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Publisher: Routledge

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European Journal of Work and Organizational Psychology

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/pewo20>

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Published online: 11 May 2015.



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To cite this article: Irene M.W. Niks, Josette M.P. Gevers, Jan De Jonge & Irene L.D. Houtman (2015): The relation between off-job recovery and job resources: person-level differences and day-level dynamics, *European Journal of Work and Organizational Psychology*, DOI: [10.1080/1359432X.2015.1042459](https://doi.org/10.1080/1359432X.2015.1042459)

To link to this article: <http://dx.doi.org/10.1080/1359432X.2015.1042459>

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The relation between off-job recovery and job resources: person-level differences and day-level dynamics

Irene M.W. Niks^{a*}, Josette M.P. Gevers^a, Jan De Jonge^{a,b} and Irene L.D. Houtman^c

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(Received 14 July 2014; accepted 14 April 2015)

It is well-known that recovery from work and job resources can counteract negative effects of high job demands, but less is known about how off-job recovery and job resources are related to each other. In this two-level daily diary study, 67 employees filled out daily surveys over the course of 8 days to examine this issue. Consistent with our expectations, multilevel analyses revealed that previous day's detachment from work is positively related to the state of being recovered before going to work, and that the state of being recovered is positively related to one's level of job resources. Moreover, the results indicated that both person-level differences and day-level dynamics play a role in these relations. Our study highlights the importance of recovering from work in the sense that it does not only help individuals by repairing negative strain effects but can also function as a catalyst in the activation of job resources.

Keywords: off-job recovery; job resources; detachment from work; self-regulation; daily diary study

Recent societal developments, such as an ageing population and decreasing financial resources, are placing increasingly high demands on health-care staff, a group that is already at high risk for work-related stress (Shimizu, Mizoue, Kubota, Mishima, & Nagata, 2003). Highly demanding work situations, characterized by, for instance, time pressure and a heavy workload, can negatively affect employees' health and well-being (cf. Crawford, LePine, & Rich, 2010; Demerouti, Le Blanc, Bakker, Schaufeli, & Hox, 2009). Moreover, in health-care settings, stressful working conditions can threaten the quality of patient care and patient safety (Berland, Natvig, & Gundersen, 2008; Laschinger & Leiter, 2006). Nevertheless, a growing body of research has shown that there are at least two important aspects that can counteract potential negative consequences of high demands within the workplace: job resources and recovery from work (e.g., Bakker & Demerouti, 2013; De Jonge, Spoor, Sonnentag, Dormann, & Van Den Tooren, 2012). Job resources are work-related assets (i.e., opportunities, data, people, tools) that can be employed to deal with job demands (De Jonge, Demerouti, & Dormann, 2014; Van Den Tooren, 2010), such as job autonomy or co-worker support. For instance, health-care workers might be able to deal better with aggressive patients if they can count on support from one another. Recovery from work, on the other hand, refers to the process where bodily

systems that were activated on the job unwind and return to their baseline levels (Geurts & Sonnentag, 2006). More specifically, by recovering from work during off-job hours, job-related strain that accumulated during work can return to pre-stressor levels before the start of the next working period (Demerouti, Bakker, Geurts, & Taris, 2009). For example, after a hard day's work, one might recover from work by engaging in leisure activities that take one's mind of the demanding day.

Although the beneficial effects of recovery from work and job resources are evident, less is known about the relation *between* the two. Recently, it has been proposed that the joint beneficial effect of recovery from work and job resources is larger (i.e., synergetic effect) than the sum of their separate effects (De Jonge et al., 2012). However, it remains unclear what exactly happens in the presumed synergy between off-job recovery and job resources. Are both job-stress buffers indeed positively related, and if so, in what way? For instance, does recovery enhance the mobilization of job resources? And if there is a positive relation between recovery and job resources, can it be attributed to individual differences or to changing (daily) circumstances? To gain insight into the relation between off-job recovery and job resources, it is therefore important to consider both between-person differences (e.g., are highly recovered people more likely to mobilize job resources?) *and* within-person differences (e.g., are

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persons more likely to mobilize job resources on days that they feel highly recovered?) (cf. Fleeson, 2004; Sheldon, Ryan, & Reis, 1996).

In this study, we aim to provide insight into the way off-job recovery and job resources are related by shedding light on the presumed synergy between both aspects. More specifically, we investigate the *daily* process of recovering from work during non-work time, in relation to levels of job resources that individuals report, grounding the suggested relations on existing theoretical principles and recent empirical findings. By conducting a daily diary study, we are able to investigate both between-person differences and within-person daily dynamics between off-job recovery and job resources. Integrating these two approaches addresses the need for testing comprehensive models of the joint psychological effect of both situational variables and individual differences on organizational outcomes (D'Amato & Zijlstra, 2008). It allows us to learn more about longer-term impact of individual tendencies, as well as short-term (daily) processes (e.g., Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009a), thereby acknowledging the fact that a typical individual's behaviour is usually highly variable (Fleeson, 2004). As such, the contribution of this study to the literature is twofold. First, we add to the literature about combating job stress by providing insight into differences in the daily process of recovering from work and the activation of job resources due to underlying individual tendencies. Second, literature on predictors of job resources is still very scarce and limited to either cross-sectional designs or to longitudinal designs with relatively long time spans (Hakanen, Perhoniemi, & Toppinen-Tanner, 2008; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009b). In the current study, we shed light on the ways different job-stress buffers (i.e., recovery and job resources) are related on a daily basis by investigating whether daily fluctuations in the amount of job resources can be predicted by one's state of being recovered. This might provide clues about how to optimize levels of job resources in day-to-day work life, which can be relevant with regard to reducing (daily) job strain.

