# Part II
# Workplace Health and Well-Being

# 8

# The Job Demands-Resources Model

Toon W. Taris and Wilmar B. Schaufeli

## Introduction

One of the currently most popular models in occupational health psychology is the Job Demands-Resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The JD-R model describes the relations between work characteristics, work outcomes (i.e., health, well-being, and performance), and personal characteristics. The present version of the model holds that high job demands lead to high levels of stress and health issues (the *health impairment process*), whereas the presence of high levels of job resources results in high levels of motivation and excellent job performance (the *motivational process*). Since the model was first published in 2001, it has attracted much attention from both researchers and practitioners. For example, according to *Google Scholar* the three most significant papers on the JD-R model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004) had been cited nearly 7,000 times as of January 2015.

Schaufeli and Taris (2013, 2014) argue that one likely reason for this apparent popularity is the fact that the JD-R model builds on established models such as Karasek's Job Demand-Control (-Support) model (DCS model; Karasek, 1979; Karasek & Theorell, 1990) and Siegrist's (1996) Effort-Reward Imbalance (ERI) model. For example, the JD-R's central tenet that work outcomes are the result of negative (demands) and positive (resources) work characteristics parallels the assumption of the DCS that the adverse effects of high job demands can be offset by the presence of high support and high control. Similarly, the ERI model proposed that the harmful effects of "high effort" can be compensated by the presence of sufficient "rewards." The terms "job demands" and "job resources," referring to broad and open categories in which a wide range of very different job characteristics could be placed, had earlier been coined in an influential meta-analysis of the antecedents of job burnout

*The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health*, First Edition. Edited by Sharon Clarke, Tahira M. Probst, Frank Guldenmund, and Jonathan Passmore.  Published 2016 by John Wiley & Sons, Ltd.

by Lee and Ashforth (1996; cf. Taris, Schreurs, & Schaufeli, 1999). Finally, the JD-R model proposes that the two central processes linking work characteristics and work outcomes involve *motivation* and *health impairment*; these processes bear more than a superficial similarity to the *motivation/active learning* and *stress* hypotheses in the DCS model, respectively (Karasek & Theorell, 1990). Apparently, then-current models and ideas had already prepared the minds for the JD-R model.

The major innovation in the JD-R model is the fact that it combines Lee and Ashforth's (1996) conceptualization of demands and resources with earlier notions about the effects of demands and resources on worker health and well-being. Rather than confining itself to a limited set of particular job demands and job resources as most earlier models had done, it proposes that *any* job demand and *any* job resource can affect worker health and well-being. Indeed, the JD-R model assumes that relevant demands and resources can vary across jobs, thus enhancing the flexibility and scope of the model (Bakker & Demerouti, 2007). In effect, building on familiar, tried-and-tested notions, the JD-R model provides a simple, yet comprehensive heuristic framework for relating a wide variety of job characteristics to a broad range of work outcomes – something that at the time of its inception very few of the models then used in the emerging discipline of occupational health psychology could offer.

Since its first publication in the early 2000's, the JD-R model has been modified and extended considerably. Whereas an early version of the model focused on burnout as the primary outcome variable, later versions incorporate more diverse outcomes and more antecedents, including both work-related and personal resources. Below these models are discussed and reviewed in further detail.

## The Jobs Demands-Resources Model of Burnout

In their seminal (2001) publication in the *Journal of Applied Psychology*, Demerouti et al. attempted to account for the antecedents of burnout, defined in terms of exhaustion/fatigue and disengagement/withdrawal (the two key dimensions of burnout; Schaufeli & Taris, 2005). At the heart of the model was Lee and Ashforth's (1996) distinction between job demands and job resources, combined with the *structural model of burnout* proposed by Maslach, Jackson, and Leiter (1996, p. 36).

### The model

Demerouti et al. (2001) defined job demands as "those physical, social, or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs" (Demerouti et al., 2001, p. 501). This conceptualization is broad enough to encompass concepts such as Karasek's (1979) job demands and Siegrist's (1996) effort (which is measured in terms of obligations and task interruptions). Demerouti et al. defined job resources analogously as "those physical, social or organizational aspects of the job that may do any of the following: (a) be functional in achieving work goals; (b) reduce job demands and the associated physiological and psychological costs; (c) stimulate personal growth and development" (p. 501). Again, concepts such as Karasek and Theorell's (1990) job control and social support, and Siegrist's (1996) financial rewards, esteem, job security, and career opportunities fit well with this conceptualization of job resources.

The JD-R model of burnout argued that demands and resources could affect the two burnout components in two ways. First, following Hockey (1997), the model

assumed that dealing adequately with high job demands requires high levels of energy. Chronic high effort expenditure due to high job demands leads to physiological and psychological costs, including high levels of fatigue. Recovery from this state of exhaustion can be achieved by taking breaks, by switching to other tasks, or by working more slowly. However, when there is little opportunity for such recovery-promoting strategies, for instance when performance standards are high, employees will enter a state of *sustained activation* (Knardahl & Ursin, 1985) that can ultimately lead to physical and psychological exhaustion – the energetic component of burnout (Maslach, Schaufeli, & Leiter, 2001). Second, the JD-R model proposed that resources help employees cope with the negative influences of the work environment (e.g., high demands) and are conducive in achieving their goals. A lack of resources will instill a self-protective process in which reduced motivation and withdrawal from the job (i.e., the motivational component of burnout: Maslach et al., 2001) prevents possible negative effects resulting from the future frustration of not obtaining work-related goals. Although Demerouti et al. acknowledged that this reasoning implies that a statistical interaction of demands and resources is central to the development of burnout (p. 502), on the basis of previous research on the absence of such interactions in Karasek's (1979) Demand-Control model they argued that demands-resource interactions would rarely occur. Therefore, the JD-R model of burnout proposed that exhaustion is primarily linked to high demands, and that disengagement/withdrawal primarily results from lack of resources.

## Evidence for the JD-R model of burnout

Research employing the JD-R model of burnout has provided much, although not fully consistent, support for the main effects of job demands and job resources on burnout, with high job demands being associated with high levels of fatigue and exhaustion, and lack of resources being associated with withdrawal (Bakker, Demerouti, & Euwema, 2005; Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003; Bakker, Demerouti, & Verbeke, 2004; Crawford, LePine, & Rich, 2010; Demerouti et al., 2001; Hansen, Sverke, & Näswall, 2009; Huyn, Winefield, Xanthopoulou, & Metzer, 2012; Li, Jiang, Yao, & Li, 2012; Lizano & Mor Barak, 2012; Van Riet & Bakker, 2004; Xanthopoulou, Bakker, Dollard, et al., 2007; see Alarcon, 2011, for a review). Interestingly, in spite of the fact that in the seminal publication on the JD-R model of burnout the importance of demands × resource interactions was downplayed (Demerouti et al., 2001), later research did examine this interaction. For example, Bakker et al. (2003) showed that demands and resources interacted statistically in predicting the two burnout components. As expected, they found that high levels of resources mitigated the adverse effects of high job demands on exhaustion, and that the positive effect of resources on withdrawal/cynicism was weaker when demands were high. Follow-up research by Bakker et al. (2005) and Xanthopoulou et al. (2007) revealed that about 60 percent of all possible interactions between job demands and job resources were significant and in the expected direction; none of these interactions ran counter to the predictions. Hansen et al. (2009) replicated these findings in the context of three hospitals, adding credence to these findings. As regards the outcomes of high levels of burnout, Van Riet and Bakker (2004) showed that high levels of cynicism were associated with lower sales performance of teams (with cynicism mediating the association between job resources and sales performance). Similarly, Bakker et al. (2004) reported that high levels of cynicism and exhaustion were associated with lower levels of objectively measured in- and extra-role performance.

### Conclusions: The JD-Resources model of burnout

While previous research has largely confirmed the assumptions of the JD-R model of burnout, it is important to note that the large majority of the studies cited above draw upon self-report cross-sectional data sets. For example, in a two-sample longitudinal study, Diestel and Schmidt (2012) found little support for the idea that demands and resources would predict later burnout. Moreover, the evidence for the main effects of job demands and job resources on the outcome variables is considerably stronger than that for statistical interactions, but this is not uncommon in the area of job stress research (cf. Taris, 2006). One possible reason for this lack of demand × resource interaction effects is that interactions are especially likely when job demands, job resources, and job-related outcomes refer to qualitatively identical dimensions, e.g., *emotional* demands, *emotional* support, and *emotional* exhaustion, respectively. There is some support for this reasoning (among others, De Jonge & Dormann, 2006; De Jonge, Dormann, & Van den Tooren, 2008; Feuerhahn, Bellingrath, & Kudielka, 2013; Van de Ven & Vlerick, 2013), which goes against Demerouti et al.'s (2001) implicit assumption that the qualitative differences among different demands (or resources) can be neglected, since these demands (resources) would all trigger the same underlying processes.

