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The relationship between working conditions and sick leave in Swedish dental hygienists

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Abstract: The purpose of this study was to examine the relationship between working conditions and sick leave in Swedish dental hygienists. Seventy-one percent of 577 randomly selected dental hygienists responded to a questionnaire. From those who responded ($n = 411$) a homogenous group of 252 was selected. They were assigned to four groups that exhibited either musculoskeletal disorders (MSD), low well-being (LWB), both low well-being and musculoskeletal disorders (BLM), or relative health (main group or M group). These groups were further divided according to number of sick days taken per year. Non-parametric statistics and logistic regressions were used for analyses. Those with MSD worked more clinical hours and treated more patients per day than the other groups. While the M group had fewer sick days, better work climates and decreased demands on work efficiency, increased sick leave within this group was related to greater staff numbers and less commitment to improving work processes. In the M group, role ambiguity and LWB were associated with absence of 1–3 days, compared with those who took no sick leave. Respondents in the LWB group, who perceived role ambiguity, were absent more than 7 days/year, compared with those who perceived role clarity. Management issues were the distinguishing factor for those who had severe health problems. In conclusion: role ambiguity is the predominant psychosocial factor associated with sick leave. Psychosocial management factors rather than physical work factors seem important for work and sick leave rates among dental hygienists.

Key words: dental hygienists; musculoskeletal disorders; role ambiguity; sick days; stress; work

Introduction

The current focus of research on sick leave within the workplace is due to the increase in days of absence due to illness seen in Sweden and Europe in recent years. Sick leave among women increased the most; women are generally absent more often than men (1–3). A systematic review of the literature revealed that despite this, women were studied less frequently than men. And there have been few studies within the health care sectors. There is little scientific evidence that physical and psychosocial strain from rotated and twisted body postures, low work satisfaction, quantitative work demands and lack of support from supervisors increases sick leave (4). Furthermore, neither the neck and back disorders, nor mental illness appears to influence sick leave (4). But long-term sick leave is common for those who experience musculoskeletal and psychiatric diseases, i.e. diagnosed disorders (1, 4–6). Notably, women with musculoskeletal diseases tend to take longer sick leave than men (1).

A newly published eight-year follow-up study of hospital staff showed that work satisfaction and social support within the workplace had declined in recent years. In addition, long-term sick leave had increased and was associated with insufficient time for planning work duties. Psychosocial factors, such as lack of support from colleagues and low work satisfaction, were associated with short-term sick leave (5).

Two studies partially examined sick leave among dental hygienists, which increased between 1998 and 2002 (7, 8). Musculoskeletal disorders (MSD) are common within the profession (7, 9–11) and can shorten the weekly working hours for individuals (12). Perceived stress from scaling work, social and work relations and role conflicts are known to predict MSDs, while supportive management and high levels of commitment at work predict high well-being (7, 9). Work conflicts and role ambiguity were also reported as problems in the workplace (11, 12). Although it is known that sick leave of more than 10 days/year predicts improvements of peer recognition and clinical work processes in dental hygienists (8), the relationship between working conditions and sick leave among dental hygienists has not been extensively studied. There is also a considerable lack of knowledge about women's working conditions concerning the risk factors for sick leave due to MSDs (4).

Health care professionals are characterized by low rates of sick leave (13–15). Reasons for this could be high work presence during sickness, which is thought to be common in professionals who work with people and whose duties cannot be easily handed over to others (16). There is reason to believe that this is also true of dental hygienists, i.e. health care professionals who have an independent role in the dental health team (8).

There are several reasons for studying female health care professionals (1, 4, 5, 7–9, 12). Because dental hygienists (97.5% female) are health care professionals, the same reasons might apply. While MSDs are common in dental hygienists, we know very little about sick leave among hygienists. Work and health problems in dental hygienists probably start on a small scale and increase in severity over time. So, it is important to understand the early warning signals before sick leaves increase.

Here, we hypothesized that increased sick leave is related to management factors for those with low well-being (LWB), and perceived stress from scaling work in those hygienists with MSDs.

The aim of the study was to examine how working conditions relate to sick leave and health in Swedish dental hygienists.