Theoretical reflections

A theoretical model that incorporates both job resources and off-job recovery, hence providing an excellent starting point to explain and investigate the relation between both aspects, is the so-called Demand-Induced Strain Compensation Recovery (DISC-R) Model (De Jonge & Dormann, 2003, 2006; De Jonge et al., 2012). The DISC-R Model is a theoretical job-strain model that proposes that states of psychological imbalance, induced by stressors at work (i.e., high demands), activate self-regulatory processes (cf. Pomaki & Maes, 2002). More specifically, individuals will generally strive to combat stress by

balancing high job demands with the activation of internal (personal) or external (job) resources. Internal resources refer to an individual's sense of their ability to control and impact upon their environment successfully (Hobfoll, Johnson, Ennis, & Jackson, 2003), such as energy or self-regulatory resources. External resources are resources provided by the environment (e.g., organizational and social), which are conceptualized as job resources within a work context (cf. Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). Examples of such external resources are job autonomy and emotional support from colleagues. When coping with job stressors, internal and external resources can be of equivalent use (cf. Hobfoll, 2002). For instance, when a nurse needs to deal with a stressful situation (e.g., an aggressive patient), resilience is likely to be quite helpful (cf. Van Erp, Rispen, Gevers, & Demerouti, 2014), but when the individual lacks this internal resource, emotional support from a co-worker may be helpful to the same extent.

An important condition for the effective functioning of self-regulatory processes, as proposed by the DISC-R Model, is that resources that have been used need to be restored. According to the conservation of resources (COR) theory (Hobfoll, 1998, 2001, 2011), the threat of losing resources, the actual loss of resources, or the failure to gain resources after considerable resource investment can lead to psychological stress reactions. A way to prevent these stress reactions is through resource investment, that is, "people must invest resources in order to protect against resource loss, recover from losses, and gain resources" (Hobfoll, 2001, p. 349). According to Gorgievski and Hobfoll (2008), energy resources are typically the ones people invest and even deplete, with the expectation based on prior experience that they will get replenished without much effort. However, the inability to replenish these energy resources may lead to long-term fatigue, which hampers normal functioning in many aspects in daily life, including work. In other words, restoration of consumed resources seems vital.

A general assumption is that depleted resources can be restored and additional resources (such as increased energy) can be gained by removing job-related demands during off-job time (Fritz & Sonnentag, 2005; Hobfoll, 1989, 2001; Meijman & Mulder, 1998). More specifically, the effort-recovery theory (Meijman & Mulder, 1998) points out that expending effort at work is inherently related to so-called load reactions in the individual (e.g., higher blood pressure, fatigue). Load reactions can accumulate and lead to impaired health and well-being, unless individuals can recover during respite from work. By no longer being exposed to work demands, load reactions can return to pre-stressor levels, and recovery can occur before the next working period starts. Therefore, the DISC-R Model incorporates the recovery concept of detachment from work as an additional way to buffer negative effects

from job demands, alongside job resources (De Jonge et al., 2014, 2012). Detachment from work during off-work time refers to an “individual’s sense of being away from the work situation” (Etzion, Eden, & Lapidot, 1998, p. 579), encompassing cognitive, emotional, and physical absence from work. It is viewed as a psychological experience that is known to facilitate (daily) recovery (Demerouti, Bakker, et al., 2009; Fritz, Sonnentag, Spector, & McInroe, 2010). In other words, whereas recovery from work refers to the entire process of internal resource replenishment, detachment from work can be seen as an important strategy to enhance the process of recovery (cf. Sonnentag & Geurts, 2009). By detaching from work, bodily systems that have been activated during work can return to baseline levels (cf. Geurts & Sonnentag, 2006; Sonnentag & Niessen, 2008). Put differently, detaching from work facilitates the down-regulation of load reactions, so internal resources can be rebuilt. For example, engaging in off-job activities that appeal to other systems than the ones used during work, or by not engaging at all in effort-related activities, can help to replenish one’s energy resources (cf. Geurts & Sonnentag, 2006).

Although the importance of the availability and restoration (i.e., recovery) of internal and external resources is evident, the link *between* recovery and external (job) resources remains empirically implicit. The question remains how the investment and restoration of internal and external resources takes place in the work context and what the role of detachment from work is in this process. In the next section, we will formulate specific hypotheses about the link between off-job recovery and job resources, based on the DISC-R Model, COR principles, and recent empirical findings in this field of research.

