The Impact of High Involvement Work Systems on Employee Well-Being: The Role of Job Demands and Social Support

Student:	Viktoria Oppenauer
ANR:	573357
Supervisor:	Dr. F.C. van de Voorde
Second reader:	Prof. Dr. M.J.P.M. van Veldhoven
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Tilburg University

Faculty of Social and Behavioral Sciences

Extended Master Human Resource Studies

ABSTRACT

This study aims to contribute to a better understanding of the impact of high involvement work systems (HIWS) on employee energetic well-being (vigor and emotional exhaustion). The job demands-resources (JDR) model is used as the basis to propose that job demands mediate the relationship between HIWS and energetic well-being. Thereby, this study integrates the differentiation between two types of job demands to examine whether the distinction between job hindrances (i.e., work overload) and job challenges (i.e., job responsibility) accounts for differential associations with employee energy levels. Moreover, it is hypothesized that job resources in terms of coworkers' and supervisor's social support moderate the relationship between both types of job demands and vigor and emotional exhaustion. Multilevel data (286 employees nested within 51 work units) obtained from line managers and employees are used. Results indicate that HIWS are positively related to both job hindrances and job challenges. Further, findings reveal that job hindrances exhaust energy reserves, whereas job challenges only have a stimulating effect on energy. Moreover, job hindrances negatively and positively mediate the relationships HIWS–vigor and HIWS–emotional exhaustion, respectively. Whereas, job challenges only positively mediate the relationship between HIWS and vigor. No moderation of coworkers' social support was found. In addition, a second dataset including employee ratings (N = 178) is used to test the moderation of supervisor's social support on the relationship between the two types of job demands and vigor and emotional exhaustion. Hierarchical regression analyses reveal – rather unexpectedly – that higher levels of supervisor's support do not strengthen the positive relation between job challenges and vigor. The fact that implemented HIWS impact employee vigor and emotional exhaustion positively as well as negatively through different job demands would call for a refinement of the concept of job demands in the JDR model. The findings suggest that certain job demands such as job challenges would be conceptualized as resources due to their positive relation to vigor, whereas others such as job hindrances would still be considered as demands due to their harmful impact on vigor and emotional exhaustion.

Keywords: HRM, HIWS, job demands-resources (JDR) model, job hindrances, job challenges, job responsibility, work overload, social support, well-being, vigor, emotional exhaustion, multi-level analysis.

INTRODUCTION

High involvement work systems (HIWS) are models of modern management which are supposed to improve organizational performance through enhanced employees' power, information, rewards and knowledge (Butts, Vandenberg, DeJoy, Schaffer, & Wilson, 2009). This notion has led to a significant research stream investigating the HIWS–organizational outcome relation. Indeed, scholars have found support for a relationship between HIWS and a variety of organizational outcomes including firm competitiveness, return on equity, productivity and turnover (Guthrie, 2001; Riordan, Vandenberg, & Richardson, 2005; Vandenberg, Richardson, & Eastman, 1999). By contrast, limited research has focused on the potential effects of HIWS on employee outcomes (i.e., Van de Voorde, Paauwe, & Van Veldhoven, 2012; Mohr & Zoghi, 2008). HIWS are often viewed as being beneficial not only for the organization but also for employees due to their participatory nature (Butts et al., 2009). Drawing on the *optimistic perspective* (Peccei, 2004), human resource management (HRM) practices promoting employee involvement have a positive impact on employee outcomes (Vandenberg et al., 1999) as employees have feelings of being more valued, confident and able to make work-related decisions (Wood & Menezes, 2011). However, this idea of bilateral benefits has to be considered cautiously as HIWS can negatively affect employee outcomes as well (Jensen, Pattel, & Messersmith, 2013). Following the *pessimistic perspective* (Peccei, 2004), HIWS aiming at increasing organizational effectiveness do so at the cost of reduced employee energy as they lead to work intensification, job strain and feelings of being exploited (Green, 2004; Jensen et al., 2013; Mohr & Zoghi, 2008). Due to this ambiguous nature of HIWS, additional research is needed on the potential positive and negative effects of HIWS on different kinds of employee outcomes and, particularly, on the mechanisms that help to understand how HIWS influence employees. To attenuate this gap, the current study examines the effects of HIWS on employee well-being through two possible mediating roles of job demands.

Employee well-being can be described as the overall quality of employee functioning at work (Warr, 1987) and can be classified into three dimensions: happiness (i.e., satisfaction), health (i.e., strain) and social (i.e., quality of relationships at work; Van de Voorde et al., 2012). This study focuses on the health-related dimension of well-being, in particular, on the energetic well-being of employees. Energy directs employees' behavior at work and constitutes an important aspect of motivation (Pinder, 2008) which, in turn, determines the quality of their functioning. Two different concepts of energy are under research, namely emotional exhaustion

and vigor. Emotional exhaustion is a long-term consequence of sustained exposure to specific job demands and is an extreme form of fatigue reflecting a lack of energy (Demerouti, Bakker, Vardakou, & Kantas, 2003). The feelings of exhaustion reduce personal capacity and may evoke psychological and emotional withdrawal of employees from work as a way to cope with work stress (Demerouti et al., 2003). Whereas vigor is characterized by high levels of energy and mental resilience while working, the willingness to invest effort into one's work, and persistence even in the face of difficulties (Schaufeli & Bakker, 2004, p. 295). Vigor is a positive motivating experience per se and includes physical strength and cognitive liveliness which helps to carry out daily tasks at work with energy (Shirom, 2003). Within this study, vigor and emotional exhaustion do not represent two poles of the same dimension, meaning that vigor is not conceptualized as the direct opposite of emotional exhaustion (Shirom, 2003; Maslach, Schaufeli, & Leiter, 2001). Work situations which are demanding are likely to evoke negative feelings such as exhaustion, however, at the same time they also provide opportunities to experience positive emotions such as vigor when accomplishing tasks and goals (Shirom, 2003). Thus, feeling vigorous does not necessarily exclude symptoms of fatigue, but an energy-depleting effect resulting in an extreme form of fatigue and thus exhaustion does not eventuate (Van den Broeck, De Cuyper, De Witte, & Vansteenkiste, 2010). Energy at work is an important concern not only for the individual employee but also for the organization. Previous studies have revealed that both vigor and emotional exhaustion are related to job performance (Bakker, 2011; Christian, Garza, & Slaughter, 2011; Wright & Cropanzano, 1998). In addition, emotional exhaustion leads to an increase in employee withdrawal-oriented behavior in terms of sickness absence and voluntary turnover (Bakker, Demerouti, & Schaufeli, 2003; Deery, Iverson, & Walsh, 2002; Wright & Cropanzano, 1998).

As part of the attempt to gain a better understanding of the mechanisms linking HIWS with vigor and emotional exhaustion the current study draws on the job demands-resources (JDR) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The JDR model differentiates work conditions into two broad categories, job demands and resources, which have distinct relationships to specific outcomes (Demerouti et al., 2001). This study extends the concept of job demands and focuses on the distinction of job demands by distinguishing between job hindrances (work overload) and job challenges (job responsibility; Cavanaugh, Boswell, Roehling, & Boudreau, 2000; Crawford, Lepine, & Rich, 2010). Job hindrances are demands which exhaust employees' energy reserves, thus, related unfavorably to vigor and emotional exhaustion; whereas job challenges include demands which are both stimulating and

energy-depleting, and therefore are positively associated with vigor and negatively with emotional exhaustion (Crawford et al., 2010; Van den Broeck et al., 2010). By focusing on job hindrances and job challenges, the role of two possible mediating mechanisms through which HIWS impact employee energetic well-being is investigated. The first is solely based on the pessimistic perspective where HIWS negatively affect employee energy through increased job hindrances. The second mechanism follows both the optimistic and pessimistic perspective in which HIWS positively and negatively affect energy components of well-being through increased job challenges (Van den Broeck et al., 2010).

Moreover, it is suggested that the relationship between job hindrances and job challenges and energy-related outcomes depends on how much social support employees receive from their supervisors and coworkers. Social support belongs to the category of job resources in the JDR model, and is claimed to have the potential to put job demands in another angle and assists employees in coping with stressful situations (Bakker, Demerouti, & Euwema, 2005). It is expected that employees with the same job demands will react differently depending on the amount of social support they receive (i.e., Bakker et al., 2005; Bakker, Demerouti, & Verbeke, 2004). At higher levels of social support the unfavorable effect of job hindrances and job challenges on employee energy will be weaker compared to lower levels of social support. In addition, higher levels of social support do also have the potential to reinforce the possible positive effect of job challenges on employee energetic well-being. This suggests that social support has a beneficial influence on the relationship between the different job demands and energy-related outcomes by providing resources that help employees to deal more effectively with job demands. Thus, the purpose of this study is to examine the following research question: *To what extent do job hindrances and job challenges mediate the relationship between implemented high involvement work systems (HIWS) practices and employee energetic well-being, and are the relations job hindrances-energetic well-being and job challenges-energetic well-being moderated by social support?*

This study contributes both theoretically and empirically to the literature as it examines the impact of HIWS on employee energetic well-being through employee perceptions of job demands. In particular, the integration of the distinction of job demands by considering the mediating role of job hindrances and job challenges in the relationship between HIWS and employee outcomes is a novelty. Even though previous research has suggested that HRM practices have an impact on employees through employee perceptions of these practices (i.e.,

Nishii & Wright, 2007; Bowen & Ostroff, 2004; Butts et al., 2009), the job hindrances and job challenges processes have not yet been explored empirically. Further, the investigation of the relationship between HIWS and vigor and emotional exhaustion is a contribution. Although prior research in the field of HRM has investigated the effects of HRM on employee well-being (i.e., anxiety, burnout, engagement; Jensen et al., 2013; Kroon, Van de Voorde, & Van Veldhoven, 2009), focusing on two different energy concepts as outcomes in the HIWS-employee well-being relation is sparse. The inclusion of vigor and emotional exhaustion should provide evidence that HRM can have both positive and negative consequences for employees at the same time. Based on this, the current study focuses on two conflicting perspectives, namely the optimistic and pessimistic perspective. Previous research is driven primarily from the optimistic perspective, while the pessimistic perspective or the simultaneous consideration of both perspectives in studies has been neglected (Peccei, Van De Voorde, & Van Veldhoven, 2013).

The practical relevance of this study is to provide organizations with more understanding of how HIWS may affect organizational performance through employee experiences of their work environment. Work is one of the biggest life domains which is responsible for a large part of people's stress as employees are faced with high work demands such as work overload and pressure (Tennant, 2001). In 2013, the Dutch government and the Dutch employers' and workers' organizations concluded that psychosocial risk factors at work such as work-related stress are a major social problem in the Netherlands and beyond, and have to be considered as a priority subject of a new European Occupational Safety and Health (OSH) strategy (EU-OSHA, 2013). Prolonged stressful work situations impact employee well-being which, in turn, can have severe health and financial consequences for the employee, employer and society (i.e., work disability, absenteeism, lower productivity, higher turnover, public spending; Brenninkmeijer, Houtman, & Blonk, 2008). Thus, employees' perceptions of their work context and their well-being explains some of the relations between HIWS and organizational effectiveness (Wood & Menezes, 2011). This understanding should provide relevant information for changing and/or preventing organizational practices and conditions reducing employees' energetic well-being and for devising systems which benefit employees' health.

The link between HIWS and job demands

HIWS consist of bundles of HR practices aimed at improving employee and firm performance through increased employee involvement in key aspects of decision-making (i.e., Butts et al., 2009; Guthrie, 2001). The underlying premise of HIWS is a system of inclusion based on four complementary attributes (PIRK) providing employees with enhanced power in work-related decision-making (P), relevant information flows (I), rewards linked to organizational outcomes (R) and opportunity to improve organizational- and task-related knowledge (K; Butts et al., 2009). HIWS contrast to Taylorist workplaces which emphasize a control-oriented approach to management characterized by tight job descriptions, centralized decision making, narrow skill variety and little training opportunities (Guthrie, 2001; Felstead & Gallie, 2004). While there is variance in the composition of the specific practices comprising the HIWS in the literature (Vandenberg et al., 1999), some consensus can be found regarding those practices supporting the four PIRK attributes – enhanced power, relevant information, rewards linked to outcomes and increased knowledge (i.e., Butts et al., 2009; Vandenberg et al., 1999). In the current study, the bundle of HIWS practices reflects these primary characteristics involving participation and communication (P, I), compensation and performance evaluation (R), employee training and development opportunities (K). Furthermore, in line with the dominant research trend in the HRM field where HRM is viewed as a system by considering the overall aggregation of HRM practices (Bowen & Ostroff, 2004), this study investigates the joint impact of HIWS practices, as opposed to the effect of individual practices, on employee job demands and energetic well-being. This is because HIWS is assumed to be a synergistic set of practices, and these practices are coherent and interact positively with each other. Thus, the combined effect of the practices is stronger on outcomes than the sum of effects of individual practices (Appelbaum, Bailey, Berg, & Kalleberg 2000, as cited in Wood & Menezes, 2008). Moreover, the present study includes line managers' ratings on the proportion of employees covered by HIWS practices in their work unit. These ratings provide information about the spread of implemented HIWS practices in work units. Further, according to recent HRM process models (Bowen & Ostroff, 2004; Nishii & Wright, 2007) where actual HRM practices (implemented HRM practices by line management) impact how employees experience these practices and which, in turn, influences employee outcomes, the current study investigates a specific HRM process. The idea here is to investigate a process which suggests that when in work units more employees are covered by HIWS practices implemented by line management, employees will experience more job demands which affect their energetic well-being.

As part of the investigation of the suggested HRM process the focus lies on the distinction of job demands. Job demands are distinguished between job hindrances and job challenges due to their expected differential contributions to energy-related outcomes (Lepine, Podsakoff, & Lepine, 2005; Van den Broeck et al., 2010). Before exploring the job hindrances and job challenges mechanisms linking HIWS and employee outcomes, a closer look at the literature on the JDR model is necessary for gaining a theoretical understanding of job demands and resources. The JDR model considers several job characteristics in relation to employee well-being (Bakker et al., 2004). These characteristics have positive and negative impacts on well-being as some of them are simulating whereas others are health-impairing (Bakker & Demerouti, 2007). According to the JDR model, those work characteristics can be grouped into job demands and job resources (Bakker et al., 2004). *Job demands* refer to those work context aspects requiring sustained physical or mental effort, and are thereby associated with certain physiological and/or psychological costs like burnout (Bakker et al., 2004). Particularly work overload and time pressure are job characteristics of the job demands category (Bakker & Demerouti, 2007). Job demands are not necessarily negative, however, they might turn into job stressors when those demands require prolonged high effort and therefore draining employees' energy resources, causing negative responses such as emotional exhaustion (Schaufeli & Bakker, 2004).

