Title: Work-related stress, job satisfaction, and quality of work life among cardiovascular nurses in Italy: Structural equation modeling.

Running head: Cardiovascular care and organizational wellbeing.

Zaghini Francesco [a], Biagioli Valentina [b], Fiorini Jacopo [a], Piredda Michela [c], Philip Moons[d] & Sili Alessandro [a]*

Authors' affiliation:

[a] *Department of Nursing Professions, University Hospital of Tor Vergata, Viale Oxford, 81, 00133, Rome, Italy.*

[b] *Department of Medicine and Psychology, Sapienza University, Piazzale Aldo Moro 5, 00185, Rome, Italy.*

[c] *Research Unit Nursing Science, Campus Bio-Medico di Roma University, Via Álvaro del Portillo, 200, 00128, Rome.*

[d] *Department of Public Health and Primary Care, KU Leuven, Kapucijnenvoer 35 PB 7001, 3000 Leuven Belgium.*

***Corresponding author:**
Dr Jacopo Fiorini
Policlinico di Tor Vergata
Viale Oxford, 81
00133 – Roma
fiorini.jcp@gmail.com
Tel. +39 06 2090 8175
Orcid ID 0000-0002-4964-8794

CRediT author statement

Zaghini F.: Conceptualization, Methodology, Visualization, Writing – Original Draft, Data Curation, Investigation, Formal analysis, Software. **Biagioli V.:** Conceptualization, Methodology, Visualization, Writing – Original Draft, Data Curation, Formal analysis, Software. **Fiorini J.**: Methodology, Visualization, Validation, Writing – Original Draft, Data Curation, Investigation. **Piredda M.**: Conceptualization, Methodology, Visualization, Validation, Writing - Review & Editing. **Moons P.:** Conceptualization, Methodology, Writing – Original Draft, Visualization**. Sili A.**: Conceptualization, Methodology, Writing – Original Draft, Visualization, Project administration, Supervision.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for profit sectors.

Conflict of interest

The authors declare that there is no conflict of interest.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

N. words: 3220

N. table: 3

N. figure: 1

Abstract

Aim: To investigate the simultaneous effects of work-related stress and job satisfaction on cardiovascular nurses' quality of work life.

Background: Prior research has investigated nurses' work-related stress, job satisfaction, and quality of work life as separate aspects and not in specific nursing settings, such as cardiovascular wards. Cardiovascular care settings can be particularly stressful for nurses, who are often faced with distress, depression and patients and caregivers' physical and psychological exhaustion.

Methods: A multicenter cross-sectional study was conducted among 1,126 cardiovascular nurses from 10 hospitals in Italy. Work-related stress, job satisfaction, and quality of work life were measured using valid and reliable questionnaires. Structural equation modeling was performed.

Results: Nurses working in critical cardiac care units experienced more stress than their colleagues working in other cardiac units. Nurses working in cardiac outpatient clinics reported lower quality of work life than those working in other cardiac settings. There was a negative relationship between work-related stress and nurses' quality of work life, which was partially mediated by job satisfaction, indicating that stress generated by the work environment negatively affect nurses' quality of work life by reducing their job satisfaction.

Conclusion: Cardiovascular nurses' quality of work life is negatively affected by work-related stress. The work-related stress is mediated through job satisfaction. Nurse managers should maximize nurses' job satisfaction by providing comfort at work, supporting professional development opportunities, sharing organizational objectives, and actively listening and addressing nurses' concerns. When cardiovascular nurses' quality of work life is elevated, patients' care quality and outcomes are improved.

Keywords: job satisfaction; nurses; quality of work life; work-related stress.

Highlights

- Cardiovascular nurses' quality of work life affects both their level of work-related stress and their job satisfaction.
- Stress generated by the cardiovascular setting negatively affects nurses' quality of work life and reduce job satisfaction.
- Work-related stress levels and the quality of life of cardiovascular nurses depend on the cardiac unit in which they work.