Materials and methods

Subjects and procedure

In 2002, a self-reporting 300-item questionnaire on working environments was developed for the present study. The questionnaire was based on a previous study (6) and adapted using pilot studies in Sweden and interviews with 10 dental hygienists in the Stockholm area, who identified current work-related issues. The questionnaire was tested using random sampling of 60 subjects (90% response rate) from the Swedish Dental Hygienists' Association (SDHA), of which about 95% of dental hygienists in Sweden are members. The questionnaire was then refined further before distribution. Each questionnaire was assigned an ID that was destroyed when all questionnaires were returned. Non-respondents received two reminders.

The questionnaire was mailed to 577 randomly sampled members (25%) of the SDHA. Inactive members, retirees, educators, unemployed members and hygienists who worked abroad were excluded from the sample. Seventy-one percent responded ($n = 411$).

The 411 respondents were then filtered to obtain a homogenous group that included only full-time or nearly full-time workers. Those who worked less than 30 weeks/year ($n = 22$), <30 h/week ($n = 60$), or did not indicate their hours and weeks worked or sick days ($n = 74$) were excluded from the study. Three more respondents were excluded because they indicated the *number of patients treated per day* (35, 36 and 46, respectively) which was judged to be far out of the normal range.

This produced a study group of 252 dental hygienists, called the initial group (I group). Of those, six people reported absence from work for various reasons, but they still fulfilled the criteria for number of hours worked per week and number of weeks worked per year. One of these was reported to be in rehabilitation, one was studying, three were on maternity leave and one was on leave for unspecified reasons.

Classification of subjects

Musculoskeletal disorders (MSD; n = 14)

This group included only those with severe MSD symptoms. In response to: *Please rate for the last month the level of intensity of MSDs during work*, a response of at least 4 on a 1–4 point scale (i.e. experienced severe pain and difficulty using a body part) was required for one of these variables: the neck, shoulders, upper back, lower back, hips, knees and feet/ankles (as a unit) and lower arms on the left or right side of the body (7, 9).

Low well-being (LWB; n = 43)

This group included only those with severe LWB symptoms. In response to: *Have you noticed any of following health symptoms during the last month*, a score of 4 or 5 on a 1–5 point scale (i.e. experienced symptoms rather often or very often to constantly) was required for three or more of these variables: headaches, worry/anxiety, inability to sleep, irritability/impatience, physical fatigue, mental fatigue, depression and gastritis (7, 9).

Both low well-being and musculoskeletal disorders (BLM; n = 12)

See MSD and LWB above for questions asked.

The main group (M group; n = 183)

No MSD, LWB, or BLM to any great extent.

Division into sick leave categories

The M group was divided into four sick leave categories: 0, 1–3, 4–8 and >8 sick days per year with roughly the same number of individuals in each category.

Those with MSD and LWB were further divided into two sick leave groups representing 0–7 and >7 sick days per year, and those with BLM in groups of 0–4 and >4 sick days per year (there were too few individuals to form more than two roughly equal groups).

Assessments

The questionnaire measured aspects of working environments and health in dental hygienists. Respondents were asked to rank their perceptions of their working environment and health on Likert-type scales. The questions on dental hygienists' backgrounds, work and health were similar to those in previous questionnaires (7, 9).

The questionnaire covered these broad areas: background, workplace, physical and psychosocial working conditions and health. The following lists show the variables in the present study and their components. Validated scales and indices from previous occupational research have been used in their original form or as revised by the authors (7–9, 17–19). One new scale and two indices were developed.

Background

Age, years in profession, weekly work hours, clinical work hours per week, weeks worked per year, number of staff in the workplace, number of patients treated per day and sick days per year.

Working conditions

Number of staff in the workplace

The median was used as the cut-off point for the groups; that is, <12 employees and ≥12 employees.

Demands at work interfere with personal life

Rankings of opportunities to relax after work and the ability to cope with work and personal tasks during the day. New Scale.

Demands on work efficiency

Being economical or cost-efficient, keeping scheduled appointments and days fully booked with patients (7, 9). Original scale.

Social and work climate

Rankings of working environment experienced at the unit as encouraging, supportive, relaxed and comfortable (17–19). Original scale.

Disturbing conflicts at work

Rankings of disturbing conflicts noticed between superiors and subordinates and between co-workers (17–19). Original scale.

Problem-solving management

Immediate supervisors tackle work problems as soon as they surface and plan work in advance (17–19). Original scale.