By contrast, *job resources* refer to those work aspects which i) can reduce job demands and their negative impact on well-being, ii) are functional in attaining work-related goals and iii) can satisfy personal growth needs such as personal development and learning (Bakker et al., 2004). Work aspects belonging to the category of job resources are for instance salary/career opportunities, job security and supervisor/coworker support (Bakker et al., 2004). Job resources may weaken the negative impact of job demands on well-being so that employees who have more resources available are less likely to experience negative feelings such as burnout (Bakker, Demerouti, De Boer, & Schaufeli, 2003).

Drawing on the definition of job demands in the JDR model, this study differentiates job demands into two types, job hindrances and job challenges, as there has been an increasing recognition of the potential positive outcomes associated with demands (Cavanaugh et al., 2000). Prior research has found support that job demands may be related with both negative (i.e., emotional exhaustion) and positive work outcomes (i.e., vigor; Cavanaugh et al., 2000; Crawford, Lepine, & Rich, 2010; Van den Broeck et al., 2010; Tuckey, Bakker, & Dollard, 2012). Job demands which are negatively related to both emotional exhaustion and vigor are

called job hindrances, whereas demands which can be both negatively and positively associated with emotional exhaustion and vigor are labeled as job challenges. Thus, the job hindrances-challenges distinction provides an understanding for the relations between different types of job demands and higher or lower energetic well-being (Tuckey et al., 2012).

Job hindrances are stressful demands and can be considered as threatening obstacles (Cavanaugh et al., 2000). They prompt negative emotions, interfere with employees' work goal achievement and lead to a perceived lack of control (Cavanaugh et al., 2000; Van den Broeck et al., 2010; Selye, 1956). In the present study, work overload is examined as a job hindrance. Work overload is characterized by working very fast, high levels of amount of work and experiences of time pressure (Van Veldhoven & Meijman, 1994). It is a main aspect of work-related stress which a large proportion of the working population is facing nowadays (EU-OSHA, 2013). In the Netherlands, workload has been constituted as a severe societal problem as four in ten employees experience high pressure at work (Centraal Bureau Statistiek, 2014). Previous research has addressed the relationship between HRM and workload and suggested that HRM practices precipitate work overload (i.e., Kroon et al., 2009; Jensen et al., 2013). Related to this study, it could be argued that implemented HIWS practices lead to work overload due to their participatory nature which promotes delegation, seeking opportunities to learn and grow, and engaging in participative goal setting (Tuckey et al., 2012). These employee involvement practices may interfere with task completion, signal that increased work effort is expected, and hence transfer heightened demands and feelings of stress to employees (Jensen et al., 2013). A study by Mohr and Zoghi (2008) indeed revealed that HIWS practices such as participation in employee suggestion programs are positively associated with reduced hours worked, which can contribute to work overload.

In contrast, *job challenges* are demands which are not necessarily stressful and threatening but can instead be stimulating (Tuckey et al., 2012; Van den Broeck et al., 2010). Based on this, job challenges include some characteristics being generally ascribed to both job demands and job resources. Job challenges can be considered as obstacles at work which can be overcome (Van den Broeck et al., 2010). They trigger positive feelings of stress like feelings of being challenged and may provide opportunities to learn and develop new skills/abilities, and thus contribute to achieve work goals (Cavanaugh et al., 2000; Van den Broeck et al., 2010; Selye, 1956). In the current study, job responsibility reflects a job challenge. Job responsibility can be described as the extent to which an employee 'feels personally accountable and responsible for the results of work he/she does' (Hackman & Oldham, 1976, p. 256). Jobs with

high levels of autonomy and in which the outcomes depend on one's own effort, initiatives and decisions are supposed to trigger stronger feelings of personal responsibility for a success or failure (Hackman & Oldham, 1976). Therefore, it could be argued that assuming higher levels of job responsibility involves more eagerness for own skill development, working independently, more decision-making autonomy, and a broader task variety in order to meet one's responsibilities and avoid any failure (O'Connor, 2005; Stilz, 2011; Tuckey et al., 2012). These features related to job responsibility are linked with the primary characteristics (PIRK) of HIWS practices as they provide employees with enhanced power, relevant information, rewards linked to outcomes and comprehensive knowledge (Guthrie, 2001; Tuckey et al., 2012). Thus, implemented HIWS practices act as tools which promote more responsibility and accountability of employees for their work because they enable employees to acquire the professional competence so as to carry out their responsibilities. Consistent with this reasoning, a study by Vandenberg et al. (1999) showed that HIWS promote the acquisition and utilization of employees' knowledge, skills and abilities, which could result in higher levels of job responsibility as employees are able to use their cognitive abilities more efficiently (Butts et al., 2009).

As the preceding discussion indicates, it is expected that implemented HIWS practices are related to higher levels of job hindrances (work overload) as well as job challenges (job responsibility). These expectations are reflected in the following hypotheses:

Hypothesis 1: The level of employee coverage by implemented high involvement work systems (HIWS) practices is positively associated with job hindrances.

Hypothesis 2: The level of employee coverage by implemented high involvement work systems (HIWS) practices is positively associated with job challenges.

Job hindrances, job challenges and employee well-being

Further, it is expected that job hindrances and job challenges influence employee energetic well-being. Thereby, this study focuses on the energy components of burnout and engagement, emotional exhaustion and vigor respectively. *Emotional exhaustion* was selected as one of the dependent variables as it is the core dimension and the first stage of burnout, therefore it represents a critical point for intervention (Gaines & Jermier, 1983). Emotional exhaustion can be perceived as an individual stress response to prolonged high job demands (Kroon et al., 2009). It involves feelings of being drained, overextended, fatigue and a high lack of energy due to the depletion of one's energy and mental resources (Schaufeli & Bakker, 2004). This

negative state leads to distancing oneself emotionally and cognitively from work in order to cope with demands (Maslach et al., 2001). *Vigor* is the core component of engagement and includes high energy levels, mental alertness while performing tasks, readiness for effort investments into work and the ability to not be easily fatigue (Schaufeli & Bakker, 2004). Feeling vigorous is characterized by feelings of being strong, alive, vital and motivated. When being vigorous, even in the face of high work demands which require effort expenditure, no energy-depletion process is activated which would lead to a complete exhaustion (Sonnentag & Niessen, 2008; Van den Broeck et al., 2010).

The relationship between job hindrances and job challenges and employee energetic well-being, in terms of emotional exhaustion and vigor, is examined in the context of the JDR model. Job hindrances like work overload represent the classical job demands in the JDR model which are associated with physiological and/or psychological costs (Bakker et al., 2004). They reduce employees' mental and physical reserves which will result in lower energetic well-being (Cavanaugh et al., 2000; Lepine, Lepine, & Jackson, 2004). Due to the lack of energy, employees feel drained and overextended which hinders them to cope with work overload and achieve work-related goals (Van den Broeck et al., 2010; Lepine et al., 2004). Prompted negative emotions due to work overload lead to feelings of being unable to deal with the work load and employees' perceptions that their effort expenditure does not suffices to manage work (Crawford et al., 2010; Spreitzer, 1995; Selye, 1956). Hence, employees are more likely to believe that the use of resources to overcome this demand will not result in any meaningful outcome (i.e., goal attainment; Crawford et al., 2010). Therefore, employees experience work overload as a threatening demand which reduces their motivation and willingness to invest effort into work, resilience while working and persistence in dealing with demands. Based on this, work overload has a detrimental effect on employees' mental alertness which, in turn, unfavorably impacts employees' level of vigor (Van den Broeck et al., 2010). Furthermore, the prolonged effort expenditure and activated energy-sapping process of work overload results in extreme feelings of fatigue and in distancing oneself from work as a coping mechanism to the stressful situation (Maslach & Goldberg, 1998). These adverse effects of work overload on employees' personal resources and energy state contributes to emotional exhaustion. According to Maslach and Goldberg (1998), work overload is indeed one of the major predictors of emotional exhaustion. In line with the above reasoning, previous research found support for a negative effect of job hindrances on vigor (Van den Broeck et al., 2010) and a positive effect on emotional exhaustion (Lepine et al., 2004; Van den Broeck et al., 2010), suggesting that job

hindrances such as work overload have a solely harmful effect on employee energetic well-being.

Moreover, it is assumed that job hindrances yield a stronger effect on emotional exhaustion than on vigor. As mentioned above, work overload is by definition a job demand which results in physical and psychological costs due to additional effort expenditure (i.e., Cavanaugh et al., 2000; Demerouti et al., 2001). Additional effort investment requires mobilizing extra energy which can lead to a completion of energy reserves (Van den Broeck et al., 2010). Especially, if work overload represents a long-term job demand from which employees are not able to recover adequately, work overload will gradually deplete employees' energy reserves (Crawford et al., 2010). Following the health-impairment process within the JDR model, job demands lead to the depletion of energy which results in emotional exhaustion; whereas according to the motivational process the absence of job resources diminishes motivation which impacts engagement, and thus vigor (i.e., Bakker et al., 2003; Bakker et al., 2004). Based on this, higher levels of work overload lead primarily to the depletion of energy which results in emotional exhaustion; and not so much to decreased levels of vigor. Therefore, it is expected that the health-impairment process outweighs the motivational process. Van den Broeck et al. (2010) and Crawford et al. (2010) support this claim as they found evidence that the positive association between job hindrances and emotional exhaustion is stronger than the negative association between job hindrances and vigor.

In contrast, job challenges which include some characteristics belonging to both job demands and job resources are expected to contribute both positively and negatively to employees' energy reserves (Lepine et al., 2004; Van den Broeck et al., 2010). It could be claimed that experiencing job challenges such as job responsibility might be a stressful challenge (i.e., being responsible for work and work outcomes) requiring prolonged effort investment, however, it could also be perceived as opportunity to learn, facilitate goal achievement and stimulate effort which will be rewarded (Tuckey et al., 2012). Based on this argumentation, carrying job responsibility might be energy-consuming, but it can also have a stimulating role which promotes employees' readiness and motivation to expend effort into work and persist on overcoming obstacles (Schaufeli & Bakker, 2004). This motivating feature, which is generally ascribed to job resources, might arise from psychological empowerment employees experience with job responsibility (Spreitzer, 1995; Butts et al., 2009). It will lead to the perception of a positive relation between effort expended on dealing with job responsibilities and the chance of meeting those (Crawford et al., 2010; Lepine et al., 2005).

Thus, employees believe in their competence to perform activities and meet challenges with their skills (Spreitzer, 1995). This positive perception and belief will result in an active orientation to job demands (Crawford et al., 2010; Spreitzer, 1995), which can energize personal resources and keep employees mentally alert. Consistent with this theorizing, job responsibility can act as a job resource and, thus, has the potential to correlate positively with vigor (Van den Broeck et al., 2010). However, job responsibility can translate into a job demand which taxes employees' personal capacity and deplete their energy resources (Lepine et al., 2004; Van den Broeck et al., 2010). Drawing on the Vitamin model by Warr (1987), which suggests that desirable work context aspects will have a negative effect on well-being at extremely high levels, it could argued that job challenges such as job responsibility turn into a pressure-laden job demand which increases employees' perceived pressure to improve one's performance and to exercise one's responsibilities (Cavanaugh et al., 2000; Wood & Menezes, 2011). Due to this pressure, employees attempt to meet their demands by investing prolonged high effort. This, in turn, induces feelings of being drained and overextended, depletes one's energy state and results in emotional exhaustion (Maslach & Goldberg, 1998). Following these argumentation, job responsibility has a negative impact on employee well-being in terms of heightened emotional exhaustion (Lepine et al., 2004).

Moreover, it is expected that job responsibility has a stronger positive impact on vigor than on emotional exhaustion. Even though all demands might require effort expenditure, not all expended efforts might trigger feelings of exhaustion (Van den Broeck et al., 2010). Therefore, it could be argued that job challenges require effort investment which might lead to feelings of fatigue, but do not have an energy-depleting effect in such a way that employees become completely exhausted (Van den Broeck et al., 2010). Job responsibility might trigger feelings of psychological empowerment, elicit an active orientation to demands and promote personal growth (Crawford et al., 2010; Spreitzer, 1995). Thus, employees with a high level of job responsibility are likely to feel that they can meet this demand by putting heightened effort into their work which, in turn, will result in personal accomplishment (Crawford et al., 2010). Employees feel confident that their energy investment will be rewarded in some meaningful way (i.e., goal attainment, personal accomplishment; Crawford et al., 2010). Based on this, it could be claimed that the activated motivational process outweighs the health-impairment process because of job responsibility's characteristics (i.e., autonomy, competence, opportunities), which are attributed rather to job resources than to job demands. The JDR model contends that employees with greater resources are better able to meet demands and protect

themselves from strains (i.e., Bakker et al., 2004), contributing to a better energetic well-being. In line with the above reasoning, it is expected that job responsibility yields a larger positive effect on vigor than on emotional exhaustion. A study by Van den Broeck et al. (2010) indeed found a stronger positive association between job challenges and vigor compared to the relation between job challenges and emotional exhaustion.

Based on the above reasoning, it is expected that i) job hindrances show a negative relation with vigor and a positive relation with emotional exhaustion, whereby the positive impact of job hindrances on emotional exhaustion is larger than the negative impact on vigor, and ii) job challenges yield a positive association with vigor and emotional exhaustion, whereby the positive impact of job challenges on vigor is larger than on emotional exhaustion. Therefore, it is hypothesized:

Hypothesis 3: Higher levels of job hindrances are associated with lower levels of vigor.

Hypothesis 4: Higher levels of job hindrances are associated with higher levels of emotional exhaustion.

Hypothesis 5: Higher levels of job hindrances are stronger associated with higher levels of emotional exhaustion than with lower levels of vigor.

Hypothesis 6: Higher levels of job challenges are associated with higher levels of vigor.

Hypothesis 7: Higher levels of job challenges are associated with higher levels of emotional exhaustion.

Hypothesis 8: Higher levels of job challenges are stronger associated with higher levels of vigor than with higher levels of emotional exhaustion.

The mediating role of job hindrances and job challenges in the HIWS–employee well-being relationship

Drawing on the HRM process models (Boxall & Purcell, 2008; Nishii & Wright, 2007; Bowen & Ostroff, 2004), the effect of implemented HRM practices resides not in these practices per se, but rather in employee perceptions of these practices. In turn, employees' perceptions and evaluations of HRM practices influence employee attitudinal and behavioral reactions to them. A recent stream of research found evidence that employee perceptions of HRM practices are indeed important to gain a better understanding of the relationship between implemented HRM practices and employee outcomes (i.e., Den Hartog, Boon, Verburg, & Croon, 2013).

