

How dentists cope with their job demands and stay engaged: the moderating role of job resources

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This study focuses on job demands, job resources, and work engagement among 1,919 Finnish dentists employed in the public sector. Based on the *Job Demands – Resources* model, it was first predicted that the inverse relationship between job demands (e.g. workload, physical environment) and work engagement would be weaker when dentists had many resources (e.g. variability in the required professional skills, peer contacts). Second, using the *Conservation of Resources* theory it was hypothesized that job resources are most beneficial in maintaining work engagement under conditions of high job demands. The data were based on a postal questionnaire with a response rate of 71%. The dentists were split into two random groups in order to cross-validate the results. A set of hierarchical regression analyses resulted in 17 out of 40 significant interactions (40%). Four out of 20 possible interaction effects could be cross-validated showing, for example, that variability in professional skills mitigated the negative effect of qualitative workload on work engagement and, in addition, boosted work engagement when the qualitative workload was high. The main conclusion is that job resources are useful in coping with the high demands in dentistry and help dentists to stay engaged.

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Dentistry is a stressful occupation (1, 2). Moreover, several studies have shown that burnout (i.e. a job stress syndrome characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment) is by no means rare among dentists (3–7). In addition, a good deal is known about the job demands associated with job stress and burnout. A literature review (8) reported that demanding patient interactions, workload, time pressure, physical demands, and inflicting pain or fear have been identified as possible causes of job stress in dentistry. However, little is known about how dentists manage to cope with their job demands and stay engaged in their work.

The present study focuses on dentists working in the Finnish public sector. The dental law reforms recently carried out in Finland are of particular concern for dentists working in the public sector. The reforms have meant that, since December 2002, every Finnish citizen has a right to dental healthcare support by society. It was legislated that dental healthcare support should be provided through two channels: (i) clients can use the services of private dentists and get health insurance compensation, or (ii) clients can use the services of community dental health care. However, clients' financial responsibility is clearly higher in the private sector. Consequently, the dental services in the public sector have become congested. In addition, there has been a

shift from preventive work towards acute and emergency care, and the work pace of dentists in the public sector has increased after the reform. For example, 43% of dentists employed in the public sector (as compared with 5% in the private sector) reported that since the reform, acute and emergency care has increased to a large extent and, at the same time, 48% of the dentists in the public sector (17% in the private sector) stated that the demand for dental services has increased (9).

Within this context, the present study focuses on work engagement – the presumed positive antipode of burnout (10, 11). Engagement is defined as a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption (12). 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 refers to a sense of significance, enthusiasm, inspiration, pride, and challenge. The third dimension of engagement is absorption, which is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly.

The Job Demands–Resources (JD-R) model (13, 14) is used to examine how engaged dentists cope with their job demands. Accordingly, dentists' working conditions can be classified into two broad categories producing work-related wellbeing, namely 'job demands' and 'job

resources'. Job demands refer to those characteristics of the job that potentially evoke strain, in the event that they exceed the employee's adaptive capability. These have also been called work stressors. Job resources refer to those physical, psychological, social, or organizational aspects of the job that: (i) reduce job demands and the associated physiological and psychological costs, (ii) are functional in achieving work goals, or (iii) stimulate personal growth, learning and development.

The JD-R model can be seen as an expansion of previous job stress models (15, 16) because it is able to integrate many different demands and resources, independently of the occupational group under consideration. In addition, the model is flexible because it allows a focus on both general and profession-specific job demands and resources (17). Obviously, the demands and resources in dentistry are different from those of many other highly educated professionals.

A central hypothesis in the JD-R model is that job resources may buffer the impact of job demands on work-related wellbeing. In general, research on job stress among dentists has been restricted to identifying the crucial job demands, thereby ignoring the potential buffering and motivating role of job resources. Research among other professionals has shown that job resources such as performance feedback, social support, and opportunities for self-growth can indeed play an important role by diminishing the influence of job demands on burnout (18). The following hypothesis – job resources moderate the negative relationship between job demands and work engagement (vigor, dedication, and absorption), so that the negative relationship between job demands and work engagement will be weaker for dentists with high (vs. low) resources – was evaluated. While previous studies suggested that resources like job autonomy could moderate the impact of job demands for the majority of jobs (15), in the present study, it is suggested that all kind of resources can – by definition – have a buffering effect. However, some job resources may be more important in some occupations than in others (e.g. positive patient contacts for dentists).

