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Article *in* Journal of Vocational Behavior · August 2008

DOI: 10.1016/j.jvb.2008.01.003

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Positive gain spirals at work: From job resources to work engagement, personal initiative and work-unit innovativeness

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Received 24 September 2007
Available online 1 February 2008

Abstract

The present cross-lagged panel study aimed to investigate the energizing power of job resources and related gain spirals. Drawing on Hobfoll's Conservation of Resources (COR) theory's rarely tested assumptions of cumulative resource gains and gain spirals a reciprocal process was expected: (1) job resources lead to work engagement and work engagement leads to personal initiative (PI), which, in turn, has a positive impact on work-unit innovativeness, and (2) work-unit innovativeness leads to PI, which has a positive impact on work engagement, which finally predicts future job resources. The study was based on a two-wave 3-year panel design among 2555 Finnish dentists. Structural equation modeling was employed to study cross-lagged associations. The results mainly confirmed our hypotheses: positive and reciprocal cross-lagged associations were found between job resources and work engagement and between work engagement and PI. In addition, PI had a positive impact on work-unit innovativeness over time.

Keywords: Job resources; Work engagement; Personal initiative; Innovativeness; Positive psychology; Well-being at work; Conservation of resources theory; Cross-lagged panel analysis; Dentists

1. Introduction

In modern organizations, employees are expected to be engaged in their work, show initiative and be innovative, and to achieve this, organizations should arrange working conditions with sufficient motivating and energizing resources (Schaufeli & Salanova, 2006). In the current study, we propose that the positive strengths in work life may cluster together resulting in resource gains and upward spirals in individual employees as well as in their work communities. To gain actual information regarding these assumptions, we investigated the reciprocal cross-lagged effects between task-level job resources, work engagement, personal initiative, and work-unit innovativeness using two-wave 3-year follow-up data among Finnish dentists.

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doi:10.1016/j.jvb.2008.01.003

1.1. Job resources can lead to resource caravans

The impact of various resources on well-being has been widely acknowledged. For example, Stevan Hobfoll's influential Conservation of Resources (COR) theory assumes that various resources are salient factors in gaining new resources and enhancing well-being (Hobfoll, 1998, 2001; Westman, Hobfoll, Chen, Davidson, & Lasky, 2004). According to the theory, resources are things that people value and therefore strive to obtain, retain, and protect. In addition, one of the sub-principles of the COR theory posits that whereas those with fewer resources are more vulnerable to resource loss, those with greater resources are, correspondingly, less vulnerable to resource loss and more capable of resource gain (Hobfoll, 2001). This signifies a general tendency for enrichment of resources among those with initial resource reservoir with the consequence that increasing resources tend to form resource caravans (Hobfoll, 2002).

Similarly, in the occupational context, the Job Demands–Resources model (JD-R model; Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) has underlined the motivational and wellness-promoting potential of job-related resources. The JD-R model posits that various job demands (e.g. time pressure, emotional workload, problems in physical work environment) may lead to resource loss, such as health problems and drainage of employee's energy resources in the form of, for instance, burnout. On the other hand, the JD-R model also suggests that job resources (e.g. autonomy, immediate feedback, and rewards) are especially salient for resource gain, for example, true well-being and motivation at work, also termed work engagement. Thus, regarding resource losses and gains the JD-R model can be viewed as a specific work-related application of the more general and parsimonious COR theory.

Demerouti and her colleagues (2001) have defined *job resources* as those physical, psychological, social, or organizational aspects of the job that not only potentially reduce the negative effects of job demands and help to achieve work goals but may also stimulate personal growth, learning and development – and positive state of work engagement. *Work engagement* is defined as a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption (Schaufeli, Salanova, González-Roma, & Bakker, 2002). *Vigor* refers to high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence in the face of difficulties. *Dedication* is characterized by a sense of significance, enthusiasm, inspiration, pride, and challenge. The third defining characteristic of engagement is identified as *absorption*, a sense of being fully concentrated and happily engrossed in one's work, so that time passes quickly and detaching oneself from work may seem difficult.

Research shows that job resources indeed are important antecedents of work engagement. For example, Mauno and her colleagues (Mauno, Kinnunen, & Ruokolainen, 2007) found that job control and organization-based self-esteem were the best lagged predictors of the three dimensions of work engagement among Finnish health care personnel. In an experimental study, Llorens, Schaufeli, Bakker, and Salanova (2007) showed that task resources (time and method control) predicted work engagement via efficacy. In addition, among Finnish teachers several job resources, such as job control, supervisor support, access to information, and good organizational climate, were positively associated with work engagement (Hakanen, Bakker, & Schaufeli, 2006). Moreover, by boosting work engagement, job resources may also initiate far-reaching motivational processes that extend beyond employee well-being. Studies by Schaufeli and Bakker (2004) and Hakanen and his colleagues (2006) showed that job resources had a positive impact on various indicators of organizational commitment through work engagement. In addition, Salanova, Agut, and Peiró (2005) found that work engagement mediated the impact of organizational job resources on performance and on customer loyalty.

In the current study that derives its foundation from the COR theory, we expect that while job resources will predict increased work engagement, work engagement will predict future personal initiative. *Personal initiative* (PI) refers to active and initiative-taking behaviour that goes beyond the formal requirements at work. More specifically, PI: (1) is consistent with the organization's mission, (2) has long-term focus, (3) is goal directed and action oriented, (4) is persistent when facing barriers or setbacks, and (5) is self-starting and proactive (Frese, Fay, Hilburger, Leng, & Tag, 1997). As a characteristic, PI is positively associated with performing well both in formal and informal tasks (Fay & Frese, 2001). Psychologically, the link from work engagement to PI can also be argued from the perspective of the broaden-and-build theory of positive

emotions (Fredrickson, 2000). According to this theory, positive emotions broaden people's momentary thought-action repertoires and build their enduring personal resources. Feeling good sparks willingness to play, try things out, and experiment. This kind of initiative and creative activity fosters new ideas, novel solutions, and optimal functioning not just momentarily, but also in the long-term (Fredrickson, 2000). Thus, employees experiencing a positive state of emotional and motivational fulfilment at work, also termed work engagement, may over time acquire more initiative. We were able to locate two studies supporting this assumption. When interviewing engaged employees, Schaufeli and his colleagues (2001) found that these people were especially active in taking initiative at work. In addition, Sonnentag (2003) found that psychological recovery during leisure time predicted higher work engagement, which in turn positively predicted PI.

