

Effect of autonomy and organizational climate on well-being of dental hygienists

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Abstract

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While certain dental procedures may cause musculoskeletal problems in dental hygienists, the emotional labor when aiding patients to feel at ease in the dental chair can cause mental problems. Experiencing the physical and mental demands consistently and over time may lead dental hygienists to reduce hours or quit the profession if they do not have autonomy at work or if the organizational climate is unsupportive. The objective of this study was to investigate the association between musculoskeletal disorders, autonomy and organizational climate and the outcomes of likelihood of leaving practice and salutogenic health.

Methods: This cross-sectional study was conducted via an online survey of registered Washington State dental hygienists between February and March 2020. Participants answered questions about musculoskeletal disorder symptoms using the Nordic Musculoskeletal Questionnaire and organizational climate using the Work Experience Measurement Scale (WEMS). The main outcomes were the single item on likelihood to leave practice in the next two

years and the Salutogenic Health Indicator Scale (SHIS). Adjusted prevalence ratios (PR) and 95% confidence intervals were calculated using robust Poisson multivariable regression models.

Results: In the adjusted analysis, the highest quartile of musculoskeletal symptoms (PR= 1.57, 95% CI=1.05-2.36), and low supportive working conditions (PR=1.48, 95% CI= 1.15-1.92) were associated with higher likelihood of leaving practice. Quartiles 2 to 4 of musculoskeletal symptoms (low quartile: PR = 6.14, 95% CI = 2.32-16.29; moderate: PR = 4.32, 95%CI=1.62-11.54; high: PR = 2.97, 95%CI=1.07-8.23), and middle and high tertiles of internal working experience (moderate: PR =5.08, 95% CI = 1.65-15.65; high: PR =6.19, 95% CI = 1.89-20.28) were associated with higher salutogenic health.

Conclusion: Our research indicates that organizational climate and autonomy are important factors influencing the well-being and retention of clinical dental hygienists. Appropriate training and education in healthcare management and wellbeing are needed and both dental hygienists and their employers (most often dentists) need to foster supportive working environments.

Keywords: Dental hygiene, Burnout, Emotional labor, Musculoskeletal disorders, salutogenic health, Leave practice

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Introduction

Dental hygienists working as clinical providers perform procedures that require fine motor skills throughout the day. Contortion of their bodies into unnatural positions in order to effectively access angles for proper instrumentation and visualization can be physically demanding and lead to musculoskeletal disorders (MSDs). Dental professionals experience high rates of MSDs with the prevalence varying between 64% and 93% (Hayes, Taylor, & Smith, 2012). Musculoskeletal problems such as neck and shoulder pain have significant consequences on dental professionals including quitting the profession or reducing hours (Morse, Bruneau, & Dussetschleger, 2010).

Aside from physical demands, the dental hygiene profession can be emotionally and mentally demanding due to factors like emotional labor (Hochschild, 1983) and burnout (WHO, 2019). As a health service provider working directly with patients, a dental hygienist may often find themselves having to control their emotions in order to help make a patient more comfortable or at ease when receiving care. Suppression of true feelings and reactions day in and day out can wear on the clinician and become an emotional and mental burden (Hochschild, 1983). In addition, treating patients can require a substantial amount of effort. After this effort expenditure, a recovery time or psychophysiological unwinding may be needed (Ejlertsson, Heijbel, Ejlertsson, & Andersson, 2018). Those who have too short of a recuperation time may require a higher need for recovery (Jansen, Kant, Amelsvoort, Nijhuis, & Brandt, 2003). The fast pace of a dental office does not allow dental hygienists to have adequate time to recuperate after seeing patients, and their recovery time from this stress may only happen during non-working hours as compared to other professions who have more down time during the work day.

Experiencing the physical, mental and emotional demands consistently and over time may lead to burnout (Jeung, Kim, & Chang, 2018).