In the HRM process under research in the current study the focus is on a specific type of employee perceptions of their work environment, namely the employee perceptions of two types of job demands. Recent studies suggest that employee perceptions of job demands is a mediating mechanism in the relationship between HRM and employee outcomes (i.e., Jensen et al., 2013; Wood & Menezes, 2011; Snape & Redman, 2010; Kroon et al., 2009). Based on the HRM process model and prior research, HIWS are expected to influence employee energetic well-being through two differential processes. In line with the pessimistic perspective on the HIWS-employee well-being relationship (Peccei, 2004), it is expected that implemented HIWS practices are positively associated with job hindrances (work overload), which are in turn related to decreased vigor and enhanced emotional exhaustion (Van den Broeck et al., 2010; Maslach & Goldberg, 1998). This is because HIWS practices can be experienced by employees as additional stressful demands which are related to problem solving, participation in decision-making, trainings and goal setting (Tuckey et al., 2012). Likewise, it is expected that implemented HIWS practices are positively associated with job challenges (job responsibility), which in turn are related to increased emotional exhaustion (Van den Broeck et al., 2010). Job responsibility provided by implemented HIWS practices might be perceived as additional stress putting employees under greater pressure. This activates an energy-depletion mechanism, leading to higher levels of emotional exhaustion (Cavanaugh et al., 2000; Van den Broeck et al., 2010; Lepine et al., 2004).

In contrast, following the optimistic perspective (Peccei, 2004), it is expected that implemented HIWS practices are positively related to vigor through job challenges (job responsibility). Implemented HIWS practices are expected to result in more job responsibility, therefore, they can be perceived as positive work experiences with growth and development opportunities, appealing to autonomy and competence (Spreitzer, 1995; Butts et al., 2009). As a consequence, a motivational and energizing process is activated which results in higher levels of vigor (Bakker et al., 2004; Cavanaugh et al., 2000; Snape & Redman, 2010; Tuckey et al., 2012).

Following the above argumentation, it is expected that i) HIWS are negatively indirectly related to vigor and positively indirectly related to emotional exhaustion through job hindrances and ii) HIWS are positively indirectly related to both vigor and emotional exhaustion through job challenges.

Hypothesis 9: Job hindrances negatively mediate the relationship between implemented high involvement work systems (HIWS) practices and vigor.

Hypothesis 10: Job hindrances positively mediate the relationship between implemented high involvement work systems (HIWS) practices and emotional exhaustion.

Hypothesis 11: Job challenges positively mediate the relationship between implemented high involvement work systems (HIWS) practices and vigor.

Hypothesis 12: Job challenges positively mediate the relationship between implemented high involvement work systems (HIWS) practices and emotional exhaustion.

The moderating role of job resources

Turning to the JDR model, job resources have the potential to reduce job demands' negative impact on employee well-being, but may also increase the positive effect of several demands on employees (Bakker et al., 2004). There are many potential job resources which can influence the possible negative and positive effects of job demands, whereby social support is one of the most well-known resources alleviating adverse and boosting positive impact of job demands (Bakker et al., 2005). Several authors (i.e., House, Umberson, & Landis, 1988; Parkes, Mendham, & Von Rabenau, 1994) accentuated the importance of social support due to its beneficial influence on organizational stressors. The concept social support within the work context consists of two sources of support: the supervisor's social support and the coworkers' social support (Väänänen, Toppinen-Tanner, Kalimo, Mutanen, Vahtera, & Peiró, 2003). This study focuses on both sources of social support as separate moderating variables. Social support involves positive and helpful social interactions provided by supervisors and coworkers and it comprises the following dimensions: (1) belonging support (i.e., fulfilling a need for affiliation), (2) instrumental support (i.e., helping others by taking over tasks), (3) emotional support (i.e., showing empathy, providing trust) and (4) informational support (i.e., providing information so that the other person is able to cope with problems; House, 1981). Effective social support systems can facilitate dealing with job-related stress and avert burnout (Constable & Russell, 1986). Bakker et al. (2005) argued that the appreciation and support from others may put job demands in another angle and assists employees in coping with them. During the last decades, research provided evidence for a buffering effect of social support. Constable and Russell (1986) showed that high levels of social support reduced feelings of emotional exhaustion. In line with these results, Haines, Hurlbert and Zimmer (1991) as well as Bakker et al. (2005) found that social support within the workplace buffers the harmful effects caused by work overload on exhaustion. Based on these findings a buffer effect of social support is expected. Following the job hindrances-challenges distinction it is suggested that social support

weakens the detrimental impact of job hindrances (work overload) and job challenges (job responsibility) on vigor and emotional exhaustion for those employees receiving more social support as they will be less likely to experience negative feelings and prolonged effort investments compared to employees receiving less social support (Haines et al., 1991).

Moreover, work contexts encouraging autonomy, competence and relatedness improve well-being and promote intrinsic motivation as they provide employees with allegiance, relevant information, good relationships and reduction in workload (Deci & Ryan, 2002; Bakker et al., 2005; Hakanen, Bakker, & Demerouti, 2005). Based on this, social support has a motivating role which fosters employees' ability, motivation and willingness to deal with job demands (Bakker et al., 2005; Hakanen et al., 2005). Due to this motivating potential, social support can not only weaken the detrimental impact of job demands, but may also reinforce positive effects of some demands. A job with high demands is not necessarily stressful (Schaufeli & Bakker, 2004), and especially if accompanied by high levels of social support. For instance supportive coworkers and proper feedback from the supervisor will help with achieving work goals (Schaufeli & Bakker, 2004). Thus, social support provides employees with additional resources which foster energizing personal resources, overcoming difficulties and experiencing work positively (Bakker et al., 2005; Salanova, Agut, & Peiró, 2005). Applying this reasoning to job challenges in terms of job responsibility, it is assumed that social support amplifies the beneficial impact of job responsibility on employee vigor. It could be argued that employees with a strong social backup might tend to take over more responsibility for their work outcomes as social support, such as proper feedback, activates a motivational process which leads to more confidence to meet responsibilities and achieve success at work (Deci & Ryan, 2002). Hence, social support strengthens the favorably effect of job responsibility for employees receiving higher levels of social support as they will gain a greater positive, fulfilling and motivational work experience compared to employees receiving lower levels of social support.

Based on this reasoning, it is expected that social support from both the supervisor and coworkers has a moderating effect on the impact of job hindrances (work overload) and job challenges (job responsibility) on vigor and emotional exhaustion. It is assumed that experiencing higher levels of supervisor's and coworkers' social support i) will mitigate the adverse effect of job hindrances on vigor and emotional exhaustion, and ii) will reinforce the positive effect of job challenges on vigor and buffer the detrimental effect of job challenges on emotional exhaustion. These expectations are captured in the following hypotheses:

Hypothesis 13: The relationship between job hindrances and vigor will be moderated by coworkers' social support, such that the relationship will be weaker for higher levels of coworkers' social support compared to lower levels of coworkers' social support.

Hypothesis 13a: The relationship between job hindrances and vigor will be moderated by supervisor's social support, such that the relationship will be weaker for higher levels of supervisor's social support compared to lower levels of supervisor's social support.

Hypothesis 14: The relationship between job hindrances and emotional exhaustion will be moderated by coworkers' social support, such that the relationship will be weaker for higher levels of coworkers' social support compared to lower levels of coworkers' social support.

Hypothesis 14a: The relationship between job hindrances and emotional exhaustion will be moderated by supervisor's social support, such that the relationship will be weaker for higher levels of supervisor's social support compared to lower levels of supervisor's social support.

Hypothesis 15: The relationship between job challenges and vigor will be moderated by coworkers' social support, such that the relationship will be stronger for higher levels of coworkers' social support compared to lower levels of coworkers' social support.

Hypothesis 15a: The relationship between job challenges and vigor will be moderated by supervisor's social support, such that the relationship will be stronger for higher levels of supervisor's social support compared to lower levels of supervisor's social support.

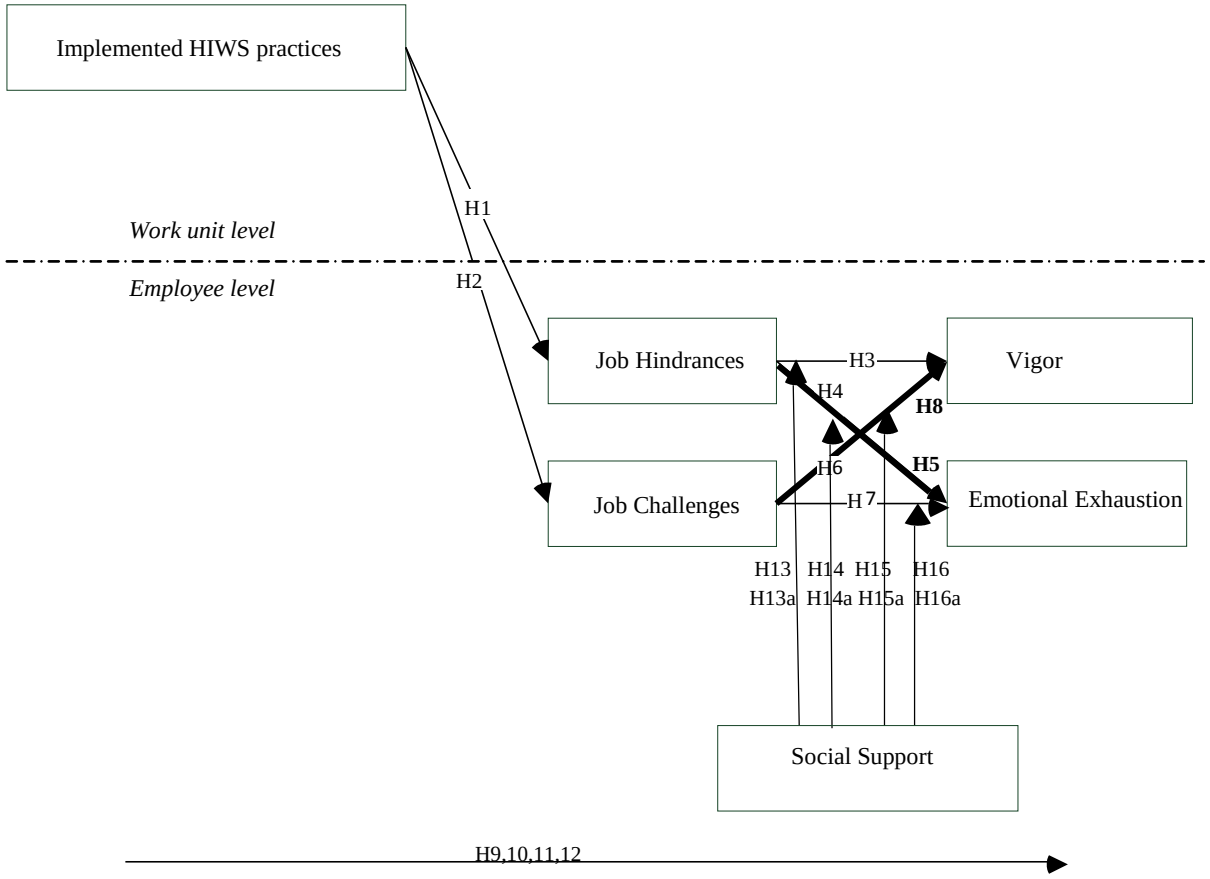
Hypothesis 16: The relationship between job challenges and emotional exhaustion will be moderated by coworkers' social support, such that the relationship will be weaker for higher levels of coworkers' social support compared to lower levels of coworkers' social support.

Hypothesis 16a: The relationship between job challenges and emotional exhaustion will be moderated by supervisor's social support, such that the relationship will be weaker for higher levels of supervisor's social support compared to lower levels of supervisor's social support.

To summarize the above theoretical framework, a visual overview is provided in Figure 1.

Figure 1

Conceptual Model



METHODS

The current study tested the above hypotheses by performing a secondary research including two separate studies. The data of the first study were hierarchical in nature including work unit- and individual-level data. Work unit-level data were collected from line managers, individual-level data from employees. As employees were nested within work units, dependency in the data was likely, and thus nesting had to be considered. With the utilization of a multilevel analysis work unit-level data were used to measure HIWS practices implemented by line management and individual-level data from employees were used to investigate job hindrances (work overload) and job challenges (job responsibility), social support from coworkers, vigor and emotional exhaustion. These data provided all variables of interest with the corresponding level of analysis, except for one, namely the supervisor's social support. Due to the missing supervisor's social support variable, data from a second separate study were used additionally to test the proposed hypotheses concerning the moderation of supervisor's social support on the relationships between both types of job demands (job hindrances and job challenges) and

energetic well-being (vigor and emotional exhaustion). These data had no hierarchical nature, thus, a single-level analysis was conducted at the individual level.

Study 1

Procedure and Sample

The data were collected in a variety of Dutch industries by HRS master students of Tilburg University in 2013. Students collected data through the use of questionnaires from both line managers and employees at one moment in time. The work units needed to consist of at least 3 employees and one line manager who was responsible for the implemented HR practices within the work unit. A leaflet was developed where the study's purpose was explained as well as confidentiality was explicitly stated. Once the organizations have agreed to take part in the study questionnaires were distributed either on paper or online via Qualtrics. The sampling method used was a convenience sampling, where that respondents were chosen due to their immediate availability and easy access (Ritchie & Lewis, 2003).

After deletion of work units with fewer than three employee responses or with no returned line manager questionnaire, the sample consisted of 51 work units, 403 employees and 51 line managers, representing an overall response rate of 64%. The average number of returned employee questionnaires within a work unit was 7.9. The respondents were employed at various Dutch organizations within 12 different sectors, mainly the financial service sector (30%) and the industry (24%). Almost 80% of the managers were male, and their average age was 41 years with a standard deviation (SD) of 6.57. Half of the manager sample held at least a bachelor's degree, and the average tenure within the organization was 11 years (*SD* = 7.03). In the employee sample almost 40% were female, and the average age was 40 years (*SD* = 10.74). 40% of the respondents held at least a bachelor's degree, and the average organizational tenure of the respondents was 9.73 years (*SD* = 9.32). The majority of participants held an open-ended contract (82.20%) and 15.10% had a temporary contract.