Recovery and the cumulative gain process of internal and external resources

According to Hobfoll (2001), losing and gaining resources have a cumulative nature—those who have fewer resources to begin with are more prone to resource loss and less capable of resource gain because they have a smaller pool of resources that can be used for resource investment. Contrarily, those with more resources are more likely to gain more. Indeed, the longitudinal study of Xanthopoulou et al. (2009b) showed a positive relation between personal (i.e., internal) resources at time 1 and job resources at time 2, about 18 months later. This is also in line with Frese and Zapf (1994), who argued that using job resources requires *extra effort* necessary for task accomplishment, which implies that additional (internal) resources are needed to activate job resources. For example, changing a stressful situation at work by asking for help or using decision authority (i.e., activating job resources) might come at the cost of using energy or

self-regulatory resources. It seems, therefore, that it is not merely the presence of job resources that matters, but also employees’ *ability* to use them. As mentioned earlier, internal resources are defined as an individual’s sense of their ability to control and impact upon their environment successfully (Hobfoll et al., 2003). Thus, as proclaimed by the COR resource investment principle (Hobfoll, 2001), a certain level of internal resources seems necessary to activate subsequent external (job) resources. In other words, the question is to what extent employees are able to make the extra effort needed for resource activation, through the investment of self-regulatory and energy resources. Using these internal resources, though, will lead to resource depletion, if restoration of internal resources (i.e., recovery) does not occur.

In the absence of job demands, employees can “switch off” from work, thereby facilitating recovery. Various studies have found support for this assumption. For example, Kühnel and Sonnentag (2011) revealed a decrease of emotional exhaustion and an increase of work engagement immediately after vacation, implying that internal individual resources were restored. Although the positive effects of vacationing faded out over time, daily recovery, to a certain amount, seemed to compensate for the consumption of resources restored during vacation. In another study, Binnewies, Sonnentag, and Mojza (2010) found that recovery experiences during the weekend (such as detachment from work) predicted the state of being recovered at the beginning of the working week. The state of being recovered in turn was positively related to weekly task performance, personal initiative, and organizational citizenship behaviour, and negatively related to perceived effort. Similarly, Debus, Sonnentag, Deutsch, and Nussbeck (2014) showed that the more a person felt recovered in the morning of a specific day, the more flow he or she experienced on average during that day. The results of these studies suggest that when individuals are highly recovered they may have more resources available that can be allocated to work tasks and thus benefit performance. Moreover, when detaching oneself from work during leisure time, work demands no longer consume resources needed for self-regulation, which facilitates the restoration of internal resources that were used during work (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Fritz et al., 2010). As mentioned earlier, the DISC-R Model proposes that self-regulation underlies the activation of internal and external resources (De Jonge & Dormann, 2003). Building on this premise, it seems that detachment from work can restore both energy and self-regulatory resources, which in turn can be used to activate subsequent resources. This is also in accordance with the aforementioned cumulative nature of resources (Hobfoll, 2001).

In conclusion, off-job recovery may constitute an important linking pin in the cumulative gain process of internal and external resources. First, as detachment is

seen as a facilitator for recovery (Demerouti, Bakker, et al., 2009; Fritz et al., 2010) and in line with the findings of Binnewies et al. (2010), we expect a positive relation between detachment from work and the state of being recovered at the start of a working day (i.e., the degree to which recovery occurred). Second, being recovered from the last working day implies that *internal* self-regulatory and energy resources have been restored (Kühnel, Sonnentag, & Westman, 2009). In correspondence with the COR resource investment principle (Hobfoll, 2001), these internal resources can be tapped to activate subsequent *external* (job) resources. Hence, we expect a positive relation between one's state of being recovered and one's level of job resources. Finally, in line with our theorizing, we expect detachment from work and job resources to be *indirectly* related. An indirect effect between predictor and criterion is indicated if predictor and outcome are *not* directly related, but if a predictor is related to an intervening variable, that in turn links the predictor to the outcome (Mathieu & Taylor, 2006, 2007). As such, we suggest a sequence of effects, with detachment being an initiator and the state of being recovered being the linking mechanism (cf. Binnewies et al., 2010).

As mentioned earlier, we are interested in between-person *and* within-person differences in predicting an individual's level of recovery and job resources on a given day (cf. Sheldon et al., 1996). The assumption is that people differ on their baseline levels of detachment, the state of being recovered, and job resources due to certain stable, enduring personal characteristics. At the same time, we also assume that for every individual there will be days where the respective levels are higher or lower than usual, that is, their scores will fluctuate around their own mean. Investigating potential causes of these daily fluctuations in one's state of being recovered and level of job resources (while controlling for between-person differences) might give clues of how to increase one's daily level of job resources and state of being recovered, regardless of the individual baseline level. Using a daily diary method, we will therefore test the suggested relations at both person level and day level, resulting in the following hypotheses:

Person-level

Hypothesis 1: Individuals with high levels of detachment from work will generally have a higher state of being recovered before going to work.

Hypothesis 2: Individuals with a high state of being recovered before going to work will generally report higher levels of job resources.

Hypothesis 3: Detachment from work and job resources will be *indirectly* related in a way that the state of being recovered is the linking mechanism between both aspects at the person level.

Day-level

Hypothesis 4: Detachment from work after a working day will be positively related to the state of being recovered at the beginning of the subsequent working day.

Hypothesis 5: The state of being recovered at the beginning of a working day will be positively related to the level of job resources during that day.

Hypothesis 6: Detachment from work and job resources will be *indirectly* related in a way that the state of being recovered is the linking mechanism between both aspects at the day level.

