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The associations between psychosocial workload and mental health complaints in different age groups

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ABSTRACT

The objective of the present study was to explore associations between psychosocial workload and mental health complaints in different age groups. A questionnaire was sent to 2021 employees of a Dutch railway company. Six aspects of psychosocial workload (work pressure, mental workload, emotional workload, autonomy, social support from colleagues and social support from supervisors) and three mental health outcomes (work-related fatigue, stress and burnout) were assessed. Associations between the aspects of psychosocial workload (distributed into tertiles) and health complaints were analysed by logistic regression analysis in four age groups (22–35, 36–45, 46–55 and 56–66 years old). In all age groups, worse work pressure was a significant risk factor for having mental health complaints. Worse emotional load in the younger employees and lack of social support in older employees were associated with a higher risk of having mental health complaints. Age-specific preventive measures should be implemented on both individual and group levels.

Statement of Relevance: With an ageing workforce, understanding relationships between age and work-related health ailments is increasingly important. This study found that emotional workload in younger and lack of social support in older employees were associated with a higher risk of mental health complaints. Work pressure was a risk factor in all age groups.

1. INTRODUCTION

The world population is ageing (United Nations 2005), and this includes the working population (Keese et al.). This means that more employees work longer (CBS 2007). At the same time, fewer young workers are entering the working population. As a result, age and work will remain very relevant topics in the coming decades. To improve their functioning, it is important to keep workers, young and old alike, healthy on the job for longer periods.

Mental health complaints, like work-related fatigue (and need for recovery), stress and burnout, are common (Bültmann et al. 2002) and must be avoided, because they may cause absenteeism and, in the long term, even work disablement (De Croon et al. 2003, Eriksson et al. 2008). It is well recognised that workload is associated with mental health complaints (Stansfeld and Candy 2006, Nieuwenhuijsen et al. 2010). Psychosocial workload variables that are associated with burnout, high stress complaints and need for recovery are as follows: work overload, lack of job control, low social support, lack of autonomy and time pressure (Visser et al. 2003, Escribà-Agüir et al. 2006). Such work conditions have also shown to be risk factors for high stress complaints (Bültmann et al. 2002b, 2002c; Visser et al. 2003). Work speed and quantity, emotional workload, lack of variety and lack of autonomy have been shown to have cumulative effects on an employee's need for recovery (Van der Hulst et al. 2006).

As both younger and older employees may experience mental health ailments (Bültmann et al. 2002a), organisations should take measures to prevent the development of these ailments in all employees of all ages. To do so, insight into possible age-related associations between psychosocial workload and mental

health complaints is needed. Age is often included in studies as a descriptive variable, predictor or covariate. There are also studies wherein work conditions and health complaints are studied in relation to age separately but are not associated with each other (Broersen et al. 1996, De Zwart et al. 1997, Vingard et al. 1999). Some studies can be found with age-dependent associations between workload and health problems. For example, Hiro et al. (2007) studied aged differences in association between job stressors and heavy drinkers. However, to our knowledge, no similar studies have been published in the area of psychosocial workload and mental health. Recently, Bos et al. (2009) studied age-related effects of work characteristics. However, they used job satisfaction, which may be seen as an intermediate measure between work and health, as an outcome measure instead of mental health outcomes. Gathering detailed information about age-related associations between psychosocial workload and mental health complaints makes it possible to take preventive measures to improve health and quality of life of workers. Specific preventive measures in every age group can also be used to avoid workers becoming ill and dropping out of the workforce, thereby enhancing functioning till retirement.

In practice, it is often desirable to implement preventive measures to decrease health complaints collectively in a specific sector or branch. Sluiter and Frings-Dresen (2007), for example, studied age-related workability of fire fighters to implement special measures to improve the quality of health in fire fighters. The present study focuses on the employees of a Dutch railway company. The employees of this organisation are all exposed to a comparable organisational atmosphere (non-profit, semi-government organisation with a strong hierarchy and job security) and, therefore, can be studied together.

The purpose of the present study is to explore the associations between aspects of psychosocial workload and mental health complaints in four age groups of workers within the largest Dutch railway company. Because psychosocial workload and the prevalence of mental health complaints vary among different age groups (Bültmann et al. 2002a), it is hypothesised that different associations between aspects of psychosocial workload and mental health complaints will be found among different age groups.