Interestingly, previous research in other domains has suggested that resources may be particularly salient under stressful conditions (19, 20). According to the conservation of resources (COR) theory (21–23), people seek to obtain, retain, and protect what they value (e.g. material, social, personal, or energetic resources). This theory proposes that stress experienced by individuals can be understood in relation to potential or actual loss of resources. HOBFOLL & SHIROM (24) have argued that: (i) individuals must bring in resources in order to prevent the loss of resources, (ii) individuals with a greater pool of resources are less susceptible to resource loss, (iii) those individuals who do not have access to strong resource pools are more likely to experience increased loss ('loss spiral'), and (iv) strong resource pools lead to the greater likelihood that individuals will seek opportunities to risk resources for increased resource gains ('gain spiral'). HOBFOLL (22) has additionally argued that resource gain, in turn and in itself has only a modest effect, but instead acquires its saliency in the context of

resource loss. On the basis of the COR theory and previous research, a second hypothesis was formulated: job resources will be more strongly related to work engagement (vigor, dedication and absorption) when dentists are confronted with high levels of job demands.

Materials and methods

Participants and context

This study was part of the first phase of a longitudinal research project 'Work-related wellbeing among Finnish dentists', which focuses on the psycho-social working conditions, work–family interface, and wellbeing and health in dentistry. The data for the study were obtained from a questionnaire survey, which was aimed at every dentist who was a member of the Finnish Dental Association (FDA) at the time of the data gathering (beginning of 2003). About 98% of working-aged dentists employed in clinical work in Finland are members of the FDA (25). In total, 71% ($n = 3,255$) of the Finnish dentists responded to the questionnaire (9). Using the membership registers of the FDA, it was impossible to detect the exact proportion of dentists working in the public and private sectors. It is estimated that the percentage of dentists is $\approx 50\%$ in each sector. In total, 60% of the respondents were employed in the public sector, suggesting that the response rate for this sector was somewhat higher than for the private sector.

The respondents of the present study were representative of the Finnish dentists in terms of age and gender. Of all respondents ($n = 3255$), 71% were women (mean age 45.8 yr), whereas 68% of the FDA members are women (mean age 46.7 yr). The percentage of Swedish-speaking dentists was 5.2% in the study, compared with 5.3% among all Finnish dentists (9). As the present study focused on dentists working in the public sector, we describe their characteristics in the Results section.

Measurement instruments

Work Engagement was assessed using the Finnish version of the Utrecht Work Engagement Scale (UWES) (12). The factorial validity of the Finnish version of the UWES has been demonstrated in previous research (26). In addition, previous studies carried out in other countries have shown that the UWES has satisfactory psychometric properties (11, 12). Work engagement seems to share about one-quarter to one-third of its variance with job burnout, thus showing the distinctiveness and the relatedness of the two constructs (12). The instrument includes three subscales: 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'). Items were rated on a seven-point scale ranging from 0 (never) to 6 (always). The scores on the three subscales were summed to form one index of work engagement (27) with Cronbach's $\alpha = 0.90$.

Job demands. Four job demands were included in this study. Qualitative workload is a scale derived from the Dentists' Experienced Work Stressors Scales (DEWSS) developed by GORTER *et al.* (28). Respondents were requested to indicate the stressfulness of six scenarios (e.g. 'the risk of making mistakes', and 'inflicting pain'). Items

were scored on a five-point scale, ranging from 1 (very little) to 5 (very much). The scale was highly reliable, Cronbach's $\alpha = 0.84$. Physical environment is a scale widely used by the Finnish national bureau for statistics (Statistics Finland) in surveys covering the whole population of working age (29). This scale consists of nine items measuring the perceived adversity of different aspects in the physical work environment (e.g. 'chemicals', 'noise', and 'quality of indoor air') that were rated on a five-point scale of 1 (not at all) to 5 (very much). In the present study, the reliability of this scale was Cronbach's $\alpha = 0.78$. Emotional dissonance is a scale developed by ZAPF *et al.* (30). The scale included four items, including 'How often in your job do you have to display feelings that do not agree with your actual feelings towards the clients?', that were rated on a five-point scale of 1 (very rarely/never) to 5 (very often/several times an hour). The scale had satisfactory reliability, Cronbach's $\alpha = 0.86$. Negative changes is a seven-item scale developed by HAKANEN (9) to measure the impact of the law reform to one's work and worksite. The topics covered by the items were work pace, work climate, threat to professional competence, work motivation, quality of the dental services, leadership, and the overall impact on work. The impact of the changes could be indicated on a five-point scale ranging from 1 (very positive) to 5 (very negative). This was again a reliable scale, Cronbach's $\alpha = 0.84$.

