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Need Satisfaction at Work, Job Strain, and Performance: A Diary Study.

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A Diary Study

Abstract

We performed a daily diary study to examine the mediating role of autonomy need satisfaction and competence need satisfaction in the relationships between job characteristics (i.e., job resources, challenge and hindrance demands) and strain and performance. For 10 consecutive working days, 194 employees reported on their daily job resources, challenge and hindrance demands, task performance, strain level, and satisfaction of the needs for competence and autonomy. Multilevel path modeling demonstrated that the within-person relationships between job resources, challenge and hindrance demands, and strain are mediated by autonomy need satisfaction, but not by competence need satisfaction. However, the relationships between job resources and hindrance demands, and performance are mediated by both competence and autonomy need satisfaction. Our findings show that organizations may benefit from designing jobs that provide employees with the opportunity to satisfy their basic needs for competence and autonomy.

Keywords:

job demands; job resources; need satisfaction; performance; stress

Introduction

Because of their importance for organizational results and employee wellbeing, employee outcomes such as strain and performance attract ample attention from both human resource practitioners and scholars. Gaining insight into their antecedents is important because it may help to develop interventions aimed at alleviating strain and improving performance. In this regard, several studies on the job demands-resources (JD-R) model have already shown that both strain and performance are affected by characteristics of the job (Bakker & Demerouti, 2014). Yet, the underlying mechanisms by which job demands and resources exert their influence received less research attention (Schaufeli & Taris, 2014; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008). The present study addresses this research gap by examining the role of basic need satisfaction in the job characteristics-employee outcomes relationship. In particular, we test whether satisfaction of the needs for competence and autonomy accounts for the daily relationships between job demands and job resources and employee strain and performance.

Our study makes at least three important contributions. First, at a theoretical level, by integrating two complementary theoretical frameworks—that is, the JD-R model and self-determination theory (SDT; Deci & Ryan, 2000)—we shed light on the psychological mechanisms relating job demands and resources to job outcomes (i.e., strain and performance). The strength of the JD-R model is that it explicates the relationships between specific job demands and resources and employee attitudes and behaviors, while a limitation is that the underlying processes through which these job demands and resources exert their influence are understudied (Schaufeli & Taris, 2014). SDT, instead, —through the study of basic psychological need satisfaction—strongly emphasizes *how* job characteristics influence employees' psychological functioning (Gagné & Deci, 2005), while it pays less attention to detailing which specific job characteristics trigger variation in psychological need satisfaction

and hence employees' psychological functioning. Thus, whereas both theories propose that job characteristics influence job outcomes, JD-R's primary contribution lies in the distinction of different (categories of) job characteristics that have differential effects, while SDT's contribution lies in the explicitation of the underlying mechanism that relates job characteristics to outcomes. In the present study, we combine the strengths of both theories by studying the mediating role of psychological need satisfaction in the job characteristics-outcomes relationship. In this way, we contribute to the JD-R model by studying the mechanisms underlying the relationship between job demands and resources and job outcomes, while we contribute to SDT by showing which concrete job characteristics trigger variation in need satisfaction. As a second contribution, in contrast to previous studies (e.g., Gillet, Fouquereau, Forest, Brunault, & Colombat, 2012; Van den Broeck et al., 2008), we do not focus on the role of overall need satisfaction. Instead, our study addresses the recent call to stop aggregating the basic needs (Van den Broeck, Ferris, Chang, & Rosen, 2016) by examining the role of autonomy and competence need satisfaction separately, thereby capturing the unique mediating role of both needs. Moreover, our study addresses the recent call to study the role of need satisfaction at the day level (Van den Broeck et al., 2016). Third, at a methodological level, we add to the literature by testing the proposed mediation model at the within-person level (Bolger, Davis, & Rafaeli, 2003; Sonnentag & Ilies, 2011; Van den Broeck et al., 2016), examining whether within-person fluctuations in need satisfaction do account for the relationship between within-person fluctuations in job characteristics and within-person fluctuations in daily strain and performance. Whereas previous studies have typically examined the underlying mechanisms between job characteristics and outcomes as they occur in general across individuals, psychological mechanisms operating at the between-person level do not necessarily transfer to the within-person level (Fisher & To, 2012; Sonnentag & Ilies, 2011). Knowing that each of our study variables fluctuates over time (e.g.,

Bakker & Demerouti, 2014; Debusscher, Hofmans, & De Fruyt, 2014; Reis et al., 2000; van

Hooff & Geurts, 2015), our study will add to the literature by revealing the dynamic

interrelationships between these constructs, thereby identifying the within-person processes as

they emerge over time (Beal & Weiss, 2003; Fisher & To, 2012).

Job Demands, Job Resources, Strain and Performance

Each job is characterized by a unique combination of job characteristics (Bakker &

Demerouti, 2014). *Job demands* are those aspects of a job—physical, psychological, social, or

organizational—that require sustained physical and/or mental effort and are therefore

associated with physiological and/or psychological costs (e.g., workload, emotional demands;

Demerouti et al., 2001). *Job resources*, in contrast, are features of a job that: (1) help to

achieve organizational goals or accomplish personal tasks, (2) reduce the impact of job

demands and their corresponding costs, and (3) stimulate personal growth and development

(e.g., social support, feedback; Demerouti et al., 2001).

A core proposition of the JD-R model is that job demands and job resources evoke two

separate psychological processes that impact employee behavior and wellbeing. First, high

job demands consume cognitive and physical resources and therefore high demands

negatively influence employee wellbeing and behavior (Bakker & Demerouti, 2014). Job

resources, in turn, motivate employees because they facilitate learning and enable the

achievement of work goals (Bakker & Demerouti, 2014). Drawing on the energy-depleting

and motivational process, numerous studies have demonstrated that job demands and job

resources relate to a variety of employee behaviors and wellbeing indicators (Bakker &

Demerouti, 2014, in press; Schaufeli & Taris, 2014).

According to the motivational process, being able to draw on job resources motivates

employees, thereby helping them to control their level of strain (i.e., the psychological,

behavioral, and physiological responses to stressors such as anxiety, absenteeism, and illness; Griffin & Clarke, 2011) and deliver a good performance (i.e., the formally required outcomes and behaviors that contribute to the realization of organizational goals; Motowildo & Van Scotter, 1994). The absence of valued job resources, instead, frustrates employees and tends to increase their level of strain or hinders their performance (Schaufeli, Bakker & Van Rhenen, 2009).