Method

Procedure and participants

This daily diary study was part of a larger research project in a general hospital. In this project, the participants filled out a baseline and a follow-up survey of a longitudinal study. In consultation with the heads of the participating hospital units, we approached 80 employees who were expected to be working at least 16 hr during the course of the data collection of the diary study. To encourage participation, monetary incentives were offered to participants completing the diary study. A total of 79 employees from nursing departments (24%), operation rooms (41%), a laboratory (23%), and an emergency room (13%) volunteered to take part in this study. All participants received a handheld device (iPod Touch) and printed instructions about how and when to use the device. They were instructed to complete short surveys on eight consecutive days, including both working days and non-working days. On a working day, the participants filled out surveys on three different moments: before work (T1), after work (T2), and at bedtime (T3). On non-working days, the participants only completed surveys after waking up (T1) and at bedtime (T3). In the current study, the analyses are based on the data collected on working days because those days allowed for the assessment of job resources.

After data was collected, it turned out that 12 participants filled out the surveys incompletely or incorrectly (e.g., more than three surveys filled out on a single day), or missed a large amount of measurement moments (more than 50% of the measurement moments that were expected based on their self-reported work–non-work pattern). To ensure reliability of the data, these participants were excluded from the analysis. Attrition analyses showed no significant differences on the demographic and key variables on day 1 for those who completed less than 50% of the measurement moments compared to the remaining participants. The final sample consisted of 67 participants and 341 daily observations; 54 participants were female (81%) and 13 male (19%). Their mean age was 42.7 ($SD = 11.6$) years.

Measures

The daily diary survey measured the state of being recovered, detachment from work, job resources, and several control variables.

The state of being recovered refers to the outcome of the entire process of off-job recovery and was measured before work (T1) with one item that was developed for this particular study: “I am sufficiently recovered from my last work shift”. The response categories ranged from 1 (*completely disagree*) to 5 (*completely agree*). The item is based on the Intershift Recovery subscale of the Occupational Fatigue Exhaustion Recovery scale (Winwood, Winefield, Dawson, & Lushington, 2005), which consists of three items that reflect the extent to which recovery is achieved from one work shift to the next. As this construct is relatively narrow and unambiguous to respondents, a single-item measure seemed more appropriate (Wanous, Reicher, & Hudy, 1997), especially in the light of relatively high intrusiveness of multiple daily measurements.

Detachment from work was measured at bedtime (T3) with six items derived from the scales that were developed by De Jonge et al. (2012), reflecting a cognitive, emotional, and physical component of detachment. These dimensions are in line with Sonnentag and Niessen (2008), who proposed that a full degree of off-job recovery is attained when the employee feels that cognitive, emotional, and physical systems called upon during work have returned to their baseline levels after work. Each dimension was measured with two items, for example: “After work, I put all thoughts of work aside” (cognitive); “After work, I emotionally distanced myself from work” (emotional); and “After work, I shook off the physical exertion from work” (physical). The items were scored on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For detachment from work, we created a lagged variable (i.e., detachment at T3 on the previous day) with the respective command in SPSS (version 20) to assess effects of detachment from work on the next day’s state of being recovered (T1).

Job resources were measured right after work (T2) with six items of the shortened DISC-Questionnaire (DISQ-S 2.1; De Jonge et al., 2009; cf. Bova, De Jonge, & Guglielmi, 2013) that were adapted to refer to the specific workday (i.e., daily measurement). In accordance with the DISC-R Model (De Jonge & Dormann, 2003, 2006; De Jonge et al., 2012) and similar to the detachment items, the job resources scale reflected a cognitive, emotional, and physical component, with two items for each dimension. Cognitive job resources refer to the opportunity to determine a variety of task aspects and to use

problem-solving skills, for example, “Today, I was able to determine my own work method”. Emotional job resources refer to emotional support from colleagues or supervisors, for example, “Today, I was able to count on emotional support from others (e.g., clients, colleagues, or supervisors) when a threatening situation at work occurred”. Finally, physical job resources refer to instrumental support from colleagues and supervisors, or ergonomic aids at work, for example, “Today, I was able to use adequate technical equipment to accomplish physically strenuous tasks”. The job resources items were also scored on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

In this particular study, we did not a priori expect differential relations with *specific* dimensions of detachment and job resources, but merely *overall* relations between the study variables, while still accounting for their multidimensional nature. Therefore, we conceptualized these variables as aggregate multidimensional constructs (Edwards, 2001). To test the appropriateness of aggregating the items of different dimensions, we performed a confirmatory factor analysis specifying a second-order two-factor model (model 1), with cognitive, emotional, and physical detachment loading on one factor, and cognitive, emotional, and physical job resources on another. Subsequently, we compared this model to the alternative six-factor model (model 2). According to the criteria formulated by Hair, Black, Babin, and Anderson (2010), results revealed a good model fit for both model 1 ($\chi^2 = 93.12$, $df = 47$, $p < .001$, root mean square error of approximation (RMSEA) = .06, comparative fit index (CFI) = .96, Tucker–Lewis index (TLI) = .94, and standardized root mean squared residual (SRMR) = .05) and model 2 ($\chi^2 = 82.12$, $df = 39$, $p < .001$, RMSEA = .06, CFI = .96, TLI = .94, SRMR = .05). However, the values of the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) were both smaller for model 1 (AIC = 6299.771 and BIC = 6455.448) than for model 2 (AIC = 6304.922 and BIC = 6489.564), indicating a slightly superior fit of model 1 with regard to model parsimony (Akaike, 1974; Schwarz, 1978). There was no significant correlation between both second-order factors ($r = .01$, $p = .53$). Additionally, we assessed the internal consistency reliability of the multidimensional measures. Because the number of measured cases varied between days, the reliability coefficients were averaged across eight days. This resulted in $\alpha = .83$ for detachment from work and $\alpha = .71$ for job resources, suggesting that the respective constructs were rather consistent. Therefore, we used the aggregated multidimensional constructs to test the hypotheses of this study.

