
</tr>
<tr>
<td>Test Performance Motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Exhaustion Time 1</td>
<td>.33***</td>
<td>.22*</td>
<td>.33**</td>
<td>-.20*</td>
<td>-.16</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.05</td>
<td>.19***</td>
<td>.27***</td>
<td>.06</td>
<td>.19***</td>
</tr>
</tbody>
</table>

Note. Numbers in the table present standardized coefficients ($\beta$) and $R^2$. * $N = 100$. † $N = 87$. ‡ $N = 95$. * $p < .05$; ** $p < .01$; *** $p < .001$. 
Table 3

*Linear regression analyses predicting job performance, cognitive stress symptoms, self- and peer-rated cognitive impairments and physical health at Time 2*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cognitive Stress Symptoms Time 2 (^a)</th>
<th>Cognitive Impairments self-rating Time 2 (^a)</th>
<th>Cognitive Impairments peer-rating Time 2 (^b)</th>
<th>Job Performance Time 2 (^c)</th>
<th>Self-rated Physical Health Time 2 (^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>Gender</td>
<td>-.04</td>
<td>-.07</td>
<td>-.09</td>
<td>-.01</td>
<td>-.08</td>
</tr>
<tr>
<td>Tenure</td>
<td>.09</td>
<td>.05</td>
<td>.06</td>
<td>.06</td>
<td>.03</td>
</tr>
<tr>
<td>Work Hours</td>
<td>-.26(^*)</td>
<td>-.12</td>
<td>-.11</td>
<td>-.19</td>
<td>-.04</td>
</tr>
<tr>
<td>Dependent Variable Time 1</td>
<td>.67***</td>
<td>.60***</td>
<td>.73***</td>
<td>.67***</td>
<td>.64***</td>
</tr>
<tr>
<td>Emotional Exhaustion Time 1</td>
<td>.17(^b)</td>
<td>.16(^b)</td>
<td>.17(^b)</td>
<td>-.10</td>
<td>-.10</td>
</tr>
<tr>
<td>(R^2)</td>
<td>.07</td>
<td>.50***</td>
<td>.53(^b)</td>
<td>.04</td>
<td>.54***</td>
</tr>
</tbody>
</table>

*Note.* Numbers in the table present standardized coefficients (\(\beta\)) and \(R^2\). \(^a\): \(N = 87\); \(^b\): \(N = 74\); \(^c\): \(N = 76\). \(^*\) \(p < .10\); \(^*\) \(p < .05\); \(^**\) \(p < .01\); \(^***\) \(p < .001\).
Self- and peer-ratings of cognitive impairments were moderately correlated ($r = .49$, $p < .001$). Self-rated ($M = 2.11$) cognitive impairments were significantly higher ($t = 5.97$, $p < .001$) than the peer-ratings ($M = 1.79$). This seems plausible as peer-raters could not observe all cognitive impairments of our participants throughout the day. However, this mean difference should not have affected the relationships between emotional exhaustion and cognitive impairments (see Tables 2 and 3). Exhaustion also went along with poorer learning and memory performance in a neuropsychological test. Thus, our findings raise the question whether the cognitive impairments in everyday tasks and cognitive deficits measured in the neuropsychological test can be attributed to the same underlying mechanism. As cognitive stress symptoms, cognitive impairments and memory performance deficits indicate compromised executive control, our results strengthens the idea that emotional exhaustion affects executive control. Further research is necessary to identify the mechanisms that link chronic stress states such as burnout with cognitive deficits. For example, acute stress was repeatedly found to increase cortisol release and to compromise cognitive functioning such as working memory, declarative memory or cognitive control (e.g., Plessow, Fischer, Kirschbaum, & Goschke, 2011; Taverniers, Van Ruysseveldt, Smeets, & von Grumbkow, 2010; Wolf, 2009). Thus far, for chronic stress states much less is known about the impact of stress hormones and their cognitive consequences (Wolf, 2003). Therefore, long-term changes in the release of stress hormones and their impact on brain structures set out a promising research road in this field (Arnsten, 2009; De Kloet, Joëls, & Holsboer, 2005; Herbert et al., 2006).

In our longitudinal analyses, associations between emotional exhaustion at Time 1 and decreased self- and peer-rated cognitive performance after about six months only slightly missed the conventional level of significance. Perhaps the time interval was too short to detect significant changes in cognitive performance. Future research might benefit from longer time intervals and multiple waves of data collection. We would like to note, however, that we
applied a rather conservative approach by controlling for the respective outcome at Time 1 and that relationships were significant if such control variables were not entered.