2 METHODS

2.1 Subjects and data collection

The study population is an exploratory study with secondary analysis of data derived from a large workload study among employees of one large Dutch railway company (Ruitenburg et al. 2008). In May 2008, a questionnaire (in Dutch language) was sent to a random sample ($n = 2021$) of workers, stratified for job, age and sex. After stratifying for age and sex, the questionnaire was sent to 483 service employees, 540 train drivers, 496 train conductors and 502 service electricians. Service employees work at the service desks in several Dutch railway stations, providing information and selling tickets to travellers. Train drivers operate the train, ensuring safety and time schedules. Train conductors work at the train, ensuring safety of the passengers, checking for valid tickets and providing information. Service electricians work at train garages and are responsible for maintenance and repair of the trains.

2.2 Socio-demographic and work characteristic variables

Questionnaire respondents provided information on gender, age, occupation, years on job, number of work days per week and number of work hours per week.

2.3 Independent variables: psychosocial workload

Six aspects of psychosocial workload were used in this study: work pressure, mental load, emotional load, work autonomy, social support from colleagues and social support from supervisors (all Dutch scales, coming from Van Veldhoven et al. 2002). The work pressure scale exclusively focuses on quantitative aspects of workload in terms of required speed and quantity of work and consists of 11 items, such as 'Do you work under time pressure?' The mental load subscale consists of seven items, for example, 'Does your work demand a lot of concentration?' and 'Do you have to give continuous attention to your work?' The emotional load subscale consists of seven items, including 'Does your work demand a lot from you emotionally?' and 'Do you have contact with difficult clients or patients in your work?' Work autonomy was assessed with a subscale consisting of 11 items on timing and method control which an employee may or may not have in his or her present job situation. These items include the following: 'Do you have an influence on the pace of work?' and 'Can you decide on how your work is executed on your own?' Social support from colleagues was assessed with nine items like 'Do you have conflicts with your colleagues?'

The Social support from supervisor subscale consisted of nine items like 'Have there been any unpleasant occurrences between you and your boss' and 'Do you have conflicts with your supervisor?'

All subscales use four response categories: never, sometimes, often or always. A total score between 0 and 100 can be calculated for each subscale according to Van Veldhoven et al. (2002), where a higher score indicates a higher or worse psychosocial workload. The psychometric properties of all scales were considered satisfactory ($p > 0.80$) during scale construction among 812 employees of different work sectors (Van Veldhoven et al. 2002). A replication study on an independently gathered database confirmed this method's validity (Van Veldhoven et al. 2002)

2.4 Dependent variables: mental health complaints

Mental health complaints were operationalised in three different ways, by means of work-related fatigue, stress complaints and burnout. Work-related fatigue refers to the extent that the work tasks induce a need to recuperate from work induced effort (Van Veldhoven and Broersen 2003). Stress is the direct manifestation of the effort people must exert to maintain their psychophysiological homeostasis and social functioning when confronted with taxing life stress. Burnout is the prolonged response to chronic emotional and interpersonal stressors on the job and is defined by the three dimensions of exhaustion, cynicism and inefficacy (Maslach et al. 2001).

The Dutch subscale need for recovery after working time developed by Van Veldhoven et al. (2002) was assessed to operationalise work-related fatigue (Sluiter et al. 1999). The scale need for recovery contains 11 statements, and the respondent is asked to rate whether these statements apply using a yes/no format. The items inquire about the severity and duration of symptoms which indicate that the respondent is not fully recovered from the effects of sustained effort during the work day, such as lack of attention and concentration and reduced motivation for activities in the evening with family or friends (Van Veldhoven and Broersen 2003). Examples are 'Generally, I need more than an hour before I feel completely recuperated after work' and 'By the end of the working day, I feel really worn out'. A sum score can be calculated between 0 and 100, with higher scores indicating higher work-related fatigue. When a score of 54.5 or greater is obtained, work-related fatigue is considered 'high' (Wiezer et al. 2006). Reliability of the need for recovery scale was good during scale construction ($p = 0.87$; Van Veldhoven et al. 2002) and in an independent replication study ($p = 0.86$; Van Veldhoven et al. 2002). Test-retest reliability over a two-year interval was considered to be good to excellent when applied in stable work environments (Intraclass Correlation Coefficients (ICC) 068–080; De Croon et al. 2006). Content of the need for recovery scale as a measure of fatigue at work was validated by comparing the scores on the need for recovery scale with the scores of the same respondents on other fatigue scales. The need for recovery scale has also been shown to be an adequate scale for use at both the individual and group levels (department/organisation; Van Veldhoven and Broersen 2003).