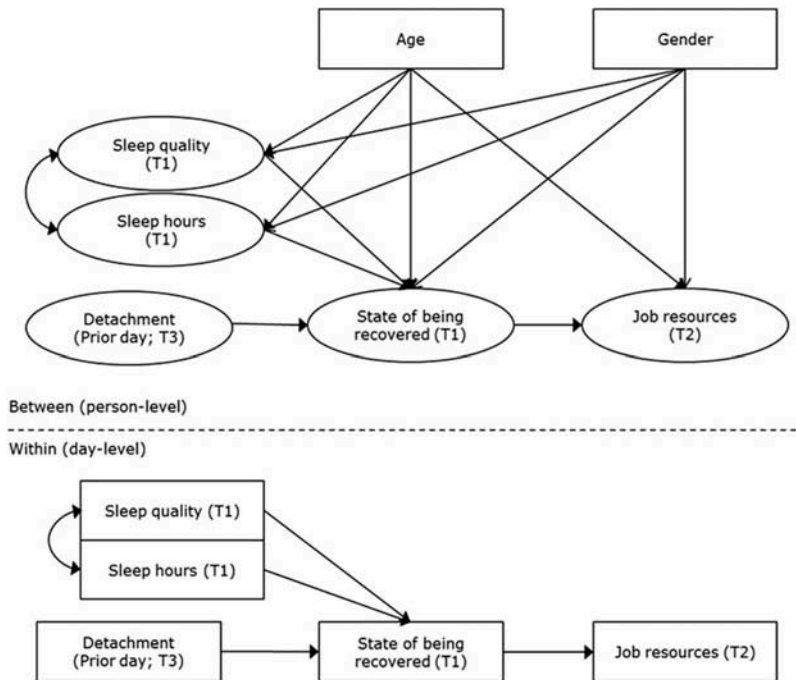


Figure 1. Hypothesized model of this study.

Control variables

To rule out alternative interpretations of the study results, we included a number of control variables. First, as sleep plays a very important role in the process of recovery (Baumeister, 2002; Zijlstra & Sonnentag, 2006), we assessed the daily hours of sleep and sleep quality as additional predictors of the state of being recovered before work. It might be that good sleep during the night compensates for poor detachment during the evening. *Sleep hours and sleep quality* were measured with the daily survey before work (T1), with one item each. The corresponding items were “How many hours did you sleep?” with a 6-point response scale, ranging from 1 (*less than 5 hours*) to 5 (*more than 9 hours*), and “How do you rate the quality of your sleep?” with scale anchors ranging from 1 (*very poor*) to 4 (*very good*). Second, previous research has indicated the relevance of age and gender with regard to job resources, recovery, and sleep (e.g., Day & Livingstone, 2003; Huang et al., 2002; Krishnan & Collop, 2006; Sonnentag, 2003). Therefore, they were included as control variables, too. Age and gender of the participants were derived from the longitudinal study.

Data analysis

Because all participants responded to the same questions for eight consecutive days, we had day-level data (level 1) nested within persons (level 2). We used the Mplus software (Muthén & Muthén, 2010) to test the hypotheses

with multilevel structural equation modelling (MSEM; see Figure 1). Next to analysing the predicted pathways, this approach allowed us to test for indirect effects of sleep hours, sleep quality, and detachment from work on the level of job resources. We did not integrate the measurement model into the multilevel model, to avoid model non-identification due to insufficient cases for the number of parameters to be estimated on both levels (Mehta & Neale, 2005). For all study variables, except for age and gender, variance components were modelled at the person level and the day level to account for both between- and within-person variability, respectively (Mehta & Neale, 2005; Preacher, Zyphur, & Zhang, 2010). In other words, we expected differences between individual base-lines of sleep quality, sleep hours, detachment, the state of being recovered, and job resources (between-person variance), and that for each person their scores on these variables fluctuate across days (within-person variance). By modelling the variables on both levels, the possibility that day-level relations between the study variables are due to differences between persons can be ruled out. Finally, age and gender were only modelled at the person level (i.e., no daily fluctuations), with age being centred around the grand mean.

Results

Table 1 presents means, standard deviations, and correlations among the study variables. To determine whether multilevel modelling was justified, we examined the

Table 1. Means, standard deviations, and correlations among study variables.