## The Revised Job Demands-Resources Model

Three years after the publication of the JD-R model of burnout, Schaufeli and Bakker (2004) presented an extended and revised version of the model that included not only burnout but also job engagement (Figure 8.1). Engagement is a positive, fulfilling, work-related state of mind that is characterized by vigor (i.e., high levels of energy and resilience), dedication (experiencing a sense of significance, pride, and challenge) and absorption (being fully concentrated and happily engrossed in one's work) (cf. Schaufeli & Bakker, 2010). The revised model included two main hypotheses, referring to two distinct underlying processes:

1 The first hypothesis is that strain mediates the associations between job demands and health problems (or, more generally, negative outcomes). Similar to the JD-R model of burnout, the revised model assumes that strain results from experiencing high levels of (stress-inducing) demands and low levels of resources. However, contrary to the JD-R model of burnout, the revised JD-R model construes strain as a concept that can have multiple indicators, including – but not limited to – the two core dimensions of burnout (i.e., exhaustion and withdrawal/cynicism). Although this presents a conceptual shift as compared with the JD-R model of burnout (in which these two dimensions were treated as theoretically distinct concepts, each with a different set of antecedents), it should be acknowledged that both indicators of burnout are empirically usually strongly related (e.g., Taris, Le Blanc, Schaufeli, & Schreurs, 2005). To account for the fact that previous research on the JD-R of burnout had shown that job resources were related to withdrawal, the revised model also included a direct effect of resources on strain. Further, consistent with previous research (Melamed, Shirom, Toker, Berliner, & Shapira, 2006), it was assumed that strain could lead to health problems such as depression, cardiovascular complaints, and psychosomatic complaints. Thus, this part of the model proposes that the presence of high demands and low resources leads to a gradual decrease of mental energy (burnout), which in turn could trigger the development of other health and well-being issues. This was termed the *energetic* or *health impairment process.*

2 The second main hypothesis is that engagement mediates the association between job resources and positive outcomes (such as low turnover and high performance). The revised JD-R model emphasizes the fact that some job characteristics (resources) have inherently motivational qualities (e.g., Bakker, Demerouti, & Sanz-Vergel, 2014). Drawing on Meijman and Mulder's (1998) Effort-Recovery Model, the revised JD-R model proposes that the presence of job resources activates workers' willingness to devote their efforts and abilities to their tasks at work. That is, job resources increase workers' levels of extrinsic motivation since they increase their willingness to spend compensatory effort in order to reach work goals. However, job resources such as high levels of autonomy, support, and feedback could also increase workers' levels of intrinsic motivation, since they serve to satisfy the basic human needs for autonomy, affiliation, and competence (cf. Deci & Ryan, 2000; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008). For example, high levels of autonomy and feedback could promote learning behavior, which would, in turn, lead to increased levels of perceived competence (Taris, Kompier, Geurts, Houtman, & Van den Heuvel, 2010). This implies that job resources lead to higher levels of engagement through two motivational paths: an extrinsic path (through reaching one's work goals) and an intrinsic path (through satisfaction of basic human needs). In turn, work engagement is presumed to increase the level of positive work outcomes, including work performance. Thus, job resources increase motivation and work engagement, which, in turn, leads to higher performance. This part of the model is referred to as the *motivational process.*

A further refinement of the revised JD-R model was made in 2007 by Bakker and Demerouti, who explicitly acknowledged the fact that job demands and job resources could interact in affecting job strain and motivation. Drawing on previous findings obtained for Karasek's (1979) Demand-Control model (where the demand × control interaction takes a central place) and on Diener and Fujita (1995) (who found that many different types of resources could facilitate the achievement of particular goals), Bakker and Demerouti argued that "the JD-R model proposes that the interaction between job

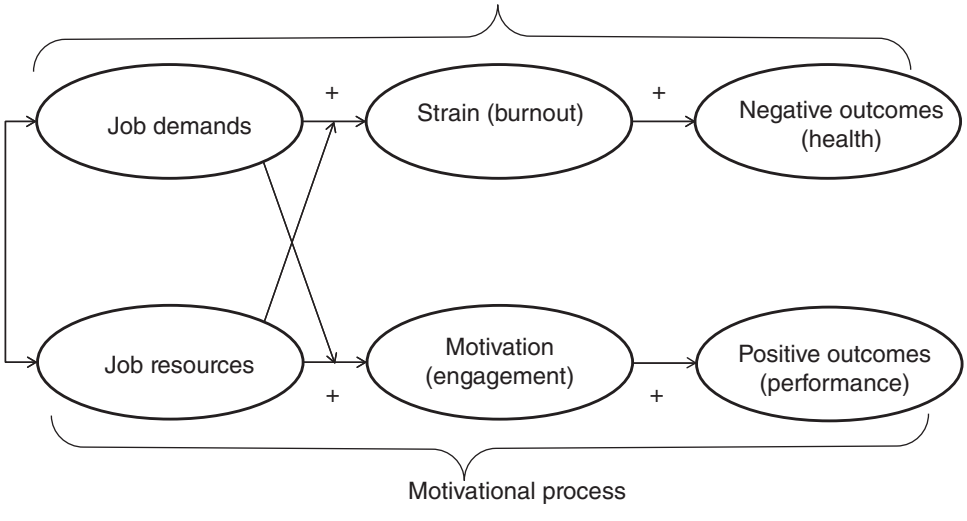


**Figure 8.1** The revised Job Demands-Resources model.

demands and job resources is important for the development of job strain and motivation as well" (2007, p. 217), and that "different types of job demands and job resources may interact in predicting job strain" (p. 217).

Interestingly, counter to the idea that job resources trigger *one specific motivational process* that explains why various resources are associated with higher levels of motivation (work engagement) and performance, Bakker and Demerouti (2007, p. 315) argued that the reason why job resources can act as buffers may vary across – and even within – resources. For example, a worker's high-quality relationship with their supervisor may alleviate the adverse effects of high demands on job strain, since their supervisor's appreciation and support puts demands in a different perspective. It could also help the worker in coping with his or her job demands, facilitate performance, or protect against ill-health. Thus, whereas the main effects of job demands and job resources on strain and motivation are interpreted in terms of two separate and unambiguous processes (health impairment and motivation), this does not apply to the possible demand × control interactions: here a multitude of specific explanations may apply. Although this somewhat spoils the attractive simplicity of the revised JD-R model, it probably does justice to the fact that real-life processes may be too complex to be represented adequately by the two relatively straightforward processes proposed in models such as the JD-R model.

## Evidence for the revised JD-R model

During the last decade or so, the revised JD-R model has constituted the theoretical basis for a large body of research. On the one hand, this research intended to test the model's assumptions; on the other, it was also used as a framework in which other concepts and phenomena were studied. Both types of research can be used to examine the degree to which the model is supported empirically.

*Cross-sectional evidence* The first studies employing the revised JD-R model were conducted in the Netherlands among call center employees (Bakker, Demerouti, & Schaufeli, 2003), industrial workers (Bakker, Demerouti, De Boer, & Schaufeli, 2003) and administrative staff and health care employees (Schaufeli & Bakker, 2004). These studies supported the model's hypotheses regarding the main effects of demands and resources on strain and motivation, respectively, and were replicated internationally as well as in other occupations, for example, among Finnish dentists (Hakanen, Bakker, & Schaufeli, 2006), Australian volunteers (Lewig, Xanthopoulou, Bakker, Dollard, & Metzer, 2007), employees of Chinese family-owned businesses (Hu & Schaufeli, 2011), Dutch interns and temporary workers (Akkermans, Schaufeli, Brenninkmeijer, & Blonk, 2013), and blue- and white-collar workers in Austria (Korunka, Kubicek, Schaufeli, & Hoonakker, 2009), Belgium (Hansez & Chmiel, 2010), Spain (Llorens, Bakker, Schaufeli, & Salanova, 2006), South Africa (De Beer, Rothmann, & Pienaar, 2012), and China (Hu, Schaufeli, & Taris, 2011). A similar study among Italian call center agents (Consiglio, Borgogni, Alessandri, & Schaufeli, 2013) showed that at the individual level, higher job demands were associated with higher burnout; the effect of resources on burnout was not statistically reliable. At the team level, higher demands and lower resources were associated with higher burnout. Finally, Kinnunen, Feldt, Siltaloppi, and Sonnentag (2011) showed that the associations between job demands and fatigue/strain, and between job resources and engagement, were partly mediated through the degree to which workers were able to detach from work. High demands were both directly and indirectly (through low detachment) associated with low engagement; high resources were directly associated with low strain, and both directly and indirectly (through high detachment) with high engagement.

A much smaller number of studies have not only examined the main effects of demands and resources, but also their statistical interaction. For example, a study among Finnish teachers found that high job resources, such as a positive school climate, social support, and appreciation by the supervisor, were especially strongly related to high levels of engagement when job demands were high (Bakker, Hakanen, Demerouti, & Xanthopoulou, 2007). Hu et al. (2011) reported for one of their samples that the adverse effects of high job demands on burnout decreased in the presence of high job resources. However, this interaction effect accounted for little variance in burnout beyond what was already accounted for by the main effects of demands and resources. In two samples, one from Australia and one from China, and each including more than 4,000 participants, Brough et al. (2013) found that out of the eight interactions of job demands and various forms of social support tested in this study, two were statistically significant and in the correct direction. Interestingly, two other demand × support interactions were also significant, but went against the model's predictions. Finally, in a study among more than 12,000 Dutch workers, Bakker, Van Veldhoven, and Xanthopoulou (2010) found that 28 out of the 32 tested demand × resource interactions were statistically significant and in the expected direction, although it should be noted that on average these interactions accounted for only 0.5 percent of the variance (mode = 0.1 percent) in this study's outcome variables (i.e., task enjoyment and organizational commitment).