Organizational climate and autonomy may be important factors in mediating the impacts of the physical, mental and emotional demands of dental hygiene. In nursing, there have been studies showing that better work environments correlated with lower rates of intent to leave practice and burnout (Nantsupawat, et al., 2017) and practices that created and fostered a supportive work environment helped to retain nurse managers and attracted staff to leadership positions (Hewko, Brown, Fraser, Wong, & Cummings, 2015). However, for dental hygienists, the work environment of a dental clinical practice may be mostly out of their control. Long hours, few breaks, ergonomically inefficient operatories and unsupportive office conditions and staff are factors that may contribute to the negative impacts of the profession. Conversely, a positive organizational climate and autonomy may lead to better perceived health and well-being of dental hygienists when they have more control over their work environment and are supported by their employer and office staff. Few studies with dental hygienists assessed the impact of the work environment on their health and well-being and intent to leave practice.

Factors that contribute to health and well-being despite stressful conditions can be described as salutogenesis (Merriam-Webster, 2020). This term was coined by Aaron Antonovsky and reflects a continuum of 'ease to dis-ease' from which people can move towards better health (Vinje HF, 2016). Salutogenesis research concentrates on sense of coherence (SOC) and how SOC relates to disease and illness endpoints (Mittelmark & Bull, 2013). SOC is described as an individual or collective's ability to be motivated to cope, believe a challenge is understood and believe that there are resources available to cope (Antonovsky, 1996). In other words, how an individual perceives their environment will determine how they will perceive

their health and well-being. Use of a salutogenic approach within a workplace is a way to maintain and improve employee health (Lindmark, Wagman, Wåhlin, & Rolander, 2018). The salutogenic approach also recognizes the subjectivity of health and well-being where each individual may experience these stressors differently and may require different courses of action.

Our study aimed to investigate the association between MSD symptoms and organizational climate and autonomy and outcomes related to likelihood of leaving practice and salutogenic health. We hypothesized that MSD issues and poor organizational climate and lack of autonomy would increase the likelihood of leaving practice and that inversely, none or minimal MSD issues with supportive organizational climate and increased autonomy lead to improved salutogenic health.

Methods

Study Sample and Design

The study was a cross-sectional study conducted from February to March 2020. Eligible participants were dental hygienists registered to work in Washington State in the United States of America (USA). Inclusion factors were registered dental hygienists who did or have worked as a clinical dental hygienist.

Data Collection

Washington state registered dental hygienist emails were obtained through a request from the Washington State Department of Health. From a total of 7,476 records received, 2,465 emails were not on file and 192 emails were undeliverable, thus the survey invitation was sent to 4,819 emails. The survey/questionnaire was organized into one document to be distributed from the REDCap platform and sent to participants via a link.

Instruments

Prior to beginning the survey, participants read and electronically signed a consent form. The survey instrument utilized existing instruments and questions alongside specific questions developed for this research. The first part of the questionnaire included background/demographic questions: sex, age, race, Hispanic origin, level of education, ever or currently working as a clinical dental hygienist, work setting, type of work and hours worked per week. Questions used based on existing sources were race, Hispanic origin, work setting and hours (National Sample Survey of Registered Nurses, 2018).

The main questions used in this analysis were the single question on likelihood to leave practice and those from the following validated scales: the Nordic Musculoskeletal Questionnaire (modified version) (Franasiak, Craven, Mosaly, & Gehrig, 2014), Work Experience Measurement Scale (WEMS) (Nilsson, Bringsén, Andersson, & Ejlertsson, 2010), and the Salutogenic Health Indicator Scale (SHIS) (Bringsén, Andersson, & Ejlertsson, 2009). The single item on likelihood to leave practice asked participants what the likelihood was for them to leave their current practice in the next 2 years (Williams ES, 2007). This question had answer options from none to definitely.

The musculoskeletal disorder (MSD) questions were modified from the Nordic Musculoskeletal Questionnaire (NMQ), a validated tool for assessing strain in epidemiologic studies. The questionnaire had four sections asking if participants were having any MSD trouble (such as ache, pain, discomfort, numbness) in the last 12 months and in the last seven days, prevented from carrying out normal activities in the last 12 months, and if they had seen a physician for the condition in the last 12 months. Participants answered these four questions for

each of the following body areas: neck, shoulders, upper back, elbows, wrist/hands, lower back, hips/thighs, knees, and ankles/feet.

