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ORIGINAL ARTICLE

Dentists working conditions – factors associated with perceived workload

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ABSTRACT

Background: Dentists are often exposed to occupational health hazards such as stress, high workload, and ergonomic and mental strain. However, there are limited studies focussing on occupational health and factors associated with working conditions. The aim of this study was to identify possible gender differences and factors associated with a high workload.

Method: The study population comprised of 187 dentists (123 women and 64 men) who had been working between 5 and 12 years. All participants completed a questionnaire regarding perceived workload and different working conditions. In the logistic regression analyses, gender and employment (employee or employer/manger), influence over work, social support, ergonomics, and working hours were used as independent covariates.

Results: Poor satisfaction with ergonomic conditions and low influence on the work situation were reported by 40 and 47% of the participants, respectively. Female dentists were more often employees, reported lower influence over work situation, and more often worked part-time compared to male dentists. Those who reported a high workload significantly more often experienced that they had low influence over work, low levels of social support, and were not satisfied with ergonomic working conditions.

Conclusion: Dentists with low influence over work, low levels of social support, and who were unsatisfied with the ergonomic conditions reported higher levels of workload. The dentists experienced a similar workload, regardless of employment and gender. Preventive actions at the workplace in order to maintain a moderate workload promote both individual and organizational measures, to minimize the risk of poor occupational health.

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Introduction

Musculoskeletal disorders, pain, stress, and mental strain, are highly prevalent in today's society [1], and are a major health concern among dental professionals [2]. Dentists have high demands in the form of high quantitative demands relating to treating as many patients as possible during a working day. The physical work environment is characterized by high exposure to awkward postures, relatively high forces extorted by hand and fingers, and prolonged static loading of muscles in the neck, shoulders and upper back [3,4]. There is also a high degree of precision and concentration [5] combined with a time schedule and tight deadlines that must be strictly adhered to [6].

In a study from New Zealand on dentists´ occupational health status, women had a higher prevalence of pain in the shoulders, wrist/hand, neck and upper back regions compared to men [7]. Another study reported that women tended to have a poorer recovery from back and neck pain compared to men [8]. Previous studies have shown that pain in the jaw, neck, shoulders and back, as well as frequent headaches, was already prevalent during the dental education period [9], and there was a mutual influence between these pain conditions [10]. Furthermore, it was also shown that there was an increased risk for female dental students to develop and maintain myofascial pain over a 2-year period [9]. High levels of stress can contribute to musculoskeletal disorders according to a study of Belgian dentists [11]. Consequently, dentists are at a high occupational risk of contracting musculoskeletal pain and disorders [12].

A widely used model in health research is the 'work–demand model' [13]. It focuses on the psychosocial work environment, and the dimensions of job demands, job control and social support. According to the model, there are significant associations between the experienced working situation, the amount of control over the work situation, and the level of social support. The model suggests that social support could decrease perceptions of stress and reduce the detrimental effects of a stressful work situation. Additionally, in a Swedish public health report, emotional and task-related social support from both supervisors and co-workers were shown to be important for health and well-being [14]. Thus, a combination of high work demands, low social support and limited influence on work situations would increase the

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sense of having a heavy workload and increase the risk of mental disease according to the 'work-demand model' [13]. Furthermore, for at least some women, there seem to be substantial challenges that limit career potential and career satisfaction [15].

In a recent study, decreased workability in terms of productivity loss was associated with poor sleep quality, high amount of stress, and multi-site pain [16]. Stress, mental strain and high workload are common problems in general, but there is a paucity of studies that focus on these problems within the dental profession. Also, studies are limited on whether there are differences in the experience of workload depending on employment as the manager of a clinic compared to being an employee, and whether there are gender differences among dentists in experienced workload according to employment.

The aim of this study was to evaluate how dentists experience their working conditions and to identify possible factors associated with a high workload. The first hypothesis was that female dentists experience a higher workload compared to male dentists. The second hypothesis was that working conditions such as influence over work, social support, ergonomics and working hours were associated with experienced workload and job position.

Materials and methods

Study population

During the period of 1998–2005, a total of 371 dental students in the dental program at Umeå University participated in a study on temporomandibular disorders (TMD) [9]. These 371 individuals were all invited to participate in this cohort study (2015), based on the expectation that the majority was now working as dentists. Everyone received a questionnaire survey on working conditions and general health, a letter of correspondence, and a reply envelope. A consent letter was attached to the survey to inform the participants about the study and that participation would be voluntary and could be aborted at any time. After two reminders, 212 responses were received (57% response rate). Dropouts ($n = 159$) were due to the following reasons: interrupted dental studies, unknown address, replied that they did not want to participate, had emigrated, or had died. Of the 212 subjects who answered the questionnaire, 25 were excluded because they did not work as dentists, were on sick leave, or were on parental leave. Thus, a total of 187 working dentists were identified and had been working as dentists between 5 and 12 years. Those 187 dentists, al working at dental clinics, were included in the study. The mean age was 37.4 years (range 31–59 years). The study was approved by the Regional Ethical Review Board in Umeå, Sweden, (Dnr 2015-86-32 M).