Commitment to improving personal work processes

Dental hygienists' willingness to improve their own practical work processes and flexibility at work (7, 8). Original scale.

Commitment to improving workplace processes

Dental hygienists' eagerness to improve organizational and clinical processes and cost efficiency (7, 8). Original scale.

Role ambiguity (versus role clarity)

Dental hygienists' uncertainty regarding authority, work goals, responsibilities and management expectations (8, 17). Original scale minor revisions in wording were made for this study.

Peer recognition of dental hygienists' qualifications

Promotion of dental hygienists' competencies to patients, better support from clinic managers and staff understanding of dental hygienists' roles (7, 8). Original scale.

Teamwork and distribution of work tasks should be improved

Dental hygienists' ranking of the importance of improving working conditions (7, 8). Original scale.

Sick leave and health

Musculoskeletal disorders

Perceived pain in the musculoskeletal system in the last month (7, 9). Original scale.

Mental well-being

Perceived symptoms in the last month, including frequency of headaches, anxiety, worry, inability to sleep and irritability (7, 9). Original scale. Two new indices were created for the study, each of which included three symptoms: (1) impatience, mental fatigue and gastritis; and (2) headaches, anxiety and sleep disturbance.

Self-reported sick days per year

Different cut-off points for sick days and grouping of people with sick leave were used (7, 8) in response to: how many days have you been absent from work due to sickness in the last 12 months?

Statistical methods

Descriptive statistics were used to describe the characteristics and background of the dental hygienists in terms of percentage, mean, and SD, median (Md) and quartiles. The SPSS 6.1 statistical software program was used for analyses. The Cronbach alpha reliability coefficient was checked for all scales and varied between 0.73 and 0.89 except for one variable, interference between work and private life, where the value was 0.66. The intercorrelation (Pearson's r) was <0.60 for a reasonable degree of scale independence (20). The Mann–Whitney U-test was used to analyse differences in the background data.

Coefficient prognostic variables for the logistic regressions were identified using Spearman's rank correlation. Multiple stepwise logistic regression modeling was used to determine which working condition variables were the best predictors for the LWB, MSD, BLM and M groups. Logistic regressions were used to identify which of the working conditions and mental well-being variables were the best predictors of sick leave of different lengths, including the M group. Pearson's chi-squared, Fischer's exact test and McNemar's test were then used to test the associations between working conditions and sick leave of varying lengths in the LWB, MSD and BLM groups (21).

Several potential regression models based on rank correlations were tested; the best models are presented in the results section. Statistical significance was defined as a P-value < 0.05.

Ethical approval

Regional ethics committees at Karolinska Institutet and Uppsala University approved the study (number: 02–092), the study protocol, the cover letter and the questionnaire.

Results

Characteristics of the study groups

In this study, 97.2% ($n = 245$) of participants were female and 2.8% ($n = 7$) were male. The study revealed that 26% ($n = 63$) of participants reported no sick days, 48% ($n = 116$) reported 1–7 days and 26% ($n = 64$) reported more than 7 sick days during the past year. Sick leave of more than 28 days was reported by 7% ($n = 17$), while 2% ($n = 5$) reported 90–99 sick days. The median number of sick days per year was 3, with a range of 0–99.

Sick leave was significantly higher in the MSD group compared with the M group (Table 1). When the BLM and LWB groups were added to the MSD group, sick leave was found to be higher in these groups ($P < 0.01$; $P < 0.04$) than in the M group. The MSD group had significantly more clinical work hours and treated more patients per day compared with the other groups. The BLM group worked fewer hours per week than the M group ($P < 0.03$). No significant differences were found in demographics between the groups, in terms of the number of staff at the clinics (<12 versus ≥12).

Working conditions and sick leave in the M group

Perceived good social and work climate [odds ratio (OR) 1.7; CI 1.2–2.4], being highly committed to improving personal work processes (OR 1.6; CI 1.0–2.6), and perceived lower demands on work efficiency (OR 1.4; CI 1.2–1.6) were factors associated with the M group (Table 2).

A workplace with less than 12 staff (OR 2.1; CI 1.3–3.4) was associated with sick leave of 1–3 days annually, while a staff of 12 or more (OR 2.9; CI 1.5–5.3) was associated with sick leave of more than 8 days annually (Table 3).