The Work Experience Measurement Scale (WEMS) is a valid and reliable multidimensional questionnaire about autonomy and organizational climate (Bringsén, Andersson, & Ejlertsson, 2009). It has six dimensions of work experience: supportive working conditions (7 questions), internal work experience (6 questions), autonomy (4 questions), pressure of time (3 questions), management (6 questions) and re-organization (6 questions). Answer options were on a Likert scale of 1 to 6 with 1 being totally disagree and 6 being totally agree.

The Salutogenic Health Indicator Scale (SHIS) is a valid and reliable two-dimensional questionnaire about the salutogenic and holistic perspective on health and well-being (Bringsén, Andersson, & Ejlertsson, 2009). The SHIS explores feelings, sleep, concentration, creativity, decision making, emotional balance, energy, functioning with others and in relation to life situation needs. Participants were to choose a number representing how they felt in the last 4 weeks. The questionnaire could be split into 2 different dimensions of health indicators, one that is intrapersonal (IntraPersonal Characteristics - IPC) and one that is interactive (InterActive Function - IAF). Participants were presented with a list of positive statements on the left side and opposing negative statements on the right side. Answer options were based on a 6-point Likert scale, and an answer closer to 1 meant more agreement with the negative statements on the right of the scale and answers closer to 6 meant more agreement with the positive statements on the left.

Analysis

Descriptive analysis was used to present the prevalence of each variable and the standardized means of the scales. Total or domain summary scores were calculated by adding the answer values of all questions within a scale or within a subscale and then standardized so that all scales vary between 0 and 100%.

Bivariate and multivariate models using Poisson regressions with robust variance were used to calculate the crude and adjusted prevalence ratios (PR) (Barros & Hirakata, 2003) and their respective 95% confidence intervals. The main outcomes were the likelihood of leaving practice in the next 2 years and salutogenic health. A dichotomic variable was created with a positive likelihood to leave practice being considered if participants selected slight, moderate, likely or definitely likely to leave. Quintiles of the salutogenic health total score were created and the variable dichotomized as the highest quintile (vs other quintiles), representing high salutogenic health. The main explanatory variables were MSD symptoms and organizational climate and autonomy. The quartile of the total summary score of the MSD symptoms scale were included in the regression models; with the higher quartile representing higher occurrence of musculoskeletal disorder symptoms. The tertiles of the organizational climate and autonomy subscale scores were included in the models, with high tertiles representing positive organizational climate and autonomy. Variables associated with each outcome in the bivariate analysis with a p-value <0.15 were considered potential confounders and were included in the multivariate analysis using backward selection method (Hosmer & Lemeshow, 2000). The model's adjustment was assessed using the $-2\log$ likelihood. The value for rejection of the null hypothesis was set at $p < 0.05$. The data were analyzed using SPSS v.20 (Chicago, SPSS Inc.).

Results

Of the 4,819 email invitations, 434 dental hygienists started the questionnaire. After excluding the participants who did not respond to the primary outcome variable of likelihood of leaving practice (n=75), our final sample size was 359. The majority of respondents were female (95.3%), averaged the age of 45 (± 13.0) and white (91.4%). About half had bachelor's degree as the highest level of education (54%). Average years worked clinically was 17.4 (± 12.6) with an average of 30.1 (± 9.4) hours worked per week. Majority of respondents worked in private practice (Table 1).

The average total score for musculoskeletal disorder symptoms was 9.5 (± 6.7) with 6.8 (± 4.6) for upper body and 2.6 (± 3.1) for lower body. On a scale from 0 to 100, the average total score for organizational climate and autonomy was 39.6 (± 21.2), for salutogenic health was 38.3 (± 21.0) and 64.2% of all respondents were slightly, moderately or definitely likely to leave their current practice in the next two years (Table 2).