Background

Governing and managing the different elements of the organizational context of nursing is crucial, as they are directly linked to nursing outcomes (Sili et al., 2014; Zaghini et al., 2015) and to nurses' performance and quality of life, while indirectly affecting patient safety and quality of care (Farnese et al., 2019). Specific organizational settings, such as cardiovascular wards, can be particularly stressful for both patients and staff (Babaei & Haratian, 2020). While caring for hospitalized patients, cardiovascular nurses face distress, depression and the physical exhaustion of patients and their caregivers (Burns et al., 2010), especially in life-threatening situations (Ariapooran, 2014). Nurses' quality of life at work is recognized as an important issue(Krueger et al., 2002), difficult both to achieve and to improve given its multidimensional nature (Wu et al., 2010). Among the variables associated with nurses' quality of work life, work-related stress can play a detrimental role(Fair et al., 2009). In turn, work-related stress can lead to several health conditions (Giorgi et al., 2018; Hassard et al., 2018; Zaghini et al., 2020), such as coronary heart disease (Fair et al., 2009), musculoskeletal pain, anxiety, and depression (Marcatto et al., 2016; Su et al., 2009).

Given their negative impact, it is important to modify those factors that may generate work-related stress among nurses in their work environment (Ríos-Risquez & García-Izquierdo, 2016). For example, nurses can experience happiness with their job, even in stressful working conditions. In this particular state of mind, known as "Job Satisfaction" (George & Zakkariya, 2015), nurses work with greater vigor and more dedication to patients (Liu et al., 2016) and their quality of work life improves even when work is very stressful (Choi & Yun, 2019). Moreover, a healthier work environment leads to more satisfied nurses and reduces their stress levels. Stress generated by the work environment affects nurses' quality of work life by reducing their job satisfaction (Wei et al., 2018). Consequently, we may assume that by improving nurses' job satisfaction the impact of work-related stress on their quality of work life could be reduced.

These dynamics are further amplified in specific environments such as intensive care(Lilly et al., 2021) or cardiovascular wards (Bianchi, 2004). Prior studies evaluated the stressful situations

that nurses experienced in these settings (McHugh et al., 2016; Wei et al., 2018). Specific stress factors include particular, complicated patient health needs (Kentischer et al., 2018), high workloads, rapid patient turnover, the multidisciplinary nature of the professional team (Kim et al., 2017), and interpersonal conflicts (Johnson-coyle et al., 2016; Moss et al., 2016). All of these typical aspects of such units have been associated with burnout syndrome and the intention to leave work (Lilly et al., 2021). Furthermore, these factors may affect the nursing care process, compromising the quality of care in complex care units, such as cardiovascular environments (Babaei & Haratian, 2020).

Despite the importance of improving nurses' quality of work life, most research investigating nurses' work-related stress, job satisfaction, and quality of work life has not taken all these elements into account simultaneously (Huang et al., 2011; Vidotti et al., 2019; Yu et al., 2008). Hence, it has not been possible to verify the associations between these three variables and the effects that one may have on the others in specific settings such as cardiovascular wards. An all-encompassing model would have the potential to verify the simultaneous effects of work-related stress and job satisfaction on cardiovascular nurses' quality of work life. Therefore, the aims of this study were (i) to evaluate work-related stress, job satisfaction and perceived quality of work life in nurses working in cardiovascular units, (ii) to investigate the demographic and professional correlates of these work-related outcomes, and (iii) to examine the interrelationship between these work-related outcomes.

Methods

Study population

A multicentre cross-sectional study was conducted in 10 different hospitals in Italy, between September 2019 and May 2021. A convenience sample of covid-free clinical cardiovascular nurses was enrolled. Inclusion criteria were nurses caring directly for cardiovascular patients in any unit/service, with any kind of shift or employment arrangement (full-time/part-time;

temporary/permanent) and with any length of work experience, including newly graduated nurses. Head nurses and nurse managers were excluded.

Variables and Measurements

Work-related stress was measured using the Management Standard Indicator Tool (MS-IT) (Rondinone et al., 2012; Wood et al., 2019). MS-IT comprises 31 items over six dimensions ("Demand", "Control", "Support from Colleagues", "Relations", "Role" and "Change"). The items were rated on a 5-point Likert-type response scale (from 1 "Never" to 5 "Always"), with higher scores indicating higher levels of stress. The scale showed good reliability (Cronbach's alpha coefficients between 0.80 and 0.92 in all dimensions) and validity in terms of confirmatory factor analysis (Wood et al., 2019).