Stress was assessed by the Dutch version of the distress subscale of the Four-Dimensional Symptom Questionnaire (4DSQ; Terluin 1996). This scale consists of 16 items with the format: 'During the past week, did you feel ...' followed by a list of possible complaints, such as feeling tense, easily irritated and frightened. Possible answer choices are never, sometimes, regularly, often or very often. A sum score between 0 and 32 is calculated, where a higher score indicates higher stress complaints. Scores of 11 and higher indicate increased stress levels, and these scores are labelled as 'high' (Van Rhenen et al. 2008). Reliability of the 4DSQ scale, measured as internal consistency, is high, with α coefficients ranging well above 0.80 (Terluin et al. 2006). The 4DSQ subscale is a valid questionnaire to measure distress (Terluin et al. 2006, Braam et al. 2009).

Burnout was assessed by the Dutch Utrecht Burnout Scale (UBOS), which is the shortened general version of the Maslach Burnout Inventory (Maslach and Jackson 1986). A sample item is 'I feel used up at the end of the workday'. Possible answer categories are never, almost never, rarely, sometimes, often, very often or always. Total scores from 0 to 6 can be calculated for the subscales emotional exhaustion (5 items), depersonalisation (5 items) and personal accomplishment (6 items). Maslach and Jackson (1986) defined that scores of >2.2 on the subscales emotional exhaustion and depersonalisation were high scores. As emotional exhaustion and depersonalisation are considered to be the essence of burnout (Maslach et al. 2001), burnout was defined as scores of >2.2 on both the subscale emotional exhaustion and depersonalisation. The UBOS has been shown to be valid (Cronbach's $\alpha = 0.63$ – 0.86) and reliable (reliability estimates 0.54–0.84; Powers and Gose 1986) and can differentiate burnout from other mental syndromes (e.g. anxiety and depression; Schaufeli et al. 2001).

2.5 Data analysis

In this secondary analysis study, we were not interested in the differences between occupations but between age groups. So, data from the four different occupational groups (e.g. service employees, train driver, train conductors and service electricians) were combined. Not only to enlarge the population number, but more important to create variation in psychosocial workload in the different age groups. Subjects were divided into the following age groups: 22–35 years, 36–45 years, 46–55 years and 56–66 years old.

The scores of the six psychosocial workload scales were divided into tertiles labelled ‘low’, ‘middle’ or ‘worse’, so that those subjects with the top-third worst scores on the psychosocial workload scales were labelled as having worse psychosocial workload scores. These independent variables often showed to be significant, though they had low correlations with each other ($r < 0.4$ for all correlations), thereby showing no multicollinearity.

The associations between the psychosocial workload tertiles (independent variables) and mental health complaints (dependent variables) were analysed by a two-step logistic regression analysis for each age group. Initially, univariate logistic regressions analyses were performed for the significant ($p < 0.05$) relationship between each of the individual psychosocial workload variables and mental health complaints. Those variables with Wald Statistics of $p < 0.25$ in the univariate logistic regression analyses were included in the multivariate logistic regression analyses. With this broadened criteria, a more complete picture of predictors of mental health complaints was developed (Hosmer and Lemeshow 2000). We only adjusted for variables in the analyses, whereof we expected that they might influence the relationships between different age groups. Sex was disproportionally distributed across age groups, and we adjusted for sex by entering this variable in the multivariate analyses. Occupation was also somewhat disproportionally distributed across the age groups. However, occupation strongly correlated with sex and some psychosocial workload variables ($\Phi > 0.7$, $p < 0.01$). To avoid overadjustment (De Croon 2006), occupation and other work variables were not entered in the analyses.

Odds ratios (ORs) and 95% confidence intervals (CIs) for the effects of the psychosocial workload variables and sex on the separate health complaints were calculated for every age group. For the psychosocial workload scores, the low workload tertile served as the reference group, and, for sex, the reference group was male. Statistical analyses were carried out using SPSS 16.0 for Windows.

