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Job resources and flow at work: Modelling the relationship via latent growth curve and mixture model methodology

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The aim of the present three-wave follow-up study ($n = 335$) among employees of an employment agency was to investigate the association between job resources and work-related flow utilizing both variable- and person-oriented approaches. In addition, emotional exhaustion was studied as a moderator of the job resources–flow relationship, and as a predictor of the development of job resources and flow. The variable-oriented approach, based on latent growth curve analyses, revealed that the levels of job resources and flow at work, as well as changes in these variables, were positively associated with each other. The person-oriented inspection with the growth mixture modelling identified four trajectories based on the mean levels of job resources and flow and on the changes of these mean levels over time: (a) moderate work-related resources ($n = 166$), (b) declining work-related resources ($n = 87$), (c) high work-related resources ($n = 46$), and (d) low work-related resources ($n = 36$). Exhaustion was found to be an important predictor of job resources and flow, but it did not moderate their mutual association. Specifically, a low level of exhaustion was found to predict high levels of job resources and flow. Overall, these results suggest the importance of a person-oriented view of motivational processes at work. In addition, in order to fully understand positive motivational processes it seems important to investigate the role of negative well-being states as well.

Organizational psychologists have long been interested in job-related antecedents of work motivation (see, e.g., Hackman & Oldham, 1980). Recently in the tail wind of positive psychology, we have witnessed a renewed interest in the role of job resources

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in the work motivation processes (Bakker & Demerouti, 2008; Schaufeli & Salanova, 2007). However, studies concerning employee motivation generally have relied on the traditional variable-based approach, and thus, our knowledge about *individual differences* in motivational processes is scarce. Do employees follow different trajectories of job resources and flow over time? The purpose of the present three-wave longitudinal study is to examine a more dynamic conceptualization of work motivation aimed at understanding how (changes in) job resources and work-related flow are related across time. In addition, we take into account the role of initial health status (i.e., exhaustion) when analysing the association between job resources and flow. In this study, the association and development of job resources and flow are dissected from the viewpoint of two theoretical models, namely the job demands–resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) and conservation of resources (COR) theory (Hobfoll, 1989).

Definition of flow at work

Flow has been defined by Csikszentmihalyi (1977, p. 36) as 'the holistic sensation that people feel when they act with total involvement'. Being a momentary experience characterized by intense and focused concentration on what one is doing in the present moment, the flow experience reflects the involvement in an intrinsically motivated activity (Nakamura & Csikszentmihalyi, 2005). Csikszentmihalyi and his colleagues have argued that feelings of control, an increased likelihood of learning new skills, and a balance between challenges and skills are essential to the flow experience (Csikszentmihalyi, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988; Csikszentmihalyi & LeFevre, 1989). Other scholars have used slightly different definitions of the peak experience of flow. For example, Ellis, Voelkl, and Morris (1994) define flow as an optimal experience that is the consequence of a situation in which challenges and skills are equal. According to these authors, such a situation facilitates the occurrence of flow-related phenomena, such as positive affect, arousal, and intrinsic motivation. Furthermore, Ghani and Deshpande (1994) emphasize the total concentration and the enjoyment people experience during the flow experience.

These definitions of flow suggest that enjoyment, intrinsic motivation, and total immersion in an activity are central aspects of the flow experience. Using these three core dimensions of flow, Bakker (2005, 2008) applied the concept to the work context and developed a new scale to measure it. Accordingly, work-related flow is defined as a short-term peak experience at work that is characterized by absorption, work enjoyment, and intrinsic work motivation (Bakker, 2005, 2008). *Absorption* refers to a state of total concentration, whereby employees are totally immersed in their work. *Work enjoyment* refers a positive judgment about the quality of working life (see also Veenhoven, 1984). *Intrinsic work motivation* indicates the desire to perform a certain work-related activity with the aim of experiencing the inherent pleasure and satisfaction in the activity (see also Deci & Ryan, 1985). These flow dimensions have been found to be positively related (Bakker, 2005). In addition, evidence for reliability and construct validity of the flow scale has been demonstrated (Bakker, 2008).

The work-related flow concept shares similarities with other positive work attitude and well-being constructs. For example, the resemblance to theoretical definitions of job satisfaction and job involvement is evident. Associations between flow and these variables also have been found at the empirical level. Specifically, the relationship between the flow component of work enjoyment and job satisfaction was found to be relatively strong and positive (Bakker, 2008). In addition, work engagement, which is defined as 'the positive, fulfilling, and work-related state of mind that is characterized by vigor, dedication and absorption' (Schaufeli, Salanova, Gonzáles-Romá, & Bakker, 2002, p. 74), shares affinity with the flow construct. Particularly, both of these constructs contain the component of absorption. The main distinction between engagement and flow is their difference in time frame, as work engagement is discussed to be more enduring and stable over time than flow (Schaufeli *et al.*, 2002).

Job resources and flow at work

One of the basic premises of the JD-R model (Bakker & Demerouti, 2007; Demerouti *et al.*, 2001) is that job resources are crucial for employee motivation. Accordingly, *job resources* are physical, psychological, social, or organizational aspects of the job that help the person to cope with job demands, increased learning, and development as an employee, and are useful in achieving work-related goals. Job resources have motivational potential because they make employees' work meaningful, hold them responsible for work processes and outcomes, and provide them with information about the actual results of their work activities (cf. Hackman & Oldham, 1980). According to the JD-R model, job resources trigger the motivation process, and thus lead to positive well-being and better performance. In previous studies, job resources, such as performance feedback, skill variety, and supervisory support, have indeed been related to increased work motivation (Fried & Ferris, 1987; Hackman & Oldham, 1980; Houkes, Janssen, De Jonge, & Bakker, 2003), work engagement (Bakker, Demerouti, & Verbeke, 2004; Mauno, Kinnunen, & Ruokolainen, 2007), and better job performance (Tierney & Farmer, 2002). In the light of these earlier studies, autonomy, performance feedback, social support, opportunities for professional development, and coaching by the supervisor are considered as job resources in the present study.