According to the energy-depleting process, excessive job demands consume employees' cognitive and physical energy. Dealing with these demands results in a higher strain level and an energy shortage, which inhibits the employee to perform well. Yet, recent advancements in the literature on job demands suggest that the relationship between demands and outcomes differs as a function of the type of demand (Crawford, Lepine, & Rich, 2010). One type of demands, hindrance demands (e.g., role ambiguity, emotional conflict), evokes the energy-depleting process because these are threatening obstacles that consume energy and interfere negatively with goal achievement and employee wellbeing. Challenge demands (e.g., workload, time pressure), in turn, are both energy depleting and motivating: Although they consume energy, they stimulate a sense of mastery or personal growth, and challenge employees to perform to the best of their abilities. Complex and difficult work tasks that need to be performed under time pressure, for example, demand the allocation of all the available attention and energy in order to be successfully completed. This means that challenge demands cost considerable energy and therefore they relate to exhaustion; however, they also offer employees ample opportunities for learning and growth—which is the reason why they are positively related to work engagement—(Crawford, Lepine & Rich, 2010; Vandenbroeck, Vansteenkiste, De Witte, Soenens & Lens, 2010). Therefore, we hypothesize the following relationships between challenge and hindrance demands, job resources, strain and performance:

Hypothesis 1a: Hindrance demands relate positively whereas challenge demands and job resources relate negatively to strain.

Hypothesis 1b: Hindrance demands relate negatively whereas challenge demands and job resources relate positively to performance.

We selected five challenge (i.e., workload) and hindrance demands (i.e., emotional and physical demands), and job resources (i.e., skill utilization, feedback) that are frequently studied in the context of the JD-R model (Schaufeli & Taris, 2014), and that are relevant for the jobs and occupational sector studied here. Our participants perform service jobs in public social-service organizations (i.e., municipal offices, public center for social welfare, local job placement office), for which they often interact with demanding and/or dissatisfied customers and perform office as well as fieldwork—implying both emotional and physical demands. Their activities are mainly demand-driven and require quick responses—implying significant workload. Based on our knowledge of this occupational setting and insights from supervisors, we categorized our demands as challenge our hindrance demands. Yet, making this a priori categorization is difficult, as the particular effect of job demands seems to vary across occupations or sectors (Bakker & Sanz-Vergel, 2013).

Although the energy-depleting and motivational process have often been used to theorize why specific job demands and job resources should relate to specific job outcomes, very few studies have explicitly examined these underlying psychological mechanisms (Schaufeli & Taris, 2014; Van den Broeck et al., 2008). Indeed, whereas there are many empirical studies showing that different job demands and resources relate to a wide range of job outcomes (Bakker & Demerouti, 2014), most of them did not study *how* these job demands and job resources affect job outcomes (Schaufeli & Taris, 2014).

As behavior results from the interaction between contextual factors (i.e., job demands and job resources) and personal factors, scholars recently started to explore the role of

personal resources when linking job characteristics to job outcomes (Bakker & Demerouti, 2014; Schaufeli & Taris, 2014; Van den Broeck et al., 2008; Xanthopoulou et al., 2007). Whereas contextual resources are resources located outside the self, in the social environment of the individual (e.g., job resources such as social support from a colleague), *personal resources* are proximate to the self, including personal traits and energies of the individual (e.g., self-efficacy, health) (Hobfoll, 2002). Personal resources can play a role in the underlying mechanism linking job characteristics to job outcomes, potentially through mediating this relationship. In the present study, we extend this line of research by examining the mediating role of basic need satisfaction in the job characteristics-employee outcomes relationship.

Basic need satisfaction

Self-determination theory (SDT) defines basic needs as "*those nutriments that must be procured by a living entity to maintain its growth, integrity, and health*" (Deci & Ryan, 2000, p. 326). Three basic psychological needs are central to the theory. First, the need for competence refers to employees' desire to feel capable and competent in mastering their environment, and to be able to achieve desired outcomes and realize various challenges. Second, the need for autonomy refers to employees' desire to guide their own behavior and act in line with their own integrated self. Finally, the need for relatedness pertains to the desire to feel closely connected to relevant others and achieve a sense of belongingness (Deci & Ryan, 2000). As needs satisfaction secures the personal nutriments for individuals' growth and health, it is considered to be an energetic personal resource, fostering the employee's well-being and performance (Deci & Ryan, 2000).

In the present study, we focus on the role of the needs for autonomy and competence, while the need for relatedness is omitted. Although it is less common to focus on (a) particular need(s) and not examine all three of them in relation to each other, there are several

studies that have also focused on one or two needs depending on their research aim and sample (e.g., Fousiani, Dimitropoulou, Michaelides, & Van Petegem, 2016; Hofer & Busch, 2011; Kazakova, Cauberghe, Pandelaere, & De Pelsmacker, 2014; Richer, Blanchard, & Vallerand, 2002; Schüler, Sheldon, & Fröhlich, 2010). In our study, the need for relatedness was omitted for a number of reasons. First, satisfaction of the need for relatedness plays a more distal role in the elicitation of employees' intrinsic motivation (Deci & Ryan, 2000; Gagné & Deci, 2005). Second, the needs for competence and autonomy are central to several seminal stress and performance theories, which is less the case for the need for relatedness. For example, with regard to strain, the job control dimension of Karasek's Job Demands-Control Model contains two components (i.e., skill discretion and decision authority) that are conceptually close to the needs for competence and autonomy (Karasek, 1979). Regarding performance, the critical psychological states (i.e., meaningfulness of work, responsibility for work outcomes, and knowledge of results) described in Hackman and Oldham's (1976) Job Characteristics Model clearly match with the needs for competence and autonomy, but not with the need for relatedness. Given both arguments—in combination with our aim to keep the length of our daily questionnaire acceptable for participants—we decided not to include the need for relatedness in this study.

According to SDT, the degree to which employees can satisfy their needs for autonomy and competence depends on the work environment or the job characteristics thereof (Deci & Ryan, 2000; Van den Broeck et al., 2008). Resourceful work environments promote growth and development, and stimulate employees to accomplish their tasks. In such stimulating environments employees can satisfy their needs (e.g., Bakker & Demerouti, 2007, 2014; Gillet et al., 2012; Fernet, Austin, Trépanier, & Dussault, 2013). Gillet and colleagues (2012), for example, demonstrated that receiving organizational support and autonomy support positively relates to higher overall need satisfaction levels. Similar effects on overall

need satisfaction were found for skill utilization and having a strategic impact (De Cooman, Stynen, Van den Broeck, Sels & De Witte, 2013), task autonomy, skill variety and feedback (Van den Broeck et al., 2008), and cognitive, emotional and physical job resources (Trépanier, Forest, Fernet & Austin (2015). Likewise, Fernet and colleagues (2013) reported that social support and job control positively influenced employees' autonomy need satisfaction, with social support also increasing employees' relatedness need satisfaction. Whereas the positive impact of job resources on need satisfaction is well established, the effect of challenge demands on satisfaction of the needs for autonomy and competence is unexplored. We reason that, when trying to deal with challenging demands such as a high daily level of workload, employees need to accelerate, take initiative, and use their competences. Doing so will create opportunities to satisfy the needs for autonomy and competence. De Cooman and colleagues (2013) already acknowledged a positive relationship between workload and overall need satisfaction. Nevertheless, dealing with extreme momentary levels of challenging demands could also deplete employees' energy and might result in low levels of autonomy and/or competence need satisfaction. Recent findings already demonstrated the negative effect of extreme levels of work pressure on daily task performance (Hofmans, Debusscher, Dóci, Spanouli, & De Fruyt, 2015). Contrary to job resources and challenge demands, hindrance demands can possibly make it more difficult to satisfy the needs for autonomy and competence. Having to deal with unfavorable job demands hinders employees in their functioning and leads to dissatisfaction of their basic needs (e.g., Fernet et al., 2013; Gillet et al., 2015; Van den Broeck et al., 2008). Fernet and colleagues (2013), for example, demonstrated in their cross-sectional study examining school board employees that feeling overwhelmed by the different roles they need to fulfill (i.e., role overload), might prevent school board employees from performing those tasks that are in line with their values, and as such it might lead to less satisfaction of their need for autonomy. Moreover, they found a

negative effect of experiencing role ambiguity on satisfaction of the need for competence. Other studies also reported negative effects of workload, emotional and physical demands and work-family interference on overall need satisfaction (De Cooman et al. 2013; Van den Broeck et al., 2008). Consequently, we hypothesize:

> *Hypothesis 2a: Job resources and challenge demands are positively related to satisfaction of the need for autonomy and the need for competence.*
>
> *Hypothesis 2b: Hindrance demands are negatively related to satisfaction of the need for autonomy and the need for competence.*

The direct influence of need satisfaction on employees' strain level is obvious, because "something is a need only to the extent that its satisfaction promotes psychological health and its thwarting undermines psychological health" (Gagné & Deci, 2005, p.337). In other words, a person's well-being can be considered to directly result from need satisfaction (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Satisfaction of the basic needs for autonomy and competence boosts employees' well-being and performance (Baard, Deci, & Ryan, 2004; Desrumaux et al., 2015; Gagné & Deci, 2005; Leroy, Anseel, Gardner & Sels, 2015; Reis et al., 2000), whereas dissatisfaction of the basic needs results in ill-being, strain and malfunctioning (Fernet, Austin, Trépanier, & Dussault, 2013; Deci & Ryan, 2000). Therefore, we hypothesize that:

> *Hypothesis 3a: Satisfaction of the need for autonomy and the need for competence relates negatively to strain.*
>
> *Hypothesis 3b: Satisfaction of the need for autonomy and the need for competence relates positively to performance.*

The mediating role of basic need satisfaction

One core proposition of SDT is that the work situation influences employees' psychological functioning through satisfaction of the basic psychological needs (Gagné & Deci, 2005), suggesting that basic need satisfaction mediates the job characteristics-job outcomes relationship (Crawford et al., 2004; Van den Broeck et al., 2010). Through stimulating growth and responsibility within employees, job resources and challenge demands promote the satisfaction of the basic needs, which is a necessary requirement for the employees to thrive, feel well and perform good. Moreover, resources activate each other, suggesting that when employees are confronted with a resourceful and challenging work environment, their personal resources get activated which in turn will lead to higher performance levels and well-being (Hobfoll, 2002). Hindrance demands, in turn, exert their influence on employees' well-being and functioning through the energy-depleting process (Bakker & Demerouti, 2014). Although hindrance demands do not evoke a motivational process, they may influence employees' strain and performance through dissatisfaction of the needs for autonomy and competence. For example, Van den Broeck et al. (2008) showed that need satisfaction partly mediated the relationship between job demands and exhaustion— without making a distinction between challenge and hindrance demands—, while Trépanier, Fernet and Austin (2013) recently discovered that being a victim of bullying at work—which can be considered an extreme hindrance demand—influences employees' burnout through the need for autonomy.

Although a few recent empirical findings have supported the mediating role of basic need satisfaction in the job characteristics-job outcomes relationship (Gillet et al., 2012, Van den Broeck et al., 2008) an important shortcoming is that most of these studies focused on overall need satisfaction. Recent meta-analytic findings (Van den Broeck et al., 2016) demonstrate that it is inappropriate to average the basic needs, as they are not that strongly correlated, predict incremental validity in a variety of outcomes, and have different

nomological networks in terms of their antecedents differ. Instead, scholars are urged to examine the effect of each need separately. Fernet and colleagues (2013) and Desrumaux and colleagues (2015) addressed this call and demonstrated that the different needs might have unique mediating effects, a finding that also holds when linking satisfaction of the needs to motivational and behavioral outcomes (e.g., Boezeman & Ellemers, 2009; Haivas, Pepermans & Hofmans, 2014). As a whole, these early findings strengthen the belief that interesting between-need differences can be overlooked when aggregating the satisfaction levels of the different needs. Therefore, we opted to examine the effects of satisfaction with the different needs separately:

> *Hypothesis 4a: Satisfaction of the need for competence and need for autonomy mediates the relationships between job resources and strain, and between job resources and performance.*
>
> *Hypothesis 4b: Satisfaction of the need for competence and need for autonomy mediates the relationships between challenge demands and strain, and between challenge demands and performance.*
>
> *Hypothesis 4c: Satisfaction of the need for competence and need for autonomy mediates the relationships between hindrance demands and (1) strain and (2) performance.*

Diary Approach

The present study aims to clarify the role of basic need satisfaction in the relationships between job resources, challenge and hindrance demands, and strain and performance, respectively. Although it is important to understand how job characteristics in general relate to employee behaviors and attitudes across employees (between-person level)— by analyzing cross-sectional data—, recent studies demonstrated that job characteristics, as well as

employee behaviors and reactions not only differ across individuals (between-person level) but also vary within employees over time (within-person level), and that the mechanisms linking job characteristics to outcomes at the between-person level do not always transfer to the within-person level (Fisher & To, 2012; Sonnentag & Ilies, 2011). Recent studies indeed showed that there is within-person fluctuation in each of our study variables over time: job demands and job resources (e.g., Bakker & Demerouti, 2014), basic need satisfaction (e.g., Hewett, Haun, Demerouti, Rodriguez Sanchez, Skakon & De Gieter, 2017; van Hooff & Geurts, 2015), performance (e.g., Debusscher, Hofmans, & De Fruyt, 2014), and strain or well-being (e.g., Reis et al., 2000).

To examine the hypothesized relationships, we opted for a daily diary design that allows us to study the within-person processes occurring between our research variables over time (Beal & Weiss, 2003). More specifically, in our study we repeatedly measured job characteristics, need satisfaction, performance, and strain over a period of two working weeks in a large sample of working people. The repeated nature of this design allows to study dynamic within-person relationships between the research variables (Bolger, Davis, & Rafaeli, 2003).

Method

Participants and Procedure

A daily questionnaire was emailed to 251 employees working for one of four participating public social-services organizations in Belgium (i.e., municipal offices, public center for social welfare, local job placement office). All participants delivered services to the local community for which they frequently accessed a computer. Two weeks before the start of the data collection, participants received an e-mail explaining the purpose and method of

the study. Participation was strictly voluntary and the anonymity of participants was guaranteed. The research design was deemed noninvasive and harmless by our university's ethical committee. At the end of each of 10 consecutive working days, participants received an e-mail inviting them to complete an on-line questionnaire before leaving the office. The timing for sending these daily e-mails was aligned with the (part-time or full-time) work schedules of the participants. As we focus on within-person fluctuations—requiring us to differentiate between-person differences (i.e., the average score across days) from within-person differences (i.e., the fluctuations around this average score)—, we only included participants who completed the questionnaire at least three times (out of 10 days). This resulted in a sample of 204 participants who together completed 1718 daily questionnaires. Moreover, only responses that were provided in a timely manner—that is, on the same day after work—were retained for further analyses in order to minimize recollection bias (Reis & Gable, 2000). This resulted in a final sample of 194 participants who filled out the questionnaire 971 times, indicating a rather low compliance (50%) with our instruction to complete the questionnaire at the end of the workday.