3 RESULTS

3.1 Socio-demographic and work characteristic variables

Responses that included age were obtained from 827 employees of the Dutch railway; 193 service employees, 278 train drivers, 201 train conductors and 155 service electricians. Of the respondents, 69 employees had an age between 22 and 35 years, 235 between 36 and 45 years, 383 between 46 and 55 years and 140 between 56 and 66 years. The socio-demographic and work characteristic variables are summarised in Table 1.

3.2 Association between psychosocial workload and mental health complaints

Table 2 shows the results of the univariate logistic regression analyses. These results demonstrate which psychosocial workload variables are associated with mental health complaints and should, therefore, be considered when explaining mental health complaints. Work pressure, emotional workload and social support from supervisors seemed to be relevant variables. Mental workload, autonomy and social support from colleagues must be considered in some age groups.

[TABLE 1]

3.3 WORK-RELATED FATIGUE

Of the 22- to 35-year-old employees, 29% showed high work-related fatigue. Of the 36- to 45-year-old employees, the 46- to 55-year-old employees and the 56- to 66-year-old employees, the prevalences of work-related fatigue were 23%, 30% and 34%, respectively.

Table 3 shows the results of the multivariate logistic regression analyses of work-related fatigue. Sex was a non-significant predictor of high work-related fatigue in all age groups, even for mental workload and

autonomy. Employees with worse work pressure had a significantly (6- to 18-fold) higher risk of experiencing high work-related fatigue than their colleagues with low work pressure in all age groups.

For the 36- to 45-year-old employees, the risk of experiencing work-related fatigue was fivefold higher for the employees with worse emotional workload than for the employees with low emotional workload. For the 46- to 55-year-old group, employees with worse social support from colleagues had a significantly (3-fold) higher risk of experiencing work-related fatigue, compared with the employees with better social support from colleagues. For the 56- to 66-year-old group, the risk of experiencing work-related fatigue was fourfold higher in the employees with worse social support from their supervisor compared with the employees with better social support from their supervisor.

[TABLE 2]

3.4 Stress

Of the 22- to 35-year-old employees, 33% had high stress complaints. Of the 36- to 45-year-old employees, 25% had high stress complaints. Of the 46- to 55-year-old employees and the 56- to 66-year-old employees, 29% and 38% had high stress complaints, respectively.

As seen in Table 4, employees in all age groups with worse work pressure had a significantly (4- to 22-fold) higher chance of experiencing stress compared with their colleagues with low work pressure. Mental workload and autonomy were non-significant predictors of high stress in all age groups.

For the 36- to 45-year-old group, the risk for experiencing high stress was sevenfold and fourfold higher for the employees with worse emotional workload or worse social support from their supervisor, respectively, compared with their colleagues with lower emotional load or better social support from their supervisor. For the 46- to 55-year-old group and 56- to 66-year-old group, employees with worse social support from colleagues had a significantly (4-fold) higher risk of experiencing high stress compared with their colleagues with better social support from colleagues. Females in the 56- to 66-year-old group had a fivefold higher risk of experiencing high stress compared with their male colleagues.

[TABLE 3]

3.5 Burnout

Of the 22- to 35-year-old employees, 33% showed high burnout complaints, of the 36- to 45-year-old employees 25%, of the 46- to 55-year-old employees 29% and of the 56- to 66-year-old employees 38%.

Table 5 shows the association between psychosocial workload variables and high burnout complaints. In all age groups, employees with a worse work pressure had a significantly (3- to 17-fold) higher risk of experiencing high burnout complaints than the employees with a low work pressure. Sex and autonomy were non-significant predictors for high burnout complaints in all age groups.

Furthermore, employees between 22 and 35 years of age with a worse emotional workload had a significantly higher risk of having high burnout complaints than the employees with a better emotional load. For the employees between 36 and 45 years of age, those with a middle score on mental workload and worse social support from their supervisor had a significantly higher risk (3-fold and 8-fold, respectively) of having high burnout complaints compared with the employees with better mental workload and better social support from their supervisor. Employees ages 46–55 years with worse social support from colleagues and their supervisor had a threefold and sixfold higher risk, respectively, of experiencing high burnout complaints compared with the employees with better social support from their colleagues and supervisor. Worse social support from supervisors in the group aged 56–66 years was associated with a fourfold higher risk of having high burnout complaints.