The longitudinal study design allowed testing for reversed causation. This is important because cognitive impairments have been discussed as a vulnerability factor of burnout. Thus, it could be assumed that teachers reporting cognitive impairments would be more prone to become overtaxed by work demands. However, in our analyses we found no support for this hypothesis of reversed causation.

Contrary to our expectations and previous research (e.g., Taris, 2006), emotional exhaustion was not related to self-reported job performance, neither concurrently nor lagged. Thus, a somewhat differentiated picture of performance decrements from emotional exhaustion emerged. Several reasons might contribute to this finding. First, performance protection might compensate for diminished resources (Hockey, 1997). The compensatory control model (Hockey, 1997) assumes that energetic resources are controlled by strategic resource-management decisions. To a certain degree people can compensate for scarce resources to reduce performance decrements at the costs of other domains. Thus, people exert extra effort to protect job performance. The compensatory control model (Hockey, 1997) further assumes that compensatory effort for means of performance protection would have negative consequences for less-central tasks and would negatively impact on health and well-being. If cognitive everyday tasks are regarded as less central, this reasoning would fit with our results on cognitive and job performance. Compensatory effort to maintain performance is also assumed to incur costs to the body leading to reduced physical health (Hockey, 1997) and would thus fit with our findings that exhaustion was negatively related to physical health. An alternative explanation why emotional exhaustion was not related to self-reported job performance is that emotionally exhausted people have a drop in their job performance that they are simply not aware of. Therefore, future studies would benefit from more objective
performance measures (e.g., supervisor- or peer-ratings). Still, job performance might indeed be less affected by emotional exhaustion because it depends not only on ability (e.g., cognitive functioning) but also on knowledge, skills and motivation. Thus, cognitive deficits would not affect job performance to the same extent as cognitive performance measures that are linked more closely to executive control. Finally, our job performance measure needs to be discussed. Self-rated job performance scores were rather high ($M = 4.20$) and showed rather low variation ($SD = 0.56$). This might indicate a social desirability or impression management bias although we assured strict anonymity to participants to avoid such effects.

Finally, we found that the more exhaustion teachers initially reported the more physical health problems they reported six months later. A number of explanations might contribute to this. Perhaps, to alleviate their distress in the short run, burnt-out people might have engaged in unhealthy behaviors (Shirom, 2009) such as smoking or drinking alcohol (Gorter, Eijkman, & Hoogstraten, 2000). Also, burnout might have reduced their ability to unwind from work stress and replenish their resources (Melamed et al., 1999). Third, it was suggested that changes in the immune system and the stress induced activation of the sympathetic-adrenal medullary system might play a role in the burnout–health relationship (Melamed et al., 2006; von Känel, Bellingrath, & Kudielka, 2008)

**Strength and Limitations**

Our sample consists solely of German teachers, raising the question of generalizability across countries and occupations. Neuropsychological testing was only feasible at Time 1, preventing any conclusion about relationships with learning and memory performance over time. In some measures, we had to rely on self-reports, raising the issue of common method bias. However, in cross-sectional analyses we controlled for negative affectivity and in longitudinal analyses for third variable effects. Moreover, analogous results from peer-ratings and the neuropsychological test strengthen our findings of self-rated cognitive performance.
Despite these limitations, our study extends previous research. First, we included peer-ratings of cognitive performance. Gathering data from a second source validates the finding on cognitive impairments in daily tasks. This indicates that individuals reporting higher emotional exhaustion not only report more frequent cognitive impairments, but seem to truly show more lapses. Second, we added a longitudinal perspective to gain more insight into causal relationships. Third, this study contributes to current research on burnout-related cognitive consequences by studying working individuals instead of patients. Our results suggest that cognitive deficits are not only found in burnout patients but also occur in apparently healthy employees, who experience work-related exhaustion to some degree. This suggests that the cognitive effects of burnout do not develop in discrete stages but gradually rise with emotional exhaustion.

In sum, although in this study teachers’ job performance was unaffected, emotional exhaustion diminished various facets of cognitive performance as well as subjective physical health. Notwithstanding ethical reasons, providing healthy working conditions (i.e., reducing demands, promoting resources) seems warranted for organizations to not overtax employees’ resources and put their cognitive performance and health at risk.
GENERAL DISCUSSION

The goal of the present dissertation was to examine under which circumstances stressful working conditions relate to emotional exhaustion and how emotional exhaustion affects individual performance. Three independent empirical studies tested the interplay of job characteristics and person-related factors within different theoretical models and examined individual performance consequences of emotional exhaustion. In the present chapter, I will summarize the findings of this dissertation and highlight the contribution of these findings to research in work and organizational psychology. Finally, I will discuss strengths and limitations of this dissertation, derive implications for research and practice, and end with a general conclusion.