Several characteristics of the dental hygienists were associated with the likelihood to leave current practice in the next two years (Table 3). In the adjusted analysis, the high quartile of musculoskeletal issues (PR= 1.57, 95% CI=1.05-2.36), and low supportive working conditions (PR=1.48, 95% CI= 1.15-1.92) were associated with likelihood of leaving practice. Dental hygienists in the highest quartile of MSD symptoms were 1.57 times more likely to leave practice than dental hygienists in the lowest quartile of MSD symptoms. Other variables associated with this outcome were years working as a dental hygienist (PR=1.01 (95% CI 1.002-1.013) and hours worked per week (PR=0.99, 95% CI=0.98-0.99).

Characteristics of the dental hygienists associated with salutogenic health were MSD symptoms and organizational climate and autonomy subscales (Table 3). Quartiles 2-4 of MSD symptoms (low quartile PR = 6.14, 95% CI = 2.32-16.29; moderate PR = 4.32, 95%CI=1.62-11.54; high PR = 2.97, 95%CI=1.07-8.23), and middle and high tertiles of internal working experience (middle/T2 PR =5.08, 95% CI = 1.65-15.65; high/T3 PR =6.19, 95% CI = 1.89-20.28) were associated with salutogenic health. Dental hygienists who perceived a positive internal working experience (high/T3) were 6.19 times more likely to report salutogenic health than dental hygienists in the lowest tertile of the internal working experience subscale. Supportive conditions subscale also remained in the model, but was not statistically significant (middle/T2 PR = 0.75, 95% CI = 0.29-1.92; and high/T3 PR = 1.49, 95% CI = 0.56-3.95).

Discussion

This study illuminates factors associated with likelihood of leaving practice within the next 2 years as well as what impacts salutogenic health of dental hygienists. As expected, increase in age and years working as a dental hygienist increase the likelihood of leaving practice in the next 2 years outcome. However, other factors were associated with likelihood of leaving practice and these were related to increased MSD issues and unsupportive working conditions. These factors were also associated in an opposite direction to salutogenic health: lower MSD issues and high internal working experience were associated with higher or better salutogenic health. This data suggests a substantial negative impact on the well-being of the clinical dental hygienists from MSD issues and lack of supportive working conditions. This data also suggests that health, MSD issues and supportive working conditions may be linked. For example, providing the right supportive working conditions, dental hygienists may feel more empowered to take needed time off for physical ailments, make adjustments to working schedule, seek care

for things like physical therapy or other actions to help reduce the impacts of the job on their bodies and minds.

Self-reported psychosocial and physical health and work environment have been linked in different dental occupations and workplaces. The current study differs from other studies that reported that dental professionals have a high degree of overall psychosocial health as well as a positive work experience (Lindmark, Wagman, Wåhlin, & Rolander, 2018). These researchers found a mean SHIS score of 50.6 (higher scores indicate good health), almost 13 points higher than our mean score of 38.3. Differing results were also found among dental hygienists in Texas where those who left practice were primarily influenced because of family responsibility along with boredom and lack of benefits (Johns, Gutmann, DeWald, & Nunn, 2001). These findings disagree with our results which attribute factors associated with leaving practice as unsupportive working conditions and MSDs. However, it could be said that with more supportive working conditions, family responsibilities could still be addressed while remaining in practice.

Inversely, similar findings to ours have been reported when researching dental hygienists as well as other health professions. Using the same scales as the ones used in this study (WEMS and SHIS), supportive working conditions and positive internal work experiences were some of the factors associated with a higher SHIS index among hospital workers in Lithuania (Andruškienė, et al., 2015). In a national survey in the USA, dental hygienists reported that one of the factors related to job retention, among six major factors, were a supportive working environment (Calley, Bowen, Darby, & Miller, 1996). Associations with MSD issues and salutogenic health and the development of stress were found to occur if dental hygienists did not get support with work problems (Ylipää, Arnetz, & Preber, 1999).