Questionnaire

All participants completed a questionnaire regarding the following working conditions:

- Employment (employee or employer/boss)
- Influence over work (ratings on the Numerical Rating Scale, NRS 1 always – 10 never)
- Social support (ratings on the Numerical Rating Scale, NRS 1 always – 10 never)
- Work demands (psychological, physical, or psychological and physical)
- Ergonomics (are you satisfied with the ergonomics at your workplace – yes/no)
- Working hours
- Workload (ratings on a 5-point scale ranging from too low to often bothering high)

Data analysis

For the analyses, the items below were dichotomized as follows:

- Employment: employee or employer/boss
- Influence over work situation: high (NRS 1–3) or low (NRS 4–10)
- Social support: high (NRS 1–3) or low (NRS 4–10)
- Ergonomics: satisfied or unsatisfied
- Working hours: part-time (<100%) or full-time (100% = 40 hours per week)
- Workload: moderate (too low, moderate, usually moderate) or high (on the verge of overload, often bothering high)

Cut-off values for influence over work and social support were chosen to get enough individuals (n) in each group for the analyses.

Statistics

The statistical analysis was performed in the Statistical Package for Social Sciences (SPSS 24, Inc, Chicago, IL). Chi-square test, Fisher's test, and Mann–Whitney U test was used for the associations between the variables in the data set. Logistic regression analyses were first calculated for each factor and dependent variable, adjusted for gender. Then a multivariate model was created using a backward selection method, run in a manual procedure. Step by step, the non-significant interactions were removed, followed by the removal of non-significant single factors. Associations between the outcome variables and covariates were assessed by odds ratios (OR) and 95% confidence intervals (CI). In the regression analysis, the results were considered statistically significant if the CI did not include 1 (one). If expected observations were less than five, the association analysis was carried out with Fisher's exact test. A p-value $< .05$ was considered statistically significant.

Results

The response rate was 57% (212 of 371 initially contacted responded). Among those who did not respond ($n = 159$), the age range was between 18–42 years, and the majority (80% of those who did not respond) were 27 years or

Table 1. Population characteristics ($n = 187$).

	n	%	Mean	SD
Gender				
Female	123	65.8		
Male	64	34.2		
Age				
Range 31–59			37.4	5.1
Job position				
Employee	141	75.4		
Manager	46	24.6		
Ergonomics[a]				
Satisfied	112	59.9		
Not satisfied	75	40.1		
Workload[b]				
Moderate	102	54.8		
High	84	45.2		
Missing	1			
Social support[c]				
High	126	68.9		
Low	57	31.1		
Missing	4			
Work demands				
Psychological	41	21.9		
Physical	16	8.6		
Psychological & physical	130	69.5		
Influence over work[d]				
High	97	52.7		
Low	87	47.3		
Missing	3			
Working hours				
Part-time	69	36.9		
Full-time	118	63.1		

[a]Satisfied with ergonomics at workplace; Not satisfied with the ergonomics; [b]Moderate = too low, moderate, usually moderate; High = on the verge of overload, often bothering high; [c]High = high social support (NRS 1–3); low- = low social support (NRS 4–10); [d]High = high influence (NRS 1–3); low = low influence (NRS 4–10).

younger. The distribution between men (46%, $n = 73$) and women (54%, $n = 86$) for the non-responders was more equal compared to the distribution for those who did respond.

Population characteristics

The characteristics of the study population are presented in Table 1. Women represented 2/3 of the participants. The majority of participants were employed, experienced high social support, and worked full-time. About 50% reported a high workload. Approximately 70% perceived their work as both psychologically and physically demanding, while 8.6% experienced the work as only physically demanding, and almost 50% reported a low influence over their work situation.

Working conditions and associated factors

Female dentists were more often employed, reported lower influence over their work situation as compared to male colleagues, and worked part-time (Table 2). In the univariate logistic regression analysis, the high workload was associated with the unsatisfactorily ergonomic situation (OR 2.6; 95% CI 1.4–4.8), low social support (OR 2.7; 95% CI 1.4–5.1), and low influence over work (OR 3.2; 95% CI 1.7–5.8) (Table 3). In the multivariate regression analysis, including ergonomics, social support, and influence over work, the association remained between low influence over work and a high workload (OR 2.3; 95% CI 1.2–4.4).

Those being employees more often experienced low influence over work (OR 7.4; 95% CI 3.1–17.6) and worked part-time (OR 0.1; 95% CI 0.1–0.4) compared to those who worked as managers. No differences were observed between work demands and the independent covariates, except for working hours. Part-time workers experienced more psychological (30%) and less physical demands (4%) as compared

Table 2. Differences between gender regarding working conditions.