Summary of Results

The first study (Chapter 2) investigated whether job and personal resources counteract the detrimental effects of job demands on job strain and if matching resources are more suitable than non-matching resources to do so. This study tested the Demand-Induced Strain Compensation (DISC) model’s proposition that matching resources are more likely to buffer job demands’ detrimental effects on job strain, such as emotional exhaustion, than non-matching resources. More specifically, this study examined if an emotional resource (emotional support) and a cognitive resource (teacher self-efficacy) moderate the relationships of three types of emotional job demands (parents’ criticism, conflicts with colleagues, and emotional dissonance) and two types of cognitive job demands (time pressure and classroom disruptions) with emotional exhaustion such that resources attenuate the positive relationships between demands and exhaustion. I retrieved data from 177 school teachers and from a subsample (N= 56) that was re-examined after a time lag of about 21 months. Results of cross-sectional multiple regression analyses showed that emotional and cognitive resources buffered the detrimental effects of
emotional and cognitive demands on emotional exhaustion among teachers. Results of the longitudinal analyses showed that the interaction between emotional support and conflicts with colleagues and the interaction between emotional support and emotional dissonance predicted emotional exhaustion two years later. Interestingly, the significant time-lagged interactions are triple-match interactions. In cross-sectional analyses, double-match interactions were as likely as triple-match interactions. Over all, the results support my hypotheses that resources can compensate detrimental effects of job demands on work-related exhaustion and that triple-match interactions are more likely than double-match interactions. Thus, as proposed by the compensation principle, resources have the potential to prevent or counteract job strain. In support of the triple-match principle, especially matching resources proofed effective combating job strain.

Study 2 (Chapter 3) also addressed a moderator of the relationship between stressful working conditions and work-related outcomes. This study focused on the often neglected interaction hypothesis of the Effort-Reward Imbalance (ERI) model which proposes that OC potentiates the detrimental relationships between ERI and work-related outcome variables, here emotional exhaustion and supervisor-rated job performance. In this study, I applied multilevel modeling based on data from 152 employees nested in 20 teams from a German manufacturing company. As hypothesized, results showed that ERI was positively related to emotional exhaustion and negatively related to job performance while overcommitment (OC) was unrelated to exhaustion and performance. Importantly, testing the interaction hypothesis by taking OC into account as a moderator, the data showed that OC significantly aggravated the associations between ERI and emotional exhaustion, as well as ERI and job performance.

The first two studies focused on antecedents of emotional exhaustion and especially on the interplay of job characteristics and person-related factors. The third study of this dissertation
focused on consequences of emotional exhaustion. Specifically, the third study (Chapter 4) investigated how emotional exhaustion relates to cognitive performance, job performance, and health. This study assumed emotional exhaustion to impair cognitive functioning and job performance because executive control is compromised. I retrieved data from 100 German school teachers and their spouses. As hypothesized, cross-sectional linear regression analyses showed that emotional exhaustion was positively related to self- and peer-rated cognitive impairments in everyday tasks, cognitive stress symptoms, and negatively related to cognitive performance (assessed with a neuropsychological test of learning and memory). Longitudinal linear regression analyses supported these results for self- and peer-rated cognitive impairments and cognitive stress symptoms by trend. In longitudinal analyses, work-related exhaustion also significantly predicted subjective physical health. Contrary to our expectations, emotional exhaustion did not affect job performance. In tests of reversed causation, none of the performance variables at Time 1 predicted change in emotional exhaustion from Time 1 to Time 2. This speaks against cognitive impairments serving as a vulnerability factor for exhaustion.

**Discussion of Results and Contribution to the Field of Work and Organizational Psychology**

In this section, I will discuss the findings and how this dissertation contributes to the field of work and organizational psychology, specifically to the fields of occupational health psychology and organizational behavior. Research in occupational health psychology is concerned with the application of psychology to improving the quality of work life, and to protecting and promoting the safety, health and well-being of workers (as defined by the US National Institute for Occupational Safety and Health [NIOSH]). In other words, occupational health psychology involves the application of psychology to prevent occupational stress, illness, and injury. Among others, areas of research include how work related stress affects workers physical and mental health, or how to optimize work performance without sacrificing the well-
being of employees. Organizational Behavior can be defined as the study and application of knowledge about how people as individual or as groups act within organizations. Research in organizational behavior is applied in an attempt to create more efficient business organizations. The central idea of the study of organizational behavior is that a scientific approach can be applied to the management of workers. Organizational behavior theories are used for human resource purposes to maximize the output from individual group members.