Altogether, these findings reinforce the importance of a positive organizational climate and autonomy on better health outcomes and workforce retention. The conflicting findings suggest that there could be a large variance of experiences within one dental setting and among different dental professions. In addition, as the studies were conducted in different regions of the globe and in different times, they may have differences regarding work practices, environment and culture. The limited number of studies, the diversity of healthcare and dental professionals, of geography and settings and of the time period when they were conducted adds complexity when making comparisons to our study. What can be seen is that some of the issues noted in studies over 20 years ago are still relevant today. This could indicate that working conditions and the clinical dental hygienist's working environment have not changed much or have not changed for the better. We can also conclude that much of the work of the dental hygienist has not changed or improved resulting in the continued physical problems like MSDs and mental problems like burnout. Concerns arise from this information because within the limited research, the suggested improvements in the working conditions for dental hygienists seem to not be implemented and the needed increase in research regarding these topics has not yet been met.

In particular, an additional topic that may need more exploration is the relationship between dentist's likelihood of leaving practice compared to the dental hygienist's likelihood of leaving practice. Dentists have reported less career dissatisfaction and have lower odds of leaving the profession in the next 6 years with the employment of a dental hygienist (Vick, 2015). It would be worth exploring if work stressors are put upon dental hygienists resulting in improved career satisfaction and reduced likelihood of leaving the profession for dentists to the detriment of the dental hygienists. This sentiment is echoed in the study by Ylipää et al discussed earlier. These researchers found high work-efficiency decreased well-being where the efficient

use of time may result in higher workloads for dental hygienists (Ylipää, Arnetz, & Preber, 1999). Future studies may want to focus in on one particular group of dental professionals, or subgroup comparisons, to prevent overlooking disparities within this large and diverse group.

There are limitations to this study. First, the questionnaire was created for dental hygienists who were or are working as clinical dental hygienists. Unfortunately, the questionnaire did not allow for those who are retired to participate as the questions pertained to current working situations along with clinical dental hygiene work experiences. Adding the perspectives of retired dental hygienists would possibly impact our results in a direction that is unknown to us. Secondly, the response rate of our survey was low. We expected this low response given the limited capability of web surveys to attract interest of potential participants as opposed to a more active approach. Another limitation was the limited generalizability of our findings as our sample was region specific, and thus our results may only be applicable to one State in the USA.

Our findings have implications for training and education, practice and research. When becoming a dental hygienist, early in their training, students need to be educated about the physical, mental and emotional toll that the profession can have and acquire the knowledge and skills to cope with the stressors, and seek healthy and supportive work environments. Appropriate preparation may also include training for non-clinical roles such as public health and healthcare management and administration, and, so that dental hygienists have skills to help them transition out of clinical work more easily when/if the physical or mental burden become too great. Finally, possible educational changes for future dental hygienist employers, like dentists, should be considered to help prepare them in providing positive organizational climates.

In dental practices, employers need to understand the negative impact on dental hygienists when deprived of a supportive work environment and the positive impact on health of a supportive and autonomous work environment. If dental hygienists' well-being and working climate and autonomy continue to go unaddressed, we may see a reduction in the dental hygiene workforce and/or an increase in physical and mental ailments. Furthermore, transition to other careers may be difficult due to the very specific skill set needed for dental hygiene. Pay cuts in order to transition careers could create financial hardships forcing dental hygienists to remain in practice. Long-term negative impacts may include the development of chronic conditions for dental hygienists and a reduction in the dental hygiene workforce.

Even with its limitations, our study adds to an emerging body of research of the impacts of organizational climate, and work autonomy on health among the healthcare professions, and may be one of the first focusing specifically on dental hygienists. Even still, more research is needed in this area. Our results showed that a large portion of dental hygienists may choose to leave practice within the next 2 years and have low salutogenic health. In addition, our study indicates that factors like MSD pain, organizational climate and autonomy are key factors in determining whether a dental hygienist feels healthy and stays or leaves clinical practice.