	Gender		
Working conditions	Female *n* (%)	Male *n* (%)	*p*-value*
Job position			
Employee	104 (84.6)	37 (57.8)	<.000
Manager	19 (15.4)	27 (42.2)	
Ergonomics			
Satisfied	74 (60.2)	38 (59.4)	.917
Not satisfied	49 (39.8)	26 (40.6)	
Workload[a]			
Moderate	64 (52.0)	38 (60.3)	.283
High	59 (48.0)	25 (39.7)	
Social support[b]			
High	80 (65.6)	46 (75.4)	.176
Low	42 (34.4)	15 (24.6)	
Influence over work[c]			
High	57 (46.7)	40 (64.5)	.022
Low	65 (53.3)	22 (35.5)	
Working hours			
Part-time	56 (45.5)	13 (20.3)	.001
Full-time	67 (54.5)	51 (79.7)	

n (number), % and *p*-values are reported.
[a]Moderate = to low, moderate, usually moderate; high = on the verge of overload, often bothering high; [b]high = high social support (NRS 1–3); low = low social support (NRS 4–10); [c]high = high influence over work (NRS 1–3); low- = low influence over work (NRS 4–10).
*Chi-square test. $p < .05$ was considered statistically significant.

Table 3. Binary logistic regression analysis of workload (moderate or high) as dependent factor, and the outcome variables as covariates.

	Workload[a]		
Variables	Number (*n*)	Univariate OR (95%CI)	Multivariate OR (95%CI)
Gender			
Female	123	1.0	
Male	63	0.7 (0.4–1.3)	.
Job position			
Employee	141	1.0	
Manager	46	0.6 (0.3–1.2)	.
Ergonomics			
Satisfied	112	1.0	
Not satisfied	74	**2.6 (1.4–4.8)**	.
Social support[b]			
High	126	1.0	
Low	57	**2.7 (1.4–5.1)**	.
Influence[c]			
High	97	1.0	1.0
Low	87	**3.2 (1.7–5.8)**	**2.3 (1.2–4.4)**
Working time			
Part-time	69	1.0	
Full-time	117	0.6 (0.3–1.2)	.

OR (odds ratio) and CI (confidence interval) are reported, adjusted for gender. Significant associations in bold.
[a]Moderate = too low, moderate, usually moderate; high = on the verge of overload, often bothering high; [b]high = high social support (NRS 1–3); low- = low social support (NRS 4–10); [c]high = high influence over work (NRS 1–3); low = low influence over work (NRS 4–10).

to full-time workers (17% and 11%, respectively). No significant gender differences were found in how the different job positions, that is, managers and employees, perceived their workload.

Discussion

The main findings of the present study were that nearly 50% of the dentists experienced high workload and low influence over work. Those who reported a high workload significantly more often experienced low influence over work, low levels of social support, and were not satisfied with ergonomic working conditions. Female dentists more often worked as employees, reported a lower influence over their work situation, and more often worked part-time compared to the male dentists.

The demography of the dental profession in Sweden appears to be shifting towards a female-dominated workplace. The study population, which is based on younger dentists, thus reflects a higher proportion of females that work as dentists. In the present study, no statistically significant difference was observed between gender and workload.

This is, however, not in line with a report by Arbetsmiljöverket 2017 [17] that showed that women in occupations overall experience a heavier workload than men. In Sweden, women dominate in human service and health care occupations. Accordingly, there was a dominance of female dentists in the present study population.

About 1/3 of the respondents worked part-time. Of these 81% were women. We do not know the reason for this finding, but it may be because women more often decrease their working time to care for young children. Additionally, maternal leave for childcare may still dominate, and result in working part-time as dentists when returning back to work [15]. For women, childcare and finding a balance between work-life with children at home often results in working fewer hours per day as a dentist when returning back to work [15]. However, our results show that it is important for the employer to have clear expectations for part-time employed women since 30% of dentists working part-time experienced more psychological demands compared to 17% of full-time dentists. Thus, this reality may be an expression that female dentists experience higher levels of stress. A study by Lundberg et al. 1999 about stress and workload between men and women in high-ranking positions showed that women during and after work had high norepinephrine levels compared to men [18]. The norepinephrine levels of women, compared to men, were significantly elevated during higher workloads, and especially for women with children at home had higher levels of norepinephrine.