Job satisfaction was evaluated using the Nursing Questionnaire on Organizational Health (QISO). QISO is a questionnaire measuring the nurses' organizational well-being through eight dimensions: *a)* work environment comfort; *b)* organizational context and relationship processes; *c)* stress factors *d)* safety; *e)* task tolerability; *f)* innovation; *g)* job satisfaction; *h)* psychophysical malaise. The instrument has shown good reliability (Cronbach's alpha coefficients range 0.83- 0.85) and validity, evaluated using Exploratory Factor Analysis (Sili et al., 2010). Given the possibility of using a single dimension as an instrument, as stated by the authors in the validation study, for this research the job satisfaction dimension has been used. This 15-item scale includes 2 dimensions: satisfaction with the general organization and satisfaction with management, rated on a 4-point Likert scale (from 1 "Never" to 4 "Often"). Higher QISO scores indicate a higher level of job satisfaction.

Quality of work life was assessed using a 6-item dimension of the Nursing Quality of Life scale (NQoLs), which refers to nurses' quality of life at work. Respondents are asked to express their degree of satisfaction on a 4-point Likert scale (from 1 "Not at all" to 4 "Much"), with higher scores indicating higher levels of quality of work life. This dimension shows satisfactory reliability

in terms of internal consistency (alpha = 0.81) and validity in terms of confirmatory factor analysis (Sili et al., 2018, 2022).

Nurses' *socio-demographic and occupational data* were collected through a specific questionnaire.

Procedure

Potentially eligible nurses were provided with written and verbal information about the study's purpose and procedures and were asked to grant their consent to participate. Participating nurses were asked to complete a self-report questionnaire including several validated scales. To ensure data anonymity and compliance with privacy legislation, participants were instructed to place the completed questionnaires in a closed box made available in each unit/service.

The study was conducted following the principles of the Declaration of Helsinki, developed by the World Medical Association (2013). Nurses' participation was voluntary and informed consent was obtained before administration of the questionnaire. All data were collected anonymously. The study was approved by the Ethics Committee of the Tor Vergata University hospital, leader of the research project (PROT. 111/17).

Data analysis

Descriptive analysis of the participants' socio-demographic and occupational characteristics was performed. The Pearson correlation coefficient (r) was calculated to verify the relationship between the investigated variables and socio-demographic and job quantitative variables. The *t*-test for independent samples and the Kruskal-Wallis non-parametric test were used to evaluate, respectively, the differences in the means based on categorical (e.g., gender) and ordinal (e.g., education) characteristics. Finally, univariate analysis of variance (ANOVA) with Tukey's post hoc test was used to verify the difference in the means of all variables regarding the clinical setting. To test the hypotheses and to verify the mediating effect of job satisfaction in the relationship between

work-related stress and quality of work life, structural equation modelling (SEM) was conducted using the different dimensions for measuring work-related stress and job satisfaction, and the 6-item dimension of the Nursing Quality of Life scale for measuring quality of work life. The adequacy of the model was evaluated taking the following fit indices into consideration: chi-squared ($\chi 2$) (not significant), RMSEA (< .05), CFI (> .90), TLI (> .90) and SRMR (< .05) (Marsh et al., 2014; Muthén & Muthén, 2012; Schermelleh-Engel et al., 2003). SPSS v. 25® statistical package was used for descriptive and correlation analyses, and MPlus v. 8.3 software was used for SEM (Muthén & Muthén, 2012).

The psychometric properties of the instruments are described above. The reliability of each single scale was verified by calculating the Cronbach's alpha coefficients, which were always excellent and were equal to or greater than 0.87 (Nunnally & Bernstein, 1994).

In the structural equation modeling, the mediation role of job satisfaction between work-related stress and quality of work life was examined by evaluating total, direct, and indirect effects. We used the Maximum Likelihood robust (MLr) estimator to account for the distortions produced by the partial non-normality of distribution.

Results

Sample characteristics

Of the 1,200 questionnaires administered, 1,126 were completed (response rate = 93.8%). The socio-demographic and occupational characteristics of the participants are described in Table 1. The sample comprised mainly women, with a mean age of 43.1 years and working at a cardiac care unit.

Descriptive results

The mean scores and standard deviations for work-related stress, job satisfaction, and quality of work life in the entire sample were 3.49 ± 0.47, 2.79 ± 0.51, and 2.83 ± 0.50, respectively. This

means that nurses *"often"* experienced situations generating work-related stress, they *"sometimes"* reported job satisfaction and they reported a moderate level of quality of work life.