	Mean	SD	1	2	3	4	5	6	7
1. Age	42.70	11.51	–						
2. Gender	.81	.39	-.07	–					
3. Detachment (prior day)	3.89	.58	.19	.12	–	.03	.25***	.19***	.03
4. Sleep hours	3.22	1.09	-.33**	.05	-.12	–	.44***	.18***	-.08
5. Sleep quality	2.95	.65	.01	.37**	.09	.44***	–	.17**	-.02
6. State of being recovered	3.75	.94	.28*	.37**	.48**	.14	.77***	–	.13*
7. Job resources	3.44	.53	-.29*	.22	.05	.21	.16	.34**	–

Notes: Correlations below the diagonal are person-level correlations ($N = 67$). Correlations above the diagonal are day-level correlations ($N = 341$). * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

intra-class correlations (ICC) of the outcome variables, which show how much of the variance may be attributed to the different levels of the analysis. For job resources, 59% of the variance could be explained by between-person differences and 41% by within-person differences. The respective percentages for the state of being recovered were 45% (between-persons) and 55% (within-person). Finally, the ICCs of detachment, sleep quality, and sleep hours showed that also for these variables a substantial proportion of the variance could be attributed to within-person variations (ranging from 57% to 71%). These results confirmed the multilevel structure of our data and, thus, supported the choice for multilevel modelling.

Testing the hypothesized model

The fit of the hypothesized MSEM model to the data was very good: $\chi^2 = 14.42$, $df = 12$, $p = .275$, RMSEA = .02, CFI = .98, TLI = .95, SRMR = .05 (within level) and .07 (between level). Figure 2 depicts the final model based on the results of multilevel structural modelling, including standardized estimates of path coefficients. The level of statistical significance was set at $p \leq .05$. However, p -values at the level of .10 are also reported for the main effects (i.e., $p \leq .10$). Although not statistically significant, this kind of results can provide clues for possible power-related type II errors (i.e., concluding that a supposed effect or relation does not exist when in fact it does) and, as such, directions for future research.

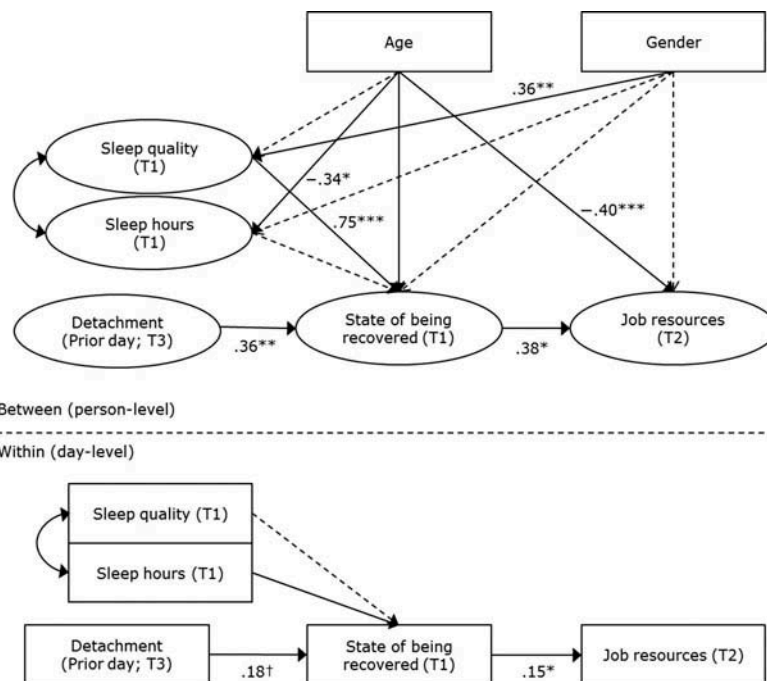


Figure 2. Final model based on results of multilevel structural equation modelling.

Notes: † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. The dashed lines represent the paths that were statistically non-significant at $p > .10$.

At the person level, we proposed a positive relation between detachment from work and the state of being recovered (H1), as well as between the state of being recovered and job resources (H2). Both hypotheses were supported: detachment from work was positively related to the state of being recovered ($\beta = .36, p = .006$), which in turn was positively related to job resources ($\beta = .38, p = .011$). Put differently, people who generally detached well from work also felt more recovered before work than people with lower scores on detachment from work (see also Von Thiele Schwarz, 2011). Similarly, people who generally felt more recovered before work also reported a higher level of job resources than people who generally scored lower on their state of being recovered before work. The control variables at the between-person level showed various significant relations with the predictor and outcome variables. First, sleep quality was positively related to the state of being recovered ($\beta = .75, p < .001$). Second, age was negatively related to both job resources ($\beta = -.40, p = .001$) and sleep hours ($\beta = -.34, p = .014$). Finally, gender was positively related to sleep quality ($\beta = .36, p = .010$), implying that females generally reported a better sleep quality than males. As the results at the person level showed that detachment from work and sleep quality predicted the state of being recovered, and the state of being recovered predicted job resources, the state of being recovered might be the linking mechanism between detachment and job resources (i.e., indirect relation—H3). However, sleep quality might also be linked to job resources through the state of being recovered. Therefore, we examined the indirect effects from detachment from work and sleep quality on job resources, using the respective commands in Mplus (Muthén & Muthén, 2010) and the online interactive tool of Preacher and Selig (2010) for creating 95% confidence intervals (CIs) for the indirect effects. Results revealed a statistically non-significant indirect relation between detachment from work and job resources ($\beta = .14, p = .053, CI = .01-.33$), thereby not supporting Hypothesis 3, and a significant indirect relation between sleep quality and job resources ($\beta = .28, p = .021, CI = .04-.69$).