[TABLE 4]

3.6 Overall associations by age group

In summary, employees of all ages with relatively high work pressure had a significantly increased risk of reporting mental health complaints (high work-related fatigue, high stress, high burnout) with ORs of up to 18–20 in the youngest and oldest groups of workers.

[TABLE 5]

Higher emotional workload was a significant risk factor for burnout in the youngest workers (22–35 years). In the group aged 36–45 years, high emotional workload, high mental workload and worse supervisor social support were significant risk factors for having high work-related fatigue, high stress complaints and/or burnout complaints. For the 46- to 55-year-old group, worse colleague social support was a significant risk factor for all mental health complaints. Worse supervisor social support was associated with an increased risk of reporting high burnout complaints. In the oldest group (56–66 years old), worse supervisor social support increased the risk of high work-related fatigue and burnout, and worse social support from colleagues increased the risk of developing stress complaints.

4 DISCUSSION

The purpose of the present study was to analyse age-related associations between psychosocial workload indicators and several health complaints in a Dutch railway company. In this study, associations between aspects of psychosocial workload and mental health complaints vary among different age groups. Worse emotional workload in the younger employees and lack of social support in the older employees were associated with a higher risk of having mental health complaints. Worse work pressure was a significant risk factor for having mental health complaints in all age groups.

The question if high psychosocial workload factors are risk factors for mental ill health (causal relationships) is already studied and discussed in other studies (Stansfeld and Candy 2006, Nieuwenhuijsen et al. 2010). In this study, the focus did not lie so much on the causality of psychosocial workload and mental health complaints but on the associations in the different age groups. Methodologically, this cross-sectional design seems sufficient to obtain a global impression of the relationship between psychosocial workload and mental health in different age groups. To strengthen the results, prospective longitudinal studies are (of course) desired.

Despite the fact that the youngest group was relatively small compared with the other groups, a reasonable number of subjects were available for the analysis in all age groups. Making tertiles of the workload variables made the numbers per cell even smaller. However, all cells were reasonably equal filled and statistically significant associations were found in every age. So, the somewhat small sample size did not seem to have any effect. The prevalence of complaints in every age group was also sufficiently high to compare subgroups; the prevalence of high work-related fatigue, high stress or burnout complaints was 23–40% in every age group. The prevalence found in this study population was higher compared with the prevalence of mental health complaints in other Dutch employees. In the Dutch working population, the prevalence of work-related fatigue is 23% (Bültmann et al. 2002a). The prevalence of high stress and burnout in the Dutch working population is 23% (Bültmann et al. 2002a) and 16% (Kant et al. 2004), respectively.

Work pressure (general workload) is widely recognised as a risk factor for having mental health complaints (Al-Dubai and Rampal 2009, Verdonk et al. 2009). However, the finding that this relation is age-independent is quite new. In a study done by Bos et al. (2009), problems associated with workload were shown to be causes of worse job satisfaction in almost all age groups.

Emotional workload was found to be a risk factor for developing mental health problems in the study of Verdonk et al. (2009). In the present study, emotional workload was a risk factor for having mental health complaints in younger employees only. A possible explanation for this age-related association is that older employees who were not sufficiently resistant to the effects of high emotional workload have already left the organisation.

Recent studies showed that poor social support in the workplace is associated with mental health complaints (Sinokki et al. 2009). The present study's finding that poor social support in the workplace was a risk factor for having mental health problems in the two oldest workgroups confirms the findings of Bos et al. (2009) with respect to job satisfaction. This may be explained by the cumulative exposure of older employees to poor social support. Adaptations in the workplace may be difficult to make because of the poor employee–supervisor relationships, and, in combination with declining ability to work as an employee ages (Ilmarinen et al. 1997), this may lead to overload on the long term.

Mental health complaints are known to be associated with longer sick leave and higher chances of work disablement (De Croon et al. 2003, Eriksson et al. 2008). Knowing what aspects of the psychosocial environment are important for different ages provides the opportunity to implement age-specific preventive

measures. The outcomes of this study should alert supervisors to risk factors in the workplace that contribute to mental health complaints of their workers. In addition, this study may help occupational physicians take preventive action at the appropriate time on both individual and group levels.