Group comparisons and correlations

A *t*-test revealed a difference in the mean quality of work life scores between men (3.21 ± 0.43) and women (2.87 ± 0.47), indicating that male nurses reported a higher quality of work life than female nurses (T = 4.89; p = 0.002). Work-related stress and quality of work life scores differed among cardiac clinical units (Table 2). Nurses working in the critical care area (Cardiac / Cardiothoracic surgery / Intensive Care Unit / Critical Coronary Care Unit) reported greater stress than their colleagues working in the cardiac care unit. Nurses working in the cardiac outpatient area, on the other hand, reported lower quality of work life than their colleagues working in the critical care area and cardiac care unit (Table 2).

Several statistically significant correlations between the study variables and the sample's socio-demographic and job characteristics were found (Table 3). More specifically, work-related stress was positively associated with age, work experience and absences, showing that the most stressed nurses were the oldest nurses, those who had been working the longest, and those with more absences. Job satisfaction was negatively correlated with the number of years working in the current organization and the number of absences. This indicated that job satisfaction was lower for those nurses who had spent longer in their organization and for those who had been absent more often. As regards nurses' quality of work life, negative correlations were found with age, work experience, years in the current organization, and absences. These results show that younger nurses, those with less work experience—both overall and in a particular organization—and nurses who had fewer absences from work reported better quality of work life.

As expected, negative correlations were found between work-related stress and job satisfaction (r = -0.63; p <0.001), and between work-related stress and quality of work life (r = -0.42; p <0.001). This indicates that the most stressed nurses were the least satisfied and had lower

quality of work life. In contrast, a positive correlation was found between job satisfaction and quality of work life ($r = 0.57$; $p < 0.001$), indicating that nurses with higher job satisfaction reported a higher quality of work life.

Structural Equation Model Results

The structural equation model conducted to examine the interrelationship between the variables under study yielded the following fit indices: χ^2 (78; N = 1124) = 4297.926 p <0.001); RMSEA = 0.05 (90% CI = 0.05 - 0.06), p (RMSEA <.05) 0.17; CFI = 0.95; TLI = 0.93 SRMR = 0.04. As shown in Figure 1, work-related stress negatively affected the nurses' job satisfaction (ß = -0.83; p <0.001) and quality of work life (ß = -0.31; p <0.001). Job satisfaction had a positive effect on nurses' quality of work life (ß = 0.56; p <0.001). Finally, job satisfaction partially mediated the relationship between work-related stress and nurses' quality of work life (Total Effect ß = -0.78 p <0.001; Indirect effect ß = -0.47 p <0.001; Direct effect ß = -0.31 p = 0.001).

Discussion

This study aimed to verify the simultaneous effects of work-related stress and job satisfaction on cardiovascular nurses' quality of work life. Findings confirmed that cardiovascular nurses' quality of work life may be affected not only by their level of work-related stress, but also by their job satisfaction, with good model fit indices. We found a partial mediation effect of nurses' job satisfaction in the relationship between work-related stress and quality of work life. This means that the stress generated by the work environment (high workloads, organizational constraints and inadequate staffing levels) can negatively affect cardiovascular nurses' quality of work life by reducing their job satisfaction (Gillet et al., 2013; Zaghini et al., 2019; Zaghini, Biagioli, Caruso, et al., 2017). Therefore, mitigating cardiovascular nurses' work-related stress helps improve their quality of work life by enhancing their job satisfaction, indirectly improving patient care. Also, it is important to improve cardiovascular nurses' job satisfaction to limit the impact of work-related

stress on their quality of work life. In turn, increasing cardiovascular nurses' quality of work life can improve their work performance (Gayathiri & Ramakrishnan, 2013; Perry et al., 2017) and ensure greater patient safety and quality of care (Farnese et al., 2019).

This study showed that nurses working in the critical care area reported greater stress than their colleagues working in the cardiac care unit. This finding is in line with prior research (Salimi et al., 2020; Young et al., 2011). Nurses caring for patients at life-threatening risk in intensive cardiac units need more technical skills to manage sophisticated technology, and they face difficult clinical and psychological conditions (Fair et al., 2009; Salimi et al., 2020; Stewart, 2002). In fact, due to the physical and emotional pain suffered by patients and their caregivers, nurses experience stress and fatigue (Young et al., 2011). However, one study found that nurses working in intensive care units experienced less stress than nurses working in the medical area (Zaghini et al., 2015). One explanation was that patients in the intensive care unit were often sedated, and family visits were more restricted. In cardiovascular critical care, the situation can be different given the presence of other stress factors such as the complexity of patients' diseases, their healthcare needs, and their critical condition (Bagnasco et al., 2021) .