Due to the fact that work-related flow is a relatively new construct, only a limited number of studies have investigated its relationship with job resources. The existing studies have showed that job resources and flow are strongly and positively related. For example, Bakker (2005) examined the relationship between four job resources (autonomy, performance feedback, social support, and supervisory coaching) and work-related flow utilizing a sample of music teachers and their students. Results showed that job resources were related to students' flow experience through the teachers' experience of flow. In addition, utilizing four different samples, Bakker (2008) found that autonomy, social support, and opportunities for professional development associated positively with work-related flow. Furthermore, Demerouti (2006) found a positive relationship between the 'motivational potential score' (a combined index of skill variety, task identity, task significance, autonomy, and feedback; Hackman & Oldham, 1980) and work-related flow. In this study, flow was also positively related to other ratings of performance among employees with a high level of conscientiousness. Similarly, Eisenberger, Jones, Stinglhamber, Shanock, and Randall (2005) found that the combined experience of high skills and challenges (i.e., flow) was related to high positive mood, task interest and, organizational spontaneity (e.g., include making constructive suggestions and helping co-workers) among achievement-oriented employees.

Some studies have shown that job resources and flow mutually influence each other. Salanova, Bakker, and Llorens (2006), in their longitudinal study among secondary school teachers, found that organizational resources (e.g., social support and clear goals) facilitated work-related flow 8 months later; in a similar vein, work-related flow had predictive value for organizational and personal resources. In addition, Houkes *et al.* (2003) found that the motivating potential score predicted intrinsic work motivation, while, at the same time, intrinsic work motivation predicted increased levels of the motivating potential score.

To sum up, these previous findings provide firm evidence for a positive relationship between job resources and flow (Bakker, 2005, 2008; Demerouti, 2006). Moreover, flow and job resources have been found to reciprocally interact with each other over time, suggesting the existence of an upward spiral (Salanova *et al.*, 2006). Such an upward spiral process is one of the basic tenets of the COR theory (Hobfoll, 1989), which constitutes along with the JD-R model (Demerouti *et al.*, 2001) the main theoretical framework to investigate the work motivation process in the present study.

The central idea of the COR theory is that people have a deep motivation to obtain, maintain, and protect their valued personal resources (Hobfoll, 1989). People are motivated to create resources because these enable the acquisition or preservation of other valued resources. Furthermore, the theory indicates that resources change in a dynamic way over time; central to the theory are the *loss* and *gain cycles* of resources (Hobfoll, 1989, 2002). The idea of these cycles is that both the loss and gain of resources are cumulative: initial loss may trigger a chain of decreased resources (i.e., a loss cycle) or resources tend to strengthen each other over time in a reciprocal, dynamic process (i.e., a gain cycle). Hence, resources do not exist in isolation, but instead have great impact on each other. Applied to the work motivation process, the gain cycle means that employees who gain more job resources will also attain a higher level of work-related flow. As a positive motivational–affective state, flow may also promote job resources. This may occur, for example, due to increased social activity in the workplace or attainment of work-related goals. Based on the earlier empirical findings and the assumptions of the JD-R model (Demerouti *et al.*, 2001) and the COR theory (Hobfoll, 1989), we formulated our first hypothesis:

> *Hypothesis 1:* Job resources and flow, and their changes over time, are positively related to each other.

Heterogeneity in the work motivation process

Earlier results on the work motivation process are largely based on traditional variable-oriented research, where the underlying implication is that changes over time follow a general trend, and that the associations among variables are similar to all persons in the study population (Laursen & Hoff, 2006). Such a variable-oriented analysis often ignores the heterogeneity among individual patterns of (possible) change. *Heterogeneous change* suggests that some persons change whereas others do not, and the pattern of change varies across persons (see Mroczek, Almeida, Spiro, & Pafford, 2006). COR theory postulates that, on a general level, resources change together in a dynamic way over time (Hobfoll, 1989). However, it is logical to assume that there are differences in the level, shape, and velocity of the change in resources between persons because, according to the COR theory (Hobfoll, 1989), the contents of people's resource pools differ from each other (e.g., coping skills, personality traits) and, additionally, people value and appraise various resources differently. To illustrate this, it might be that among certain employees both job resources and flow increase over time (i.e., a gain cycle), whereas among others flow and resources decrease (i.e., a loss cycle). Based on the COR theory, those who have lower levels of available resources are more vulnerable to loss cycles (Hobfoll, 1989).

In addition, since the COR theory emphasizes the maintenance and protection of possessed resources (Hobfoll, 1989, 2002), there is good reason to expect that among some individuals the possessed resources are relatively stable over time. The maintenance and stability of resources is expected, particularly if the obtained levels of job resources and flow are high. In addition, some resources are more stable than others; for example, in the case of job resources like job control and supportive organizational climate, previous studies have revealed relatively high rank-order stability over time (see, e.g., Feldt, Kivimäki, Rantala, & Tolvanen, 2004; Mäkikangas, Feldt, & Kinnunen, 2007).

The amount of heterogeneity in change trajectories in work motivation variables is related *inter alia* to the nature of the data. To illustrate this, more differentiated trajectories could be expected if the sample under study confronts some environmental changes that challenge the possessed resources (see Hobfoll & Freedy, 1993). In the work context, these changes might relate, for example, to organizational transitions (e.g., structural changes due to lay-offs or recruitment of employees) or various interventions (i.e., rehabilitation of employees or organizational development programmes). In the present study, we investigate the work motivation process in an organization – an employment agency – that was going through many rapidly occurring changes (including a high rate of personnel turnover). According to the COR theory (Hobfoll, 1989), people confronted by stress focus on minimizing the loss of resources, since the development of resources takes place when there are no significant stressors present. Thus, it was expected that, in the context of the present study, the stability and the loss cycle of resources would be more probable than a gain cycle of resources. In order to capture the hasty changes occurring in the studied organization, longitudinal data with a 6-week time lag between the measurement points was used. As the flow construct is hypothesized to have a short-term nature (Bakker, 2008), the overall 3-month time frame was chosen in order to capture the possible change and stability of the flow experiences.