The majority of our participants were women (67%). The mean age of our respondents was 42 years (SD = 10), ranging between 21 and 64 years old. Most participants had a professional bachelor (54.2%), followed by secondary school (38.8%), and university (8%).

Measures

Participants were asked to complete the daily questionnaire ten times, which is more effortful than completing a traditional cross-sectional survey only once. Therefore, researchers recommend using abbreviated scales with few or even a single item (Ohly, Sonnentag, Niessen, & Zapf, 2010). In this study, competence and autonomy need satisfaction were measured with three items each and the level-specific reliability of these scales was

tested using the multilevel confirmatory factor analysis (CFA) approach described in Geldhof,

Preacher, and Zyphur (2014). A multilevel CFA model is similar to a traditional CFA model

but tests the factor model at the different levels of analysis. In our particular case, a multilevel

CFA yields a factor model at the within-person and a factor model at the between-person

level. Using the parameter estimates of this multilevel CFA model, one can calculate the

composite reliability (i.e., omega reliability) at the between- and the within-person level. As

we focus on within-person fluctuations in the present study, we are only concerned with

within-person omega reliability. For strain and performance, as well as for the specific job

resources, challenge and hindrance demands, we used single-item measures, so no reliability

index can be estimated.

   Job resources. We tested two job resources: *skill utilization* and *feedback*. Each of

them was measured with one item: 'I had to use all my skills to be able to perform my tasks

today' (skill utilization), and 'I received positive feedback about my work today' (feedback).

The items were scored on a 7-point scale ranging from 'totally disagree' (1) to 'totally agree'

(7). To test the quality of these one-item measures, we performed a day reconstruction study

on 113 individuals (448 observations) in which we measured skill utilization and feedback

using our one-item measure as well as with validated scales. For skill utilization we used 8

items adapted (adding the word 'today') from the Leiden Quality of Work scale of van der

Doef and Maes (1999). Feedback was measured using 3 items developed by Van den Broeck

and colleagues (2008). Next, we tested a CFA model in which all items loaded on one single

factor at the within-person level, while the between-person level was saturated (i.e., all item

correlations were allowed). To assess model fit, we compared this model to a baseline model

in which the items were uncorrelated at the within-person level (i.e., the worst possible

within-person model), and a saturated model at the between-person level (i.e., the best

possible between-person model). Because the only difference between the baseline model and

the one-factor model is in the within-person part, computing the fit indices relative to this baseline model ensures that the fit indices reflect fit and misfit in the within-person model only (Ryu, 2014; Debusscher, Hofmans, & De Fruyt, 2016a). Both for skill utilization (*CFI* = .863; *RMSEA* = .062; *SRMR* = .063) and feedback (*CFI* = .994; *RMSEA* = .068; *SRMR* = .021) the one-factor model provided a fair fit at the within-person level. Moreover, the items we used in our diary study loaded strongly on the skill utilization (λ = .63; *p* < .001) or feedback factor (λ = .65; *p* < .001).

  Job demands. We measured one challenge demand (Bakker & Demerouti, 2014; Crawford, LePine & Rich, 2010), being *workload* ('I had to work very hard today to get things done'). As for hindrance demands we included *emotional demands* ('My job was emotionally demanding today') and *physical demands* ('Today I had to perform physically demanding tasks'). All three items had to be scored on a 7-point scale ranging from 'totally disagree' (1) to 'totally agree' (7). As for the job demands, we tested the quality of these one-item measures with the day reconstruction data (113 individuals and 448 observations). Workload was measured with 3 items developed by Sanz-Vergel, Demerouti, Moreno-Jiménez and Mayo (2010) based on Karasek's Job Content Scale. Emotional demands was measured with 7 items from the VBBA scale of Van Veldhoven, De Jonge, Broersen, Kompier, and Meijman (2002). Physical demands were measured using the 3 items from the Leiden Quality of Work scale of van der Doef and Maes (1999). For all job demands, a one-factor model fitted the data well (workload: *CFI* = .980; *RMSEA* = .032; *SRMR* = .025; emotional demands: *CFI* = .995; *RMSEA* = .008; *SRMR* = .040; physical demands: *CFI* = 1.000; *RMSEA* = .000; *SRMR* = .021). Moreover, the items we used in our diary study loaded significantly on the workload (λ = .57; *p* < .001), emotional demands (λ = .48; *p* < .001) or physical demands factor (λ = .48; *p* < .001).

Basic need satisfaction. Satisfaction of the need for autonomy and competence were measured with 3 items each. The items were adapted from the Work-related Basic Need Satisfaction Scale of Van den Broeck and colleagues (2010) and reformulated in a way they refer to daily experiences (for a similar approach, see Hewett et al., 2017; van Hooff & Geurts, 2015). The items had to be answered on a 7-point scale ranging from "totally disagree" (1) to "totally agree" (7). The items for autonomy need satisfaction were: 'The tasks I had to do at work today are in line with what I really want to do', 'If I could choose, I would have done things differently at work today (R)', and 'While completing my tasks today, I often felt that I had to do what others told me to (R)'.The following items were used for competence need satisfaction: 'Today I felt competent in my job', 'I really master the tasks I had to do at work today', and 'I am good at the tasks that I had to do today'. Within-person Omega reliability coefficients—a reliability estimate taking into account the multilevel nature of our data (Geldhof, Preacher, & Zyphur, 2014)—were .57 for autonomy need satisfaction and .70 for competence need satisfaction.

Strain. One item was used to measure employees' daily strain level: "How much strain did you experience today?". Participants had to rate their strain level using a 7-point scale ranging from "very little" (1) to "very much" (7). To test the quality of this one-item measure, we collected additional daily diary data from 31 individuals (220 observations) in which we measured strain using our one-item measure as well as with the 4-item scale of Motowidlo, Packard, and Manning (1986; the items were slightly adapted for measurement at the daily level: e.g., 'Today I felt a great deal of stress because of my job'). A one-factor model in which all items loaded on one single factor fitted our data well at the within-level ($CFI =$ 1.000; $RMSEA = .000$; $SRMR = .012$). Moreover, the single-item measure loaded significantly on the strain factor ($\lambda = .78$; $p < .001$).

Performance. One item was used to measure self-reported task performance: "How did you perform today?" Participants had to rate their job performance using a 7-point scale ranging from "very poor performance" (1) to "very good performance" (7). Again, we tested the quality of our one-item measure by collecting additional daily diary data (220 observations from 31 individuals). In addition to the one-item measure, we measured performance using the 7-item scale of Williams and Anderson (1991; the items were slightly adapted for measurement at the daily level: e.g., 'Today I adequately completed my assigned duties'). A one-factor model in which all items loaded on a single performance factor fitted our data well at the within-person level (*CFI* = .915; *RMSEA* = .041; *SRMR* = .041). Moreover, the single-item measure loaded significantly on this factor (λ = .55; *p* < .001).