Measurements

HIWS. HIWS was measured as one bundle consisting of HR practices which concern four functional HIWS areas (training and development opportunities, compensation, performance evaluation, participation and communication). To measure HIWS, 28 HIWS items were selected based on earlier work by Prieto and Pilar Pérez Santana (2012) and Messersmith, Patel and Lepak (2011). Line managers reported the extent of coverage of employees by the

HIWS items on a 6-point scale with the following response categories: (1) 'I don't know', (2) 'None of the employees of my department', (3) 'Less than half of the employees of my department', (4) 'About half of the employees of my department', (5) 'More than half of the employees of my department', (6) 'All employees of my department'. 'I don't know' responses were recoded so as to be equal to the second response category 'None of the employees of my department'. Consistent with Gardner et al. (2011) it was concluded that 'I don't know' answers meant 'not to my knowledge', which meant that the HRM practice questioned was not employed within the work unit. Thus, no employees were covered by that HRM practice. A sample item is: 'Employees will normally go through ongoing training programs'. All of the verification steps for assessing the factorability of data revealed good results (KMO > .60, significant Bartlett's test of sphericity $p < .001$). Principal component analysis (PCA) findings showed that 23 of the 28 items contributed to the first factor. The total variance explained in HIWS by this factor was 35.76%. Based on these findings, this study excluded the five items which had small loadings on the first factor (< .30) and did not contribute to the reliability of the scale ($\alpha = .91$). The five items which lacked contribution were related to the areas concerning training and development opportunities, participation and communication, and compensation: the provision of trainings focusing on team building and teamwork skills (training and development), employee opportunity for upward mobility (training and development), department emphasizes employees' teamwork and network collaboration (participation and communication), supervisors keep open communication with the department (participation and communication) and department pays competitive salaries (compensation). After the deletion of items, the HIWS measure consisted of 5 items belonging to training and development opportunities, 4 items regarding compensation, 5 items concerning performance evaluation, and 9 items pertaining to participation and communication. A complete overview of the HRM practices including factor loadings (Table A1) as well as the relative representation of each functional HIWS area in the HIWS measure (Table B1) can be found in the appendix. A mean score of the 23 HIWS items was calculated to reflect a single measure of HIWS.

Job hindrances. In this study, work overload was included as job hindrances. Work overload was measured using a five-item scale from Cousins et al. (2004) as well as four items of the 'pace and amount of work' subscale of the Dutch Questionnaire on the Experience and Assessment of Work (Dutch abbreviation: VBBA; Van Veldhoven & Meijman, 1994). Employees were asked to rate their experience of time pressure, working speed and amount of work in their job. A sample item is: 'I have to work very fast'.

Participants responded on a 4-point scale ranging from 1 (never) to 4 (always). The KMO value was .87 and Bartlett's test of sphericity reached statistical significance ($p < .001$). PCA findings revealed that with a forced one-factor solution all items showed high factor loadings (see Appendix A Table A2) as well as a good contribution to the scale's reliability ($\alpha = .87$). The total variance explained in work overload by the factor was 48.18%. A mean score was calculated of all items indicating the extent to which an employee experiences work overload.

Job challenges. Job responsibility was included as job challenges. Job responsibility was assessed using a modified three-item scale, where the work of Cavanaugh et al. (2000) was the starting point for scale development. Cavanaugh et al. (2000) included only two items about responsibility in their measure. Therefore, in this study the item 'The amount of responsibility I have' was separated into two new items concerning both the work itself and work outcomes. This resulted in a scale of three items. A sample question is: 'I have a considerable amount of responsibility for the work I do on this job'. Items were answered on a 4-point response scale ranging from 'never' (1) to 'always' (4). Factorability of the data was supported by the KMO value of above .60 and a significant value on Bartlett's sphericity test ($p < .001$). According to PCA all items measured a single construct of job responsibility (see Appendix A Table A3). The factor explained 73.89% of the total variance in job responsibility. After the factor analysis, a mean score was calculated of all items, which showed the extent to which an employee carries job responsibility. The reliability for this scale was .82.

Coworkers' social support. Social support from coworkers was measured using a four-item scale based on Van Veldhoven and Meijman (1994). A sample item is: 'If necessary, can you ask your colleagues for help'. Items were answered on a 4-point response scale ranging from 'never' (1) to 'always' (4). The KMO value was .64 and Bartlett's test of sphericity was significant ($p < .001$). PCA indicated a one-factor solution explaining 60.70% of the total variance in coworker's social support (see Appendix A Table A4). Subsequently, a mean score was calculated showing the extent to which an employee receives social support from his/her coworkers. Cronbach's alpha for this scale was .78.

Vigor. Vigor was assessed with the use of a seven-item scale based on Shirom (2003). The items pertain to the extent of energy feelings at work including physical strength and cognitive liveliness. A sample question is: 'I feel energetic'. Items were scored on a 7-point scale from 'almost never' (1) to 'almost always' (7). Factorability of the vigor data was supported (KMO > .60, Bartlett's test of sphericity $p < .001$). PCA results revealed one factor with a total explained variance of 65.04%. The individual factor loadings of items can be found

in appendix A (Table A5). Following, a mean score was calculated which showed the extent to which an employee feels energetic and mentally alert. The scale showed a high reliability of .91.

Emotional exhaustion. Emotional exhaustion was measured with three items based on the Utrecht Burnout Scale (UBOS) by Schaufeli and Van Dierendonck (2000). The items reflect the extent to which work depletes employee's energy levels. A sample item is: 'I feel emotionally drained from my work'. Answer categories ranged from 'never' (0) to 'always' (6). The KMO value was .72 and Bartlett's test of sphericity reached statistical significance ($p < .001$). PCA showed a one-factor solution explaining 83.92% of the total variance in emotional exhaustion (see Appendix A Table A6). Subsequently, a mean score was calculated of all items showing the extent to which an employee feels drained and exhausted from his/her work. Cronbach's alpha of this scale was .90.

Control variables. The model controlled for five demographic individual-level variables in order to test for spuriousness: gender, age (in years), tenure (in years), type of contract (open ended; temporary; others), and education (low = lower vocational, secondary; medium = middle vocational; high = higher vocational, college/university). Dummy variables were created for gender, type of contract and education with the reference categories female, other types of contract and low education respectively.

Statistical analysis

Multilevel analysis

The data were hierarchical in nature due to the fact that employees were nested within work units. The investigation of the proposed model included examining the effect of a work unit-level construct (HIWS practices) on individual-level variables (vigor and emotional exhaustion), and two individual-level mechanisms (job hindrances and job challenges) and moderation (coworkers' social support). The model focuses on downward cross-level relationships including a lower-level mediation and moderation (Mathieu & Taylor, 2007), since HIWS practices derive from the higher level of analysis (work units) whereas the mediators (job hindrances and job challenges), the moderator (coworkers' social support) and dependent variables (vigor and emotional exhaustion) belong to the individual-level of analysis. Therefore, to account for the nesting of employees within work units multilevel analysis was used to test the conceptual model.

To justify conducting multilevel analysis variance in the individual-level variables (job hindrances, job challenges, vigor and emotional exhaustion) was partitioned into the within- (individual σ^2) and between-group (work unit τ^2) variance (Table 1). Based on this, the intraclass correlation coefficient (ICC) was calculated which represents the ratio of between-group variance to the total variance (Table 1; Hoffman, Griffin, & Gavin, 2000; Heck, Thomas, & Tabata, 2013). The ICC value ranges from 0 to 1, whereby higher ICC values indicate greater proportions of between-group variance and hence potentially greater bias if the hierarchical nature of the data is not considered (Dyer, Hanges, & Hall, 2005). Based on this, a substantial between-group variance calls for utilization of multilevel analysis. In case of low ICC values (less than 0.05) multilevel models are difficult to estimate (Dyer et al., 2005). For job hindrances the ICC was .25, meaning that 25% of the total variance in job hindrances resided between work units. For job challenges the ICC was .14, indicating that 14% of the total variance in job challenges is attributable to work unit membership. These findings suggest that there is significant work unit-level variance in both types of job demands, which means that HIWS on the work unit-level could explain between-work unit variance in job demands (Dyer et al., 2005). Regarding vigor and emotional exhaustion, the ICC values were extremely low (for both .00). This implies that employees' reports of job demands were more highly influenced by work unit membership than their reports of energetic well-being as the low ICC values suggest that none of the variance in vigor and emotional exhaustion was explained at the work-unit level. This is because vigor and emotional exhaustion are highly individual-driven constructs which are directly predicted by individual-level constructs (job demands), and which are not directly influenced by work-unit variables. These low ICC values would imply that the use of multilevel regression analyses is not necessary. However, due to the justifiable ICC values of job hindrances and job challenges, multilevel regression analyses were performed to investigate the influence of a work-unit level construct (HIWS) on employees' experience of work.

Table 1
Intraclass Correlations

Variable	Individual-level variance (σ^2)	Work unit-level variance (τ^2)	ICC
Job hindrances	.15	.05	.25
Job challenges	.36	.06	.14
Vigor	.73	.00	.00
Emotional Exhaustion	1.38	.01	.00

ICC Formula: $\tau^2 / (\sigma^2 + \tau^2)$ (Hoffman et al., 2000)

Concerning mediation, the guidelines of MacKinnon, Fairchild and Fritz (2007) for testing mediation effects were used. According to MacKinnon et al. (2007), a first requirement for mediation is a significant effect between the independent variable (HIWS) and the mediating variable (job hindrances, job challenges), secondly a significant effect of the mediating variable (job hindrances, job challenges) on the dependent variable (vigor, emotional exhaustion), while controlled for the independent variable (HIWS). In order to test the significance of the proposed mediating mechanisms, one-tailed Sobel tests (1982) were performed.

For testing moderation effects of social support, the independent and moderating variables were grand mean centered following the recommendations from the ordinary least square (OLS) regression literature (Aiken & West, 1991). Multiplying the centered variables created the interaction terms. Related to this study, the interaction terms were the product of both job demands (work overload, job responsibility) and coworkers' social support. In case of significant interaction effects, the principles for computing simple slopes by Aiken and West (1991) were followed. Using a simple slope analysis enables depicting the moderation effects which helps interpreting the nature of the moderation effects of social support (Aiken & West, 1991).

Moreover, Full Information Maximum Likelihood (FML) was used for model comparison testing rather than Restricted Maximum Likelihood (REML). This connotes that the maximum likelihood function remained unrestricted (full information), hence, it includes both the regression coefficients and variance components, whereas REML involves only variance components (Kreft & De Leeuw, 1998). The inclusion of both regression coefficients and variance components enables the researcher to compare fixed effects in nested models (Heck et al., 2013). From the likelihood function a statistic is produced showing how well the model fits the data. This statistic is called the deviance or sample log-likelihood statistic (-2LL). The deviance/-2LL and the change in number of parameters (degree of freedom *df*) was used for calculating a chi-square test (see Appendix D). A chi-square test was performed to test whether a more complex model (the researched model as shown in Figure 1) fitted significantly better than a simpler model.

Study 2

Procedure and Sample

To study the hypothesized relationships concerning the moderation of supervisor's social support a secondary quantitative data analysis was performed. Data were collected in a variety

of Dutch industries by HRS master students of Tilburg University in 2014. Students collected data through the use of questionnaires from employees at one moment in time. Once the respondents agreed to take part in the study, the questionnaires were distributed either on paper or online via Qualtrics. A cover letter was distributed along with the questionnaire which explained the aim of the research and explicitly stated the anonymity of all respondents as well as the confidentiality of all collected information. The sampling method used was a convenience sampling, meaning that respondents were chosen due to their immediate availability and easy access (Ritchie & Lewis, 2003).

A total of 224 surveys was distributed and 178 respondents completed and returned the questionnaires. This represents a response rate of 79.46%. The respondents were occupied within various Dutch organizations from different sectors, prevalent from the education sector (21%) and culture service sector (20%). In the sample, 41.60% of the respondents were female, and the average age of participants was 34.4 years with a standard deviation (SD) of 23. Almost 80% of the respondents held at least a bachelor's degree, and the average organizational tenure of the respondents was 5.67 years (*SD* = 8.59). 57.90% of the respondents held an open-ended contract and 29.80% had a temporary contract.

Measurements

Job hindrances. Work overload was included as job hindrances and measured using a two-item scale from Cousins et al. (2004) as well as three items on the 'pace and amount of work' subscale of the VBBA (Van Veldhoven & Meijman, 1994). Employees were asked to rate their experience of work pace and quantity. A sample item is: 'I have unrealistic time pressures'. Participants responded on a 4-point scale ranging from 1 (never) to 4 (always). The KMO value was .66 and Bartlett's test of sphericity was significant ($p < .001$). The results of PCA revealed a one-factor solution with a total explained variance in job hindrances of 69.60%. Individual factor loadings can be found in appendix C (Table C1). A mean score was calculated which showed the extent to which an employee experiences work overload. Cronbach's alpha for this scale was .78.

Job challenges. Job responsibility was used as job challenges which was measured with two items based on Spreitzer (1995) and a single item from Cavanaugh et al. (2000). A sample question is: 'I have a considerable amount of responsibility for my work'. A 5-point response scale was used ranging from 'strongly disagree' (1) to 'strongly agree' (5). Factorability was supported by the KMO value of .60 and a significant Bartlett's test of sphericity ($p < .001$).

PCA showed one factor that explains 70.56% of variance in job challenges (see Appendix C Table C2). A mean score was calculated showing the extent to which an employee bears responsibility in the job. The reliability for this scale was .79.

Vigor. Vigor was measured with three items based on the Utrecht Work Engagement Scale (UWES; Schaufeli, Bakker, & Salanova, 2006) and with four items from Crawford et al. (2010). A sample question is: 'At my job I feel strong and vigorous'. Participants responded on a 7-point scale ranging from 1 (never) to 7 (always). The KMO value was .85 and Bartlett's test of sphericity reached statistical significance ($p < .001$). According to PCA the total explained variance explained in vigor by the factor was 68.94% (see Appendix C Table C3). After the factor analysis, a mean score was calculated of all items, which showed the extent to which an employee feels vigorous at work. This scale had a high reliability of .92.

Emotional exhaustion. Emotional exhaustion was measured with a four-item scale based on the VBBA (Van Veldhoven & Meijman, 1994). The items pertain to the extent to which employees need recovery after work. A sample item is: 'Because of my job, at the end of the working day I feel rather exhausted.' Items were answered on a 4-point response scale ranging from 'never' (1) to 'always' (4). The KMO value was .73 and Bartlett's test of sphericity reached statistical significance ($p < .001$). PCA showed one factor and the amount of total explained variance in emotional exhaustion by this factor was 60.52%. Individual factor loadings of items can be found in appendix C (Table C4). A mean score was calculated showing the extent to which an employee feels emotionally exhausted from work. Cronbach's alpha for this scale was .77.

Supervisor's social support. Supervisor's social support was assessed with three items developed by Van Veldhoven, Jonge, Broersen, Kompier and Meijman (2002). A sample item is: 'My supervisor had attention for my feelings and problems'. Answer categories ranged from 'never' (1) to 'always' (4). Factorability of these data was supported (KMO > .60, Bartlett's test of sphericity $p < .001$). PCA results proved that all items measured a single construct. The explained variance in supervisor's social support by the factor was 74.81% (see Appendix C Table C5). Following, a mean score was calculated which showed the extent to which an employee receives social support from the supervisor. The scale's reliability was .83.