Job resources. Five job resources were included in this study. 'Job control' was measured with KARASEK'S (31) scales of skill discretion and decision latitude. It includes nine items, such as 'My job allows me to make a lot of decisions on my own'. The items are scored on a five-point scale, of 1 (strongly agree) to 5 (strongly disagree). The scale was highly reliable, $\alpha = 0.81$. 'Innovativeness' is a scale derived from the healthy organization barometer (HOB) (32, 33). The scale includes three items, for example: 'We often do the following aspects occur in your work? ... We regularly make improvements in our work' [(the items were rated on a five-point scale of 1 (never) to 5 (very often))]. The Cronbach's alpha was 0.74. The three other job resources were assessed with scales that were adapted from TE BRAKE (34). 'Variability of required professional skills' includes three items (e.g. 'the possibility to work with one's hands', and 'the opportunity to combine medical and technical aspects at work'); 'peer contacts' is measured with four items (e.g. 'interacting with colleagues', and 'possibilities for advanced training'); and 'positive patient contacts' includes three items (e.g. 'the enthusiasm and spontaneity of children'). TE BRAKE (34) formulated the items such that respondents could indicate the extent to which the descriptions (items) were personal resources at work. The items were rated on a five-point scale of 1 (very little or not at all) to 5 (very much). The reliabilities (Cronbach's α) of the latter three scales were 0.71, 0.78, and 0.71, respectively.

The answers were coded such that higher scores indicated higher job demands, as well as elevated levels of job resources, and work engagement. For the scales that were translated for this study (qualitative workload, emotional dissonance, variability, peer contacts and positive patient contacts) translation/back-translation procedures were applied to ensure the quality of the translation.

Statistical analyses

True interaction effects are typically difficult to detect in non-experimental designs because of limited statistical

power (35). Therefore, relatively large samples are needed for the effects to be significant. On the other hand, very large sample sizes may produce trivial, albeit significant, interactions (in other words Type I error, i.e. failure to reject significance when no significance exists). In this study, we had acquired data from nearly 2,000 dentists, so we decided to split the data into two random groups, and cross-validated our findings in order to avoid Type I error and capitalization on chance (36). The 'random sample of cases' – a procedure included in the SPSS statistical package – was employed in the randomization. Before carrying out the (regression) analyses, we explored whether the demand and resource variables used in this study could be distinguished empirically. Exploratory factor analyses showed that the items for the working conditions loaded on nine independent factors, as expected. All factors had eigenvalues larger than one, and together they explained 56.2% of the variance, thus supporting the proposed factor structure.

Results

Sample description

Of all the participants in the present study ($n = 1,919$), 76.5% were women. The mean age was 44.7 yr (SD = 8.7). The average number of working years as a dentist was 18.5 yr (SD = 9.3). On average, the participants worked 36.5 h per wk (SD = 7.2).

Descriptives

Table 1 shows the means, standard deviations, and the correlations of the variables used in this study. The means of the study variables did not differ for the two random groups of dentists. None of the correlations was > 0.50 , confirming that the variables did not overlap to a considerable extent.

Job demands, job resources, and engagement

Hierarchical regression analyses were employed to investigate the role of the four job demands and five job resources, and to test both hypotheses: (1) the hypothesized moderating effect of job resources on the relationship between job demands and work engagement, and (2) the predicted higher salience of job resources under conditions of high demands. The moderator analyses were carried out in line with the procedure suggested by AIKEN & WEST (37). Therefore, all the job demand and job resource variables were first centered around their means, and the interaction terms were computed. In each hierarchical regression, age and gender were first included in the model. In the second step, a specific job demand and a specific job resource were added to the model. Finally, in the third step, the interaction term of a specific job demand and resource was included.