All in all, from the evidence discussed above it can be concluded that there is strong cross-sectional evidence for the main effects of job demands and job resources on outcome variables such as strain (especially burnout) and motivation (especially work engagement). Tests of demands × resources interaction effects have been published much less frequently. Overall, the available evidence on interactions suggests that the adverse effects of job demands on work outcomes may be mitigated or even be turned into positive effects when participants possess high levels of resources, which confirms the predictions of the JD-R model and is consistent with earlier work on demands × control interaction effects in Karasek's (1979) Demand-Control model (see Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010, and Taris & Kompier, 2004, for reviews). However, similar to previous findings on interaction effects in the Demand-Control model (e.g., Taris, 2006), the current evidence on demand × resource interaction effects shows that, even if significant, the practical relevance of such interactions tends to be low.

*Longitudinal evidence* Correlation does not imply causation: cross-sectional associations – even if these are in accordance with a particular theory – present only weak evidence for the causal assumptions of that theory. Fortunately, a number of studies on the revised JD-R model have employed a longitudinal design, allowing us to examine the evidence for the causal relations proposed in the JD-R model more appropriately. Several of these studies provide longitudinal support for the JD-R. For example, a three-year study among Finnish dentists (Hakanen, Schaufeli, & Ahola, 2008) showed that job resources predicted the degree of later job engagement, which was in turn related to dentists' work engagement. Further, this study showed that high demands predicted later levels of burnout, which was in turn related to depression. Similarly, a study among Dutch managers showed that an increase of job demands and a decrease of job resources across one year were associated with an increase of burnout complaints during that same year (Schaufeli, Bakker, & Van Rhenen, 2009). As expected, an increase of job resources was associated with an increase in job engagement. This study also revealed that burnout was associated with the *duration* of sickness absence (an indicator of health), whereas engagement was associated with sickness absence *frequency* (an indicator of motivation). Further, Akkermans, Brenninkmeijer, Van den Bossche, Blonk, and Schaufeli (2013) found in two statistically independent

samples (of low and high-education young employees, respectively) that higher resources at the start of the study were associated with higher later dedication and lower later exhaustion, and that higher demands were associated with higher later exhaustion. No reversed effects (from dedication and exhaustion on job demands/resources) were found. In a three-wave study, Barbier, Hansez, Chmiel, and Demerouti (2013) reported that an increase in opportunities for development predicted higher concurrent (i.e., within-wave) and later work engagement; for the second resource included in this study, social support, only concurrent support was found. Finally, in a ten-year study among Finnish firefighters, Airila et al. (2014) showed that the initial level of job resources predicted later work engagement and work ability, which is also consistent with the motivational predictions of the JD-R. However, this study did not include a measure of initial work ability, meaning that it is unclear whether the effect of job resources on later work ability can be interpreted causally.

These positive findings for the longitudinal predictions of the JD-R model are counterbalanced by the results of other longitudinal studies. In a one-year study among Dutch university employees, Ouweneel, Le Blanc, and Schaufeli (2012) found no evidence for lagged effects of job resources on work engagement: apparently, these effects were "overwhelmed" by the high temporal stability of engagement. Similarly, contrary to the JD-R's expectations, a three-wave study among Swiss workers (Brauchli, Schaufeli, Jenny, Füllemann, & Bauer, 2013) found no evidence for lagged effects of demands and resources on job burnout or engagement; however, *within* the three study waves cross-sectional evidence for the expected associations was obtained. This study suggested that job resources were more stable across time than job demands, but provided no longitudinal evidence for the causal processes proposed in the JD-R. In a seven-year three-wave study among Finnish dentists, Seppälä et al. (2014) found that work engagement and job resources were largely stable across time, and that it was unclear whether job resources and job engagement were causally related. In a prospective cohort study with a one-year follow-up among Norwegian nurses, Roelen et al. (2014) showed that high initial job demands and low initial social support (a resource) were associated with later sickness absence. No main effects of job control (another resource) or demand × resource interactions were statistically significant. Finally, in a two-nation longitudinal study among 1,600 Chinese and Australian workers, Brough et al. (2013) found no lagged main effects of job demands on the outcome variables in their study (strain and engagement), whereas only one out of eight lagged main effects of two forms of support (from supervisor and coworker) on these outcomes was statistically reliable and in the expected direction. Moreover, inclusion of the interactions between demands and supervisor and coworker support did not account for any additional variance in strain or engagement. Apparently somewhat disappointed, Brough et al. (2013) conclude that their "results are (…) markedly different from the proportions of significant job demands × job resources interaction terms reported elsewhere" (p. 1326), and that "the theoretical associations between the job demands and job resources variables in the prediction of psychological strain and work engagement may be more transient than has been previously identified" (p. 1330).

## Conclusions: The revised JD-R model

All in all, it seems fair to say that the findings discussed above provide compelling cross-sectional evidence for the main effects of job demands on strain/exhaustion, and of job resources on motivation/engagement. The longitudinal evidence for these associations is less convincing, with the number of studies supporting the expected associations being matched by a similar number of studies finding no or reversed effects. As for the

JD-R model of burnout, the evidence for demands × resources interaction effects in the revised JD-R model is weak, which might – again – be due to the fact that it is possible that interactions are especially likely when demands, resources, and outcomes refer to qualitatively similar dimensions (De Jonge & Dormann, 2006; Van de Ven & Vlerick, 2013). Another possibility is that the associations between demands and resources on the one hand, and outcomes such as strain/burnout and motivation/engagement are contingent upon other variables or that they are sample specific. In the next section we discuss a line of research that examines the role of personal resources in the job demands-resources model.

## Extension of the Jobs Demands-Resources Model: Personal Resources

When these models were introduced, neither the JD-R model of burnout nor its revision considered factors other than characteristics of the job and the work environment. However, psychological theories usually emphasize that human behavior results from the interaction of environmental factors (such as work characteristics) and personal factors (such as personality). Therefore, it is hardly surprising that such personal factors have been incorporated in the JD-R model as well. Bearing a strong analogy to job resources, personal resources are defined as "positive self-evaluations that are linked to resiliency and refer to individuals' sense of their ability to control and impact upon their environment successfully (…) [and] (a) are functional in achieving goals, (b) protect from threats and the associated physiological and psychological costs, and (c) stimulate personal growth and development" (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009, p. 236).

Personal resources strongly resemble job resources in that they are instrumental in achieving the same goals as job resources (cf. Demerouti et al., 2001). However, this strong resemblance of job and personal resources does not imply that both categories of resources take a similar place in the JD-R model. Whereas job resources are usually considered antecedents of especially motivation and (sometimes) strain (perhaps in interaction with job demands), up until now personal resources have been included in at least five different ways in the JD-R model (Schaufeli & Taris, 2014).

Firstly, one natural way of including personal resources is to consider them as *antecedents of strain and motivation,* just like job resources and job demands. Since personal resources are defined in terms of resilience, they should be associated with higher levels of engagement/motivation and lower levels of strain/burnout. Consistent with this reasoning, a longitudinal study among Spanish teachers, Llorente, Salanova, Martinez, and Schaufeli (2008) found that higher levels of mental and emotional competencies at the start of the academic year were related to lower levels of burnout and higher levels of engagement at the end of the year, independent of job demands and job resources. Similarly, in an 18-month longitudinal study, Xanthopoulou et al. (2009) showed that the initial level of personal resources (measured as optimism, self-efficacy, and organizational-based self-esteem) predicted higher later levels of engagement. Moreover, engagement as measured at the start of the study predicted future higher levels of job and personal resources. This suggests that so-called *gain* and *loss spirals* may occur (cf. Hobfoll, 2002), in which the presence (absence) of resources leads to higher (lower) levels of engagement, in turn leading to even higher (lower) levels of resources, etc. (Salanova, Schaufeli, Xanthopoulou, & Bakker, 2010, and Taris & Kompier, 2014, for more thorough discussions of this subject).

A second way of including personal resources in the JD-R model is to consider them as *moderators of the associations between job characteristics and work outcomes*. The definition of personal resources suggests that they could affect the magnitude of the associations between job demands/resources on the one hand, and outcomes on the other. Theoretically, the adverse effects of high job demands on strain should be mitigated by high levels of personal resources, whereas the already positive effects of high resources on motivation could be enhanced further by high personal resources. Consistent with this idea, Van den Broeck, Van Ruysseveldt, Smulders, and De Witte (2011) showed that high levels of intrinsic motivation reduced the adverse effects of lack of learning opportunities on exhaustion, and strengthened the positive effect of job control on job engagement. Similarly, Brenninkmeijer, Demerouti, Le Blanc, and Van Emmerik (2010) reported that the adverse effects of high job demands and conflicts at work on exhaustion were stronger among prevention-oriented workers (i.e., those who focus on safety, obligations, and avoidance of loss).