On an individual level, the development of evidence-based worker's health surveillance and the implementation of preventive medical research activities in the field are advised to trace possible mental health complaints and identify their risk factors.

On a group level, exactly which preventive measures could reduce workload and health complaints should be examined. In the Dutch railway company, attention should be paid to work pressure in all age groups. Implementation of work breaks for rest had a positive effect on fatigue and performance (Tucker 2003, Mitra et al. 2008). For each type of worker in the railway company, the kind of break most feasible to implement should be determined. The types of breaks are as follows: meta- and macro-breaks whilst off the job (vacation, respite, leisure time) or micro- and meso-breaks whilst on the job (rest breaks, beginning and ending time, ability to interrupt task performance at will; Van Veldhoven and Sluiter 2009). Overwork and irregular working hours should be avoided. Having employees work only one type of shift (morning, midday, evening or night) is one possible solution. Shifts should not be too long, and it is advised to circulate as much as possible among different tasks. Furthermore, in the younger employees of the Dutch railway company, preventive measures on a group level should primarily focus on coping with and preventing the effects of emotional workload. Emotional workload may be affected by aggressive travellers, which are present in the Dutch railway (Ruitenburg et al. 2008). Possible preventive measures, therefore, may be (I) implementation of campaigns directed towards aggressive travellers, (II) training for employees having contact with aggressive travellers, and (III) offer aftercare by a special care team. Social support for older employees may be improved by informing both supervisors and employees about the consequences of a poor work climate. For example, paying attention to the company atmosphere, having space for social interaction and having break opportunities may contribute to a better social support.

From this study, it can be concluded that associations between aspects of psychosocial workload and mental health complaints seem to vary among different age groups. This knowledge stimulates implementation of age-specific preventive measures.

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TABLES

Table 1. Socio-demographic and work characteristic variables by age group amongst workers of a Dutch Railway company: numbers (*n*) with percentages (%) and means with standard deviations (SDs).

	Age groups							
	22–35 years, <i>n</i> = 69		36–45 years, <i>n</i> = 235		46–55 years, <i>n</i> = 383		56–66 years, <i>n</i> = 140	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Occupation								
Service employee	11	16	62	26	87	23	33	24
Train driver	20	29	65	28	147	38	46	33
Train conductor	17	25	73	31	77	20	34	24
Service electricians	21	30	35	15	72	19	27	19
Sex								
Male	52	75	147	63	302	79	113	81
Female	17	25	87	37	80	21	27	19
	22–35 years		36–45 years		46–55 years		56–66 years	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Years on job	5.6	3.7	12.6	7.3	19.2	9.7	23.4	11.1
Hours/week	33.9	5.8	32.5	6.7	33.9	5.5	34.5	5.1
Days/week	4.6	0.8	4.4	1.1	4.6	0.9	4.5	0.7

Table 2. Univariate associations for need for recovery, burnout and stress, by age group.

	Need for recovery						Stress						Burnout					
	Work pressure	Mental workload	Emotional workload	Autonomy	Soc. supp. colleagues	Soc. supp. supervisor	Work pressure	Mental workload	Emotional workload	Autonomy	Soc. supp. colleagues	Soc. supp. supervisor	Work pressure	Mental workload	Emotional workload	Autonomy	Soc. supp. colleagues	Soc. supp. supervisor
22-35 years	x		x			x	x		x				x		x			x
36-45 years	x	x	x			x	x		x		x	x	x	x	x	x		x
46-55 years	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
56-66 years	x		x		x	x	x		x		x	x	x		x	x	x	x

Note: x = significant associations (Wald statistics $p < 0.05$).

Table 3. Multivariate logistic regression analyses: association of workload variables with high work-related fatigue[#] by age groups: ORs with 95% CIs.