Control variables. The model controlled for five demographic variables to test spurious effects: gender, age (in years), tenure (in years), type of contract (open ended; temporary; others), and education (low = elementary, lower secondary, general secondary; medium = upper secondary, lower vocational; high = advanced vocational, college/university). Dummy

variables were created for gender, type of contract and education with the reference categories female, other types of contract and low education respectively.

Statistical Analysis

Individual-level analysis

The data of study 2 were without hierarchical structure as data were collected only from employees, thus, a single-level analysis was conducted. To test the moderation hypotheses of supervisor's social support, the use of centering the independent and moderating variables was made (Aiken & West, 1991). Hence, the two types of job demands (work overload and job responsibility) and supervisor's social support were centered and multiplied for obtaining the interaction terms. In case of significant interactions a simple slope analysis was performed for plotting and interpreting the nature of the moderation effects (Aiken & West, 1991).

RESULTS – STUDY 1

Descriptive statistics and correlations

Table 2 shows the means, standard deviations and correlations of study variables. In accordance with the proposed theoretical framework, the extent of employee coverage by HIWS is positively correlated to both work overload (r = .27, p < .01) and job responsibility (r = .16, p < .01). In addition, the two types of job demands were positively inter-correlated (r = .18, p < .01). Further, work overload was positively related to emotional exhaustion (r = .36, p < .01), while job responsibility was positively related to vigor (r = .26, p < .01) and negatively to emotional exhaustion (r = -.47, p < .01). In addition, from Table 2 follows that on average about half of the employees in a work unit were covered by HIWS practices (M = 4.78, with '4' equaling "about half of the employees of my department" and '5' equaling "more than half of the employees of my department"). With concern to the variation of employee coverage by HIWS practices, the minimum of coverage by HIWS practices in a work unit was 2.86 (with '2' equaling "none of the employees of my department" and '3' equaling "less than half of the employees of my department"); the maximum of coverage by HIWS practices in a work unit was 5.73 (with '5' equaling "more than half of the employees of my department" and '6' equaling "all of my employees of my department"). Further, Table 2 demonstrates that respondents sometimes experienced work overload (M = 2.13, with '2' equaling "sometimes"), whereas they often carried job responsibility (M = 3.18, with '3' equaling "often"). With regard to energy at work, respondents reported that they felt vigorous on a regular basis (M = 5.25,

with '5' equaling "regularly"), whereas feelings of being exhausted were experienced not often (M = 2.40, with '2' equaling "rarely"). Moreover, respondents received social support from coworkers often (M = 3.31, with '3' equaling "often"). To summarize, on average the sample of study 1 experienced higher levels of job responsibility than work overload, and felt energetic and supported at work. These average scores of energy at work and social support from coworkers are in line with the average scores of other studies (i.e., Van den Broeck et al., 2010; Schaufeli & Bakker, 2004).

Hypotheses tests

The proposed hypotheses were tested with four sets of nested models in SPSS, namely with job hindrances, job challenges, vigor and emotional exhaustion as dependent variables and coworker's social support as moderator. To test the effect of the two types of job demands on energy-related outcomes and the possible mediation of job demands in the relation between HIWS and energetic well-being, the first step was the inclusion of control variables into the model (M1). Further, the HIWS predictor was added (M2). Subsequently, only for vigor and emotional exhaustion, the mediating variables job hindrances and job challenges were included (M3). Finally, to test for moderation effects of coworkers' social support on the relation between job demands and energetic well-being the interaction terms were added for vigor and emotional exhaustion (M4). Within all analyses performed in the study, for individual characteristics of employees was controlled.

HIWS and job demands

First, the effect of HIWS on job demands was tested (H1–2). It was hypothesized that the proportion of employees covered by implemented HIWS practices in a work unit is positively associated with work overload as well as job responsibility. Table 3 (M2) shows that HIWS is positively related to work overload (B = .13, p < .05) and job responsibility (B = .20, p < .001; M2 Table 3). Therefore, hypothesis 1 and 2 are accepted. In addition, including HIWS scores improves significantly the model for predicting work overload ($Chi^2(1) = 6.06$, $p < .05$) and job responsibility ($Chi^2(1) = 13.51$, $p < .001$; M2 Table 3). In sum, the results indicate that implemented HIWS by line management lead to more work overload and job responsibility for employees.

Job demands and employee well-being

Hypothesis 3–8 concerned the relationship between the two types of job demands and employee outcomes. As results indicate in Table 4 (M3), work overload was found to be negatively associated with vigor (B = -.29, p < .05) and positively with emotional exhaustion (B = 1.02, p < .001). These findings support the assumption that the more employees experience work overload, the lower employees' vigor level and the higher their emotional exhaustion. Thus, job hindrances do deplete employees' energy reserves, and hypothesis 3 and 4 are supported. In addition, including work overload scores into the analysis improves significantly the model for predicting vigor (Chi^2(2) = 22.86, p < .001; M3 Table 4) and emotional exhaustion (Chi^2(2) = 44.13, p < .001; M3 Table 4).

Hypothesis 5 suggested that job hindrances yield a stronger effect on emotional exhaustion than on vigor. As findings indicate, work overload was stronger related to emotional exhaustion (t = 6.86; p < .001) than it was to vigor (t = -2.60; p < .05). Therefore, the positive relationship between work overload and emotional exhaustion is stronger compared to the negative relationship between work overload and vigor, supporting hypothesis 5.

Further, findings indicate that job responsibility prove to have a positive effect on vigor (B = .34, p < .001). However, no significant relationship between job responsibility and emotional exhaustion was found (B = -.18, p > .05; M3 Table 4). Based on these results, higher levels of job responsibility are associated with more vigor but do not affect employees' emotional exhaustion levels. Thus, hypothesis 6 is supported, whereas hypothesis 7 is rejected. Moreover, Table 4 (M3) shows that the inclusion of job responsibility into the analysis for predicting vigor (Chi^2(2) = 22.86, p < .001) and emotional exhaustion (Chi^2(2) = 44.13, p < .001) leads to a significant model fit improvement.

Hypothesis 8 proposed that job challenges are stronger associated with vigor than with emotional exhaustion. As indicated above, job responsibility is positively related to vigor, whereas a non-significant relation between job responsibility and emotional exhaustion was found. Due to this insignificant effect on emotional exhaustion, hypothesis 7 is accepted.

In sum, these findings support the idea that the two different types of job demands yield different associations with energetic well-being. Job hindrances such as work overload indeed exhaust employees' energy reserves, whereas job challenges such as job responsibility do only have a stimulating effect on energy as they are positively associated with vigor, but not with emotional exhaustion.

HIWS, job demands and employee well-being

Further, hypothesis 9–12 suggested that job hindrances and job challenges mediate the relationship between HIWS and employee energetic well-being. To investigate these proposed mediation effects, the procedure by McKinnon et al. (2007) was applied. According to McKinnon et al. (2007), the requirements for mediation are a statistically significant relation between (1) the independent variable (HIWS) and the mediating variable (job hindrances and job challenges), and (2) between the mediating variable and the dependent variable (vigor and emotional exhaustion). HIWS was positively related to both types of job demands (M2 Table 3), and work overload was associated with both vigor and emotional exhaustion (M3 Table 4), thus meeting the requirements of mediation. Additional Sobel tests (1982) were performed using the regression coefficient and standard error from M2 in Table 3 (B = .13 (.05), HIWS on work overload) and the regression coefficients and standard errors from M3 in Table 4 (B = -.29 (.11), B = 1.02 (.15), work overload on vigor and emotional exhaustion respectively). The result of these tests support mediation of work overload on the relationship between HIWS and vigor (t = -1.85; p < .05) and emotional exhaustion (t = 2.43; p < .01). Hypothesis 9 and 10 are, therefore, accepted.

Although HIWS was positively associated with job responsibility (M2 Table 3), job responsibility was found to be related only to vigor (M3 Table 4), thereby meeting the guidelines for mediation only for the relation HIWS–vigor, and thus precluding a mediation effect of job responsibility on the relationship between HIWS and emotional exhaustion. The regression coefficient and standard error from M2 in Table 3 (B = .20 (.05), HIWS on job responsibility) and the regression coefficient and standard error from M3 in Table 4 (B = .34 (.08), job responsibility on vigor) were used to perform an additional Sobel test (1982). This test supports mediation of job responsibility on the relationship between HIWS and vigor (t = 2.91; p < .001). Therefore, hypothesis 11 is supported, whereas hypothesis 12 is rejected.

Comprising, these findings indicate that job hindrances mediate the relationship between HIWS and both energy concepts (vigor and emotional exhaustion), and job challenges mediate only the relationship between HIWS and vigor.

The moderating role of coworkers' social support

Hypothesis 13–16 proposed moderation effects of coworkers' social support on the associations between HIWS and vigor and emotional exhaustion. Table 4 (M4) shows that coworkers' social support yields a direct effect on employee energetic well-being, as it was found to have a

significant positive effect on vigor (B = .50, p < .001) and negative effect on emotional exhaustion (B = -.65, p < .001). These findings indicate that higher levels of social support received from coworkers result in higher employee vigor and lower emotional exhaustion. However, the moderation effect of coworkers' social support on the job demands–employee energy relationships was found to be insignificant. According to the results, the associations between work overload and vigor and emotional exhaustion do not depend on the level of social support received from coworkers (B = .20, p > .05; B = -.48, p > .05; M4 Table 4). The same is true for the relation job responsibility–vigor (B = -.07, p > .05; M4 Table 4) and job responsibility–emotional exhaustion (B = -.03, p > .05; M4 Table 4). Therefore, the expected buffering and reinforcing effect of coworkers' social support on employee energy is not supported, leading to the rejection of hypothesis 13–16. Further, although the interaction effects of coworkers' social support are non-significant in M4 (Table 4), the inclusion of coworkers' social support into the analysis reveals a significant model fit improvement for both vigor (Chi^2(3) = 27.90, p < .001; M4 Table 4) and emotional exhaustion (Chi^2(3) = 30.55, p < .001; M4 Table 4). This model fit improvement is due to the significant direct effects of coworkers' support.

In sum, the study results indicate that higher levels of coworkers' social support have neither a buffering nor a reinforcing effect on the relations HIWS–employee energetic well-being. Nevertheless, coworkers' social support was proven to be an important resource due to its direct effect on employees' vigor and emotional exhaustion.

Table 2
Means, Standard Deviations and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender[1]	.63	.48	1											
2. Age	40.52	10.44	-.02	1										
3. Tenure	9.73	9.32	-.20**	.58**	1									
Contract[2]														
4. Contract Open-ended	.85	.36	-.11	.29**	.37**	1								
5. Contract Temporary	.14	.35	.10	-.30**	-.36**	-.95**	1							
Education[3]														
6. Education Medium	.38	.49	-.11	.06	.12*	.10	-.11	1						
7. Education High	.48	.50	.06	-.15**	-.15**	-.11	.14*	-.76**	1					
8. HIWS	4.78	.74	-.08	-.03	.07	.20**	-.20**	.05	.06	1				
9. Work Overload	2.13	.43	.12*	.05	.12*	.19**	-.18**	.03	.03	.27**	1			
10. Job Responsibility	3.18	.62	.24**	.14*	-.01	.01	-.04	.03	-.10	.16**	.18**	1		
11. Vigor	5.25	.81	.12*	.02	-.05	.03	-.04	-.08	.08	.05	-.08	.26**	1	
12. Emotional Exhaustion	2.40	1.11	.07	-.04	.07	.06	-.06	.03	-.06	.00	.36**	-.03	-.47**	1
13. Social Support	3.31	.50	-.03	.04	-.04	-.05	.05	-.09	-.05	-.01	-.27**	.08	.32**	-.36**

Note: [1]Dummy variable with female as reference group. [2]Dummy variable with other type of contract as reference group. [3]Dummy variable with low education as reference group. HIWS = high-involvement work systems. *p < .05, ** p < .01; Descriptives and correlations are reported at the individual level of analysis. Valid N (listwise) = 286 employees.

Table 3
Predicting Job Demands (Job Hindrances and Job Challenges)

	Job Hindrances (Work overload)			Job Challenges (Job Responsibility)		
Variable	M0	M1 B (SE)	M2 B (SE)	M0	M1 B (SE)	M2 B (SE)
Individual level						
Gender[1]		.12 (.05)*	.12 (.05)*		.30 (.08)***	.32 (.07)***
Age		-.00 (.00)	-.00 (.00)		.01 (.00)*	.01 (.00)*
Tenure		.00 (.00)	.00 (.00)		-.01 (.00)	-.00 (.00)
Education[2]						
- Medium		-.01 (.07)	-.01 (.07)		-.08 (.11)	-.11 (.11)
- High		-.00 (.08)	-.01 (.08)		-.19 (.11)	-.22 (.11)
Contract[3]						
- Open ended		.20 (.19)	.20 (.19)		-.33 (.31)	-.35 (.29)
- Temporary		.03 (.20)	.04 (.20)		-.39 (.31)	-.35 (.30)
Work unit level						
HIWS			.13 (.05)*			.20 (.05)***
Variance components						
Individual level (σ^2)	.15 (.01)***	.13 (.01)***	.13 (.01)***	.36 (.03)***	.33 (.03)***	.32 (.03)***
Work unit level (τ^2)	.05 (.02)***	.05 (.02)**	.04 (.01)**	.06 (.03)*	.03 (.02)	.01 (.01)
Modelfit						
-2 log likelihood	425.31	283.54	277.48	734.44	522.13	508.62
Parameters	3	10	11	3	10	11
Change in -2LL/(df)		141.77 (7)***	6.06 (1)*		212.31 (7)***	13.51 (1)***

Note: [1]Dummy variable with female as reference group. [2]Dummy variable with low education as reference group. [3]Dummy variable with other type of contract as reference group. HIWS = high-involvement work systems. df = degrees of freedom. B is the unstandardized parameter estimate. SE is the standard error. *p < .05, ** p < .01; ***p < .001.