Analyses

Because our data have a multilevel structure, with measurements nested within individuals, the data were analyzed using multilevel path analysis (Preacher, Zyphur & Zhang, 2010) in Mplus version 7.31. Multilevel path analysis was preferred over multilevel regression analysis because of two reasons. First, because in multilevel path analysis all variables are modeled simultaneously, it allows accounting for correlations among the mediators (i.e., competence and autonomy need satisfaction) and among the outcomes (i.e., performance and strain), which is not possible in multilevel regression analysis. Second, multilevel path analysis (and more generally, multilevel SEM analysis) allows to separate the within- from the between-component of the model, and therefore it allows for a straightforward test of our model at the within-person level (Preacher, Zyphur, & Zhang, 2010). In the multilevel path model, we specified random intercepts and fixed slopes because random slopes add "unnecessary complications and may reduce the probability of convergence" (Preacher et al., 2010; p. 217).

When working within the multilevel path analysis framework, indirect–or mediation–effects are typically tested using the product-of-coefficients approach, meaning that the indirect effect (i.e., the indirect effects via satisfaction of the need for competence and the need for autonomy) is calculated by multiplying the coefficients of its constituent paths (see Preacher, Zyphur & Zhang, 2010). Total effects (e.g., the effect of job demands on strain/performance), in turn, are calculated by summing the direct (i.e., the direct effect of job demands on strain/performance) and indirect effects. Because the indirect effects are typically non-normally distributed, they have to be tested for significance using a distribution-free method (Preacher & Hayes, 2008). Because Bayesian analysis can flexibly accommodate non-normal distributions, we opted for a Bayesian approach (Kruschke, Aguinis, & Joo, 2012; Muthen, 2010; Zyphur & Oswald, 2014), As opposed to the more traditional—frequentist—approach, Bayesian analysis does not yield p-values or confidence intervals. Instead, for all model parameters, it produces a probability distribution of the parameter given the data (Kruschke et al., 2012; Zyphur & Oswald, 2014). Based on these posterior distributions, credibility intervals (CRI's) that include a predefined percentage of the posterior distribution (e.g., 95%) can be constructed, and these credibility intervals help deciding whether the parameter values are important or not (Kruschke et al., 2012).

In our multilevel path model, the individual job demands (i.e., workload, emotional demands, and physical demands) and resources (i.e., positive feedback, and skill utilization) predicted competence and autonomy need satisfaction (i.e., the paths between the predictors and the mediators), and strain and performance (i.e., the direct effects or the paths between predictors and outcomes). Moreover, competence and autonomy need satisfaction predicted strain and performance (i.e., the paths between the mediators and the outcomes). To account for serial dependency in the repeated measurements data (i.e., the influence of previous on current states), we included paths from lagged competence need satisfaction to concurrent

competence need satisfaction, from lagged autonomy need satisfaction to concurrent

autonomy need satisfaction, from lagged strain to concurrent strain, and from lagged

performance to concurrent performance at the within-person level (see Fisher & To, 2012).

The inclusion of these lagged predictors (which were group-mean centered) allowed

examining the dynamic nature of the hypothesized relationships; that is, it tests whether the

predictors and mediators predict *change* in the mediators and outcomes. Note that inclusion of

these lagged autoregressive effects further reduced the effective sample size to 565

observations at the within-person level. Finally, in our path model, the mediators (i.e.,

competence and autonomy need satisfaction) and outcomes (i.e., strain and performance)

were allowed to correlate.

Finally, temporal precedence of the hypothesized relationships was tested with a series

of cross-lagged path models in which we simultaneously tested the hypothesized relationships

as well as the reversed one. Because lagged effects can only be tested at the within-person

level, we saturated the between-person model in each of the cross-lagged path models (i.e.,

we modeled all possible correlations between the variables at the between-person level).

Results

Table 1 shows the means, intraclass correlation coefficients (ICC), the within- and

between-person standard deviations, and the within- and between-person correlations between

all study variables. All ICCs ranged between .46 and .60, indicating a considerable amount of

within-person variability (between 40 and 54% of the total variance) in these variables

(Marcoulides & Schumacker, 2009).

[Insert Table 1 about here]

Regarding the relationships between job demands and resources and strain (hypothesis

1a) and performance (hypothesis 1b), we found that strain was positively predicted by

emotional demands (γ = .21; 95% CRI = [.12, .30]), physical demands (γ = .13; 95% CRI = [.02, .25]), workload (γ = .21; 95% CRI = [.13, .29]) and skill utilization (γ = .11; 95% CRI = [.02, .20]) whereas it was negatively predicted by positive feedback (γ = -.09; 95% CRI = [-.17, -.01]). For performance, we found a positive relationship with workload (γ = .12; 95% CRI = [.06, .18]) and skill utilization (γ = .08; 95% CRI = [.01, .14]), while no relationship was found with positive feedback, physical demands, and emotional demands. Overall, these results provided partial support for hypotheses 1a and 1b.

[Insert Figure 1 about here]

Regarding the relationship between job demands and resources and satisfaction of the needs for competence and autonomy, we found that only physical demands (γ = -.12; 95% CRI = [-.19, -.04]) related to satisfaction of the need for competence, thereby providing partial support for Hypothesis 2a. Autonomy need satisfaction, in turn, was positively predicted by positive feedback (γ = .09; 95% CRI = [.03, .15]), while it was negatively predicted by emotional demands (γ = -.10; 95% CRI = [-.17, -.03]), physical demands (γ = -.17; 95% CRI = [-.26, -.09])), and workload (γ = -.11; 95% CRI = [-.17, -.05]). As a result, hypothesis 2b was largely supported.

Also Hypothesis 3a was partially supported, as changes in strain were negatively predicted by satisfaction of the need for autonomy (γ = -.22; 95% CRI = [-.36, -.08]), but not by satisfaction of the need for competence (γ = .01; 95% CRI = [-.15, .17]). Changes in performance, in turn, related positively to satisfaction of both the need for competence (γ = .39; 95% CRI = [.28, .50]) and autonomy (γ = .16; 95% CRI = [.07, .26]), providing full support for hypothesis 3b.

[Insert Table 2 about here]

The indirect (mediation) effects and their associated 95% credibility intervals are shown in Table 2. In line with hypothesis 4a, satisfaction of the need for autonomy mediated

the relationship between job resources and both strain and performance (except for skill utilization). Competence need satisfaction, in turn, failed to do so, providing partial support for hypothesis 4a. Likewise, autonomy need satisfaction also mediated the relationship between workload and both strain and performance whereas competence need satisfaction did not, providing partial support for hypothesis 4b. Finally, whereas autonomy need satisfaction mediated the relationship between all hindrance demands and strain and performance, competence need satisfaction only mediated the relationship between physical demands and performance.