Part of this study data was collected during the COVID-19. We need to consider that general stress levels increased for all nurses during the pandemic, independently of working setting (Labrague & De los Santos, 2020). Differences of stress levels among nurses of cardiovascular wards, as found in our study, could be due at the setting characteristics. Moreover, as already verified in literature, the levels of nurses' work-related stress during the pandemic waves has been equilibrated by their commitment, dedication to caring for COVID19 patients and public recognition of "heroes" for facing this healthcare emergency (Alsaqri et al., 2021). In some cases, also, the organizational interventions acted by the managers, such as increase the staffing levels, organizational support and psychological support, have reduced the work-related stress levels (Zaghini et al., 2021).

Work environment differences may explain cardiac outpatient nurses reporting lower quality of work life than their colleagues in the critical area and cardiac care units. Cardiac events generate anxiety and distress in patients; cardiac outpatient nurses have to foster an educational relationship and become therapeutic consultants to assure better healthcare outcomes, such as improved adherence to treatment or regular physical exercise (Bagnasco et al., 2021; Ciumărnean et al., 2021). For these reasons, cardiac outpatient nurses may be exposed to high interpersonal strain while building up a therapeutic relationship with patients and pursuing an educational role to promote a healthy lifestyle (Stewart, 2002; Wei et al., 2018).

The finding of lower quality of work life in older women with longer work experience (both generally and in the present organization) is in accordance with previous research (Saboya et al., 2016). Healthcare managers should therefore pay particular attention to older, female cardiovascular nurses; namely, by planning specific interventions to reduce their work-related stress (Portoghese et al., 2014).

The finding of lower job satisfaction in nurses with longer tenure in the current hospital, but shorter overall work experience was unexpected. This could indicate that cardiovascular nurses' job satisfaction in our sample does not depend on the number of years in practice or on the type of work, but rather, that it is linked to the daily organizational context and to the procedures used (Sermeus et al., 2011).

The results of the structural equation model emphasize the role of job satisfaction in partially mediating the relationship between cardiovascular nurses' work-related stress and quality of work life. We corroborated that those nurses with higher levels of work-related stress reported lower quality of work life because their job satisfaction was reduced. Our results highlight a new field of intervention for healthcare managers, with a potential impact on patient outcomes. Job satisfaction is provided as a useful indicator for monitoring nurses' quality of work life both within and outside the workplace. Indeed, the scale that was used to measure nurses' job satisfaction in this study was taken from the QISO, a questionnaire measuring the organizational well-being of nurses

(Sili et al., 2010). This underlines the fundamental role of the job satisfaction in highlighting the well-being of an organization and its workers (Liu et al., 2016; Choi & Yun, 2019). Moreover, previous organizational research has underlined the role of head nurse leadership style in reducing work-related stress and improving job satisfaction (Zaghini, Biagioli, Fida, et al., 2017) and also when dealing with emergencies such as the COVID-19 pandemic (Zaghini et al., 2021). When nursing leaders promote a positive atmosphere of teamwork and mutual support between nurses, an increase in skills and interprofessional learning may occur (Carney et al., 2019). In cardiovascular settings, the multiple job demands become a goal for the entire team, a battle to be won together, and the team becomes a source of mutual strength and support (McAtavey & Nikolovska, 2010; Reeves et al., 2011). All this can transform stress into challenging and stimulating goals (Locke & Latham, 2019) which, when achieved, increase cardiovascular nurses' job satisfaction and, consequently, their quality of work life (Choi & Yun, 2019). Accordingly, managers should assess and promote cardiovascular nurses' job satisfaction to reduce the impact of work-related stress on their quality of work life. As a result, nursing outcomes (Baptiste, 2008), patient safety, and quality of care will also improve (Farnese et al., 2019).

Limitations

The results of this study must be considered considering some limitations. First, the study was conducted on a convenience sample, so further studies are needed to confirm the results. Second, the self-report nature of the instruments described nurses' perception of their organization, which could also be influenced by personal factors. In future studies, therefore, objective evaluation methods should be identified to verify that what is self-reported corresponds to third-party observations. Third, this is a cross-sectional study, and therefore it is not possible to establish causality between the study variables. Finally, part of the data was collected during the COVID-19 pandemic, and this may have impacted the findings. Even if we enrolled cardiovascular nurses working in covid free units, where working conditions (workloads, patients' conditions and

healthcare concerns) should have remained similar, possible individual implications of covid on nurses' lives (e.g. fear of being infected or infected their family, social isolation for being a possible infection source) have not been considered or analyzed. Hence, future research is needed to confirm our findings.