	Age groups							
	22-35 years		36-45 years		46-55 years		56-66 years	
	n	OR (95% CI)	n	OR (95% CI)	n	OR (95% CI)	n	OR (95% CI)
Sex								
Male	51		136		282		106	
Female	17	0.4 (0.1-2.5)	86	0.7 (0.3-1.4)	73	1.3 (0.7-2.5)	25	2.0 (0.6-6.1)
Work pressure								
Low score (<30.3)	28		84		104		38	
Middle score	25	5.1 (0.9-30.4)	71	2.0 (0.7-5.7)	124	2.2 (0.9-5.1)	42	3.6 (0.9-15.3)
Worse score (>42.4)	15	17.8* (2.1-149.7)	67	5.6* (2.0-15.7)	127	7.9* (3.4-18.3)	51	11.8* (2.7-51.1)
Mental workload								
Low score (<71.4)			92		123		46	
Middle score			85	2.1 (0.9-5.1)	129	0.8 (0.4-1.5)	43	0.7 (0.2-2.4)
Worse score (>90.5)			45	1.2 (0.4-3.3)	103	0.9 (0.4-1.9)	42	0.8 (0.3-2.6)
Emotional workload								
Low score (<26.5)	23		61		81		32	
Middle score	23	1.7 (0.3-10.3)	68	1.6 (0.5-5.3)	125	1.2 (0.5-2.7)	38	1.5 (0.4-5.9)
Worse score (>38.1)	22	5.2 (0.9-30.0)	93	5.0* (1.6-15.3)	149	2.0 (0.9-4.2)	61	2.6 (0.7-9.6)
Autonomy								
Low score (<48.5)					97			
Middle score					125	0.9 (0.5-1.9)		
Worse score (>75.6)					133	1.1 (0.5-2.3)		
Soc. supp. Colleagues								
Low score (<14.8)	15		66		88		52	
Middle score	26	0.2 (0.0-1.6)	84	0.5 (0.2-1.4)	145	1.4 (0.6-2.9)	40	1.6 (0.5-5.0)
Worse score (>29.6)	27	0.6 (0.1-4.8)	72	0.5 (0.2-1.6)	122	2.8* (1.3-6.1)	39	1.2 (0.4-3.6)
Soc. supp. Supervisor								
Low score (<18.5)	17		71		107		45	
Middle score	28	0.2 (0.0-1.6)	82	1.3 (0.5-3.5)	118	1.2 (0.6-2.6)	39	2.6 (0.8-9.0)
Worse score (>33.3)	23	1.5 (0.3-8.3)	69	1.7 (0.6-4.8)	130	1.9 (0.9-4.1)	47	3.5* (1.1-11.8)

Note: [#]Score on need for recovery scale > 54.5. * $p < 0.05$.

Table 4. Multivariate logistic regression analyses: association of workload variables with high stress[#] by age groups: ORs with 95% CIs.

	Age groups							
	22–35 years		36–45 years		46–55 years		56–66 years	
	<i>n</i>	OR (95% CI)	<i>n</i>	OR (95% CI)	<i>n</i>	OR (95% CI)	<i>n</i>	OR (95% CI)
Sex								
Male	50		139		286		107	
Female	17	1.1 (0.3–4.8)	86	0.5 (0.3–1.1)	72	1.4 (0.7–2.7)	26	4.6* (1.3–16.2)
Work pressure								
Low score (<30.3)	28		85		106		39	
Middle score	24	4.3 (0.9–20.5)	72	1.5 (0.6–3.4)	123	2.5* (1.2–5.5)	42	2.9 (0.7–11.6)
Worse score (>42.4)	15	6.2* (1.2–33.8)	68	4.1* (1.6–10.0)	139	4.4* (2.0–9.8)	52	22.3* (4.9–101.3)
Mental workload								
Low score (<71.4)	33		94		125		47	
Middle score	22	2.0 (0.5–8.4)	72	1.4 (0.6–2.9)	129	0.8 (0.4–1.5)	43	0.3 (0.1–1.2)
Worse score (>90.5)	12	1.5 (0.3–7.7)	68	0.5 (0.2–1.3)	103	0.9 (0.5–1.9)	43	0.8 (0.2–2.9)
Emotional workload								
Low score (<26.5)	22		94		83		32	
Middle score	23	1.1 (0.3–4.9)	85	3.5* (1.2–10.3)	127	0.8 (0.4–1.7)	39	0.6 (0.1–2.5)
Worse score (>38.1)	22	1.7 (0.4–7.7)	46	7.2* (2.6–20.4)	148	2.0 (0.9–4.0)	62	1.1 (0.3–4.1)
Autonomy								
Low score (<48.5)					98			
Middle score					125	0.8 (0.4–1.6)		
Worse score (>75.6)					135	1.3 (0.6–2.6)		
Soc. supp. Colleagues								
Low score (<14.8)	15		66		90		54	
Middle score	26	0.5 (0.1–3.0)	84	1.1 (0.4–2.8)	145	1.9 (0.9–4.0)	40	2.4 (0.7–7.7)
Worse score (>29.6)	26	1.7 (0.3–9.5)	75	0.9 (0.3–2.4)	123	3.9* (1.8–8.6)	39	3.9* (1.2–12.8)
Soc. supp. Supervisor								
Low score (<18.5)	17		71		108		45	
Middle score	27	0.2 (0.0–1.1)	82	1.5 (0.6–3.8)	118	0.6 (0.3–1.3)	41	2.0 (0.6–7.2)
Worse score (>33.3)	23	0.9 (0.2–4.6)	72	3.8* (1.4–10.2)	132	1.3 (0.7–2.6)	47	2.7 (0.8–9.4)