**Theoretical models in occupational health psychology.** In general, findings of the present dissertation concern emotional exhaustion and thus add to research on burnout. At the same time, results of the three studies add to research on important theoretical models in occupational health psychology. Teacher specific demands and resources as well as ERI were shown to predict emotional exhaustion. These findings support hypothesized main effects in the theoretical models employed in the studies, namely the DISC (de Jonge & Dormann, 2003, 2006) and the ERI model (Siegrist, 1996, 2002). Moreover, the results are also in line with other well established theories in occupational health psychology, such as the Conservation of Resources theory (Hobfoll, 1989, 2001) or the Job-Demands Resources Model (Demerouti et al., 2001).

This dissertation focused on interaction effects rather than additive effects. Findings highlight the importance of moderators in stressor–strain relationships by showing that these relationships can substantially differ if individual characteristics and resources are taken into account.

Generally, my findings that resources compensated the detrimental effects of job demands are in line with the buffering hypothesis (cf. Cohen & Wills, 1985). Above that, this dissertation could show that especially matching resources have the potential to prevent or counteract job strain. Findings support the idea of match, specifically the triple-match principle of the emotional dimension (de Jonge & Dormann, 2003, 2006). The fact that especially matching resources seem suitable to buffer detrimental effects of demands on emotional exhaustion might benefit
intervention endeavors to improve working conditions and protect employees’ well-being more effectively.

The first part of this section dealt with resources and how they can buffer the relationship between job demands and work-related exhaustion. In the next paragraph, I will discuss the role of individual differences and how they can qualify relationships between working conditions and job strain. The second interaction pattern examined in this dissertation was that OC serves as a vulnerability factor to become exhausted under stressful working conditions. This finding supports the often neglected interaction hypothesis of the ERI model and more generally underpins the importance to consider the moderating role of individual differences, such as motivational patterns or personality factors, in stressor–strain relationships. This thesis could show that individual characteristics can significantly qualify relationships between working conditions and employees’ well-being as well as their productivity. Thus, relationships are often more complex than main effects suggest and stressful working conditions do not have to result in job strain and performance decrements. This thesis suggests that the field of occupational health psychology may profit from putting a greater focus on the potential of protective and vulnerability factors. Although some research is available on how personal characteristics are related to well-being and productivity outcomes, much less is known about the interplay of working conditions and individual differences. The finding that stressful working conditions mainly affect employees with high OC is thus noteworthy and contributes to the literature.

**Excursion: Relevance for research on recovery.** The moderator OC, investigated in the relationship of ERI with emotional exhaustion and job performance, may also be of interest for the field of research on recovery. Overcommitment reflects the inability to withdraw from work. Overcommitment seems to inhibit employees to successfully detach from stressful working conditions, that is, switching mentally off from work. One might speculate that these employees
can not recover during off-job time because they continue to think about work-related problems. The inability to psychologically withdraw from work obligations hinders the taxed psychobiological systems to recover from the drain at work, that is, to return to their baseline levels (Etzion et al., 1998; Meijman & Mulder, 1998). If psychobiological resources are not replenished regularly, the risk for job strains increases (Eden, 2001; Fritz et al., 2010). This reasoning is in line with recent work showing that psychological detachment and recovery are positively related to well-being as well as performance (Binnewies, Sonnentag, & Mojza, 2009; Fritz et al., 2010; Siltaloppi et al., 2009; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag, Kuttler, & Fritz, 2010). Results from a longitudinal study showed that psychological detachment from work during off-job time negatively predicted emotional exhaustion. Moreover, detachment buffered the relationship between job demands and an increase in psychosomatic complaints and the relationship between job demands and a decrease in work engagement (Sonnentag et al., 2010). Overcommitment and psychological detachment from work (Etzion et al., 1998) both refer to the (in)ability to withdraw from work. Psychological detachment has become an important construct in research on recovery (e.g., Fritz et al., 2010). Therefore, this dissertation may also add to research on recovery.