Based on the propositions of the COR theory (Hobfoll, 1989) and the aspects relating to studied organization, we formulated our second hypothesis:

> *Hypothesis 2:* There are different developmental trajectories of job resources and flow that differ in terms of mean levels and changes in mean levels over time. It is assumed that, among employees with relatively high initial levels of job resources and flow, these resources are relatively stable, whereas among employees with lower initial levels, resources will tend to decrease over time, representing the loss cycle.

The role of exhaustion

At the theoretical level, the change of resources is depicted either from the perspective of positive or negative development (Hobfoll, 1989). Nevertheless, in everyday life positive and negative emotions fluctuate and can occur simultaneously. The level of overall psychological well-being is one crucial resource that effects how other resources are invested in order to retain or gain more resources (Hobfoll, 1989). Furthermore, the level of psychological well-being can provide a set-point for other affective states. For example, in the work context, the level of exhaustion may hinder the possibility for flow experiences. For these reasons, we will include emotional exhaustion as a possible predictor of flow and job resources. Emotional exhaustion refers to the draining of emotional resources, feelings of tiredness, and chronic fatigue resulting from work overload (Maslach, Jackson, & Leiter, 1996), and it is one central component of the burnout syndrome.

In the JD-R model, job demands primarily evoke the health impairment process, which leads through burnout to ill-health (Bakker & Demerouti, 2007). However, according to the JD-R model, scarce job resources are negatively related to burnout because the lack of resources increases job demands and could therefore indirectly contribute to burnout (see Schaufeli & Bakker, 2004). Accordingly, job resources have been found to correlate negatively with exhaustion in previous studies (Bakker, Demerouti, & Euwema, 2005; Hakanen, Bakker, & Schaufeli, 2006; Schaufeli & Bakker, 2004). For example, Schaufeli and Bakker (2004) found that job resources (i.e., performance feedback, social support from colleagues, and supervisory coaching) negatively associated with burnout in three different cross-sectional samples. In a similar vein, Hakanen *et al.* (2006) found among teachers that job resources, such as job control, supervisor support, information, social climate, and innovative climate correlated negatively with burnout.

To the best of our knowledge, no previous studies have examined the relationship between exhaustion and work-related flow. However, exhaustion has been found to be negatively related to work engagement (Hakanen *et al.*, 2006; Schaufeli & Bakker, 2004) which shares similarities with the flow construct. In addition, while positive and negative well-being states at work rarely exist together (see González-Romá, Schaufeli, Bakker, & Lloret, 2006; Mäkikangas *et al.*, 2007), it could be assumed that that exhaustion and flow are negatively related to each other. Based on the presented empirical literature and the JD-R model (Bakker & Demerouti, 2007; Demerouti *et al.*, 2001), we formulated our third hypothesis:

Hypothesis 3: Exhaustion is negatively associated with job resources and flow.

Exhaustion may also affect the *relationship* between job resources and flow at work. Exhausted employees may be unable or unwilling to identify or use the available job resources in their work. Because a high level of exhaustion already represents the prolonged stress situation in which a loss of resources has already occurred (Hobfoll & Freedy, 1993), exhausted employees focus on minimizing the net loss of existing resources (see Hobfoll, 1989). Thus, according to the COR theory, exhausted employees may not be capable of investing their resources in the job in order to gain other required resources, such as a higher level of work motivation. For example, employees with a high level of exhaustion may experience job resources such as autonomy or social support and interactions with a supervisor or colleagues as a burden, or might even avoid such situations due to a lack of energy to innovate, develop, or interact with others. Feelings of flow require an investment of other resources, as it arises from situations that are challenging, require skills, and offer opportunities for learning (see Csikszentmihalyi, 1990). On the contrary, employees with a low level of exhaustion may be able to benefit more from high job resources, such as autonomy because they have the energy to invest to these resources, which will also become evident in terms of their level of positive well-being at work. Thus, based on the COR theory, it is reasonable to expect that the situation characterized by high levels of job resources is more beneficial for employees with low than high levels of exhaustion. Based on this rationale, we formulated our fourth and final hypothesis:

Hypothesis 4: Exhaustion moderates the relationship between job resources and flow, that is, the relationship between job resources and flow is stronger among employees with a lower (vs. higher) level of exhaustion.

Method

Procedure and participants

The study was part of a larger research project executed among all 831 employees of an employment agency in The Netherlands. The employees were requested to fill in the same questionnaire at three different points in time. The time between the follow-ups was 6 weeks. At T1, 576 questionnaires were returned (69.3% response rate). Six weeks after the T1, 733 employees from the original sample received the second questionnaire (98 persons had undergone job change, promotion, or job transfer, and thus removed from the original sample). At T2, 425 persons returned the questionnaire completed for a response rate of 58%. At T3 (measured 6 weeks after T2), the questionnaire was returned by 357 employees (49% of the original sample). The procedure of the data collection is provided in Demerouti, Bakker, and Bulters (2004).

The present study was based on those individuals who participated in all three collection points based of the study ($N = 335$). The sample included 235 females (70%) and 100 males (30%). Their mean age was 30 years ($SD = 6.0$) and mean organizational tenure was 4 years ($SD = 3.8$). The majority of the sample had a permanent contract (81%). Most employees worked full time (83%), and 27% of the participants had a supervisory position. The main activities of the employees in this organization were to offer staffing resources, quality assessment, testing and training for various types of jobs, on-site management of the contingent workforce, flexible staffing, employee training, outplacement, and reintegration programmes.