As can be seen from Tables 2–5, job demands were consistently negatively related to work engagement, while job resources were positively associated with engagement. In addition, as predicted by the JD-R

Table 1

Means, standard deviations (SDs), and correlations between the study variables in the first randomized group of dentists ($n_1 = 959$)

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender (1 = female, 2 = male)														
2. Age	44.9	8.72	0.06											
3. Qualitative Workload	2.76	0.74	-0.14	0.09										
4. Physical Work Environment	2.63	0.65	-0.14	-0.05	0.32									
5. Emotional Dissonance	2.55	0.81	-0.08	-0.02	0.32	0.27								
6. Negative Changes	3.12	0.48	-0.02	0.06	0.19	0.29	0.17							
7. Job Control	3.98	0.54	0.11	0.03	-0.24	-0.28	-0.24	-0.31						
8. Innovativeness	3.01	0.80	0.04	0.06	-0.13	-0.21	-0.17	-0.21	0.32					
9. Variability	3.48	0.79	0.06	-0.03	-0.22	-0.03	-0.15	-0.07	0.34	0.14				
10. Positive Patient Contacts	3.77	0.77	-0.23	-0.03	0.02	0.09	-0.17	0.00	0.10	0.06	0.32			
11. Peer Contacts	3.81	0.67	-0.16	-0.13	-0.06	0.00	-0.11	-0.14	0.25	0.27	0.34	0.37		
12. Work Engagement	4.32	1.03	-0.01	-0.06	-0.22	-0.18	-0.20	-0.21	0.42	0.23	0.41	0.30	0.37	

Correlations of ≥ 0.12 are statistically significant at the $P < 0.001$; correlations between 0.09 and 0.11 are statistically significant at the $P < 0.01$ level; and correlations between 0.07 and 0.08 are statistically significant at the $P < 0.05$ level.

Table 2

Means, standard deviations (SDs), and correlations between the study variables in the second randomized group of dentists ($n_2 = 960$)

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender (1 = female, 2 = male)														
2. Age	44.6	8.77	0.12											
3. Qualitative Workload	2.78	0.77	-0.17	0.10										
4. Physical Work Environment	2.62	0.63	-0.15	-0.10	0.42									
5. Emotional Dissonance	2.54	0.79	-0.06	-0.01	0.33	0.23								
6. Negative Changes	3.11	0.46	-0.09	0.10	0.22	0.25	0.18							
7. Job Control	3.98	0.55	0.11	0.03	-0.22	-0.25	-0.18	-0.33						
8. Innovativeness	3.08	0.81	0.05	0.10	-0.06	-0.16	-0.02	-0.15	0.30					
9. Variability	3.50	0.80	0.01	-0.08	-0.14	0.02	-0.15	-0.19	0.37	0.15				
10. Positive Patient Contacts	3.77	0.83	-0.23	-0.03	0.07	0.10	-0.14	-0.03	0.04	0.04	0.33			
11. Peer Contacts	3.79	0.68	-0.16	-0.12	0.03	0.07	-0.11	-0.10	0.22	0.21	0.34	0.41		
12. Work Engagement	4.37	0.98	-0.04	-0.06	-0.29	-0.11	-0.17	-0.21	0.41	0.20	0.49	0.24	0.29	

Correlations of ≥ 0.12 are statistically significant at the $P < 0.001$; correlations between 0.09 and 0.11 are statistically significant at the $P < 0.01$ level; correlations between 0.07 and 0.08 are statistically significant at the $P < 0.05$ level.

model, job resources were generally more strongly associated with engagement (vigor, dedication, and absorption) than job demands. Importantly, after controlling for the main effects of job demands and resources, the interaction term explained a unique, albeit limited, amount of the variance in work engagement. More specifically, 11 out of 20 interaction effects (55%) were significant for the first group of dentists, and six out of 20 interaction effects (30%) were significant for the second group. This means that altogether 17 out of 40 possible interaction terms (40%) were significantly associated with engagement. All the job resources had a buffer effect on the relationship between at least one of the job demands and work engagement, whilst all the job demands interacted at least with one of the job resources in either group. Finally, the cross-validation of the results of Group 1 in Group 2 shows that four out of 20 potential interactions (20%) were significant. More specifically, positive patient contacts buffered the effect of qualitative workload and an unfavorable physical work environment on work engagement in both groups. Additionally, variability in the required professional

skills mitigated the effect of qualitative workload, and peer contacts diminished the negative relationship between work changes and engagement (Tables 3–6).