Testing temporal precedence

In a first model, strain and performance at time *t* were predicted from the individual resources and demands at time *t-1*. Moreover, we also predicted the individual resources and demands at time *t* from strain and performance at time *t-1*. Finally, we included all autoregressive effects. We found that performance at time *t-1* related to physical demands at time t ($\gamma = -.12$; 95% CRI = [-.24, -.02]). The other cross-lagged effects were not substantial.

In the second model, we predicted competence and autonomy need satisfaction at time *t* from the different resources and demands at time *t-1,* while also predicting the different resources and demands at time *t* from competence and autonomy need satisfaction at time *t-1*. Again, the autoregressive effects were also included in the model. This test showed emotional demands at time *t-1* ($\gamma = -.09$; 95% CRI = [-.15, -.02]) were related to autonomy need satisfaction at time *t*. At the same time, we also found a reversed effect from autonomy need satisfaction at time *t-1* to physical demands ($\gamma = -.12$; 95% CRI = [-.23, -.01]).

Discussion

Our study adds to the existing knowledge on strain and performance by demonstrating a mechanism through which job characteristics link to strain and performance. Our results suggest that, on days when people experience more job resources and challenge demands, and less hindrance demands than usual, their needs for competence and autonomy are more satisfied, which make them experience less strain and perform better than usual. Moreover, satisfaction of the need for autonomy played a more central role than satisfaction of the need for competence.

When looking at strain, we found that only satisfaction of the need for autonomy mediated the job characteristics-strain relationship. This is not surprising given the fact that having autonomy or control plays a prominent role in most classic stress and job design theories—including Hackman and Oldham's (1976) Job Characteristics Model—whereas feeling competent does not play a role, or to a lesser extent. Moreover, the more central role of the need for autonomy is in line with results from Trépanier and colleagues' (2013) cross-sectional study, showing that satisfaction of the need for autonomy mediated the relationship between bullying—an extreme hindrance demand—and stress, whereas satisfaction of the need for competence did not. Turning to the individual job characteristics, we found tentative support for our reasoning that job resources (i.e., positive feedback) have a positive, whereas hindrance demands (i.e., emotional and physical demands) have a negative impact on strain through the (dis)satisfaction of employee's need for autonomy, respectively. As for our challenge demand, we found workload to directly and indirectly (through low autonomy need satisfaction) increase employees' strain level. Similarly, being required to use all their skills—which is generally considered a job resource (Schaufeli & Taris, 2014)—also increased our participants' daily strain level.

Regarding performance, our findings showed that satisfaction of both the need for autonomy and the need for competence mediated the relationships between job resources,

hindrance demands, and performance. Although competence need satisfaction turned out to be relevant for explaining the job characteristics-performance relationship, autonomy need satisfaction again played a more central role, mediating all job characteristics-performance relationships. Instead, competence need satisfaction only mediated the effect of physical demands on performance. This implies that people who—on average—are exposed to fewer physical demands generally experience more satisfaction of their need for competence, and are better able to perform at the daily level. This finding aligns with the positive relationship between self-esteem and generalized self-efficacy and performance (Debusscher, Hofmans, & De Fruyt, 2016b), and with the few SDT studies that have already illustrated the direct link between the need for competence and performance (Baard, Deci, & Ryan, 2004). Finally, although need satisfaction did not mediate the relationship between workload and performance, workload had a direct motivating effect on employees' performance.

In summary, our findings revealed that within-person variation in job characteristics relates to within-person fluctuations in strain and performance through triggering within-person variation in need satisfaction. Moreover, although both competence and autonomy need satisfaction play a role, the bulk of the effect is due to satisfaction of the need for autonomy. As such, our findings strongly support the pertinence of a recent call to study the impact of satisfaction of the various needs separately (e.g., Fernet et al., 2012; Trépanier, Fernet & Austin, 2013).

Limitations and Future Directions

The results of our study must be viewed in light of several limitations, but also provide interesting avenues for future research. A first issue is that the proposed mediation model implies a particular directionality of the relationships (i.e., with demands and resources affecting need satisfaction, which in turn impacts strain and performance). To test whether

this directionality was supported by our data, we tested a series of cross-lagged path models. Overall, the results of these models did not indicate clear directionality, with limited support for both the hypothesized and the reversed directionality. Instead, these results tend to suggest that job resources, challenge and hindrance demands, need satisfaction, strain and performance are dynamically related to each other and continuously influence each other throughout time.

Second, we used single-item measures for strain and performance. Whereas single-item scales are not often used in traditional, between-person designs, they have a considerable history in diary research because it has been shown that they perform as well as multi-item scales for concrete constructs (Fisher & To, 2012). Moreover, as the latter authors argue "If the single item has face and content validity and correlates with other variables as it should, ..., it probably should be considered acceptable" (p. 871). We believe that the use of single-item scales in our diary study is appropriate given that these requirements were met. Moreover, our single-item measures of strain and performance showed medium to high correlations with validated scales for strain and performance, and the correlations with other research variables were in line with what could theoretically be expected.

A third limitation concerns the marginal within-person omega reliability coefficient (.57) of the autonomy need satisfaction scale. Because reliability restricts validity, the low within-person reliability has probably suppressed some of the relationships with autonomy need satisfaction, rather than inflated them. Therefore, we believe that the role of autonomy need satisfaction is probably underestimated in our study.

Another limitation of our study is the self-reported nature of our data. This probably does not pose a problem for our predictor (i.e., job demands, job resources) and mediator variables (i.e., competence need satisfaction, autonomy need satisfaction). As for our outcome variables, even if participants might systematically overestimate their daily strain or

performance level this is less of a problem for within-person analyses than for between-person analyses. The reason is that participants are compared to themselves and not to other participants (i.e., within-person fluctuations are deviations with respect to the person's own average across the measurement moments). As a result, by focusing on within-person fluctuations, all between-person differences in self-serving biases are removed from the data, thereby eliminating many of the self-report concerns (Beal, 2012). Yet, future research may want to combine self-rated strain and performance with objective or observer-rated measures. At the same time, we are aware of the challenges this might pose, as observers may not always be physically around to observe and able to estimate daily strain and performance levels.

Finally, we made some theoretical choices that deserve explanation. First, we focused on the mediating role of basic need satisfaction. Nevertheless, empirical studies have demonstrated that personal resources can be integrated in the JD-R model in various ways (Schaufeli & Taris, 2014; Xanthopoulou et al., 2007). Personal resources might also play a moderating role—for example by buffering the effect of hindrance demands on performance and strain— or even act as antecedents of an employee's perception of daily job demands and job resources. Although it made sense to test their mediating role in the present study, future studies should simultaneously explore these various roles more in depth. Second, when testing our hypotheses, we did not look into possible interactions between job resources and demands. However, according to JD-R theory job resources and job demands may interact in in two ways (Bakker & Demerouti, 2014, in press). First, job resources may buffer the negative relationship between job demands and employee well-being and performance. Second, job resources are more salient and are used as a coping mechanism when employees need to deal with a highly demanding work situation. Third, we did not include the need for relatedness in our study, although recent findings have shown that this need may have an effect on

employees' burnout level and performance (Baard, Deci & Ryan, 2004; Trépanier et al., 2013), and mediate the relationships between job demands, job resources, and burnout (Trépanier et al., 2013).When examining the satisfaction of this need in future studies, it would be particularly interesting to include social support as one type of job resource and examine its influence on strain and performance through satisfaction of the need for relatedness. Finally, we focused exclusively on the role of need satisfaction in the relationship between job characteristics, strain and performance. Yet, recent studies acknowledged the important role of need thwarting—that is, "the personal experience of having one's psychological needs undermined as a result of social contextual influences" (Costa, Ntoumanis, & Bartholomew, 2015, p. 12)—in predicting diminished functioning and ill-being (such as strain). Exploring the (daily) effect of need satisfaction as well as need thwarting on work outcomes within the same study would definitely advance our current understanding of both constructs[i].