At the within level, we also expected a positive association between detachment from work and the state of being recovered (H4), as well as between the state of being recovered and job resources (H5). Although the estimated path coefficient from daily detachment from work at T3 to the state of being recovered on the next day at T1 was in the hypothesized direction, it was not statistically significant on the .05 level ($\beta = .18, p = .074$), thereby not supporting Hypothesis 4. The relation between the daily state of being recovered at T1 and daily job resources at T2 was relatively small but significant ($\beta = .15, p = .044$), providing support for Hypothesis 5. In other words, on days that individuals felt more

recovered before going to work, they also reported a higher level of job resources by the end of their working day. Regarding the control variables, we did not find any significant relations between the day-level sleep variables and the day-level state of being recovered. Finally, as the path between detachment from work and the state of being recovered was not significant at the within level, the conditions for indirect effects between detachment and job resources through the state of being recovered were not met (H6). Thus, Hypothesis 6 was not supported by our data.

Discussion

The aim of this study was to provide insight into the way that job resources and recovery from work are related to each other. Both work-related aspects have an important function in buffering job-related strain and, as such, can contribute to improved health and well-being of employees (e.g., Bakker & Demerouti, 2013; De Jonge et al., 2012). However, little is known about the relation between job resources and recovery and, more specifically, whether and how the prevalence of one is associated with the prevalence of the other. In this daily diary study, we simultaneously examined the relation between job resources and recovery on the between-person level and the within-person (day) level. In line with our expectations, results from multilevel analyses revealed that detachment from work in the evening is positively related to the state of being recovered at the beginning of the working day, and that the state of being recovered is positively related to the level of job resources. Moreover, the results indicated that both person-level differences and, to a seemingly lesser extent, day-level dynamics play a role in these relations. We discuss the findings in more detail later.

Implications for theory and practice

At the person level, the results indicated that individuals who generally detach more from work than others generally feel more recovered before work, and individuals who generally feel more recovered before work than others generally report higher levels of job resources. At the day level, our study addressed but did not confirm the link between daily detachment from work in the evening and the daily state of being recovered at the beginning of the subsequent working day. However, we did find a positive trend, indicating that this relation might exist nonetheless. Future research should replicate the findings to allow for a stronger statement about this hypothesized relation. Nevertheless, the expected positive relation between the daily state of being recovered and daily job resources was indeed confirmed by the results: on days that employees felt highly recovered from their last work

shift before going to work, they reported higher levels of job resources during their work shift on the same day. This finding is consistent with COR theory (Hobfoll, 1998, 2001, 2011), suggesting that having more resources at one's disposal to begin with (e.g., self-regulatory and energy resources) makes it more likely to gain more (e.g., job resources). Finding these results on the within-person as well as the between-person level demonstrates that the relation between recovery from work and job resources indeed seems to hold components on both levels: there are differences between persons in their general levels of recovery and job resources, but apart from that, it seems possible for individuals to manage their daily within-person levels of job resources to a certain extent. This provides some support for the self-regulation principle of the DISC-R Model (De Jonge & Dormann, 2003, 2006; De Jonge et al., 2012), which proposes that people generally deal with states of psychological imbalance through self-regulatory processes. That is, they can set goals and make modifications in their behaviours or cognitions if there is a discrepancy between a goal (e.g., feeling energized) and a current state (e.g., fatigue) (cf. Lord, Diefendorff, Schmidt, & Hall, 2010).

With regard to the control variables, the findings of the study show that *sleep quality* at the person level is closely related to the state of being recovered, whereas *sleep duration* at the person level is unrelated. Most likely, the general amount of hours a person sleeps is less important with respect to feeling recovered, as long as the sleep quality is good. On the contrary, *daily* sleep quality and sleep duration do not seem to influence the daily state of being recovered at the beginning of the subsequent working day. The reason we did not find (robust) within-person effects of sleep on being recovered the next day might be explained by the fact that poor sleep quality or a lack of sleep hours mainly becomes problematic when it accumulates over time (e.g., Van Dongen, Rogers, & Dinges, 2003). In other words, a single night of not sleeping well might be relatively easy to overcome. Finally, age was negatively related to job resources at the person level. A possible explanation can be found in Rhodes' (1983) model of age-related differences in work behaviour, which showed how physiological ageing processes can negatively affect the basic cognitive and psychomotor abilities required to successfully perform work activities. In this sense, older employees might depend more on job resources to perform well than younger employees, which could make the absence of job resources more salient to this group.

Against our expectation, we did not find indirect effects with the state of being recovered being the linking mechanism between detachment and job resources. A possible explanation is that in the temporal sequence between detachment from work and the state of being recovered the next morning sleep might be an additional

and interrelated linking mechanism. More specifically, detachment might be related to sleep, which in turn is related to the state of being recovered and, indirectly, to subsequent job resources. In fact, the results did show indirect effects from sleep quality on job resources through the state of being recovered at the person level.