Finally, we expect that individual resource gains from job resources to work engagement and from work engagement to PI will boost work-unit innovativeness. In this study, we use the concept of innovativeness to refer to the perceptions of innovative behaviour and climate in one's team or work-unit: discussing work tasks, means and goals in the workplace, making constant functional improvements, and getting feedback and proposals for improvement from clients. In previous studies, PI has been positively associated with individual innovative behavior (Miron, Erez, & Naveh, 2004; Ohly, Sonnentag, & Pluntke, 2006), and innovative organizational culture (Miron et al., 2004). The importance of individual innovativeness for work-unit innovativeness has also been established in previous studies (Bharadwaj & Menon, 2000; West & Anderson, 1996).

We constructed the following hypotheses related to resource gains:

Hypothesis 1a. Task-level job resources have a positive cross-lagged effect on work engagement.
Hypothesis 1b. Work engagement has a positive cross-lagged effect on PI.
Hypothesis 1c. PI has a cross-lagged, positive effect on perceptions of work-unit innovativeness.

1.2. Gain spirals

So far, we have hypothesized a cumulative resource gain process from job resources to future work-unit innovativeness. Furthermore, we expect to find gain spirals between the study variables: in addition to the hypothesized causal effects, it may be hypothesized that reversed causal effects can also be detected between the study variables. For example, not only is it assumed that work engagement fosters PI, but PI may also predict future work engagement. Supporting the possibility of reciprocal relationships, Zapf, Dormann, and Frese (1996) found in their review on longitudinal studies on organizational stress at least some indications for a reverse causal effect in approximately half of the studies that tested reversed relationships. Support for the expected reciprocal effects can also be found from the propositions of "loss spirals" and "gain spirals" in the COR theory. According to Hobfoll (1998, 2001), those who lack resources are not only more vulnerable to resource loss, but initial loss also begets future loss. Conversely to this "loss spiral," those who possess resources are more capable of gain, and in addition, initial resource gain begets future gain thus generating "gain spirals." According to COR, these gain cycles are plausible, because when initial gains are made still greater resources become available: with resource surpluses employees and work-units are less vulnerable and able to invest more resources that are not required for everyday functioning or reserve capacity (Hobfoll, 1998, p. 82).

However, research has thus far shown more interest in resource losses and loss spirals than gain spirals (e.g. De Lange, Taris, Kompier, Houtman, & Bongers, 2004; Demerouti, Bakker, & Bulters, 2004). One explanation for this could be that the COR theory emphasizes the primacy of loss processes, which are expected to be quicker and more impactful than gain cycles (Hobfoll, 2001). Another reason could lie in the general dominance of negative aspects in psychology in relation to positive psychology (Luthans, 2002). We were able locate two longitudinal studies supporting "gain spirals." Salanova, Bakker, and Llorens (2006) have shown that school teachers' personal and organizational resources led to positive flow experiences at work, while flow at work predicted personal and organizational resources. In another study, Llorens et al. (2007) found that task resources contributed to the work engagement of students, and work engagement increased task resources over time. Both these relationships were mediated by efficacy beliefs.

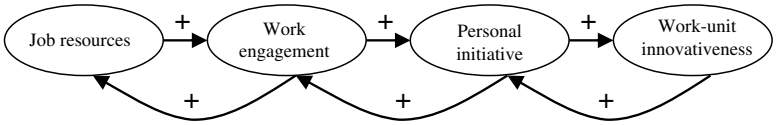

Fig. 1. Theoretical model.

Following the assumptions of gain spirals, we expected that (1) work-unit innovativeness would promote PI, (2) PI would promote work engagement, and (3) work engagement would foster later task-level job resources. Although the positive consequences of innovativeness are sparsely examined (Anderson, de Dreu, & Nijstad, 2004) work-unit innovativeness can be expected to be positively related to future PI. Work-unit innovativeness may encourage employees and support new ways of doing things at work, being proactive, and going beyond the formal requirements of the job. The reversed associations from PI to work engagement and from work engagement to job resources would mean that the more an employee takes initiative, the more engaged he or she will become, and, in turn, more engaged employees may assess their job resources more positively and be more capable of acquiring and mobilizing new job resources. With view to reversed causal relationships and gain spirals, we formulated the following hypotheses:

Hypothesis 2a. The perception of work-unit innovativeness has a positive cross-lagged effect on PI.
Hypothesis 2b. PI has a positive cross-lagged effect on work engagement.
Hypothesis 2c. Work engagement has a positive cross-lagged effect on task-level job resources.

Taken together, the study model consisting of the hypothesized cross-lagged reciprocal relationships is depicted in Fig. 1.

2. Methods

2.1. Participants and procedure

Data was first gathered through a postal questionnaire survey between January and April 2003 and again between January and April 2006. An interval of 3 years for the follow-up was based on practical decisions and financial arrangements, and could not be influenced by the researchers. In the first phase, the questionnaire was posted to every working-age member of Finnish Dental Association ($N = 4531$) covering 98% of all Finnish dentists. At baseline, 71% ($N = 3255$) returned the questionnaire. The follow-up study 3 years later had access to address information of 3035 first-phase respondents. In the follow-up, 84% ($N = 2555$) returned the questionnaire.