Respondents who perceived role ambiguity (OR 2.0; CI 1.2–3.5) and were less committed to improving their own work processes (OR 2.0; CI 1.1–3.5) were associated with sick leave of 1–3 days and more than 8 days/year, respectively. Those who were highly committed to improving their own work processes (OR 1.7; CI 1.1–2.7) were associated with sick leave of 4–8 days/year, while respondents who were less committed to improving workplace processes (OR 1.4; CI 1.1–1.7) were associated with sick leave of more than 8 days/year.

Dental hygienists with symptoms such as impatience, mental fatigue and gastritis (OR 1.6; CI 1.2–2.2) were associated with sick leave of 1–3 days, while those with symptoms of headache, anxiety and sleep disturbances (OR 1.4; CI 1.1–1.8) were associated with sick leaves of more than 8 days/year.

Regression models were tested for different groupings of the I group according to sick days (0, 1–7, >7 days and 0, 1–10 and >10 days). The analyses did not add other prognostic variables compared with Table 3, except for two significant factors in the areas with the most sick leave, which involved interference between work and personal life (OR 1.7; CI 1.1–2.6) and the need to improve the recognition of dental hygienists' qualifications in the workplace (OR 1.5; CI 1.1–2.1). The overall predictions for the models were 62% and 65%, respectively.

Working conditions and sick leave in the MSD, LWB and BLM groups

Perceived poor social and work climates (OR 2.5; CI 1.8–3.2) and management that did not resolve work issues (OR 2.1; CI 1.2–3.8) were factors associated with the LWB group, compared with the MSD group (Table 4). A need for improvements in teamwork and distribution of work duties

Table 1. **Characteristics of the main group (M group), MSD group, LWB group and BLM group. Mean (M), SD and *P*-value. For number of sick days, the median (Md) and the first and third quartiles (Q1–3) are also presented (underscored)**

Age and work characteristics	M group M (SD) $n = 183$	MSD group M (SD) $n = 14$	*P*-value	MSD group M (SD) $n = 14$	LWB group M (SD) $n = 43$	*P*-value	BLM group M (SD) $n = 12$
Age	46 (9.7)	44 (9.7)	NS	44 (9.7)	45 (9.9)	NS	48 (4.5)
Years at work	13 (8.1)	15 (8.0)	NS	15 (8.0)	14 (8.0)	NS	16 (6.0)
Weekly work hours	36 (4.4)	37 (3.6)	NS	37 (3.6)	35 (4.5)	NS	33 (4.5)
Clinical work hours per week	29 (7.4)	34 (3.8)	0.008	34 (3.8)	30 (7.4)	0.040	29 (4.6) β
Weeks worked per year	45 (4.7)	47 (5.2)	NS	47 (5.2)	46 (4.2)	NS	46 (3.4)
Number of staff	14 (9.3)	18 (10)	NS	18 (10)	16 (11)	NS	18 (10)
Patients treated per day	09 (4.7)	11 (2.7)	0.010	11 (2.7)	09 (2.3)	0.020	09 (1.7) δ
Number of sick days	06 (11)	21 (35)	0.001	21 (35)	12 (15)	NS	18 (29)
Number of sick days	2 (0–7)	5 (4–13)		5 (4–13)	5 (0–19)		4 (2–15)

MSD, musculoskeletal disorders; LWB, low well-being; BLM, both low well-being and musculoskeletal disorders.
Mann–Whitney *U*-test was performed for the group comparisons. Number of sick days was self-reported for the past year.
β = significant difference between the MSD and BLM groups related to clinical work hours ($P < 0.001$).
δ = significant difference between the MSD and BLM groups related to number of patients treated per day ($P < 0.05$).

Table 2. **Stepwise logistic regression models. Working conditions associated with the main group (M group)**

Dependent variable	Prognostic variables	Log odds coefficient	SE	Odds ratio (OR)	OR 95% CI	*P*-value
M group	Good social and work climate	0.5	0.18	1.7	1.2–2.4	0.006
Correct predictions 78%	Lower demands on work efficiency	0.3	0.08	1.4	1.2–1.6	0.001
	Highly committed to improving own work processes	0.5	0.20	1.6	1.0–2.6	0.050
R^2 (Nagelkerke 30%)	Constant	3.2	0.7			

ORs and 95% CIs of work environment factors related to the M group. The dependent variable was dichotomized in the logistic regression analyses, i.e. representing the M group and the others included in the study group (those belonging to the both low well-being and musculoskeletal disorders, low well-being and musculoskeletal disorders groups).