**Exhaustion and performance.** This thesis also contributes to the relationship between work stress and job performance (Jex, 1998; Rosen et al., 2010) and thus to the field of organizational behavior. This dissertation extends the scope of the ERI model that has proven its predictive value for health and well-being outcomes in a large body of research (cf., Siegrist, 2005; Tsutsumi & Kawakami, 2004; van Vegchel et al., 2005) by integrating job performance in this framework of social reciprocity. For organizational researchers, a framework that has predictive value for individual well-being as well as for organizational outcomes, such as job performance, will likely be of interest. Practitioners will be more willing to pay attention to these
frameworks and to invest in working conditions in terms of a cost gain balance if performance improvements are likely to occur.

Beyond demonstrating that stressful working conditions detrimentally affect job performance, results did not show that emotional exhaustion is related to job performance. In Study 2, I tested in additional analyses whether emotional exhaustion is related to job performance. I did so in order to test the idea that employees who experienced high ERI performed less well because they feel emotionally exhausted. The present data did not support this assumption of mediation. However, these results should be interpreted with caution, as data of Study 2 are cross-sectional and thus conclusions about sequential effects as proposed by mediational processes should not be drawn. In Study 3, neither results of cross-sectional analyses nor results of longitudinal analyses showed a relationship between emotional exhaustion and job performance. Several reasons might explain to this finding. First, performance protection might compensate for diminished resources (Hockey, 1997). That is, people exert extra effort to protect job performance and thereby impose negative consequences on less-central behaviors and health. Second, one might speculate that emotionally exhausted people could indeed have a drop in their job performance that they are simply not aware of. In favor of this, self-rated job performance scores in Study 3 were rather high and showed rather low variation. However, contrary to this speculation, I neither found a relationship between exhaustion and supervisor-rated job performance in Study 2.

Having said all this, the present work adds to the literature by offering explanations for the finding that emotional exhaustion is unrelated to job performance. Possibly, this relationship is more complex such that only under specific circumstances exhaustion impairs performance. It was argued that job stressors impair performance because job stressors reduce an individual’s capacity to exert control over their work environment, thus adversely affecting their ability to
function effectively (Bakker, Demerouti, & Verbeke, 2004; McGrath, 1976). Emotional exhaustion, indicating the depletion of individual coping and energy resources, signifies that workers possess insufficient resources to deal effectively with the demands of their jobs, leading to impaired job performance (cf. Taris, 2006). This line of reasoning, however, might not apply to all type of jobs alike. For two reasons the depletion of individual coping and energy resources might be better compensable in some jobs than in others. First, jobs might differ in the amount of job resources provided. For example, autonomy or co-worker support might buffer employees’ state of energy depletion. Second, jobs differ in their performance requirements. Depending on the performance requirements of the jobs, suboptimal functioning might be more or less compensable by compensatory effort. Spending more effort at work than usual (i.e., compensatory effort) is one prominent mechanism that individuals may use to counteract a suboptimal state such as the lack of resources necessary for task fulfillment in order to prevent a performance breakdown (Hockey, Wastell, & Sauer, 1998; Hockey, 1993). It seems questionable whether compensatory effort can prevent performance impairments in every job. For example, in jobs that require very high concentration and have low error tolerance, such as air-traffic controllers, compensatory effort might fail to prevent performance impairments. In jobs that require a lot of creativity, such as artists, compensatory effort might as well be ineffective. Finally, the relationship between emotional exhaustion and job performance might not only depend on the job under investigation but also employees might differ in their willingness to. Taking into account concepts that might alter employees’ likelihood to exert extra effort to maintain their job performance may provide further insights on this issue. For instance, it seems plausible that employees high on work centrality would be more willing to invest compensatory effort to maintain their job performance. I suggest future research should take into account
moderators that might qualify the relationship between emotional exhaustion and job performance.

Beyond examining the relationship between emotional exhaustion and job performance, the findings on the relationships between exhaustion and cognitive impairments contribute to knowledge on burnout and its consequences. Study 3 could show that emotional exhaustion goes along with diminished cognitive performance. Thus, findings support the proposition that emotional exhaustion has consequences for cognitive functioning (Maslach et al., 2001; Schaufeli & Enzmann, 1998). Because, evidence on the relationship between emotional exhaustion and cognitive impairments is still scarce further research is needed.