Approximately half of Finnish dentists are employed in the public sector, while the other half work in private sector dental practices. Typical dental workplaces may involve dentists, dental specialists, e.g. oral surgeons or orthodontists, dental hygienists and assistants, receptionist(s), equipment maintenance assistant(s), and possibly some other related occupations. In this study we focused on dentists who were not working solo. Of the respondents in this study ($N = 2066$ after deletion of missing values), 85% worked in an organization that also involves other dentists and 98% worked with assisting personnel. We tested selective drop-outs by comparing the demographics and the study variables of participants who responded to the queries at both time T1 and T2 to those who had participated at T1 only ($N = 697$). Women were slightly over-represented in the follow-up data, as 73.5% were women, compared to 64.3% among the non-respondents ($\chi^2(1) = 22.86$, $p < 001$). Also younger dentists participated more actively in the follow-up (mean ages 45.5 years vs 46.9 years; $F(1) = 12.79$, $p < .001$) probably implying that the oldest participants had retired before T2. In addition, the respondents at T2 showed somewhat greater dedication than non-respondents ($F(1) = 4.55$, $p < .05$). However, the groups did not differ on the basis of the three job resources, vigor, absorption, PI, nor perceived work-unit innovativeness. Therefore, we assume that selective drop-out did not bias our results.

2.2. Measures

Job resources. The three job resources included in this study were derived from the Dentists' Experienced Job Resources Scale (DEJRS; Gorter, te Brake, Eijkman, & Hoogstraten, 2006), which is specifically aimed at identifying and investigating job resources in dentistry. DEJRS is based on previous studies known to be job resources in dentistry, and it has been validated among large samples of dentists in the Netherlands (Gorter et al., 2006) and also in Finland (Hakanen, 2004; Hakanen, Bakker, & Demerouti, 2005). *Craftsmanship* consisted of three items, comprising the possibility to work with one's hands, being creative, and combining medical and technical aspects. The Cronbach's alphas were $\alpha_{T1} = .71$ and $\alpha_{T2} = .72$. *Pride in the profession* included five items covering aspects such as pride, problem solving, and nature of the profession in itself. The Cronbach's alphas were $\alpha_{T1} = .74$ and $\alpha_{T2} = .77$. *Direct and long-term results* consisted of six items covering, for example, good treatment result, making a successful restoration, gaining the patients' trust, and patients using their teeth with pleasure again. The Cronbach's alphas were $\alpha_{T1} = .87$ and $\alpha_{T2} = .89$. The items were formulated so that the respondents could indicate the extent to which they perceived the descriptions (items) as personal resources at work (1 = very little or not at all, 5 = very much).

Work engagement was assessed with the Finnish version of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002). The validity of the Finnish version of the UWES has been demonstrated in previous research (Hakanen, 2002). The instrument includes three sub-scales; vigor, dedication, and absorption. *Vigor* was assessed with six items (e.g. "At my work, I feel bursting with energy"). *Dedication* was measured with five items (e.g. "I am enthusiastic about my job"). Finally, *Absorption* was assessed with six items (e.g. "I am immersed in my work"). The Cronbach's alphas for vigor were $\alpha_{T1} = .77$ and $\alpha_{T2} = .75$; for dedication $\alpha_{T1} = .87$ and $\alpha_{T2} = .86$; and for absorption $\alpha_{T1} = .81$ and $\alpha_{T2} = .84$. The items were rated on a seven-point scale ranging from 0 (never) to 6 (always).

Personal initiative (PI) was measured with four items adapted from Frese's self reported initiative scale (Frese et al., 1997). The items included, among others, "Whenever there is a chance to get actively involved, I take it" and "Usually I do more than I am asked to do". The Cronbach's alphas were $\alpha_{T1} = .75$ and $\alpha_{T2} = .77$. The items were scored on a five-point scale ranging from 1 (hardly ever or never) to 5 (very often or always).

Work-unit innovativeness scale was derived from the Finnish Healthy Organization Barometer (Lindström, Hottinen, & Bredenberg, 2000). The question "How often do the following aspects occur in your work unit?" preceded the following three statements to be rated accordingly: "We make constantly improvements in our work"; "Tasks, goals and means to goals are discussed together"; and "We gather feedback and ideas for improvements from customers." The Cronbach's alphas were .74 for α_{T1} and .74 for α_{T2}. The items were rated on a five-point scale of 1 (practically never) to 5 (very often).

2.3. Data analysis

In order to investigate the cross-lagged longitudinal analysis, we employed structural equation modeling (SEM) techniques using the AMOS 6.0 software package (Arbuckle, 2005). In the tested models *task-level job resources* were indicated by three scales (immediate and long-term results, pride in the profession, and craftsmanship). *Work engagement* was indicated by its sub-dimensions vigor, dedication, and absorption. *PI* was indicated by four items. Finally, *work-unit innovativeness* had three items as indicators. In order to test the resource caravan and gain spiral hypotheses with two waves, we applied the procedure suggested by Cole and Maxwell (2003) and Taris and Kompier (2006). With two-wave designs aiming at investigating mediated relationships, they recommend a pair of longitudinal tests: first, the causal relationship between the predictor A and the mediator B and second, the causal relationship between the mediator B and the outcome C. In our study, this procedure implied three cross-lagged tests: (1) investigating cross-lagged relationships between job resources and work engagement; (2) between work engagement and PI; and (3) between PI and work-unit innovativeness.