In order to rule out selection problems due to panel loss, we examined whether there were differences between employees in the panel group and the drop-outs with regard to demographic characteristics and main study variables. The t tests indicated that the panel group had comparable age and organizational tenure with the drop-outs, but the panel group included slightly more male employees than did the drop-outs, $\chi^2(1) = 8.38$, $p < .01$. There were some significant differences between the panel group and the drop-outs with regard to job resources and flow: the drop-outs (at Time 3) scored lower on Time 2 autonomy, coaching, opportunities for professional development and enjoyment than did the panel group (at $p < .05$).

Measures

Job resources were assessed using five scales. Four of these were developed by Bakker, Demerouti, Taris, Schaufeli, and Schreurs (2003), each including three items. Here is an example item of each scale: 'Can you decide yourself how you execute your work?' (1 = *never*, 5 = *always*; *autonomy*); 'I receive sufficient information about the goal of my work' (1 = *totally disagree*, 5 = *totally agree*; *performance feedback*); 'Can you ask your colleagues for help if necessary?' (1 = *never*, 5 = *always*; *social support*); and 'My work offers me the opportunity to learn new things' (1 = *totally disagree*, 5 = *totally agree*; *opportunities for professional development*). The fifth scale, *coaching by the supervisors*, was measured using a Dutch version of leader–member exchange scale (see Le Blanc, 1994). The scale comprises five items (My supervisor uses his/her influence to help me solve my problems at work), which were scored on a five-point scale, ranging from 1 (*never*) to 5 (*always*).

Flow was assessed with the work-related flow instrument (WOLF; Bakker, 2008). The WOLF includes 14 items measuring absorption (4 items; e.g., 'When I am working, I forget everything else around me'), work enjoyment (4 items; e.g., 'When I am working very intensely, I feel happy'), and intrinsic work motivation (6 items; e.g., 'I get my motivation from the work itself, and not from the rewards for it'). The participants were asked to indicate how often they had each of the experiences during the preceding week (0 = *never*, 6 = *every day*).

Exhaustion at Time 1 was measured with a subscale of the Dutch version of the Maslach Burnout Inventory – General Survey (Schaufeli, Leiter, Maslach, & Jackson, 1996). The scale comprises five items that refer to severe fatigue (e.g., 'I feel burned out from work'). The items were scored on a seven-point rating scale (0 = *never*, 6 = *always*).

Statistical analysis

In this study, we utilized relatively novel modelling methods; latent growth curve (LGC) analysis (Duncan, Duncan, Strycker, Li, & Alpert, 1999; Muthén & Khoo, 1998) and growth mixture modelling (GMM; Muthén, 2001; Muthén & Muthén, 2000) to study the process of job resources and flow at work. The LGC model is a variant of structural equation modelling that explains change and its form across time as an underlying latent process (Duncan *et al.*, 1999). Data in LGC modelling are described by latent change factors that have a mean and variance parameter, and hence the analysis method results in a mean-level change pattern while estimating also the individual variation within the change pattern (Duncan *et al.*, 1999). GMM, an extension of LGC modelling, seeks to identify unobserved (i.e., latent) classes from the observed data that follow similar patterns of mean-level change over time (Muthén, 2001).

The LGC and GMM analyses were performed by using the Mplus statistical package (version 3.12; Muthén & Muthén, 1998–2005). The missing data method (i.e., the standard missing at random approach) was used, which allowed us to use all observations in the dataset to estimate the parameters in the models without imputing the data (Muthén & Muthén, 1998–2005). The parameters of the models were estimated using maximum-likelihood estimation with robust standard errors (MLR estimator; Muthén & Muthén, 1998–2005). Goodness-of-fit was evaluated by using the χ^2 value (Bollen, 1989). In addition, a variety of practical model fit indices were also used. These were the root mean square error of approximation (RMSEA; Steiger, 1990), for which values of .05 or less indicate a good fit, values .06–.08 an adequate fit, and values close to .10 a mediocre fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003); the comparative fit index (CFI; Bentler, 1990); and the Tucker–Lewis index (TLI; Tucker & Lewis, 1973), for which values above .95 indicate an acceptable fit (Schermelleh-Engel *et al.*, 2003).

The statistical analyses consisted of five major phases. In the *first phase*, we used LGC modelling to examine both the nature of the mean-level changes across the three measurement points, as well as the individual variation in the initial level and subsequent change of job resources and flow, separately. The model testing was started in both cases by estimating three latent factors, that is, (a) the initial mean level, (b) the linear change, and (c) the quadratic change (see Duncan *et al.*, 1999). These latent factors were based on same continuous observed composite variables measured at every study phase. The initial level (intercept) is a constant for any given individual across time, and thus the factor loadings of the observed composite variables were set at 1 for each measurement point (see Duncan *et al.*, 1999). The linear change factor (slope) describes individual differences in the constant rate of mean-level change across measurement points. Consequently, the loadings for the linear change factors were fixed in ascending order (in this case 0, 1, and 2; see

Duncan *et al.*, 1999). The quadratic change rate (quadratic trend) captures the possible nonlinear mean-level change across time and thus, the loadings were set to 0, 1, and 4 (see Duncan *et al.*, 1999).

In the *second phase*, the relationship between job resources and flow was examined by combining the separate LGC models of job resources and flow (i.e., the associative LGC model, see Duncan *et al.*, 1999). The associative LGC analysis makes it possible to investigate how latent level and change factors of one construct are related to these latent aspects of another construct. In this model, all the latent factors of job resources were allowed to correlate with the latent factors of flow. In the *third phase* of the analysis, the role of exhaustion in job resources and flow was examined. First, it was tested whether exhaustion moderates the relationship between job resources and flow. After that, the possibility that the level of exhaustion predicts the latent level and change factors of job resources and flow was examined.

In the *fourth phase*, the GMM was used to investigate whether it is possible to statistically identify naturally occurring homogeneous groups of employees that differ according to their level and change rate in job resources and flow. The GMM estimates mean-level curves for each latent trajectory class (Muthén & Muthén, 2000). In this study, participants within a trajectory were treated as homogeneous with respect to their mean-level change. The analyses of latent trajectory classes were based on expected differences in the mean level of latent factors of job resources and flow, and thus, GMM was based on LGC analysis. Whereas the LGC analysis models the covariance structure between job resources and flow at the whole data level, GMM may elicit different combinations of job resources and flow manifesting on different developmental trajectories that cannot be predicted on the basis of covariance structure.