Table 4
Predicting Employee Well-Being

Variable	Vigor				
	M0	M1 B (SE)	M2 B (SE)	M3 B (SE)	M4 B (SE)
Individual level					
Gender[1]		.19 (.10)	.19 (.10)	.13 (.10)	.14 (.10)
Age		.00 (.00)	.01 (.01)	.00 (.01)	.00 (.01)
Tenure		-.01 (.01)	-.01 (.01)	-.00 (.01)	-.00 (.01)
Education[2]					
- Medium		-.04 (.15)	-.04 (.15)	.01 (.15)	.13 (.14)
- High		.13 (.15)	.13 (.15)	.21 (.15)	.31 (.14)
Contract[3]					
- Open ended		.04 (.40)	.03 (.40)	.21 (.39)	.14 (.37)
- Temporary		-.16 (.42)	-.15 (.42)	-.02 (.41)	-.09 (.38)
Work overload (Job hindrances)				-.29 (.11)*	-.13 (.11)
Job responsibility (Job challenges)				.34 (.08)***	.31 (.08)***
Coworkers' Support					.50 (.09)***
Work unit level					
HIWS			.03 (.08)	-.00 (.08)	-.02 (.07)
Interactions					
Coworkers' Support*Work overload					.20 (.19)
Coworkers' Support*Job responsibility					-.07 (.16)
Variance components					
Individual level (σ^2)	.73 (.05)***	.60 (.05)***	.60 (.05)***	.55 (.05)***	.51 (.05)***
Work unit level (τ^2)	.00 (.00)	.04 (.03)	.04 (.03)	.03 (.03)	.02 (.03)
Modelfit					
-2 log likelihood	951.12	678.56	678.46	655.60	627.70
Parameters	3	10	11	13	16
Change in -2LL/(df)		272.56 (7)***	.01 (1)	22.86 (2)***	27.90 (3)***

Note: [1]Dummy variable with female as reference group. [2]Dummy variable with low education as reference. [3]Dummy variable with other type of contract as reference group. HIWS = high-involvement work systems. df = degrees of freedom. B is the unstandardized parameter estimate. SE is the standard error. *p < .05, ** p < .01; ***p < .001.

Table 4 continued
Predicting Employee Well-Being

Variable	Emotional Exhaustion				
	M0	M1	M2	M3	M4
		B (SE)	B (SE)	B (SE)	B (SE)
Individual level					
Gender[1]		.23 (.14)	.23 (.14)	.13 (.13)	.12 (.13)
Age		-.02 (.01)*	-.02 (.01)*	-.01 (.01)	-.01 (.01)
Tenure		.02 (.01)*	.02 (.01)*	.01 (.01)	.01 (.01)
Education[2]					
- Medium		-.13 (.21)	-.13 (.21)	-.21 (.19)	-.36 (.19)
- High		-.25 (.20)	-.25 (.20)	-.35 (.19)	-.46 (.18)**
Contract[3]					
- Open ended		.02 (.55)	.03 (.55)	-.20 (.51)	-.12 (.49)
- Temporary		-.15 (.57)	-.16 (.57)	-.22 (.53)	-.15 (.51)
Work overload (Job hindrances)				1.02 (.15)***	.80 (.15)***
Job responsibility (Job challenges)				-.18 (.10)	-.11 (.10)
Coworkers' Support					-.65 (.12)***
Work unit level					
HIWS			-.01 (.09)	-.13 (.09)	-.09 (.08)
Interactions					
Coworkers' Support*Work overload					-.48 (.25)
Coworkers' Support*Job responsibility					-.03 (.21)
Variance components					
Individual level (σ^2)	1.38 (.10)***	1.16 (.11)***	1.16 (.10)***	1.00 (.09)***	.91 (.08)***
Work unit level (τ^2)	.01 (.03)	.01 (.04)	.01 (.04)	.01 (.03)	.00 (.00)
Modelfit					
-2 log likelihood	1193.05	858.45	858.44	814.31	783.76
Parameters	3	10	11	13	16
Change in -2LL / (df)		334.60 (7)***	0.01 (1)	44.13 (2)***	30.55 (3)***

Note: [1]Dummy variable with female as reference group. [2]Dummy variable with low education as reference group. [3]Dummy variable with other type of contract as reference group HIWS = high-involvement work systems. df = degrees of freedom. B is the unstandardized parameter estimate. SE is the standard error. *p < .05, ** p < .01; ***p < .001.

RESULTS – STUDY 2

Descriptive statistics and correlations

Table 5 shows the means, standard deviations and correlations of study variables. Work overload was only correlated to emotional exhaustion (r = .25, p < .01). Job responsibility was positively correlated to vigor (r = .35, p < .01) and negatively to emotional exhaustion (r = -.20, p < .01). In this sample, the average scores of work overload, job responsibility, vigor and

emotional exhaustion do not substantially deviate compared to the average scores of the sample of study 1. Further, like the coworkers' social support in study 1, supervisor's social support was often provided to the respondents (M = 3.06, with '3' equaling "often"). Likewise the sample of study 1, respondents of study 2 experienced more job responsibility than work overload, felt considerably more vigorous than exhausted and received often social support from their supervisor.

Hypotheses tests

To test the moderation effect of supervisor's social support, hierarchical regression analyses were performed with job hindrances and job challenges as independent variables, vigor and emotional exhaustion as dependent variables and supervisor's social support as moderator.

The moderating role of supervisor's social support

A moderation of supervisor's social support on the relationships between both types of job demands and energetic well-being was hypothesized (H13a–16a). As shown in Table 6 and 7, social support provided by the supervisor yields significant direct effects on employee energetic well-being. Supervisor's social support was found to have a positive direct effect on vigor controlling for work overload and job responsibility (B = .64, p < .001; B = .61, p < .001; M2 Table 6, M3 Table 7 respectively), and a negative direct effect on emotional exhaustion keeping work overload and job responsibility constant (B = -.21, p < .001; M2 Table 6 and 7). These findings suggest that the more social support employees receive from their supervisor, the higher their vigor level and the lower their emotional exhaustion. However, the proposed buffering effect of supervisor's social support on employee energetic well-being was found to be insignificant. Results indicate that higher levels of supervisor's social support do not mitigate the adverse effect of work overload either on vigor (B = .13, p > .05; M3 Table 6) nor on emotional exhaustion (B = -.07, p > .05; M3 Table 6). In addition, no buffering effect was found on the relation job responsibility–emotional exhaustion (B = .10, p > .05; M3 Table 7). Based on these findings, the idea that social support provided by the supervisor has a buffering effect on the relations job demands–employee energetic well-being is not supported. These findings are also proven by the results regarding model fit improvement as it was found that those models with the interaction term have a worse model fit compared to the models including only the direct effects of supervisor's social support (F *Change* = 51.19, p < .001; F *Change* = 14.46, p

< .001; M 2 Table 6; *F Change* = 12.22, *p* < .001; M 2 Table 7). Therefore, hypothesis 13a, 14a and 16a are rejected.

With respect to the expected reinforcing effect of supervisor's social support on the association between job responsibility and vigor (H15a), results show that supervisor's social support does indeed influence this relationship (*B* = -.23, *p* < .01, M3 Table 7). To interpret this interaction effect simple slope analysis was performed (Aiken & West, 1991). Following Aiken and West (1991), simple slopes of the effects of job responsibility on vigor are represented for employees having low supervisor's social support (one standard deviation below the mean) versus having high supervisor's social support (one standard deviation above the mean). Figure 2 shows that the relationship between job responsibility and vigor is positive under the condition of low and high supervisor's social support. Subsequently, the significance of the simple slopes at one standard deviation below and above the mean of supervisor's support was tested (Aiken & West, 1991). Results confirm the positive relationship between job responsibility and vigor for employees receiving lower social support from their supervisor (*B* = .50, *p* <.001). Whereas for employees receiving higher supervisor's social support, the positive relationship between job responsibility and vigor was non-significant (*B* = .18, *p* > .05). Based on these findings, the relationship between job responsibility and vigor is not reinforced for those employees receiving higher levels of social support from their supervisors compared to those receiving lower supervisor's social support. Therefore, hypothesis 15a is rejected.

In sum, the study results indicate that higher levels of supervisor's social support has neither a buffering nor a reinforcing effect on energetic well-being. However, it was shown that supervisor's social support is an important resource at work as it is directly related to employees' vigor and emotional exhaustion.

Table 5
Means, Standard Deviations and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender[1]	.58	.49	1										
2. Age	34.40	23.08	.14	1									
3. Tenure	5.67	8.60	.20**	.36**	1								
Contract[2]													
4. Contract Open-ended	.58	.50	.16*	.11	.37**	1							
5. Contract Temporary	.30	.46	-.07	-.05	-.34**	-.76**	1						
Education[3]													
6. Education Medium	.14	.35	.08	-.05	.01	-.15	-.02	1					
7. Education High	.79	.41	-.07	-.02	-.26**	.04	.09	-.79**	1				
8. Work Overload	2.19	.49	.01	.05	.01	.08	.01	-.09	.10	1			
9. Job Responsibility	3.14	.83	.10	.07	.18*	.11	-.17*	-.15*	.12	-.08	1		
10. Vigor	4.89	.93	-.00	.14	.15	.05	-.05	.07	-.11	.12	.35**	1	
11. Emotional Exhaustion	1.89	.53	-.11	-.16*	-.16*	-.14	.17*	-.08	.11	.25**	-.20**	-.34**	1
12. Social Support	3.06	.69	-.02	-.09	-.12	-.05	.09	.15*	-.08	-.04	.09	.44**	-.25**

Note: [1]Dummy variable with female as reference group. [2]Dummy variable with other type of contract as reference group. [3]Dummy variable with low education as reference group. HIWS = high-involvement work systems. *p < .05, ** p < .01; Descriptives and correlations are reported at the individual level of analysis. Valid N (listwise) = 178 employees.

Table 6
Results of Regression Analysis on Employee Well-Being
Supervisor's Social Support x Work Overload

	Vigor			Emotional Exhaustion		
Variables	M1 B (SE)	M2 B (SE)	M3 B (SE)	M1 B (SE)	M2 B (SE)	M3 B (SE)
Step 1						
Gender[1]	-.08 (.15)	-.06 (.13)	-.07 (.13)	-.07 (.08)	-.07 (.08)	-.07 (.08)
Age	.00 (.00)	.00 (.00)	.00 (.00)	-.00 (.00)	-.00 (.00)*	-.00 (.00)*
Tenure	.01 (.01)	.01 (.01)	.01 (.01)	-.00 (.00)	-.00 (.00)	-.00 (.01)
Education[2]						
- Medium	.03 (.35)	-.24 (.31)	-.26 (.31)	-.09 (.19)	.00 (.19)	.01 (.19)
- High	-.20 (.30)	-.26 (.27)	-.27 (.27)	.02 (.17)	.04 (.16)	.04 (.16)
Contract[3]						
- Open-ended	-.03 (.23)	-.17 (.20)	-.16 (.20)	-.06 (.13)	-.02 (.12)	-.02 (.12)
- Temporary	-.05 (.24)	-.22 (.21)	-.20 (.22)	.11 (.13)	.17 (.13)	.16 (.13)
Work overload (Job hindrances)	.24 (.14)	.27 (.13)*	.28 (.13)*	.28 (.08)***	.27 (.08)***	.26 (.08)***
Step 2						
Supervisor Support		.64 (.09)***	.64 (.09)***		-.21 (.05)***	-.20 (.06)***
Step 3						
Supervisor Support*Work overload			.13 (.18)			-.07 (.11)
R^2	.05	.28	.28	.13	.20	.20
F	1.21	7.08	6.40	3.15	4.63	4.19
R^2 Change	.05	.22	.00	.13	.07	.00
F Change	1.21	51.19***	0.46	3.15**	14.46***	.38

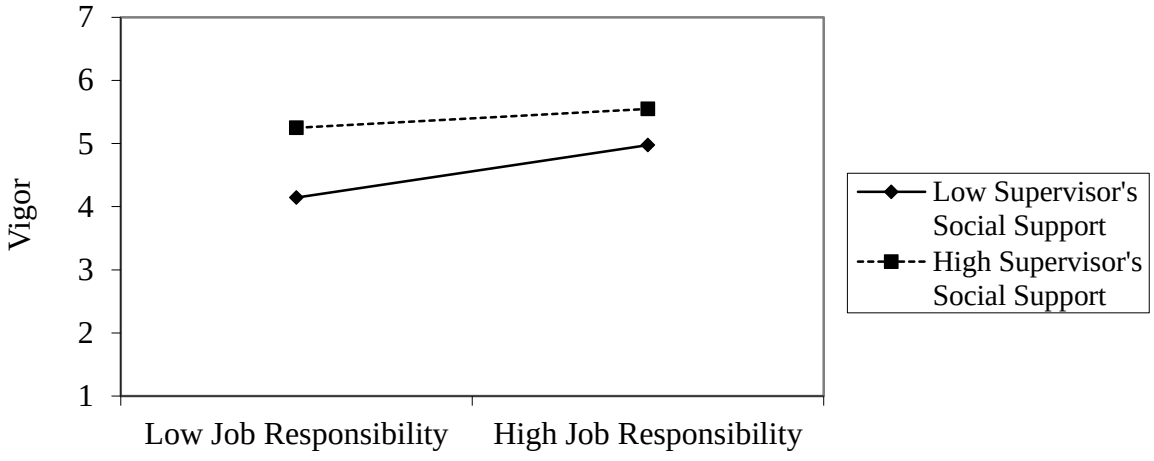
Note: [1]Dummy variable with female as reference group. [2]Dummy variable with low education as reference group. Dummy variable with other types of contract as reference group. B is the unstandardized parameter estimate. SE is the standard error. *p < .05, ** p < .01; ***p < .001.

Table 7
Results of Regression Analysis on Employee Well-Being
Supervisor's Social Support x Job Responsibility

	Vigor			Emotional Exhaustion		
Variables	M1 B (SE)	M2 B (SE)	M3 B (SE)	M1 B (SE)	M2 B (SE)	M3 B (SE)
Step 1						
Gender[1]	-.15 (.14)	-.11 (.12)	-.15 (.12)	-.05 (.08)	-.06 .08	-.05 .(08)
Age	.00 (.00)	.00 (.00)*	.01 (.00)	-.00 (.00)	-.00 .00	-.00 (.00)
Tenure	.00 (.01)	.01 (.01)	.01 (.00)	-.00 (.01)	-.00 .01	-.00 (.01)
Education[2]						
- Medium	.12 (.33)	-.14 (.30)	-.18 (.29)	-.11 (.20)	-.02 .19	-.01 (.19)
- High	-.29 (.29)	-.32 (.26)	-.37 (.25)	.07 (.17)	.08 .17	.11 (.17)
Contract[3]						
- Open-ended	.15 (.22)	.01 (.20)	.12 (.20)	-.05 (.13)	-.00 .13	-.05 (.13)
- Temporary	.19 (.23)	.01 (.21)	.09 (.21)	.10 (.14)	.16 .13	.13 .(14)
Job responsibility (Job challenges)	.41 (.08)***	.34 (.08)***	.34 (.07)***	-.12 (.05)*	-.09 .05	-.09 (.05)
Step 2						
Supervisor Support		.57 (.09)***	.61 (.09)***		-.21 .06***	-.21 (.06)***
Step 3						
Supervisor Support*Job Responsibility			-.23 .(09)**			.10 (.06)
R^2	.16	.34	.36	.10	.16	.17
F	4.12	9.38	9.42	2.27	3.51	3.49
R^2 Change	.16	.17	.03	.10	.06	.02
F Change	4.12***	43.20***	6.84**	2.27*	12.22***	2.97

Note: [1]Dummy variable with female as reference group. [2]Dummy variable with low education as reference group. [3]Dummy variable with other types of contract as reference group. B is the unstandardized parameter estimate. SE is the standard error. *p < .05, ** p < .01; ***p < .001.