Thirdly, personal resources could *mediate the relations between job characteristics and outcomes*. For example, workers in high-resource work environments are often expected to experience higher levels of self-efficacy and optimism. These could in turn lead to higher levels of work engagement. So far, four cross-sectional studies have tested and confirmed the mediating role of personal resources, focusing on self-esteem/optimism and self-efficacy (Xanthopoulou et al., 2007), psychological capital (PsyCap: self-efficacy, optimism, hope, and resilience; Vink, Ouweneel, & Le Blanc, 2011), creativity (Bakker & Xanthopoulou, 2013), and psychological need fulfillment (for competence, affiliation, and autonomy; Van den Broeck et al., 2008) as mediators, respectively. Two further longitudinal studies showed that self-efficacy mediated the association between job resources and engagement over time (Llorens, Salanova, Schaufeli, & Bakker, 2007; Simbula, Guglielmi, & Schaufeli, 2011).

A fourth way of incorporating personal resources into the JD-R model is to consider them as possible *antecedents of work characteristics*. In the past, it has been proposed that personal resources could affect the work environment, either factually or by altering workers' perceptions of that environment. For example, Bandura's (1997) social-cognitive theory proposes that a person's subjectively perceived competence determines their perception of and their reactions to their environment. Similarly, Judge, Bono, and Locke (2000) argued that an employee's core self-evaluation (CSE; an amalgamate of self-esteem, generalized self-efficacy, locus of control, and neuroticism) affects their perception of the work environment, which, in turn affects job satisfaction and work performance. Consistent with these ideas, Xanthopoulou, Bakker, Demerouti, and Schaufeli (2007) reported that job resources mediated the association between personal resources (i.e., self-efficacy, optimism, and self-esteem) and engagement.

Finally, personal resources could act as a *confounder of the associations among job demands, job resources, and work outcomes*. That is, if it is correct that personal resources affect both work characteristics as well as work outcomes (see above), failing to control for personal resources could bias the associations between work characteristics and work outcomes. For example, Bakker, Boyd, Dollard, et al. (2010) found that the level of extraversion of Australian academics partly accounted for the associations between job resources and engagement.

In summary, the findings discussed above show that: (i) a wide range of personal resources can fruitfully be integrated into the JD-R model, (ii) their effects can be substantial, but (iii) it is unclear which place they should take in the model. It can be presumed that there is no single "correct" place, since findings may vary across different types of personal resources. For example, relatively stable personal characteristics such

as personality traits are probably better conceptualized as possible antecedents of job characteristics and/or work outcomes, rather than as mediators of the relations in the JD-R model. Conversely, relatively malleable personal characteristics (e.g., psychological capital) could well be studied as mediators (cf. Van der Heijden, Van Dam, Xanthopoulou, & De Lange, 2014). Apparently, additional research on the role of personal resources would seem desirable.

## Applications and Extensions of the Job Demands-Resources Model

Since the publication of the JD-R model, it has been applied in various contexts and with different goals. In this section we briefly discuss how the model can be used in practice and how it can be extended.

### Examining the relations between work characteristics and work outcomes

The most obvious application of the JD-R model is to examine the work-related antecedents of a particular type of outcome, perhaps in conjunction with personal characteristics. As the review above indicated, initially the outcome to be studied was burnout or its sub-dimensions (exhaustion and depersonalization, later complemented with engagement in the revised JD-R model). Moreover, since strain (burnout) and affect/motivation (engagement) were presumed to be linked to positive and negative outcomes, concepts such as in-role and extra-role performance (Bakker et al., 2004, 2010), commitment (Bakker et al., 2010), turnover, safety behavior (Hansez & Chmiel, 2010; see also Chmiel & Hansez, Chapter 7, this volume), sickness absence (Schaufeli et al., 2009), and health issues such as depression (Hakanen et al., 2008) have all been studied in this research. The main purpose of much of this research was to test and further validate various aspects of the JD-R model, yielding evidence as to the robustness of the model as well as regarding the antecedents of the outcomes that were involved.

### Mapping work characteristics as a basis for interventions

JD-R based research may also have a strong practical component, that is, when the antecedents of a particular phenomenon (such as burnout or work engagement) have been mapped, a logical next step is to design and implement interventions in order to address possible issues and concerns. The JD-R model fits well in a cyclical process that starts with a particular practical question or even a problem: *problem definition*, e.g., (1) "how do this company's employees experience their jobs?"; (2) "how can the experienced levels of exhaustion and cynicism in this organization be reduced?"; (3) "how can levels of work engagement be increased?"; or (4) "how can we reduce levels of sickness absence in this department?" The JD-R model offers a clear conceptual framework to study such questions, in that it focuses on two important indicators of employee well-being (strain/burnout and motivation/engagement) which is relevant to question 1, indicates how employee scores on these concepts are related to possible work-related and personal antecedents (addressing questions 2 and 3), and suggests what can be expected – e.g., in terms of sickness absence – if adverse scores on these antecedents are addressed (question 4). In addition, the rationale behind the JD-R model is straightforward and therefore relatively easy to communicate, also to HR and occupational health practitioners as well as to executives, managers, and employees.

One often-applied approach in JD-R based intervention studies is to identify the job demands, personal and job resources, indicators of well-being, motivation and health (usually including burnout and engagement), and outcomes that are most significant for the organization, profession or jobs under study. According to the JD-R model these demands, resources and outcomes may vary across organizations and professions, but the basic JD-R model and its assumptions remain the same (cf. Bakker & Demerouti, 2007). Deciding which demands, resources and outcomes are relevant in a specific situation may require the input of key agents such as HR officers, the company management, occupational physicians, and so on (Schaufeli & Taris, 2014).

On the basis of these insights, the next step (*diagnosis*) involves an empirical (survey) study in which participants complete a questionnaire tapping the study's central concepts. After the data collection phase is concluded, the data can be analyzed and fed back into the organization. For example, it is often helpful to compare the average scores on the study concepts across departments, jobs, various types of workers (e.g., age and gender) and – if applicable – organizations, since this allows for identifying possible issues. One JD-R-based study among 1,500 Dutch police officers revealed that especially supervisory and management staff reported high levels of engagement and low levels of burnout and correspondingly favorable scores on the job demands and resources included in this study, whereas especially police patrol officers obtained considerably less favorable scores in these respects (Van Beek, Taris, & Schaufeli, 2013). This knowledge on the one hand suggests where possible issues are located and, on the other hand, indicates which interventions – if any – may be suitable.

Based on these findings, interventions may be selected and implemented (*intervention phase*). Interventions may be directed at specific demands and/or resources and be implemented in the organization as a whole or be targeted toward specific groups (e.g., older workers or workers in a particular occupation). They may take on different forms, ranging from job redesign and training programs to cultural change. In the final step the results of the intervention may be evaluated (*evaluation*). It is often useful to conduct a follow-up to the initial survey study in which the same concepts are measured again. Comparison of the findings of this follow-up study to the initial study provides an indication of the effects of the intervention and whether possible problems have been resolved.

*Example: Job stress interventions in the Dutch domiciliary care sector* In an early application of the JD-R model of burnout, Taris et al. (2003) reported on the effects of various types of job stress interventions in the Dutch domiciliary care sector. Organizations in this sector (i.e., the care agencies) offer short- and long-term services to people who need help or attendance with regard to housekeeping, care, or nursing, such as elderly or chronically ill people. Levels of burnout are traditionally high in this sector (cf. Taris, Stoffelsen, Bakker, Schaufeli, & Van Dierendonck, 2005). In order to address this issue, a large-scale intervention program was conducted.

In the first step (*diagnosis*), a survey was devised that incorporated outcomes (job stress, measured in terms of emotional exhaustion), job demands, and job resources. These demands and resources were selected on the basis of discussions with work council members, members of employer and employee organizations, government representatives, and researchers in this area. At the first wave of the study (1999–2000), all employees of 105 participating home care organizations received the survey. Based on these data, detailed reports were compiled for and discussed with each participating organization in which the scores on all resources and exhaustion were compared across specific target groups, both within the organization – revealing which groups of workers were better off than others in terms of demands, resources, and outcomes – and across organizations –

that is, organizations could compare themselves with other, similar organizations (a *benchmarking* approach).

On the basis of these reports, organizations could individually decide which interventions they wanted to implement to address possible issues that had been identified (*intervention*). Two years later a follow-up study was conducted among employees of the participating organizations (*evaluation*), using the same format as the initial study. Comparison of the levels of work stress, job demands, and job resources indicated that working conditions had improved during the study period. At the follow-up study, the workers reported lower levels of exhaustion and job demands, and higher levels of skill discretion, decision latitude, and social support.