Process models of burnout. One might raise the question whether cognitive impairments are a consequence of burnout or a substantial component of burnout. In Shirom’s (2003) definition of burnout, burnout consists of physical fatigue, emotional exhaustion, and cognitive weariness. Other researchers suggested the components of burnout to influence each other. Thus, even if cognitive impairments are regarded as a component of burnout, cognitive impairments might evolve at a later stage of burnout, triggered by emotional exhaustion, which is proposed to evolve first. Results of the longitudinal analyses in Study 3 revealed that emotional exhaustion positively predicted change in cognitive impairments while in analyses of reversed causation cognitive impairments did not predict change in emotional exhaustion. Accordingly, this dissertation’s data would suggest a process, whereby emotional exhaustion triggers cognitive impairments. With regards to process models of the three burnout components according to the Maslach Burnout Inventory (Maslach et al., 1996; emotional exhaustion, depersonalization, and personal accomplishment), five causal models have been proposed. Whereas two of these models hold that exhaustion represents the final stage in the development of burnout (Golembiewski, Munzenrider, & Stevenson, 1986; Van Dierendonck, Schaufeli, & Buunk, 2001a, 2001b), the
three other models assume that exhaustion occurs first in the developmental process (Lee & Ashforth, 1993; Leiter & Maslach, 1988; Taris, Le Blanc, Schaufeli, & Schreurs, 2005). The former phase models assume either that depersonalization leads to low accomplishment, which in turn determines exhaustion (Golembiewski et al., 1986), or that decreased personal accomplishment determines depersonalization, which in turn leads to emotional exhaustion (van Dierendonck et al., 2001a, 2001b). The latter phase models predict a positive effect of exhaustion on depersonalization, whereas depersonalization, in turn, is expected to result in a low sense of accomplishment (Leiter & Maslach, 1988). Alternatively, emotional exhaustion was assumed to simultaneously trigger depersonalization and a low sense of personal accomplishment (Taris et al., 2005). Recently, the analyses of longitudinal data from two samples showed that depersonalization is longitudinally predicted by exhaustion and that accomplishment is longitudinally predicted by depersonalization and exhaustion (Diestel & Schmidt, 2010). Another longitudinal three wave study found that the process of burnout is triggered by depersonalization for men and by emotional exhaustion for women (Houkes, Winants, Twellar, & Verdonk, 2011).

Summing up, despite the controversial results on process models of burnout, evidence suggests emotional exhaustion to be the starting point of burnout. In this dissertation I hypothesized cognitive impairments to be a consequence of burnout. However, integrating my findings of Study 3 and Shirom’s (2003) burnout definition, which suggests cognitive impairments to be a component of burnout, one might speculate that emotional exhaustion is the initial symptom determining cognitive impairments at a later stage.

**Strength and Limitations**

One limitation is the use of self-reports in large parts of this work. Common method variance might inflate the relationships between predictor and outcome variables (Podsakoff et al., 2003). In all three studies, at least part of the data were self-reports. However, Studies 2 and 3
also included job performance data from supervisors (Study 2), peer-ratings of cognitive impairments in everyday tasks, and neuropsychological test data on learning and memory performance (both Study 3). Future studies will benefit from including more objective data on job demands, resources, and outcome variables to overcome problems of common method variance. However, it might be the subjective experience that matters and thus ratings provided by others may not be appropriate, rather some job related concepts are best assessed with self-reports Chan (2009). This becomes especially apparent considering the key variable of this dissertation, emotional exhaustion, a highly subjective experience that will be difficult to be assessed more objectively. To deal with this issue, I controlled for negative affectivity as recommended (Burke et al., 1993; Podsakoff et al., 2003). Examining relationships between working conditions, individual characteristics, emotional exhaustion, and individual performance, I tried to rule out further alternative interpretations for the present findings. Therefore, I controlled for demographic variables such as gender, age, and education to eliminate the interpretation that results are only due to differences in these variables. Moreover, cross-sectional analyses usually suffer from left-out-variables-problems (i.e., confounding variables can lead to spurious relations), but this is much less likely in relationships between interaction terms and outcomes (cf., Evans, 1985). Thus, the cross-sectional interaction analyses of Study 1 and Study 2 should less likely be affected by this issue.

In longitudinal analyses, I predicted changes in the outcome variables from Time 1 to Time 2. Thus, I ruled out several third variables by controlling for the outcome at Time 1. For example, social desirability, personality factors, or demographic variables (that were not controlled otherwise) should most likely influence the absolute level rather than intra-individual changes over time in the outcome variables (Burke et al., 1993).
Study 3 additionally tested for reversed causation. These analyses did not reveal evidence for cognitive impairments serving as a vulnerability factor for exhaustion. However, from this dissertation I cannot finally conclude that stressful working conditions (e.g., high demands, low resources or ERI) have a causal effect on emotional exhaustion or job performance, or that emotional exhaustion causally affects cognitive impairments and physical health. The question of causality could only be addressed by experimental or intervention studies that manipulate working conditions or exhaustion. Experimental studies certainly have a higher internal validity, exerting more control over unwanted influences. However, external validity is generally regarded to be higher in field studies, as conducted in this dissertation.