Four criteria were used to decide the number of classes (Muthén, 2003): (a) the Bayesian information criterion (BIC), for which the model with the smallest value is considered the best model; (b) the Vuong-Lo–Mendell–Rubin (VLMR) test of fit (which compares solutions with different number of classes; a low p value indicates that the k model has to be rejected in favour of a model with at least $k + 1$ classes); (c) the classification quality that can be determined by entropy values; entropy values range from 0 to 1, where values close to 1 indicate clear classification (Celeux & Soromenho, 1996); and (d) usefulness and clarity of the latent classes in practice. In the final and *fifth phase*, the extent to which the level of exhaustion predicts different latent trajectory classes of job resources and flow were examined.

Results

Descriptive statistics

The means, standard deviations, Cronbach's alphas, together with the correlations and covariance matrices, are shown in Table 1.

Latent growth curve modelling

To investigate the nature of the mean-level change, any variation across the mean level, and the association between the latent level and the subsequent change factors, LGC analyses were first carried out for job resources and flow separately. In these models, the residual variances of the observed variables were estimated as equal across time.

Table 1. Descriptive statistics, correlations (below the diagonal), and covariance (diagonal and above) matrices for studied variables

Variable	Mean	*SD*	α	1	2	3	4	5	6	7
Job resources										
1. Time 1	3.60	0.62	.92	.37	.29	.28	.22	.22	.19	−.19
2. Time 2	3.53	0.59	.91	.84	.32	.29	.19	.21	.19	−.19
3. Time 3	3.53	0.58	.91	.78	.88	.34	.20	.21	.22	−.20
Flow										
4. Time 1	3.52	0.70	.81	.54	.53	.51	.49	.38	.39	−.25
5. Time 2	3.43	0.72	.84	.57	.54	.54	.77	.52	.44	−.27
6. Time 3	3.38	0.75	.86	.43	.48	.51	.75	.82	.55	−.25
Exhaustion										
7. Time 1	1.88	1.08	.85	−.30	−.33	−.32	−.34	−.34	−.32	1.15

Note. All correlations are significant ($p < .001$).

Without this restriction, the estimated models were not identifiable. In addition, the strict invariance assumption was applied. Estimating the latent factors of initial level, linear change, and quadratic change for both model variables started the model testing. However, because the preliminary analyses showed that neither the mean nor the variance of the quadratic change component was statistically significant in any of the models, this component was excluded from the final analyses. The results and goodness-of-fit indexes of the final models are presented in Table 2.

Table 2. Parameter estimates (unstandardized forms) of latent growth models for job resources and flow (each in separate analysis)

	Growth parameters		Goodness-of-fit indexes					
Latent growth curve model	Estimate	*t* value	χ^2	*df*	*p* value	CFI	TLI	RMSEA
Job resources			3.02	2	.22	1.00	1.00	.04
Means								
Level	3.56	106.74						
Linear trend	−0.02	−1.35						
Variances								
Level	0.34	12.18						
Linear trend	0.02	4.23						
Flow			1.814	3	.61	1.00	1.00	.00
Means								
Level	3.52	91.29						
Linear trend	−0.07	−4.59						
Variances								
Level	0.39	9.51						
Linear trend	0.02	2.48						

Note. The *t* values greater than 1.96 in magnitude indicate a parameter estimate that is significantly different from zero.

LGC for job resources

The fit of the initial LGC model for job resources was $\chi^2(3) = 10.56, p = .01$, CFI = .98, TLI = .98, and RMSEA = .09. The modification indices suggested that estimating the covariance between time-specific residuals at T2 and T3 would improve the model fit. After this specification, the fit of the model was good (see Table 2). The results indicated that there were no mean-level changes in job resources over time (see Table 2). However, the variance of mean and change factors was significant. The results showed further that the latent level factor of job resources was negatively associated with its latent linear change factor (*standardized estimate* $= -.31$, $p < .05$): the higher the initial level of job resources, the less growth in it.

LGC for flow

The fit of the linear LGC for flow was good (see Table 2). The results showed that, at the mean level, flow decreased over time. In addition, variance of the level and change of flow was significant, suggesting that individuals differed from each other not only in the level of flow but also in the rate of mean-level change. The results showed further that the initial level of flow was not associated with its subsequent linear change (*standardized estimate* = .03, ns).

Association between job resources and flow

In order to investigate the relationship between job resources and flow, the previous two LGC models were combined. The fit of the associative LGC model was good, $\chi^2(10) = 13.71$, $p = .19$, CFI = 1.00, TLI = 1.00, and RMSEA = .03. The results showed, first, that the latent initial level factor of job resources was positively associated with the latent initial level of flow (*standardized estimate* = .60, $p < .001$). The higher the level of job resources, the higher the level of flow. Second, the latent linear change factors of job resources and flow were also positively associated with each other (*standardized estimate* = .67, $p < .001$): the greater the increase in job resources across the three measurements, the greater the increase in flow across the same time period, and vice versa. However, neither of the initial mean-level factors predicted the subsequent linear change factor of another construct. Taken together, these findings offer support for Hypothesis 1: the levels of as well as the changes in job resources and flow are positively associated.