Practical Implications and Conclusion

Our study highlights the role of need satisfaction in everyday working life. It is obvious that organizations try to create work contexts in which employees can feel free of strain and perform well. Therefore, it is very important to design jobs that provide employees with the opportunity to satisfy their basic needs for competence and autonomy. Organizations can strive for optimal combinations of job resources, challenge and hindrance demands to stimulate basic need satisfaction (Fernet et al., 2013; Ryan & Deci, 2000; Van den Broeck et al., 2010). Moreover, they can also foster their supervisors' knowledge on how to help employees with satisfying their needs. Training and stimulating supervisors to adapt a more autonomy-supportive leadership style (Baard et al., 2004; Gillet et al., 2012), and to reduce the control they exert over their employees (Gillet et al., 2012) will result in higher

satisfaction levels of the needs for competence and autonomy. Similarly, employees' need satisfaction will significantly benefit from experiencing organizational support (Gillet et al., 2012).

This study shows that basic need satisfaction plays a mediating role in the underlying psychological mechanisms that associate job resources and job demands with employee strain and performance. As such, our study adds to the emerging body of research on the role of basic need satisfaction in the relationship between personal (e.g., Vansteenkiste et al., 2007), job (e.g., Fernet et al., 2013; Van den Broeck et al., 2008), supervisor (e.g., Baard, Deci & Ryan, 2004; Gillet et al., 2012) and organizational (e.g., Gillet et al., 2012) characteristics on one hand, and employee well-being and performance on the other hand.

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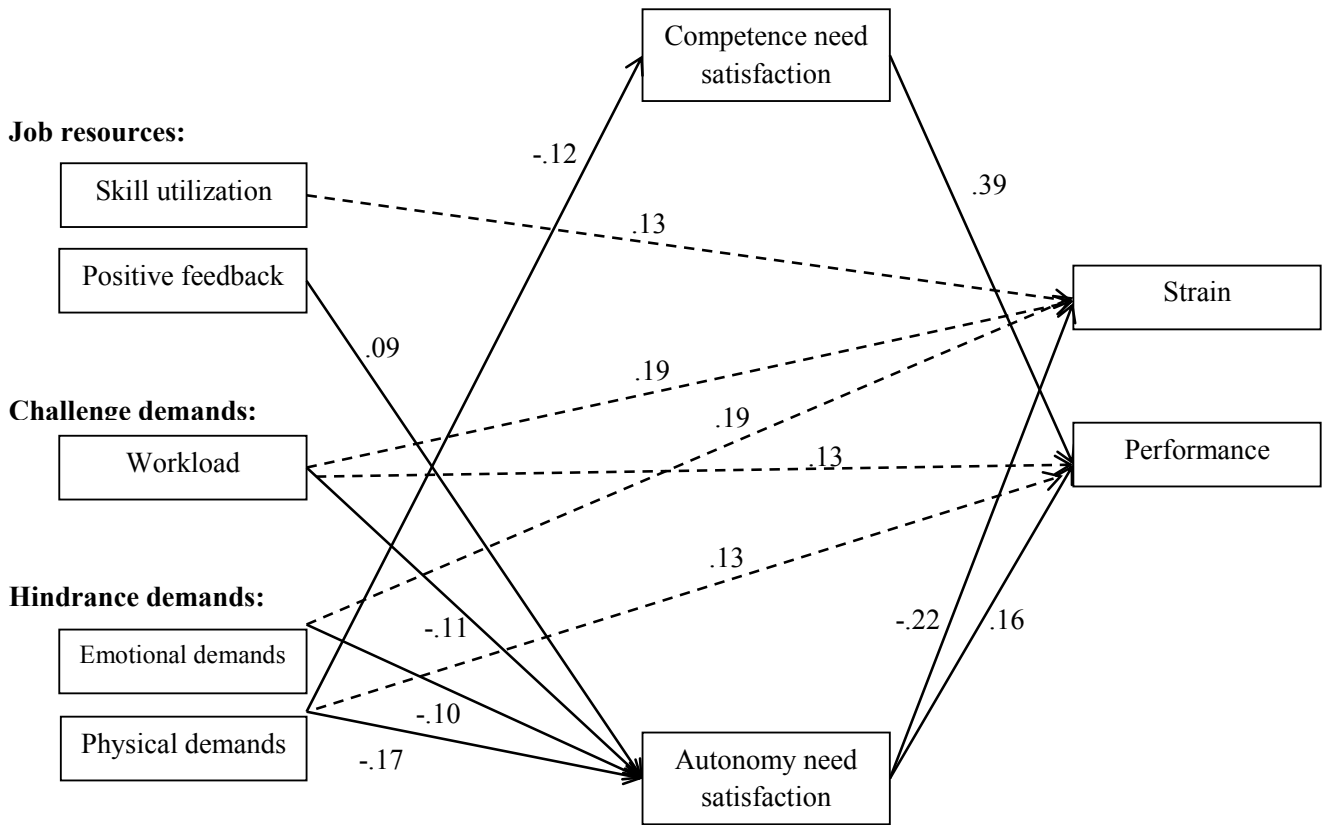   *Management*, 14, 121–141. DOI:10.1037/1072-5245.14.2.1

Figure 1. Within-person path coefficients.

Table 1. Means, standard deviations, intraclass coefficients, and correlations for all study variables.

N = 194	$M_{between}$	$SD_{between}$	SD_{within}	ICC	1	2	3	4	5	6	7	8	9
Job resources:													
1. Skill utilization	4.35	1.13	.92	.60	-	.22	.50	.14	.09	.24	.33	.12	.43
2. Positive feedback	3.78	1.10	1.02	.54	.05	-	.13	-.19	-.05	.12	.33	-.18	.18
Challenge demands:													
3. Workload	4.42	1.02	1.07	.48	.22	.06	-	.38	.29	.16	.00	.54	.32
Hindrance demands:													
4. Emotional demands	2.85	.92	1.00	.46	.11	.02	.19	-	.49	-.35	-.38	.65	-.21
5. Physical demands	2.45	1.03	.84	.60	.14	.01	.14	.28	-	-.15	-.34	.36	-.03
6. Competence need satisfaction	5.78	.63	.53	.58	.06	.10	.04	-.15	-.15	-	.46	-.29	.66
7. Autonomy need satisfaction	4.32	.76	.71	.59	.02	.16	-.12	-.25	-.21	.31	-	-.41	.37
8. Strain	3.32	1.10	.97	.56	.22	-.08	.33	.40	.21	-.10	-.29	-	-.10
9. Performance	5.28	.59	.63	.47	.18	.14	.25	.02	.10	.33	.13	.07	-

Note. Within-person correlations are shown below and between-person correlations are shown above the diagonal. Number of observations = 971.