Furthermore, our results show that those who worked part-time are also those who experienced lower physical demands compared to those who worked full-time. A possible reason may be that part-time workers do not expose the body to static loading as much as the full-time workers, and have less extent of a sedentary workday. This presumably gives the body more time to recover between the work shifts. Individuals with effective coping strategies were found to be more adaptive to unfavourable working conditions [19]. In the present study, the type of employment (employee or employer/manager) was not associated with the workload. Both types of job positions involve a high component of workload but presumably of a different character. One possible interpretation is that both managers and employees have a similar capability to control their working situation, which consequently makes work more tolerable. However, a higher proportion of employees experienced a lower influence over work than did the managers. This could be due to that managers most likely have a greater opportunity to affect their work situation. On the other hand, in the same study population, employment was not associated with work ability or productivity in terms of quality and quantity of work [16].

The present study also showed a significant correlation between gender and employment, with men overrepresented among managers while women were overrepresented among employees. A Swedish report by SOU – Statens offentliga utredningar (State public reports), showed that more women were employees and more men worked as managers. The suggested reason behind gender differences in employment was that women are not considered as suitable candidates for the manager position. Faults made by men can be corrected, whereas faults by women are seen as flaws. This in turn may lead to women being excluded from the recruitment process [20].

High influence over work means being able to affect the working situation, that is, how, what, when certain task assignments should be done within the limits of what an employee can handle. This in turn creates the sense of being a meaningful co-worker and a positive working environment for the employed, thus a balanced workload [13]. Our results indicate that dentists with high professional control and high social support in their work situation are able to deal with the workload in a better way than dentists with low influence. In Sweden, it is usual that the dental nurses make appointments with the patients and fill in the booking schedules of the dentists. This may cause the feeling that appointments are made without any consideration for the dentist's demands and how many patients the dentist can handle in one day. This can be one reason why the dentists experience low control and influence over his/her work situation and consequently lead to a high workload. High influence and high job control are important when managing workload, which was also confirmed in a study on the impact of workload demands. Employees with high job control and influence reported less job risk than those with less control [21]. Different job resources in dentistry may cause stressful conditions and situations. Therefore, high influence over the work situation and high social support are significant variables to maintain the moderate workload and stress that occurs during working. As mentioned, the work-demand model suggests that work demands are significant in developing stress and workload, but it can be balanced and reduced by different types of job resources such as social support and influence over work. According to the work-demand model by Karasek, social support can act as a stress

buffer, which is one type of job resource [13]. A high degree of social support and having control over work are believed to reduce negative work situations. This suggests that moderate workload is related to high influence over work and social support, while a high workload is related to low influence over work and a low degree of social support. Thus, a decisive measure to ensure the dentist's influence over the work situation seems to be to take complete control of their own booking schedule.

Social support can come from different directions, and it is important with feedback and encouragement from employers, colleagues, and from home. Social support buffers the effects of negative stress and gives a sense of belonging during hardship in workplace [13]. Based on the interaction between social support and workload, social support was found to subdue the negative effects on workload and health [22]. In the present study, a high workload was associated with perceived low social support. Stress, mental strain and high workload belong to everyday life in dental care. Being able to talk about this and receiving support from managers, colleagues and relatives is probably of great importance. When this support is low or lacking, it is reasonable to believe that the workload is perceived to be higher. The study does not disclose cause and effect.

Our results showed that those who felt dissatisfied with their ergonomic situation experienced their workload as higher than those who were more satisfied with their ergonomic situation. This finding could be because those having a poorer ergonomic situation perceived a high workload as a consequence of this. However, it could also be so that those with a high workload reported a poorer ergonomic situation. Due to the cross-sectional design it is impossible to elucidate what is the cause and effect. The biomechanical exposure within dentistry is reported to be high [23], with a high risk for developing musculoskeletal disorders [24].

One way of handling or reduce a high workload may be to work part-time. There were no significant gender differences in how managers and employees, respectively, perceived their workload, but one should keep in mind that a higher percentage of the female dentists work part-time, and this may affect the results. For example, the reported workload for female dentists may decrease with part-time work, and accordingly, the actual results on workload, social support, influence overwork and ergonomics may be concealed. When adjusting for all factors, including gender, in the multivariate regression analysis, only low influence over work remained significantly associated with a high workload. For a more detailed understanding and interpretation of the working situation, an individual comparison would be suggested with a qualitative interview study design.

A limitation of the present study is the cross-sectional design. A longitudinal approach is necessary when studying natural course and cause and effect. However, it is remarkable that almost 50% of these working dentists perceived a high workload, even at young ages and so early in their careers. Dentists working conditions and the influence on their occupational health is an area that needs further study to improvise the possibilities for preventive measures.

Conclusion

Dentists with low influence over work, low levels of social support and who were unsatisfied with the ergonomic conditions perceived higher levels of workload. Working conditions must be made visible early and taken seriously to avoid stress and future inconvenience. Thus, preventive actions at the workplace aimed at both the individual and organizational levels are essential to minimize poor work environments and prevent work-related ill-health.

Compliance with ethical standards

Participation in this study was entirely voluntary and all subjects gave their informed consent. Survey responses and results are processed so that unauthorized persons cannot access them.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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