The role of exhaustion

In the next phase, the role of exhaustion in the relationship between job resources and flow was examined. First, the possibility that the level of exhaustion moderates the relationships between job resources and flow was investigated. This was done by using the median split procedure to divide the sample into two groups according to the level of exhaustion at T1. A combined LGC model for flow and job resources was then conducted for these two groups using a multisample approach for LGC modelling (Curran & Hussong, 2003; Rigdon, Schumacker, & Wothke, 1998). In this analysis, the LGC model, including equality constraints in all estimated variances and associations in both groups, was tested. The results showed that the fit of the model including equality constraints was good, $\chi^2(33) = 42.24$, $p = .13$, CFI = .99, TLI = .99, RMSEA = .04, suggesting that all the associations between latent factors of job resources and flow can be assumed to be equal in the two groups. Overall, these results suggested that exhaustion did *not* moderate the relationships between job resources and flow. Thus, Hypothesis 4 indicating that exhaustion would moderate the relationship between job resources and flow was rejected.

After that, the possibility that exhaustion predicts the levels and changes in job resources and flow was examined by adding exhaustion to the combined LGC of job resources and flow, and by estimating paths from exhaustion to the level and linear change factors of job resources and flow. The final model is presented in Figure 1. The fit of this model was $\chi^2(14) = 13.65$, $p = .48$, CFI = 1.00, TLI = 1.00, and RMSEA = .03. The results showed that exhaustion was negatively associated with the latent level factors of job resources and flow: the higher the initial level of exhaustion, the lower the initial level of job resources and flow. However, exhaustion did not predict the latent change factors of flow or job resources. Altogether, these findings offered partial support for our Hypothesis 3 which indicated that exhaustion would predict both the levels of job resources and flow, and also their change over time.

Growth mixture modelling

Finally, we were interested in examining whether there different trajectories of job resources and flow that differ from each other from their mean level and its change over time. Thus, the next step was to carry out a GMM analysis based on the LGC models of flow and job resources. Table 3 presents the results of the GMM by showing the fit indices for the solutions with different numbers of latent trajectory classes. The results show that the BIC indices supported a five-class solution. However, the VLMR tests supported a four-class solution. In addition, the class sizes of the four-class solution were large enough and interpretable. As a result of this analysis, a four-class solution was chosen for subsequent analysis.

Table 4 and Figure 2 show the results of the four-class solution. In this solution, the largest latent trajectory class ($n = 166$) consisted of those participants whose mean

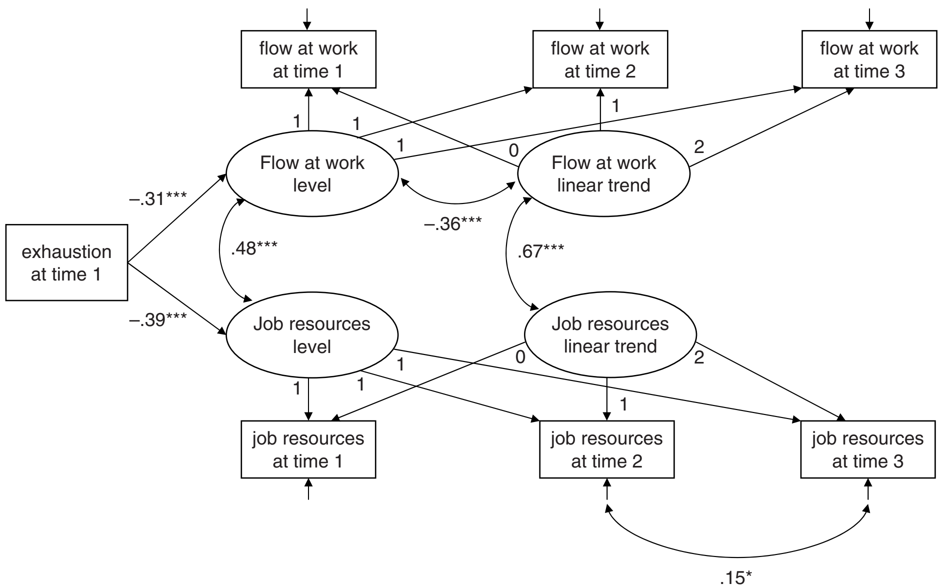

Figure 1. Latent growth curve model for job resources and flow.

Table 3. Fit indices for growth mixture models of job resources and flow with different number of latent classes

Number of classes	log L	BIC	Entropy	VLMR	Difference in the number of parameters	*p* value
2	− 1358.25	2786.27	.84	− 1631.26	5	.000
3	− 1283.92	2666.68	.80	− 1358.25	5	.032
4	− 1230.40	2588.71	.83	− 1283.92	5	.036
5	− 1186.92	2530.82	.82	− 1230.40	5	.237

Note. log L, log likelihood value; BIC, Bayesian information criterion; Entropy with values approaching 1 indicate clear delineation of classes; VLMR, Vuong-Lo-Mendell-Rubin test.

level of job resources and flow remained at a moderate level during the follow-up time. The participants in this trajectory reported either regularly or often feelings of flow in their work and also their level of job resources seemed to be at reasonable level. This latent trajectory class was labelled *'moderate work-related resources'*. The second latent trajectory class ($n = 87$) was characterized by moderate initial levels of job resources and flow but, in the mean level, both of these constructs linearly and significantly declined over time. Hence, this latent trajectory class was labelled as 'declining work-related resources'. The third latent trajectory class, 'high work-related resources' ($n = 46$), was characterized by high mean levels of both job resources and flow, which also remained at the same high level across time. The fourth and smallest latent trajectory class ($n = 36$) was characterized by relatively low mean levels of job resources and flow at each of the three measurements point (labelled 'low work-related resources'). In particular, feelings of flow were relatively rare in this latent trajectory class. Overall, the results offered support for the Hypothesis 2 that predicted heterogeneity in the trajectories of job resources and flow.