Moreover, all organizations that had participated in both waves of the study received a questionnaire listing 80 interventions that they might have implemented since the first wave of the study. Most organizations (72 percent) indicated that they had implemented at least one intervention during the study period. Organizations with favorable scores on job demands, job resources and/or job stress at the first study wave implemented significantly fewer interventions than other organizations: apparently, organizations used the information they had received in the diagnostic phase to decide whether they should implement any interventions. Organizations implemented different types of interventions, ranging from interventions that focused on factual changes in the work content and/or relations at work (e.g., job redesign and restructuring, ergonomic improvements) to person-directed interventions that focused on changing personal characteristics without the explicit aim to improve employee functioning at work (e.g., promoting exercise, employee assistance programs, relaxation training). Interestingly, further analysis revealed that *only* the work-directed intervention programs affected the central concepts in this study. All in all, this example shows that: (i) a JD-R-based survey study can help in diagnosing problematic issues in an organization, (ii) organizations tend to respond to information about possible work-related risks in their organization, (iii) implementing measures that directly address work-related issues is more effective than taking other measures, and (iv) such interventions affect job stress (exhaustion) in ways predicted by the JD-R model.

*Job crafting* Interventions are usually instigated by organizations. That is, the management of organizations decides more or less top-down whether there is a need for change. However, employees may also spontaneously and on an individual basis (i.e., bottom-up) apply strategies that optimize their work conditions and could therefore lead to higher well-being, motivation, and performance at work. In the literature this phenomenon is referred to as content innovation (Feij, Whitely, Peiro, & Taris, 1995; Schein, 1971) or, more recently, job crafting (Wrzesniewski & Dutton, 2001). Whereas in both cases work characteristics are the main drivers of employee proactive behavior, the difference is that content innovation is usually examined as a direct precursor of performance improvement (focusing on worker's attempts to increase their skills, knowledge, and performance). Conversely, job crafting is primarily examined as an antecedent of meaningful work, well-being, and motivation, focusing on workers' efforts to make their work more interesting and enjoyable, and less demanding (cf. Berg, Dutton, & Wrzesniewski, 2013; Petrou, Demerouti, Peeters, Schaufeli, & Hetland, 2010; Wrzesniewski & Dutton, 2001). Job crafting is defined as a personal strategy to change the content of the job – or its cognitive representation – in such a way that it fits better to one's competencies, preferences, and values.

The JD-R model fits well with both traditions, in that the JD-R model encompasses both well-being and motivation (in the form of strain/burnout and engagement) and performance (as an outcome thereof). Two recent questionnaires tapping job crafting behavior were fully based on the JD-R model, distinguishing between strategies to increase

job resources, increase challenging demands, and decrease hindering and/or stressful job demands (Nielsen & Abildgaard, 2012; Tims, Bakker, & Derks, 2012). In practice, such JD-R based job crafting questionnaires can be used to examine whether employee job crafting behaviors lead to the desired outcomes, both for the employees (e.g., in terms of reducing hindering job demands and maximizing job resources) and for the organization (e.g., in terms of performance).

In an interesting application, De Groot, Van den Heuvel, Demerouti, and Peeters (2012) examined whether a JD-R based job crafting training among 39 police officers resulted in improved well-being. Participants in the intervention condition completed a four-week, four-session training program in which they wrote a personal job crafting plan that specified how they could increase their job resources (weeks 1 and 4), reduce hindering job demands (week 2), and increase challenging demands (week 3). Pre- and post-test comparisons with a non-intervention control group showed that participants in the intervention condition reported improved well-being (i.e., lower levels of negative emotions, higher levels of self-efficacy), increases in the opportunities for development, and better supervisor relations. Apparently, the training program was more effective in increasing job resources (i.e., opportunism for development and supervisor relations) than in reducing job demands.

### Conclusions: Application of the JD-R model

Intuitively appealing as the JD-R may be, the proof of the pudding lies in the eating. That is, can the JD-R model be used to change the work context in such a way that well-being, health, motivation, and performance are improved? The examples provided in this section suggest that this is the case. In previous research the JD-R model has been used as a means to map relevant characteristics of the work environment, resulting in practical and effective organizational interventions to reduce work stress. Moreover, it offers some potential to design and examine job crafting behaviors – as a spontaneous, individual-level type of intervention – as well. Clearly, the JD-R model is not just an analytical framework that is primarily relevant to academics; rather, one of its great attractions is probably that the findings generated by the model can easily be translated into practical applications and interventions (cf. Schaufeli & Taris, 2013).

## The Range of the Job Demands-Resources Model

Scientifically and practically attractive as the JD-R model might be, it is not without limitations. Two main limitations are discussed below.

### Flexibility of the JD-R: Can the JD-R be falsified?

One important advantage of the JD-R model is that it is extremely flexible, one of its main assumptions being that relevant demands and resources can vary across work contexts (e.g., Demerouti & Bakker, 2011). For example, a particular job demand may be relevant in occupation A, but not in occupation B; in the context of the JD-R model, such diverging findings are not necessarily problematic, since they only reflect the fact that not all demands are equally relevant across all job contexts (which would also be interpreted as supporting the model). However, this poses the ontological problem that the model itself cannot be falsified, which is – according to Popperian logic (Popper, 1963) – the hallmark

of truly scientific theories. This issue does not only apply at the operational level (i.e., the specific choice of demands and resources to be included in a study), but also at the level of the associations among the basic study concepts (i.e., the associations between demands, resources, stress, and motivation/well-being, respectively). That is, if a particular set of demands (resources) is unrelated to stress (motivation/well-being), this could simply be accounted for by stating that this signifies that the demands (resources) were not salient in this particular profession. Indeed, this issue is already present in the definition of demands as "those … aspects of the job that … are … associated with certain … costs" (Demerouti et al., 2001, p. 501) – that is, if a particular "job demand" would in a particular application *not* result in such "costs" (i.e., high levels of strain or exhaustion), this job characteristic would not be a demand, at least not in the population under study – *and this would not discredit the JD-R model in any way*. The same remark applies to Demerouti et al.'s (2001, p. 501) definition of resources. Apparently there is a certain circularity in the model that makes it difficult to decide which set of findings would falsify the model.

## Interpreting the relations in the JD-R model/ heterogeneity of demands/resources?

On a higher level, the model holds that "motivation" and "health impairment" are the fundamental processes that link work characteristics to outcomes. However, there are many different processes that could account for the relations between work characteristics and work outcomes. Even within the two fundamental types of work characteristics (demands vs. resources), the processes underlying the relations between specific work characteristics and outcomes may differ strongly. For example, the effects of instrumental support on engagement are often interpreted differently than the effects of emotional support on engagement, and "motivation" may not be the most plausible process that links these forms of support to engagement. Similarly, the effect of job control/autonomy on work outcomes draws on a different underlying process than the effect of support (and, again, "motivation" is not necessarily a relevant factor here). Apparently, it is not immediately clear how the relations between demands/resources on work outcomes should be interpreted, and it is unclear whether health impairment/motivation are indeed the most relevant processes accounting for these relations. This suggests that the JD-R model is better construed as a heuristic framework that conveniently summarizes previous findings on the associations between job characteristics and work outcomes than as a theoretical model on its own. Note that this issue can easily be resolved, since theories relating specific work characteristics to work outcomes are readily available (cf. Schaufeli & Taris, 2014).

Further, given the conceptual heterogeneity of the characteristics within the two clusters of job characteristics, it is not immediately clear *why* these factors should covary. For example, empirically it is often found that all sorts of theoretically heterogeneous "resources" tend to cluster in a single, latent "resources"factor. This might be due to the fact that some resources actually affect the scores on other resources (e.g., high levels of autonomy could allow workers to seek and find social support), job design processes in relation to organizational labor market policies (jobs may be designed to be attractive in terms of the presence of resources, in order to allow organizations to attract the best staff, cf. Wagenaar et al., 2012), methodological issues (job characteristics are often measured using self-reports, meaning that halo-effects or common method variance may be an issue), and even conscious post-hoc selection of demands/resources on the basis of empirical findings (relating to the issue of whether the JD-R can be falsified). In this sense,

one could maintain that what is gained by using the JD-R model in terms of generality (all sorts of concepts can be included in the model), is lost in terms of specificity (i.e., insightful theoretical distinctions as to how particular work characteristics would affect the outcomes are lost).

Summarizing, in spite of the apparent popularity of the JD-R model, the model is not without its limitations. As a catch-all model, from a theoretical point of view the value of the JD-R model is perhaps not so much the fact that it encompasses all sorts of different concepts and provides an account for the relationships among these concepts, but rather that it serves as a heuristic classification scheme that describes how particular broad categories are empirically related to each other. The model describes clearly *which* concepts are related to each other and *how* they are related to each other, but does not convincingly specify *why* they are related. However, this issue can be resolved by drawing on complementary, more specific and often well-established theories.

## Future Research

The JD-R model has generated a considerable body of research since its inception, and much of this research has been summarized in this chapter. As we have seen, the main assumptions of the model have been tried and tested across many occupational and national/cultural contexts. These tests have often confirmed its assumptions, at least in cross-sectional research: longitudinal support is apparently considerably scarcer, but in this respect the JD-R model does not differ from other job stress models such as Karasek's (1979) Demand-Control model. At present there seems little need for additional research on the basic relationships proposed by the JD-R model, as these have already been established firmly in cross-sectional and (to a lesser degree) in longitudinal studies. What, then, are the most pressing issues that need to be addressed in future research? We believe there are at least three such issues.