Furthermore, we applied the full panel design to investigate simultaneously causal and reversed causal effects by comparing several alternative models. First, the *stability model* (M_{stabil}) without any cross-lagged associations was tested. In this model, each latent variable at T1 is assumed to predict the same factor at

T2. Second, we made comparative analyses between M_{stabil}, the causality model (M_{causal}), the reversed causation model ($M_{reversed}$), and the reciprocal model ($M_{reciproc}$). For example, the first model tests with job resources and work engagement included (1) $M1_{stabil}$, in which only job resources at T1 predicted job resources at T2, and work engagement at T1 predicted work engagement at T2; (2) $M1_{causal}$, which included the autoregression paths in $M1_{stabil}$, and in addition, a cross-lagged path from job resources at T1 to work engagement at T2; (3) $M1_{reversed}$ included the paths in $M1_{stabil}$, and a cross-lagged path from work engagement at T1 to job resources at T2; and finally (4) $M1_{reciproc}$ which was a combination of $M1_{causal}$ and $M1_{reversed}$, suggesting that both job resources at T1 might predict work engagement at T2, and work engagement at T1 might predict job resources at T2. Similarly, we conducted cross-lagged analyses with work engagement and PI, and with PI and work-unit innovativeness. In addition, the synchronous correlations between the latent variables at T1 and error terms of latent variables at T2 were allowed in all tested models. Moreover, the error term of each indicator at T1 was allowed to covary with the corresponding error term at T2.

In this study, we used the Goodness-of-Fit Index (GFI) and the Root Mean Square Error of Approximation (RMSEA) as absolute goodness-of-fit indices. In addition, three relative fit indices were assessed: the Comparative Fit Index (CFI), the Normed Fit Index (NFI), and the Tucker–Lewis Index (TLI). RMSEA values smaller than .05 are indicative of an excellent fit, whereas values greater than .1 should lead to model rejection (Browne & Cudeck, 1993). For the other indices, as a rule of thumb, values greater than .90 (and preferably greater than .95) are considered to indicate a good fit (Hoyle & Panter, 1995; Hu & Bentler, 1999). We compared different competing nested models by means of chi-square difference test.

As preliminary analyses, we investigated whether the measures of job resources and work engagement could be distinguished empirically. In addition, we tested the overall measurement model and direct effects models included in the hypothesized model. First, because the job resource items were partly defined in terms of their effects, we investigated whether our measures of job resources and work engagement could be distinguished empirically. In order to do that, we compared a single-factor model (with six indicators comprising the scales of job resources and work engagement) with the expected two-factor model (the distinct albeit correlating "job resources" and "engagement" factors) separately at both times. Based on the results, the one-factor model showed very poor fit to the data, whereas the expected two-factor model showed excellent fit at both times. Therefore, we conclude that job resources and work engagement could be distinguished empirically.

Second, before testing the structural models, we estimated the measurement model for all observed and unobserved variables simultaneously. As can be seen from Table 2, the measurement model showed satisfactory fit to the data. Third, as a preliminary step in our structural analyses, we wanted to find support for the theoretical sequential resource gain model linking job resources through work engagement via PI to work-unit innovativeness. Therefore, we tested three direct effects models: (1) a model showing that job resources are directly related to work-unit innovativeness; (2) a model showing that job resources are directly related to PI; and (3) a model in which work engagement is directly related to work-unit innovativeness. As can be seen from Table 2, all three direct effects models showed good fit to the data. In addition, both job resources at T1 (st. β was .13, $p < .001$) and work engagement at T1 (st. β was .12, $p < .001$) had a cross-lagged impact on the final study outcome, work-unit innovativeness at T2. In addition, job resources had a direct lagged effect on PI (st. β was .09, $p < .001$).

3. Results

3.1. Descriptive statistics

Means, standard deviations, and intercorrelations between the study variables are presented in Table 1. All the study variables correlated positively with each other. The dimensions of work engagement correlated highly over 3 years (ranging from .67 to .71). Similarly, PI was rather stable over time (the Pearson correlation was .66). Out of the work engagement dimensions, dedication seemed to have the highest temporal and synchronous correlations with job resources, whereas vigor seemed to have the highest correlations with PI and vigor and dedication were similarly correlated with work-unit innovativeness.

Table 1
Means, standard deviations, and correlations between the study variables ($N = 2555$)

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Time 1																	
1. Pride in the profession $_{T1}$	3.75	.62															
2. Craftsmanship $_{T1}$	3.58	.80	.59														
3. Direct and long-term results $_{T1}$	4.33	.59	.60	.45													
4. Vigor $_{T1}$	4.52	1.03	.42	.40	.33												
5. Dedication $_{T1}$	4.99	1.06	.54	.45	.40	.73											
6. Absorption $_{T1}$	3.80	1.38	.34	.33	.24	.53	.52										
7. Personal initiative $_{T1}$	3.65	.66	.31	.31	.20	.46	.40	.31									
8. Work-unit innovativeness $_{T1}$	3.08	.78	.19	.15	.09	.23	.24	.14	.21								
Time 2																	
9. Pride in the profession $_{T2}$	3.76	.62	.66	.48	.48	.38	.46	.29	.30	.15							
10. Craftsmanship $_{T2}$	3.62	.78	.47	.68	.37	.37	.40	.30	.31	.12	.63						
11. Direct and long-term results $_{T2}$	4.30	.70	.43	.32	.60	.21	.27	.14	.12	.03	.52	.44					
12. Vigor $_{T2}$	4.59	.95	.39	.32	.28	.69	.57	.41	.41	.18	.44	.40	.28				
13. Dedication $_{T2}$	4.98	.98	.45	.36	.33	.57	.71	.40	.35	.18	.53	.45	.34	.74			
14. Absorption $_{T2}$	3.81	1.35	.30	.27	.21	.40	.39	.67	.27	.10	.34	.32	.20	.53	.50		
15. Personal initiative $_{T2}$	3.63	.66	.29	.31	.17	.41	.36	.29	.66	.18	.35	.37	.15	.51	.43	.35	
16. Work-unit innovativeness $_{T2}$	3.08	.78	.20	.17	.10	.20	.21	.13	.19	.52	.24	.18	.09	.25	.25	.14	.23

Correlations |>|.08 are statistically significant, $p < .001$.