This dissertation’s findings should be generalized with caution because research was conducted only in Germany and within a limited range of occupations. However, research was conducted in three independent empirical studies with different time intervals and in different samples: Study 1 was conducted with a sample of teachers and a time lag of almost two years, which was previously shown to be most appropriate to demonstrate effects of job conditions on employee strain (Dormann & Zapf, 2002). Study 2 comprised blue and white collar employees of a company producing scientific and industrial technical devices. Study 3 again relied on data from teachers, this time with a time lag of about six month. In Germany, teachers are amongst the occupations with the highest burnout rates (Meyer et al., 2011). In an analysis of 73 studies conducted in various occupational fields in the US, emotional exhaustion was found to be highest in teachers, compared with other occupations (Schaufeli & Enzmann, 1998). Because teachers show high burnout rates (Rudow, 1999; Schmitz, 2004), they make an interesting study population to study the relationship between job characteristics and emotional exhaustion. The same accounts for the relationship between emotional exhaustion and individual performance. Study 2 sampled company employees, because their job characteristics are better suited to study
ERI as they provide more variety in job security, promotion prospects, and salary. Moreover, supervisor performance ratings are better attainable in a company. Participation in all three studies was voluntary and—if at all—only slightly financially compensated. Thus, employees experiencing very high time pressure or workload might be underrepresented, as they are more likely to refrain to allocate working time to the participation in a scientific study. Furthermore, when sampling a working population one has generally to be aware of the fact that a healthy worker effect might bias the data (Li & Sung, 1999). To demonstrate representativeness of the samples of Study 1 and 2, I compared the samples with data on the population of German teachers from the German Federal Statistical Office (Statistisches Bundesamt, Fachserie 11, Reihe 1, 2004/05) and a representative sample of the German working population from 2010 (microcensus; N = 39 000) provided by the German Federal Statistical Office (Statistisches Bundesamt, Fachserie 1, Reihe 4.1.2, 2010), respectively (see Chapter 2 and 3).

**Implications for Research and Practice**

A number of implications for future research and practice can be derived from this dissertation. With regards to future research, one goal should be to identify mediating mechanisms that explain how working conditions are related to exhaustion and performance and further how exhaustion is related to performance. For instance, from the findings in Study 2 the question emerged, if unwillingness or inability to perform mediates the relationship between ERI and job performance. Unwillingness to perform may reflect a lack of motivation or a strategy to reestablish reciprocity of cost and gains via reduced performance. For instance, Kinnunen et al. (2008) found a relationship between ERI and decreased work engagement, especially dedication. The inability to perform may result from job strain and health complaints induced by ERI. One specific job strain induced by ERI is emotional exhaustion. Exhaustion was thus used as a proxy for the inability to perform. However, the present data did not support the idea that employees
who experienced high ERI performed less well due to emotional exhaustion. I propose to further investigate whether stressful working conditions affect job performance partly via an inability to perform caused by impaired health and well-being. Doing so, future studies should apply longitudinal designs and assess a wider range of health and well-being facets.

Mediating mechanisms between emotional exhaustion and cognitive performance also deserve further investigation in the future. With regards to results of Study 3, it is of interest why and how brain structures involved in attention and memory are affected in emotionally exhausted individuals. Moreover, examining effects of chronic stress and associated glucocorticoid release on brain structures coupled with cognitive behavioral data would advance our knowledge on the cognitive processes associated with emotional exhaustion. Drawing on the results of Study 3, I argue that executive control deficits are responsible for the negative relationship between emotional exhaustion and cognitive performance. It was observed that the prefrontal cortex plays an important role in working memory functioning (e.g., Cabeza & Nyberg, 2000). Acute stress was repeatedly found to increase cortisol release and to compromise cognitive functioning such as working memory, declarative memory, and cognitive control (e.g., Plessow et al., 2011; Taverniers et al., 2010; Wolf, 2009). Thus far, concerning chronic stress much less is known about the impact of stress hormones and its cognitive consequences (Wolf, 2003). Therefore, long-term changes in the release of stress hormones and their impact on brain structures set out a promising research road in this field (Arnsten, 2009; De Kloet et al., 2005; Herbert et al., 2006).