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Table 1: Characteristics of the sample of dental hygienists practicing in Washington State, 2020

		N (%)
Sex		
	Male	17(4.7%)
	Female	342(95.3%)
Age, Mean (\pmSD)		45.0 (\pm 13.0)
Race		
	White	328(91.4%)
	Non-White	31(8.6%)
Hispanic, Latino or Spanish origin		
	Yes	17(4.7%)
	No	342(95.3%)
Highest level of education		
	Associate	151 (42.1%)
	Bachelor	194 (54.0%)
	Master	14 (3.9%)
Years working as a clinical dental hygienist, Mean (\pmSD)		17.4 (\pm 12.6)
Hours worked /week, Mean (\pmSD)		30.1 (\pm 9.4)
Current employment setting		
	Private practice (yes)	303(84.4%)
	Public Health (yes)	29(8.1%)
	Academia (yes)	10(208%)
Current work type		
	Clinical	323(90.5%)
	Administrative	6(1.7%)
	Clinical and Administrative	28(7.8%)

Table 2: Outcomes and main explanatory variables: dental hygienists, Washington, 2020

	Mean (\pm SD)	Median (Q1-Q3)
Likelihood to leave practice, N (%)	208 (64.2%)	
Salutogenic health		
Total score	38.3 (\pm 21.0)	36.7 (23.3-53.3)
Intra Personal Characteristics (IPC)	41.6 (\pm 23.5)	40 (22.9-57.1)
Inter Active Function (IAF)	33.8 (\pm 19.7)	32 (20-44)
Musculoskeletal disorder symptoms		
All	9.5 (\pm 6.7)	8 (5-13)
Upper body	6.8 (\pm 4.6)	6 (3-10)
Lower body	2.6 (\pm 3.1)	2 (0-4)
Organizational climate and autonomy		
Total score	39.6 (\pm 21.2)	37.4 (23.1-54.7)
Supportive working condition	32.4 (\pm 21.2)	28.6 (17.1-45.7)
Internal working experience	29.8 (\pm 21.5)	26.7 (13.3-43.3)
Autonomy	33.6 (\pm 23.8)	30 (15-50)
Pressure of time	46.0 (\pm 30.0)	40 (20-66.7)
Management	35.3 (\pm 24.6)	33.3 (16.7-50)
Re-organization	40.4 (\pm 24.6)	40 (20-56.7)

Table 3: Factors associated with the likelihood of dental hygienists to leave practice in the next two years: Washington State, 2020.

		Crude PR (95%CI)	p-value	Adjusted PR (95%CI)	p-value
Sex	Female	1	0.52		
	Male	1.12 (0.80-1.58)			
Age		1.01 (1.00-1.02)	0.008		
Race	Non-White	1			
	White	0.91 (0.71-1.17)	0.45		
Hispanic, Latino or Spanish origin	No	1			
	Yes	0.72 (0.43-1.20)	0.21		
Highest level of education	Associate	1			
	Bachelor	0.87 (0.74-1.02)	0.10		
	Master	0.78 (0.45-1.36)	0.39		
Years working as a clinical dental hygienist		1.01 (1.00-1.02)	0.008	1.01 (1.002-1.013)	0.02
Hours worked /week		0.99 (0.98-0.99)	0.005	0.99 (0.98-0.99)	0.001
Current employment setting	Private practice (no)	1			
	Private practice (yes)	1.09 (0.81-1.47)	0.57		
Current employment setting	Public health (no)	1			
	Public health (yes)	0.83 (0.57-1.19)	0.31		
Current employment setting	Academia (no)	1			
	Academia (yes)	0.66 (0.28-1.57)	0.35		
Current employment setting work type	Clinical	1			
	Clinical and Administrative	0.81 (0.52-1.25)	0.34		
Musculoskeletal disorder symptoms	None/minimal	1		1	
	Low	1.31 (0.87-1.98)	0.20	1.20 (0.78-1.83)	0.41
	Moderate	1.70 (1.15-2.52)	<0.01	1.49 (0.99-2.25)	0.057
	High	1.81 (1.23-2.68)	<0.01	1.57 (1.05-2.36)	0.02