1 *The nature of demands and resources.* One basic assumption in the JD-R model is that many (if not most) work characteristics can be neatly divided across two broad categories: demands and resources, respectively. However, one important issue with this assumption is that the difference between these two categories is less clear than it would seem. On the one hand, having to deal with a structural lack of a particular resource might be construed as a demand, since it fits the definition of a demand as an aspect of the job that requires "sustained physical or mental effort" and will therefore be "associated with certain physiological and psychological costs" (Demerouti et al., 2001, p. 501). For example, lack of resources at work will imply that workers must work harder to achieve their work goals. This suggests that a lack of resources is equivalent with high demands. Indeed, previous research using Karasek and Theorell's (1990) Demand-Control-Support model has frequently shown that the absence of support and autonomy (two "resources") are associated with adverse health outcomes (see De Lange, Taris, Kompier, Houtman, & Bongers, 2003, for a review of high-quality longitudinal studies). Similarly, excessively high job demands could well be considered as a lack of resources, since this would surely be *dysfunctional* in achieving work goals and would *hinder* personal growth and development (cf. Demerouti et al., 2001).

On the other hand, it has been suggested that not all demands are created equal. Drawing on the distinction between challenge demands and hindrance demands (LePine, LePine, & Jackson, 2004; LePine, Podsakoff, & LePine, 2005), Van den Broeck and

colleagues showed that high levels of hindrance demands (i.e., threatening demands that impede employees' control, cannot easily be overcome and elicit an emotion-focused coping response) were associated with higher exhaustion and lower vigor, whereas challenging demands (i.e., demands that do not just require effort to deal with, but are also stimulating, elicit a problem-focused coping response and contribute to the achievement of work goals) related positively to vigor (but not to exhaustion) (Van den Broeck, De Cuyper, De Witte, & Vansteenkiste, 2010). These findings were largely confirmed in Crawford et al.'s (2010) meta-analysis.

Apparently, the distinction between demands and resources that was posed in early formulations of the JD-R model is not as unambiguous as initially thought. Future research should address this issue, distinguishing between different types of demands (and, perhaps, resources) and preferably across different types of jobs (Demerouti & Bakker, 2011; Schaufeli & Taris, 2013).

2 *Demand × resource interactions.* Another recurrent issue in discussions on Karasek's (1979) Demand-Control (DC) model refers to the presumed interaction between job demands and job control. Although such an interaction is the central tenet of the DC model, empirical research rarely confirmed this interaction (Taris, 2006). History seems to repeat itself: the interaction between demands and resources is central to the JD-R model (Demerouti & Bakker, 2011), yet the evidence for this interaction effect is considerably weaker than that for both main effects of demands and resources. Moreover, even if interactions are found, the practical relevance of these interactions is small, as evidenced by small effect sizes (e.g., Bakker, Van Veldhoven, & Xanthopoulou, 2010). What is important is perhaps not so much that interactions are rare and usually small, but rather the issue as to when interactions are most likely to occur. Bakker and Demerouti's (2007) idea that "different types of job demands and job resources may interact in predicting job strain" (p. 217) was challenged by De Jonge and colleagues, arguing that the likelihood of finding interactions between demands and resources varies with the degree to which these job characteristics and the outcome under study refer to qualitatively identical domains (e.g., De Jonge & Dormann, 2006; De Jonge, Demerouti, & Dormann, 2014). Although they do not deny that qualitatively different types of demands and resources may interact, interactions between qualitatively non-matching demands and resources would be considerably less frequent and practically less important than when demands, resources, and outcomes have a qualitatively strong match.

Since – insofar as interactions have been reported in the literature – both Bakker and Demerouti (2007) and De Jonge and Dormann's (2006) ideas have been confirmed, at present it is by no means clear which of these sets of assumptions has received the strongest support, or, alternatively, under which circumstances which type of interactions – if any – can be expected. This issue is not just of academic interest: from a practical point of view it is important to know whether high levels of a particular demand can indeed be mitigated by high levels of resources, and whether it matters which type of resource is offered.

3 *Gain and loss cycles/reciprocal effects.* As discussed above, much JD-R based research shows that the presence of job resources and the absence of excessively high job demands tends to lead to higher levels of well-being. Interestingly, building on Fredrickson's (2001) Broaden-and-Build theory, it can be expected that high levels of well-being (engagement) can also lead to higher levels of resources (Salanova et al., 2010, for an overview). This research suggests that high-resource workers tend to become more engaged over time

and that engaged workers tend to collect more resources in their job, which in turn leads to even higher levels of engagement (the so-called gain spiral), whereas low-engagement and/or burned-out workers tend to lose job resources, leading to even lower levels of engagement (the loss spiral) – findings that find an analog in Merton's (1968) well-known Matthew effect, stating that: *For unto everyone that has shall be given, and he shall have abundance: but from him that has not shall be taken away even that which he has* (Matthew 25:29). However, how do these findings translate into practice – if they have any practical value at all, that is? Although research has frequently demonstrated longitudinal reciprocal effects between job resources and job engagement, it is not entirely clear how a gain (or loss) spiral would develop, or even whether such a spiral actually exists. That is, gain and loss spirals refer to changes in the *level* of engagement and resources, but the evidence available today draws on correlational studies, referring to the correspondence of the *order* of the study participants on the variables of interest. Since information on the order of participants on the study variables tells us nothing about the stability or change in terms of the actual level of the participants' scores on these variables (Mortimer, Finch, & Kumka, 1982, for a discussion), the currently available evidence hardly supports any claims regarding the existence of gain and loss spirals. In order to examine such spirals properly, researchers should examine the across-time development of mean levels of engagement (and resources) for low- and high-resources (engagement) groups (cf. Salanova et al., 2010), rather than to look only at suggestive – but largely irrelevant – patterns of lagged regression effects. Clearly, more – well-designed and correctly analyzed – research on this intriguing issue is needed.

## Conclusion

In this chapter, we have: (i) provided an overview of the development and conceptual bases of the JD-R model, drawing parallels with earlier job stress models such as Siegrist's (1996) Effort-Reward Imbalance model and Karasek and Theorell's (1990) Demand-Control-Support model; (ii) discussed the empirical support from cross-sectional and longitudinal studies for the various versions of the model; (iii) addressed some applications and extensions of the model; (iv) discussed several important limitations of the model; and, (v) suggested a number of venues for future research on the JD-R model.

Our overview showed that the major innovation of the JD-R model was that it extended the notion forwarded in earlier job stress models that particular positive and negative work characteristics could affect workers' motivation and well-being with the idea that these job characteristics could be assigned to two broad categories: job demands and job resources, respectively (Lee & Ashforth, 1996). Later on, the model was extended with a third category: personal resources. A considerable body of research – covering a wide range of occupations and nations/cultures – supported the model; although most evidence was obtained in cross-sectional research, several longitudinal studies also reported support for the model's assumptions. The currently available evidence on the presumed interactions between demands and resources is relatively sparse, often weak, and cannot always unequivocally be interpreted. As regards the application of the model, we have indicated how the JD-R model can be used to guide practical interventions. Moreover, we have shown how the current body of research on job crafting could be framed in the terms of the JD-R model. The fact that the model has several important limitations (relating to its epistemological status, the interpretation of the specific relations included in the model, and the nature of demands and resources)

suggests that the JD-R model is perhaps better considered a heuristic framework that integrates all sorts of findings and approaches, rather than a well-developed theory on its own. Finally, we identified a number of important issues to be addressed in future research, including clarification of the nature of demands and resources, the interaction between demands and resources, and the existence of gain/loss cycles. All in all, the present overview illustrates that the JD-R model sparked quite some research in the area of occupational health psychology and that it has the potential to continue to do so.

## References


Airila, A., Hakanen, J. J., Schaufeli, W. B., Luukkonen, R., Punokallio, A., & Lusa, S. (2014). Are job and personal resources associated with work ability 10 years later? *Work & Stress*, *28*, 87–105.

Akkermans, J., Brenninkmeijer, V., Van den Bossche, S. N. J., Blonk, R. W. B., & Schaufeli, W. B. (2013). Young and going strong? A longitudinal study on occupational health among young employees of different educational levels. *Career Development International*, *18*, 416–435.

Akkermans, J. Schaufeli, W. B., Brenninkmeijer, V., & Blonk, R. W. B. (2013). The role of career competencies in the Job Demands-Resources model. *Journal of Vocational Behavior*, *83*, 356–366.

Alarcon, G. M. (2011). A meta-analysis of burnout with job demands, resources, and attitudes. *Journal of Vocational Behavior*, *79*, 549–562.

Bakker, A. B., Boyd, C. M., Dollard, M., Gillespie, N., Winefield, A. H., & Stough, C. (2010). The role of personality in the Job Demands-Resources model. *Career Development International*, *15*, 622–636.

Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology*, *22*, 309–328.

Bakker, A. B., Demerouti, E., De Boer, E., & Schaufeli, W. (2003). Job demands and job resources as predictors of absence duration and frequency. *Journal of Vocational Behavior*, *62*, 341–356.

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology*, *10*, 170–180.

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD-R approach. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*, 389–411.

Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2003). Dual processes at work in a call center: An application of the Job Demands-Resources model. *European Journal of Work and Organizational Psychology*, *12*, 393–417.