In the final phase, exhaustion at T1 was added to predict the latent class membership in the four-class solution of job resources and flow. The results show that exhaustion associated with the class membership: the lower the level of exhaustion at T1, the higher the likelihood that employees were member of the 'high work-related resources' class. The mean level of exhaustion in that group was 1.28. The highest level of exhaustion was among the members who belonged to the latent trajectory class 'low work-related resources' (mean level of exhaustion was 2.93). The participants in the

Table 4. Estimated means for the LGC models in different latent classes

	Class 1 ($n = 166$)		Class 2 ($n = 87$)		Class 3 ($n = 46$)		Class 4 ($n = 36$)	
Growth mixture model	Estimate	*t* value	Estimate	*t* value	Estimate	*t* value	Estimate	*t* value
Job resources								
Level	3.79	69.60	3.29	50.70	4.09	23.21	2.79	26.01
Linear trend	− 0.02	− 1.03	− 0.06	− 2.14	− 0.07	− 1.65	0.03	0.47
Flow								
Level	3.72	54.67	3.15	49.47	4.44	28.37	2.32	24.31
Linear trend	− 0.05	− 2.05	− 0.12	− 3.45	− 0.02	− 0.53	− 0.08	− 1.90

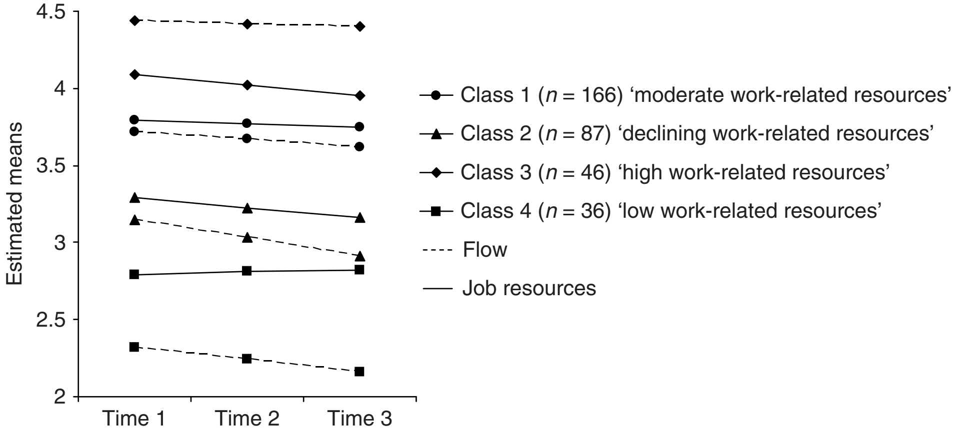

Figure 2. Estimated growth curves for latent trajectory classes for job resources and flow.

latent trajectory class 'declining work-related resources' reported a relatively high level of exhaustion as well (mean level of exhaustion was 2.15).

Discussion

The aim of the present study was to investigate the association between job resources and work-related flow by utilizing longitudinal data and statistical analysing methods that can accurately capture mean-level changes of variables at the general level, as well as at the subgroup level. Besides that, the role of exhaustion in the work motivation process of job resources and work-related flow was examined.

Cycles of job resources and flow

Our first hypothesis, concerning the positive and cyclic association between job resources and flow, gained support. The levels of job resources and flow correlated strongly with each other, and also their changes over time associated providing evidence for a mutual cycle of change as proposed by the COR theory (Hobfoll, 1989). In this respect, these findings are in line with previous results found between job resources and flow using a between-person approach (Bakker, 2005, 2008; Salanova *et al.*, 2006). An interesting result was that the reciprocal relationship between these constructs did not manifest itself in the traditional sense (i.e., the levels did not predict changes). Instead, the linear change factors of job resources and flow related positively, indicating that the changes in job resources and work-related flow were similar during the study period (i.e., changes occurred simultaneously and in the same direction).

An inspection of the mean-level changes revealed that there were no overall changes in job resources at the level of the sample as a whole, but instead the average level of flow decreased over time. The general downward trend of flow may reflect the difficulties that the organization was facing (i.e., a high rate of resignation, absenteeism). However, these negative changes did not manifest themselves in loss of job resources when detecting the general change in whole data level. The high absolute stability of job resources might be explained by the relatively stable nature of the subscales used to capture job resources. Perceptual changes in these psychosocial work conditions may require significant changes in the content of the actual work, as earlier studies on their high rank-ordering suggest (see, e.g., Feldt *et al.*, 2004; Mäkikangas *et al.*, 2007). It could be that the investigation of other job resources, such as fairness of the supervisor, would have been more relevant in the change context of the present organization.

While the results discussed above describe the overall trend of mean-level changes that occurred in the studied organization, the results further revealed different developmental trajectories of job resources and flow. Hence, our second hypothesis concerning the heterogeneity in the development paths of job resources and flow gained support. The person-oriented analysis revealed that there were altogether four distinct latent trajectories that differed from each other in terms of their level and/or the direction of mean-level change. The most typical trajectory contained nearly half of the participants, and was characterized by moderate levels of both job resources and flow that remained at the same level over the study period. In addition, another typical trajectory (declining work-related resources) was described by a significant mean-level decrease of both job resources and flow. Especially, flow decreased across time within this trajectory. In addition, there were two smaller latent trajectory classes in which the levels of job resources and flow remained constant.

These person-oriented results complement the variable-oriented results by illustrated in more detail that the levels of job resources and flow were strongly associated, and also that their change or stability over time was similar. This means that if there was a mean-level change, both of these constructs changed simultaneously. However, these mean-level changes occurred only among a quarter of the study participants, whereas among the majority of the respondents the absolute stability of the studied constructs was a more typical state. Thus, these present results offer some support for the dynamic cycling process between resources posited in the COR theory (Hobfoll, 1989). There were indeed some cycling processes between the job resources and flow, but their cycle was more mutually perpetuating than level-wise processing (see also Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009). This means that although job resources and flow were positively associated over time, their mean levels remained, to a large degree, at the same level across time. The level-wise spiraling that represented the loss cycle between job resources and flow occurred only within one subgroup. Within the level-wise trajectory the mean levels of job resources and flow decreased at the same time, and thus, in an empirical sense, it was impossible to state the direction of the causal process between these constructs.