To further examine the direction of the interaction effects, graphical representations of the moderation effects were produced using the procedure of simple slope analyses (35, 37). Predicted values of work engagement were computed for two groups, namely for those who scored 1 standard deviation below and above the mean, respectively, on the predictor and moderator variables. After that, figures representing the form of the moderations were drawn. All the interaction effects were in the expected direction and supported both hypotheses: the negative relationship between job demands and work engagement was weaker for dentists with many (vs. few) resources; and job resources were particularly salient under conditions of high job demands. For example, when the qualitative workload was high or when there were problems in the physical work environment, positive patient contacts acted as buffers against the negative impact of these job demands on work engagement. In a similar vein, peer contacts and high variability in the

Table 3

Regression of work engagement on qualitative workload and five job resources in two random groups of dentists ($n_1 = 959$ and $n_2 = 960$)

Step	Model	Group 1			Group 2		
		β	R ² change	F change	β	R ² change	F change
1	Age	-0.06*			-0.04		
	Gender	-0.08*	0.005	2.11	-0.11***	0.005	2.34
2	Qualitative workload	-0.12***			-0.21***		
	Job control	0.38***	0.21	112.15***	0.37***	0.19	128.73***
3	Qualitative workload \times Job control	0.05	0.00	2.36	0.02	0.00	0.42
1	Age	-0.05			-0.04		
	Gender	-0.05	0.005	2.28	-0.09**	0.00	2.05
2	Qualitative workload	-0.19***			-0.29***		
	Innovativeness	0.21***	0.09	46.49***	0.19***	0.12	64.01***
3	Qualitative workload \times Innovativeness	0.05	0.00	3.02	0.00	0.00	0.01
1	Age	-0.04			0.00		
	Gender	-0.05	0.005	2.23	-0.09**	0.005	2.41
2	Qualitative workload	-0.13***			-0.23***		
	Variability in the required professional skills	0.36***	0.19	108.01***	0.45***	0.29	194.09***
3	Qualitative workload \times Variability in the required professional skills	0.09**	0.007	8.72**	0.06*	0.005	4.85*
1	Age	-0.05			-0.03		
	Gender	0.01	0.005	2.23	-0.03	0.005	2.37
2	Qualitative workload	-0.23***			-0.33***		
	Positive patient contacts	0.29***	0.13	69.65***	0.25***	0.15	81.72***
3	Qualitative workload \times Positive patient contacts	0.08**	0.006	6.89**	0.10**	0.01	11.59**
1	Age	-0.01			0.00		
	Gender	0.00	0.005	2.23	-0.05	0.005	2.41
2	Qualitative workload	-0.20***			-0.31***		
	Peer contacts	0.33***	0.16	88.24***	0.28***	0.17	94.47***
3	Qualitative workload \times Peer contacts	0.06*	0.005	3.94*	0.04	0.00	1.59

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$.

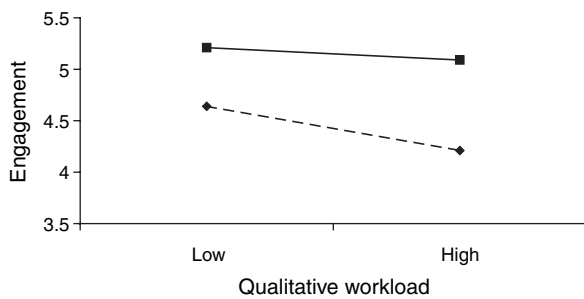


Fig. 1. Interaction effect of qualitative workload and variability in the required professional skills on engagement. ■: high variability in the required professional skills; ◆: low variability in the required professional skills.

required professional skills particularly boosted work engagement when there were many negative work changes and when the qualitative workload was high, respectively. Figures 1–4 display the job demands–resources interactions.

Discussion

Where previous research focused, in particular, on job demands and burnout among dentists (3, 4), the present study examined how Finnish dentists managed to cope with their job demands and stay engaged in their work.