In sum, identifying mediating mechanisms in the etiology of burnout and those that explain how burnout relates to performance facets is important as it can provide us with further knowledge of the burnout process. Moreover, such findings may serve to set up interventions to protect employees’ well-being, health, and job performance.
The present results highlight that it is important to consider moderators in the relationships of working conditions with emotional exhaustion and job performance. Detrimental relationships might account only or especially for individuals with low personal resources, such as low emotional support and self-efficacy or specific characteristics such as OC. Thus, future studies should strive to identify further moderators that serve as protective or vulnerability factors. The DISC model (de Jonge and Dormann, 2003, 2006) presents a promising framework to identify specific resources that enable coping with specific demands (e.g., Schmidt, Hupke & Diestel, 2012). Once moderators are identified, stress management interventions can target these factors or individuals characterized by them. Organizations should try to foster matching resources to buffer job demands. For instance, results from Study 1 suggest that interventions which aim to protect teacher well-being should consider the dimension of demands (i.e., emotional, cognitive, physical) that teachers frequently encounter and should foster those resources that match the demands to compensate their detrimental effects on teacher well-being. Furthermore, interventions to effectively reduce strain in teachers should aim especially at reducing demands and increasing resources that match the dimension of the strain; e.g., in order to reduce emotional exhaustion one should focus on emotional demands like emotional dissonance and on emotional resources like emotional support. Study 2 implicates that organizations should create social reciprocity—reflected in balanced working conditions between costs and gains—to foster well-being and high performance levels. Organizations might also want to offer trainings for overcommitted employees to modify their work-related attitudes of approval and commitment. Overcommitted employees have to be aware that their motivational pattern of excessive job-related commitment and a high need for approval puts them at risk for health and productivity decrements, especially under stressful working conditions. Stress management interventions that aimed at reappraising job demands and motivations for excessive engagement
(Aust et al., 1997; Limm et al., 2011) provided promising attempts to modify OC. Recently, Hahn et al. (2011) presented an approach to successfully train psychological detachment.

Generally speaking, burnout interventions target either the employee or the workplace (Schaufeli & Buunk, 2003). Even though most researchers state that a combination of individual and workplace approaches is probably most effective, the vast majority of burnout interventions have been conducted on the individual level (Schaufeli & Buunk, 2003). Most individual level approaches that aim to lower burnout originate from clinical or health psychology. Many are rather general in nature; they aim to combat stress per se, rather than focusing on burnout in particular. These stress management strategies seek to reduce negative arousal that goes along with stress, or to increase employees’ awareness (for a detailed review see Le Blanc & Schaufeli, 2008). Organization level strategies focus on job redesign (i.e., job rotation, job enlargement, and job enrichment) that is generally considered to decrease workload, and thus counteract burnout. Other attempts offer career counseling or foster co-worker support that helps employees to express, analyze, and share their feelings. The supportive interaction between colleagues may also contribute to job-related problem solving. Finally, organizational development has the potential to reduce burnout by improving internal operations of an organization. According to Halbesleben, Osburn, and Mumford (2006), perhaps the most significant limitation of organizational burnout intervention programs is that they tend to seek out universal solutions for organizational issues without taking into account the significant variety of stressors that may lead to burnout and the uniqueness of stressors that appear in any one organization. It was also argued that organizational interventions designed to promote health and well-being can only be effective if they are based on workers’ own experience and active participation (Griffiths, 1999; Semmer, 2003). Therefore, some authors have recently suggested action research as a new approach for burnout interventions (Halbesleben et al., 2006; Le Blanc & Schaufeli, 2008). Action research
provides a framework that does not include universal solutions to combat burnout, but rather helps determine the specific causes of burnout in a specific organization and allows organizational members to develop tailor-made interventions based on their organization-specific causes of burnout (Halbesleben et al., 2006). Research participants are the employees and the starting point is their specific situation. They are granted control over the design and the implementation of interventions that are part of the research. Instead of being objects of interventions, participants are the subjects of the change process. Employees collaborate with expert researchers in identifying problems (e.g., job demands) that are typical for their working situation and in developing, implementing, and evaluating plans to tackle them. This way, the capability of employees and work teams to solve self-identified problems is increased as workers gain job control. The results of this dissertation on matching job characteristics and individual differences, such as OC, speak in favor of this individualized intervention approach.

**General Conclusion**

This dissertation extended research on work-related antecedents of emotional exhaustion and individual performance by showing that moderators should be accounted for in these relationships and that exhaustion is related to cognitive performance. These findings highlight the importance of individual characteristics and resources, which can be targeted in interventions at the individual and organizational level. I conclude that it is valuable to consider the interplay of job characteristics and personal factors for emotional exhaustion and the consequences of exhaustion for individual functioning.
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