Altogether, these results may reflect the stressful change situation that the studied organization was facing. According to the COR theory (Hobfoll, 1989), people in such situations focus on the maintenance of their resources. This theoretical assumption was supported by the results of the present study that pointed more at stability of the job resources than at change. The stability and the change of resources was also linked to the initial level of resources, as posited in the COR theory (Hobfoll, 1989). Those who possessed high initial levels of job resources and flow (i.e., employees among trajectories ‘moderate’ or ‘high work-related resources’) retained the original obtained level. When the initial level was lower, as was in the case of the ‘declining work-related resources’ trajectory, a loss cycle occurred – in line with the COR theory. In the case of change, the loss cycle was detected. However, the loss cycle did not manifest itself in the trajectory that had the lowest initial levels of job resources and flow. According to Hobfoll (1989), in the case of loss, people reevaluate and revalue decreased resources, and it could be that the job resources and flow were not the valued and emphasized resources among this trajectory. For example, not everyone expects that a job produces positive experiences of well-being, such as flow; instead, they are satisfied when a job fulfils their financial needs (see, e.g., Hyvönen, Feldt, Salmela-Aro, Kinnunen, & Mäkikangas, 2009). It also needs to be remembered that the lack of flow experience at work does not necessarily indicate that employees in this trajectory suffer from symptoms of ill-health.

Exhaustion and the work motivation process

The results further showed, consistent with our hypothesis, that exhaustion was an important covariate that predicted the levels of job resources and flow. It was found that employees' level of exhaustion was negatively related to the levels of job resources and flow at work: the lower the level of exhaustion in the first measurement, the higher the level of both job resources and flow at work. In addition, the level of exhaustion predicted the membership of latent trajectory classes of job resources and flow. Thus, those with a low level of exhaustion were more likely to be in the trajectory of high job resources and flow. On the contrary, those employees with a high level of exhaustion were more likely to be in the trajectory of low or decreasing job resources and flow. There was some weak indication that exhaustion acted as the trigger for the loss cycle (see Hobfoll, 1989, 2002) that led to a gradient decrease of resources, as the trajectory results showed. However, the role of exhaustion in the loss cycle over time is difficult to evaluate because, in this study, it was only measured in the first study phase.

The moderation hypothesis did not gain empirical support. Thus, exhaustion did not affect the relationship between job resources and flow. The hypothesis was based on contention that energetic and enthusiastic employees may benefit more from the high job resources situation in terms of flow. However, the absence of exhaustion symptoms does not necessary indicate high levels of occupational well-being (see, e.g., Keyes, 2005; Schaufeli *et al.*, 2002). It might be that other factors, such as personality characteristics, would be more relevant moderators in the relationship between job resources and flow, as found in earlier studies (Demerouti, 2006; Eisenberger *et al.*, 2005).

Limitations and strengths

There are several limitations, which should be taken into account in generalizing the results of the present study. The first limitation of this study concerns the use of purely self-reported data, which is prone to response styles, personality characteristics, and affective states (see, e.g., Kompier, 2005). The next limitation is related to the possible attrition and response rate of the sample. The response rates of the longitudinal data varied from 49% to 69% and, despite the attrition analysis, there is always the possibility that the sample was somehow selective regarding some unmeasured variables. In addition, the employees in the present study were followed during a relatively short-time period. Concerning the short-term nature of the flow construct, further studies with even shorter time period between the measurements seem to be needed. In addition, longitudinal research with more than three measurement points would offer more flexible possibilities to estimate change and its shape over time.

Furthermore, the analyses of the present study were based on composite variables instead of measurement models. Due to this solution some specific associations between the different subscales of the studied constructs may have been masked. Moreover, the present study focused on the role of baseline mental health, that is, exhaustion, in employees' work-related resources. However, other factors, such as personality characteristics may also play important role in the relationship between job characteristics and work-related well-being (see, e.g., Mäkikangas & Kinnunen, 2003). In addition, more information about the work-related negative changes would have shed light on the obtained trajectory solution. Furthermore, the results of this study are based on one organization that was going through several changes. Thus, the association of job resources and flow at work should be also tested by using data from different types of organizations.

Despite these limitations, the major strengths of this study include the novel statistical methods employed and the use of three-wave data, which is still relatively rare in occupational studies. Earlier longitudinal studies of work motivation processes have been based primarily on the variable-orientated approach. However, when analysing a long-term development, a single stability coefficient does not say much about dynamic developmental processes, as Fraley and Roberts (2005) have pointed out. Therefore, this study used the LGC and GMM in order to analyse more thoroughly the relationship between job resources and flow. The LGC analysis gave us information about the overall change of job resources and flow and their association at the (whole) sample level. The GMM analysis made a more complete picture by detailing and investigating groups of employees that differed according to their level and change in job resources and flow.

Conclusions

The present study offers new information about employee motivation by analysing the relationship between job resources and work-related flow from a dynamic and person-oriented viewpoint. We found that job resources and flow closely entwine with each other, and their changes also go hand in hand, although different subgroups that diverged in terms of their mean level and their change direction were detected. In addition, according to this study, exhaustion is an important element in explaining the level and also the direction of work motivation. Thus, in order to increase the possibility of experiencing flow at work, it is important to reduce feelings of exhaustion. This might occur, for example, through decreasing job demands, such as time pressure (see, e.g., Lee & Ashforth, 1996).

This study was a first attempt to analyse the work motivation process of job resources and flow using a person-oriented perspective. In the future, more studies using this approach are needed in order to understand work motivation paths more accurately. In answering such questions, the use of statistical methods that facilitate the proper analysis of individual differences and change across time are needed and recommended. There already exist a few recent studies utilizing these kinds of methods inspecting the development of employee well-being (Feldt, Hyvönen, Mäkikangas, Kinnunen, & Kokko, 2009; Hätinen *et al.*, 2009). In the organizational psychology context, the study of trajectories offer information about which work-related variables intertwine, thereby increasing our knowledge for identifying the employees who are at risk for encountering well-being problems at work. Similarly, the study of trajectories adds knowledge about protective factors at work, that is, what kind of factors make people flourish in their work.

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