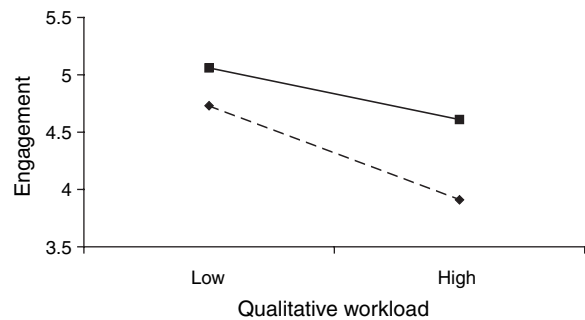


Fig. 2. Interaction effect of qualitative workload and positive patient contacts on engagement. ■: high positive patient contacts; ◆: low positive patient contacts.

Consistent with our hypotheses based on the JD-R model (13, 14), the results showed that resources at work – such as positive patient contacts, variability in professional skills, and peer contacts – are able to diminish the negative influence of job demands on work engagement. Thus, dentists felt vigorous and strong, dedicated to their work, and immersed in their tasks, despite high job demands, such as qualitative workload, emotional dissonance and a negative influence of the law reform on one’s work and worksite, but only if their job resources were relatively high. These findings offer a theoretical basis for a central hypothesis in the JD-R model, and are in line with previous research focusing on job burnout (17, 18).

Table 4

Regression of work engagement on physical work environment and five job resources in two random groups of dentists ($n_1 = 959$ and $n_2 = 960$)

Step	Model	Group 1			Group 2		
		β	R ² change	F change	β	R ² change	F change
1	Age	-0.07*			-0.07*		
	Gender	-0.06*	0.00	1.44	-0.09**	0.005	2.43
2	Physical work environment	-0.07*			-0.05		
	Job control	0.41***	0.19	107.06***	0.44***	0.17	98.85***
3	Physical work environment \times Job control	0.00	0.00	0.00	-0.10**	0.01	9.59**
1	Age	-0.07*			-0.08*		
	Gender	-0.04	0.00	1.57	-0.06	0.005	2.12
2	Physical work environment	-0.13***			-0.09**		
	Innovativeness	0.20***	0.07	37.00***	0.20***	0.05	24.67***
3	Physical work environment \times Innovativeness	0.06a	0.003	2.87a	-0.07*	0.005	4.67*
1	Age	-0.06*			-0.03*		
	Gender	-0.05a	0.00	1.68	-0.06a	0.005	2.52a
2	Physical work environment	-0.16***			-0.13***		
	Variability in the required professional skills	0.38***	0.19	113.55***	0.48***	0.25	161.22***
3	Physical work environment \times Variability in the required professional skills	0.09**	0.007	8.11**	0.06a	0.003	3.67a
1	Age	-0.06*			-0.07*		
	Gender	0.03	0.00	1.63	0.00	0.005	2.47a
2	Physical work environment	-0.21***			-0.15***		
	Positive patient contacts	0.31***	0.13	68.92***	0.25***	0.08	38.41***
3	Physical work environment \times Positive patient contacts	0.10**	0.01	10.12**	0.07*	0.005	5.17*
1	Age	-0.02			-0.04		
	Gender	0.02	0.00	1.63	-0.02	0.005	2.52a
2	Physical work environment	-0.18***			-0.14***		
	Peer contacts	0.34***	0.15	85.30***	0.29***	0.09	49.30***
3	Physical work environment \times Peer contacts	0.07*	0.005	4.93*	0.00	0.00	0.01

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$; a, $P < 0.10$.

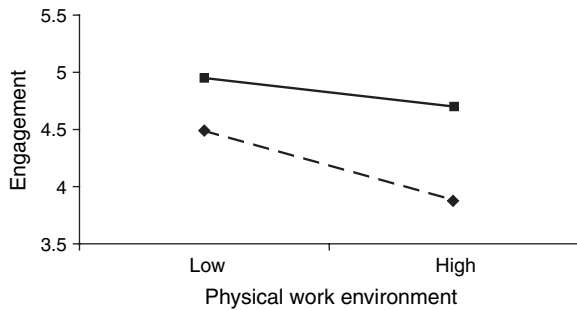


Fig. 3. Interaction effect of physical work environment and positive patient contacts on engagement. ■: high positive patient contacts; ◆: low positive patient contacts.