3.2. Cross-lagged relationships between the study variables

The study model consisted of four latent variables measured twice with their respective manifest indicators. To test our hypotheses, we performed cross-lagged analyses comparing alternative models in three steps: (1) between job resources and work engagement, (2) between work engagement and PI, and (3) between PI and work-unit innovativeness.

As a first step in testing our hypotheses, we investigated the cross-lagged associations between job resources and work engagement. Table 2 shows that the reciprocal model assuming reciprocal cross-lagged effects between job resources and work engagement ($M1_{reciproc}$) fitted to the data better than the stability model ($M1_{stabil}$; $\Delta\chi^2 = 23.64$, $\Delta df = 2$, $p < .001$), the causality model ($M1_{causal}$; $\Delta\chi^2 = 8.03$, $\Delta df = 1$, $p < .01$), or the reversed causation model ($M1_{reversed}$; $\Delta\chi^2 = 10.25$, $\Delta df = 1$, $p < .001$). This means that, as expected, job resources at T1 had a positive cross-lagged effect on work engagement at T2 (st. β was .08, $p < .001$) and, in addition, work engagement at T1 had a reversed positive effect on job resources at T2 (st. β was .08, $p < .01$) even after the temporal autoregressive effects of the latent variables were controlled for (see Fig. 2). Thus, job resources and work engagement reciprocally influenced each other over the 3-year study period.

In the next step, we investigated the cross-lagged associations between work engagement and PI. Table 2 illustrates that again the reciprocal model assuming cross-lagged effects between work engagement and PI ($M2_{reciproc}$) fitted to the data better than the stability model ($M2_{stabil}$; $\Delta\chi^2 = 54.45$, $\Delta df = 2$, $p < .001$), the causality model ($M2_{causal}$; $\Delta\chi^2 = 15.61$, $\Delta df = 1$, $p < .001$), or the reversed causation model ($M2_{reversed}$; $\Delta\chi^2 = 29.11$, $\Delta df = 1$, $p < .001$). Accordingly, Fig. 3 shows that work engagement at T1 had a positive cross-lagged effect on PI at T2 (st. β was .13, $p < .001$), and reciprocally, PI at T1 had a reversed positive effect on work engagement at T2 (st. β was .09, $p < .001$). Hence, work engagement and PI reciprocally and positively predicted each other over time.

Finally in the third step, we tested the cross-lagged associations between PI and work-unit innovativeness. As indicated in Table 2, the causality model including a cross-lagged path from PI to work-unit innovativeness ($M3_{causal}$) was superior to the stability model ($M3_{stabil}$; $\Delta\chi^2 = 22.90$, $\Delta df = 1$, $p < .001$). It also had better fit indices compared with the reversed causation model ($M3_{reversed}$). The reciprocal model ($M3_{reciproc}$) did not improve the model fit ($\Delta\chi^2 = 0.20$, $\Delta df = 1$, ns), and work-unit innovativeness did not significantly predict future PI after the temporal autoeffect of PI was controlled for. According to the best fitting model $M3_{causal}$

Table 2
Fit statistics for the study models ($N = 2555$)

Model	Model description	χ^2	*df*	GFI	CFI	NFI	TLI	RMSEA	Model comparisons	$\Delta\chi^2$	Δdf
M_m	Measurement model	1817.16	265	0.94	0.94	0.93	0.93	0.053			
M_{dir1}	Direct effect from job resources to PI	315.24	65	0.98	0.98	0.98	0.97	0.043			
M_{dir2}	Direct effect from job resources to work-unit innovativeness	134.26	43	0.99	0.99	0.99	0.99	0.032			
M_{dir3}	Direct effect from work engagement to work-unit innovativeness	110.75	43	0.99	0.99	0.99	0.99	0.023			
Cross-lagged relationships between task-level job resources and work engagement											
$M1_{stabil}$	Stability model	198.19	44	0.98	0.99	0.98	0.98	0.041			
$M1_{causal}$	Causality model ($M1_{stabil}$ + job resources → work engagement)	182.58	43	0.98	0.99	0.99	0.98	0.040	$M1_{stabil}$ vs $M1_{causal}$	15.61^{***}	1
$M1_{reversed}$	Reversed causation model ($M1_{stabil}$ + work engagement → job resources)	184.21	43	0.98	0.99	0.99	0.99	0.040	$M1_{stabil}$ vs $M1_{reversed}$	13.38^{***}	1
$M1_{reciproc}$	Reciprocal model ($M1_{causal}$ + $M1_{reversed}$)	174.55	42	0.99	0.99	0.99	0.99	0.039	$M1_{stabil}$ vs $M1_{reciproc}$	23.64^{***}	2
									$M1_{causal}$ vs $M1_{reciproc}$	8.03^{**}	1
									$M1_{reversed}$ vs $M1_{reciproc}$	10.25^{**}	1
Cross-lagged relationships between work engagement and PI											
$M2_{stabil}$	Stability model	415.10	66	0.97	0.98	0.97	0.97	0.051			
$M2_{causal}$	Causality model ($M2_{stabil}$ + work engagement → PI)	376.25	65	0.97	0.98	0.98	0.97	0.048	$M2_{stabil}$ vs $M2_{causal}$	38.84^{***}	1
$M2_{reversed}$	Reversed causation model ($M2_{stabil}$ + PI → work engagement)	389.76	65	0.97	0.98	0.97	0.97	0.049	$M2_{stabil}$ vs $M2_{reversed}$	25.34^{***}	1
$M2_{reciproc}$	Reciprocal model ($M2_{causal}$ + $M2_{reversed}$)	360.64	64	0.98	0.98	0.98	0.97	0.047	$M2_{stabil}$ vs $M2_{reciproc}$	54.45^{***}	2
									$M2_{causal}$ vs $M2_{reciproc}$	15.61^{***}	1
									$M2_{reversed}$ vs $M2_{reciproc}$	29.11^{***}	1
Cross-lagged relationships between PI and work-unit innovativeness											
$M3_{stabil}$	Stability model	231.09	66	0.98	0.98	0.98	0.98	0.035			
$M3_{causal}$	Causality model ($M3_{stabil}$ + PI → work-unit innovativeness)	208.19	65	0.99	0.99	0.98	0.98	0.033	$M3_{stabil}$ vs $M3_{causal}$	22.90^{***}	1
$M3_{reversed}$	Reversed causation model ($M3_{stabil}$ + work-unit innovativeness → PI)	230.79	65	0.98	0.98	0.98	0.98	0.035	$M3_{stabil}$ vs $M3_{reversed}$	0.3 ns	1
$M3_{reciproc}$	Reciprocal model ($M3_{causal}$ + $M3_{reversed}$)	207.99	64	0.99	0.99	0.98	0.98	0.033	$M3_{stabil}$ vs $M3_{reciproc}$	23.10^{***}	2
									$M3_{causal}$ vs $M3_{reciproc}$	0.20 ns	1
									$M3_{reversed}$ vs $M3_{reciproc}$	22.80^{***}	1