Figure 2
Moderation Effect
Supervisor's Social Support x Job Challenges



DISCUSSION

This study aimed to shed light upon the impact of job demands on employee well-being in the context of the JDR model (Demerouti et al., 2001) by integrating the literature that separates job demands into job hindrances and job challenges (Cavanaugh et al., 2000; Van den Broeck et al., 2010). Therefore, the present study was designed to test the mediating role of job hindrances and job challenges (as rated by employees) in the association between HIWS in work units (as rated by line managers) and employee energetic well-being. In addition, the moderating role of job resources on the relationships between both types of job demands and energetic well-being was examined.

The findings demonstrate when more employees are covered by HIWS in a work unit, HIWS translate into job hindrances and job challenges as employees reported higher levels of work overload and job responsibility. Thus, the idea that implemented HIWS practices by line management are experienced as demands by employees is supported. The participatory nature of HIWS indeed transfers heightened demands and feelings of stress to employees (Jensen et al., 2013), resulting in work overload. Further, HIWS are proven to promote job responsibility as the PIRK characteristics equip employees to carry and deal with higher levels of job responsibility (Tuckey et al., 2012). Based on this, the more employees are affected HIWS practices implemented by line management, the more employees experience work overload and job responsibility. These results are supported by Jensen et al. (2013), Kroon et al. (2009) and Mohr and Zoghi (2008) who have claimed that HR practices lead to heightened demands for employees.

Due to the distinction between job hindrances and job challenges (Cavanaugh et al., 2000), this study was able to investigate differential associations between job demands and employee energetic well-being (Van den Broeck et al., 2010). The results confirm that job hindrances and job challenges do yield different effects on employee vigor and emotional exhaustion. Job hindrances in terms of work overload are negatively related to vigor and positively to emotional exhaustion. Therefore, when employees experience work overload they feel exhausted and less vigorous. In contrast, job challenges such as job responsibility are positively associated only with vigor as no association with emotional exhaustion was found. Thus, when experiencing job responsibility employee energetic well-being is positively affected as one's personal reserves are not drained. These findings are in line with the study of Van den Broeck and colleagues (2010) who found that job hindrances are truly health impairing due to a negative association with vigor and a positive association with emotional exhaustion, whereas

job challenges were found to only have a stimulating effect as they are positively related to vigor but not to emotional exhaustion. An explanation for the latter finding might be that when employees are confronted with job challenges such as job responsibility employees perceive them as a positive work experience and as a challenge eliciting a motivational process, instead of perceiving them as demands which deplete energy reserves (Spreitzer, 1995; Tuckey et al., 2012). Nevertheless, it should be noted that there might be a tipping point at which the motivational effect of job responsibility turn into a more negative and energy-depleting one. Drawing on the Vitamin model by Warr (1987), there could be a curvilinear relationship between work context aspects such as job responsibility and employee well-being such as vigor. This would imply that at extremely high levels of job responsibility, the positive effect of job responsibility on vigor may turn into a negative, energy-sapping effect. However, regarding the current study, this is not applicable as respondents experienced no extremely high levels of job responsibility, which excludes the tipping point suggested by Warr (1987). Job responsibility does therefore not turn into a job stressor leading to a complete emotional exhaustion. Hence, job responsibility is perceived solely as a job resource which has a stimulating effect on employee energy rather than as a job demand having an energy-depleting effect. This might be due to different individual employee appraisals of demands (Lazarus & Folkman, 1984). Individuals appraise job demands as either potentially i) threatening and negatively or ii) challenging and positively for their well-being (Crawford et al., 2010; Lazarus & Folkman, 1984). Findings proved that job demands are experienced and appraised not only negatively since job responsibility was appraised positively. This refinement of job demands based on appraisal contests the typology of job demands in the JDR model, which claims that job demands are appraised negatively only, and would call for a redefinition (Schaufeli & Taris, 2014). Job challenges such as job responsibility would be conceptualized as job resources rather than as demands, because they are appraised as a positive experience, impacting one's well-being favorably. Job hindrances such as work overload would still be conceptualized as job demands, because they are appraised as threatening and negative, impacting one's well-being adversely. Nevertheless, it should be mentioned here that whether a specific work condition such as work overload and job responsibility represents a job demand or a resource depends on the work context (i.e., a particular constellation of different demands and resources) or on the individual's experience (De Jonge, Demerouti, & Dormann, 2014). Furthermore, the current job hindrances-challenges literature (i.e., Crawford et al., 2010; Van den Broeck et al., 2010) provides a blurring conceptualization of job challenges as they are defined as demands which

can be both challenging (positive) and threatening (negative). There is no clear-cut in defining job challenges as either job resources or demands. Following the above argumentation and the findings, a redefinition of job challenges as job resources would be desirable within the job hindrances-challenges literature.

Moreover, results support two mediating mechanisms linking HIWS and energetic well-being through job demands. The coverage of employees by HIWS is associated with vigor and emotional exhaustion through job hindrances and job challenges. In line with the pessimistic perspective (Peccei, 2004), HIWS are negatively indirectly associated with vigor and positively indirectly with emotional exhaustion through work overload. In contrast, according to the optimistic perspective (Peccei, 2004), HIWS are positively indirectly associated with vigor (but not with emotional exhaustion) through job responsibility. As explained above, no effect was found between job responsibility and emotional exhaustion, precluding a mediation effect. Based on these findings, both a pessimistic and an optimistic pathway was confirmed as implemented HIWS triggered two conflicting processes on energetic well-being through the perceptions of job demands. The two opposing mediating mechanisms linking HIWS and employee energetic well-being advocate the simultaneous inclusion of a pessimistic and optimistic perspective of HRM on employee outcomes (Peccei et al., 2013; Wood & Menezes, 2011).

One surprising finding of this study was that job resources in terms of social support do not have a buffering nor a reinforcing effect on the relationships between both types of job demands and employee energy. Results show an insignificant interaction between work overload and both sources of social support (coworkers and supervisor) on vigor and emotional exhaustion. In addition, no moderation of social support on the relation job responsibility–emotional exhaustion was found. Therefore, the idea that higher levels of coworkers' and supervisor's social support weakens the unfavorable impact of job demands on energetic well-being is not supported. With respect to the proposed reinforcing effect of coworkers' social support, findings demonstrate a non-significant interaction between job responsibility and coworkers' social support on vigor, thereby precluding a moderation. The assumption that the positive relationship between job responsibility and vigor can be reinforced by higher levels of coworkers' social support is not confirmed. An explanation for the non-significant buffer effect of both coworkers' and supervisor's social support and for the missing reinforcing effect of coworkers' social support could be that the samples of this study did not experience major problems in terms of heightened work overload and emotional exhaustion. Both samples

perceived higher levels of job responsibility and felt vigorous at work, implying a dominating motivational process rather than a health-impairing one. Therefore, it might be that employees did not need social support as a job resource which alleviates or boosters the effects of job demands. Another explanation for the missing moderation could be that both sources of social support have more direct impact on employee well-being. Indeed, as findings reveal social support is a proximal factor affecting vigor and emotional exhaustion rather than a distal one, meaning that the influence of supervisor's and coworkers' social support was transferred in the form of direct effects instead of buffering or reinforcing effects. This is in line with the direct-effect hypothesis of social support claiming that the effect of social support on job strain can be rather direct than indirect (Cohen & Syme, 1985). Following this, social support fosters employees' health and well-being, irrespectively of their demands level. Such a direct effect might occur because social support leads to a positive work experience with employee perceptions of being valued and cared for, and it satisfies the need of belongingness which prompts a motivational process (Deci & Ryan, 2002). Social support from both the supervisor and coworkers provide employees with allegiance, relevant information and good relationships which, in turn, helps and motivates employees to invest effort into and accomplish their work, be persistence in overcoming any problems at work, not to distance themselves from tasks and to conserve energy resources (Schaufeli & Bakker, 2004). Based on this, social support has a direct positive impact on employee vigor and a direct negative impact on emotional exhaustion. The findings emphasize the general value of social support at the workplace, regardless of how much job demands employee experience (Cohen & Syme, 1985).

Further, the expected reinforcing effect of supervisor's social support on the association between job responsibility and vigor could not be supported. Although a significant interaction between job responsibility and supervisor's social support on vigor was found, confirming the assumption that higher levels of supervisor's support would strengthen the positive effect of job responsibility on vigor was not possible. Simple slope analysis (Aiken & West, 1991) showed that under the condition of high supervisor's social support the effect of job responsibility on vigor is non-significant. An explanation for this counterintuitive finding could be that when experiencing job responsibility employees perceive higher levels of social support from their supervisor not as a job resource which energizes their reserves. Instead, it might be that employees perceive the supervisor's support as a means of control. It could be that employees with job responsibility where they have autonomy and control over their work, supervisors who provide higher levels of support are perceived as monitoring their employees in performing

tasks, decision-making etc. Thus, supervisor's social support might be tiring for employees and lead to employee demotivation if it is too control-orientated. Further, it is likely that the support is perceived as a lack of trust in employees. This lack of trust may lead that employees feel actually unsupported by their supervisor. Hence, higher levels of supervisor's social support might not be perceived as a helpful job resource. Another explanation for this finding could be that employees are more likely to use resources as a coping mechanism especially under stressful work conditions (Bakker et al., 2004). As results indicate job responsibility acts as a job resource which is appraised positively, and which is not associated with lower energy levels (emotional exhaustion). Therefore, job responsibility was not perceived as stress. Based on this, it could be argued that employees with job responsibility do not use job resources such as supervisor's support as a coping strategy because they do not experience job responsibility as a stressful situation. A final explanation for the missing positive moderation effect of supervisor's social support could be the conceptualization of supervisor's support in this study. The measure of supervisor's social support did not include all dimensions (belonging, instrumental, emotional, informational) proposed by House (1981). Social support from the supervisor was conceptualized mainly as emotional support in the current study. Due to the lacking dimensions, especially instrumental and informational, supervisor's support might not provide enough additional resources (i.e., proper feedback) which would contribute to overcome any difficulties, employees' willingness to invest effort into their work and the achievement of work goals (Schaufeli & Bakker, 2004; Bakker et al., 2005). Thus, higher levels of supervisor's social support has not the potential to reinforce the positive impact of job responsibility on vigor. However, the results of simple slope analysis (Aiken & West, 1991) demonstrated that lower levels of supervisor's social support strengthen the relationship between job responsibility and vigor. It might be that job responsibility acts as a substitute for supervisor's social support (Kerr & Jermier, 1978), as it seems that supervisor's social support may be quite trivial for an increase in vigor, but job responsibility is. In addition, it might be that when supervisors provide support only if their employees are in need and ask for then the positive effect of job responsibility on vigor will reinforce. This could be explained with employees' perceptions of supervisor support. It could be that under the condition of low supervisor support employees feel more vigorous because they perceive the supervisor's support as adequate and helpful instead of a control mean or a lack of trust. Thus, restraining supervisor's social support might help in order to increase employees' vigor levels.

In sum, the study reveals that management practices like HIWS have the potential to act as both contextual stressors and motivators resulting in heightened job hindrances and job challenges which, in turn, have differential relations to employee energetic well-being. Further, the study demonstrates that higher levels of social support yield neither a buffering nor a reinforcing effect on employee energy reserves as it impacts rather directly energetic well-being.

Limitations and future research implications

This research has several limitations which need to be taken into account when interpreting the findings. First, HIWS were conceptualized and tested as a system (e.g., Butts et al., 2009; Kroon et al., 2009) consisting of HR practices reflecting the PIRK features (participation, information, rewards, knowledge) of HIWS. However, it would be worthwhile for future research to bundle HIWS practices into sub-bundles (i.e., Boon, Belschak, Den Hartog, & Pijnenburg, 2014; Vandenberg et al., 1999) such as Ability-enhancing bundle (knowledge practices like training and development), Motivation-enhancing bundle (rewards practices like bonuses) and Opportunity-enhancing bundle (information practices like information sharing and participation in decision-making). This would enable researchers to test for possible differential effects of HIWS sub-bundles on job demands.

Second, a cross-sectional study design was used in which all variables were measured at the same time. Thus, no conclusions regarding any causal relationships suggested by the results can be drawn, although the proposed causal relations depicted in Figure 1 are on the basis of theoretical predictions which are based on theoretical logic and previous research findings from HRM and occupational health psychology literature (e.g., Bakker et al., 2004; Butts et al., 2009; Cavanaugh et al., 2000; Demerouti et al., 2001; Nishii & Wright, 2007; Lepine et al., 2004; Van den Broeck et al., 2010). In order to more confidently understand how HIWS influence several job demands, which in turn affect employee outcomes, a longitudinal design should be performed in which all variables of interest are measured at different times.

Third, given the use of a convenience sample design, the generalizability of the findings might be limited. Using a non-probability sampling method represented by a convenience sample, the sample is not representative of the entire population and sampling bias is likely to occur. Therefore, conclusions about the entire population cannot be drawn. Thus, it would be advisable for future research to use a random selection method as this minimizes sample bias and the sample would be representative of the entire population.

Fourth, the measurement scales used for study 1 and study 2 are not identical, in particular job responsibility and emotional exhaustion were measured differently. The scale of job responsibility included items from Cavanaugh et al. (2000) in both studies, however, in study 2 items from the impact scale by Spreitzer (1995) were included as well. The impact scale items refer to the control and influence one has within the organization rather than to the responsibility of one's own work and work outcomes. The scale of job responsibility in study 2 was measured mainly by items of the impact scale (Spreitzer, 1995) as more items from this scale compared to items from Cavanaugh et al. (2000) were included. Therefore, in study 2, job responsibility is conceptualized primarily as one's control and influence of what happens within the organization, whereas in study 1 job responsibility reflects one's responsibility and accountability of one's work and work outcomes, which is in line with job responsibility's definition by Hackman & Oldham (1976). Furthermore, with respect to emotional exhaustion, in study 1 it was measured with items of the Utrecht Burnout Scale (UBOS; Schaufeli & Van Dierendonck, 2000) where the items pertain to the extent to which work depletes employee energy levels, whereas in study 2 emotional exhaustion was measured with items of the need for recovery scale based on the VBBA (Van Veldhoven & Meijmann, 1994). The items of the need for recovery scale refer to feelings of tiredness and exhaustion after work, rather than during work. Based on this, using distinct measurements for the same construct might lead to differences in results. Although this had no consequences for the results of this study as study 2 had a complementary purpose only (testing moderation of supervisor's support) which excludes results comparisons between study 1 and study 2, for comparison reasons in future research the same measurements for the same constructs should be included.