Table 3. **Stepwise logistic regression models. Working conditions associated with sick leaves of various lengths for the main group (M group)**

Dependent variable	Prognostic variables	Log odds coefficient	SE	Odds ratio (OR)	OR 95% CI	*P*-value
Sick leave 1–3 days Φ	Number of staff <12 at workplace (versus ≥12)	0.8	0.20	2.1	1.3–3.4	0.001
(Compared with no absence)	Role ambiguity (versus role clarity)	0.7	0.20	2.0	1.2–3.5	0.008
Correct predictions 69%	Impatience, mental fatigue and gastritis	0.5	0.20	1.6	1.2–2.2	0.001
R^2 (Nagelkerke 33%)	Constant	–2.5	0.8			
Sick leave 4–8 days (Compared with 1–3 days absent)	Highly committed to improving own work processes	0.6	0.20	1.7	1.1–2.7	0.010
Correct predictions 65%						
R^2 (Nagelkerke 9%)	Constant	–0.2	0.2			
Sick leave >8 days (Compared with 4–8 days absent)	Number of staff ≥12 in the workplace (versus <12)	1.1	0.30	2.9	1.5–5.3	0.001
Correct predictions 74%	Low commitment to improving own work processes	0.7	0.30	2.0	1.1–3.5	0.020
R^2 (Nagelkerke 34%)	Constant	–2.2	1.0			
Sick leave >8 days (Compared with no absence)	Headaches, anxiety and sleep disturbance	0.3	0.10	1.4	1.1–1.8	0.030
Correct predictions 65%	Low commitment to improving workplace processes	0.3	0.10	1.4	1.1–1.7	0.030
R^2 (Nagelkerke 19%)	Constant	2.1	0.1			

ORs and 95% CIs of working environment and health factors related to self-reported sick days during the past year.
Φ = the dependent variable was dichotomized in the logistic regression analyses. The groups represent quartiles 0, 1–3, 4–8 and >8 days leave from work.

Table 4. **Stepwise logistic regression models. Working conditions associated with the low well-being group (LWB group), the group with both LWB and MSD (BLM group) and the musculoskeletal disorder group (MSD group)**

Dependent variables	Prognostic variables	Log odds coefficient	SE	Odds ratio (OR)	OR 95% CI	*P*-value
LWB group (Compared with MSD-group) δ	Poor social/work climate	1.0	0.34	2.5	1.8–3.2	0.004
Correct predictions 76%	Management not solving work problems	0.7	0.30	2.1	1.2–3.8	0.020
R^2 (Nagelkerke 25%)	Constant	2.7	1.3			
BLM group (Compared with LWB-group)	Teamwork and distribution of work duties should be improved	0.7	0.30	2.0	1.4–2.6	0.020
Correct predictions 74%						
R^2 (Nagelkerke 20%)	Constant	–8.3	3.1			
BLM group (Compared with MSD-group) β	Demands at work interfere with personal life	0.7	0.30	2.0	1.1–3.6	0.020
Correct predictions 69%						
R^2 (Nagelkerke 38%)	Constant	–5.3	2.3			

MSD, musculoskeletal disorders; LWB, low well-being; BLM, both low well-being and musculoskeletal disorders.
ORs and 95% CIs of working environment factors related to the LWB group. The dependent variables were dichotomized, i.e. representing the LWB group, BLM group and MSD groups in the logistic regression analyses.
δ = in one model, 42% of the variance for the MSD group was explained by more than 30 h of clinical work per week, Good social and work climate, and treatment of more than nine patients per day. See also Table 1.
β = in one model 45% of the variance for the MSD group was explained by more than 30 h of clinical work per week. Hosmer & Lemeshow goodness of fit test showed that the data did not fit the model (21). See also Table 1.

(OR 2.0; CI 1.4–2.6) was associated with the BLM group, as was a perceived interference between work and personal life (2.0; CI 1.1–3.6) compared with the LWB and MSD groups, respectively.