Bakker, A. B., Demerouti, E., Taris, T. W., Schaufeli, W. B., & Schreurs, P. J. G. (2003). A multigroup analysis of the Job Demands-Resources Model in four home care organizations. *International Journal of Stress Management*, *10*, 16–38.

Bakker, A. B., Demerouti, E., & Verbeke, W. (2004). Using the Job Demands-Resources model to predict burnout and performance. *Human Resource Management*, *43*, 83–104.

Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement particularly when job demands are high. *Journal of Educational Psychology*, *99*, 274–284.

Bakker, A.B., Van Veldhoven, M., & Xanthopoulou, D. (2010). Beyond the Demand-Control model: Thriving on high job demands and resources. *Journal of Personnel Psychology*, *9*, 3–16.

Bakker, A. B., & Xanthopoulou, D. (2013). Creativity and charisma among female leaders: The role of resources and work engagement. *International Journal of Human Resource Management*, *24*, 2760–2779.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: Freeman.

Barbier, M., Hansez, I., Chmiel, N., & Demerouti, E. (2013). Performance expectations, personal resources, and job resources: How do they predict work engagement? *European Journal of Work and Organizational Psychology*, *22*, 750–762.

Berg, J. M., Dutton, J. E., & Wrzesniewski, A. (2013). Job crafting and meaningful work. In B. J. Dik, Z. S. Byrne, & M. F. Steger (Eds.), *Purpose and meaning in the workplace* (pp. 81–104). Washington, DC: American Psychological Association.

Brauchli, R., Schaufeli, W. B., Jenny, G. J., Füllemann, D., & Bauer, G. F. (2013). Disentangling stability and change in job resources, job demands, and employee well-being: A three-wave study on the job demands-resources model. *Journal of Vocational Behavior*, *83*, 117–129.

Brenninkmeijer, V., Demerouti, E., Le Blanc, P., & Van Emmerik, H. (2010). Regulatory focus at work: The moderating role of regulatory focus in the Job Demands-Resources model. *Career Development International*, *15*, 708–728.

Brough, P. M., Timms, C., Siu, Q., Kalliath, T., O'Driscoll, M. P., Sit, C. H. P., Lo, D., & Lu, C. (2013). Validation of the job demands-resources model in cross-national samples: Cross-sectional and longitudinal predictions of psychological strain and work engagement. *Human Relations*, *66*, 1311–1335.

Consiglio, C., Borgogni, L., Alessandri, G., & Schaufeli, W. B. (2013). Does self-efficacy matter for burnout and sickness absenteeism? The mediating role of demands and resources at the individual and team levels. *Work & Stress*, *27*, 22–42.

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*, 834–848.

De Beer, L., Rothmann, S., & Pienaar, J. (2012). A confirmatory investigation of a job demands-resources model using a categorical estimator. *Psychological Reports*, *111*, 528–544.

De Groot, K., Van den Heuvel, M., Demerouti, E., & Peeters, M. (2012). *Succesvol job craften door middel van een groepstraining* [in Dutch]. In J. de Jonge, M. Peeters, S. Sjollema, & M. de Zeeuw (Eds.), *Scherp in werk: Vijf routes naar optimale inzetbaarheid* (pp. 27–52). Assen, The Netherlands: Van Gorcum.

De Jonge, J., Demerouti, E., & Dormann, C. (2014). Current theoretical perspectives in work psychology. In M. C. W. Peeters, J. de Jonge, & T. W. Taris (Eds.), *An introduction to contemporary work psychology* (pp. 89–113). Oxford: Wiley-Blackwell.

De Jonge, J., & Dormann, C. (2006). Stressors, resources, and strain at work: A longitudinal test of the triple-match principle. *Journal of Applied Psychology*, *91*, 1359–1374.

De Jonge, J., Dormann, C., & Van den Tooren, M. (2008). The Demand-Induced Strain Compensation model: Renewed theoretical considerations and empirical evidence. In K. Naswall, J. Hellgren, & M. Sverke (Eds.), *The individual in the changing working life* (pp. 67–87). Cambridge, UK: Cambridge University Press.

De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2003). The very best of the millennium: Longitudinal research and the Demand-Control(-Support) model. *Journal of Occupational Health Psychology*, *8*, 282–305.

Deci, E. L. & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 319–338.

Demerouti, E., & Bakker, A. B. (2011). The Job Demands-Resources model: Challenges for future research. *South-African Journal of Industrial Psychology*, *37*, doi:10.4102/sajip.v37i2.974

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The Job Demands-Resources model of burnout. *Journal of Applied Psychology*, *86*, 499–512.

Diener, E., & Fujita, F. (1995). Resources, personal strivings, and subjective well-being: A nomothetic and idiographic approach. *Journal of Personality and Social Psychology*, *68*, 926–935.

Diestel, S., & Schmidt, K.-H. (2012). Lagged mediator effects of self-control demands on psychological strain and absenteeism. *Journal of Occupational and Organizational Psychology*, *85*, 556–578.

Feij, J. A., Whitely, W. T., Peiro, J. M., & Taris, T. W. (1995). The development of career-enhancing strategies and content innovation: A longitudinal study of new workers. *Journal of Vocational Behavior*, *46*, 231–256.

Feuerhahn, N., Bellingrath, S., & Kudielka, B. M. (2013). The interplay of matching and non-matching job demands and resources on emotional exhaustion among teachers. *Applied Psychology: Health and Well-being*, *5*, 171–192.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*, 218–226.

Hakanen, J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, *43*, 495–513.

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress*, *22*, 224–241.

Hansen, N., Sverke, M., & Naswall, K. (2009). Predicting nurse burnout from demands and resources in three acute care hospitals under different forms of ownership: A cross-sectional questionnaire survey. *International Journal of Nursing Studies*, *46*, 95–106.

Hansez, I., & Chmiel, N. (2010). Safety behavior: Job demands, job resources, and perceived management commitment to safety. *Journal of Occupational Health Psychology*, *15*, 267–278.

Häusser, J. A., Mojzisch, A., Niesel, M., & Schulz-Hardt, S. (2010). Ten years on: A review of recent research on the job demand-control (-support) model and psychological well-being. *Work & Stress*, *24*, 1–35.

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, *6*, 307–324.

Hockey, G. R. J. (1997). Compensatory control in the regulation of human performance under stress and high workload: A cognitive energetical framework. *Biological Psychology*, *45*, 73–93.

Hu, Q. & Schaufeli, W. B. (2011). Job insecurity and remuneration in Chinese family-owned business workers. *Career Development International*, *16*, 6–19.

Hu, Q., Schaufeli, W. B., & Taris, T. W. (2011). The Job Demands-Resources Model: An analysis of additive and joint effects of demands and resources. *Journal of Vocational Behavior*, *79*, 181–190.

Huyn, J.-Y., Winefield, A. H., Xanthopoulou, D., & Metzer, J. C. (2012). Burnout and connectedness in the Job Demands-Resources model: Studying palliative care volunteers and their families. *American Journal of Hospice and Palliative Medicine*, *29*, 462–475.

Judge, T. A., Bono, J. E., & Locke, E. A. (2000). Personality and job satisfaction: The mediating role of job characteristics. *Journal of Applied Psychology*, *85*, 237–249.

Karasek, R. (1979). Job demands, job decision latitude and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*, 285–306.

Karasek, R. A., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York, NY: Basic Books.

Kinnunen, U., Feldt, T., Siltaloppi, M., & Sonnentag, S. (2011). Job demands-resources model in the context of recovery: Testing recovery experiences as mediators. *European Journal of Work and Organizational Psychology*, *20*, 805–832.

Knardahl, S., & Ursin, H. (1985). Sustained activation and the pathophysiology of hypertension and coronary heart disease. In J. F. Orlebeke, G. Mulder, & L. J. P. van Doornen (Eds.), *Psychophysiology of cardiovascular control: Models, methods, and data* (pp. 151–167). New York, NY: Plenum.

Korunka, C., Kubicek, B., Schaufeli, W., & Hoonakker, P. L. T. (2009). Burnout and work engagement: Do age, gender, or occupation level matter? Testing the robustness of the Job Demands-Resources Model. *Positive Psychology*, *4*, 243–255.

Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, *81*, 123–133.

LePine, J. A., LePine, M. A., & Jackson, C. (2004). Challenge and hindrance stress: Relationships with exhaustion, motivation to learn, and learning performance. *Journal of Applied Psychology*, *89*, 883–891.

LePine, J. A., Podsakoff, N. P., & LePine, M. A. (2005). A meta-analytic test of the challenge stressor-hindrance stressor framework: An explanation for inconsistent relationships among stressors and performance. *Academy of Management Journal*, *48*, 764–775.

Lewig, K. A., Xanthopoulou, D., Bakker, A. B., Dollard, M., & Metzer, J. C. (2007). Burnout and connectedness among Australian volunteers: A test of the Job Demands-Resources model. *Journal of Vocational Behavior*, *71*, 429–445.

Li, F., Jiang, L., Yao, X., & Li, Y. (2012). Job demands, job resources and safety outcomes: The roles of emotional exhaustion and safety compliance. *Accident Analysis and Prevention*, *51*, 243–251.