Put differently, dentists benefited most from their job resources (in terms of work engagement) under conditions of high demands. This finding is in line with previous research in other domains (19, 20), and with the COR theory (22). It suggests that resources in dentistry gain salience and relevance under stressful conditions (i.e. when they are most needed). The practical implication of these findings is that dentists should try to mobilize their job resources in order to stay engaged in their work (something that can be learned during their education). Results suggest, for example, that dentists with sufficient job control, who try to consistently improve their work (innovativeness), are best able to deal

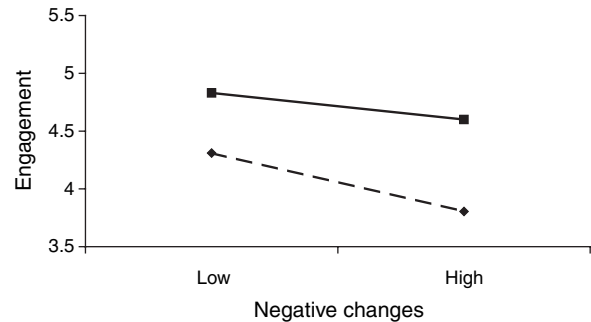


Fig. 4. Interaction effect of negative changes and peer contacts on engagement. ■: high peer contacts; ◆: low peer contacts.

with their job demands. This is all the more relevant since the recent Finnish dental law reform has had a major influence on dental practice, particularly in the public sector. For example, HAKANEN (9) found that the work pace of Finnish dentists has become clearly tighter after the reform, and there has been a shift from preventive work towards acute and emergency care.

The data used in this study originated from members of the FDA. The response rate was high (71%) for a mailed questionnaire and this reduced the possible selection bias owing to non-response. In addition, the proportion of respondents working in the public sector (the sector on which we based our analyses) was estimated to be somewhat higher than that in the total

Table 5

Regression of work engagement on emotional dissonance and five job resources in two random groups of dentists ($n_1 = 959$ and $n_2 = 960$)

Step	Model	Group 1			Group 2		
		β	R ² change	F change	β	R ² change	F change
1	Age	-0.08**			-0.06*		
	Gender	-0.07*	0.005	2.36a	-0.09**	0.006	2.69a
2	Emotional dissonance	-0.10**			-0.09**		
	Job control	0.39***	0.19	110.92***	0.38***	0.18	102.61***
3	Emotional dissonance \times Job control	0.06a	0.003	3.62a	0.06a	0.003	3.57a
1	Age	-0.08*			-0.08*		
	Gender	-0.04	0.005	2.41a	-0.05	0.005	2.41a
2	Emotional dissonance	-0.16***			-0.17***		
	Innovativeness	0.20***	0.08	41.84***	0.20***	0.07	34.58***
3	Emotional dissonance \times Innovativeness	0.07*	0.005	5.01*	0.01	0.00	0.03
1	Age	-0.07*			-0.03		
	Gender	-0.05a	0.005	2.48a	-0.05a	0.006	2.77a
2	Emotional dissonance	-0.13***			-0.09**		
	Variability in the required professional skills	0.38***	0.20	116.14***	0.48***	0.26	161.43***
3	Emotional dissonance \times Variability in the required professional skills	0.11***	0.01	13.90***	0.04	0.001	1.66
1	Age	-0.07*			-0.07*		
	Gender	0.03	0.005	2.46	0.02	0.006	2.77a
2	Emotional dissonance	-0.17***			-0.13***		
	Positive patient contacts	0.29***	0.13	67.67***	0.24***	0.09	43.17***
3	Emotional dissonance \times Positive patient contacts	0.10**	0.01	10.07**	0.01	0.00	0.07
1	Age	-0.03			-0.04		
	Gender	0.02	0.005	2.46a	0.00	0.006	2.77a
2	Emotional dissonance	-0.17***			-0.14***		
	Peer contacts	0.34***	0.16	85.47***	0.28***	0.10	53.51***
3	Emotional dissonance \times Peer contacts	0.05a	0.003	3.06a	0.02	0.00	0.26

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$; a, $P < 0.10$.

population, suggesting that the response rate among our study group was even higher. This indicates that the results can be generalized to the whole group of public dentists.

A question that can be raised regarding the findings of this study is whether they could be generalized to dentists employed in the private sector and in other countries. While it is possible that the specific interactions cannot be replicated in other samples (as specific working conditions may prevail in each particular job), the findings of the present study suggest that some job resources will be able to buffer the effects of specific job demands. This is all the more likely because the interactions could be replicated in two randomly created samples in the present study and because they could also be found in other samples, such as Dutch employees of a large institute for higher education (18). Nevertheless, it is important that future studies replicate the job demands-resources interactions found in the present study.