Another regression model indicated that 42% of the variance that characterizes the MSD group (compared with LWB group) was explained by more than 30 h of clinical work (OR 2.6; CI 1.7–3.4), good social and work climates (OR 2.7; CI 1.9–3.5) and treatment of more than nine patients per day (OR 2.6; CI 1.8–3.0). The overall prediction for the model was 83%. A workload variable to predict MSDs and sick leave was created by multiplying *clinical work hours* by *patients treated per day*, and using the median as a cut-off point. Heavy workloads demonstrated symmetry with hand numbness, according to McNemar's test ($P < 0.001$).

Respondents in the LWB group who perceived role ambiguity took more than 7 sick days per year compared with those who perceived role clarity (Fischer's exact test $P < 0.05$). McNemar's test showed some symmetry ($P < 0.06$) between scaling work and increased sick days for the MSD group. No other working conditions were found to relate to sick days in these groups.

Figure 1 summarizes descriptive data for the strongest psychosocial predictors of sick days found in the logistic regressions. The central lines in the boxes represent the median number of sick days (3) for the I group.

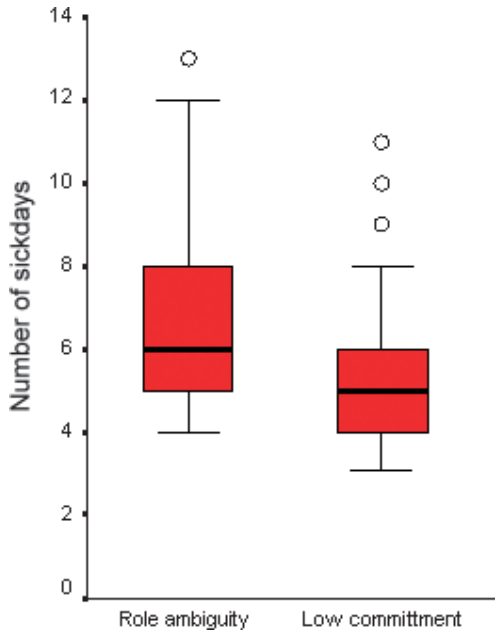

Fig. 1. The strongest psychosocial predictors of sick leave. The median number of sick days was 3 for the entire study group ($n = 252$).

Discussion

Working conditions related to health and self-reported sick leave were studied in Swedish dental hygienists. The results indicated that role ambiguity was the predominant psychosocial factor related to sick leave. Further, the results showed that those with MSDs worked more clinical hours and treated more patients per day compared with the other groups studied.

Sick leave has been thought to reflect levels of self-perceived health and well-being associated with physical (scaling work) and psychosocial work factors (role ambiguity), and an individual's motives and behavior (work commitment) for work attendance (*22*, *23*). We found a median of 3 absent days per year for dental hygienists, compared with 1–3 absent days for health care personnel in general (14). Only 7% were absent more than 28 days/year, which is consistent with data for Swedish female workers (*24*).

Two hypotheses were tested in the present study. The first hypothesis – that management factors could be associated with sick leave in those with LWB – was supported. The strongest factor was role ambiguity, found in the M group with 1–3 sick days and in the LWB group with more than 7 sick days. These results differ from a previous study among white-collar women, which found no association between role expectations and sick leave (25). A possible explanation is that we studied a specific profession and that different instruments (questionnaires, interviews, database analyses) were used. A public sector study that included 84% females, many of whom worked in health care, found that role clarity was related to excellent work ability no sick leave (*26*). We found similar results for the M group. These suggest that role ambiguity could be an early signal of role stress, indicating that a person may choose to stay home from work. Role stress occurs when there is a mismatch between employee expectations and management demands. Low work satisfaction in health care professionals is usually associated with short-term sick leave (5), but this study does not support this association in dental hygienists, possibly because of high levels of work satisfaction (9). Studies have shown that role ambiguity can be a problem in the workplace (11) and can indicate that workplace improvements are necessary (8). The influence of role ambiguity on very low levels of sick leave observed in this study indicates that role ambiguity should be considered in studies of working environments and sick leave.

Extensive reviews found no evidence that MSDs influenced sick leave (4), or that physical workloads that affect ergonomics were associated with absences (27).