Lizano, E. L., & Mor Barak, M. E. (2012). Workplace demands and resources as antecedents of job burnout among public child welfare workers: A longitudinal study. *Children and Youth Services Review*, *34*, 1769–1776.

Llorens, S., Bakker, A. B., Schaufeli, W. B., & Salanova, M. (2006). Testing the robustness of the Job Demands-Resources model. *International Journal of Stress Management*, *13*, 378–391.

Llorens, S., Salanova, M., Schaufeli, W. B., & Bakker, A. (2007). Does a positive gain spiral of resources, efficacy beliefs and engagement exist? *Computers in Human Behavior*, *23*, 825–841.

Llorente, L., Salanova, M., Martinez, I., & Schaufeli, W. B. (2008). Extension of the Job Demands-Resources model in the prediction of burnout and engagement among teachers over time. *Psicotema*, *20*, 354–360.

Maslach, C., Jackson, S. E., & Leiter, M. (1996). *Maslach Burnout Inventory* (3rd edn.). Palo Alto, CA: Consulting Psychologists Press.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, *52*, 397–422.

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry, & C. J. de Wolff (Eds.), *Handbook of work and organizational psychology* (pp. 5–33). Hove, UK: Psychology Press.

Melamed, A., Shirom, A., Toker, S., Berliner, S., & Shapira, I. (2006). Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychological Bulletin*, *132*, 327–353.

Merton, R. K. (1968). The Matthew effect in science. *Science*, *159*, 56–63.

Mortimer, J. T., Finch, M. D., & Kumka, D. (1982). Persistence and change in development: The multidimensional self-concept. In P. B. Baltes & O. G. Brim, Jr. (Eds.), *Life span development and behavior* (Vol. 4, pp. 263–313). New York, NY: Academic Press.

Nielsen, K., & Abildgaard, J. S. (2012). The development and validation of a job crafting measure for use with blue-collar workers. *Work & Stress*, *26*, 365–384.

Ouweneel, E., Le Blanc, P. M., & Schaufeli, W. B. (2012). Don't leave your heart at home: Gain cycles of positive emotions, resources, and engagement at work. *Career Development International*, *17*, 537–556.

Petrou, P., Demerouti, E., Peeters, M. C. W., Schaufeli, W. B., & Hetland, J. (2010). Crafting a job on a daily basis: Contextual correlates and the link to work engagement. *Journal of Organizational Behavior*, *33*, 1120–1141.

Popper, K. R. (1963). *Conjectures and refutations: The growth of scientific knowledge*. London, UK: Routledge.

Roelen, C., Van Rhenen, W., Schaufeli, W., Van der Klink, J., Mageroy, N., Moen, B., Bjorvatn, B., & Pallesen, S. (2014). Mental and physical health-related functioning mediates between psychological job demands and sickness absence among nurses. *Journal of Advanced Nursing*, *70*, 1780–1792.

Salanova, M., Schaufeli, W. B., Xanthopoulou, D., & Bakker, A. B. (2010). Gain spirals of resources and work engagement. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 118–131). New York, NY: Psychology Press.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, *25*, 293–315.

Schaufeli, W. B., & Bakker, A. B. (2010). The conceptualization and measurement of work engagement. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 10–24). New York, NY: Psychology Press.

Schaufeli, W. B., Bakker, A. B., & Van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *Journal of Organizational Behavior*, *30*, 893–917.

Schaufeli, W. B., & Taris, T. W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work & Stress*, *19*, 256–262.

Schaufeli, W. B., & Taris, T. W. (2013). Het job demands-resources model: Een kritische beschouwing. *Gedrag & Organisatie*, *26*, 182–204.

Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the job demands-resources model: Implications for improving work and health. In G. F. Bauer & O. Hämmig (Eds.), *Bridging occupational, organizational and public health: A transdisciplinary approach* (pp. 43–68). Dordrecht, The Netherlands: Springer.

Schein, E. (1971). Occupational socialization in the professions: The case of the role innovator. *Journal of Psychiatric Research*, *8*, 521–530.

Seppälä, P., Hakanen, J., Mauno, S., Perhoniemi, R., Tolvanen, A., & Schaufeli, W. B. (2014). Stability and change model of job resources and job engagement: A seven-year, three-wave follow-up study. *European Journal of Work and Organizational Psychology*, *24*, 360–375.

Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, *1*, 27–41.

Simbula, S., Guglielmi, D., & Schaufeli, W. B. (2011). A three-wave study on job resources, self-efficacy and work engagement among Italian school teachers. *European Journal of Work and Organizational Psychology*, *20*, 285–305.

Taris, T. W. (2006). Bricks without clay: On urban myths in occupational health psychology. *Work & Stress*, *20*, 99–104.

Taris, T. W., & Kompier, M. A. J. (2004). Job characteristics and learning behavior: Review and psychological mechanisms. In P. L. Perrewé & D. C. Ganster (Eds.), *Research in occupational health and well-being* (Vol. 4, pp. 127–166). Oxford, UK: Elsevier.

Taris, T. W., & Kompier, M. A. J. (2014). Cause and effect: Optimizing the designs of longitudinal studies in occupational health psychology. *Work & Stress*, *28*, 1–8.

Taris, T. W., Kompier, M. A. J., Geurts, S. A. E., Houtman, I. L. D., & Van den Heuvel, F. F. M. (2010). Professional efficacy, exhaustion, and work characteristics among police officers: A longitudinal test of the learning-related predictions of the demand-control model. *Journal of Occupational and Organizational Psychology*, *83*, 455–474.

Taris, T. W., Kompier, M. A. J., Geurts, S. A. E., Schaufeli, W. B., De Boer, E., Sepmeijer, K. J., & Wattez, C. (2003). Stress management interventions in the Dutch domiciliary care sector: Findings from 81 organizations. *International Journal of Stress Management*, *10*, 297–325.

Taris, T. W., Le Blanc, P. M., Schaufeli, W. B., & Schreurs, P. J. G. (2005). Are there causal relationships between the dimensions of the Maslach Burnout Inventory? A review and two longitudinal tests. *Work & Stress*, *19*, 238–255.

Taris, T. W., Schreurs, P. J. G., & Schaufeli, W. B. (1999). Construct validity of the Maslach Burnout Inventory–General Survey: A two-sample examination of its factor structure and correlates. *Work & Stress*, *13*, 323–237.

Taris, T. W., Stoffelsen, J., Bakker, A. B., Schaufeli, W. B., & Van Dierendonck, D. (2005). Job control and burnout levels across occupations. *Psychological Reports*, *97*, 955–961.

Tims, M., Bakker, A. B., & Derks, D. (2012). Development and validation of the job crafting scale. *Journal of Vocational Behavior*, *80*, 173–186.

Van Beek, I., Taris, T. W., & Schaufeli, W. B. (2013). *Psychosocial health of police officers* [in Dutch]. The Hague, The Netherlands: WODC.

Van de Ven, B., & Vlerick, P. (2013). Testing the triple-match principle among technology employees. *European Journal of Work and Organizational Psychology*, *22*, 658–669.

Van den Broeck, A., De Cuyper, N., De Witte, H., & Vansteenkiste, M. (2010). Not all demands are equal: Differentiating job hindrances and job challenges in the Job Demands-Resources model. *European Journal of Work and Organizational Psychology*, *19*, 735–759.

Van den Broeck, A., Van Ruysseveldt, J., Smulders, P., & De Witte, H. (2011). Does intrinsic value orientation strengthen the impact of job resources? A perspective from the Job Demands-Resources model. *European Journal of Work and Organizational Psychology*, *20*, 581–609.

Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress*, *22*, 277–294.

Van der Heijden, B., Van Dam, K., Xanthopoulou, D., & De Lange, A. H. (2014). Individual characteristics and work-related outcomes. In M. C. W. Peeters, J. de Jonge, & T. W. Taris (Eds.), *An introduction to contemporary work psychology* (pp. 243–265). Oxford, UK: Wiley-Blackwell.

Van Riet, P., & Bakker, A. B. (2004). Financiële omzet als een functie van werkstressoren en energiebronnen (financial performance as a function of work stressors and energy sources). *Gedrag & Organisatie*, *17*, 487–504.

Vink, J., Ouweneel, A., & Le Blanc, P. (2011). Psychologische energiebronnen voor bevlogen werknemers: Psychologisch kapitaal in het Job Demands-Resources model. *Gedrag & Organisatie*, *24*, 101–120.

Wagenaar, A. F., Taris, T. W., Houtman, I. L. D., Van den Bossche, S., Smulders, P., & Kompier, M. A. J. (2012). Labour contracts in the European Union, 2000–2005: Differences among demographic groups and implications for the quality of working life and work satisfaction. *European Journal of Work and Organizational Psychology*, *21*, 169–194.

Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review*, *26*, 179–201.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2007). The role of personal resources in the job demands-resources model. *International Journal of Stress Management*, *14*, 121–141.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of Organizational and Occupational Psychology*, *82*, 183–200.

Xanthopoulou, D., Bakker, A. B., Dollard, M. F., Demerouti, E., Schaufeli, W. B., Taris, T. W., & Schreurs, P. J. G. (2007). When do job demands particularly predict burnout? The moderating role of job resources. *Journal of Managerial Psychology*, *22*, 766–785.