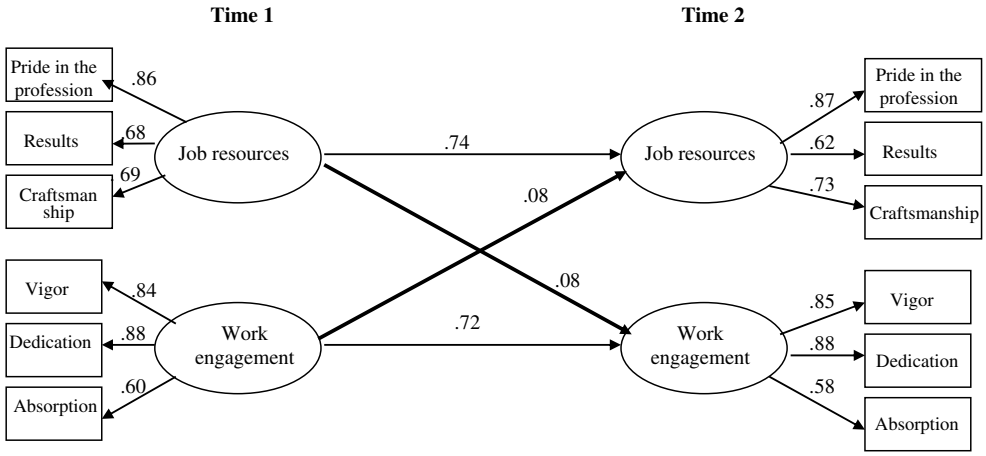

Fig. 2. The final model of the statistically significant cross-lagged relationships between task-level job resources and work engagement ($N = 2555$).

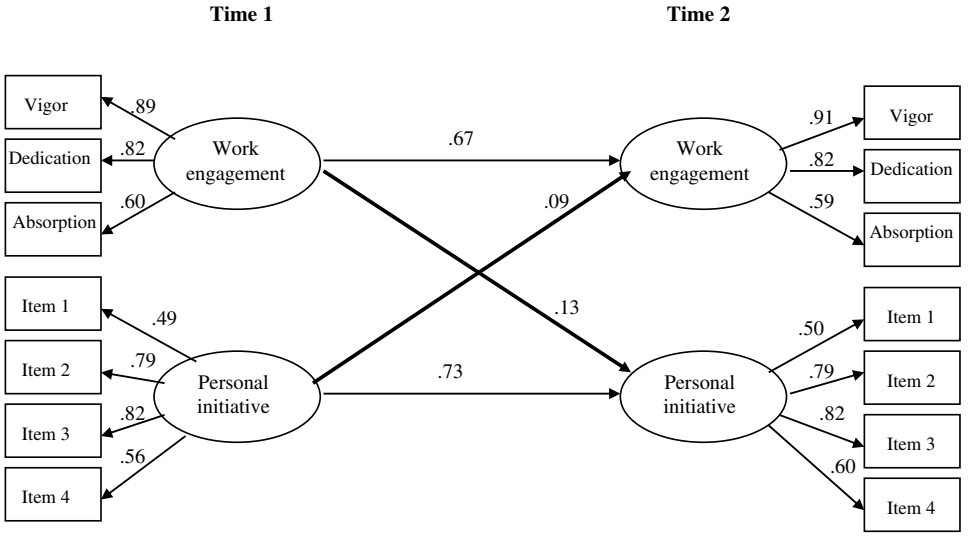

Fig. 3. The final model of the statistically significant cross-lagged relationships between work engagement and PI ($N = 2555$).

(see Fig. 4), PI at T1 had a positive cross-lagged effect on work-unit innovativeness at T2 (st. β was .12, $p < .001$). Thus, PI positively influenced work-unit innovativeness, which, however, did not affect PI.

To summarize, the cross-lagged panel analyses indicated that job resources at T1 predicted work engagement at T2, work engagement at T1 predicted PI at T2, and PI at T1 further predicted work-unit innovativeness at T2. Thus, hypotheses 1a–1c concerning cumulative resource gains were confirmed. In addition, we found partial support for the gain spiral hypotheses. In addition to cross-lagged causal effects, reversed causal effects of PI at T1 were detected on work engagement at T2 (hypothesis 2b), and of work engagement at T1 on job resources at T2 (hypothesis 2c). However, work-unit innovativeness at T1 displayed no reversed effect on PI at T2 (hypothesis 2a).