This study showed only weak support for the second hypothesis that scaling work is associated with sick leave in those with

MSDs, although it is a common health problem in dental hygienists (7, 9–11). The physical workload from treating many patients per day showed significant symmetry with hand numbness, but not with other illnesses or number of sick days in the I group. This could be explained by frequent repetitive movements due to scaling work (7, 9). The MSD group reported high physical stress but a better social working climate, a problem-solving management and an ability to keep work and family demands in balance compared with the other groups with severe health problems. Indeed, one study found that people with MSD work despite problems (16). As dental hygienists' duties cannot be easily handed over to other dental professionals, they may indeed work while sick – particularly those with high well-being. Presence during sickness might occur more often at smaller workplaces because there is no immediate replacement available for those who are sick. Larger workplaces (≥12 staff members) were found to be associated with more than 8 sick days per year among the M group. In small dental workplaces, management and collegial support was reported to be better (28). These psychosocial factors may play a role in lowering the number of sick days, but no correlation with staff numbers was found.

The M group was characterized by good social and work climates and not unduly high work efficiency demands. Health levels within the group ranged from excellent to quite poor, only those with severe health problems were excluded. Because of this fewer sick days were expected and confirmed. The split of sick days into quartiles was made to make a successive comparison possible between those with 0, 1–3, 4–8 and >8 sick days per year. The aim of the comparison was to study if the prognostic variables showed some trend with increasing sick days, but no such trend was found, neither has any been found in previous studies (22, 23, 30). The only significance found was a lowering of work commitment as sick days increased from 4 to 8 to above 8. This may be due to a shift of focus from the job during long periods of sick leave.

Interference between work and personal life was associated with absence of more than 7 days, and poor perceived recognition of dental hygienists' qualifications was associated with absence of more than 10 days among the I group. A previous larger study of dental hygienists (8) supported the need for improved recognition of dental hygienists' qualifications, while interference between work and personal life was weakly associated with long-term sick leave (29). This may indicate that the present study group, which works nearly full-time or full-time, finds it difficult to balance demands of work and home.

As per our definitions, 27% of the study group suffered from severe health problems. This figure seems high, although no comparable studies were found. We expected to find more than 6% with severe MSD, as this is a known health problem for dental hygienists (7, 9–11), but we did not expect to find as many as 17% with severe LWB. Furthermore, 4% suffered from both symptoms.

Management factors were found to vary mainly among those with severe health problems.

Psychosocial management factors were found to be significant in the logistic regressions. Of course physical stress is important, and the results indicate that those who work intensely with scaling may be at risk. But psychosocial factors may cause just as many 'extra' sick days and affect more staff, resulting in a higher total number of 'extra' sick days.

From one initial homogenous group of individuals, three groups with severe health problems were identified, which should reduce possible confounders. This classification helped to establish active factors that contribute to sick leave. While the overall response rate was satisfactory (8), healthy respondents may have been more likely to respond and may thereby be over-represented, while those who felt unwell may have been less likely to participate and thus be underrepresented. The use of validated scales and reliability coefficient checks (20) clarified working environments among dental hygienists. The overall strong prediction of cases in the logistic models also confirms that dental hygienists have sufficient support within the workplace. Stepwise multivariate logistic methods (which decrease the effect of third-variable controls) and logistic regression models further strengthened the study (21). The small sample sizes of these groups make these results less suitable for generalization. But the results from the larger M group may be applied in general to Swedish dental hygienists who work full-time or nearly full-time in clinics.

The small sample sizes within the MSD and BLM groups limited the use of both several sick day cut-off points and multivariate analyses. Larger sample sizes would have enabled the use of several cut-off points for sick days, thereby increasing the possibility of finding more predictors of sick leave. It must be noted that long- and short-term sick leave *per se* were not studied; only total sick days per year. Moreover, use of self-reported sick days may allow misinterpretations and memory errors. It is important to note that we know little about the diagnosed MSDs or mental illnesses in those taking several sick days, although the respondents fulfil our inclusion criteria. We found that work factors do not necessarily predict numbers of sick days taken. Mental well-being and number of staff members at a workplace also play a role. As discussed elsewhere, sick leave is a complex subject to study (22, 23, 30).

Our novel finding that role ambiguity is an early signal of potential sick leave indicates that this factor should be

studied further in dental and other health care professionals.

Conclusions

Within the limitations of the study, role ambiguity was found to be the predominant psychosocial factor associated with sick leave. Overall, psychosocial management factors, rather than physical work factors, seem to be important for working conditions and sick leave among dental hygienists.

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