Fifth, the scale of supervisor's social support did not include all dimensions suggested by House (1981; belonging support; instrumental support; emotional support; informational support) as supervisor's social support was conceptualized mainly as emotional support. It would be favorable to include all dimensions constituting social support when examining the construct's effect on employee well-being.

Sixth, the data were collected from Dutch organizations solely which limits the generalizability of the findings across countries. Hence, cross-cultural differences cannot be identified. It might be that the coverage of employees in a work unit by HIWS practices implemented by line management differs among countries due to power distance (Hofstede, 1993; Wu & Chaturvedi, 2009). Organizations in high power-distance countries strictly adhere to rules and procedures and employees have less job responsibility, autonomy and have a more

monitoring supervision reflecting an unequally distributed power (Lee & Antonakis, 2014; Hofstede, 1993). Thus, it might be that organizations with a high power-distance orientation do not implement HIWS practices as these involvement and empowering practices would not correspond to their cultural values (Hofstede, 1993). In the Netherlands, power distance is quite small compared to other countries (Hofstede, 1993), hence, HR practices emphasizing the involvement of employees are likely to be advocated and correctly implemented by Dutch line managers. For future research the moderating role of power distance (Wu & Chaturvedi, 2009) might be important to consider when examining the impact of implemented HIWS by line managers on employee outcomes.

Another limitation in the current study is that it did not control for any task-related resources such as job variety or job control which might be associated with vigor (i.e., Crawford et al., 2010). The empowerment and involvement nature of HIWS offers employees job variety and job control which, in turn, could lead to higher levels of vigor. Based on this, it might be that job variety and job control would reduce the observed relationship between job responsibility and vigor. Therefore, in future studies which examine the relationship between job responsibility and vigor task-related resources such as job variety and job control should be included.

A final limitation concerns the focus on only one job hindrance (work overload) and job challenge (job responsibility). There are other types of job hindrances (i.e., role ambiguity) and job challenges (i.e., job scope) at work which are related to HIWS and which trigger other processes stimulating vigor and lowering emotional exhaustion. Thus, researchers might examine a larger variety of job hindrances and job challenges in their future studies to contribute to a better understanding of the underlying processes linking HIWS to employee energetic well-being. Moreover, this study revealed that the definition of job demands in the JDR model needs a revision, and the literature concerning job hindrances-challenges distinction should integrate a clear-cut off whether job challenges represent demands or resources. This study found evidence that job challenges function as job resources, as they had a positive impact on vigor only. Therefore, it would be worthwhile for future research to challenge the typology of job demands in the JDR model and the construct of job hindrances and job challenges.

Practical Implications

The present study shows that line managers can influence employee energetic well-being positively as well as negatively in their work unit by offering more HIWS practices to their

employees. According to the optimistic perspective of HRM (Peccei, 2004), when line managers increase the employee coverage by HIWS practices, employees perceive more job challenges such as carrying more job responsibility, which in turn enhances their vigor level. On the other hand, following the pessimistic perspective of HRM (Peccei, 2004), increasing the employee coverage by HIWS also increases job hindrances like work overload, which leads to higher emotional exhaustion and less vigor. Thus, line managers need to be aware of these conflicting consequences of HIWS on employee well-being. Line managers should provide resources such as encouraging a supportive work environment, stress management trainings and employee wellness programs (Losyk, 2006) in order to balance the conflicting outcomes of HIWS on employee energetic well-being.

CONCLUSION

The aim of this study was to examine the impact of HIWS on employee energetic well-being through employee perceptions of job demands. Drawing on the JDR model (i.e., Demerouti et al., 2001) and the occupational health psychology literature (i.e., Cavanaugh et al., 2000; Van den Broeck et al., 2010) this study focused on the differentiation of job demands as mediating mechanisms linking HIWS and employee well-being. The results of the study provide support for the idea that HIWS are positively associated with different types of job demands, which in turn yield differential relations to employee energetic well-being. Whereas job hindrances in terms of work overload were negatively related to energy, job challenges in terms of job responsibility were positively related to energy. These findings suggest that job hindrances are experienced as classical job demands which need to be reduced and job challenges are experienced as job resources should be increased when vigor should be enhanced and emotional exhaustion should be lowered. Moreover, the results of this study suggest a redefinition of job demands in the JDR model and a clear definition of job challenges within the hindrances-challenges literature. Furthermore, this study underlines the importance of considering a more balanced approach of HRM by including both the pessimistic and optimistic perspective into the investigation of effects of HIWS on employee energetic well-being. In addition, although the current study did not find a buffering nor a reinforcing effect of job resources in terms of higher levels of social support it stresses the notion that social support from coworkers and the supervisor is an important feature of the work environment as it is directly related to employee energy reserves.

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APPENDIX A: Results of Factor Analysis and Cronbach's alpha of study 1–scales

Table A1: Results of factor analysis and Cronbach's alpha of HIWS scale

	Training and development items:	
1.	Employees will normally go through ongoing training programs	.39
2.	My department provides specialized training and development for its employees	.73
3.	My department initiates and provides various kinds of training and development for its employees	.79
4.	Formal training programs are provided to teach new hires the skills they need to perform their job	.36
5.	Employees have clear career paths	.39
	Compensation items:	
6.	Within my department, team members are financially rewarded based on their individual performance in addition to their basic salary	.75
7.	Within my department, team members are financially rewarded based on team performance in addition to their basic salary	.63
8.	Within my department, team members are financially rewarded based on organizational performance in addition to their basic salary	.49
9.	My department's pay system reflects employee's contribution to the department	.74
	Performance evaluation items:	
10.	Employees' performance appraisal is based on individual behaviors and attitudes at work	.45
11.	Employees' performance appraisal is oriented toward their development and progress at work	.63
12.	Employees' performance appraisal emphasizes collective and long-term-based results	.77
13.	Employees receive performance feedback on a routine (multiple times a year)	.49
14.	Performance appraisals are based on objective quantifiable results	.75
	Participation and communication items:	
15.	My department emphasizes employees' job rotation and flexible work assignments in different work areas	.37
16.	My department transfers extensively different tasks and responsibilities to employees	.82
17.	Employees in my department have broadly designed jobs requiring a variety of skills	.47
18.	Employees in my department are allowed to make decisions	.53
19.	The job duties of employees are clearly defined	.68
20.	Employees are provided the opportunity to suggest improvements in the way things are done	.40
21.	Employees are invited to participate in a wide range of issues, including performance standards, quality improvement, benefits, etc	.55
22.	Employees are invited to participate in problem solving and decisions	.55
23.	Employees receive information on the relevant concerns of the company (goals, performance, etc.)	.60
	KMO	.69
	Bartlett's sphericity significance	.000
	Eigenvalue	8.22
	Variance explained	35.76%
	Cronbach's alpha	.91

Table A2: Results of factor analysis and Cronbach's alpha of work overload scale

1.	I have too much work to do	.65
2.	I have to work very fast	.69
3.	I have unrealistic time pressures	.79
4.	I have to work very hard	.72
5.	Do you have problems with the work pace?	.70

6.	I have unachievable deadlines	.69
7.	I have to neglect come tasks because I have too much to do	.65
8.	Do you find that you are behind in your work activities?	.67
9.	Do you have problems with the work pressure?	.68
	KMO	.87
	Bartlett's sphericity significance	.000
	Eigenvalue	4.34
	Variance explained	48.18%
	Cronbach's alpha	.87

Table A3: Results of factor analysis and Cronbach's alpha of job responsibility scale

1.	I have a considerable amount of responsibility for the work I do on this job	.88
2.	I have a considerable amount of responsibility for the results of my work on this job	.82
3.	My position entails a broad scope of responsibility	.88
	KMO	.70
	Bartlett's sphericity significance	.000
	Eigenvalue	2.22
	Variance explained	73.89%
	Cronbach's alpha	.82

Table A4: Results of factor analysis and Cronbach's alpha of coworkers' social support scale

1.	Can you count on your colleagues when you encounter difficulties in your work?	.80
2.	If necessary, can you ask your colleagues for help?	.76
3.	Do you get on well with your colleagues?	.77
4.	Is there a good atmosphere between you and your colleagues?	.77
	KMO	.64
	Bartlett's sphericity significance	.000
	Eigenvalue	2.4
	Variance explained	60.70%
	Cronbach's alpha	.78

Table A5: Results of factor analysis and Cronbach's alpha of vigor scale

1.	I feel I have physical strength	.87
2.	I feel vigorous	.88
3.	I feel energetic	.89
4.	A feeling of vitality	.84
5.	I feel mentally alert	.84
6.	I feel I am able to contribute new ideas	.68
7.	A feeling of flow	.59

KMO	.85
Bartlett's sphericity significance	.000
Eigenvalue	4.55
Variance explained	65.04%
Cronbach's alpha	.91

Table A6: Results of factor analysis and Cronbach's alpha of emotional exhaustion scale

1.	I feel burned out from my work	.92
2.	I feel emotionally drained from my work	.95
3.	I feel tired when I get up in the morning and have to face another day on the job	.88

KMO	.72
Bartlett's sphericity significance	.000
Eigenvalue	2.52
Variance explained	83.92%
Cronbach's alpha	.90

APPENDIX B: Presence of HRM practices in the HIWS measure

Table B1: Relative representation of HRM practices in HIWS

	Training & development	**Compensation**	**Performance evaluation**	**Participation & communication**
HIWS items	5	4	5	9
% of HIWS system	21.74	17.40	21.74	39.13

APPENDIX C: Results of Factor Analysis and Cronbach's alpha of study 2–scales

Table C1: Results of factor analysis and Cronbach's alpha of work overload scale

1.	I have too much work to do	.79
2.	Do you have to work extra hard in order to complete something?	.89
3.	Do you have to hurry?	.82

KMO	.66
Bartlett's sphericity significance	.000
Eigenvalue	2.09
Variance explained	69.60%
Cronbach's alpha	.78

Table C2: Results of factor analysis and Cronbach's alpha of job responsibility scale

1.	I have a great deal of control over what happens in my organization	.88
2.	I have a significant influence over what happens in my organization	.92
3.	My position entails a broad scope of responsibility	.70

KMO	.60
Bartlett's sphericity significance	.000
Eigenvalue	2.11
Variance explained	70.56%
Cronbach's alpha	.79

Table C3: Results of factor analysis and Cronbach's alpha of vigor scale

1.	At my work, I feel bursting with energy	.79
2.	At my work, I feel strong and vigorous	.84
3.	When I get up in the morning, I feel like going to work	.80
4.	I work with intensity on my job	.77
5.	I exert my full effort to my job	.85
6.	I devote a lot of energy to my job	.86
7.	I exert a lot of energy on my job	.90
	KMO	.85
	Bartlett's sphericity significance	.000
	Eigenvalue	4.83
	Variance explained	68.94%
	Cronbach's alpha	.92

Table C4: Results of factor analysis and Cronbach's alpha of emotional exhaustion scale

1.	I find it difficult to relax at the end of a working day	.58
2.	By the end of the working day, I feel really worn out	.87
3.	Because of my job, at the end of the working day I feel rather exhausted	.88
4.	During the last part of the working day, a feeling of tiredness prevents me from doing my work as well as I normally would	.74
	KMO	.73
	Bartlett's sphericity significance	.000
	Eigenvalue	2.42
	Variance explained	60.52%
	Cronbach's alpha	.77

Table C5: Results of factor analysis and Cronbach's alpha of supervisor's social support scale

1.	If necessary, can you ask your superior for help?	.85
2.	Is there a good atmosphere between you and your superior?	.91
3.	My supervisor pays attention to my feelings and problems	.84
	KMO	.69
	Bartlett's sphericity significance	.000
	Eigenvalue	2.24
	Variance explained	74.81%
	Cronbach's alpha	.83

APPENDIX D: Calculation of ICC values and Chi-square tests

Job Responsibility

Empty Model

ICC = $\tau^2_{00}/(\sigma^2+\tau^2_{00})$
ICC = 0.06/(0.36+0.06)
ICC = 14%

Model 1 with control variables only: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
= 734.44-522.13 = 212.31
df = 7
--> $\text{Chi}^2(7)$ = 212.31 --> Significant, p value < .001

Model 2 with work unit-level predictor HIWS: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=522.13-508.62 = 13.51
df = 1
--> $\text{Chi}^2(1)$ = 13.51 --> Significant, p value < 0.001

Work Overload

Empty Model

ICC = $\tau^2_{00}/(\sigma^2+\tau^2_{00})$
ICC = 0.05/(0.15+0.05)
ICC = 25%

Model 1 with control variables only: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=425.31-283.54 = 141.77
df = 7
--> $\text{Chi}^2(7)$ = 141.77--> not significant, p value > .001

Model 2 with work unit-level predictor HIWS: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=283.54-277.48 = 6.06
df = 1
--> $\text{Chi}^2(1)$ = 6.06--> not significant, p value > .01

Vigor

Empty Model

ICC = $\tau^2_{00}/(\sigma^2+\tau^2_{00})$
ICC = 0.00/(0.73+0.00)
ICC = 0%

Model 1 with control variables only: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
= 951.12-678.56 = 272.56
df = 7
--> $\text{Chi}^2(7) = 272.56$ --> Significant, p value < .001

Model 2 with work unit-level predictor HIWS: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=678.56-678.46 =0.1
df = 1
--> $\text{Chi}^2(1) = 0.1$ --> Not Significant, p value > .05

Model 3 with work unit-level predictor job demands: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=678.46-655.60 = 22.86
df = 2
--> $\text{Chi}^2(2) = 22.86$ --> Significant, p value < .001

Model 4 with interactions: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=655.60-627.7 = 27.90
df = 3
--> $\text{Chi}^2(3) = 27.90$ --> Significant, p value < .001

Emotional Exhaustion

Empty Model

ICC = $\tau^2_{00}/(\sigma^2+\tau^2_{00})$
ICC = 0.01/(1.38+0.01)
ICC = 0%

Model 1 with control variables only: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
= 1193.05-858.45 = 334.6
df = 7
--> $\text{Chi}^2(7) = 334.6$ --> Significant, p value < .001

Model 2 with work unit-level predictor HIWS: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$
=858.45-858.44 = 0.01
df = 1
--> $\text{Chi}^2(1) = 0.01$ --> Not Significant, p value > .05

Model 3 with work unit-level predictor job demands: Chi-square Test

= $\text{Deviance}_{\text{previous model}}$ - $\text{Deviance}_{\text{current model}}$

=858.44-814.31 = 44.13
df = 2
--> $Chi^2(2) = 44.13$ --> Significant, p value < .001

<u>Model 4 with interactions: Chi-square Test</u>

= $Deviance_{previous\ model}$ - $Deviance_{current\ model}$
=814.31-783.76 = 30.55
df = 3
--> $Chi^2(3) = 30.55$ --> Significant, p value < .001