Note: [#]Score on the Four-Dimensional Symptom Questionnaire ≥ 11 . * $p < 0.05$.

Table 5. Multivariate logistic regression analyses: association of workload variables with burnout[#] by age groups: ORs with 95% CIs.

	Age groups							
	22–35 years		36–45 years		46–55 years		56–66 years	
	<i>n</i>	OR (95% CI)	<i>n</i>	OR (95% CI)	<i>n</i>	OR (95% CI)	<i>n</i>	OR (95% CI)
Sex								
Male	51		137		282		106	
Female	17	1.8 (0.2–14.4)	85	0.3 (0.1–0.7)	74	0.9 (0.5–1.8)	26	0.5 (0.2–1.8)
Work pressure								
Low score (<30.3)	28		84		104		40	
Middle score	25	5.2 (0.5–50.2)	71	3.0* (1.1–8.0)	124	1.8 (0.8–4.1)	41	3.6 (0.9–13.8)
Worse score (>42.4)	15	17.2* (1.2–242.3)	67	3.0* (1.1–8.2)	128	6.3* (2.8–14.2)	51	12.0* (3.1–47.5)
Mental workload								
Low score (<71.4)	34		92					
Middle score	22	4.7 (0.2–98.8)	85	3.1* (1.3–7.4)				
Worse score (>90.5)	12	0.5 (0.0–14.6)	45	0.7 (0.2–2.1)				
Emotional workload								
Low score (<26.5)	23		62		82		32	
Middle score	23	19.9 (0.9–452.7)	68	1.3 (0.4–3.7)	125	2.2 (0.9–4.9)	39	0.6 (0.1–2.2)
Worse score (>38.1)	22	33.9* (1.7–678.6)	92	2.5 (0.9–7.0)	149	1.7 (0.8–3.7)	61	0.8 (0.2–2.7)
Autonomy								
Low score (<48.5)	26		78		98		33	
Middle score	29	0.2 (0.0–2.4)	91	2.3 (0.9–5.8)	124	0.9 (0.4–1.8)	56	2.2 (0.6–7.3)
Worse score (>75.6)	13	1.0 (0.0–22.0)	53	1.2 (0.4–3.5)	134	0.8 (0.4–1.6)	43	1.3 (0.4–4.7)
Soc. supp. Colleagues								
Low score (<14.8)	15		65		89		55	
Middle score	26	0.1 (0.0–3.7)	82	0.8 (0.3–2.2)	144	1.7 (0.7–3.8)	38	1.9 (0.6–5.6)
Worse score (>29.6)	27	6.9 (0.4–128.8)	75	0.7 (0.2–2.1)	123	2.9* (1.3–6.7)	39	2.9 (0.9–9.1)
Soc. supp. Supervisor								
Low score (<18.5)	17		69		109		45	
Middle score	28	0.2 (0.0–3.4)	82	1.3 (0.4–3.7)	116	3.1* (1.3–7.4)	41	2.8 (0.9–9.3)
Worse score (>33.3)	23	2.8 (0.2–51.6)	71	7.7* (2.5–23.8)	131	5.5* (2.4–12.8)	46	3.9* (1.2–13.2)

Note: [#]Both scores of 'exhaustion' and 'distance' of the UBOS >2.2. **p* < 0.05.