Overall, the findings of the current study provide some support for the view that next to sleep detachment from work allows for the restoration of an individual's internal resources (Baumeister et al., 1998; Sonnentag, Kuttler, & Fritz, 2010), which is reflected in the state of being recovered at the beginning of a working day (Binnewies et al., 2010). In turn, these internal (self-regulatory and energy) resources can enhance the ability to activate subsequent job resources, according to the self-regulation principle as proposed by the DISC-R Model (De Jonge & Dormann, 2003, 2006; De Jonge et al., 2012).

Results from our study also have practical implications. Organizations should not solely focus on providing sufficient job resources, but also make sure employees can recover from work when being at home. This can down-regulate the bodily systems that were activated during work and, as such, restore the internal resources necessary for the activation of job resources. Detachment from work can be enhanced, for instance, by establishing spatial and technological work-home boundaries (Park, Fritz, & Jex, 2011; Sonnentag et al., 2010). Decreasing expectations for employees to enact work-related roles at home during off-work hours could provide them with more time to "switch off" from work. Furthermore, Sonnentag et al. (2010) propose the following approaches for detachment: engaging in non-work activities that require full attention, developing "rituals" that help to detach, and sharing information with spouses about the working day directly after work and then move on to other topics for the rest of the night. Finally, organizations could offer training and counselling to their employees about how to effectively detach from work (e.g., by increasing recovery-related self-efficacy; Sonnentag & Krueger, 2006) and about how to enhance sleep quality. The latter can be improved by sleep hygiene measures, such as regular bedtimes and a decrease of the intake of alcohol or caffeine before bedtime (Mastin, Bryson, & Corwyn, 2006).

Study limitations and future research

Although the study followed a strong design with multiple daily measurements, it also has some limitations. First, the analysed data only relies on self-report and, thus, can be subject to common method bias (Podsakoff, MacKenzie, & Podsakoff, 2012). However, by taking into account individual baselines on the between-person level, the possibility that day-level results can be attributed to general individual tendencies can be partially ruled out. Moreover, it can be argued that variables such as detachment from

work, feeling recovered, and the level of job resources are individual perceptions that fluctuate on a daily basis, therefore being difficult or impossible to be rated by anyone else other than the concerning individual (Podsakoff et al., 2012; Spector, 2006). For future research, it would be interesting, though, to include physiological measures (such as neuroendocrine and cardiovascular indicators) as additional recovery indicators (cf. Geurts & Sonnentag, 2006), or objective data and supervisor or peer ratings regarding the availability of job resources. The latter could provide information about the extent to which there is a gap between the level of job resources that are actually available or perceived by others, and the level of job resources perceived by an individual. Moreover, the term “ability” in the current job resources items (e.g., “Today I was able to count on emotional support from others”) could pertain to being able to use job resources because of their perceived presence, as well as to being able to use them because one has the internal resources necessary to activate the respective resource. Future studies might assess both the perceived presence of resources and the perceived ability to use those resources as a way to overcome this issue.

Second, although the multilevel structural equation model in this study was theoretically grounded and showed a good fit to the data, the relations between the study variables are correlational in nature and could also be modelled differently. It cannot be excluded that models with alternative causal ordering could show a good fit to the data as well. Therefore, no strong inferences about causality of the relations between the study variables can be made. Nevertheless, we did analyse the reverse model with job resources at T2 predicting detachment from work at T3. The results showed a worse fit of this alternative model to our data ($\chi^2 = 27.44$, $df = 10$, $p = .002$, RMSEA = .08, CFI = .87, TLI = .62, SRMR within level = .06, and SRMR between level = .09), thereby supporting the current causal ordering. For future research, it would be interesting to further examine whether job resources can (indirectly) predict recovery (e.g., through reduced job strain levels), and to investigate the role of possible confounders in the relation between (daily) recovery and job resources, such as affect, work–home interference, and off-job activities.

Third, our study was based on a rather specific sample, consisting mainly of females. It would be interesting to replicate our study in occupational groups other than health care that might also be at risk for psychological or physical health complaints (e.g., technology sector; Van De Ven, 2011). We expect that the dynamics between recovery and job resources will also become apparent in other more gender-mixed occupational groups because the current study was based on general theoretical principles that apply to all sorts of work.

As in this study no differential relations were expected a priori with different dimensions of detachment and job resources (i.e., cognitive, emotional, and physical), it was more parsimonious to examine the variables as aggregate multidimensional constructs. However, for future research it would be interesting to examine the relative importance of each dimension in the interplay between recovery and job resources, in relation to specific job demands. It might be, for example, that in jobs where physical job demands are very high physical detachment is more directly related to internal energy resources (and therefore to the activation of job resources) than emotional and cognitive detachment.

Conclusion

This study highlights the importance of recovering from work, in the sense that it does not only help individuals by repairing negative strain effects (Demerouti, Bakker, et al., 2009) but can also function as a catalyst in the activation of job resources, both at the person level and, to a lesser extent, at the day level. As such, recovery from work and job resources should not be seen as “stand-alone” job strain buffers, but as two positively related mechanisms that might help employees to effectively deal with job demands.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by The Netherlands Organisation for Health Research and Development (ZonMw; research programme Participation and Health) under Grant 208020003.

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