4. Discussion

The aim of this two-wave 3-year cross-lagged panel study among Finnish dentists was to examine positive resource caravans and gain spirals at work. In particular, our purpose was twofold: (1) to study resource gain

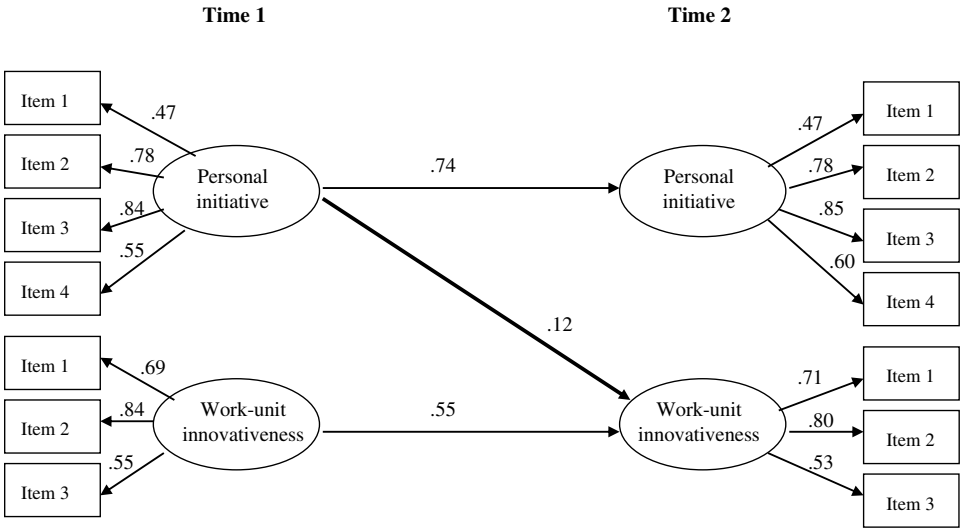

Fig. 4. The final model of the statistically significant cross-lagged relationships between PI and work-unit innovativeness ($N = 2555$).

hypothesis, or explore whether or not job resources lead to future work engagement, work engagement to future PI, and finally PI to future work-unit innovativeness and (2) to investigate gain spiral hypothesis, in other words, whether reciprocal cross-lagged relationships can be found between job resources and work engagement, between work engagement and PI, and between PI and work-unit innovativeness.

The results of structural equation modeling mainly confirmed our hypotheses. Individual gain spirals were found as task-level job resources predicted work engagement and work engagement predicted PI over time. In addition, PI positively influenced work engagement, and work engagement had a positive impact on future job resources. Furthermore, PI predicted perceptions of work-unit innovativeness, suggesting that individual resources at work can be contagious and transmit to the wider context of work-unit. These results support the COR theory (Hobfoll, 1998, 2001), which states that gaining and losing resources tend to be cumulative—those who have more resources are more likely to gain more while those with less resources to begin with are more prone to lose resources, whether the resources are material, psychological, or social. According to Hobfoll (1998, p. 82), motivation to gain comes from a desire to improve oneself or the social system and may also be intended to offset future potential loss. The cumulative nature of resources produces two types of cumulative gain. The gain process found in this study from job resources through work engagement via PI to work-unit innovativeness represents a *resource caravan*, in which one type of resource enhances other resources in a chain-like process.

The second type of cumulative gain of resources can be drawn as a *spiral* or a cycle in which two or more resources reciprocally strengthen each other. Mostly, the results of this study confirmed our assumption about reciprocal relationships between the study variables. Task-level job resources and work engagement on the one hand, and PI and work engagement on the other, were positively and reciprocally related over time. However, contrary to our expectations, work-unit innovativeness did not predict PI over time. All in all, these results are consistent with previous studies showing reciprocal gain spirals between personal and job resources and work engagement both in the occupational context (Salanova et al., 2006) and among students (Llorens et al., 2007).

In addition to finding support for resource caravans and gain spirals, the current study revealed some interesting associations between the investigated phenomena that previously have been found mainly in cross-sectional studies. First, this study has contributed to the understanding of work engagement, a relatively new concept of truly positive occupational well-being, and the JD-R model (Demerouti et al., 2001; Schaufeli & Bakker, 2004), which posits that different job resources are the prime antecedents of work engagement. Until now, this relation has been only tentatively confirmed in longitudinal panel data. Mauno and her colleagues (2007) found predictive relations between job control, organization-based self-esteem, management quality, and the three dimensions of work engagement in a 2-year follow-up study. However, after controlling for

the baseline work engagement only one of the nine tested relationships between job resources and dimensions of work engagement (job control at T1 predicted dedication at T2) was statistically significant. The present study found support both for the cross-lagged effect of job resources on work engagement and of work engagement on job resources 3 years later. It is plausible that engaged employees may recognize and assess the existing job resources more positively than employees with a lower level of engagement. Moreover, an engaged employee may also be more capable of mobilizing and actively developing new job resources.

Second, we found positive reciprocal relationships between work engagement and PI. Previously it has been found that a high level of day-level work engagement helps employees to take initiative (Sonnentag, 2003). In addition, experimental studies have shown that positive emotions may trigger more flexible thinking and openness to information (Estrada, Isen, & Young, 1997) and help creative problem solving (Isen, Daubman, & Nowicki, 1987). In a similar vein, positive states such as work engagement can be expected to promote the ability to actively observe and change one's environment; both important qualities of PI (Frese et al., 1997). However, our results showed that not only may work engagement have a positive effect on PI, but initiative-taking may also foster work engagement. Enjoying absorption in work and experiencing vigor and dedication facilitates extra-role behaviour, such as taking initiative at work. In addition, perhaps employees with high PI seek and find motivating new challenges in their work and succeed in solving problems efficiently thus achieving good performance (Fay & Frese, 2001), which then fosters feelings of vigor and dedication.