Table 2. Unstandardized within-person path coefficients (γ's). Credibility intervals that do not contain 0 are in bold.

N = 565	γ	95% CI
Skill utilization → Competence → Strain	.00	[-.01, .01]
Positive feedback → Competence → Strain	.00	[-.01, .01]
Workload → Competence → Strain	.00	[-.01, .01]
Emotional demands → Competence → Strain	.00	[-.01, .01]
Physical demands → Competence → Strain	-.00	[-.02, .01]
Skill utilization → Autonomy → Strain	-.01	[-.04, .01]
Positive feedback → Autonomy → Strain	**-.02**	**[-.04, -.00]**
Workload → Autonomy → Strain	**.02**	**[.01, .05]**
Emotional demands → Autonomy → Strain	**.02**	**[.01, .05]**
Physical demands → Autonomy → Strain	**.04**	**[.01, .07]**
Skill utilization → Competence → Performance	.02	[-.01, .04]
Positive feedback → Competence → Performance	.01	[-.01, .03]
Workload → Competence → Performance	.01	[-.01, .03]
Emotional demands → Competence → Performance	-.02	[-.04, .01]
Physical demands → Competence → Performance	**-.04**	**[-.08, -.02]**
Skill utilization → Autonomy → Performance	.01	[.00, .03]
Positive feedback → Autonomy → Performance	**.01**	**[.00, .03]**
Workload → Autonomy → Performance	**-.02**	**[-.04, -.01]**
Emotional demands → Autonomy → Performance	**-.02**	**[-.03, -.00]**
Physical demands → Autonomy → Performance	**-.03**	**[-.05, -.01]**

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[i] We thank an anonymous reviewer for this suggestion.

Table

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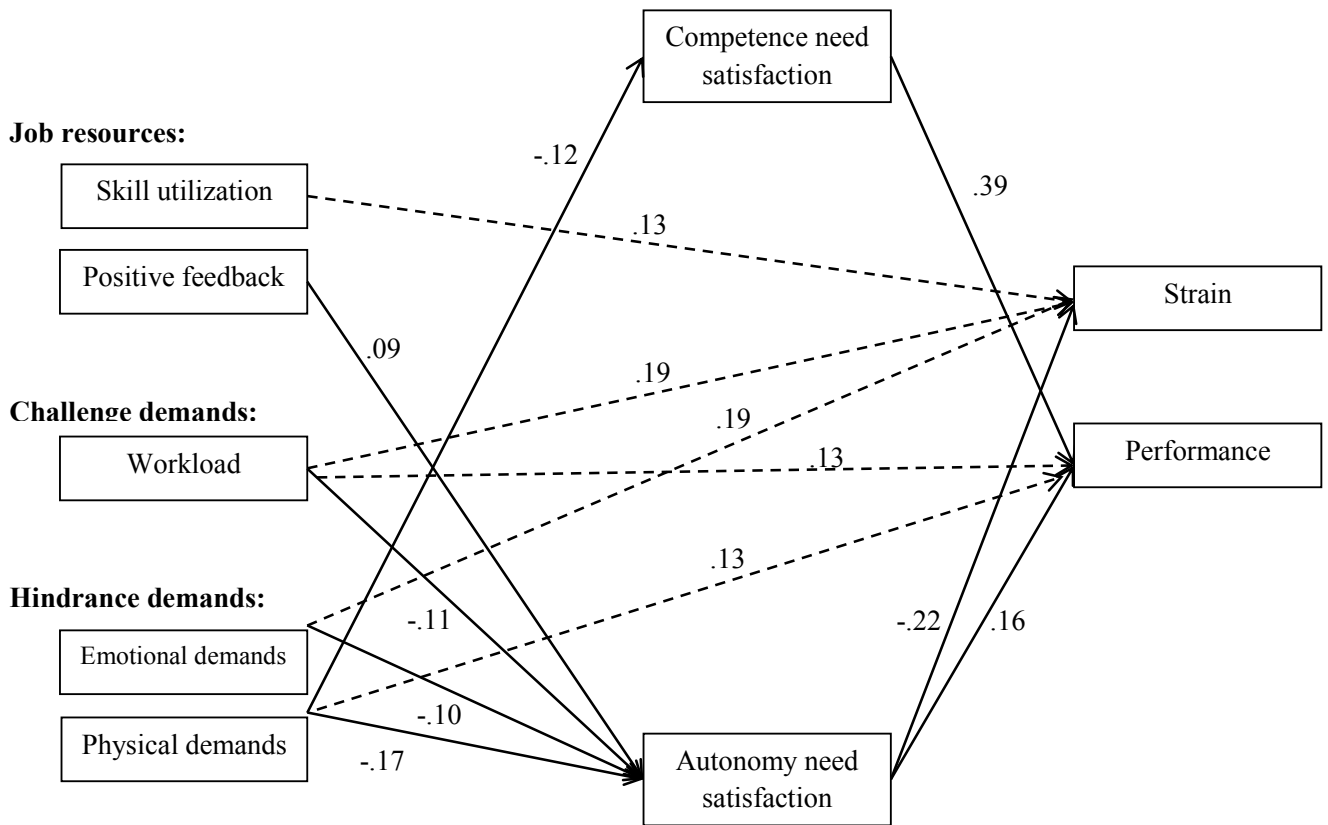| $N = 565$	γ	95% CI
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Workload → Competence → Strain	.00	[-.01, .01]
Emotional demands → Competence → Strain	.00	[-.01, .01]
Physical demands → Competence → Strain	-.00	[-.02, .01]
Skill utilization → Autonomy → Strain	-.01	[-.04, .01]
Positive feedback → Autonomy → Strain	**-.02**	**[-.04, -.00]**
Workload → Autonomy → Strain	**.02**	**[.01, .05]**
Emotional demands → Autonomy → Strain	**.02**	**[.01, .05]**
Physical demands → Autonomy → Strain	**.04**	**[.01, .07]**
Skill utilization → Competence → Performance	.02	[-.01, .04]
Positive feedback → Competence → Performance	.01	[-.01, .03]
Workload → Competence → Performance	.01	[-.01, .03]
Emotional demands → Competence → Performance	-.02	[-.04, .01]
Physical demands → Competence → Performance	**-.04**	**[-.08, -.02]**
Skill utilization → Autonomy → Performance	.01	[.00, .03]
Positive feedback → Autonomy → Performance	**.01**	**[.00, .03]**
Workload → Autonomy → Performance	**-.02**	**[-.04, -.01]**
Emotional demands → Autonomy → Performance	**-.02**	**[-.03, -.00]**
Physical demands → Autonomy → Performance	**-.03**	**[-.05, -.01]**

Figure

Figure 1. Within-person path coefficients.