It is evident that a cross-sectional study design has several disadvantages. One drawback is that it is impossible to make causal statements because of temporal ambiguity, which means that the time-points when engagement occurred and when job demands and resources were most prevalent are unknown. Assessment of working conditions after employees have come to a state of work engagement may also affect responses to questions about the working environment and thus cause

response bias (with engaged dentists rating their working environment more positive). There are, however, facts that limit the role of such biases in the present data. First, the participants are representative of the whole population of Finnish dentists working in the public sector. Second, it seems unlikely that work engagement can predict the exact combinations of job demands and resources (interaction terms) found in the current study. Third, the findings were clearly in line with two theories, namely the JD-R model (13, 14) and the COR theory (22). However, it is possible that alternative explanations account for the present findings. For instance, the experience of work engagement may partly be the result of certain personal characteristics, such as optimism or emotional intelligence. Future research should investigate the role of such personal resources in the relationship between working conditions and engagement.

In Finland, dentistry is a particularly demanding job for dentists employed in the public sector. However, as known from previous research, dentistry is also a stressful occupation in other countries where the dental services are built on a private basis. Therefore, there are good reasons to assume that the main findings of the present study in the public sector are valid also in other countries with a different dental care system.

The understanding of the role of job resources in maintaining engagement under conditions of high job demands may offer new insights for the prevention of job

Table 6

Regression of work engagement on negative changes and five job resources in two random groups of dentists ($n_1 = 959$ and $n_2 = 960$)

Step	Model	Group 1			Group 2		
		β	R ² change	F change	β	R ² change	F change
1	Age	-0.08*			-0.04		
	Gender	-0.06*	0.006	2.59a	-0.08**	0.004	1.71
2	Negative changes	-0.10**			-0.09**		
	Job control	0.41***	0.19	105.00***	0.39***	0.17	91.63***
3	Negative changes \times Job control	-0.03	0.001	0.81	-0.03	0.001	0.66
1	Age	-0.07*			-0.04		
	Gender	-0.03	0.006	2.74a	-0.05	0.003	1.45
2	Negative changes	-0.16***			-0.18***		
	Innovativeness	0.20***	0.08	40.65***	0.17***	0.07	33.45***
3	Negative changes \times Innovativeness	0.02	0.00	0.23	0.01	0.00	0.06
1	Age	-0.05a			0.00		
	Gender	-0.05a	0.006	2.70a	-0.05a	0.004	1.77
2	Negative changes	-0.18***			-0.13***		
	Variability in the required professional skills	0.38***	0.21	120.03***	0.45***	0.25	149.07***
3	Negative changes \times Variability in the required professional skills	0.08*	0.005	6.32*	0.03	0.00	0.95
1	Age	-0.06a			-0.03		
	Gender	0.05	0.006	0.2.71a	0.01	0.004	1.77
2	Negative changes	-0.21***			-0.19***		
	Positive patient contacts	0.31***	0.14	73.31***	0.25***	0.10	50.54***
3	Negative changes \times Positive patient contacts	0.03	0.001	1.04	-0.03	0.001	0.85
1	Age	-0.02			-0.01		
	Gender	0.03	0.006	2.71a	-0.01	0.004	1.77
2	Negative changes	-0.18***			-0.18***		
	Peer contacts	0.32***	0.16	84.60***	0.27***	0.10	50.89***
3	Negative changes \times Peer contacts	0.07*	0.004	4.75*	-0.07*	0.004	4.15*

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$; a, $P < 0.10$

stress and burnout among dentists and/or the facilitation of their work engagement. By improving the working environments of dentists (e.g. by increasing their access to job resources), we can enhance dentists' feelings of vigor, dedication, and absorption. This can be achieved with job enrichment approaches (38) and the job resources to start with could be to increase variability in the required skills, to open communication channels to facilitate contact with colleagues, and to create the conditions that enhance positive contact with clients. The insights of the present study can also be utilized by professional dental associations (e.g. for optimizing the guideline for good practice, and for the design of the dental curriculum). The present findings have indeed been used to adjust the Finnish guideline for creating good workplaces for dentists. This new guideline has been posted to all members of Finnish Dental Association. Such practical applications may not only enhance the quality of dentists' working life, but also the quality of the services they offer to their clients.

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