Third, we found a positive cross-lagged path from PI to work-unit innovativeness. More comprehensively, we found that individual gain spirals between task-level job resources, work engagement, and PI had a positive influence on perceptions of work-unit innovativeness. Thus, with this study, we have aimed at responding to the call for longitudinal studies and process models leading to innovativeness (Anderson et al., 2004; Länsisalmi, Kivimäki, Aalto, & Ruoranen, 2006). According to Fredrickson (2000), personal upward spirals are important to organizational transformations because positive emotions are contagious and because they stem from and create meaningful interpersonal encounters in workplaces. Along with positive emotions, the broadened cognitive and action repertoires, such as PI, assumingly link experiences of individual employees and long-range indicators of optimal organizational functioning. In addition, several studies show that PI has been closely related to innovative behavior (Miron et al., 2004; Ohly et al., 2006), innovative organizational culture (Miron et al., 2004), and change orientation (Fay & Frese, 2001).

Finally, we hypothesized that work-unit innovativeness would reciprocally influence PI in the future. However, in contrast to our hypothesis, the path from work-unit innovativeness to PI was not found. The present study has shown the motivating and energizing influence of task-level job resources in dentistry. It is possible that work-unit innovativeness as an organizational-level resource factor is not sufficiently important to dentists to further trigger individual gain spirals. A core feature in dentist's work is autonomy, and accordingly, previous studies have underlined the importance of task resources for wellness in this profession (Hakanen, 2004). However, investigating the individual-level consequences of innovativeness remains a challenge for innovation studies (Anderson et al., 2004).

4.1. Limitations

This study has some limitations. First, all our measures were based on self-reports, thus causing a concern for a common method bias. In future research combining self-report measures with more objective measures would offer additional strength in testing our hypotheses. For example, Frese and his colleagues (1997) recommend measuring PI with an aggregated scale consisting of interview-based scales. In addition, it would be interesting to study gain spirals in relation to actual work-unit innovations rated by external expert raters (West & Anderson, 1996). The longitudinal design of our study for its part diminishes the risk for the common method bias (Doty & Glick, 1998).

Second, we tested our process model with four sequential factors in a longitudinal design with only two time points, but the model as a whole was not tested at any point. Additional analyses showed that the same results with only minor differences in path coefficients could be achieved by testing the whole model simultaneously with the cross-lagged design. However, because this procedure is not recommended when using two-wave study designs, the significance of the support provided by it to our analyses remains limited. Hence, although it was possible to examine in a full panel each pair of cross-lagged associations, testing the study

model in a more comprehensive way would have required four waves. However, two waves enabled the examination of both causal and reversed causal relationships as suggested by Zapf and his colleagues (1996) thus exceeding the major shortage of cross-sectional studies.

Third, the cross-lagged effects found in this study were relatively small. While too short time lags may lead to the conclusion that no causal effects exist, too long time lags will lead to an underestimation of the true causal impact (Zapf et al., 1996). Our study design was based on two time points with a 3-year interval, which may have undermined the cross-lagged effects. In addition, in our study models, we controlled for the autoregressive effect of each latent variable at T1 on the same variable at T2 (Gollob & Reichardt, 1991). The rather stable nature of many psycho-social concepts often means that the predictors fail to account for additional variance in the outcome variable (Taris & Kompier, 2006). Thus, most of the variance in T2 job resources, work engagement, PI, and work-unit innovativeness were, unsurprisingly, explained by baseline situation in the respective variables. However, in spite of the moderate effect sizes, the fit indices of the hypothesized models and the model comparisons showed good fit to the data, thus supporting assumptions of resource gains and resource spirals.

Fourth, and related to the above limitation, we were not able to estimate the optimal time-lag nor decide on the chosen study period on theoretical basis. For example, it could be that an adequate time-lag for the effect from job resources to work engagement to occur may be different to the time period required for PI to influence innovativeness in work-units. In their multi-wave study, Dormann and Zapf (2002) concluded that time lags of at least 2 years would be the most recommendable when analysing effects of social stressors at work on irritation and depressive symptoms. Although the variables investigated in their study were different from ours, both studies examined working conditions and well-being, which are known to be rather stable over time. Moreover, the good fit indices of the structural models in our study suggest at least that the 3-year time-lag was reasonable. Furthermore, according to COR resource gains and gain spirals are expected to have less momentum than loss spirals and therefore they may be assumed to constitute rather long-term processes (Hobfoll, 1998, p. 82; Holahan, Moos, Holahan, & Cronkite, 1999).

The fifth limitation of this study concerns the measure of work-unit innovativeness. The latent variable was indicated by only three items. Moreover, we were able to use only individual perceptions of innovativeness in the work-units or teams. Dental care workplaces are typically small units with few employees. Therefore, we assume that individual perceptions may reflect shared experiences of innovativeness. Evidently, more reliable measures of work-unit innovativeness would include work-unit level information on this aspect.

In conclusion, our study has assumed the perspective of positive organizational psychology, emphasizing the importance of resources and strengths at work and opportunities for growth (e.g. Luthans, 2002). Although the present study focused on one profession, dentists, we believe that the findings based on solid theoretical grounds can be extended to other occupational sectors, too. Depending on the professional sector and the work situation, the most salient job resources can be identified in order to strengthen them. Improving these job resources may trigger gain spirals that are beneficial both to employees and organizations.

Acknowledgments

This study was supported by the Finnish Work Environment Fund (Grant No. 105325) and the Finnish Dental Association.

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