Conclusion

Cardiovascular nurses' quality of work life can be negatively affected by work-related stress. The work-related stress can be mediated through job satisfaction. Nurse managers should maximize nurses' job satisfaction by providing physical comfort at work, supporting professional development opportunities, having clear and well-defined organizational objectives, and actively listening to and addressing nurses' concerns, for instance. When cardiovascular nurses' quality of work life is elevated, patient care quality and patient outcomes are likely to be optimized. These findings suggested a turnover program within the cardiovascular units, as an organizational solution for distributing workload and reducing work-related stress levels.

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Figure 1. Results of Structural Equation Model

Note: WRS = Work-Related Stress; DEM = Demands; CON = Control; COSU = Colleagues' Support; ROL = Role; CHA = Change; REL = Relationship; JS = Job Satisfaction; GSA = General Satisfaction; MSA = Management Satisfaction; QoWL = Quality of Work Life.

Table 1. Sample characteristics

	N=1126
Age	43.1 ± 8.6
Sex	
Male	276 (24.6%)
Female	844 (75.4%)
Clinical Area	
Cardiac care unit	323 (28.7%)
Cardiac surgery unit	252 (22.4%)
Cardiac surgical operating room	120 (10.7%)
Critical care area[§]	221 (19.6%)
Cardiac Outpatients/DH	209 (18.6%)
Years of work experience	19.1 ± 7.6
Years in present organization	12.3 ± 6.8
Daily working hours	7 ± 0.6
Monthly extra working hours	8.7 ± 11.3
Days of absence over past 6 months	5.2 ± 13.4

Values are presented as mean ± standard deviation for continuous variables and count (percent) for categorical variables.
DH, Day Hospital
Note:§ Critical Area includes Cardiac/Cardiothoracic surgery/ Intensive Care Unit/ Critical Coronary Care Unit

Table 2. Differences between cardiac clinical units

Clinical Area	Work-Related Stress Mean ± SD	Job Satisfaction Mean ± SD	Quality of Work Life Mean ± SD
Cardiac care unit	2.43 ± 0.44 [a]	2.88 ± 0.56 [a]	2.99 ± 0.41 [b]
Cardiac surgery unit	2.57 ± 0.39 [ab]	2.86 ± 0.54 [a]	2.84 ± 0.39 [ab]
Cardiac surgical operating room	2.59 ± 0.40 [ab]	2.91 ± 0.49 [a]	2.79 ± 0.42 [ab]
Critical care area[§]	2.68 ± 0.42 [b]	2.79 ± 0.61 [a]	3.14 ± 0.35 [b]
Cardiac Outpatients/DH	2.56 ± 0.38 [ab]	2.90 ± 0.53 [a]	2.69 ± 0.51 [a]
F	**2.591**	0.904	**5.440**
p-value	**0.033**	0.374	**<0.001**

SD, standard deviation; DH, Day Hospital.
§ Critical Area includes Cardiac/Cardiothoracic surgery/ Intensive Care Unit/ Critical Coronary Care Unit
Note: In each column, means with different superscript letters are significantly different at Tukey post hoc test.

Table 3. Correlation between investigated and quantitative socio-demographic and job characteristics

Quantitative Variable	*Work-Related Stress*	*Job Satisfaction*	*Quality of work Life*
	r (P-value)	r (P-value)	r (P-value)
Age	**0.14 (0.03)**	-0.06 **(**0.26)	**-0.16 (0.01)**
Years of work experience	**0.13 (0.02)**	-0.04 **(**0.38)	**-0.19 (0.03)**
Years in present organization	0.05 **(**0.19)	**-0.18 (0.03)**	**-0.19 (0.02)**
Daily working hours	-0.04 **(**0.28)	-0.08 **(**0.27)	0.06 **(**0.60)
Monthly extra working hours	0.08 **(**0.31)	-0.05 **(**0.72)	-0.10 **(**0.51)
Days of absence over past 6 months	**0.12 (0.04)**	**-0.11 (0.02)**	**-0.06 (<0.01)**

r = Pearson coefficient