Organizational climate and autonomy

Supportive working condition	High	1		1	
	Middle	1.12 (0.87-1.43)	0.38	0.99 (0.74-1.31)	0.92
	Low	1.64 (1.34-2.01)	<0.01	1.48 (1.15-1.92)	<0.01
Internal working experience	High	1		1	
	Middle	1.40 (1.06-1.86)	0.02	1.21 (0.90-1.62)	0.20
	Low	1.67 (1.30-2.14)	<0.001	1.19 (0.89-1.60)	0.23
Autonomy	High	1			
	Middle	1.03 (0.80-1.31)	0.83		
	Low	1.29 (1.03-1.61)	0.02		
Pressure of time	High	1			
	Middle	1.10 (0.86-1.39)	0.01		
	Low	1.41 (1.16-1.73)	0.46		
Management	High	1			
	Middle	1.26 (0.98-1.63)	0.07		
	Low	1.66 (1.32-2.09)	<0.01		
Re-organization	High	1			
	Middle	1.39 (1.10-1.76)	<0.01		
	Low	1.61 (1.30-2.00)	<0.01		

* PR: Prevalence Ratio

Table 4: Factors associated with high salutogenic health of dental hygienists: Washington State, 2020

		Crude PR* (95%CI)	p-value	Adjusted PR (95%CI)	p-value
Sex	Male	0.86 (0.34-2.08)	0.74		
	Female	1			
Age		1.00 (0.98-1.02)	0.95		
Race	White	1	0.96		
	Non-White	0.98 (0.46-2.07)			
Hispanic, Latino or Spanish origin	Yes	1	0.10		
	No	0.56 (0.28-1.10)			
Highest level of education	Master	1	0.29		
	Bachelor	0.63 (0.26-1.49)			
	Associate	0.68 (0.28-1.63)			
Years working as a clinical dental hygienist		1.00 (0.98-1.01)	0.68		
Hours worked /week		1.02 (0.99-1.04)	0.15		
Current employment setting	Private practice (yes)	1	0.60		
	Private practice (no)	1.16 (0.67-2.00)			
Current employment setting	Public health (yes)	1	0.67		
	Public health (no)	1.20 (0.53-2.74)			
Current employment setting	Academia (yes)	1	0.98		
	Academia (no)	1.02 (0.29-3.59)			
Current employment setting work type	Clinical and Administrative	1	0.11		
	Administrative	2.80 (0.79-9.89)			
	Clinical	1.13 (0.50-2.58)			

Musculoskeletal disorder symptoms	High	1		1	
	Moderate	4.00 (1.39-11.54)	0.01	2.97 (1.07-8.23)	0.03
	Low	6.40 (2.33-17.56)	<0.01	4.32 (1.62-11.54)	<0.01
	None/minimal	12.25 (4.50-33.38)	<0.01	6.14 (2.32-16.29)	<0.01
Organizational climate and autonomy					
Supportive working condition	Low	1		1	
	Middle	2.48 (0.99-6.22)	0.05	0.75 (0.29-1.92)	0.54
	High	8.89 (3.97-19.90)	<0.01	1.49 (0.56-3.95)	0.42
Internal working experience	Low	1		1	
	Middle	6.24 (2.17-17.94)	<0.01	5.08 (1.65-15.65)	<0.01
	High	15.97 (5.94-42.92)	<0.01	6.19 (1.89-20.28)	<0.01
Autonomy	Low	1			
	Middle	2.74 (1.38-5.45)	<0.01		
	High	5.40 (2.82-10.32)	<0.01		
Pressure of time	Low	1			
	Middle	2.52 (1.18-5.38)	0.02		
	High	5.55 (2.84-10.86)	<0.01		
Management	Low	1			
	Middle	3.06 (1.36-6.87)	<0.01		
	High	7.32 (3.44-15.58)	<0.01		
Re-organization	Low	1		1	
	Middle	2.64 (1.05-6.62)	0.04	1.55 (0.65-3.68)	0.32
	High	8.39 (3.74-18.81)	<0.01	2.73 (1.18-6.32)	0.02

* PR: Prevalence Ratio